



Double Jump Road Residential Estate Development

Preliminary Documentation Report

EPBC Referral 2024-09825

Volume 3.7

Appendix 12.2

29 July 2026

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Double Jump Road Residential Development

Thagoona Offset Management Plan

EPBC 2024/09825

28 August 2026

Document Control

Project No: 2019-100e

Project: Double Jump Road Residential Development

Document: Thagoona Offset Management Plan

Client: Sutgold Pty Ltd.

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Document History and Status

Revision	Date	Description	By	Review
0.1	23 March 2026	Draft	GM, AF, NC	AD
1.0	16 April 2026	Final	GM, AF, NC	AD
2.0	28 July 2026	Final	GM	AD
3.0	21 August 2026	Final	GM	AD, BS
4.0	28 August 2026	Final following NEPA minor change request	GM	AD

Approval for Issue

Name	Position	Date
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1. Introduction

1.1 Background

Sutgold Pty Ltd (**Applicant**) is required to deliver an environmental offset as compensation for residual significant impacts to habitat for Matters of National Environmental Significance (**MNES**) resulting from the Double Jump Road Residential Development (**Proposed Action**).

The requirement for an Offset arises under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) following assessment of EPBC Referral 2024/09825. The residual significant impacts relate to habitat for Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*).

This Offset Management Plan (**OMP**, this document), is prepared in accordance with the National Environmental Protection Agency (**NEPA**) formerly the Department of Climate Change, Energy, the Environment and Water (**DCCEEW**) *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (**EPBC Offset Policy**) and has been prepared to accompany the Preliminary Documentation Report. It provides the framework for delivery, monitoring and reporting of the nominated Thagoona Offset Area.

The Thagoona Offset is provided in addition to another offset (Woolshed Offset) that in combination will acquit the offset liability for the Proposed Action. In combination, the percentage of the impact offset by the Thagoona Offset and the Woolshed Offset will be greater than 100%.

1.2 Purpose of Offset Management Plan

The overarching purpose of this draft OMP is to support the Preliminary Documentation Report submission for EPBC Referral No. 2024/09825. The purpose of this OMP is to:

- Establish a clear and enforceable framework for delivery of the environmental Offset.
- Define baseline ecological condition across the Offset Site.
- Specify management actions required to achieve measurable habitat uplift.
- Establish completion criteria and performance indicators.
- Define monitoring, adaptive management and reporting obligations.
- Demonstrate compliance with the EPBC Offset Policy.

This OMP provides details of:

- The environmental offset required to be delivered by the Proponent as a consequence of anticipated residual significant impacts of the Proposed Action.
- The nominated Thagoona Offset Area, including location, size, condition, and relevant ecological/species values present.
- How the nominated Thagoona Offset Area will be legally secured.
- The nature of the conservation gain, including completion criteria, to be achieved over the nominated offset period for relevant MNES on the proposed Offset Area.
- Land management actions required over the offset period to support progress towards achieving the completion criteria.
- A monitoring program required to measure progress towards achieving the completion criteria, including corrective actions.

- Adaptive management, including corrective actions, and reporting requirements for the duration of the offset period.

1.3 Limitations

This draft OMP is to be read in conjunction with the Preliminary Documentation Report, and generally aligns with relevant principles and sections of the Environmental Management Plan Guideline (Department of Environment, 2014).

Values that have been adopted for use in calculations for Modified Habitat Quality Assessment (**MHQA**) for Koala (*Phascolarctos cinereus*), using the *Offsets Assessment Guide* (Department of Environment, 2012), are introduced and justified within the Preliminary Documentation Report (**PD Report**) (28 South Environmental, 2026).

Values that have been adopted for use in calculations for the Grey-headed Flying-fox Alternate Habitat Quality Assessment (**Alternate HQA**) which is an adaption of *Offsets Assessment Guide* (Department of Environment, 2012), are introduced and justified within the PD Report (28 South Environmental, 2026). Quality value changes in this assessment reflect implementation of the specific actions listed in this OMP (**Section 6**).

Survey methods deployed over the offset incorporated standard practices from the *Guide to Determining Terrestrial Habitat Quality: A toolkit for assessing land based offsets under the Queensland Government Offsets Policy Version 1.2* (Department of Environment and Science, 2020) combined with the specific stocking rate factors from the *How to Use the Offsets Assessment Guide* (Department of Environment, n.d.).

Additionally, targeted weed assessment utilising a parallel random meander methodology was undertaken as a baseline assessment of weed presence and condition, and a vertebrate pest baseline assessment primarily informed by a baited camera trapping program within the Thagoona Offset Area and adjoining areas was also undertaken.

This OMP does not constitute legal advice. Final Offset delivery requirements will be governed by EPBC approval conditions and legally binding mechanisms securing the Offset Area.

1.4 Descriptive Terms and Nomenclature

Key descriptive terms that have been adopted throughout this OMP to describe aspects of offset delivery are presented in **Table 1**.

Table 1: Definitions of Key Descriptive Terms Used in This OMP

Term	Definition
The Proponent	Sutgold Pty Ltd.
Proposed Action	Double Jump Road Residential Development
Project Area	The Proposed Action extends across 38.1 hectares (ha) of four land parcels: - Lot 1 on RP86773 (Lot 1) - Lot 2 on RP86773 (Lot 2) - Lot 5 on SP293881 (Lot 5) - Lot 23 on SP325035 (Lot 23), and - Lot 2 on RP165178 (Lot 2).
Disturbance footprint	The extent of clearing and development within the bounds of the impact site
Offset Area	160 McGearys Road, Thagoona (Lot 1 on RP190542) (Thagoona Offset Area)

Offset Area	Area to be secured for delivery of offset within the bounds of the offset property
Offset period	20 years from the commencement of offset

1.5 Responsible Entities

The roles and responsibilities of relevant entities are provided in **Table 2**. The roles presented here exclude the regulatory role undertaken by the Commonwealth Government for the assessment and approval of the offset and the Queensland Government for registering and declaring the Voluntary Declaration (**VDEC**) over the nominated Offset Area.

Table 2: Roles and Responsibilities of Relevant Entities

Role:	Proponent	Entity:	Sutgold Pty Ltd.
Responsibilities:			
- Preparation and lodgement of the Legally Binding Mechanism (see Section 2) with the Queensland Government. - Prepare and register a covenant on title (under the <i>Land Titles Act 1994</i> (Qld) or <i>Land Act 1994</i> (Qld)) for the property. - Obtain and comply with all conditions of the EPBC approval for the Proposed Action. - Enter into a commercial agreement with an Offset Provider for the delivering of EPBC compliant offsets. - Fund all management obligations / actions / tasks as listed in the approved OMP at the offset site for the life of offset. - Report on the EPBC approval in Annual Compliance Reports (ACR) or as triggered within conditions.			
Role:	Environmental Consultant	Entity:	28 South Environmental (or future independent consultant)
Responsibilities:			
- Collection, interrogation and analysis of robust scientifically justified survey data for use as the baseline values at the offset site. - Repeating surveys as per the currency in this OMP or as per conditions of approval for measuring improvement outcomes. - Assist with the preparation and lodgement of the Legally Binding Mechanism (see Section 2) with the Queensland Government. - Audit offset reports against approval conditions as part of the ACR for the Proposed Action.			
Role:	Offset Provider	Entity:	Cherish the Environment Foundation Limited (Cherish)
Responsibilities:			
- All on-ground implementation of the OMP. - Monitoring and reporting on OMP actions, tasks and outcomes. - Appointment of relevant experts or experienced contractors to undertake specified tasks as required by the OMP. - Corrective actions for any non-compliance activities. - Review, amendment and adaptive management changes of the approved OMP over the life of the offset.			

This Offset will be provided to resolve significant residual impacts to Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*) habitat as a part of the Proposed Action. This Offset is being provided in addition to another offset proposed to resolve the liability for significant residual impacts at 528-530 Woolshed Creek Road, Woolshed (Woolshed Offset Area). Through this assessment phase, this Thagoona Offset Area has

been acquired, after it has been decided that the Woolshed Offset Area is not of sufficient size (or rehabilitative potential (i.e. already vegetated)) to resolve all significant residual impacts associated with the Proposed Action.

The Thagoona Offset is provided in addition to another offset (Woolshed Offset) that in combination will acquit the offset liability for the Proposed Action. In combination, the percentage of the impact offset by the Thagoona Offset and the Woolshed Offset will be greater than 100%. The provision of the Thagoona Offset ensures that there is a clear and demonstrable habitat gain (additionality) by the total offset package.

2. Legal Security of Proposed Thagoona Offset Area

Within 18 months of the Commencement of the Proposed Action, the Approval Holder will propose to NEPA to place a covenanted biodiversity offset area, registered on title (under the *Land Titles Act 1994* (Qld) or *Land Act 1994* (Qld)) over the Woolshed Offset Area. This is a protective mechanism ensuring protection in perpetuity. If NEPA approve of this mechanism, a covenant will be finalised over the offset.

A second level of protection is proposed; one which will ensure the highest level of protection under the *Vegetation Management Act 1999* (Qld) (**VM Act**) until the offset achieves remnant status. a Voluntary Declaration (**VDEC**). Once gazetted the VDEC will ensure that the Thagoona Offset Area is statutorily secured under a Regulated Category A designation; the OMP will be the management document for achieving the ecological benefit under State legislation. This VDEC will be established prior to the commencement of the Action.

VDECs afford protection of the Offset until the ecological benefit prescribed by the management is achieved (i.e. they 'time out'). Beyond this, the offset is transferred to Regulated Category B vegetation, to which all management exemptions and accepted clearing provisions under State Regulations would apply. To ensure the Offset is preserved in perpetuity for ecological benefit, a Covenant is necessary.

VDECs whilst current and Covenants afford the same protection level as National Park in Queensland and provide NEPA with a higher level of confidence that the offset will be protected for the duration of the impacts associated with the proposed action. Further, prior to expiry of the VDEC the Offset Provider (Cherish) will seek to have it incorporated into Ipswich City Council's conservation estate.

The Proponent (Approval Holder) or their engaged provider will be responsible for the delivery and management of offset works during the establishment and through the 20-year maintenance period and per any other Conditions of Approval. Upon the completion of works the offset will be retained in perpetuity; or, if desired by Ipswich City Council (**ICC**) (or the Queensland Government), the land may be gifted back for protection and environmental conservation purposes upon successful completion of relevant offset goals and requirements outlined.

3. Project Area

The following section provides a high-level summary of the Proposed Action and the MNES that have been identified, through assessment, as subject to residual significant impact due to the Proposed Action.

3.1 Project Area and Proposed Action

A summary of the Proposed Action is provided in **Table 3**. Further details on the Proposed Action, including timing, staging and infrastructure components, are provided in **Section 2** of the PD Report (28 South Environmental, 2026).

Table 3: Summary of the Project Area and Proposed Action

Item	Detail	
EPBC Number	2024/09825	
Project Name	Double Jump Road Residential Development	
Proponent & ACN	Sutgold Pty Ltd	
Proposed Action	The Proposed Action comprises the development of a 294 lot, residential development, two medium density residential areas, a small commercial and retail zone, two local parks, road and infrastructure and development of ecological enhancement corridors and wildlife management infrastructure	
Project address	42-44, 48, 50, 52, 56 Double Jump Road, Victoria Point, Queensland	
Lot/Plan	Lot 1 on RP86773, Lot 2 on RP86773, Lot 5 on SP293881, Lot 23 on SP325035 and Lot 2 on RP165178	
Project Area	Total area: 38.22 ha; Directly impacted area: 32.57 ha	
Tenure	Freehold	
Soils (Land Zone Classifications)	Western and northern areas: Woogaroo Subgroup (RJbw) of the late Triassic / early Jurassic geological era Southern and eastern areas: Brisbane Tuff (RiF) of the Late Triassic geological era	
Vegetation communities	Total: 4.27 ha Impact: 0.79 ha Avoided: 3.47 ha	Vegetation Community: Mixed Patchy Regrowth and Remnant Broad-leaved Paperbark (<i>Melaleuca quinquenervia</i>) woodland to open forest Condition: Remnant, Regrowth, Grassland Regional Ecosystem (RE) equivalence: 12.3.6
	Total: 14.38 ha Impact: 12.94 ha Avoided: 1.44 ha	Vegetation Community: Exotic dominated pastoral grassland with scattered relict paddock trees open woodland Condition: Pastural Grassland and Scattered Open Woodland RE equivalence: 12.12.14
	Total: 19.57 ha Impact: 18.83 ha	Vegetation Community: Exotic dominated pastoral grassland with scattered veteran paddock trees forming open woodland dominated by Scribbly Gum (<i>Eucalyptus racemosa</i>)

Item	Detail	
	Avoided: 0.74 ha	Condition: Pastural Grassland and Scattered Open Woodland RE equivalence: 12.9-10.4
Disturbance footprint	32.57 ha	

3.2 MNES Impact Summary

28 South conducted likelihood of occurrence assessments of MNES that may occur on, or adjacent to the impact site. The assessment was informed by previous assessment of values in proximity to the Proposed Action, mapped vegetation communities and targeted species surveys and site assessments for habitat characteristics and quality.

Assessment of the potential impacts to MNES concluded that, after exhaustion of all reasonable avoidance and mitigation measures, residual significant impacts to habitat for the following protected matters:

- Koala (*Phascolarctos cinereus*) - Endangered: 32.57 ha new impact
- Grey-headed flying-fox (*Pteropus poliocephalus*) - Vulnerable: 32.57 ha new impact

Full details of these desktop and field assessments are provided in Section 3 of the PD Report (28 South Environmental, 2026). Impact assessment and Residual Impacts are assessed in Section 4 and Section 6 of the PD Report (ibid).

As mentioned in **Section 1.5** of this OMP, the Thagoona Offset Area is not proposed in solidarity to resolve the significant residual impacts of the Proposed Action, but is instead, proposed in tandem with the Woolshed Offset Area.

4. Thagoona Offset Area

This section provides a description of the nominated Offset Area and its suitability for providing the conditions necessary to maximise the likelihood of offset success.

4.1 Description of the Offset Area

4.1.1 Overview

The Proponent has entered into a Heads-of-Agreement with a third party offset provider Cherish the Environment Foundation Limited (Cherish) to deliver and manage the offset for a 20-year period at a property approximately 62.9 km to the west of the Proposed Action, located at (as mentioned within **Section 1.4**) 160 McGearys Road, Thagoona, QLD 4306, within the ICC Local Government Area.

The Thagoona Offset Area is situated 12.1 km south-west of Ipswich, 2.7 km east of Rosewood, 42 kilometres south-west of Brisbane and 66 km east of Toowoomba. Contextually, the Offset Area is situated approximately 650 m from the Bremer River, within a patch of endangered regulated vegetation.

The area that is nominated for delivery of offset is mentioned in **Table 4**. The location of the Offset Area relative to other natural features in the regional landscape is shown in **Figure 1**.

Table 4: Summarised Details of Proposed Thagoona Offset Area

Item	Detail
Address	160 McGearys Road, Thagoona QLD 4306
Lot/Plan	Lot 1 on RP190542
Area	Total area of the property = 25.21 ha Area under the offset = 17.68 ha
Tenure	Freehold
Land zoning	The entirety of the Offset Area is zoned as 'Rural' under the Ipswich City Plan 2025
Distance from Project Area	The Offset Area is 62.9 km west of the Project Area
Key Features / context	- Partially located within a Regional Biodiversity Corridor. - Adjoins a State Bioregional Corridor (Bremer River). - Adjoins the northern boundary of the ~264 ha EPBC Offset (EPBC 2013 / 6941) owned and managed by the offset provider Cherish. - Koala (<i>Phascolarctos cinereus</i>) is known from the adjoining EPBC 2013/6941 offset - The entire Bremer River floodplain between Rosewood and the Amberley RAAF base contains extensive alluvial floodplain habitat dominated by remnant and regrowth RE12.3.3 Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) woodland supporting a significant local Koala population. - Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) is an important winter blossoming forage resource for Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>) during a period of seasonal forage scarcity. - The Thagoona offset will result in the establishment of 17.68 ha of RE12.3.3 Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) woodland.

Item	Detail	
	RE12.3.3 is a key component of the Endangered <i>Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions</i> Threatened Ecological Community.	
Land Zone Classification	Land Zone 3: Recent Quaternary alluvial systems. Alluvial plains and river terraces associated with the Bremer River system	
Vegetation communities within the Offset Area	Offset Area Assessment Unit: OA AU1 Total: 5.84 ha	Condition: Non-remnant Pre-clear RE: 12.3.3 AU Description: This Assessment Unit is a matrix of Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) canopy with a grassy understory and open paddock with a mixture of pastoral grasses and wetland species within the understory. The shrub layer is significantly impacted with sparse recruitment of canopy species forming the bulk of the sporadic and minimal shrub layer.
	Assessment Unit: OA AU2 Total: 11.84 ha	Condition: Regrowth Pre-clear RE: 12.3.3 AU Description: This Assessment Unit is a dominated by mature and semi-mature Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) and Moreton Bay Ash (<i>Corymbia tessellaris</i>) canopy with a grassy understory with a mixture of pastoral grasses and wetland species within the understory. The shrub layer is significantly impacted with sparse recruitment of canopy species forming the bulk of the sporadic and minimal shrub layer.

4.1.2 Topography, Terrain and Aspect

The Thagoona Offset Area is situated on the Bremer River floodplain and is characterised by low-lying, gently undulating terrain. Elevation across the Thagoona Offset Area is relatively uniform, with only minor local variation associated with subtle drainage lines and overland flow paths. The landform comprises predominantly flat to very gently sloping ground consistent with alluvial floodplain environments.

The Thagoona Offset Area lies within the Bremer River catchment, a sub-catchment of the Brisbane River system. Local drainage within the Offset Area is associated with ephemeral overland flow paths and minor drainage depressions that convey water toward the Bremer River during rainfall events. These features contribute to localised variations in soil moisture and vegetation structure across the Thagoona Offset Area and provide minor habitat heterogeneity within an otherwise predominantly grassland and regrowth-dominated landscape.

Zero water drainage features run through the site, so water will likely spread across the level surface with localised pooling after rain events (State of Queensland, 2026). **Figure 2** presents the Offset Area topography, elevation and other relevant features on-site.

4.1.3 Geology and Soils

The 1:100,000 detailed surface geology indicates that the Thagoona Offset Area is underlain by alluvial deposits associated with the Bremer River floodplain. These deposits are typically characterised by unconsolidated to weakly consolidated sediments comprising silts, clays and minor sands derived from upstream catchment processes. The alluvial nature of the geology supports the development of relatively fertile soils with moderate to high moisture-holding capacity, which are conducive to the establishment and regeneration of riparian and floodplain vegetation communities.

In accordance with the Queensland Landzone framework, the Offset Area is consistent with Landzone 3 – alluvial plains and river flats (Table 5), presented in **Figure 3**. Soils within this landzone are generally deep, fine-textured and periodically influenced by flooding, resulting in variable soil moisture regimes across the Offset Area. These conditions support the establishment of floodplain-associated vegetation communities, including regrowth dominated by Queensland Blue Gum (*Eucalyptus tereticornis*), which is a characteristic species of alluvial landscapes and provides important habitat values for the MNES addressed in the PD Report (28 South Environmental, 2026).

Table 5: Queensland Globe Geological Mapping within the Offset Area

Symbol	Rock Unit Name	Lithology	Dominant Rock Type	Age	Potential Land Zone
Qa	Qa-QLD	Clay, silt, sand and gravel; flood-plain alluvium	Alluvium	Quaternary	3

4.2 Ecological Characteristics

4.2.1 Bioregional Context

The Thagoona Offset Area is located within the Interim Biogeographic Regionalisation for Australia (**IBRA v7**), South East Queensland bioregion. Within this context, the Thagoona Offset Area lies in the centre towards the North of the Moreton Basin biogeographic subregion (Subregion 12.2). This position in the bioregion unit reflects a natural transition between the coastal wetlands and the inland ranges, contributing to low-lying flood plains around a diversity of river systems and gentle sloping terrains. The bioregional setting supports habitat values associated with Eucalypt Forest and woodland ecosystems, riparian corridors and foothill environments, consistent with the natural character of the Bremer River sub-basin landscape, where the Thagoona Offset Area sits inside the northern border.

The Thagoona Offset Area is situated within a region of biodiversity significance and is recognised by State conservation and regional planning assessments as possessing important regional biodiversity values, forming part of a mapped Regional Biodiversity Corridor. A regional biodiversity corridor begins in the middle of the site moving south where it joins a larger state biodiversity corridor ~17 km's northeast of Merryvale. The biodiversity corridor contributes to a high level of ecological linkage and movement potential across the landscape. The corridor follows both the Bremer River and Warrill Creek, running between both until it meets another biodiversity corridor and joins the state corridor. This forms a riparian connection that buffers the river and supports fauna movement through cleared agricultural lands (State of Queensland, 2026).

This corridor highlights the regional importance of the Thagoona Offset Area in maintaining landscape-scale ecological processes and facilitating habitat connectivity between protected and semi-natural environments. Securing and restoring the Thagoona Offset Area for conservation purposes will strengthen the overlap and functional connectivity of these corridors, improve habitat continuity and enhance the ecological resilience of the wider region.

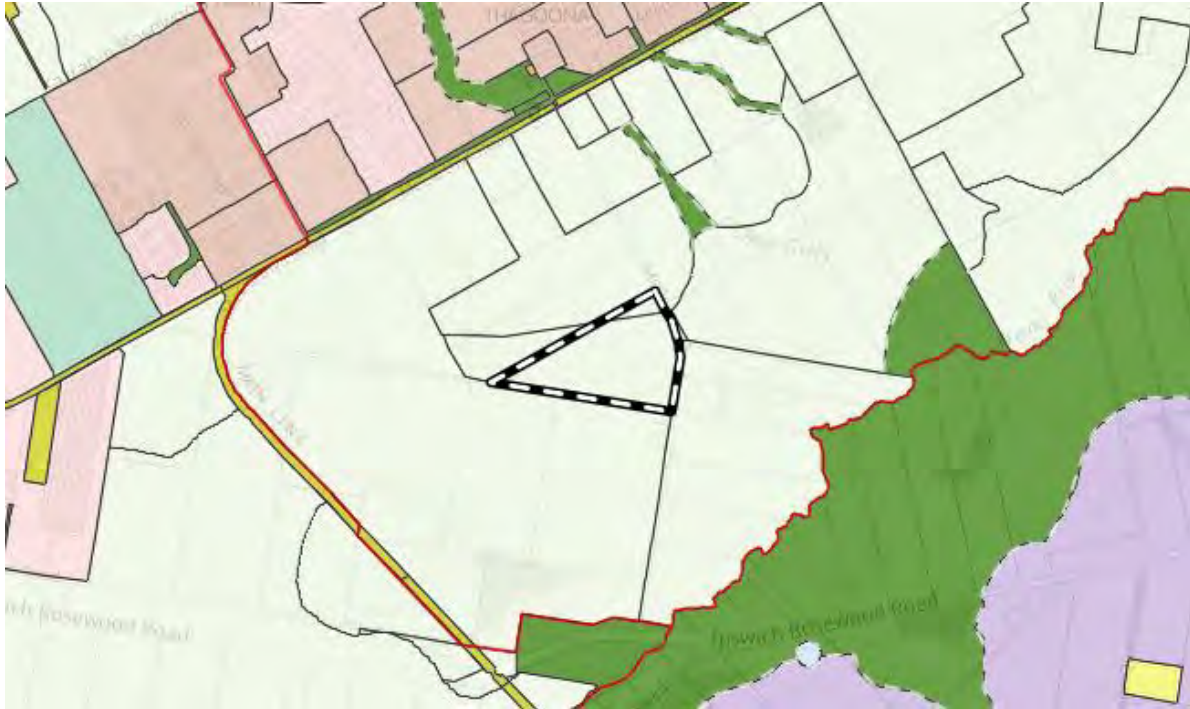
4.2.2 Biodiversity Planning Context

4.2.2.1 Regional

The Thagoona Offset Area is partially located within a regionally significant biodiversity corridor buffer as identified by the and occurs in close proximity to a State-level biodiversity corridor buffer. Under the SEQ Regional Plan, the Offset Area is situated within the Regional Landscape and Rural Production Area and lies within, and adjacent to, areas identified as supporting regional biodiversity values and connectivity.

4.2.2.2 Local

This Thagoona Offset Area is located within the ICC Planning Scheme - Rural Zone and borders the bordering the SEQ Urban Footprint. Rural Zones under the Ipswich City Plan and the State Government's SEQ Regional Plan have restrictions on development (**Inset 1**).



Inset 1: ICC Zone mapping

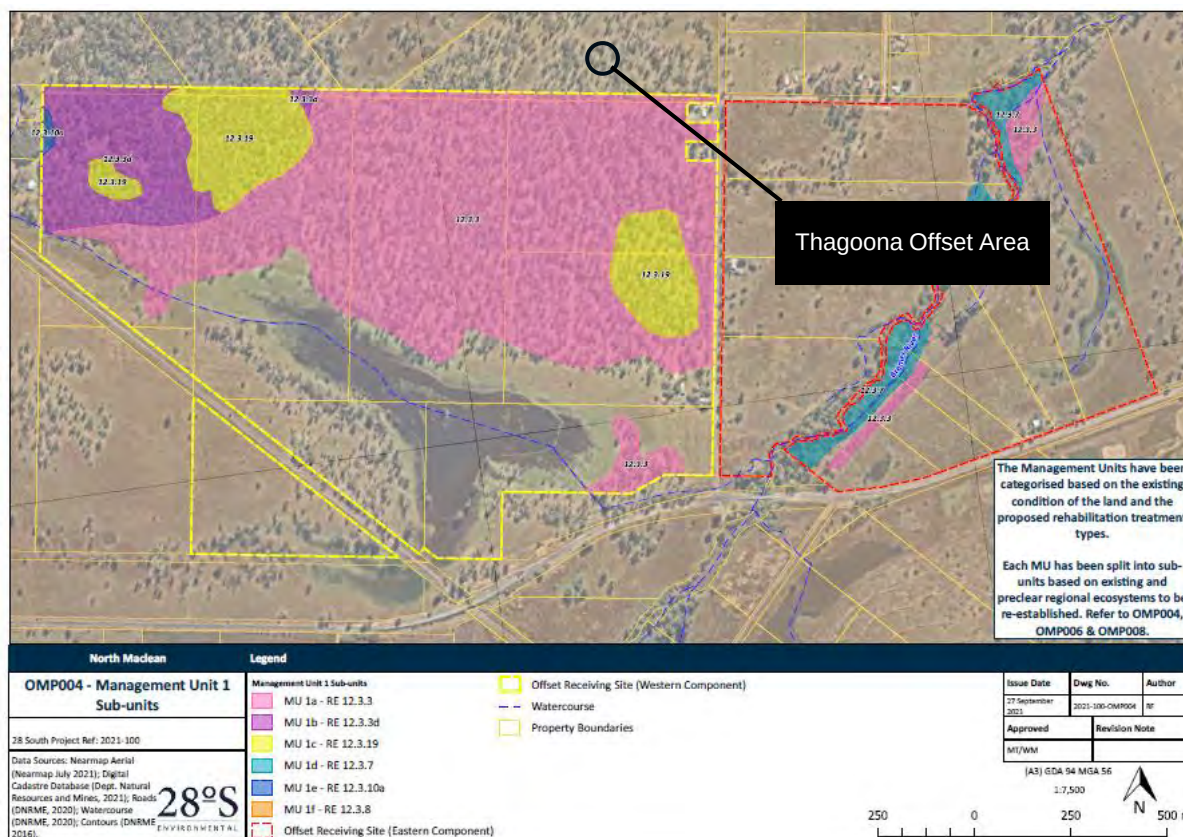
The formal dedication of the Thagoona Offset Area will secure regrowth vegetation that, while currently recovering, remains susceptible to decline under typical rural land uses. Without offset protection, ongoing activities such as pasture management, selective clearing, or incremental infrastructure could limit its ecological trajectory. By contrast, active management under the offset framework will direct this regrowth toward higher quality habitat outcomes, improving structural complexity and resource availability for MNES.

As a result, the Thagoona Offset Area will not only increase the extent of protected land but will also enhance the functionality of the surrounding network, improving continuity of habitat across the floodplain and reinforcing the broader ecological system within the Ipswich LGA.

4.2.2.3 Significant Adjoining Offset Area

In 2021 the Department approved an environmental offset of 264.4 ha (EPBC 2013 / 6941) over 19 parcels of land owned by Cherish situated adjacent to and south of Thagoona Offset. The purpose of that offset was to offset the loss of critical habitat for Koala (*Phascolarctos cinereus*), Grey-headed Flying-fox (*Pteropus poliocephalus*) and Swift Parrot (*Lathamus dioscador*).

The Management Units of the Offset Area are identified on **Inset 2**. The location of the Thagoona Offset is identified.



Inset 2: EPBC 2013 / 6941 Management Unit Plan

4.2.3 Regional Ecosystems

The Queensland Regulated Vegetation Management Map (Version 7.05) identifies most of the Thagoona Offset Area as regrowth vegetation of endangered regional ecosystem (RE) 12.3.3 under Section 20A of the *Vegetation Management Act 1999* (Qld), with the rest of the site described as non-remnant, in the same RE. This reflects historical agricultural clearing in the central areas of the Thagoona Offset Area, that is now non-remnant pastoral grassland. The pre-clear RE present on the site are presented in **Table 6**.

Table 6: Pre-clear Regional Ecosystems on Thagoona Offset Area

Regional Ecosystem code	Short description (REDD v13.1)
RE 12.3.3 ¹	<i>Eucalyptus tereticornis</i> woodland on Quaternary alluvium
RE 12.3.3a ²	<i>Eucalyptus crebra</i> , <i>Corymbia tessellaris</i> woodland to open forest on Quaternary alluvium
RE 12.3.3d ³	<i>Eucalyptus moluccana</i> woodland on Quaternary alluvium

RE12.3.3 is a key component of the Endangered *Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions Threatened Ecological Community*.

¹ <https://apps.des.qld.gov.au/regional-ecosystems/details/?re=12.3.3>

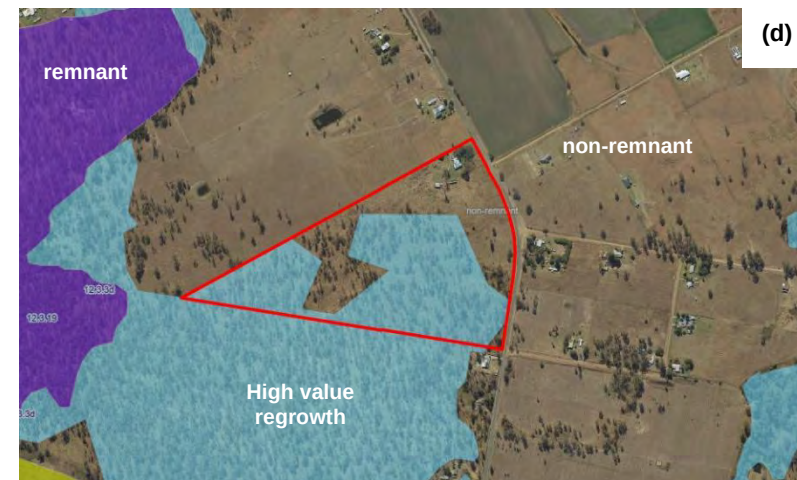
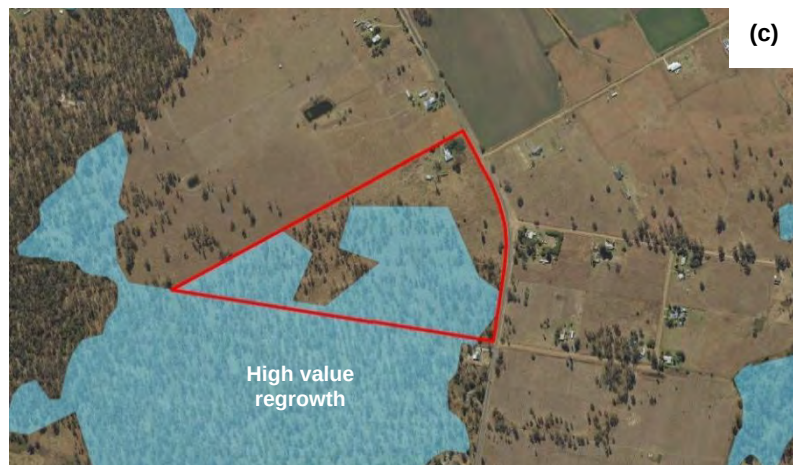
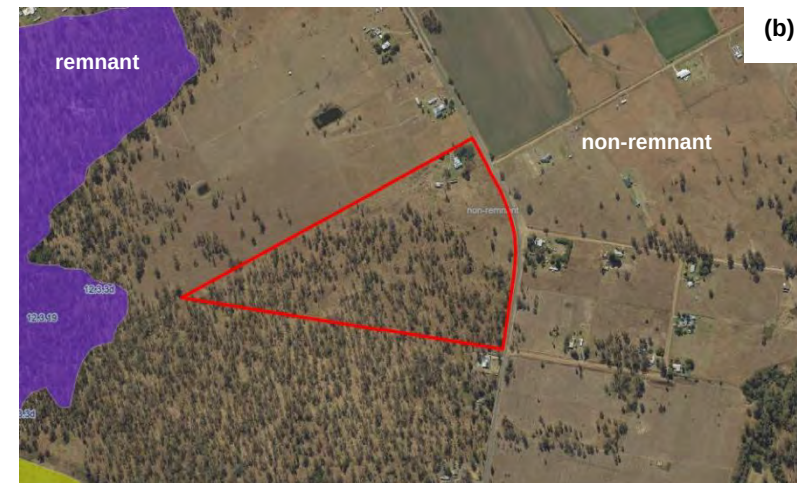
² <https://apps.des.qld.gov.au/regional-ecosystems/details/?re=12.3.3>

³ <https://apps.des.qld.gov.au/regional-ecosystems/details/?re=12.3.3>

A large portion of the Thagoona Offset Area, is mapped as Category C vegetation, located in the regrowth areas through the entire southern boundary, wrapping around a central patch of non-remnant vegetation (State of Queensland, 2026).

Despite the predominance of high importance regrowth mapping, the vegetation within the Thagoona Offset Area still has connection with surrounding natural landscapes around the site. The proximity to the Bremer River provides habitat functionality and connectivity with natural areas that surround the site.

Natural environments do surround the site however, with main roads and train lines surrounding in all directions. These roads and tracks do not completely block movement from within as the Site lays at the northern boundary of a regional biodiversity corridor that runs south where it joins a larger, state biodiversity corridor. These adjoining areas form, habitat linkages and the corridor support fauna movement, maintaining ecological processes, contributing to structure and function of the regional ecosystem network. Restoration and legal protection of the Offset Area will reinforce and expand this connectivity to allow for stronger linkages in the high significance area, supporting long-term biodiversity outcomes consistent with regional conservation priorities. State mapped Preclear, Remnant and High Value Regrowth vegetation is presented as **Inset 3**.



Inset 3: (a) Preclear Regional ecosystems, top left; (b) Remnant Regional Ecosystems, top right; (c) High Value Regrowth Regional Ecosystems, bottom left; (d) Composite High Value Regrowth and Remnant Regional Ecosystems, bottom right

Note: - Site denoted by red wire frame

Source Qld Globe <https://qldglobe.information.qld.gov.au/> accessed 8 April 2026, Queensland Herbarium Regional Ecosystem Mapping version 13

4.2.4 Ecological Values and Modified Habitat Quality Assessments

REs within the Thagoona Offset Area were ground-truthed in general accordance with the Methodology for Surveying and Mapping Regional Ecosystems and Vegetation Communities in Queensland (Neldner et al. 2023). Field verification focused on confirming the accuracy of State mapping through detailed assessment of vegetation structure, floristic composition, and landscape position. Mapped RE polygons were refined according to their homogeneous spatial extent within the Offset Area to ensure that the delineations accurately reflected on-ground vegetation patterns and transitions between community types.

The verified vegetation information provides a robust basis for evaluating habitat condition, biodiversity significance and the restoration potential of the Thagoona Offset Area **Table 7**.

Table 7: Ground-truthed Regional Ecosystems

Regional Ecosystem code	Short description (REDD v13.1)
12.3.3	Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) woodland on Quaternary alluvium

To assess habitat quality across the Thagoona Offset Area, the land area was divided into discrete ground-truthed Assessment Units (**AUs**) based on vegetation structure, floristic composition, pre-clear REs, land zones and the influence of historical and current land uses. These parameters informed the MHQA framework applied within the PD Report (28 South Environmental, 2026). The delineation of AUs recognises that although broad vegetation groups provide the initial basis for classification, finer-scale variation occurs across the landscape due to differences in topography, drainage patterns, slope, soil profile, grazing history, weed incursion and past land management practices. Transitional ecotone areas were also considered where they contributed to changes in habitat structure and ecological function.

Habitat quality was evaluated using a modified application of the Queensland Government's Guide to Determining Terrestrial Habitat Quality: *A Toolkit for Assessing Land-Based Offsets under the Queensland Environmental Offsets Policy* (Version 1.2) (DEHP, 2017). This methodology incorporates indicators of site condition, landscape context and species habitat values, allowing for an objective and repeatable assessment of ecological function and Offset suitability.

The relationships between REs, AUs and vegetation communities are documented in **Table 8** with sampling effort and compliance with HQA Version 1.2 also summarised in **the PD report**. The spatial distribution of all bio condition plots and their associated AUs is shown in **Figure 4**, demonstrating the comprehensive coverage achieved across the ecological gradients of the Thagoona Offset Area. This structured assessment provides a robust baseline for evaluating habitat quality, establishing Offset equivalence and tracking ecological improvement under the OMP.

Table 8: Relationship between Regional Ecosystems, Assessment Units and Vegetation Communities at Thagoona Offset Area

Descriptor	Sites	
Offset Area Assessment Unit (OA AU)	OA AU1 Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) canopy with a grassy understory and open paddock with a mixture of pastoral grasses and wetland species within the understory.	OA AU2 Community dominated by mature and semi-mature Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) and Moreton Bay Ash (<i>Corymbia tessellaris</i>) canopy with a grassy understory with a mixture of pastoral grasses and wetland species within the understory.
Preclear RE	12.3.3	12.3.3
Ground-truthed RE	12.3.3	12.3.3

Descriptor	Sites	
Current regulated vegetation status	Category X (non-remnant)*	Category C (regrowth)*
Ground-truthed regulated vegetation status	Category X (non-remnant)	Category C (regrowth)

* - however ground-truthed extent of HVR / non-remnant boundary is assessed as different to State mapping

Historical aerial imagery indicates that the Thagoona Offset Area has been subject to progressive clearing and land use modification associated with rural agricultural activities. Imagery from the 1950s shows that while clearing had occurred, scattered remnant trees were still present across the landscape. By the 1970s, the majority of woody vegetation had been removed, resulting in a largely cleared landscape dominated by pasture.

From the 1990s onwards, a pattern of natural regrowth is evident across the Thagoona Offset Area, with the establishment of regenerating woodland communities, particularly associated with Eucalypt species. This regrowth reflects a transition away from intensive agricultural use and has resulted in the re-establishment of vegetation structure and function across parts of the Thagoona Offset Area. The current vegetation condition is therefore representative of a regenerating system, with demonstrated capacity for further ecological recovery under appropriate management. Thus, the historical land use context establishes a realistic and ecologically defensible baseline from which measurable habitat quality improvement can be achieved through implementation of this OMP.

4.2.5 Vertebrate Pest Species

A range of vertebrate pest species have been either confirmed as utilising the Thagoona Offset Area or are considered likely to occur based on historical records, regional distribution mapping, and targeted field surveys undertaken for this project.

Desktop searches of the ALA identified the potential presence of the following pest vertebrate species within or adjacent to the Thagoona Offset Area:

- Domestic Dog (*Canis lupus familiaris*)
- Feral Cat** (*Felis catus*)
- Red Fox* (*Vulpes vulpes*)
- European Hare* (*Lepus capensis*)
- Deer species* (*Dama* sp., *Cervus* sp., *Rusa* sp. and *Axis* sp.).

These species are described as having common to occasional occurrence with widespread or localised distributions across the local government area in which the Thagoona Offset Area is situated.

The low open woodland regrowth and non-remnant pastoral grassland that characterise the Thagoona Offset Area provide suitable open habitat that enables pest species to move freely through the landscape for grazing and hunting. These conditions create opportunities for pest species to utilise site resources, potentially resulting in impacts such as over-grazing, soil disturbance, predation on native fauna, and suppression of natural regeneration and revegetation success.

4.2.5.1 Site Survey Results

Field assessment of baseline vertebrate pest species within the Thagoona Offset Area consisted exclusively of a camera trap survey. A total of four (4) trail cameras were deployed in a semi-regular grid across the site to ensure

* Exotic, naturalised species

coverage of all AUs. Cameras were deployed from 8 March 2026 to 22 March 2026, representing 14 consecutive nights and a total survey effort of 56 camera-trap nights.

All cameras were mounted to trees at approximately 50 cm above ground level. Survey methodology, camera placement, environmental conditions, and a detailed discussion of results are provided in **Attachment 1**.

Two vertebrate pest species were confirmed within the Thagoona Offset Area during the survey period:

- House Mouse* (*Mus musculus*)
- Cane Toad* (*Rhinella marina*).

A total of six (6) pest fauna detections were recorded, with House Mouse (*Mus musculus*) accounting for the majority of detections and Cane Toad (*Rhinella marina*) recorded at lower frequency.

Although Red Fox* (*Vulpes vulpes*) was not detected during the camera trap survey, it was recorded within close proximity to the Thagoona Offset Area (approximately 1.3 km from the site within the adjacent Offset Area). Given the species' high mobility and large home range, the species is considered likely to occur intermittently within the Thagoona Offset.

Other pest species commonly associated with rural and peri-urban environments, including Feral Cat, Feral Pig, Wild Dog, and Rabbit, were not detected during the survey period. However, the absence of detections does not preclude their occurrence within the Thagoona Offset Area, particularly given their documented presence within the broader local government area and the suitability of available habitat for movement and foraging.

4.2.6 Weeds

4.2.6.1 Initial Scouting Assessment

An initial assessment of weed species within the **Thagoona Offset Area** was undertaken using the following methods:

- Baseline invasive weed assessment
- Baseline BioCondition (MHQA) transects.

Surveys confirmed that weed species are present across all Assessment Units within the Thagoona Offset Area and are generally distributed uniformly throughout the site. Invasive plant species were recorded during the baseline invasive species survey and BioCondition assessments (**Attachment 2**). These comprised:

- Three (3) Weeds of National Significance (**WoNS**)
- Eight (8) species listed as Category 3 Restricted Matters under the *Biosecurity Act 2014*
- Eight (8) species identified as locally significant weeds under the ICC Biosecurity Plan.
- Ten (10) species were exotic but not identified under relevant material.

All weed species recorded during field surveys are presented in **Table 9**. Survey methodologies and the spatial extent of Assessment Units are shown in **Figure 5**.

Table 9: Weed Species Recorded Across the Thagoona Offset Area

Binomial name	Common name	WONS	Biosecurity Act 2014 Category	ICC Significant Weed
<i>Sida rhombifolia</i>	Paddy's Lucerne*	no	no	no
<i>Dichanthium aristatum</i>	Angleton Bluestem*	no	no	no
<i>Bidens pilosa</i>	Cobbler's Pegs*	no	no	no
<i>Celtis sinensis</i>	Chinese Celtis*	no	Category 3	yes
<i>Mimosa pudica</i>	Sensitive Plant*	no	no	no
<i>Aster subulatus</i>	Wild Aster*	no	no	no
<i>Cynodon dactylon</i>	Scutch Grass*	no	no	no
<i>Verbena officinalis</i>	Common Verbena*	no	no	no
<i>Macroptilium lathyroides</i>	Phasey Bean*	no	no	no
<i>Baccharis halimifolia</i>	Groundsel Bush*	no	Category 3	yes
<i>Erigone bonariensis</i>	Fleabane*	no	no	no
<i>Lantana camara</i>	Lantana*	yes	Category 3	yes
<i>Verbena litoralis</i>	Verbena*	no	no	no
<i>Paspalum urvillei</i>	Vasey Grass*	no	no	no
<i>Blakella torelliana</i>	Cadagi*	no	no	no
<i>Gomphrena celosioides</i>	Gomphrena Weed*	no	no	no
<i>Ageratum houstonianum</i>	Blue Billy Goat Weed*	no	no	no
<i>Cyperus rotundus</i>	Nutgrass*	no	no	no
<i>Gamochaeta coarctata</i>	Spiked Cudweed*	no	no	no
<i>Ambrosia artemisiifolia</i>	Annual Ragweed*	no	Category 3	yes
<i>Gomphocarpus physocarpus</i>	Cotton Balloon Bush*	no	no	no
<i>Euphorbia prostrata</i>	Prostrate Spurge*	no	no	no
<i>Digitaria violascens</i>	Bastard Summergrass*	no	no	no
<i>Senecio madagascariensis</i>	Fireweed*	yes	Category 3	yes
<i>Tipuana tipu</i>	Tipuana*	no	no	no
<i>Schinus terebinthifolius</i>	Broad-leaved Pepper Tree*	no	Category 3	yes

Binomial name	Common name	WONS	Biosecurity Act 2014 Category	ICC Significant Weed
<i>Vachellia farnesiana</i>	Sweet Acacia*	no	no	no
<i>Asparagus africanus</i>	Climbing Asparagus*	no	Category 3	yes
<i>Opuntia tomentosa</i>	Velvet Tree Pear*	yes	Category 3	yes

4.2.6.2 Baseline Weed Assessment

A comprehensive baseline weed assessment of the Thagoona Offset Area was conducted in January 2025. Detailed survey methods, sampling effort, and results are documented in **Attachment 2**.

The assessment employed an informed random meander survey using parallel transects, based on a modified version of the random meander method described by Cropper (1993). Surveys commenced at the westernmost boundary of the Thagoona Offset Area and proceeded northward within defined transect corridors. Weed species were recorded as encountered, and density estimates were undertaken in the field (**Attachment 2, Figure 2**). Upon completion of each corridor, the survey continued within the adjacent corridor in the opposite direction to ensure full site coverage.

Although the random meander approach was originally developed for detecting threatened plant species, it provides a robust and effective framework for documenting weed species presence, distribution, and relative abundance across diverse habitat types.

For all WoNS and Category 3 Restricted Matter species recorded within the Thagoona Offset Area, spatial point data were collected and infestation density classified using the following qualitative categories:

- **Low:** 1–5 individual stems at the observation point
- **Medium:** 6–25 individual stems at the observation point
- **High:** >25 individual stems at the observation point

The three (3) WoNS present within the Thagoona Offset Area are:

- Lantana* (*Lantana camara*)
- Velvety Tree Pear* (*Opuntia tomentosa*)
- Fireweed* (*Senecio madagascarensis*).

Eight (8) Category 3 Restricted Matter (*Biosecurity Act 2014* (Qld)) weeds present within the offset area are:

- Annual Ragweed* (*Ambrosia artemisiifolia*)
- Climbing Asparagus* (*Asparagus africanus*)
- Groundsel Bush* (*Baccharis halmifolia*)
- Chinese Celtis* (*Celtis sinensis*)
- Lantana* (*Lantana camara*)
- Velvety Tree Pear* (*Opuntia tomentosa*)
- Broad-leaved Pepper Tree* (*Schinus terebinthifolius*)

- Fireweed* (*Senecio madagascarensis*).

The distribution of weeds encountered in the field are presented **Figure 5**.

Across the Thagoona Offset Area, weed distribution and abundance do not exhibit any strong spatial trends and are generally uniform throughout the site. This pattern is likely attributable to several site-specific factors, including:

- the low-lying position of the site on the Bremer River floodplain,
- historical land uses associated with broad-scale agricultural activities, and
- the relatively small area of the offset.

Flooding events likely facilitate the widespread dispersal of invasive species, while historic pasture management and livestock movement have contributed to suppression of native species and introduction of weed propagules. The movement of soil and machinery may have further aided weed establishment, while limited micro-habitat diversity has enabled relatively uniform weed colonisation across the site.

Within the Thagoona Offset Area, Groundsel Bush* (*Baccharis halimifolia*) and Broad-leaved Pepper Tree* (*Schinus terebinthifolius*) display a widespread and near-cosmopolitan distribution and represent the most problematic weed species present. WoNS, including Lantana* (*Lantana camara*), Velvety Tree Pear* (*Opuntia tomentosa*), and Fireweed* (*Senecio madagascarensis*), were recorded throughout the central areas of the site, while remaining weed species exhibited more stochastic distributions.

The majority of infestations were recorded at low density, typically comprising 1–5 individuals per observation point. This pattern may reflect competitive suppression by established native grass communities, which limit germination success and resource availability for weeds. Higher-density infestations were generally confined to disturbed areas, including open paddock areas in the northern corner of the Thagoona Offset Area and a localised infestation of Climbing Asparagus Fern* (*Asparagus africanus*) in the western portion of the site. These areas are subject to ongoing disturbance, which promotes weed establishment and facilitates seed dispersal through vehicle movement and other vectors.

4.3 Offset Area Suitability

The potential occurrence of Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*) within the Thagoona Offset Area has been evaluated through a desktop assessment.

Given the highly vagile nature of the Grey-headed Flying-fox (*Pteropus poliocephalus*), together with the presence of known camps and important foraging resources both within the site and regionally (within a 25-km radius), including forage species critical during key life-history stages and periods of resource bottlenecking, the presence of this species within the area is assumed.

4.3.1 Suitability for Koalas (*Phascolarctos cinereus*)

4.3.1.1 Landscape and Site Records

An assessment of Koala (*Phascolarctos cinereus*) habitat values within and surrounding the Thagoona Offset Area was undertaken to evaluate the suitability of the site to support Koala (*Phascolarctos cinereus*) movement, foraging, and long-term habitat improvement. A desktop habitat analysis was completed, including a Protected Matters Search Tool query within a 25 km radius of the Thagoona Offset Area to identify potential occurrence records and mapped habitat values. Results were cross-referenced with records from the Atlas of Living Australia (ALA) to verify species occurrence and were further supplemented using the Queensland Government Development Assessment Mapping System to review mapped Koala (*Phascolarctos cinereus*) habitat under the State planning framework.

Contemporary records (post-1990) indicate a broad distribution of Koala (*Phascolarctos cinereus*) records across the search area, with an apparent concentration in or near built-up (urban) areas. This pattern is considered to

reflect observer effort and reporting bias rather than any substantive differences in habitat suitability between urban and rural landscapes.

A total of 3,295 Koala (*Phascolarctos cinereus*) records occur within 25 km of the Thagoona Offset Area, indicating that the surrounding locality supports a well-established and active Koala (*Phascolarctos cinereus*) population (see **Figure 6**). Substantial numbers of records are present in the Rosewood, Thagoona, Walloon, Amberley and Willowbank areas to the south-east, as well as Vineyard Hill, Spring Creek, Churchable, Atkinson Dam and Lowood to the west and north.

The density and spatial distribution of records confirm that the Thagoona Offset Area is situated within a broader landscape that supports Koala (*Phascolarctos cinereus*) populations. Continued rehabilitation and protection of the Thagoona Offset Area will enhance food resources, movement pathways, and refuge opportunities, thereby strengthening Koala (*Phascolarctos cinereus*) habitat function within the regional conservation network. The entire Bremer River floodplain between Rosewood and the Amberley RAAF base contains extensive alluvial floodplain habitat dominated by remnant and regrowth RE12.3.3 Queensland Blue Gum (*Eucalyptus tereticornis*) woodland supporting a significant local Koala population.

Queensland Blue Gum (*Eucalyptus tereticornis*) is an important forage and shelter resource for Koala recognised by both State documentation and Commonwealth⁴ documentation. RE12.3.3 is also a component of the Endangered *Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions* Threatened Ecological Community.

Although Koala (*Phascolarctos cinereus*) is known from the adjoining offset (EPBC 2013/6941), no direct Koala (*Phascolarctos cinereus*) observation assessments (e.g. spotlighting, diurnal walked transects or thermal imaging) were undertaken within the Thagoona Offset Area. Instead, indirect assessment methods and general habitat observations were completed concurrently with BioCondition transects.

To assess Koala (*Phascolarctos cinereus*) occurrence within the Thagoona Offset Area, the Spot Assessment Technique (**SAT**) was applied. No confirmed Koala (*Phascolarctos cinereus*) scat evidence was recorded during surveys. Limited secondary indicators of potential Koala (*Phascolarctos cinereus*) activity were observed, such as minor scratch marks on trees; however, these indicators were insufficient to confirm presence.

Field observations indicate that the Thagoona Offset Area has been subject to recent inundation, with evidence of flood-related debris accumulation, including debris lines and material wrapped around tree bases. These conditions are likely to influence the detectability and persistence of indirect Koala (*Phascolarctos cinereus*) evidence such as scats.

SAT surveys conducted at BioCondition transects indicate that Koala (*Phascolarctos cinereus*) use of the Thagoona Offset Area is low or episodic at the time of survey (see **Table 10**). The absence of confirmed scat records suggests limited current utilisation; however, the presence of suitable regrowth habitat indicates that the Thagoona Offset Area retains the capacity to support Koala (*Phascolarctos cinereus*) habitat as vegetation condition improves over time.

Table 10: Summary of SAT Results - Offset Area

SAT Site Number	Evidence of Koala Use (%)	Koala Use (high / medium / low) ¹
SAT survey 1	0.00	-
SAT survey 2	0.00	-
SAT survey 3	0.00	-

¹With reference to Phillips and Callaghan (2011) only, use categories are entirely unrelated to State Koala (*Phascolarctos cinereus*) habitat mapping

⁴Youngentob, K.N, Marsh, K.F., Skewes, J., (2021). *A review of koala habitat assessment criteria and methods*, report prepared for the Department of Agriculture, Water and the Environment, Canberra, November. CC BY 4.0.

Derived data indicates that the Thagoona Offset Area may currently support only low-density Koala (*Phascolarctos cinereus*) use. This finding does not suggest that the Thagoona Offset Area is unsuitable or of low value as a Koala (*Phascolarctos cinereus*) offset; rather, it reflects the present condition of the site, which is influenced by historical disturbance and current vegetation structure, limiting its capacity to support higher Koala (*Phascolarctos cinereus*) densities at this time.

The absence of confirmed Koala (*Phascolarctos cinereus*) scat records during field assessments does not preclude Koala (*Phascolarctos cinereus*) presence within the Thagoona Offset Area. Detectability of Koala (*Phascolarctos cinereus*) using indirect survey methods can be influenced by a range of factors, including recent environmental conditions. Evidence of widespread inundation across the Thagoona Offset Area, including debris deposition and accumulation around tree bases, suggests that flood events may have removed or obscured scats, thereby reducing detection rates. Additionally, low-density or transient Koala (*Phascolarctos cinereus*) use of the Thagoona Offset Area, particularly in regrowth-dominated or structurally open habitats, may limit the accumulation of detectable signs.

Department of the Environment, Tourism, Science and Innovation (**DETSI**) spatial modelling identifies that the habitat to be established and enhanced within the Thagoona Offset Area is of value for Koala (*Phascolarctos cinereus*) within the South East Queensland Bioregion (**Figure 7**). Accordingly, the Thagoona Offset Area has the capacity to support increased Koala utilisation over time as habitat condition improves through assisted natural regeneration and targeted revegetation works.

In summary, the Thagoona Offset Area represents a site with demonstrable capacity for measurable uplift in Koala (*Phascolarctos cinereus*) habitat quality and ecological function, transitioning from a currently constrained, low-density usage scenario to a more suitable and productive Koala (*Phascolarctos cinereus*) habitat over the life of the offset.

4.3.1.2 Site Resources

Area under OA AU2 predominantly comprises of regrowth vegetation associated with RE 12.3.3, which is recognised as an ecosystem capable of supporting Koala (*Phascolarctos cinereus*) within South East Queensland. The Thagoona Offset Area supports both established and regenerating individuals of locally important Koala (*Phascolarctos cinereus*) forage species (Youngentob et al. 2021), most notably Queensland Blue Gum (*Eucalyptus tereticornis*), which is known to occur across the site.

These forage species provide a suitable ecological foundation for Koala (*Phascolarctos cinereus*) habitat development and, over time, will be further enhanced through assisted regeneration and targeted revegetation. This will increase both the availability and quality of forage resources and improve the overall capacity of the Offset Site to support Koala (*Phascolarctos cinereus*) use.

Areas of RE 12.3.3 on the Thagoona Offset Area are dominated by Queensland Blue Gum (*Eucalyptus tereticornis*), with Narrow-leaved Red Ironbark (*Eucalyptus crebra*) also present and locally abundant, particularly toward the margins of the alluvial plains. Other species occur as scattered individuals or in small clumps and include Silver-leaved Ironbark (*Eucalyptus melanophloia*) and associated *Corymbia* species. The structure and composition of RE 12.3.3 within the site support Koala (*Phascolarctos cinereus*) habitat values by contributing to landscape connectivity, food resource availability, and refuge potential. As vegetation condition improves through ongoing management and restoration, these REs are expected to increasingly support Koala (*Phascolarctos cinereus*) movement, foraging, and longer-term site utilisation.

4.3.2 Suitability for Grey-headed Flying-fox (*Pteropus poliocephalus*)

4.3.2.1 Landscape and Site Records

To determine whether the Thagoona Offset Area is suitable to contribute to the viability of the Grey-headed Flying-fox (*Pteropus poliocephalus*), the presence of species records and known roost camps within a 25 km radius was assessed. Species occurrence data were sourced from the ALA and Queensland Wildlife Online to characterise local and sub-regional utilisation of the landscape.

A total of 292 Grey-headed Flying-fox (*Pteropus poliocephalus*) records were identified within 25 km of the Thagoona Offset Area, with 12 records occurring in close proximity to the site (5 km) (see **Figure 8**). This relatively low density of records is not considered indicative of limited landscape use but rather reflects patterns of observer effort and the spatial distribution of known camps and urban areas where monitoring intensity is highest.

Records are typically concentrated around urban environments and established roost sites (see **Figure 9**), which aligns with known reporting bias for this species. Importantly, several confirmed camps occur within the broader locality at distances consistent with established foraging ranges. Westcott et al. (2015) reported a mean foraging distance of 10.9 km (quartile range 6.2–27.9 km), placing the Thagoona Offset Area well within the typical foraging range of Grey-headed Flying-fox (*Pteropus poliocephalus*) from known regional camps (see **Table 11**).

The absence or low density of records within rural or regrowth-dominated landscapes such as the Thagoona Offset Area is common for this species and does not indicate an absence of use. Grey-headed Flying-fox (*Pteropus poliocephalus*) are highly vagile and opportunistic foragers that utilise a wide variety of woodland and regrowth habitats, including those present within the Thagoona Offset Area.

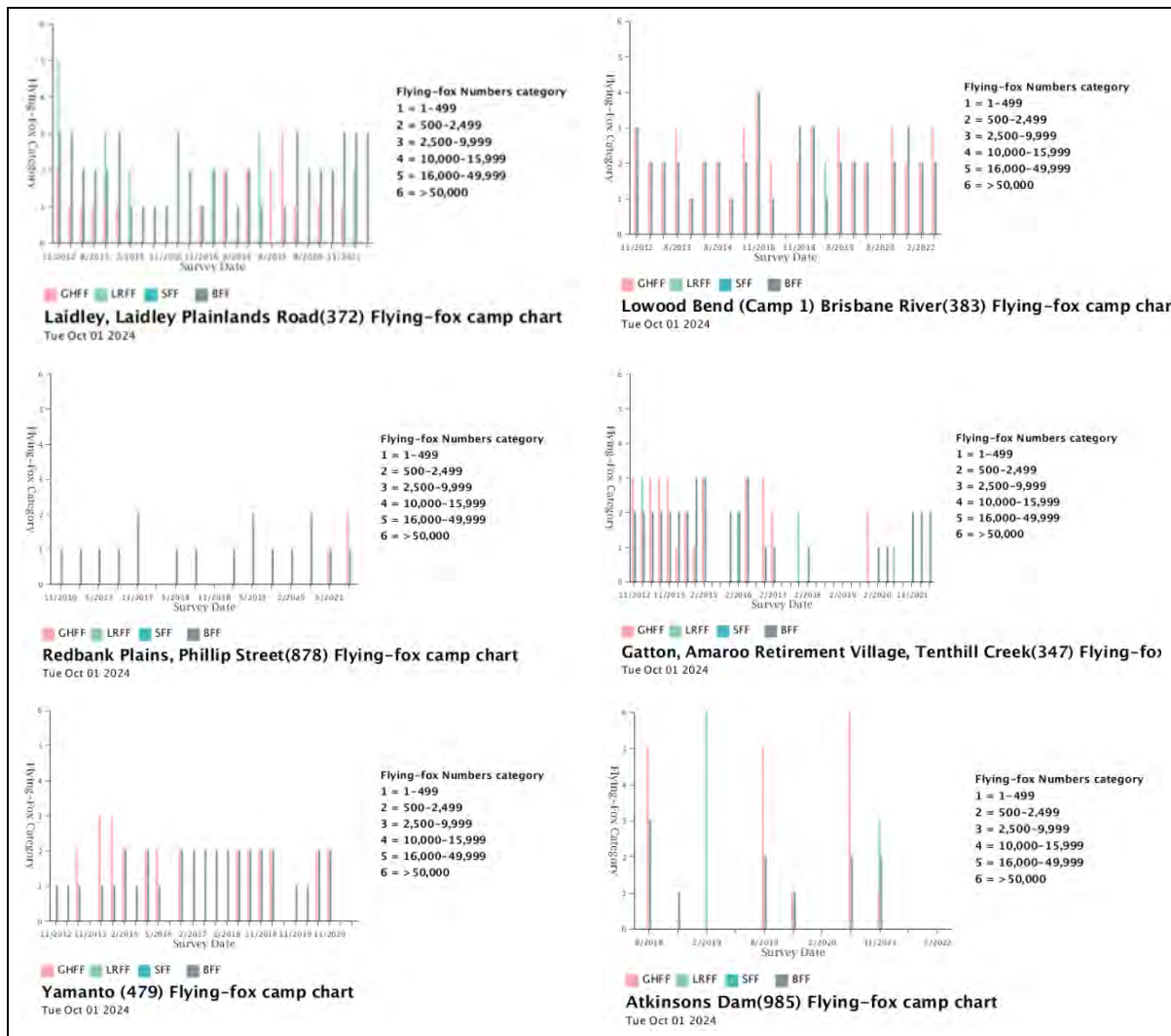
Accordingly, the Thagoona Offset Area is considered to occur within an actively utilised foraging landscape and has the capacity to contribute to the availability of foraging resources for Grey-headed Flying-fox (*Pteropus poliocephalus*) at the local and regional scale.

Table 11: Grey-headed Flying-fox Camps within 25 km of the Thagoona Offset Aea Occupied Within past 4 Years

Camps	Size*	Year of last recorded Grey-headed Flying-fox occupation
Atkinsons Dam (985)	6 (NIC)	2022
Lowood Bend (Camp 1) Brisbane River (383)	3	2022
Yamanto (479)	2	2020
Redbank Plains, Phillip Street (878)	2	2021
Laidley, Laidley Plainlands Road (372)	1	2021
Gatton, Amaroo Retirement Village, Tenthill Creek (347)	2	2020

* 1-499 (1), 500-2,499 (2), 2,500-9,999 (3), 10,000-15,999 (4), 16,000-49,999 (5), >50,000 (6), Nationally Important Camp (NIC)

One Nationally Important Camp occurs at Atkinson's Dam, approximately 30 km north-west of the Thagoona Offset Area. Additional camps with confirmed occupancy within the past four years include Laidley-Plainlands Road, Lowood Bend (Camp 1), Redbank Plains (Phillip Street), Gatton and Yamanto. Together, these camps confirm that the Thagoona Offset Area lies within an active foraging landscape for Grey-headed Flying-fox (Inset 4).



Inset 4: Yearly maximum counts of Grey-headed Flying-fox numbers for four nearest roosts utilised by the species, between 2012 and February 2022. (Source: Commonwealth of Australia (Geoscience Australia) 2015: National Flying Fox monitoring viewer: <https://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>)

4.3.2.2 Landscape Resources

Grey-headed Flying-fox (*Pteropus poliocephalus*) rely heavily on nectar and fruit derived from eucalypt and other native flowering species, with food resources being particularly critical during two key life-history periods:

- Winter, when floral resources are limited across much of eastern Australia; and
- The breeding season (September–November), coinciding with late gestation and early lactation when energetic demands are greatest.

Within the broader locality of the Thagoona Offset Area, State-mapped Remnant and High-Value Regrowth REs containing key winter and spring flowering forage species were reviewed. Queensland Blue Gum (*Eucalyptus tereticornis*), which is present within the Thagoona Offset Area, is recognised as an important forage species during these critical periods.

Vegetation mapping within a 25 km radius identifies areas of higher-quality forage habitat where key species are dominant or co-dominant canopy components, as well as areas of lower to moderate quality habitat where these species occur as sub-dominant or associated components (see **Figure 10** and **Figure 11**). Collectively, these mapped areas demonstrate a broad and interconnected network of seasonal foraging resources, within which the

Thagoona Offset Area forms a functional component capable of supporting Grey-headed Flying-fox (*Pteropus poliocephalus*) during resource-limited periods.

4.3.2.3 Site Resources

DAWE (2021, p.15) identifies vegetation communities that support important winter and spring flowering species as habitat critical to the survival of Grey-headed Flying-fox (*Pteropus poliocephalus*) where their presence is verified in the field.

Within the Thagoona Offset Area, vegetation is currently limited to RE 12.3.3. Field observations confirmed the presence of Queensland Blue Gum (*Eucalyptus tereticornis*) as the dominant canopy species, providing a functional forage resource for Grey-headed Flying-fox (*Pteropus poliocephalus*). This species is recognised as an important winter and spring flowering resource with relatively high productivity and reliability within the species' blossom-based diet.

Although the Thagoona Offset Area does not currently support the same diversity of winter-flowering species present at some other locations in the region, the established presence of Queensland Blue Gum (*Eucalyptus tereticornis*) provides a relevant and ecologically meaningful forage resource within the local landscape context. As assisted regeneration and targeted revegetation progress, the density and spatial distribution of this species are expected to increase, improving forage reliability and availability over time.

Accordingly, RE 12.3.3 within the Thagoona Offset Area contributes to the provision of foraging habitat for Grey-headed Flying-fox (*Pteropus poliocephalus*), particularly when considered in combination with surrounding mapped forage habitats. The Thagoona Offset Area therefore represents a site with demonstrable capacity to support Grey-headed Flying-fox (*Pteropus poliocephalus*) utilisation and to deliver measurable improvements in foraging habitat quality over the life of the offset.

4.4 Compliance with the EPBC Offset Policy criteria

The EPBC Act Environmental Offsets Policy details a number of principles that a suitable offset will achieve. **Table 12** demonstrates how the Offset Area meets and exceeds the Policy Principles.

Table 12: Suitability of Offset Area against the EPBC Offset Suitability Criteria

EPBC Offset Suitability Criteria	Response
1. Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter	The Thagoona Offset Area will additionally deliver an overall conservation outcome that improves the viability of MNES, including Koala (<i>Phascolarctos cinereus</i>) and Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>), through the enhancement of existing regrowth vegetation and currently pasture grass-dominated areas. The area has been historically subject to clearing and grazing, resulting in a simplified vegetation structure and reduced habitat complexity. In its current state, this limits the availability and accessibility of foraging and shelter resources for MNES. Active assisted regeneration, with a focus on weed management and targeted revegetation, will facilitate the recovery of canopy and understorey layers and support the re-establishment of a more floristically diverse and structurally appropriate vegetation community consistent with the pre-clearing RE. The presence of strong Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) regrowth provides a suitable foundation for restoration, with this species representing an important food resource for both Koala (<i>Phascolarctos cinereus</i>) and Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>). Targeted infill planting within cleared or sparsely vegetated areas will further increase habitat extent and structural diversity across the Thagoona Offset Area. These measures will result in a demonstrable improvement in habitat quality over the offset period, including increased availability of foraging resources, improved shelter and breeding habitat, and enhanced connectivity across the landscape. The expected uplift in condition, as quantified through the MHQA framework, reflects a measurable

EPBC Offset Suitability Criteria	Response
	conservation gain and supports the progression of the Thagoona Offset Area toward a higher functioning ecological system. In combination with adjoining EPBC Act offset areas and land managed for conservation outcomes, the Thagoona Offset Area will contribute to a broader, contiguous habitat network, thereby strengthening landscape connectivity and supporting the long-term persistence of MNES within the locality. The Thagoona Offset Area will be maintained in perpetuity as habitat protected by a Conservation Covenant (or an alternative mechanism suitable to achieve enduring protection, such as dedication to conservation estate). Dedication of the Offset Area under such mechanisms will remove access to landholder vegetation management rights otherwise available under the <i>Planning Regulation 2017</i> (Qld), ensuring long-term protection and management of the Thagoona Offset Area for conservation purposes.
2. Suitable offsets must be built around direct offsets but may include other compensatory measures	Thagoona Offset Area, in conjunction with the Woolshed Offset Area will collectively accommodate direct offsets for Koala (<i>Phascolarctos cinereus</i>) and Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>). The direct offset at the 17.68 ha of Thagoona Offset Area, in conjunction with the 88.63 ha Woolshed Offset Area will increase in the quality and cover of habitat for these species over the offset period, including a 20-year timeframe to ecological benefit. Both Offset Areas will deliver direct offset outcomes through the rehabilitation, enhancement and long-term protection of habitat, resulting in measurable improvements in vegetation condition and extent. In addition to benefits for MNES, the Offset Areas will also provide tangible ecological benefits to other species within the locality, including State-listed species such as Bailey's Cypress Pine (<i>Callitris baileyi</i>) (Woolshed only), through improvements in habitat structure, floristic diversity and resource availability and result in an increased area (beyond the extent at the time of this assessment) of the <u>Endangered Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions</u> Threatened Ecological Community (Thagoona only). Beyond this, the Direct Offset will have beneficial outcomes to other MNES through the consolidation and expansion of protected habitat and ecological corridors of State and Local significance. The Woolshed Offset Area forms part of the Little Liverpool Range Ecological Corridor, and when considered in combination with the Thagoona Offset Area which augments habitat within an important Regional Biodiversity Corridor, these sites will function as a complementary pair, increasing habitat availability and strengthening connectivity across the landscape. In combination with habitat under protected estate management (owned by ICC) and adjoining and proposed offset areas managed by Cherish, both Offset Areas will substantially increase the extent of protected habitat. This integrated approach ensures that the offsets are built around direct offset measures while also delivering broader compensatory outcomes at a landscape scale, consistent with the EPBC Act Environmental Offsets Policy.
3. Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter	Both Offset Areas are in proportion to the level of statutory protection that applies to the protected matter, as the offset assessment guide requires that the appropriate conservation status or extinction risk be applied in determining offset requirements. The combined Offset Areas have been designed and assessed in accordance with these requirements, ensuring that the scale and protection mechanism applied are commensurate with the significance of the MNES being offset. Both Offset Areas will be subjected to a VDEC under the <i>Vegetation Management Act 1999</i> (Qld) to register each site as a declared area for high nature conservation value with a Regulated Category A listing. This will remain in place until the conservation outcome prescribed by this OMP is achieved. Long-term perpetual outcomes will be achieved through registration of a Statutory Environmental Covenant under the <i>Land Title Act 1994</i> (Qld) or <i>Land Act 1994</i> (Qld), ensuring protection in perpetuity across both Offset Areas. Alternatively, designation

EPBC Offset Suitability Criteria	Response
	of the Offset Areas as conservation estate through amalgamation into Ipswich City Council's Mount Grandchester Conservation Estate will be sought where feasible. Covenants afford the same level of protection as National Parks in Queensland and provide NEPA with a high level of confidence that the Offset Areas will be protected for the duration of the impacts associated with the proposed action. In this context, the statutory protection mechanisms applied to the Offset Areas are directly aligned with the conservation significance of the MNES and are therefore proportionate to the level of statutory protection required.
4. Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter	Thagoona Offset Area (17.68 ha), along with the Woolshed Offset Area (88.63 ha) will be subject to ecological restoration and enhancement works aimed at improving ecological resilience and habitat quality for MNES. Thagoona Offset provides additional offset area to the bigger Woolshed Offset and will ensure the restoration of regrowth vegetation and grass-dominated areas, contributing to an overall increase in habitat extent and function. When considered together, both Offset Areas provide a scale of offset that is proportionate to, and exceeds, the residual impacts of the Proposed Action. The combined area and associated uplift in habitat quality ensure that the offsets deliver a commensurate conservation outcome, consistent with the EPBC Act Environmental Offsets Policy, through both the extent of habitat secured and the magnitude of ecological improvement achieved over the offset period.
5. Suitable offsets must effectively account for and manage the risks of the offset not succeeding	The Proponent has entered into an in-principal agreement with Cherish to secure and manage the Offset Areas for residual impacts arising from the Proposed Action, including the 88.63 ha Woolshed Offset Area and the 17.68 ha Thagoona Offset Area. All works across both Offset Areas will be actively managed by a dedicated, experienced, proven and reputable offset provider (Cherish). The Offset will be subject to a detailed management program to govern and guide success parameters, which the offset provider has had input into. Only contractors with an established track record for establishing and managing offsets for similar periods of time (20 years) will be engaged to deliver the works. The level of statutory protection and active management afforded to the Offset Areas will ensure that they are managed and retained as significant areas of conservation in perpetuity. The Direct Offset will be delivered under the framework of the Offset Management Plan, which sets out a comprehensive program of actions including implementation, management, risk evaluation and management, monitoring, reporting, review and corrective actions.
6. Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs	Prior to commencing the Action, the Approval Holder will place a VDEC under the <i>Vegetation Management Act 1999</i> (Qld) over the Offset Areas to statutorily secure them as offsets under State vegetation management legislation and register them on title (under the <i>Land Titles Act 1994</i> (Qld) or <i>Land Act 1994</i> (Qld)). Both Offset Areas will then be assigned a Regulated Category A designation; the same category as National Parks. This OMP will be the management document for achieving the ecological benefit under State legislation. The Proponent will also, prior to expiry of the VDEC, enter into a Conservation Covenant under the <i>Land Title Act 1994</i> (Qld) or <i>Land Act 1994</i> (Qld) over the Offset Areas or seek another mechanism to protect the Offset (e.g. incorporation into ICC's conservation estate). VDECs afford protection of the offset until the ecological benefit prescribed by the management is achieved (i.e. they 'time off'). Beyond this, the offset is transferred to Regulated Category B vegetation, to which all management exemptions and accepted clearing provisions under State Regulations would apply. To ensure the Offset is preserved in perpetuity for ecological benefit, a Covenant is necessary. VDECs whilst current and Covenants afford the same protection level as National Park in Queensland and provide NEPA with a higher level of confidence that the

EPBC Offset Suitability Criteria	Response
	Offset Areas will be protected for the duration of the impacts associated with the proposed action. It is important to note that the landholder, Cherish, has secured this property with the intent of establishing environmental offsets. Without the implementation of the Offset, both sites could be managed for agricultural purposes, including cattle grazing, and could be subject to vegetation clearing activities permissible under accepted development provisions (e.g. clearing for infrastructure, asset protection areas or farm forestry). This OMP identifies the nature of the conservation gain, including completion criteria, to be achieved over the nominated offset period for relevant MNES across the Thagoona Offset Area. It includes a detailed risk assessment focused on identifying and managing threats to achieving the conservation outcome, including fire management, vertebrate pest management, stochastic events and processes contributing to ecosystem decline. The management measures required to achieve the stated conservation gain, including the restoration and enhancement of native vegetation communities, are over and above what would be required to maintain the sites under existing lawful land uses. As such, the Thagoona Offset Area represents a conservation outcome that is additional to what is already required under law, planning regulation or other programs.
7. Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable	The regrowth-dominated portions of the 17.68 ha Thagoona Offset Area, in conjunction with the 88.63 ha Woolshed Offset Area and the, ensures that ecological restoration outcomes can be achieved in a timely manner relative to the residual impacts of the Proposed Action. Existing vegetation provides an immediate foundation for improvement, reducing the time required to achieve measurable ecological benefit. Beyond the protection and enhancement of existing regrowth, Thagoona Offset Area include components that will transition from cleared or grass-dominated areas to structurally complex native vegetation over the offset period. This will result in a substantial increase in habitat availability and quality for MNES, representing a clear and measurable conservation gain. The use of established assessment frameworks, including the NEPA impact and offset calculators and the MHQA methodology, ensures that the offset is transparent, scientifically robust and reasonable. The approach adopted provides a clear, repeatable and evidence-based method for quantifying impacts and demonstrating that the Thagoona Offset Area will deliver appropriate and proportionate conservation outcomes.
8. Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced	This OMP provides clarity around the environmental objectives proposed, risks and risk management in achieving these goals, and the corrective actions to be implemented should works not meet their envisaged targets across both Offset Areas. This will be achieved through: a) intensive ecological restoration works (i.e. assisted regeneration through weed management and infill planting); and b) annual monitoring (Years 1–20) across both Offset Areas for the following: ▪ vertebrate pests. ▪ WoNS and regulated weeds. ▪ MNES monitoring; and ▪ vegetation condition monitoring (BioCondition and tertiary plot monitoring). Oversight will remain with the Proponent and appointed Offset Provider (Cherish), enabling NEPA to audit and enforce compliance for the full Offset term.

5. Offset Area Design

Determination of the Offset Area AUs was informed by inspection and interrogation of State Government remnant vegetation and pre-clear mapping data sets, pre-BioCondition orientation site inspection and BioCondition survey work conducted on 21 January 2026.

At the Thagoona Offset Area, two (2) BioCondition were applied to the two (2) AUs identified (**Figure 4**). The two assessment units reflective of historic site disturbance and deviation from baseline ecological condition arising from landscape processes have been identified.

This Offset has been designed to respond to on-ground values to appropriately create and/or supplement habitat where necessary. This generally aligns with the mapped state significant biodiversity corridor through the Offset Area, where Assisted Natural Rehabilitation (**ANR**) is prescribed, and infill reconstruction in between such places is intended. The intention of this is to supplement the values of the site, and contextually vegetated siting by reconstructing previously cleared areas of the Thagoona Offset Area.

Reinstating and enhancing habitat across the Thagoona Offset Area will provide for direct wildlife connectivity between off-site habitat tracts to the west.

The Offset Area totals 17.68 ha, of which approximately 11.84 ha hectares is ground-truthed as regrowth Category C, within the balance site ground-truthed as non-remnant category X, under the *Vegetation Management Act 1999* (Qld). The offset management area has been further categorised into two (2) distinct Restoration Management Units (**RMUs**) for the purposes of management and improvement monitoring (see Inset 5).



Inset 5: Restoration Management Units of the Thagoona Offset Area

This categorisation is based on existing habitat condition and desired environmental offset principles. The two **RMUs** are broadly aligned with vegetation assessment units within the Thagoona Offset Area, as identified in **Table 13**. Each MU is described by its respective AU. The AUs identified in **Figure 4** will be subject to the management types prescribed within this section. Ultimately this section will outline the management philosophies behind the reconstruction and supplementing of habitat at the Thagoona Offset Area. The matters outlined within this section are better detailed within the Thagoona Offset Rehabilitation Management Plan (**Attachment 3**).

The RMUs are as follows:

- **RMU1** = 11.84 ha, representative of **AU1**
- **RMU2** = 5.84 ha, representative of **AU2**

Table 13: Summary of Restoration Management Units

ID	Community Description	Analogous RE	Area (ha)
RMU1	This assessment unit is a matrix of Queensland Blue Gum (<i>Eucalyptus tereticornis</i>) canopy with a grassy understory and open paddock with a mixture of pastoral grasses and wetland species within the understory. The shrub layer is significantly impacted with sparse recruitment of canopy species forming the bulk of the sporadic and minimal shrub layer.	Pre-clear 12.3.3	11.84
RMU2	This assessment unit is dominated by mature and semi-mature Forest Red Gum (<i>Eucalyptus tereticornis</i>) and Moreton Bay Ash (<i>Corymbia tessellaris</i>) canopy with a grassy understory with a mixture of pastoral grasses and wetland species within the understory. The shrub layer is significantly impacted with sparse recruitment of canopy species forming the bulk of the sporadic and minimal shrub layer.	12.3.3	5.84
Total Area			17.68

5.1 Restoration Management Unit 1

5.1.1 Existing Condition

This RMU has been denuded of canopy cover and native species, and the ground layer has been largely replaced with pastoral grasses in keeping with the agricultural history of the site. The pre-clear RE of this MU is 12.3.3 with the canopy of adjacent management units dominated by Queensland Blue Gum (*Eucalyptus tereticornis*). The low-lying nature of the site and its proximity to the Bremer River has allowed wetland ground cover species such as Rice Grass (*Leersia hexandra*), Yellow Eclipta (*Eclipta platyglossa*), Juncus (*Juncus usitatus*) and a variety of Cyperus sp. (*Cyperus* sp.).

5.1.2 Management Approach

The target RE for this MU is to reinstate a native canopy, shrub layer and ground stratum analogous with 12.3.3. This will be achieved by:

- the removal of invasive species from the RMU,
- and the installation of native species within these areas,
- The removal of livestock and culling of feral animals, and
- Selective supplementary and infill planting, as required to ensure the species mosaic and strata of the target vegetation Communities are being achieved.

5.1.3 Management Intervention for Reconstruction Area Type 1 - Weed Management & Planting

Reconstruction Type 1 is associated with large open grassed areas that have been cleared and used predominantly for grazing and other agricultural practices. Evidence of regrowth or remnant vegetation is not present, or it is only occurring sporadically.

These areas are located predominantly along the edges of the offset areas where the vegetation transitions to more regularly used areas for agricultural activities. The existing ground layer is dominated by pasture grasses and the soil is compacted.

The target for this unit is to carry out initial and ongoing weed management and planting. Ground preparation such as ripping or furrowing to improve water infiltration into the ground should be carried out in the first year, with rows three (3) metres apart and parallel with the contour lines to a depth of a minimum of 200 mm.

Once the ripped soil has settled after a number of rainfall events or a period of min three months, rehabilitation planting should be carried out. Planting is to be either done into mulch rings of 100 mm thick well composted forest mulch or with jute squares.

A significant component of the planting prescription is for planting the canopy species Queensland Blue Gum (*Eucalyptus tereticornis*) a preferred forage species for Koala (*Phascolarctos cinereus*) and an important winter-flowering species Grey-headed Flying-fox (*Pteropus poliocephalus*) during the recognised seasonal resource bottlenecking period.

5.1.4 Offset Objectives

Details on specific management actions for RMU1 are located in **Section 6** of this OMP, as well as Thagoona Offset Rehabilitation Management Plan (**Attachment 3**).

5.2 Restoration Management Unit 2

5.2.1 Existing Condition

This RMU has experienced significant disturbance including the thinning of canopy trees and the invasion of the ground stratum by pastoral grasses and other weeds. The vegetation is analogous with RE 12.3.3, with the canopy dominated by Queensland Blue Gum (*Eucalyptus tereticornis*) with Moreton Bay Ash (*Corymbia tessellaris*) and Sally Wattle (*Acacia salicina*).

5.2.2 Management Approach

It is the aim for the MU is to restore the vegetation to a remnant status with a vegetation community representing 12.3.3. This will be achieved by:

- removing the invasive species within the MU,
- install infill plantings to help to increase canopy cover and the native species density and diversity within the ground and shrub layers,
- The removal of livestock and culling of feral animals, and
- Selective supplementary and infill planting, as required to ensure the species mosaic and strata of the target vegetation Communities are being achieved.

5.2.3 Management Intervention for Assisted Natural Rehabilitation Type 2 – Weed Management & Infill Planting

Assisted Natural Rehabilitation Type 2 (**ANR-2**) is associated with large portions of the site and characterised by more open or sparsely canopied areas with moderate invasive species infestations. Much of the canopy and sub-canopy is native.

This existing ground and shrub layer, while containing significant populations of Angleton Bluestem* (*Dichanthium aristatum*) and other invasive forbs and invasive shrub species including Chinese Celtis* (*Celtis sinensis*) and Broad-Leaved Pepper Tree* (*Schinus terebinthifolius*), however, they are not dominant within the vegetation communities.

The proposed activities to occur within this management unit include carrying out initial and ongoing weed management and infill planting.

Planting will only be required in areas where weed treatment does not yield significant native species germination after two years. Planting will occur sequentially, starting with canopy and sub-canopy species planted within the first year with establishment maintenance such as watering and replacement planting.

- The aim is to achieve overall planting densities of 1.5 stems per m² (see Text Box 1).
- Plant species will be selected to reflect the preclear REs.

Text Box 1 – Rehabilitation planting densities

The South-east Queensland Ecological Restoration Framework (Chenoweth EPLA and Bushland Restoration Services, 2012) notes that density at which plants are spaced will be dependent on the aim of the project. However, when starting with an area devoid of native vegetation cover, the plantings should be established at a density that will result in rapid canopy closure so that exotic species are excluded. Experience has shown that planting trees and shrubs spaced at 1.5 m centres achieves this aim. Wider tree spacings often mean there is a longer time before canopy closure and therefore a prolonged period of weed control.

The same principle applies to the establishment of ground layer and open wetland vegetation where there is an absence of overstorey elements. In this instance, to achieve the closure of vegetation and reduction of weeds it is necessary to plant at much tighter centres of at least 2-5 plants/m². Higher density planting is also desirable at the edges of revegetation areas to reduce edge effects.

The following densities are considered favourable natural regeneration parameters to achieve effective shading of weeds. Planting should be, as a minimum planted at the following densities:

- 1 native plant per 1m² across the ground stratum of the MU
- 1 native plant per 5 m² across the shrub stratum of the MU
- 1 native plant per 10 m² across the sub-canopy stratum of the MU

Source: Chenoweth EPLA and Bushland Restoration Services. (2012). *South East Queensland Ecological Restoration Framework: Manual*. Brisbane: Prepared on behalf of SEQ Catchments and South East Queensland Local Governments

Additionally, seed collection from the site should be carried out for canopy species over the period of the rehabilitation works and be spread into rehabilitation areas where canopy is lacking. Once invasive shrub species have been removed the shrub and ground layer species will be spread throughout the site to promote the colonisation of these species in areas previously dominated by invasive species.

5.2.4 Offset Objectives

Details on specific management actions for MU are located in **Section 6** of this OMP, as well as Thagoona Offset Rehabilitation Management Plan (**Attachment 3**).

6. Offset Management Actions

There are five categories of management actions that are considered as necessary and appropriate for achieving the stated offset objectives. The primary purpose of these management actions is to either reduce or remove an existing threat or improve or create new habitat opportunities. In some instances, there is an overlap in the measurable outcomes of different management actions.

Performance indicators that are referenced in this section are those that were established and documented in **Section 6** of the Preliminary Documentation Report (28 South Environmental, 2026). This includes the use of the MHQA method for Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*) habitat to set benchmarks and targeted improvements within the Thagoona Offset Area.

Actions to be completed in accordance with this OMP are covered by plans, as follows:

- **Action 1:** Integrated vertebrate pest management plan
- **Action 2:** Biosecurity management plan
- **Action 3:** Fencing, access and signage plan
- **Action 4:** Fire management plan
- **Action 5:** Revegetation and habitat creation plan.

6.1 Action 1: Integrated Vertebrate Pest Management Plan

As acknowledged in **Section 4.2.5**, various pest invertebrate species could utilise the Thagoona Offset Area. The management plan presented in **Table 14** provides actions and measures to limit the detrimental effects of these confirmed invertebrate pest species. The management plan presented in **Table 14** provides actions and measures to limit the detrimental effects of these confirmed invertebrate pest species. An Integrated Vertebrate Pest Management Plan for the Woolshed Offset Area has been developed and is attached in **Attachment 4**.

Table 14: Management plan for Action 1

Action Description	- Reduce the occurrence of vertebrate pest species through implementation of targeted, species-specific management and an audit program - Reductions will contribute habitat quality increase throughout the offset by reducing threats for ground traversing fauna. - Ongoing active vertebrate pest management measure leading to a long term reduction (trend) in vertebrate pest fauna as represented by reductions in vertebrate pest fauna activity index derived from annual vertebrate pest camera trapping.	
Location	Integrated Vertebrate Pest Management is to occur across all RMUs.	
Timing	Activity	Responsibility
Year 1	Implement the Vertebrate Pest Management Plan (VPMP) (Attachment 4) , which specifies: - Target species (i.e. those confirmed or suspected of occurring on site based on baseline survey data) - Survey data, including mapping, generated from the baseline survey. - An on-site recording protocol for incidental observations of pest management species by the Offset Provider and neighbouring landholders. - Performance criteria for the management of pest. - Corrective action procedure to be followed in the event that monitoring indicates that the adopted management techniques are not achieving the established performance criteria.	Offset Provider Environmental Consultant
	Establishment of wildlife-friendly fencing around the full perimeter of the Thagoona Offset Area.	Offset Provider
Years 1-10	- Implement intensive pest management techniques, supplementary to fencing. Techniques may include baiting, trapping and if deemed necessary - shooting. Noting the size and shape of this property, shooting can only be undertaken on Site in a south-westerly direction (i.e. a bullet cannot pass over a road or property boundary), but in any event, such shooting must be safe, carried out by an appropriately licensed pest shooter and in line with the <i>Weapons Act 1990</i> (Qld). Given the difficulties that may arise through shooting, preference is given to trapping and baiting for pest control. Such control is to be undertaken in accordance with the Integrated Vertebrate Pest Management Plan. - Undertake annual vertebrate pest / predator monitoring and reporting to assess threat situation.	Offset Provider

	Adaptively adjust annual mitigation measures commensurate with risk / threats identified by annual reporting.	
Years 11 – 20	- Implement moderate effort pest management techniques, subject to performance criteria being met. - Undertake annual vertebrate pest / predator monitoring and reporting to assess threat situation. - Adaptively adjust annual mitigation measures commensurate with risk / threats identified by annual reporting.	Offset Provider
Each year	Undertake annual monitoring as part of the Integrated Vertebrate Pest Management Plan. Data and mapping to be included in the Offset Area Annual Compliance Report (ACR (Offset)). Include a data comparison between each year's pest census data and the baseline (Year 1) dataset. Data to be reported in the relevant year's ACR (Offset) with tracking assessed against the performance criteria. Each year's ACR (Offset) is to include proposed adaptive amendments to the VPMP for future years, based on the success of techniques utilised over the previous 12 months. ACR (Offset)s include maps of initial baseline data, then subsequent management actions, efforts, locations of pest species habitat (e.g. dens) or individuals destroyed. Koala (<i>Phascolarctos cinereus</i>) mortality data is to be presented with likely causation identified (pest interaction, or other identifiable cause of death).	Offset Provider
Monitoring & Measurement	The effectiveness of pest management measures that are implemented will be measured and monitored as follows: Years 1 – 10 – annual pest surveys to measure progress towards completion criteria. Years 11 – 20 - pest surveys every second year to measure progress towards completion criteria. The findings from each of these pest surveys will be documented in that year's ACR (Offset).	
Risks & Adaptive Management	The VPMP includes intensive implementation methods and annual data collection survey events for monitoring successful reduction of pest management impacts. The repeat survey points are designed to deliver data on outcomes being achieved. If the surveys do not demonstrate the targeted effectiveness of the implementation strategy it will be adjusted to: - Adopt new management techniques. - Increase successful techniques and reduce less successful management methods, with evidence of success/failure presented in the relevant years' ACR (Offset). - Increase intensity of implementation program. - Change the timing or locality of proposed target treatment locations or events. - Allow the Management Plan to assimilate into any new broader threat abatement programs. The VPMP will use the baseline data to build a calendar of annual activities based around varying control methods, seasons and species. The threat abatement actions and outcomes within any calendar year will be reported on within the ACR (Offset) and will provide a number of lead indicators towards a reduction in occurrence and impacts.	

	A pest management summary table is to be included in each ACR (Offset) identifying the management techniques implemented for each pest species in any one year. This table is to be expanded upon year-on-year to provide consolidated tracking of management techniques implemented over the offset delivery period. Major survey and review periods are set to ensure the program achieves long term reduction and does not respond to specific stochastic events such as a fluctuation in pest populations. If Koala (<i>Phascolarctos cinereus</i>) mortality is observed (such monitoring should occur incidentally through the day-to-day delivery of the offset – consequently, this is not aligned with any formal monitoring activity described in Section 6.6) at the Offset Area, the dead Koala (<i>Phascolarctos cinereus</i>) must be taken to a Koala hospital or Veterinarian to confirm cause of the death. If this is confirmed to occur through pest predation, immediate revaluation of the VPMP is required. If the death was confirmed to be caused by a wild dog: ▪ An additional baited camera trap round will be deployed ▪ Supplementary animal management (shooting or baiting) will be implemented. ▪ Increase intensity of implementation program and reassess after 6 months. ▪ Change the timing or locality of proposed target treatment locations or events. ▪ While events such as fire, drought, grazing by livestock, browsing by feral herbivores, vandalism through uncontrolled access are rare and can be managed by the contractor: ○ within six months of the event, restoration works are to replace losses and reporting within the ACR (Offset) is required ○ within six months of rectification evidence of impacts and rectification measures are to be reported in the following ACR (Offset).
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6.2 Action 2: Biosecurity Management Plan

The management plan presented in **Table 15** provides actions and measures to limit the detrimental effects of potential confirmed pest plant species. A Biosecurity Management Plan for the Woolshed Offset Area has been developed and is attached in **Attachment 5**.

Table 15: Management plan for Action 2

Action Description	▪ Removal and control of all major weed infestations within the Thagoona Offset Area using a variety of mechanical and herbicide methods. Targets will be 95% eradication of WoNS and Category 3 (Biosecurity Act 2014 (Qld)) infestations by year 20, with demonstrated annual reductions years 2-10, and environmental weed cover to be reduced to below 5% of the site by year . ▪ Ongoing maintenance rotations to retain extents of weed infestations within the Thagoona Offset Area at or below the reduced extent achieved through weed management actions. ▪ Prevent the further spread or establishing of new weed outbreaks within the Thagoona Offset Area.
Location	Management of non-native weeds is to occur across the entire Thagoona Offset Area.

Timing	Activity	Responsibility
Years 1-20	- Implement Biosecurity Management Plan (BMP) in Year 1. - Implement BMP in Year 1 (Attachment 5). - Undertake weed surveys and weed management control activities within the Thagoona Offset Area, in accordance with the endorsed BMP. Activities conducted in the reporting period are to be included in the relevant ACR (Offset) and Project ACR. - Undertake weed monitoring and reporting to assess weed threat situation and assess trends in coverage in line with action goals (eradication of WoNS and Category 3 (Biosecurity Act) infestations by year 10, with demonstrated annual reductions years 1-10, and locally significant are to be reduced to below 5% of the Offset Area by Year 20). - Adaptively adjust annual mitigation measures commensurate with risk / treats identified by annual reporting	Offset Provider Environmental Consultant
	Include a data comparison between each year's weed survey data and the baseline (Year 0) dataset. Data to be reported in the relevant year's ACR (Offset) and ACR with performance assessed against the completion criteria.	Offset Provider Environmental Consultant
	Each year's ACR (Offset) is to include proposed adaptive amendments to the BMP for future years.	Offset Provider Environmental Consultant
Monitoring and Measurement	The effectiveness of weed management measures that are implemented will be measured and monitored as follows: Years 1 to 10 – detailed weed surveys (monitoring) to measure progress towards completion criteria. Years 11 to 19 - weed surveys every second year to measure progress towards completion criteria. Year 10 - no WoNS or State weed species within Offset Area, including revegetation zones present at year 10. Year 20 – final weed survey to measure final achievement with completion criteria at the end of the offset period - no WoNS or State weed species within Offset Area - Locally significant are to be reduced to below 5% - In comparison to baseline weed assessment results (Attachment 2). Pasture grass species to show a gradual reduction in cover and species abundance over the OMP period. The findings from each of these weed surveys will be documented in that year's ACR (Offset).	
Risks & Adaptive Management	If surveys demonstrate that the Offset Area is not trending towards achieving the completion criteria (90% eradication of WoNS and Category 3 (<i>Biosecurity Act 2014</i> (Qld)) infestations by year 10, with demonstrated annual reductions years 2-10, and Locally significant are to be reduced to below 5% of the site by year 20), the following corrective actions will be implemented:	

	▪ Adopt new management techniques ▪ Increase successful techniques and reduce less successful management methods ▪ Increase intensity of implementation program ▪ Change the timing or locality of proposed target treatment locations or events. ▪ Where weed re-establishment is detected and mapped by weed monitoring occurs, revise weed action planning for the following year to facilitate additional treatment (fire, mechanical, chemical, dependent upon the on-ground situation e.g. extent of the outbreak, condition of revegetation / new natural recruitment and removal works are to be instigated: ○ within three months of detection, noting that treatment during non-growth periods may be ineffective and are best targeted during growth periods for greater effectiveness treat all WoNs and Category 3 (Restricted) Biosecurity Act 2014 weeds with methods to avoid impacts to restoration works (mechanically or chemically dependent on circumstances). ○ within 3 months of detection undertake an investigation of the potential source point of seeding. ○ within six months of detection undertake additional treatment and removal works, which are to be followed up during the next potential growth period to avoid regeneration and potential seeding events.
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6.3 Action 3: Fencing, Access and Signage Plan

The management plan presented in **Table 16** provides actions and measures to manage access, signage and fencing.

Table 16: Management plan for Action 3

Action Description	Prevention / control of unauthorised access and trespass through the Offset Area.	
Location	The full perimeter of the Thagoona Offset Area will be fenced, utilising a wildlife-friendly fence design, consistent with the Koala-Sensitive Design Guidelines (DES, 2022). Nominally this will be a four-strand straight gauge wire. Advisory prohibited access signage to be installed and maintained at 200 m intervals along fenced boundaries.	
Timing	Activity	Responsibility
Year 1	Inspection and rectification of all external fence boundaries. Removal of all barbed wire from the Thagoona Offset Area. Wildlife friendly, permeable fencing to be installed around the whole external boundary of the Thagoona Offset Area, except where provision of such fencing cannot be resolved with the adjoining landowner. Such wildlife friendly fencing is to be comprised of straight gauge wire at the very least along the bottom and top strand of the fence.	Offset Provider

	Notification of the Thagoona Offset Area purpose and intended outcomes to all adjoining landholders.	Offset Provider
	Access gates and signage (signage to be installed at 200 m intervals along the Thagoona Offset Area boundary and, on all gates) to be installed where area fencing crosses tracks and entry points. Entrance gate signage to include offset management mobile number and biosecurity management notice.	Offset Provider
At all times	No new access tracks through the area unless to support offset outcomes.	Offset Provider
Monitoring and Measurement	▪ A copy of the notification letter provided to adjoining landholders to be provided with the Year 1 ACR (Offset). ▪ Evidence (photos) of signage installed on gates and perimeter fencing to be provided with the Year 1 ACR (Offset). ▪ The effectiveness and suitability of fencing arrangements will be monitored as a component of surveys conducted for pests. ▪ The security and signage of gates will be monitored opportunistically through the course of day-to-day management of the Offset Area and following natural hazard events. As a minimum, each access point into the Offset Area will be inspected every three months. ▪ Similarly, the condition of access tracks will be monitored opportunistically through the course of day-to-day management of the Offset Area and following natural hazard events. As a minimum, each access track will be inspected every three months.	
Risks & Adaptive Management	The effectiveness and suitability of fencing arrangements will be monitored as a component of surveys conducted for pests. For example, if pest surveys identify an increased presence of pest species in the Thagoona Offset Area, the merits of additional or alternative fencing arrangements will be assessed to provide improved deterrence. ▪ If there are signs of vandalism or unauthorised access, additional deterrent measures such as improved signage or surveillance will be considered. ▪ Defective or ineffective fencing will be rectified/modified as necessary, within 30 business days of issues being identified. ▪ Signage will be replaced if found to be missing, faded or otherwise illegible within 30 business days of issues being identified. ▪ Defective access tracks will be rectified as necessary, within 30 business days of issues being identified. ○ within six months of the event, restoration works are to replace losses and reporting within the ACR (Offset) is required ○ within six months of rectification evidence of impacts and rectification measures are to be reported in the following ACR (Offset). ▪ All corrective actions will be documented in the ACR (Offset).	

VISITORS

A BIOSECURITY MANAGEMENT PLAN APPLIES TO THIS PLACE

This is a management area for the Biosecurity Management Plan that applies to this place.

It is an offence for a person entering, present at, or leaving a management area to fail to comply with the measures stated in the Biosecurity Management Plan for the area unless the person has a reasonable excuse.

FARM CHECK-IN



Scanning and completing the Farm Check-In is a condition of the Biosecurity Management Plan.

All visitors must scan the QR code and complete the form prior to entering this property.

Use the email address on this sign to send a copy to the property owner.

You must contact us or visit our office before entering the property to obtain information about the Biosecurity Management Plan and your biosecurity obligations under the *Biosecurity Act 2014*.

Vehicles, people and equipment can carry diseases, weed seeds and pests.

Phone / UHF channel: _____

Email: _____

Inset 6: Example signage – ‘Biosecurity Management Plan

Biodiversity Offset Area

Protected by Voluntary Declaration under
the *Vegetation Management Act 1999*

No Unauthorised Entry

Trespassers will be prosecuted
In case of emergency, contact + 61 XXX XXX XXX

Inset 7: Example signage – ‘No Unauthorised Entry’

6.4 Action 4: Fire Management Plan

The management plan presented in **Table 17**, provides actions and measures to limit the detrimental effects of wildfire, and the use of low intensity mosaic burning as the primary means of managing accumulated pasture grass biomass and promote germination and ecosystem health within the Thagoona Offset Area.

Table 17: Management plan for Action 4

Action Description	Manage created bushland habitat within the Thagoona Offset Area to prevent and / or minimise the impact of high intensity fires. - Establishing supplementary water storages on high points within the Thagoona Offset Area for combined use for firefighting and revegetation watering in line with the requirements of the Wildfire Management Plan. - Monitoring and management of fuel loads through the Thagoona Offset Area. - Creation and alteration of existing fire breaks in support of habitat improvement, expansion and revegetation areas (consider new tracks and breaks in replanting programs). - Establishment of safety and emergency response protocols for wildfire events. If any damage is sustained, an inventory is to be included in the reporting information.	
Location	Variable wildfire risk across the Thagoona Offset Area in its current condition. As the units become better established, vegetation across the whole Offset Area will be able to support the establishment and spread of fire. The Offset Provider will manage this risk.	
Timing	Activity	Responsibility
Year 1	A suitably qualified bushfire consultant will be commissioned to develop an Offset Area Wildfire Management Plan, which, as a minimum, is to include: - Results of base line fuel load surveys. - Method and metric for maintaining fuel loads and decreased risk levels. - Plan of fire tracks, trails and breaks. - Development of a system of internal breaks and fire management zones. - Program for control burns which must consider and incorporate cultural burns (if possible). - Methods for weed control through controlled burns. - Consultation strategy with local branch of the Queensland Rural Fire Service. - Plan to be endorsed by the Queensland Rural Fire Service. - Establishment of safety and emergency response protocols for wildfire events. If any damage is sustained, an inventory is to be included in the reporting information.	Offset Provider

Years 2-20	Implement the Offset Area Wildfire Management Plan. The Key Performance Indicators of management success are: ▪ Biomass management activities are implemented in accordance with the Wildfire Management Plan. ▪ Installation of water storage facilities through the Offset Area to increase wildfire fighting capacity. ▪ Vehicle tracks are well-maintained (i.e., no scouring, free of fallen timber, slashed on a 6-month cycle, and 'boggy' areas are filled with road base) to ensure they are trafficable at all times. ▪ Management is to be reported annually.	Offset Provider
Monitoring and Measurement	▪ Fuel load assessments to be conducted twice annually at the conclusion of the wet season (March-April) and again at the onset of the wet season (September – October) (utilising the methods described within section 6.6.4. The results of monitoring will prompt the following triggers: ○ Low–Moderate fuel load - Continue routine annual monitoring. ○ High fuel load - Review fuel accumulation trends and assess whether management is warranted in conjunction with habitat condition and seasonal outlook. ○ Very High fuel load - assess the need for fuel reduction measures (e.g. ecological burning or weed management), considering ecological objectives and prevailing fire risk. ○ Extreme fuel load - Implement fuel reduction measures where appropriate and consistent with ecological requirements. Repeat fuel hazard monitoring following management to assess effectiveness. ▪ No wildfires entering the Thagoona Offset Area except under extreme circumstances. ▪ No fires developing on the site and spreading outside of the site to surrounding areas. ▪ Revegetation plantings must not be burnt. ▪ No reported deaths of Koala (<i>Phascolarctos cinereus</i>) from wildfire within the ACR (Offset). ▪ No established trees, including trees containing hollows are to be burnt. ▪ Mosaic burning techniques to be implemented under the approval and supervision of the local fire service. ▪ No reduction (temporary or permanent) in the available foraging and food trees for Koala (<i>Phascolarctos cinereus</i>) during the offset period as a result of wildfire. Biomass and grass height to be maintained low around fauna infrastructure, particularly when fire index is considered to be at moderate to high levels/seasonally ▪ The approved Offset Area Fire Management Plan is to be included within the Year 1 ACR (Offset) and incorporated into the ACR. ▪ All Wildfire Management Plan activities that are conducted (tracks, burns, fuel load reduction, etc) are to be documented within the relevant ACR (Offset).	
Risks & Adaptive Management	Fire is a natural occurrence within open Eucalypt woodland and within time bushland will recover from even major events. Regardless, if a major wildfire event occurs within the Thagoona Offset Area during the offset period the following adaptive management actions will occur (these points also stand if a bushfire is to occur at the Offset before the Year 1 Wildfire Management Plan is prepared): 1. A post wildfire audit of the damage and cause of the wildfire (where it commenced, direction and area it moved through, which AUs sustained the greatest damage and why, recommendations on actions which could be incorporated to avoid or minimise any future events)	

	- An Offset Area Recovery Plan would be prepared scheduling actions to expedite the recovery and reinstatement of values destroyed by fire. - The Offset Area Wildfire Management Plan would be revised to adopt recommendations and strategies from the post fire event audit. - Wildfire events and emergency response activities are to be reported to the Department within 10 business days of an event. If any damage is sustained, an inventory is to be included in the reporting information. Additional maintenance and adaptive management measures are as follows: - Supplementary water storages are to be refilled within a fortnight of stored volumes dropping below 75% of capacity. - If the engaged qualified bushfire consultant determines that fuel loading (as determined from annual monitoring) warrants a hazard reduction burn, a burn will be conducted in accordance with the endorsed Offset Area Wildfire Management Plan.
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6.5 Action 5: Revegetation (Habitat Creation) Activities

Revegetation actions, including location, timing, monitoring and adaptive management, are presented in the Thagoona Offset Rehabilitation Management Plan which is included within **Attachment 3**. Opportunities will be explored to salvage coarse woody debris, and other ground-based habitat features from the Impact Site and translocate to the Thagoona Offset Area for use in rehabilitation. Biosecurity restrictions are to be considered when assessing the merits of this rehabilitation approach.

The management actions presented in **Table 18** **Error! Reference source not found.**

Table 18: Management plan for Action 5 - Revegetation

Action Description	Broadscale weed removal of MU1 and MU2 with selective planting where necessary. Actions broadly consist of: - The removal of exotic woody weed species - The removal of livestock and culling of feral animals - The use of controlled burns in accordance with Regional Ecosystem Description fire management guidelines - Selective supplementary and infill planting, as required to ensure the species mosaic and strata of the target vegetation communities are being achieved. The planting palettes for MU1 and MU2 are specified in the Thagoona Offset Rehabilitation Management Plan (Attachment 3).	
Location	Restoration efforts will occur across all MUs.	
Timing	Activity	Responsibility
All Years	Implement the Thagoona Offset Rehabilitation Management Plan (Attachment 3)	Offset Provider

	The Offset Provider is responsible for: - Engaging experienced and trained staff to undertake planting, watering and other revegetation and habitat management activities. - Preparing and issuing ACR to the Proponent and Department within contracted timeframes.	
Monitoring and Measurement	A census survey of Koala (<i>Phascolarctos cinereus</i>) and Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>) will be conducted within the Offset Area every second year. As a minimum, surveys will include Spot Assessment Technique (SAT) and spotlighting or other emerging techniques appropriate for identifying the relevant protected matters on steep sites (eg thermal drone assessments, detection dogs). Koala (<i>Phascolarctos cinereus</i>) census survey data will be reported annually in the relevant year's Annual Compliance Report. Habitat quality interim performance targets and completion criteria are set out in Section 6.6 of this OMP Offset progress should be on track with these targets at each Year 5, 10, 15 and 20 milestone. Attachment 3 establishes the following Monitoring procedures: - Monitoring locations must remain consistent throughout the implementation period and be supported by repeat photographic records. - Photographs shall be taken in directions of true north, east, south and west at each monitoring site. - The plot should be marked with star pickets and a yellow safety cap securely fixed for ease of identification in the field. All works and chemicals used should be logged and documented as part of the Monitoring Program. - Monitoring will be defined by three distinct periods: - Establishment Period 3 Month reporting - Maintenance Period Years 6 Month reporting - Ongoing Maintenance Period 12 Month reporting <u>Monitoring Data Collection Requirements</u> The following information must be collected during monitoring events and included in progress reporting: - Survival and condition of planted vegetation, including an estimate of the number of dead or declining plants; - Number and species of replacement plants installed since the previous monitoring event; - Estimated percentage weed cover within each ANR area and management unit; - Extent and density of natural regeneration within each ANR area and management unit; - Photographic records from established permanent photo monitoring points; - Evidence of weed treatment effectiveness and any follow-up actions undertaken; - General observations regarding vegetation health, site condition and restoration trajectory; and	

- Recommendations for corrective actions or adaptive management measures where required.

Monitoring results should be used to assess progress toward the Success Criteria, and inform any necessary adaptive management responses

- A Monitoring and Evaluation Checklist is set out on Sheet 2019-100E-OS2-104 of **Attachment 3**.

The restoration contractor should develop a pro-forma for the collection of relevant monitoring information during all events to ensure consistency and comparability between surveys. Where actions are required to address instances of non-compliance or plant failure, corrective actions are to be implemented by the rehabilitation contractor.

Monitoring should incorporate the matters described within **Attachment 3** track progress towards the Success Criteria.

SUCCESS CRITERIA

The *South-east Queensland Ecological Restoration Framework* (Chenoweth EPLA and Bushland Restoration Services, 2012) notes that density at which plants are spaced will be dependent on the aim of the project. However, when starting with an area devoid of native vegetation cover, the plantings should be established at a density that will result in rapid canopy closure so that exotic species are excluded. Experience has shown that planting trees and shrubs spaced at 1.5m centres achieves this aim. Wider tree spacings often mean there is a longer time before canopy closure and therefore a prolonged period of weed control. The same principle applies to the establishment of ground layer and open wetland vegetation where there is an absence of overstorey elements. In this instance, to achieve the closure of vegetation and reduction of weeds it is necessary to plant at much tighter centres of at least 2-5 plants/m².

Higher density planting is also desirable at the edges of revegetation areas to reduce edge effects.

Successful Natural Regeneration parameters within the rehabilitation areas must reflect the following as a minimum or higher:

- An average of:
 - 1 native plant per 1m² across the ground stratum of the MU;
 - 1 native plant per 5 m² across the shrub stratum of the MU;
 - 1 native plant per 10 m² across the sub-canopy stratum of the MU;
 - 1 native plant per 10 m² across the canopy stratum of the MU; or
 - Will be assessed through annualised reporting procedures to track progress in achieving interim habitat quality gains (see **Section 6.5 and Section 6.6**).
- The acceptable target for rehabilitation within all Management Units is 90% success rate of all planted tubestock following a comprehensive planting, monitoring and maintenance during the rehabilitation stage
 - Will be assessed through annualised reporting of habitat quality gains (see **Section 6.5 and Section 6.6**), though internal monitoring /reporting defined in the Works/monitoring Checklist can assist in tracking success.

This will assist in achieving compliance with the overarching OMP by:

- Eradication of WoNS and weeds listed under *the Biosecurity Act 2014* (Qld) (**Attachment 2**).
- Less than 5% of locally significant weeds on Site.

	○ <u>Will be assessed</u> through annualised reporting procedures to track progress in weed reduction against baseline data (see Section 6.2 and Section 6.6). ▪ Achieving interim habitat quality gains (see Section 6.5 and Section 6.6).
Risks & Adaptive Management	If Koala (<i>Phascolarctos cinereus</i>) or Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>) are observed utilising the Thagoona Offset Area, census data will be analysed for year-on-year trends using a statistical method that is suitable for the size of data set at hand. The need for causation analysis will be triggered if the number of individuals occurring within the Thagoona Offset Area is assessed as a) declining by a statistically significant margin over the course of one year; or b) declining consistently over three consecutive years, regardless of statistical significance. ▪ If causation analysis identifies that the reduction in specimen records is attributable to factors that are controllable within the Offset Area, appropriate corrective actions will be implemented to rectify the issues (refer adaptive management actions for Actions 1-5). Specific revegetation criteria and corrective actions are provided within Attachment 3, this is outlined below: ▪ If retained trees show signs of ill health (i.e. dead or poor health): ○ An arborist is to be engaged to identify likely causes and to recommend mitigation measures to improve regeneration conditions. ○ The Rehab Contractor will engage a suitably qualified professional to identify the likely cause of health decline and apply recommended mitigation measure/s to improve growing conditions (as recommended by the suitably qualified professional). ○ Remove ill or dead plantings, within six months of detection and undertake any remediation works and re-establishment planting. ▪ Where plant failure of >10% of the planted stock occurs during the establishment period: ○ Supplementary planting will be undertaken within six months or the next appropriate planting period (whichever comes first) of detection. ○ Should the planting fail again, within one month of detection, the Rehab Contractor is to engage a suitably qualified professional to identify the likely cause of plant failure. ○ Apply recommended mitigation measure/s to improve growing conditions (as recommended by the suitably qualified professional). ▪ Where weed re-establishment occurs, additional treatment and removal works are to be instigated: ○ Within three months of detection, noting that treatment during non-growth periods may be ineffective and are best targeted during growth periods for greater effectiveness treat all WoNs and Category 3 (Restricted) Biosecurity Act 2014 (Qld) weeds with methods to avoid impacts to restoration works (mechanically or chemically dependent on circumstances). ○ Within 3 months of detection undertake an investigation of the potential source point of seeding. ○ Within six months of detection undertake additional treatment and removal works are to be followed up during the next potential growth period to avoid regeneration and potential seeding events. ▪ Where planted specimens within the establishment and monitoring period (i.e. 48 months) fail to strike: ○ Supplementary planting will be undertaken within six months or the next appropriate planting period (whichever comes first) of detection.

- o Should the planting fail again, within one month of detection, the Rehab Contractor is to engage a suitably qualified professional to identify the likely cause of plant failure.
- o Apply recommended mitigation measure/s to improve growing conditions
- Where growth rates are not as expected (following BioCondition / MHQA assessment at years 1, 3, 5, 7, 9, 10, 11, 13, 15, 17 ,19) (see **Section 6.6**):
 - o within three months of detection engage a suitably qualified professional to review the plantings and advise on methods to increase growth rates through other interventions.
 - o within three months of detection undertake soil testing to determine what rate of soil ameliorants or fertilizers may be required to improve the chemical balance of the soils for improved plant growth.
 - o within 12 months of detection revise management plan for rehabilitation revise management actions for the offset.
 - o within 24 months of detection if the corrective actions have not amended the slowing Discuss with the Department to negotiate changes to timeframes to meet the completion criteria.
 - o Within 12 months of discussing growth rates with the Department Revise the OMP and submit to Minister for approval.
- Where growth rates are not as expected (following establishment monitoring Year 0 – Year 5 post planting):
 - o within three months of detection engage a suitably qualified professional to review the plantings and advise on methods to increase growth rates through other interventions.
 - o within three months of detection undertake soil testing to determine what rate of soil ameliorants or fertilizers may be required to improve the chemical balance of the soils for improved plant growth.
 - o within 12 months of detection revise management plan for rehabilitation revise management actions for the offset.
 - o within 24 months of detection if the corrective actions have not amended the slowing Discuss with the Department to negotiate changes to timeframes to meet the completion criteria.
 - o within 12 months of discussing growth rates with the Department Revise the OMP and submit to Minister for approval.

6.6 Summary Monitoring Schedule

A monitoring schedule is developed to ensure the above management actions are implemented and suitably adapted over the life of the OMP (20 years) in response to the progression of monitoring results. The following overarching monitoring tasks will assist to inform particular management actions:

- Vertebrate pest fauna and weed monitoring
 - o Action 1: Integrated Vertebrate Pest Management Plan
 - o Action 2: Biosecurity Management Plan
- General site inspections will monitor and report on the following management actions
 - o Action 3: Fencing, Access and Signage Plan
 - o Action 4: Fire Management Plan
 - o Action 5: Revegetation and Habitat Creation Plan
- Management Actions for Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*)
 - o Action 5: Revegetation and Habitat Creation Plan

Reports cover:

- Offset Area Compliance Annual Report
 - o Outlines management activities undertaken in the reporting period (Fencing, fire management, weed control, pest control, revegetation)
- Annual Compliance Report
 - o Outlining compliance with approval conditions

Table 19 presents the 20-year monitoring schedule for the delivery of the Offset.

Table 19: Summary of Monitoring Schedule Over the 20-Year Offset Monitoring Period

Year	Monitoring / Survey						Report	Responsibility
	General site inspection	Pest	Weed	Vegetation community	Koala and Grey-headed Flying-fox ^	Fuel monitoring		
0	✓ B	✓ B	✓ B	✓P, T	✓B	✓B	ACR (Offset)	Offset Provider
1	✓	✓	✓	✓P, T	✓	✓	ACR (Offset)	Offset Provider
2	✓	✓	✓			✓	ACR (Offset)	Offset Provider
3	✓	✓	✓	✓P, T	✓	✓	ACR (Offset)	Offset Provider
4	✓	✓	✓			✓	ACR (Offset)	Offset Provider
5	✓	✓	✓	✓P, T	✓	✓	ACR (Offset) Independent audit of the ACR documented in a Year 5 Offset Audit Report	Offset Provider and Auditor (suitably qualified ecological professional)
6	✓	✓	✓			✓	ACR (Offset)	Offset Provider
7	✓	✓	✓	✓P, T	✓	✓	ACR (Offset)	Offset Provider
8	✓	✓	✓			✓	ACR (Offset)	Offset Provider
9	✓	✓	✓	✓P, T	✓	✓	ACR (Offset)	Offset Provider
10	✓	✓	✓	✓P, T	✓	✓	ACR (Offset) Independent audit of the ACR documented in a Year 10 Offset Audit Report	Offset Provider and Auditor (suitably qualified ecological professional)
11	✓	✓	✓	✓P, T	✓	✓	ACR (Offset)	Offset Provider
12	✓					✓	ACR (Offset)	Offset Provider
13	✓	✓	✓	✓P, T	✓	✓	ACR (Offset)	Offset Provider

Year	Monitoring / Survey						Report	Responsibility
	General site inspection	Pest	Weed	Vegetation community	Koala and Grey-headed Flying-fox ^	Fuel monitoring		
14	✓					✓	ACR (Offset)	Offset Provider
15		✓	✓	✓P, T	✓	✓	ACR Independent audit of the ACR documented in a Year 15 Offset Audit Report	Offset Provider
16	✓					✓	ACR (Offset)	Offset Provider
17	✓	✓	✓	✓P, T	✓	✓	ACR (Offset)	Offset Provider
18	✓					✓	ACR (Offset)	Offset Provider
19	✓	✓	✓	✓P, T	✓	✓	ACR (Offset)	Offset Provider
20	✓	✓	✓	✓P, T	✓	✓	ACR (Offset) Independent audit of the ACR documented in a Year 20 Offset Audit Report	Offset Provider and Auditor (suitably qualified ecological professional)

Notes:

B = Baseline, P = Primary sites, T = Tertiary sites

^ = If offset species are detected on site, monitoring will be conducted at annual intervals from that point onwards for the balance of the offset period.

6.6.1 Weed Monitoring

Weed monitoring will be undertaken using an informed random meander assessment methodology consistent with that applied during the baseline survey (Cropper (1993)).⁵ The use of the same methodology will enable direct comparison with baseline conditions and allow changes in weed distribution, abundance and infestation extent to be assessed over time.

During each monitoring event, target weed species observed within the Offset Area will be recorded. Where infestations are identified, point or polygon data will be collected to document species identity, location and infestation density. Spatially extensive infestations will be mapped as polygons to facilitate comparison with baseline mapping and previous monitoring results.

Where polygons are captured, they will represent relatively large infestations. Infestation density will be categorised using the following criteria:

- Low density – > five (5) individuals with a sparse distribution;
- Medium density – > five (5) individuals with a clumped and disconnected distribution; and
- High density – > five (5) individuals with continuous vegetation forming a large clump.

For smaller species that do not typically occupy large areas (e.g. Fireweed (*Senecio madagascariensis*)), point records will be collected and classified according to the following abundance categories:

- Low – 1–5 stems; and
- Medium – 6–25 stems.
- High - > 25 stems

Monitoring results will be compared against the baseline survey and previous monitoring events to assess changes in weed occurrence, abundance and spatial extent, and to inform reporting on progress towards weed management objectives.

6.6.2 Pest Monitoring

The Offset Area will be monitored for vertebrate pest animal activity to respond to *Management Action 1– integrated vertebrate pest management (Section 6.2)*.

Vertebrate pest monitoring will be undertaken to inform species composition, species' habitat preference, and rate of activity throughout the Offset Area. Monitoring activities will be reported as a Memorandum and attached to the Annual Compliance Report.

The following survey approach has been employed to inform the *Baseline Vertebrate Pest Assessment Memorandum (Attachment 1)* and will be repeated in general accordance with the monitoring schedule in **Table 19**. Spatial location data concerning the placement of each camera trap is provided in the Memorandum to allow for the accurate repetition of survey and subsequent comparative platform for species' activity index.

6.6.2.1 Camera Trap Survey

Each vertebrate pest fauna camera survey will consist of four (4) independent camera traps deployed for 10 survey nights, in accordance with the locations utilised for the Baseline vertebrate pest assessment (**Attachment 1**). This will yield a total of 40 camera trap survey nights. Camera placement at baseline locations will capture the heterogeneity of habitat within the site to adequately survey each Assessment Unit. The inclusion of four (4)

⁵ The random meander technique described by Cropper, 1993 (Cropper SC 1993, Management of Endangered Plants, CSIRO Publications Victoria). It is noted that although the technique was derived for identifying threatened plants in the field across a range of habitat types, the underlying assessment approach is useful for weed assessments.

cameras at the Thagoona Offset will allow for up to two (2) cameras in each Assessment Unit. Within each Assessment Unit, camera placement should be selected in-situ to target areas with greater probability of vertebrate pest fauna movement. In-situ habitat features selected for may include formed pathways through vegetation, watercourse and drainage lines, fence lines, access tracks, and potential shelter sites. The primary approach to camera distribution and placement is to (i) determine which habitat types vertebrate pest fauna are utilising, and (ii) within each habitat type, target habitat characteristics to yield the greatest probability of detection.

Each camera trap will be baited with a mixture of oats, sardines, peanut paste, vanilla essence and honey. Camera programming should be set to 24-hour operation, high sensitivity, three images per trigger, and a 1 second delay.

Camera trap data will be analysed to record each encounter with a target vertebrate pest fauna species. A single encounter (or trigger) is defined as the series of photographs programmed to result from motion detection. For example a trail camera set to record 3 photographs in quick succession following being triggered, would record a single activity index score for a triggering species, irrespective of whether the animal was recorded in one (1) or all of the images (i.e. one encounter). A number of triggered sequences would be recorded even if it was obvious the same animal triggered the event.

The rate of encounter does not inform population dynamics in terms of population measures of abundance or density, nor is the data statistically robust. Instead, the results demonstrate a rate of species-specific *activity* which allows for a comparative platform between monitoring events. The resulting rate of activity can be compared between monitoring events under the following methodology assumptions:

- i) The rate of species-specific activity, represented by the rate of encounter, will change in response to species population density
- ii) Where animal management has been undertaken, it is expected that this will be reflected in reduced species activity across the Offset Area, and
- iii) Where animal management is insufficient, this will be reflected in relatively unchanged or increased activity scores.

The rate of vertebrate pest fauna activity will be used as the measurable and comparable index to inform management actions and success between monitoring years. For the purposes of incorporation into the assessment of species-specific habitat assessment, an activity index scoring framework is further defined below.

The detectability of fauna species using remote cameras is influenced by differences in behaviour, activity patterns and habitat use. Feral Cat, Wild Dog, and European Red Fox are relatively cryptic and may have lower detection rates because they can move through a site cautiously, use established pathways, and may intentionally pass outside the camera's detection zone without triggering the sensor. In contrast, diurnal herbivorous species such as Deer and Feral Pig often spend extended periods foraging and moving through open areas, resulting in repeated movement within the camera's field of view and consequently this results in a greater number of camera triggers.

Therefore, the number of independent camera detections should be interpreted as a measure of relative activity and detectability, rather than a direct measure of abundance, with behavioural differences among species potentially resulting in substantially different detection rates for similar levels of site use. For this reason, the activity index table applies a unique scale to these distinct groups of common vertebrate pest fauna: Feral Cat, Wild Dog, and European Red Fox; and, Feral Deer species, Feral Pig, European Hare, and European Rabbit.

The activity index scale is divided into six categories, each representing a range of activity expressed as a percentage of the benchmark score. The activity index benchmark for carnivorous species is derived from the total number of survey trap nights (40), i.e. a site which yields a detection on each camera and each survey night would attain a high score. For omnivorous and herbivorous species, the benchmark is set at twice the total number of survey trap nights (80), recognising that these species generally generate more frequent camera detections due to their movement and foraging behaviour. The activity index will be scaled into an activity categorisation, as detailed in **Table 20** below.

This approach to activity scoring incorporates the complete dataset of encounters between camera traps and vertebrate pest fauna. The number of encounters is theoretically unlimited, being constrained only by the duration

of the survey period and the capacity of the monitoring equipment. To account for this, the activity scoring scale adopts a smaller and more conservative range, comparable to established approaches such as the Catling activity index (Catling, Burt, & Kooyman, 1997). Importantly, the use of encounter rate retains the underlying variation in activity between locations and species, allowing monitoring results to identify meaningful patterns that can inform targeted management actions and outcomes beyond that of incorporation into habitat quality assessment. The approach also allows a high activity score to be achieved at an individual camera location where activity is concentrated, which may be particularly relevant where a site represents a focal area of pest animal activity, such as a potential Wild Dog denning site.

Table 20: Vertebrate pest fauna activity index – scoring scale

Scaled score	Percentage	Activity Index	
		Predators (Wild dog, Feral Cat, and European Fox ⁶)	Herbivores (Pig, Deer, Hare) ⁷
Absent	0%	0	0
Very low	1-10%	1 - 15	1 - 30
Low	11-25%	16 - 38	31 - 75
Medium	26-50%	39 - 75	76 – 150
High	51-75%	76 - 113	151 - 225
Very high	≥76%	≥114	≥226

Survey timing, conditions, method, data analysis, and results reporting style will be adopted from the *Baseline Vertebrate Pest Assessment Memorandum (Attachment 1)*. The Memorandum will be updated following each monitoring event to form and guide pest management efforts. The Memorandum will be submitted to the proponent and relevant contractors as necessary.

It is most important for repeatability and relativity between sampling events that the same number of trail cameras are deployed for the same period of time, and the same locations for each sampling event. Details are these are contained in the baseline vertebrate pest assessment (**Attachment 1**). Seasonal variability in sampling may be exercised; however, it is recommended that sapling occurs during the period of presumed greatest activity; March to May for wild dogs, March to April for deer, June to July for Red Fox.

6.6.2.2 Opportunistic observation

Both direct and indirect (tracks, scats, and other traces) observations of vertebrate pest fauna will be captured throughout all Offset Area site visits. This may include the following events:

- Targeted fauna survey – spotlight survey
- Baits taken
- Pests destroyed via shooting events
- Vegetation survey
- Site inspections

⁶A high score is equal to an average of one trigger per camera per night (150 triggers)

⁷A high score is equal to an average of two triggers per camera per night (300 triggers)

Observations of vertebrate pest fauna will be compiled and reported in the Annual Compliance Report, and may inform adaptive management processes.

6.6.3 Habitat Quality and Vegetation Condition

6.6.3.1 Habitat quality for Offset Matters

The Offset Area will be monitored for vegetation condition and accumulation of habitat quality as it relates to the target offset matters subject to this OMP, Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*). Monitoring activities will respond to *Management Action 6 – Ecological Restoration and Matter Habitat Creation*.

Habitat quality for each Matter will be assessed in general accordance with the *Guide to Determining Terrestrial Habitat Quality: A Toolkit for Assessing Land-based Offsets, Version 1.2* (DEHP 2017), and the *BioCondition Assessment Manual – A condition assessment framework for terrestrial biodiversity in Queensland v2.2* (Eyre et al., 2015). The Guide to determining terrestrial habitat quality provides a consistent and repeatable methodology for evaluating habitat quality under the Queensland Environmental Offsets framework and sets out a structured, step-by-step process for assessing land-based Offset Areas. This methodology has been adopted and tailored to assess the suitability and quality of the Offset Area in relation to the offset matters.

The MHQA method which has been designed and applied to assess both the proposed action and the Offset which will acquit approved impacts to MNES are subject to the single approved MHQA methodology. The MHQA methodology is described for offset matters in the Preliminary Documentation report, to which this OMP is attached.

BioCondition/Habitat quality survey plots have been established across the Offset Area, and are allocated across the three assessment units. The spatial location of each the 0, 50, and 100 metre points on each transect line is provided in **Attachment 4** to ensure the accurate repetition of survey throughout the life of the offset. BioCondition data is provided in **Attachment 5**.

The monitoring schedule is intended to measure vegetation condition and progression biennially, with the exception of interim performance target years. This concept is embedded in the adaptive management framework which underpins this OMP. BioCondition survey and subsequent habitat quality analysis is therefore scheduled to be undertaken at years baseline (results of which are reported in the PD Report), odd numbered years (1,3,5,7,9, 11, 13, 15, 17, 19) and completion performance target years (5,10,15,20). The complete monitoring schedule is illustrated on **Table 20**.

Habitat quality survey will ideally take place towards the conclusion of the wet season (between February and April) when biomass and floristic diversity is greatest, and the accurate identification of flora is most probable due to the availability of reproductive material such as flowers and seed.

Vegetation condition data (BioCondition results) and subsequent habitat quality analysis will be detailed in the Annual Compliance Monitoring Report for the same year the survey is undertaken. Reports prepared from year 3 and subsequent years will include summary data from all previous years, and these will be presented to allow trend analysis of each of the measured attributes and will be used to assess progress towards achieving the interim performance targets and completion criteria.

6.6.3.1.1 Habitat Quality Gains

The key interim performance targets and completion criteria to be achieved through the delivery of the OMP (**PD Report, Appendix 12**) include increases in habitat quality scores for offset matters Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*). Habitat quality scores are calculated by assessing a range of indicators and ecological attributes that measure the overall viability of the offset and its capacity to support given MNES. The modified habitat quality assessment method applied to achieve overall habitat quality scores for Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*) have been adopted from Saunders Havill Group (SHG).

The management actions described within this OMP will ultimately lead to the general progression of vegetation condition and subsequent habitat quality. The success of management actions are therefore reflected in habitat quality scoring gains. Interim (years 5, 10, 15) and completion (year 20) habitat quality scores are predicted as a surrogate overall indicator of management success, and the overall progression towards the conservation outcomes of the Offset Site.

Interim performance targets have been detailed for each MNES across years 5, 10, 15 and 20. This was achieved through the detailed analysis of baseline condition scoring, the habitat quality scoring methodology, and the establishment of ecologically feasible outcomes within a 20-year management period. **Table 21** and **Table 22** presents the start (baseline) and future (completion criteria) habitat quality scores for each MNES and Offset Site. The start quality score for each MNES was determined as part of baseline surveys and were calculated generally in accordance with the MHQA, replicating the method used to quantify the habitat quality score for those MNES within the Impact Area. All future habitat quality scores will also be determined following the same method. The complete MHQA workings for each interim performance year (5, 10 and 15) as well as completion year 20 are provided in **Appendix 15**.

Table 21: Thagoona - Habitat quality interim performance targets and completion criteria

MNES	Baseline Year 0		Interim performance target Year 5		Interim performance target Year 10		Interim performance target Year 15		Completion criteria Year 20	
	Raw	Rounded	Raw	Rounded	Raw	Rounded	Raw	Rounded	Raw	Rounded
Koala (<i>Phascolarctos cinereus</i>)	6.35	6	6.61	7	6.92	7	7.12	7	7.58	8
Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	4.36	4	4.43	4	4.52	5	5.29	5	6.15	6

An estimated upswing of 1.79 points is achieved for Grey-headed Flying-fox (*Pteropus poliocephalus*), and an upswing of 1.23 points is achieved for Koala (*Phascolarctos cinereus*). The year-20 completion criteria score has been determined to be an achievable upswing, meanwhile remaining a conservative but informed estimate to maintain confidence of completion. The progression of scored BioCondition metrics and species-specific ecological indicators are demonstrated at each independent Habitat Quality assessment site. This progression of score upswing is predicted for each offset matter for each years 0, 5, 10, 15, and 20. The resulting averaged habitat quality score for each AU is demonstrated and summarised in **Table 22** below. This breakdown supports the framework of adaptive management whereby specific habitat attributes which are not improving, will be identifiable through this process, and subsequently management actions can be adapted accordingly.

Table 22: Thagoona - Summary of habitat quality gains across AUs

Matter	Monitoring year	AU1	AU2	Average MHQA score	Weighted final score
Koala	Baseline	6.17	6.44	6.31	6.35
	Year 5	6.56	6.64	6.60	6.61
	Year 10	6.83	6.97	6.90	6.92
	Year 15	7.00	7.18	7.09	7.12
	Year 20	7.53	7.61	7.57	7.58

Matter	Monitoring year	AU1	AU2	Average MHQA score	Weighted final score
GHFF	Baseline	4.25	4.42	4.33	4.36
	Year 5	4.33	4.48	4.40	4.43
	Year 10	4.47	4.55	4.51	4.52
	Year 15	5.07	5.39	5.23	5.29
	Year 20	6.11	6.17	6.14	6.13

6.6.3.2 Targeted fauna survey

Fauna survey effort targeting offset matters Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*) will take place in accordance with the monitoring schedule in **Table 20**. Targeted fauna survey effort will take place concurrently with vegetation and habitat quality assessment. This is to inform habitat utilisation of the Offset Area, as well as individual assessment units and management units. Recommended minimum survey effort is detailed in **Table 23** below.

Table 23: Recommended MNES survey method and effort

MNES	Recommended survey methods	Recommended survey effort
Koala (<i>Phascolarctos cinereus</i>)	Survey timing is not specified for this species. A review of Koala habitat assessment criteria and methods (Youngentob, K.N. et al., 2021): - strip transects - spotlighting - Koala (<i>Phascolarctos cinereus</i>) detection dogs - mark-resight/mark-recapture - thermal detection drones - radio tracking - camera traps - faecal pellet (scat) surveys - call playback. (DAWE 2022; DSEWPC 2011; Eyre et al. 2022)	Minimum recommended effort: 3-4 nights of consecutive spotlight survey - SAT (scat survey) survey at BioCondition site (see below) 7-14 nights of remote acoustic recording 14 nights of remote camera survey Optional complimentary effort: - Thermal detection drone survey - Koala detection dog survey
Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	<i>Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the Environmental Protection and Biodiversity Conservation Act 1999</i> - Desktop review of known camps within the broader landscape - Surveys of vegetation communities and plants - Daytime field surveys for camps - Nighttime surveys: transects separated by 100 m (DCCEEW 2001, DCCEEW 2010; DSEWPC 2011; Eyre et al. 2022)	Minimum recommended effort: - Opportunistic diurnal survey for the detection of GHFF camps 3-4 nights of nocturnal survey for the opportunistic detection of foraging GHFF

6.6.3.2.1 Spot Assessment Technique (SAT)

The SAT methodology will be undertaken generally in accordance with the standardised protocol outlined by Phillips and Callaghan (2011) and referenced in the EPBC Act referral guidelines for the Endangered Koala (*Phascolarctos cinereus*). At each SAT location, up to 30 trees will be sequentially assessed for evidence of Koala (*Phascolarctos cinereus*) activity, with sampling preferentially targeting trees greater than 100 mm DBH which are identified as LIKT's by Youngentob *et al.* (Youngentob, 2021). The base of each tree will systematically searched within a 1 m radius for a minimum of two minutes to ensure consistency across all plots.

6.6.3.3 General fauna biodiversity survey

General fauna biodiversity survey will be included as a component of habitat quality and vegetation condition monitoring and reporting. Fauna biodiversity will be summarised and reported as a general species inventory for each monitoring event, and cumulatively over the lifetime of the OMP.

The fauna biodiversity of the Offset Area is expected to generally increase over time with the establishment and restoration of habitat and ecological condition comparable to that of remnant condition. Fauna biodiversity will therefore be reflected through a comprehensive native species list collected across the annual suite of site-based surveys as per the Monitoring schedule (**Table 20**).

Native fauna species inventories will be compared between Offset management years, and inform the overall functionality of the Offset Area. Data and results will be reported through the Annual Compliance Monitoring Report.

6.6.4 Fuel Hazard Monitoring

Fuel hazard monitoring will be undertaken in accordance with the Overall Fuel Hazard Assessment Guide (Hines *et al.* 2010). The methodology provides a rapid, standardised approach for assessing the structure and arrangement of combustible vegetation that influences bushfire behaviour and allows fuel hazard to be monitored consistently over time.

Permanent fuel hazard monitoring sites will be established throughout the offset area and co-located with habitat quality monitoring sites. A baseline assessment will be completed during Year 1 following the wet season (April), with subsequent assessments undertaken annually at the same locations and during the same seasonal period to minimise variability associated with climatic conditions.

At each monitoring site, fuel hazard will be visually assessed within each of the four fuel strata defined by Hines *et al.* (2010):

- Surface fuels – comprising leaf litter, bark, twigs and fine woody debris on the ground;
- Near-surface fuels – including grasses, herbs and low shrubs immediately above the litter layer;
- Elevated fuels – consisting of shrubs, suspended dead material and vegetation extending above the near-surface layer but below the canopy; and

Bark fuels – assessing the quantity, type and continuity of bark retained on standing trees.

Each fuel stratum will be assigned a hazard rating using the assessment criteria provided in the *Overall Fuel Hazard Assessment Guide*, considering attributes such as fuel quantity, continuity, cover, height and arrangement. Hazard ratings for each fuel stratum (surface, near-surface, elevated and bark fuels) will be assigned by comparing field observations with the descriptive criteria and photographic standards presented in Table 8.1 and associated guidance within the Guide. Individual hazard ratings will then be combined in accordance with the guide to derive an overall fuel hazard rating for each monitoring site, classified as **Low, Moderate, High, Very High or Extreme** (Hines *et al.* 2010).

Fuel hazard monitoring results will be compared with previous assessments to identify changes in fuel accumulation and vegetation structure over time. Monitoring outcomes will be considered alongside habitat quality assessments to evaluate whether active fuel management is required to maintain ecological values while reducing bushfire risk. Where fuel hazard ratings indicate excessive fuel accumulation, management actions such as ecological burning and/or targeted weed control may be implemented in accordance with the Offset Management Plan. Following the completion of any fuel management activities, monitoring will continue using the same methodology to evaluate the effectiveness of management actions and inform adaptive management.

7. Risk Assessment and Management Measures

A limited number of risks associated with climate change, pest control and large-scale rehabilitation are evaluated for the Thagoona Offset Area. Risks are generally described and assessed against the likelihood and consequence model outlined in the Commonwealth Government's Environmental Management Plan Guidelines (Department of Environment, 2014). The following risk factors are considered in more detail in this OMP:

- Wildfire
- Flooding
- Drought
- Climate-induced shifting habitat range
- Planting stock failure
- Pest management
- Weed invasion / expansion.

7.1 Likelihood, Consequence and Risk Ratings

Each environmental risk is given a rating in terms of likelihood and consequence using the criteria in **Table 24** and **Table 25**, respectively. These ratings are then combined to derive risk scores, as shown in **Table 26**.

Table 24: Description of Likelihood Definitions

Likelihood rating	Likelihood definition
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Table 25: Description of Consequence Definitions

Consequence rating	Consequence definition
Minor	Minor incident of environmental damage that can be reversed
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental amenity and real danger of continuing
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage

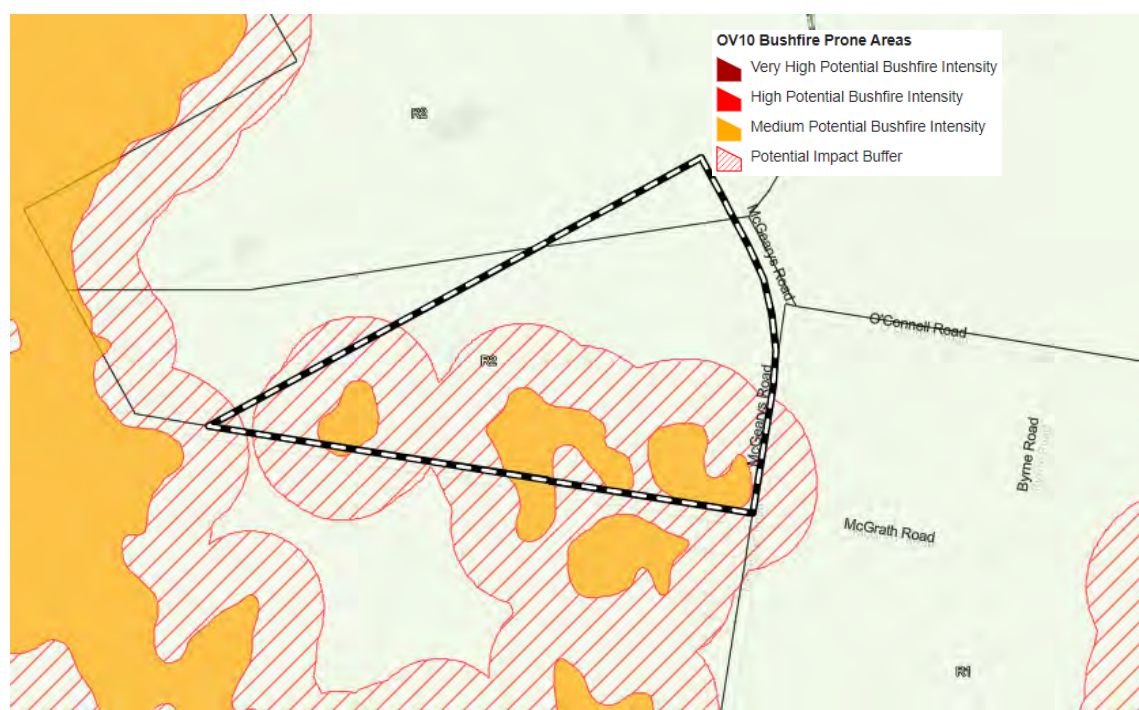
Table 26: Risk Ratings Matrix

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

7.2 Wildfire

Patches of vegetation on the southern side of the Thagoona Offset Area is recognised by ICC's Ipswich City Plan 2025 via the Bushfire Prone Areas Overlay for its bushfire potential. Woody vegetation across Lot 1 on RP190542 is mapped in these patches as 'medium' potential bushfire intensity, with a potential impact buffer around these vegetation patches overlapping, covering more than half of the site (**Inset 8**).

As the majority of the Offset Area is low open woodland regrowth and non-remnant pastoral grassland, the site's current ability to support the spread of wildfire is low. As the MUs become better established through the offset period, without intervention and management, vegetation across the whole Offset Area will have a stronger ability to support and increase the spread of a wildfire.



Inset 8. Wildfire risk mapping

(Source: ICC Ipswich City Plan 2025 Bushfire Prone Areas Overlay Mapping)

The overall assessment of wildfire risks is that such occurrence is **possible** within the offset period and consequences of such an event would be **moderate**. Without intervention and management, wildfire is evaluated

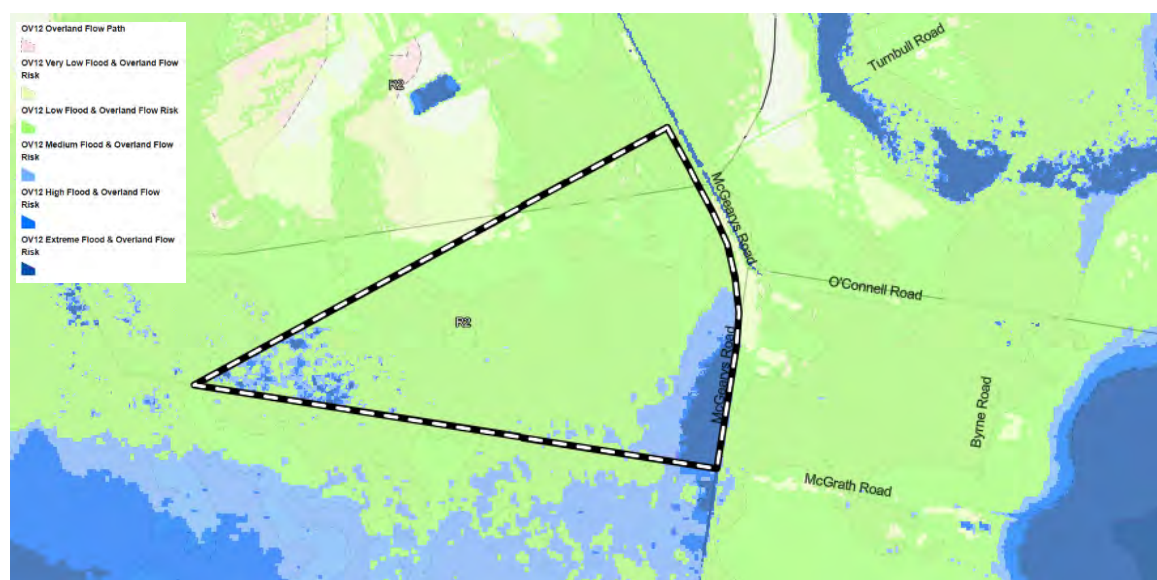
as a **medium** risk to this offset (**Table 27**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in Table 17. With the implementation of all relevant management actions, the likelihood of wildfire risk is expected to be reduced to possible, and the consequence of wildfire risk is expected to be reduced to **minor**, reducing the risk rating to **low** (**Table 27**).

Table 27: Wildfire Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Possible	Moderate	Medium
Post-mitigation	Possible	Minor	Low

7.3 Flooding

ICC's Flood Risk and Overland Flow Overlay mapping (**Inset 9**) identifies low risk elements to extreme flood risk elements across the Offset Area. The high-risk elements are limited to the south-eastern extent of the site, with the central and northeast extent explained as a low risk.



Inset 9: Flood risk mapping (Source: ICC Ipswich City Plan 2025 Flood Risk & Overland Flow Overlay Mapping)

Whilst these high and extreme elements of flood hazard mapped across the Thagoona Offset Area are limited, it is likely that rainfall events that result in flooding may impact the southern half of the site.

The objective for the Thagoona Offset Area is to restore habitat with vegetation communities resembling pre-clear condition. By doing so, vegetation communities will be established and/ or enhanced that are locally adapted and resilient to naturally occurring flood events. While limited in extent, rather than being an impediment to offset success, natural flood events will provide simulation of hydrological regimes that the target vegetation communities are adapted to tolerating.

The overall assessment of flooding risks is that their occurrence is **highly likely** within the offset period and consequences of such an event would be **moderate**. Without intervention and management, flooding is evaluated as a **high** risk to this offset (**Table 28**). Due to the likely beneficial nature to offset success of occasional natural flooding across, targeted management actions for minimise the impacts of flooding are limited to:

- Include stabilisation matting, tree stakes, etc for plantings within higher risk zones of erosion from rising flood waters

- Undertake damage assessments after flood events that effect the Thagoona Offset Area. Include findings of the damage assessment in the ACR.
- Consider taking out insurance for planting stock located within flood risk area to cover the cost of replacement works should a damaging rain / flood event occur.

With the implementation of all relevant management actions, the risk rating reduces to **medium** as the consequence is reduced to be minor after mitigation (**Table 28**).

Table 28: Flooding Risk Assessment

Mitigation Status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Highly Likely	Moderate	High
Post-mitigation	Highly Likely	Minor	Medium

7.4 Drought

The Queensland Government's Drought Duration Report (Queensland Government, 2026) identifies the ICC LGA as being drought free for 49-60 months and as being in a declared drought status for 20-30% of time since 1964.

The Bureau of Meteorology's climate statistics for the Tallegalla Alert (040503) meteorology station (closest to the Offset Area with relevant data) report mean annual rainfall as 871.7 mm since recording data in 2020 (Bureau of Meteorology, 2024). The Climate Change Adaptation Strategies for the koala prepared by Christine Adams-Hosking concluded that the highest probability of koala presence occurred at a mean annual rainfall of 700 mm (Adams-Hosking, 2011). Therefore, even with the potential for increased drought occurrence in future years, the Offset Area experiences a baseline average rainfall that, if reduced, would shift closer to the optimal range to support koala.

Periods of prolonged drought, if they were to occur, would place stress on revegetation, particularly juvenile plantings. Understorey planting and seeding is necessary on the Site rendering this a threat to revegetation. On this basis, the overall assessment of drought risks is that their occurrence is **possible** within the offset period and consequences of such an event would be **high**. Without intervention and management drought is evaluated as a **high** risk to this offset (**Table 29**). The management actions that are proposed to be implemented to reduce this initial risk rating are as follows:

- Ensure offset design includes Thagoona Offset Area and connection to higher moisture content soils associated with alluvial and riparian areas on the site.
- Place sufficient water storage for revegetation use in case of drought conditions
- Implement temporary, supplementary watering programs whilst plantings are juvenile if prolonged drought conditions occur.

With the implementation of all relevant management actions, the consequence of drought risk is expected to be reduced to **moderate**, but the risk rating remains a **medium** due to the possibility of drought. (**Table 29**).

Table 29: Drought Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Possible	High	Medium
Post-mitigation	Possible	Moderate	Medium

7.5 Climate-induced Shifting Habitat Range

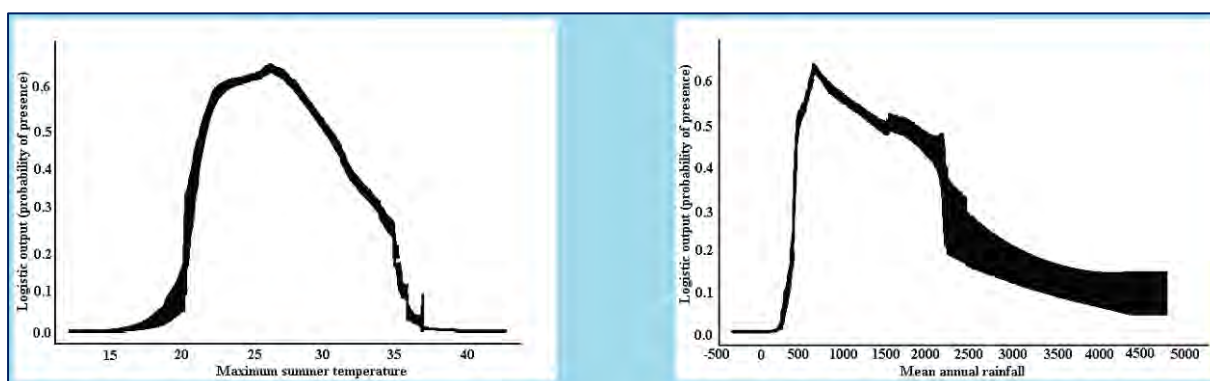
A number of contemporary case studies and research papers have investigated the combined weather characteristics of climate change on the current and future distribution of suitable koala habitat into the future. Koalas (*Phascolarctos cinereus*) are considered to be at risk of these factors because of their low tolerance to adapt to environmental changes combined with the number of existing non-climate related threats already well documented.

Grey-headed Flying-fox (*Pteropus poliocephalus*) are also considered to be affected by climate change; however, most studies relate to the increased temperatures at the camp and roosting sites, with less material available on their foraging range. The proposed offset provides foraging habitat and therefore the effects of climate change on roosting sites are not directly relevant to the Thagoona Offset Area.

The Climate Change Adaptation Strategies for the Koala (Adams-Hosking, 2011) applied climate change distribution models for the koala and five of its essential eucalypt food trees to a conservation prioritisation framework ('Zonation'), to determine which Queensland local government areas were the highest priority for koala conservation and adaptation. The study included 2011 population distribution and future predicted koala habitat distribution in 2070 showing a substantial migration eastward. The study further concludes that:

"The highest probability of koala presence occurred at a mean maximum summer temperature of approximately 27°C and a mean annual rainfall of approximately 700 mm"

The study's conclusions on the probability of koala occurrence across temperature ranges are shown in **Inset 10**.



Inset 10. Koala probability of occurrence across temperature and rainfall ranges (Adams-Hosking, 2011)

As previously stated, the average annual rainfall for the area is 871.7 mm since recording data in 2020 (Tallegalla Alert (040503)) meteorology station (closest to the Offset Area with relevant data). Additionally, the monthly mean maximum temperature for the region (University of Queensland Gatton meteorology station (040082)) is 27.0 degrees Celsius (Bureau of Meteorology, 2024). Therefore, climatic conditions remain within an acceptable range for the species. The land is also located within the current and 2070 Koala (*Phascolarctos cinereus*) habitat distribution maps based on the A1F1 climate change scenario as presented in Climate Change Adaptation Strategies for the Koala (Adams-Hosking, 2011).

The overall assessment of climate-induced habitat shift risks is that the likelihood of occurrence is **unlikely** within the offset period, but the consequences of such an event would be **moderate**. Without intervention and management this risk is evaluated as **low** risk to this offset (**Table 30**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in **Attachment 3**. With the implementation of all relevant management actions, the consequence of climate-induced habitat shift risk is expected to be reduced to **minor**, though the risk rating remains **low** (**Table 30**).

Table 30: Climate-induced Habitat Shift Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Unlikely	Moderate	Low
Post-mitigation	Unlikely	Minor	Low

7.6 Planting Stock Failure

As the Offset Area is composed of regrowth and non-remnant vegetation, significant planting may be required to help revegetate, despite other management measures such as livestock removal, and use of controlled burns. Infill planting is expected to occur in MU1 and MU2 on an as required basis. However, there is a risk for planted stock to fail due to:

- Poor soil quality or incompatible match of soils to replanted vegetation types
- Weather related impacts – frost / prolonged dry periods, excessive heat or cool periods
- Poor quality planting stock or the sourcing of planting stock from a different geographic region.
- Lack of appropriate planting area preparation – weed removal / pasture seed removal / cultivation, etc.

The majority of these challenges are expected to be managed through the use of experienced bushland regeneration experts and contractors. Failure of planting stock will principally be a financial impact as the Offset Area will not achieve committed condition improvement and habitat expansion targets without rectification of planting works.

The overall assessment of planting failure risks is that the occurrence is **possible** within the offset period and consequences of such an event would be **high**. Without intervention and management planting failure is evaluated as a **medium** risk to this offset (**Table 31**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in **Section 6.5** (i.e. correct implementation of the revegetation plan). With the implementation of relevant management actions, the likelihood of planting failure risk is expected to be reduced to **unlikely**, although keeping the risk rating at a **medium** (**Table 31**).

Table 31: Planting Failure Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Possible	High	Medium
Post-mitigation	Unlikely	High	Medium

7.7 Pest Occurrence

A range of pest species have historically been recorded (**ALA**) to occur within or near the Thagoona Offset Area, including:

- Domestic Dog (*Canis lupus familiaris*)
- Feral Cat (*Felis catus*)
- Red Fox (*Vulpes vulpes*)
- European Hare (*Lepus capensis*)

- Deer species (*Dama* sp., *Cervus* sp., *Rusa* sp. and *Axis* sp.).

These species are described as having common to occasional occurrence with widespread or localised distributions across the local government area in which the Thagoona Offset Area is situated.

Two vertebrate pest species were confirmed within the Thagoona Offset Area during the survey period:

- House Mouse (*Mus musculus*)
- Cane Toad (*Rhinella marina*)

Although Red Fox (*Vulpes vulpes*) was not detected during the camera trap survey, it was recorded within close proximity to the Thagoona Offset Area (approximately 1.3 km from the site). Given the species' high mobility and large home range, the species is considered likely to occur intermittently within the Thagoona Offset Area.

7.7.1 Wild Dog

Wild dog predation is a significant cause of koala mortality. A study by Hawthorne L. Beyer *et al.* over the 2013-2017 period in Moreton Bay Regional Council involved the capture of 503 koalas, which were fitted with telemetry devices (Beyer, 2018). Of the 144 Koala (*Phascolarctos cinereus*) deaths confirmed as predation, wild dogs accounted for 81.3 per cent and domestic dogs 4.2 per cent plus a further 38 deaths were suspected but unconfirmed predation events due to Wild dogs.

Researchers concluded the Koala (*Phascolarctos cinereus*) population could have approached local extinction within a decade without the control of wild dogs and disease. They stated a single male dog eluding capture until the end of the study was thought to be responsible for 75 Koala (*Phascolarctos cinereus*) deaths.

ICC has a Biosecurity Plan outlining procedures in pest management including declared pests such as wild dogs. No formal culling/baiting/bounty program is identified within the ICC LGA. The Queensland Government distribution map of Wild Dog places the species in the area as common and predominantly localised in the ICC LGA.

Despite Wild dog not being identified during baseline assessment, the overall assessment of wild dog risks is that the occurrence is **highly likely** within the offset period given their known presence within the locality. The consequences of such an event would be **high**. Without intervention and management wild dogs are evaluated as a **high** risk to this offset (**Table 32**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in **Table 14**. With the implementation of all relevant management actions, the likelihood of wild dog risk is expected to be reduced to **possible**, reducing the risk rating to **medium** (**Table 32**).

Table 32: Wild Dog Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Highly likely	High	High
Post-mitigation	Possible	High	Medium

7.7.2 Feral Cats

Feral cats are carnivorous and require little free water, being able to obtain moisture from their prey. They require large amounts of fresh protein, and prey upon small mammals, birds, reptiles, amphibians, insects and fish, though rabbits are their main food source (Mitchell & Balogh, Monitoring Techniques for Vertebrate Pests: Feral Cats, 2007). Feral cats impact on other animal populations through direct predation and competition for prey. Importantly, they may also spread the disease toxoplasmosis. The toxoplasma protozoan reproduces only in the intestines of the cat.

Toxoplasmosis is particularly harmful to marsupials, causing abortion and birth defects, along with blindness and paralysis. Feral cats need to consume large amounts of protein, and rabbits are not always in sufficient abundance to satisfy their appetite; therefore, native fauna is often on the menu (Mitchell & Balogh, 2007). However, neither Koala (*Phascolarctos cinereus*) nor Grey-headed Flying-fox (*Pteropus poliocephalus*) were identified as being native vertebrates susceptible to predation from feral cats in *Overview of the Impacts of Feral Cats on Australian Native Fauna* (Dickman, C, 1996).

Although not identified on-site, the Queensland Government distribution of Cat (feral) within the ICC LGA, describes them as common and widespread through the area.

The overall assessment of Feral cat risks is that the occurrence is **highly likely** within the offset period and consequences of such an event would be **minor**. Without intervention and management feral cats are evaluated as a **medium** risk to this offset (**Table 33**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in **Table 14**. With the implementation of all relevant management actions, the likelihood of feral cat is expected to be reduced to **possible**, which keeps the risk rating at **low** (**Table 33**).

Table 33: Feral Cat Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Highly likely	Minor	Medium
Post-mitigation	Possible	Minor	Low

7.7.3 European Foxes

The fox is an opportunistic predator and scavenger, being primarily carnivorous. In grazing areas, the primary diet of foxes consists of sheep (either as carrion or young lambs), rabbits and house mice. However, foxes will readily take small and medium-sized native animals, particularly mammals in the 'critical weight range' of 0.35-5.50 kg (Mitchell B. &., 2007).

There have been relatively few studies with adequate replication undertaken to demonstrate the impact of fox predation on the populations of native mammals. However, preliminary research and anecdotal data indicates that native species most susceptible to predation by foxes are those species that are ground-dwelling, e.g. bettongs, wallabies, bandicoots etc (Gentle, M., 2006).

Not identified on site, the European Fox populations within the ICC LGA are widespread and commonly distributed according to the Queensland Government distribution of Fox, with the 2025 ALA placing occurrence points across the entirety of the area encompassing the Offset Area.

The overall assessment of fox risks is that the occurrence is **highly likely** within the offset period and consequences of such an event would be **moderate**. Without intervention and management foxes are evaluated as a **high** risk to this offset (**Table 34**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in **Table 14**. With the implementation of all relevant management actions, the likelihood of foxes is expected to be reduced to **unlikely**, which reduces the risk rating to **low** (**Table 34**).

Table 34: European Fox Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Highly likely	Moderate	High
Post-mitigation	Unlikely	Moderate	Low

7.7.4 Rabbits and Hares

The rabbits and hares are considered to be some of Australia's most damaging vertebrate pests and have adverse effects on pastoral and crop industries, as well as native fauna and flora. Additional impacts include land and vegetation degradation where the loss of vegetation exposes the soil to the erosive forces of wind and rain (Mitchell & Balogh, 2007).

Grazing, browsing and ringbarking of native flora have caused declines in native species and facilitated the invasion of exotic species. Rabbits are commonly believed to cause damage only when they occur in higher numbers, but in areas of low productivity, densities as low as 1 rabbit per hectare can prevent native plant regeneration (Mitchell & Balogh, 2007).

Whilst the occurrence of rabbits and hares would not be a direct threat to Koala (*Phascolarctos cinereus*) or Grey-headed Flying-fox (*Pteropus poliocephalus*), their tendency to graze on and ringbark native vegetation could have a detrimental effect on the ability to achieve successful landform stabilisation, propagation and revegetation within the Thagoona Offset Area. Vegetation damage and land degradation could cause irreversible damage to the vegetation regrowth within the site.

The Queensland Government distribution of rabbit describes that rabbits and hares are occasional and localised throughout majority of the ICC LGA. Not identified in survey's, the site's open vegetation habitat is suitable to house rabbits and hares grazing behaviours.

The overall assessment of rabbits and hares is that the occurrence is **likely** within the offset period and consequences of such an event would be **moderate**. Without intervention and management, rabbits and hares are evaluated as a **medium** risk to this offset (**Table 35**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in **Table 14**. With the implementation of all relevant management actions, the likelihood of rabbits and hares is expected to be reduced to **possible** and the consequence reduced to **minor**, which reduces the risk rating to **low** (**Table 35**).

Table 35: Rabbit Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Likely	Moderate	Medium
Post-mitigation	Possible	Minor	Low

7.7.5 Feral Deer

Feral deer are opportunistic and highly adaptable feeders that both graze and browse. Feral deer have been reported to cause damage to a wide variety of agricultural crops, pastures and forestry plantations through competition with cattle and other livestock for pasture. Other impacts on rural enterprises include damage to fences, spreading of weeds, fouling of water holes and overgrazing causing erosion (and the subsequent degradation of water quality in creek and river systems) (DAF, 2022).

Whilst the occurrence of deer would not be a direct threat to Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*), their tendency to graze on and ringbark native vegetation could have a detrimental effect on the ability to achieve successful landform stabilisation, propagation and revegetation within the Offset Area. If natural plants are damaged, grasslands are overgrazed and weeds are allowed to spread in the site, severe damage could be done to the regrowth of the ecosystem.

Recorded in the area, not on-site survey's, Feral Deer are distributed locally and occasionally within the ICC LGA according to the Queensland Government distribution of Feral Rusa Deer.

The overall assessment of feral deer is that the occurrence is **likely** within the offset period and consequences of such an event would be **moderate**. Without intervention and management feral deer are evaluated as a **high** risk

to this offset (**Table 36**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in **Table 14**. With the implementation of all relevant management actions, the likelihood of deer is expected to be reduced to **likely** and consequences of occurrence reduced to **minor**, which reduces the risk rating to **low** (**Table 36**).

Table 36: Feral Deer Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Likely	High	High
Post-mitigation	Possible	Minor	Low

7.7.6 Feral Pigs

Feral pigs disturb natural environments through rooting up soils, grasslands and forest litter and by consuming a range of native plants (Pavlov, 1991). Fences and water sources can be damaged, and dams and waterholes fouled through wallowing and defecation (Mitchell & Balogh, 2007).

Whilst the occurrence of feral pigs would not be a direct threat to koala or grey-headed flying fox, their tendency to uproot soils and consume native vegetation could have a detrimental effect on the ability to achieve successful landform stabilisation, propagation and revegetation within the Offset Area. Given the vegetation structure of the Site, severe destruction of habitat could be done if the soil and ground layers of plants are severely damaged.

Feral pig were not identified on the Site, however, they have a mixed occasional distribution where they are widespread and localised across areas of the ICC LGA, as described by the Queensland Government's Distribution of pig (Feral).

The overall assessment of feral pigs is that the occurrence is **possible** within the offset period and consequences of such an event would be **high**. Without intervention and management pigs are evaluated as a **medium** risk to this offset (**Table 37**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in **Table 14**. With the implementation of all relevant management actions, the likelihood of pigs is expected to be reduced to **unlikely** and the consequence reduced to **moderate**, which reduces the risk rating to **low** (**Table 37**).

Table 37: Feral Pig Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Possible	High	Medium
Post-mitigation	Unlikely	Moderate	Low

7.8 Weed Invasion and Spread

Weed infestations suppress and inhibit the natural regeneration of regrowth vegetation on-site, which in-turn directly limits the growth rates and regeneration of primary and secondary koala (*Phascolarctos cinereus*) tree species and foraging species for grey-headed flying-fox (*Pteropus poliocephalus*). It is known through baseline data that highly invasive weeds occur through the Offset Area (**Section 4.2.6**) (**Attachment 2**). The highly invasive and spreading nature of some of these weed species, coupled with the in-active management in areas, would be resulting in a progressive increase as local climatic events align with optimal germination and seeding periods.

In extreme instances, dense weed infestations can form a barrier to terrestrial species, which would include limiting the koala's ability to access areas containing an over-canopy of food trees. In the case of the Site being low open

woodland regrowth and non-remnant scattered grassland the, the native regrowth and seedlings can easily be suppressed and outcompeted by the presence of weeds.

The overall assessment of weed infestation risks is that the occurrence is **highly likely** within the offset period and consequences of such an event would be **high**. Without intervention and management weeds are evaluated as a **high** risk to this offset (**Table 38**). The management actions that are proposed to be implemented to reduce this initial risk rating are presented in **Table 15**. With the implementation of all relevant management actions, the likelihood of weed infestation risk is expected to be reduced to **likely**, reducing the risk rating to **low** (**Table 38**).

Table 38: Weed Infestation Risk Assessment

Mitigation status	Likelihood	Consequence	Risk Rating
Pre-mitigation	Highly likely	High	High
Post-mitigation	Likely	Moderate	Low

8. Corrective Actions

Table 39 outlines a number of triggers and corrective actions which are to be implemented in instances of non-compliance or the lack of success toward the gradual achievement of the completion criteria identified during annual monitoring, as reported in the ACR (Offset), and major milestone monitoring events (every 5 years).

Table 39: Triggers, Corrective Actions And Timeframes

Triggers	Corrective Actions	Timeframes	Responsibility
Trees and plantings showing signs of ill health, decline or death.	- The restoration contractor will engage a suitably qualified professional to identify the likely cause of health decline - Apply recommended mitigation measure/s to improve growing conditions (as recommended by the suitably qualified professional) - Remove ill or dead plantings, undertake any remediation works and re-establishment planting	- Engage the suitably qualified professional within one month of detection - Implement recommended mitigation measures within three months of detection (or as soon as seasons practically allow – justified in annual reporting) - Remove ill or dead plantings and undertake remediation works within three months of detection	- All parties involved with offset delivery. - Primary onus is upon Offset Provider to at least notify (though action may be necessary) the Environmental Consultant to determine strategy.
Weed re-establishment	- Immediately treat all WoNs with delicate methods to avoid impacts to restoration works (mechanically or chemically dependent on circumstances) - Undertake an investigation of the potential source point of seeding - Additional treatment and removal works are to be followed up during the next potential growth period (prior to flowering) to avoid any regeneration and potential seeding events	- Within three months of detection, noting that treatment during non-growth periods may be ineffective and are best targeted during growth periods for greater effectiveness (depending on the target weed species). - Within three months of detection - Within six months of initial detection	- All parties involved with offset delivery. - Primary onus is upon Offset Provider to at least notify (though instant action may be necessary) the Environmental Consultant to determine strategy.
Plant failure (>10% of stock) during the establishment period	- Supplementary planting will be undertaken - Should the planting fail again, the contractor is to engage a suitably qualified	Within three months or the next appropriate planting period (whichever comes first) of detection	- All parties involved with offset delivery. - Primary onus is upon Offset Provider to at least notify (though instant action may be necessary) the Environmental Consultant to determine strategy.

Triggers	Corrective Actions	Timeframes	Responsibility
	professional to identify the likely cause of plant failure Apply recommended mitigation measure/s to improve growing conditions (as recommended by the suitably qualified professional)	Apply in alignment with the recommendations made by the suitably qualified professional	
Growth rates not as expected	- Engage a suitably qualified professional to review the plantings and advise on methods to increase growth rates through other interventions. - Undertake soil testing to determine what rate of soil ameliorants or fertilizers may be required to improve the chemical balance of the soils for improved plant growth - Revise management actions for offset - Adaptive management developments to the OMP to be submit to Minister for the Environment for approval via Annual Compliance Reporting.	- Within three months of detection - Within 12 months of detection - Within 24 months of detection if the corrective actions have not amended the slowing growth rates	- All parties involved with offset delivery. - Primary onus is upon Offset Provider to at least notify (though instant action may be necessary) the Environmental Consultant to determine strategy.
Stochastic or nuisance events	- While such events (e.g. fire, flood, drought, vandalism etc) are rare and can be managed by the contractor, where events take place, restoration works are to replace losses and reporting to the NEPA is required. - Evidence of impacts and rectification measures are to be submitted to the NEPA within three months	- Within three months of the event - Within three months of rectification	- All parties involved with offset delivery. - Primary onus is upon Offset Provider to at least notify (though instant action may be necessary) the Environmental Consultant to determine strategy.
Ongoing presence of pest vertebrate fauna	Baiting – continuous for the first three years and then follow a yearly campaign (baits set for 6 weeks) after that.	Within three months of continued presence identification	- All parties involved with offset delivery. - Primary onus is upon Offset Provider to at least notify (though instant action may be

Triggers	Corrective Actions	Timeframes	Responsibility
	- Shooting – Quarterly for the first three years and then biannually after that. Each campaign would occur over two nights. - Cage trapping, snare trapping - Quarterly for the first three years and then biannually after that. The campaign would last for one week. - Additional site-specific measures to be implemented prior to seeking involvement of surrounding landholders and stakeholders.		necessary) the Environmental Consultant to determine strategy.
Monitoring and reporting illustrates that Actions described within Section 6.5 are unlikely to be successful at the end of the 20 year management timeframe and other corrective actions are failing to progress the achievement of Revegetation Actions.	- Engage a suitably qualified professional to review the plantings and advise on methods to increase growth rates through other interventions. - Undertake soil testing to determine what rate of soil ameliorants or fertilizers may be required to improve the chemical balance of the soils for improved plant growth - Revise the management actions for the offset	- Within one month of detection - Within two months of detection - Report amendments to the Department. - Within 12 months of detection if corrective actions have not amended the slowing growth rates - Report within 6 months of revised methods.	- All parties involved with offset delivery. - Primary onus is upon the Environmental Consultant.
Interim performance target Habitat Quality scores are not being achieved	- Investigate factors contributing to reduced habitat quality outcomes - Implement additional restoration and land management measures where required - Review monitoring data and adapt management practices accordingly	- Undertake management adaptations within the next management year. - if failure to meet performance targets continues through to the following years' monitoring event (2 years later), further investigation will be undertaken.	- All parties involved with offset delivery. - Primary onus is upon the Environmental Consultant.

9. Adaptive Management

This OMP adopts a number of ‘adaptive management’ procedures both as a governing principle and within specific management actions (**Section 6**).

Most management actions incorporate detailed baseline survey and data collection to be periodically repeated through the offset period and utilised for iterative changes to management implementation, particularly for stochastic habitat risks and threats. The primary purpose of adaptive management procedures is to allow on-ground monitoring and experiences on the most effective measures to feed into amendments to the OMP which focus on best return in habitat outcomes for grey-headed flying-fox and koala. The structured decision-making process that is a by-product of adaptive management is shown in **Inset 11**.



Inset 11. Adaptive management process

10. Ecological Benefit Measures

Ecological performance targets have been detailed for each MNES across interim performance target years (5, 10, 15) and completion year (20). The extent of ecological gain has been determined and demonstrated through the repetition of the MHQA method for each offset matter at each performance monitoring year. The prediction of score progression was achieved through the detailed analysis of baseline condition scoring, the habitat quality scoring methodology, and the establishment of ecologically feasible outcomes within a 20-year management period.

The predicted progression of all ecological attributes and their respective ecological indicators are summarised in **Attachment 6** for each Assessment Unit and Protected Matter. The summary tables (**Attachment 6**) demonstrate the progression of indicator scores at the Assessment Unit scale, whereas the predicted progression of raw value data (i.e. field data) is detailed within the MHQA spreadsheet analysis on the survey site scale (i.e. BioCondition site) (**Attachment 7 and 8**). **Table 40** and **Table 41** below detail the progression of scaled attribute scores, i.e. the sum and scoring of respective ecological indicators. Assessment Unit MHQA scores, at each the ecological attribute and indicator level, will function as the ecological gain performance criteria of this OMP. The successful progression of ecological restoration will therefore be interpreted against these scoring milestones.

The relationship between ecological performance criteria and their respective management objectives, monitoring activities, and survey timing/frequency are detailed in **Table 42** below. Performance criteria are summarised for both Koala and Grey-headed Flying-fox across each milestone year (year 5, 10, 15, and 20).

Table 40: Performance Completion Criteria for Koala per Assessment Unit

Score Attribute	Attribute indicator	Year 0		Year 5		Year 10		Year 15		Year 20	
		AU1	AU2	AU1	AU2	AU1	AU2	AU1	AU2	AU1	AU2
Site Condition	BioCondition	26.5	35.8	39.5	42.3	48.5	50.8	54.3	57.8	67	67
	Quality and availability of food and foraging habitat	5	5	5	5	5	5	5	7.5	10	10
	Quality and availability of shelter	5	5	5	5	5	5	5	5	5	7.5
Site Context	Size of patch	10	10	10	10	10	10	10	10	10	10
	Connectedness	2	2	2	2	2	2	2	2	2	2
	Context	4	4	4	4	4	4	4	4	4	4
	Ecological Corridors	6	6	6	6	6	6	6	6	6	6
	Role of site location to species overall population in the state	5	5	5	5	5	5	5	5	5	5
	Threats to the species	15	15	15	15	15	15	15	15	15	15
	Species mobility capacity	10	10	10	10	10	10	10	10	10	10
Species Stocking Rate	Species Stocking Rate	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29
Habitat Quality Score		6.17	6.44	6.56	6.64	6.83	6.97	7.00	7.18	7.53	7.61

Table 41: Performance Completion Criteria for Grey-headed Flying-fox per Assessment Unit

Score Attribute	Attribute indicator	Year 0		Year 5		Year 10		Year 15		Year 20	
		AU1	AU2	AU1	AU2	AU1	AU2	AU1	AU2	AU1	AU2
Quality and availability of food and foraging habitat + Quality and availability of shelter	Site Condition	6.6	8.9	8.6	10.6	12.1	12.1	12.8	13.3	14.6	16.1
	Habitat index	29.5	31.5	29.5	31.5	29.5	31.5	36.5	36.5	53	53
	Total score	36.4	42.3	40.4	42.1	41.6	43.6	49.3	49.2	67.6	68.5
Site Context	Size of patch	10	10	10	10	10	10	10	10	10	10
	Connectedness	10	10	10	10	10	10	10	10	10	10
	Context	3	3	3	3	3	3	3	3	3	3
	Ecological Corridors	10	10	10	10	10	10	10	10	10	10
	Role of site location to species overall population in the state	1	1	1	1	1	1	1	1	1	1
	Threats to the species	10	10	10	10	10	10	10	10	10	10
Species Stocking Rate	Species Stocking Rate	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Habitat Quality Score		4.25	4.42	4.33	4.48	4.47	4.55	5.07	5.39	6.11	6.17

Table 42: Summary of Performance Criteria

Management Objective	Monitoring Activity	Frequency	Performance Outcome				
			Years 1-5	Years 6-10	Years 11-15	Years 16-19	Year 20 - Completion Year
Management Action 2 - Biosecurity Management	Weed Survey and eradication	Weed survey will take place Year 1-10 and every second year between Years 11-20. Weed survey to be used to program weed eradication efforts for the following year to target areas where weed effort is falling behind schedule.	Two specific targets are in effect: <i>Biosecurity Act 2014</i> (Category 3 weeds) and Weeds of National Significance (WoNS) with a completion target of 95% reduction in the mapped extent by year 15. Between years 1-5, a 35% reduction in area will be achieved. Other weed cover throughout the Offset Area is expected to be on average less than <25% non-native plant cover within BioCondition plots.	Between years 6-10, WoNS / Category 3 cover will be reduced by 65% of Baseline. BioCondition plots are expected to reflect a score of <25% non-native plant cover.	Between years 11-15, WoNS / Category 3 cover will be reduced by >95% of Baseline. BioCondition plots are expected to reflect a score of <15% non-native plant cover.	Between years 16-19, WoNS / Category 3 cover will be maintained at 95% of Baseline. BioCondition plots are expected to reflect a score of <10% non-native plant cover.	At completion year-20, WoNS / Category 3 cover through the Offset Area is expected to be on average less than <5% of Baseline. BioCondition plots are expected to reflect a score of <5% non-native plant cover.
Management Action 3– Fencing, Access, and Signage Management	Biannual comprehensive site checks	Rapid Offset Area inspections at revegetation sites will take place biannually (post-wet season, and dry season).	Observations of damage, general upkeep, and hazards will be reported and rectified between management years. The Annual Compliance Report will identify where Offset Area general upkeep is not upheld to the standard subject to this OMP.				
Management Action 5 – Native seed collection and propagation			Years 1-5 site inspections will focus on the success of planted tube stock. Where threatening processes are determined to occur, such as foraging pressure, climate conditions, and resource competition with weeds, corrective actions will be triggered. Sites of tube stock death will be reported and rectified to ensure management years 1-5 establish anticipated tree growth. Monitoring and reporting of operational performance of revegetation success as outlined by the RMP (6 monthly, Years 1-4 post planting – RMU – planting cell dependent).	Years 6-10 site inspections will continue to focus on the successful establishment of planted tube stock. Site inspections will ensure that revegetation sites remain free of threatening processes which may impede the establishment of tube stock as trees. Monitoring and reporting of operational performance of revegetation success as outlined by the RMP (6 monthly, Years 1-4 post planting – RMU – planting cell dependent).	Following year 10, planted tube stock should be established as young trees and shrubs. Site inspections will focus on the survival rate of planting sites, and continue to ensure sites are free of threatening process such as weed incursion/competition and grazing pressure from both native and exotic mammals.	Following year 16, planted tube stock should be established as young-maturing trees and shrubs. Site inspections will focus on the survival rate of planting sites, and continue to ensure sites are free of threatening process such as weed incursion/competition and grazing pressure from both native and exotic mammals.	Year 20 inspections will assess the survival and success of restoration efforts.
Management Action 6– Ecological Restoration and Matter Habitat Creation							
Management Action 1 - Integrated Vertebrate Pest Management	Vertebrate Pest Survey - remote camera	Vertebrate pest fauna survey will take place annually for the lifetime of the OMP.	Vertebrate pest activity index scores for each AU and the site overall should reflect a decreasing trend over the life of the offset and preferably, a downward trajectory in pest fauna activity scores for each sampling event referenced against previous sampling events. Year 1-5 activity scores are expected to be more volatile during early stages of pest animal management.	Vertebrate pest activity index to have reduced for Wild Dog and Red Fox populations against baseline. Activity index scores for each species are expected to maintain a decreasing trajectory, despite true score values which may remain moderate-low between years 6-10 (values 11%-50%). Pest species European Rabbit, European Hare, Red Deer, Rusa Deer, Feral Pig, Feral Cat are expected to maintain low activity index scores (value <11%), reflecting that of baseline values	Vertebrate pest activity index to have reduced for Wild Dog and Red Fox populations against baseline. Activity index scores for each species are expected to maintain a decreasing trajectory, despite true score values which may remain moderate-low between years 11-15 (values 11%-50%). Pest species European Rabbit, European Hare, Red Deer, Rusa Deer, Feral Pig, Feral Cat are expected to maintain low activity index scores (value <11%), reflecting that of baseline values	Vertebrate pest activity index to have reduced for Wild Dog and Red Fox populations against baseline. Activity index scores for each species are expected to maintain a decreasing trajectory, despite true score values which may remain moderate-low between years 16-19, (values <11%). Pest species European Rabbit, European Hare, Red Deer, Rusa Deer, Feral Pig, Feral Cat are expected to maintain low activity index scores (value <11%), reflecting that of baseline values	Vertebrate pest species Wild Dog and Red Fox populations are expected to have been managed to completion and maintenance by year 20. This will be reflected in an activity index score of absent (values <11%). Pest species Wild Dog, Pest species European Rabbit, European Hare, Red Deer, Rusa Deer, Feral Pig, Feral Cat are expected to maintain low to very

Management Objective	Monitoring Activity	Frequency	Performance Outcome				
			Years 1-5	Years 6-10	Years 11-15	Years 16-19	Year 20 - Completion Year
				and the difficulty of site-based management. Where the activity index remains consistent, increases, or exceeds the above Performance Outcomes these shall be recorded in the technical memo and the Corrective Action will be an increase in the frequency and intensity of vertebrate pest management employing those methods described in the Vertebrate Pest Management Plan (Attachment 4). Where activity indices are shown to decrease as evidenced by camera trapping, vertebrate pest management efforts will be maintained at the prior frequency and intensity. Management effort will be reduced only after three consecutive sampling periods have shown downward trends.	and the difficulty of site-based management. Where the activity index remains consistent, increases, or exceeds the above Performance Outcomes these shall be recorded in the technical memo and the Corrective Action will be an increase in the frequency and intensity of vertebrate pest management employing those methods described in the Vertebrate Pest Management Plan (Attachment 4). Where activity indices are shown to decrease as evidenced by camera trapping, vertebrate pest management efforts will be maintained at the prior frequency and intensity. Management effort will be reduced only after three consecutive sampling periods have shown downward trends.	and the difficulty of site-based management. Where the activity index remains consistent, increases, or exceeds the above Performance Outcomes these shall be recorded in the technical memo and the Corrective Action will be an increase in the frequency and intensity of vertebrate pest management employing those methods described in the Vertebrate Pest Management Plan (Attachment 4). Where activity indices are shown to decrease as evidenced by camera trapping, vertebrate pest management efforts will be maintained at the prior frequency and intensity. Management effort will be reduced only after three consecutive sampling periods have shown downward trends.	low activity index scores (1-10%). This reflects the impracticality to manage these species entirely on a property level scale. Species’ maintenance efforts will be reflected through a decreased activity index.
	Vertebrate Pest Survey - Spotlight Survey	Spotlight survey will take place on the following years: 1-10, 11, 13, 15, 17, 19 and 20.	Survey to be undertaken at years 1-5. The discovery of any new vertebrate pest fauna (i.e. fauna which have not been identified through the remote camera survey) will trigger the requirement to repeat and adapt the remote camera survey.	Survey to be undertaken at years 6-10. The discovery of any new vertebrate pest fauna (i.e. fauna which have not been identified through the remote camera survey) will trigger the requirement to repeat and adapt the remote camera survey.	Survey to be undertaken at years 11, 13 and 15. The discovery of any new vertebrate pest fauna (i.e. fauna which have not been identified through the remote camera survey) will trigger the requirement to repeat and adapt the remote camera survey.	Survey to be undertaken at years 17 and 19. The discovery of any new vertebrate pest fauna (i.e. fauna which have not been identified through the remote camera survey) will trigger the requirement to repeat and adapt the remote camera survey.	Completion survey undertaken at year 20.
Management Action 4 - Fire Management	Fuel load monitoring	TBC by Suitably Qualified Bushfire Consultant.	Monitoring method, schedule, and performance criteria will be established an enforced through an independent suitably qualified bushfire consultant. Fuel loads will be monitored in accordance with <i>Action 4 – Fire Management Plan</i> and will be maintained at a condition that is reflective of their natural structural state i.e. woodland, open woodland, or forest. At a minimum standard, annual inspections will take place (concurrently with Offset Area inspections) to assess the condition of fire breaks, trails and roads, as well as firefighting infrastructure. Fire management will be undertaken consistently throughout the life of the OMP to continually mitigate the potential of adverse bushfire impacts.				
	Controlled burns for <i>Lanta camara</i> eradication						
	Visual inspection of fire management infrastructure						
	Wildfire, controlled burn extent and fuel load monitoring and mapping.						
Management Action 6 – Ecological Restoration and Matter habitat creation	Habitat quality analysis (BioCondition survey)	Habitat Quality assessment and Fauna survey will take place on the following years: 1, 3, 5, 7, 9, 10, 12,	MHQA score progression in alignment with prediction table summary attached in Table 40 (Koala) and Table 41 (Grey-headed Flying-fox). Matter Area score targets of: Koala – 6	MHQA score progression in alignment with prediction table summary attached in Table 40 (Koala) and Table 41 (Grey-headed Flying-fox). Matter Area score targets of: Koala – 7	MHQA score progression in alignment with prediction table summary attached in Table 40 (Koala) and Table 41 (Grey-headed Flying-fox). Matter Area score targets of: Koala – 7	MHQA score progression in alignment with prediction table summary attached in Table 40 (Koala) and Table 41 (Grey-headed Flying-fox). Matter Area score targets of: Koala – 7	MHQA score progression in alignment with prediction table summary attached in Table 40 (Koala) and Table 41 (Grey-headed Flying-fox). Matter Area score targets of: Koala – 8

Management Objective	Monitoring Activity	Frequency	Performance Outcome				
			Years 1-5	Years 6-10	Years 11-15	Years 16-19	Year 20 - Completion Year
		14, 15, 17, 19 and 20.	GHFF – 4	GHFF – 4	GHFF – 5	GHFF – 5	GHFF – 6
	Targeted Fauna Survey (Undertaken over spring and summer months when Koala is vocal and most active)		Supports MHQA analysis and the scoring of species stocking rate.				

11. Reporting

All surveys, results, management activities statuses, alterations or amendments will be recorded within an Annual Compliance Report. Each Annual Compliance Report will be completed by the Offset Provider and issued to the Proponent NEPA within 30 days of each 12 month anniversary of the documented commencement of the action. The Proponent will issue a copy to NEPA within contracted timeframes.

11.1 Monitoring Memorandum

Periodic monitoring specified by each Offset Management Action (refer **Section 6**) shall be reported on in the form of an Action Monitoring Memo produced and submitted to the Approval Holder or Approval Holder's Representative and Offset Provider (if undertaken by third party) following each monitoring event, and attached to the annual report. All reporting is to be appended with raw data, results of analysis (if undertaken), site photography and mapping. As a minimum Action Monitoring Memo's should discuss:

1. Introduction and Reporting Framework
2. Offset Site Overview and Action Addressed
3. Previous Results and Recommendations and how they have been addressed
4. Action Reporting
 - Monitoring Schedule
 - Monitoring Undertaken
 - Temporal, Seasonal and weather conditions at time of Sampling
 - Results
 - Discussion and Observations
 - Actioning Risk Triggers
 - Corrective Actions
4. Recommendations for future Monitoring Event Improvement
5. Compliance Summary
6. Conclusions.

11.2 Annual Report

The nominal table of contents for the Offset Area Annual Monitoring Report is:

1. Introduction and Reporting Framework
2. Offset Site Overview
3. Compliance Summary
4. Action Reporting
 - 4.1: Action 1: Integrated Vertebrate Pest Management
 - Monitoring undertaken
 - Temporal, Seasonal and weather conditions at time of Sampling

- Results
- Discussion and Observations
- Actioning Risk Triggers
- Corrective Actions
- Recommendations for future Monitoring Event Improvement

4.2: Action 2: Biosecurity Management

- Monitoring undertaken
- Temporal, Seasonal and weather conditions at time of Sampling
- Results
- Discussion and Observations
- Actioning Risk Triggers
- Corrective Actions
- Recommendations for future Monitoring Event Improvement

4.3: Action 3: Fencing, Access and Signage

- Monitoring undertaken
- Temporal, Seasonal and weather conditions at time of Sampling
- Results
- Discussion and Observations
- Actioning Risk Triggers
- Corrective Actions
- Recommendations for future Monitoring Event Improvement

4.4: Action 4: Fire Management

- Monitoring undertaken
- Temporal, Seasonal and weather conditions at time of Sampling
- Results
- Discussion and Observations
- Actioning Risk Triggers
- Corrective Actions
- Recommendations for future Monitoring Event Improvement

4.6: Action 5: Ecological Restoration

- Monitoring undertaken
- Temporal, Seasonal and weather conditions at time of Sampling
- Results

- Discussion and Observations
 - Actioning Risk Triggers
 - Corrective Actions
 - Recommendations for future Monitoring Event Improvement
5. Auditing and Review of OMP Adequacy
 6. Monitoring Schedule
 7. Corrective Actions Summary
 8. Other Matter
 9. Summary and Conclusions

All reporting is to be appended with raw data, results of analysis (if undertaken), site photography and mapping.

11.3 OMP Review

All surveys, results, management activities statuses, alterations or amendments will be recorded within an ACR Offset. Each ACR Offset will be completed by the Offset Provider and issued to the Proponent within 30 days of each 12 months anniversary of the documented commencement of the action. This commitment is purposely documented to ensure adequate time is provided to the Proponent to evaluate and utilise the ACR Offset in preparing the Project Specific ACR for the Action.

12. References

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Figures



Double Jump Road, OMP

Figure 1 - Locality of the Thagoona Offset Area

28 South Project Ref: 2019-100e

Source: C:\Users\Mitchell\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\Woodbury EPBC Referral (GDA2020).ggz

The spatial data referenced within this map has been obtained from a variety of verified and licensed sources, as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DoR repositories QImagery and QGlobe.

28°S

ENVIRONMENTAL

Links to data sources can be provided upon request.

Thagoona Offset Area Boundary

Road

Rail Network

Major waterway

Ipswich City Council Conservation Reserve

Issue Date	Dwg No.	Author
17-04-2026		MO
Approved	Revision Note	
AD		

GDA2020 MGA 56

1:45,550

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km

N



Double Jump Road, OMP

Legend

Figure 2 - Topography, Elevation & Waterways of the Thagoona Offset Area

28 South Project Ref: 2019-100e

Source: C:\Users\Mitchell\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\Woodbury EPBC Referral (GDA2020).qgz

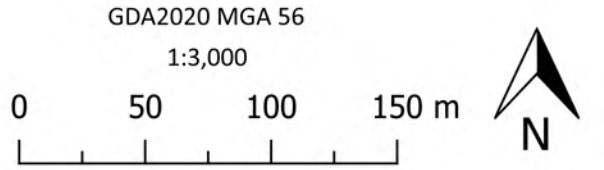
The spatial data referenced within this map has been obtained from a variety of verified and licensed sources, as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DoR repositories QImagery and QGlobe.



Links to data sources can be provided upon request.

- Thagoona Offset Area Boundary
- Property Boundaries
- Road
- Contour (1m)

Issue Date	Dwg No.	Author
17-04-2026		MO
Approved		Revision Note
AD		





Double Jump Road, OMP

Legend

- Thagoona Offset Area Boundary

Property Boundaries

Road

Waterway/overland flow path
- QLD Surface Geology

Qa-QLD

Qha/1-QLD

Walloon Coal Measures

Figure 3 - Geologies of the Thagoona Offset Area

28 South Project Ref: 2019-100e

Source: C:\Users\Mitchell\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\Woodbury EPBC Referral (GDA2020).qgz

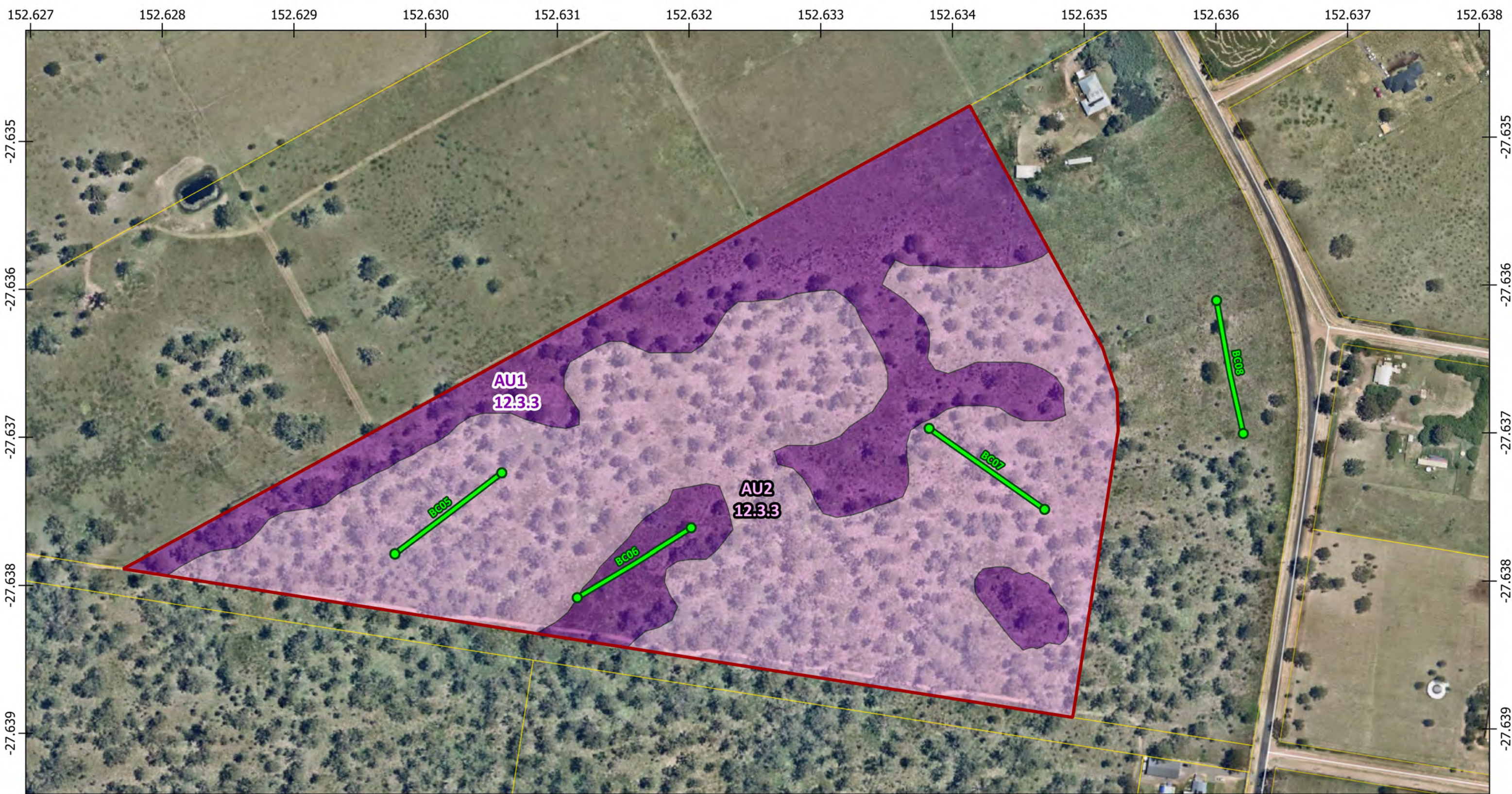
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Links to data sources can be provided upon request.

Issue Date	Dwg No.	Author
17-04-2026		MO
Approved		Revision Note
AD		

GDA2020 MGA 56
1:9,500
0 100 200 300 m



Double Jump Road, OMP

Legend

- Thagoona Offset Area Boundary
 - Property Boundaries
 - Road
 - Biocondition Plot [4]
- Thagoona Offset Area Assessment Units**
- Assessment Unit 1 (AU1) (RE 12.3.3) [5.84 ha]
 - Assessment Unit 2 (AU2) (RE 12.3.3) [11.84 ha]

Figure 4 - Assessment Units of the Thagoona Offset Area

28 South Project Ref: 2019-100e

Source: C:\Users\Mitchell\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\Woodbury EPBC Referral (GDA2020).qgz

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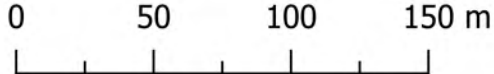
28°S
ENVIRONMENTAL

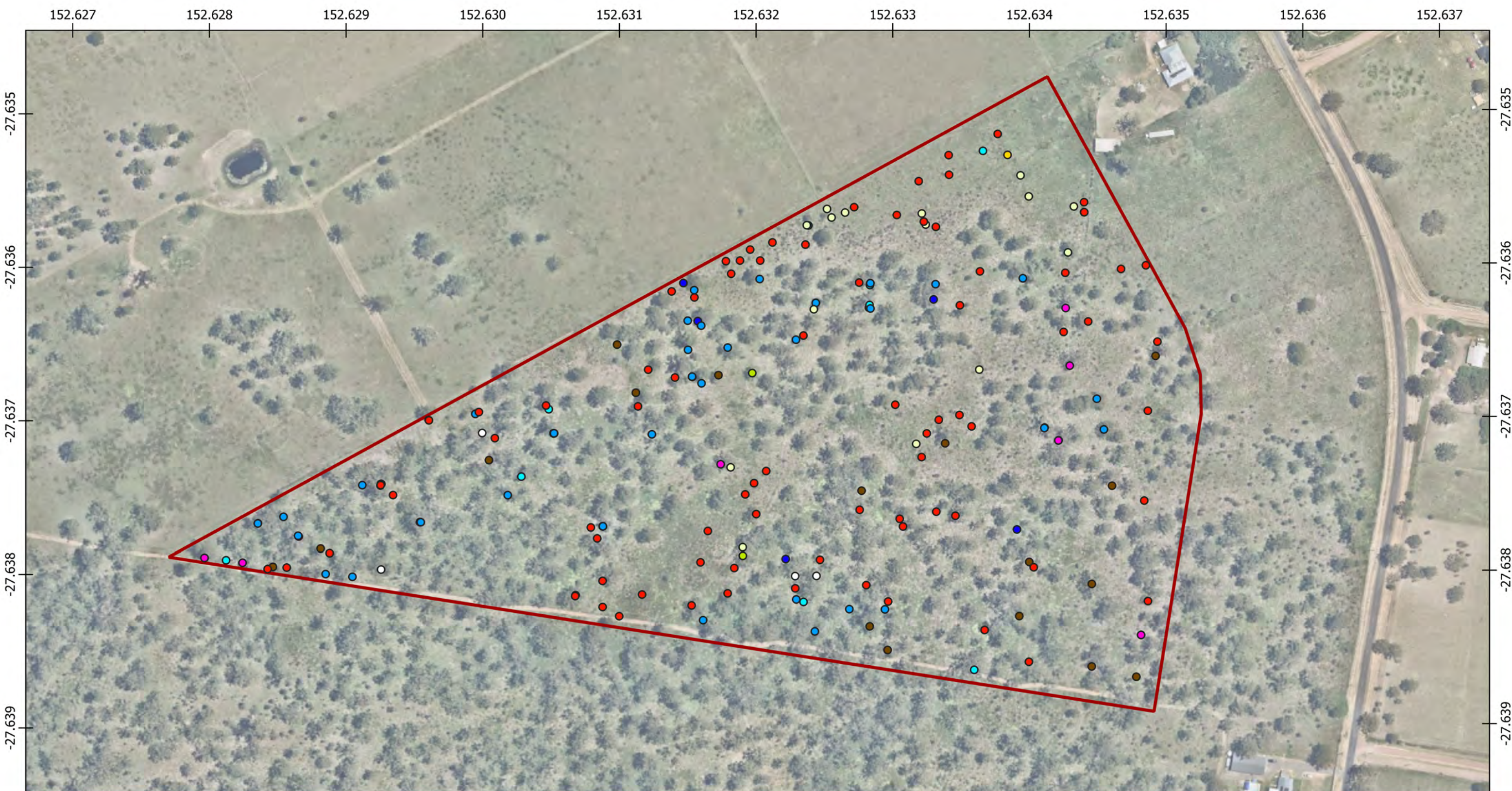
Links to data sources can be provided upon request.

Issue Date	Dwg No.	Author
17-04-2026		MO
Approved	Revision Note	
AD		

GDA2020 MGA 56

1:2,750





Double Jump Road, OMP

Legend

Thagoona Offset Area Boundary

Thagoona Offset Area Weed Species

- Ambrosia artemisiifolia [16]
- Asparagus africanus [16]
- Baccharis halmifolius [78]
- Celtis sinensis [37]
- Lantana camara [8]

- Macroptilium atropurpureum [2]
- Opuntia tomentosa [4]
- Schinus terebinthifolia [23]
- Senecio madagascariensis [5]
- Tipuana tipu [5]
- Vachellia farnesiana [1]

Figure 5 - Total Weed Species Richness of the Thagoona Offset Area

28 South Project Ref: 2019-100e

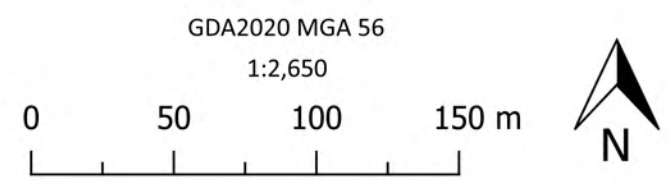
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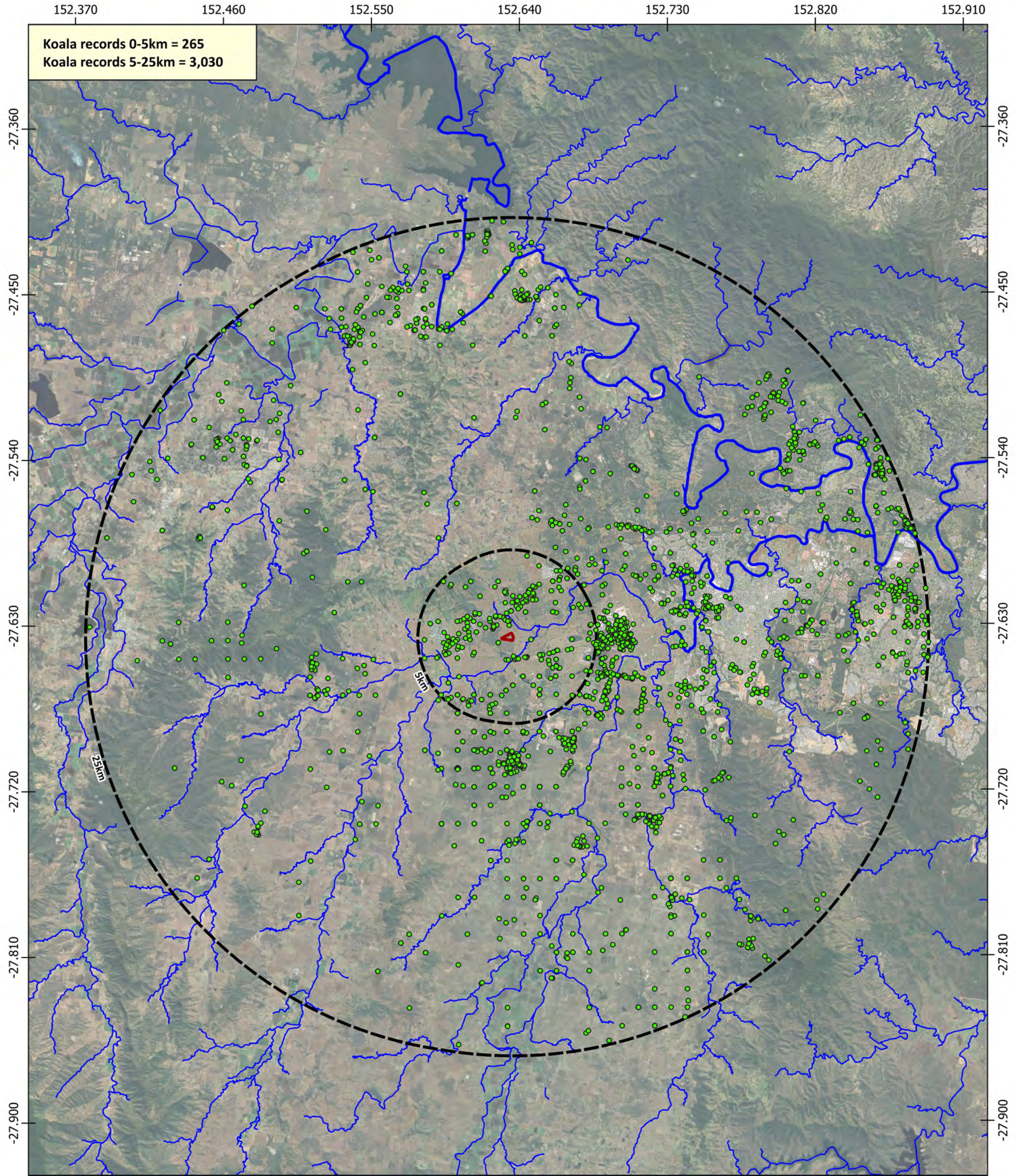
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Links to data sources can be provided upon request.

Issue Date	Dwg No.	Author
17-04-2026		CMMO
Approved		Revision Note
AD		





Koala records 0-5km = 265
Koala records 5-25km = 3,030

Double Jump Road, OMP

Legend

Figure 6 - Koala Records Within 25km of the Thagoona Offset Area (1990-present)

28 South Project Ref: 2019-100e

Source: C:\Users\Mitchell\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\Woodbury EPBC Referral (GDA2020).ggz

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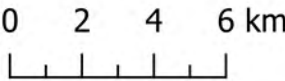
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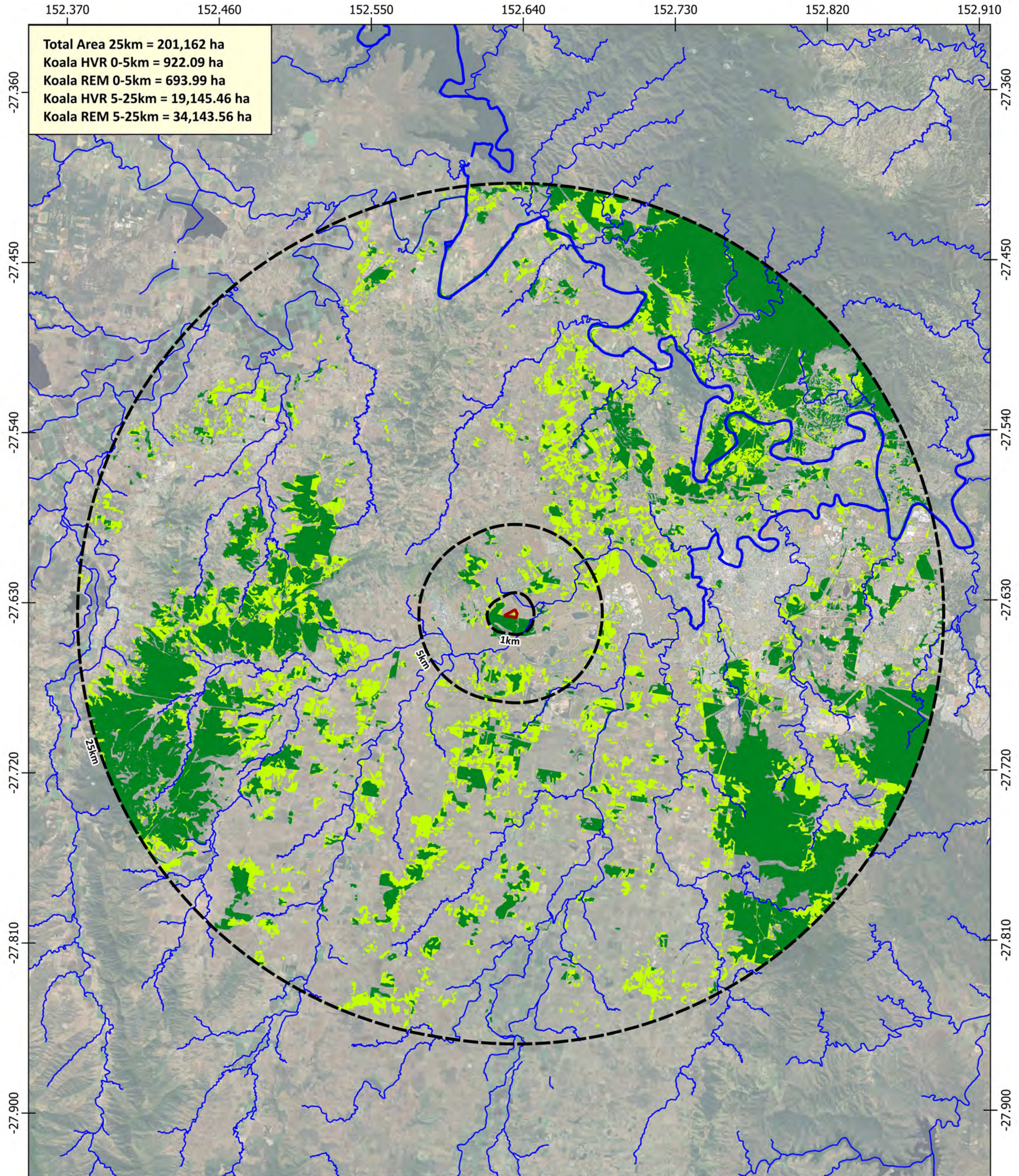


- Woolshed Offset Area Boundary
- Major Waterway
- Koala Records (ALA) (1990 to present) [3295 within 25km]

Issue Date	Dwg No.	Author
17-04-2026		MO
Approved	Revision Note	
AD		

GDA2020 MGA 56
1:210,000





Total Area 25km = 201,162 ha
Koala HVR 0-5km = 922.09 ha
Koala REM 0-5km = 693.99 ha
Koala HVR 5-25km = 19,145.46 ha
Koala REM 5-25km = 34,143.56 ha

Double Jump Road, OMP

Figure 7 - Koala Habitat Within 25km of the Thagoona Offset Site

28 South Project Ref: 2019-100e

Source: C:\Users\Mitchell\Dropbox\Projects\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\Woodbury EPBC Referral (GDA2020).gqz

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Links to data sources can be provided upon request.

28°S

ENVIRONMENTAL

Legend

Thagoona Offset Area Boundary

Major Waterway

QLD Regulated Vegetation v13

High Value Regrowth Vegetation

Remnant Vegetation

Issue Date	Dwg No.	Author
17-04-2026		MO
Approved	Revision Note	
AD		

GDA2020 MGA 56

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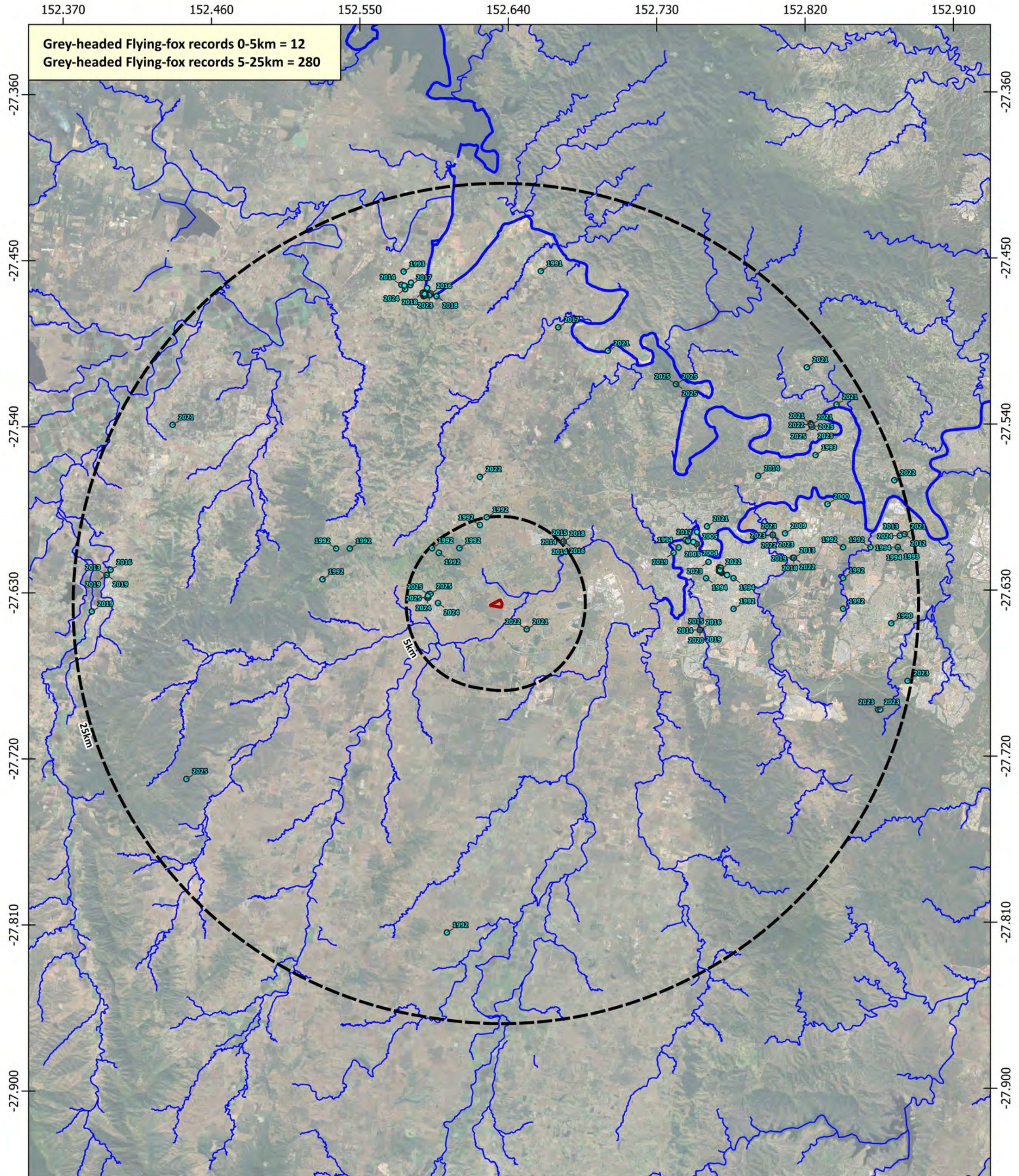
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2

4

6 km

N



Grey-headed Flying-fox records 0-5km = 12
Grey-headed Flying-fox records 5-25km = 280

Double Jump Road, OMP

Figure 8 - Grey-headed Flying-fox Records Within 25km of the Thagoona Offset Area

28 South Project Ref: 2019-100e

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28°S
ENVIRONMENTAL

Links to data sources can be provided upon request.

Thagoona Offset Area Boundary

Major Waterway

Grey-headed flying fox record (ALA) (1990 to present) [292 within 25km]

Issue Date	Dwg No.	Author
17-04-2026		MO
Approved	Revision Note	
AD		

GDA2020 MGA 56

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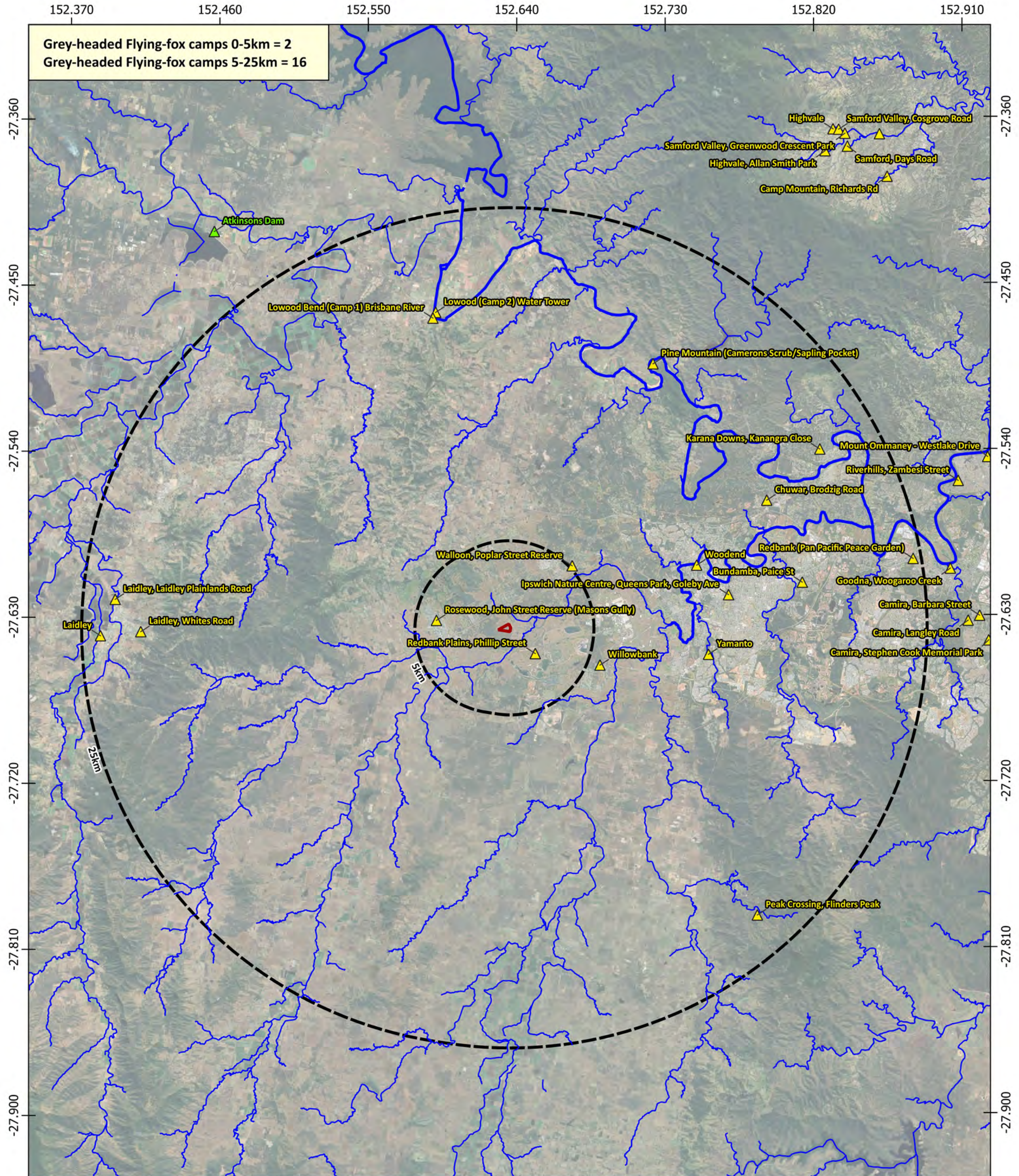
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2

4

6 km

N



Double Jump Road, OMP

Legend

- Thagoona Offset Area Boundary
- Major Waterway
- Grey-headed Flying-fox camp (CSIRO) [18 within 25km]
- Nationally Important Grey-headed Flying-fox camp (CSIRO) [1] [29.46km from Thagoona Offset]

Figure 9 - Grey-headed Flying-fox Camps Within 25km of the Thagoona Offset Area

28 South Project Ref: 2019-100e

Source: C:\Users\Mitchell\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\Woodbury EPBC Referral (GDA2020).ggz

The spatial data referenced within this map has been obtained from a variety of verified and licensed sources, as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DoR repositories QImagery and QGlobe.

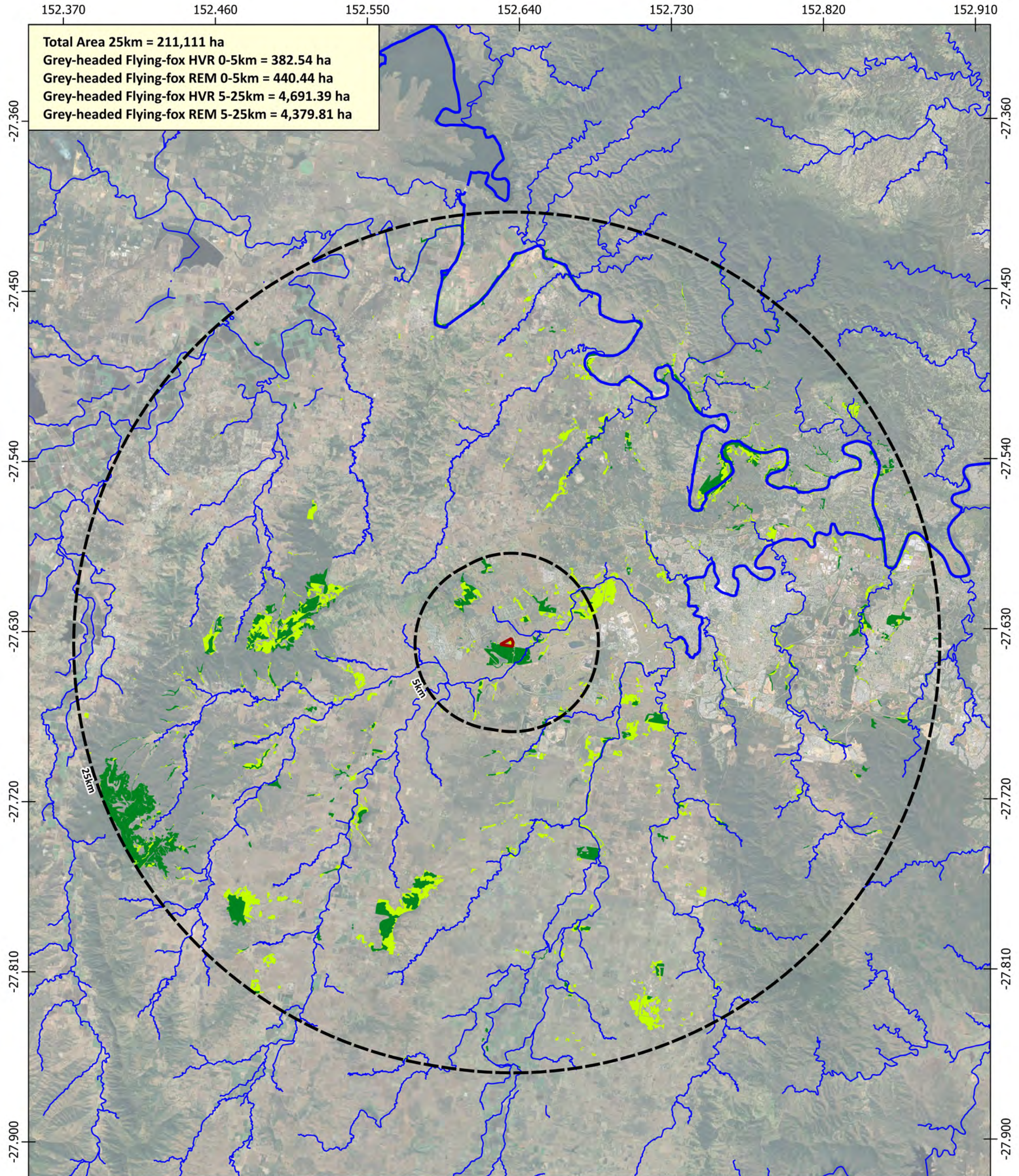


Links to data sources can be provided upon request.

Issue Date	Dwg No.	Author
17-04-2026		MO
Approved	Revision Note	
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0 2 4 6 km



Double Jump Road, OMP

Legend

Figure 10 - Grey-headed Flying-fox *E. tereticornis* / *M. quinquenervia* Dominant or Co-dominant Habitat within 25km of Thagoona Offset Area

28 South Project Ref: 2019-100e

Source: C:\Users\Mitchell\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\Woodbury EPBC Referral (GDA2020).gqz

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Links to data sources can be provided upon request.

- Thagoona Offset Area Boundary
- Major Waterway

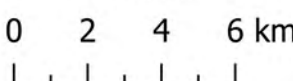
QLD Regulated Vegetation v13

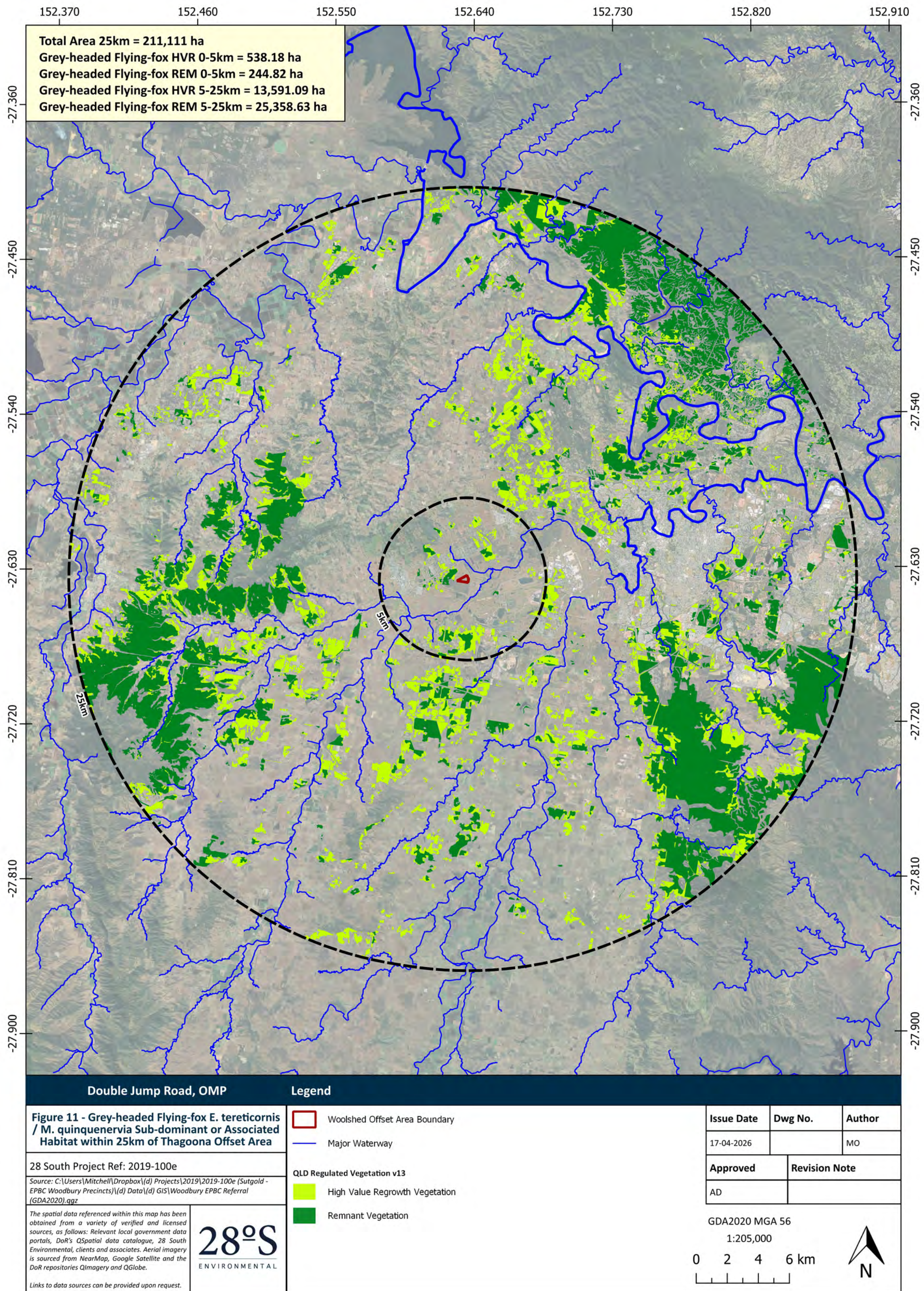
- High Value Regrowth Vegetation
- Remnant Vegetation

Issue Date	Dwg No.	Author
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Attachment 1 -
Baseline Vertebrate
Pest Assessment

Technical Memorandum

Baseline Vertebrate Pest Assessment Thagoona North Offset (EPBC 2024-09825)

1. Introduction and background information

28 South Environmental (28 South) has been engaged by Sutgold Pty Ltd to prepare a Preliminary Documentation (PD) report responding to the further information requirements of the Department of Climate Change, the Environment, Energy and Water (DCCEEW) for the Double Jump Road Residential Estate Development located in Victoria Point the in the Redland City Council (**RCC**) Local Government Area (**LGA**) of south-east Queensland. (EPBC 2024-09825).

Where residual significant impacts have been identified for protected matters under the EPBC Act, following the identification and inclusion of all reasonable avoidance and mitigation measures, a compensatory environmental offset must be established and proposed as a component of the PD Report. Item 6.0 of Attachment 1.2, and items 1.0 and 2.0 of Attachment B of the Preliminary Documentation Request addresses the proposed offset, and outlines requirements to assess baseline habitat quality for impacted protected matters, namely koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*), at the proposed Offset Area (**OA**).

The proposed OA is located on a property at 160 Mcgearys Road, Thagoona QLD, approximately 64 km west of the Impacted Area, Figure 1. The property, totals 25.21 ha, is formally described as lot 1 on RP190542 and is zoned Rural A under Ipswich City Planning Scheme 2024 .Approximately 17.68 ha of the site is proposed as the OA to acquit residual environmental impacts proposed under the controlled action. Vertebrate pest fauna surveys were conducted across the 17.68 ha area and hereafter referred to as the 'Site'.

The Site is characterised by a mixture of pastoral grassland, and mature regrowth, It is embedded within a broad matrix of open woodland near Queensland Protected Areas. Stirling Road Reserve lies approximately (distance)

Management actions will restore areas of the property which have been historically subject to agricultural practices. The OA has been ground-truthed in accordance with the Regional Ecosystem framework¹ and delineated into eight distinct assessment units (AU). Each AU is representative of a distinct regional ecosystem and vegetation condition and is described in Table 1 below.

Table 1: Offset Site Details

Description	Assessment Unit	
	AU01	AU02
Ground-truthed RE and condition	Non-remnant (Category X) vegetation; Preclear 12.3.3	High Value Regrowth (Category C); RE 12.3.3

¹ Neldner *et al.* (2023). Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland (version 7.0)

Description	Assessment Unit	
	AU01	AU02
Assessment Unit Description	This assessment unit is a matrix of Forest Red Gum (<i>Eucalyptus tereticornis</i>) canopy with a grassy understory and open paddock with a mixture of pastoral grasses and wetland species within the understory. The shrub layer is significantly impacted with sparse recruitment of canopy species forming the bulk of the sporadic and minimal shrub layer.	This assessment unit is a dominated by mature and semi-mature Forest Red Gum (<i>Eucalyptus tereticornis</i>) and Moreton Bay Ash (<i>Blakella tessellaris</i>) canopy with a grassy understory with a mixture of pastoral grasses and wetland species within the understory. The shrub layer is significantly impacted with sparse recruitment of canopy species forming the bulk of the sporadic and minimal shrub layer.

The offset (Cherish) provider will monitor and manage the environmental condition of the property in conjunction with and over the lifetime of the Offset Management Plan (OMP). This includes the management and delivery of management actions such as vertebrate pest control measures in response to information delivered through vertebrate pest technical memorandums. The *Biosecurity Act 2014* (Qld) (BA) commenced on the 1 July 2016. The Act imposes an overarching General Biosecurity Obligation (GBO) which requires reasonable and practical measures to prevent or manage biosecurity risks and not to exacerbate already present effects. A further requirement of the GBO is the management of high priority pest animals in line with restricted matter obligations prescribed by the BA. Restricted matters include pest animals that have established populations in Queensland and have a significant impact on human health, social amenity, the economy or the environment.

The Thagoona Offset is adjacent to, and compliments an existing 264ha Offset (EPBC 2023/6941) lying adjacent to the south. The purpose of this vertebrate pest assessment is to inform the Thagoona OMP, produced to guide the habitat improvement of the OA through the management of invasive matters such as vertebrate pests. The purpose of the OMP is to demonstrate that the Applicant and the Offset Provider understand requirements for vertebrate pest management at the OA in order to improve the quality of the habitat for the MNES affected by the proposed action. In addition to improving habitat quality within the OA the client will be fulfilling their GBO under the BA.

In order to provide appropriate targeted pest management activities, assessment was performed to identify activity and diversity of vertebrate pest species within the OA.

2. Techniques Employed

Assessment of the baseline presence of vertebrate pests consisted of:

- Camera trap survey.

2.1 Survey Conditions

Survey conditions are listed for the fourteen (14) days in which the camera traps were deployed; 08-March-2026 to 22-03-2026. Survey conditions over the duration of the time cameras were in field ranged from 15.2 to 35.2 degrees, with wind reaching a maximum speed of 57 km/h. Total rainfall over the survey period was 36.2 mm ^[2].

Table 2: Survey Climate Conditions

Date	Minimum Temperature (°C)	Maximum Temperature (°C)	Rainfall (mm)	Direction and Windspeed Maximum (km/h)	9 am Direction and Speed (km/h)	3 pm Direction and Speed (km/h)
08-03-2026	22.7	26.5	0.6	SSE 22	SE 15	SE13
09-03-2026	20.8	26.6	17.0	S 17	NNW 2	SE 9
10-03-2026	17.8	31.5	6.8	ESE 41	S 11	S 20
11-03-2026	15.2	31.6	0.0	NE 28	W 6	ENE 13
12-03-2026	15.9	35.2	0.0	NNW 30	NNW 13	NNE 13
13-03-2026	21.0	33.6	0.0	S 57	SSW 6	SE 19
14-03-2026	19.8	28.3	11.2	SE 46	SSE 30	SE 28
15-03-2026	19.0	28.9	0.0	SSE 37	SSE 15	NE 17
16-03-2026	16.8	29.7	0.0	NE 39	SW 6	NE 19
17-03-2026	16.3	30.5	0.0	ENE 31	SW 9	ENE 17
18-03-2026	16.1	n.d.	0.0	n.d.	SSW 7	ENE 20
19-03-2026	18.6	26.7	0.0	SE 35	E 9	ESE 20
20-03-2026	17.6	30.3	0.4	NE 35	S 6	E 20
21-03-2026	15.8	30.5	0.2	SE 39	SSW 6	ESE 26
22-03-2026	15.7	30.9	0.0	E 41	S 17	ESE 17

2.2 Camera Trap Survey

2.2.1 Survey Effort

Four (4) Browning Patriot “black flash” cameras were deployed across the OA, encompassing two (2) of the AUs (**Figure 1**). The distribution of cameras was organised to capture the heterogeneity of habitat type (RE) and condition, represented by Assessment Unit. Within each Assessment Unit, camera placement was selected in-situ to target areas with greater probability of vertebrate pest fauna movement. In-situ habitat features selected for include formed pathways through vegetation, fence lines, access tracks, and potential shelter sites. The primary approach to camera distribution and placement is to (i) determine which habitat types, vertebrate pest fauna are utilising, and (ii) within each habitat type, target habitat characteristics to yield the greatest probability of detection.

An additional survey was conducted approximately 1.3 km south of the Offset Area (OA). However, due to data limitations encountered at this location, the resulting dataset is restricted to presence-only records for pest species and survey metric are not included. Cameras were deployed for 14 days from the 8th to the 22nd of March 2026. After collection the data revealed that all the cameras reached a capacity of 10, 000 photos, prior to collection, denoted with an (*). Total survey effort as a result was 18 camera trap-nights.

2.2.2 Camera Setup

All cameras were set on trees or fence posts at ~ 0.5 m above the ground. Cameras were aimed at two bait items. A piece of chicken, as well as a PVC bait holder staked to the ground approximately 3 m away, containing a mixture of oats, sardines, peanut paste, vanilla essence and honey. Where necessary, vegetation was cleared to reduce false triggers caused by vegetation movement, and to ensure the bait holder could be easily distinguished in photos. Cameras were set to 24-hour operation, high sensitivity and captured three images per trigger event with a 1 second delay. The distribution of camera traps across the Offset Area is illustrated in **Figure 1**, with spatial location data detailed in **Table 3** below.

Table 3: Camera trap spatial location

Assessment Unit	Camera ID	Easting	Northing
AU1	04*	464066.34	6943038.03
AU1	05*	463741.67	6943071.41
AU2	06*	463510.38	6942890.16
AU2	07*	463944.43	6943229.31

2.2.3 Data Analysis

The use of camera traps to estimate population density of marked and unmarked fauna (i.e. fauna that are either individually recognisable based on morphological marking or are not) is well trialled through scientific literature (Rowcliffe *et al.*, 2008, and Palencia *et al.*, 2022). Typically, spatial capture-recapture models are used to measure species which are individually recognisable, whereas distance sampling or random encounter models are used for non-individually recognisable species (Palencia *et al.*, 2022, Santini *et al.*, 2022, Mason *et al.*, 2022). The application of robust methodologies involves a high volume of cameras, a defined area, and species-specific information such as home range and daily movement distances.

The application of these various models, although still emerging, produces promising results in terms of accurately predicting population density. However, each model includes the same relevant application constraints in terms of survey effort, cost, and essential biological data model-inputs (i.e. home range, daily movement patterns, habitat type, movement constraints etc). For the purposes of vertebrate pest fauna monitoring and the application of results to inform offset management, a robust statistical model is not a practical solution. As a surrogate for a random encounter model, a simple targeted encounter model is adopted and described below.

To inform pest management actions within the OA, it is essential to adopt a survey method which applies the greatest probability for pest animal encounter. A biased survey design is adopted through the inclusion of general bait, and the placement of cameras to face favourable habitat and movement pathways. Data is analysed to record each encounter with a target vertebrate pest fauna species. A single encounter (or trigger) is defined as the series of photographs programmed to result from motion detection. As motion cameras have been programmed to capture three photographs when triggered, this is to increase the accurate identification of the trigger cause, a single encounter is defined as three photographs.

Data analysis therefore produces a dataset of *encounters* between all cameras and all vertebrate pest fauna. The rate of encounter provides the following metrics:

- Number of encounter events across the matter area
- Number of encounter events per species
- Number of encounter events per camera and habitat type (RE and condition).

The rate of encounter does not inform population dynamics in terms of population measures of abundance or density, nor is the data statistically meaningful. Instead, the results demonstrate a uniform rate of specie-specific *activity* which allows for a comparative platform between monitoring events. The resulting rate of activity can be compared between monitoring years under the following methodology assumptions:

- i) The rate of species-specific activity, represented by the rate of encounter, will change in response to species population density;
- ii) Where animal management has been undertaken, it is expected that this will be reflected in reduced species activity across the Offset Area; and

iii) Unique scores.

The above assumptions are complimentary to the adaptive management framework of the OMP. Management action effort, i.e. the management of pests, will be tailored in response to the activity level of target vertebrate pest fauna between monitoring years. It is recommended that camera set-up and location remain consistent across monitoring events to improve the comparative power between results.

2.3 Limitations

Due to high levels of moving vegetation, the camera traps reached their maximum storage capacity prior to the scheduled conclusion of the survey period. Consequently, the total sampling effort for each unit was reduced to a duration of 3 to 5 days per camera. While a significant area in front of each camera was cleared with garden shears to minimise false triggers from moving vegetation, the rapid accumulation of data suggests that high-frequency movement still occurred, limiting the temporal scope of the survey.

3. Results

3.1 Camera Trap Survey

A total of 12 unique taxa were identified on camera traps at the site over the seventeen (17) camera trap survey nights. One amphibian pest, one pest mammal, three native bird species, one macropod species, and two native reptiles were detected across the Site. The initial pest species detected was likely the House Mouse (*Mus musculus*). As observations were recorded at night, there remains a potential for misidentification with morphologically similar native rodent species. Due to these visual limitations, the presence of native mice within the survey area cannot be entirely discounted. The only detected pest fauna species included the Cane Toad (*Rhinella marina*). Although not observed at the offset site, 1.3 km south underwent camera trapping at the same time as this assessment and recorded Red Fox (*Vulpes vulpes*). Because of this species mobility and home ranges it has been included in a pest relevant for this site. No conservation significant species were detected and identified through camera trap survey. The complete list of all fauna species identified by camera trap are detailed in **Attachment 1**.

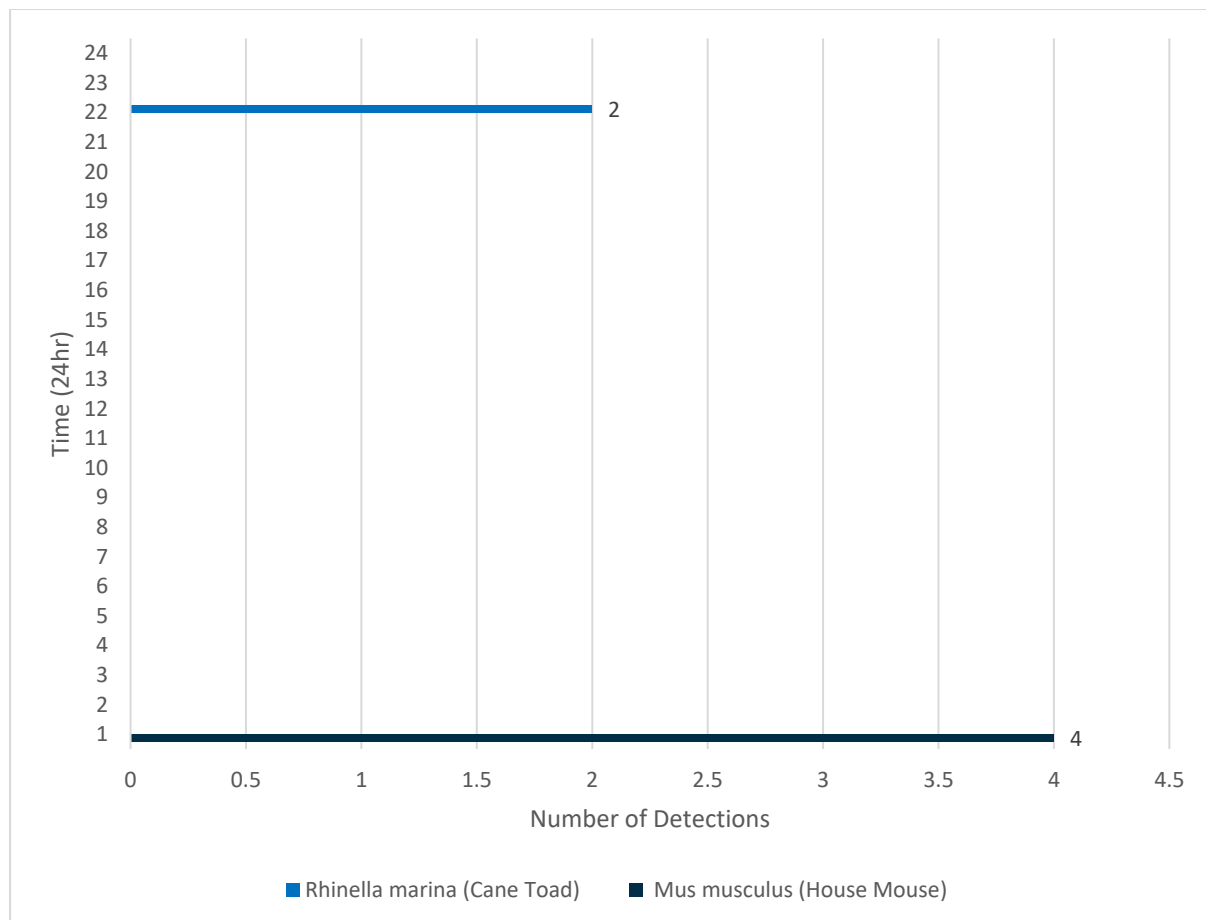
A total of 6 individual encounters with vertebrate pest fauna resulted from 4 active cameras over 17 survey nights (**Table 2**). Of the 6 encounters, 66.67 % belonged to The House Mouse (*Mus musculus*), occurred at Camera 04. All other detections occurred at Camera 06 with 33.33 % of detections belonging to the Cane Toad (*Rhinella marina*). Encounters were twice more common in AU2 within Non-remnant vegetation than AU1 within regrowth, with a 66.67 % and 33.33 % detection rate respectively. Although functional, two cameras did not detect any vertebrate pest fauna species (C05, C07). Vertebrate pest fauna encounter results are summarised according to species and camera site in **Table 4** below.

Table 4: Baseline camera trap survey results - vertebrate pest species

Camera ID	Vegetation Condition	House Mouse (<i>Mus musculus</i>)	Cane Toad (<i>Rhinella marina</i>)	Total
Camera 04	Grassland/Open grassy woodland	4	-	4
Camera 05	Grassland/Open grassy woodland	-	-	nil
Camera 06	Regrowth	-	2	2
Camera 07	Regrowth	-	-	nil
Total	-	4	2	6

The relationship between the rate of encounter, i.e. the total number of camera detections, between species (or species group) and time of day is illustrated in **Inset 1**. The inset illustrates that the rate of encounter peaked during the early morning at 01:00 AM with a total of 4 encounters, attributed to the House mouse (*Mus musculus*). Secondary encounter spikes occurred during the late evening at 10:00 PM (2), attributed to encounters with Cane Toad (*Rhinella marina*). The rate of encounter between pest fauna and cameras experiences an observable lull

between the hours of 02:00 AM and 21:00 PM. While the timing of these detections is suggestive of nocturnal and crepuscular activity patterns characteristic of each of the two species, the limited data set must be noted.



Inset 1: Rate of encounter across species and time of day (24hr)

4. Discussion and Conclusion

The most common species encountered across the Site include the House mouse (*Mus musculus*) and the Cane Toad (*Rhinella marina*). Both the species were infrequently detected on camera traps. It is observable in camera encounter results that vertebrate pest fauna activity is fairly uniform across the entirety of the Site.

The Site is characterised by RE 12.3.3 of two vegetation condition thresholds; Non-remnant and Regrowth. The Site transitions between habitat patches which contain areas of woody regrowth, and larger expanses paddocks with scattered mature regrowth woodland.

Red Fox (*Vulpes vulpes*) identified nearby the Site is likely to impede natural processes of vegetation condition improvement and compromise targeted vegetation regeneration actions. In particular, the seemingly active populations of Red Fox (*Vulpes vulpes*), listed as Category 3, 4, 5 and 6 restricted invasive animals under the BA², present significant biosecurity risk to long term survival of various marsupial and bird populations and increased spread of disease. This species is considered to have environmental degradation impacts to natural environments, pastoral and agricultural areas. In offset areas, uncontrolled populations may inhibit restoration success by reducing marsupial species richness, which in turn can negatively affect ecological processes such as soil engineering, seed dispersal, and pollination (See Attachment 7). The occupancy of Red Fox (*Vulpes vulpes*)

² Biosecurity fact sheets are published by the State of Queensland, the Department of Primary Industries and are available at biosecurity.qld.gov.au

exposes the Offset to risks associated with predation and subsequent mortality to Koala (*Phascolarctos cinereus*). The population of House mouse (*Mus musculus*) and Cane Toad (*Rhinella marina*) on-Site is so small in detections it is likely inconsequential to environmental processes in relation to restoring the Offset areas

Feral Cat (*Felis catus*), Feral Pig (*Sus scrofa*), Dingo (*Canis familiaris*), Feral Dog (*Canis lupus familiaris*), Rabbit/Hare (*Oryctolagus cuniculus* and *Lepus europaeus*) which are normally associated with peri-urban and agricultural environments. These species have not been observed within the property boundary, however, failure to detect the species is not evidence of species absence. Future monitoring and implementation of control measures if detected, should be a feature of the Site and also the adjoining Cherish Offset Site to the south.

4.1 Management Recommendations

Baseline vertebrate pest fauna survey has been undertaken to inform the implementation and timing of management actions in accordance with prescribed offset management strategies detailed in the Double Jump Road Residential Estate Development OMP, to which this memorandum is attached.

The OMP for the Double Jump Road Residential Estate Development Offset Area prescribes annual pest monitoring and adaptive vertebrate pest management actions. Adaptive management actions associated with vertebrate pest animal monitoring will be informed annually through the repetition of survey design detailed in this memorandum. Recommendations include:

- Establish a formal arrangement with Ipswich City Council during Year 1 to implement baiting on Site.
- Implement baiting throughout Year 1 and Year 2. The efficacy of these actions will be evaluated through annual monitoring to determine if management strategies require further refinement.
- Install fauna-friendly fencing to maintain habitat connectivity for native species while managing the movement of larger vertebrate pest species.
- The use of trapping and shooting should be considered a secondary management phase, to be implemented only if annual monitoring data deems these measures necessary.
- If shooting is implemented, all activities must be conducted in a southerly or south-westerly direction to ensure site safety and maintain appropriate buffers.

Ongoing management methods for pest fauna species on site can include shooting, baiting, fencing, trapping, livestock guardian animals, lures, harbour destruction, warren ripping, biological control and fumigation. The management of pest species populations on the Site should be undertaken under consultation with species specialists and strictly be undertaken with relevant approvals and conditions under Commonwealth, Queensland State guidelines or where relevant. The approach is different for each species and is to be determined based on-site management conditions. Species specific management can be found on the Department for Primary Industries website factsheets for invasive animals, the fact sheets have been summarised in **Table 5**.

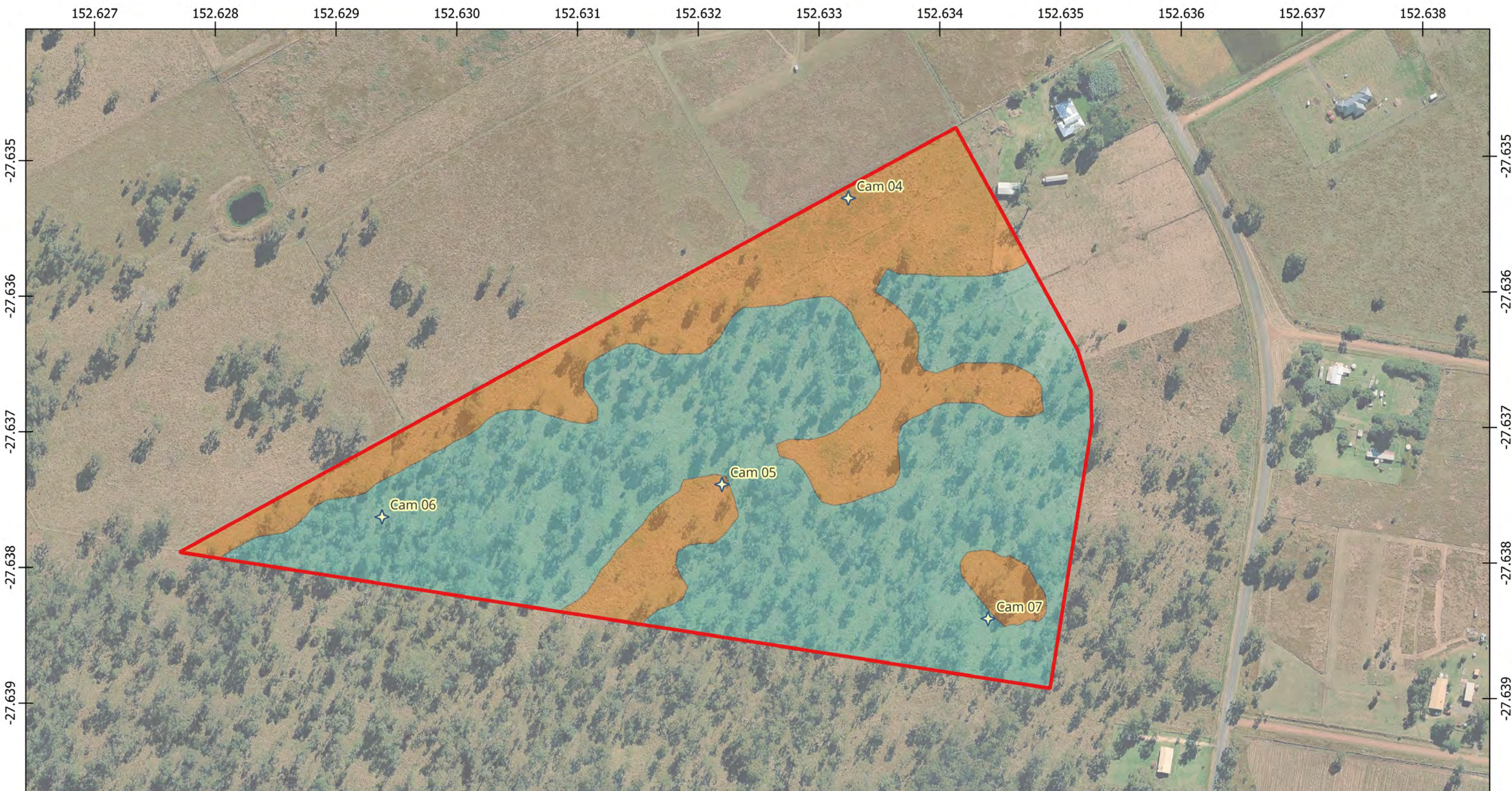
Table 5 - Methods for pest management

Species	Method										References
	Shooting	Baiting / Poisoning	Exclusion Fencing	Trapping	Guardian Animals	Lures	Harbour destruction	Warren ripping	Biological Control	Fumigation	
Feral Pig	✓	✓	✓	✓							(Department of Primary Industries, 2026b) See Attachment 1
Deer (<i>Cervus elaphus</i>)	✓		✓	✓							(Department of Primary Industries, 2025b) See Attachment 1
Dingo (<i>Canis familiaris</i>) and Feral Dog (<i>Canis lupus familiaris</i>)	✓	✓	✓	✓	✓						(Department of Primary Industries, 2024, 2025a) See Attachment 1
Rabbit/Hare (<i>Oryctolagus cuniculus</i> and <i>Lepus europaeus</i>)	✓X	✓	✓	✓			✓	✓	✓	✓	(Department of Primary Industries, 2025d) See Attachment 1
Red Fox (<i>Vulpes vulpes</i>)	✓	✓	✓	✓	✓						(Department of Primary Industries, 2026c) See Attachment 1
Feral Cat (<i>Felis catus</i>)	✓	✓	✓	✓	✓	✓					(Department of Primary Industries, 2026a) See Attachment 1

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Figures



Woodbury Offset

Figure 1: Thagoona Offset Camera Locations

28 South Project Ref: 2019 - 100e

Source: C:\Users\Amber\Dropbox\Projects\2019-2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\2026 Woodbury additional offset area - Thagoona (GDA2020).agz

The spatial data referenced within this map has been obtained from a variety of verified and licensed sources, as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DoR repositories QImagery and QGlobe.

Links to data sources can be provided upon request.

28°S

ENVIRONMENTAL

Offset Area Boundaries

Camera Site

Thagoona Offset AU

AU1

AU2

Issue Date

Dwg No.

Author

09-04-2026

AmD

Approved

Revision Note

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Addenda 1 - Pest Management Fact Sheet

Feral pig

Sus scrofa



Pigs were introduced to Australia by early settlers. Subsequent accidental and deliberate releases resulted in wild (feral) populations establishing throughout Australia.

Feral pigs cause environmental and agricultural damage, spread invasive plants and can transmit and potentially spread exotic diseases such as leptospirosis and foot-and-mouth disease.

Legal requirements

The feral pig is a category 3, 4 and 6 restricted invasive animal under the *Biosecurity Act 2014*. It must not be moved, fed, given away, sold, or released into the environment. The Act requires everyone to take all reasonable and practical measures to minimise the

biosecurity risks associated with invasive animals under their control. This is called a general biosecurity obligation (GBO).

At a local level, each local government must have a biosecurity plan that covers invasive animals in its area. This plan may include actions to be taken on feral pigs. Some of these actions may be required under local laws. Contact your local government for more information.

An animal ceases being considered an invasive restricted animal (feral) if a person is keeping it and has become a registerable biosecurity entity (RBE) to keep that designated animal. Feral pigs can be considered as designated animals if a person keeps them.

Description

Feral pigs are typically smaller, leaner and more muscular than domestic pigs with well developed shoulders and necks, and smaller, shorter hindquarters. The body is usually covered in sparse, coarse hair and they have a longer, larger snout, longer tusks, a straighter tail and narrower back than domestic pigs. Feral pigs are mostly black, buff-coloured or spotted black and white.

Growth potential is similar but slower than domestic pigs, with harsh environmental conditions to stunt development. Adult female feral pigs usually weigh 60–75 kg, while males usually weigh 90–110 kg. Older boars (razorbacks) can have massive heads and shoulders and a raised and prominent back bone that slopes steeply down to small hams and short hind legs. Some boars develop a crest or mane of stiff bristles extending from their neck down the middle of their back.

Life cycle

Under good seasonal conditions, breeding occurs all year and sows can wean two litters per year. Adult females have a 21-day oestrus cycle, with a gestation period of about 113 days, producing a litter of 4–10 piglets. Sows can make nests of available vegetation for bedding just before farrowing. Piglets normally spend the first 1–5 days of life inside the nest, with the sow nearby. Weaning occurs after 2–3 months. Sexual maturity is reached when sows weigh about 25 kg, usually around six months of age.

Mortality of juveniles is high if the mother's dietary protein intake is low (up to 100% mortality in dry seasons). Adult mortality does not vary as much with seasonal conditions, but few animals live more than five years.

Social behaviour

Feral pigs are generally nocturnal, typically spending the warmer daylight hours sheltering in dense cover. Pigs are omnivorous, eating both plants and animals and are extremely opportunistic feeders, exploiting any temporarily abundant food.

They prefer green feed and will eat grains, sugarcane and other crops, fruit and vegetables. They root extensively for tubers, worms and soil invertebrates, particularly during wet periods when soil is easy to dig.

Feral pigs have relatively high energy and protein requirements, particularly during pregnancy and lactation and often move to other parts of their home range during pregnancy.

Habitat and distribution

Feral pigs are found in nearly all habitat types in Queensland. The greatest concentrations of feral pigs are on the larger drainage basins and swamp areas of the coast and inland. In hot weather, pigs need to

remain near water and shade to keep cool. Population estimates can be achieved by spotlighting, aerial survey or the use of motion cameras.

Evidence of feral pigs includes fresh digging or rooting of the ground, tracks and faeces on and off pads, mud or hair at holes in fences where pigs have pushed through, wallows, tusk marking and mud rubs on trees and fence posts and nests in vegetation made by sows before farrowing.

Female and juvenile pigs usually live in small family groups with a home range of 2–20 km². Adult males are typically solitary, with a home range of 8–50 km². Range size increases with body size, and varies with season, habitat, food availability and disturbance. Herds of 400 pigs have been recorded in Cape York.

Impacts

Pigs can damage almost all crops from sowing to harvest, starting with uprooting seed and seedlings to feeding on or trampling mature crop. They feed on seed, sugar cane and grain crops (except safflower), fruit (especially banana, mango, papaw, macadamia and lychee) and vegetable crops. Research has shown feral pigs can take up to 40% of lambs.

Pastures are damaged by grazing and rooting and pigs can also transport invasive plants. Wallowing pigs damage and foul the water in tanks and bore drains and silt up troughs. They can also damage fences and dam walls.

Feral pig activity degrades water quality and the habitat for small terrestrial and aquatic animals. It also creates erosion and allows invasive plants to establish. Predation of native fauna does occur and examination of faeces has shown remains of marsupials, reptiles, insects, and ground-nesting birds and their eggs.

Diseases and parasites

Feral pigs can carry many infectious diseases and internal and external parasites. Some are endemic (already present), while others are exotic to Australia.

Many of the diseases can spread to domestic pigs, other livestock and humans. Feral pigs can transmit sparganosis, melioidosis, leptospirosis, Q fever and brucellosis to humans.

To prevent contracting these diseases it is advisable to either avoid handling feral pigs or use suitable protective clothing (mask, goggles, strong rubber gloves and plastic apron and boots) to minimise contamination with blood, urine and faeces. Rare or undercooked meat should not be eaten; thoroughly cook meat to avoid contracting pathogens. Raw feral pig meat and offal should not be fed to dogs as dogs can be infected with swine brucellosis. Dogs infected with swine brucellosis can also transmit the disease to humans.



Feral pig wallow



Feral pig rooting



Feral pig damage to river banks



Feral pig damage to sugar cane

Control

Managing feral pigs

The GBO requires a person to take reasonable and practical measures to minimise the biosecurity risks posed by feral pigs.

Feral pigs are difficult to control because they are primarily nocturnal, breed rapidly, and are generalist omnivores. Feral pigs can have large home ranges and thus control programs need to be conducted over a wide area (often including several properties) to be effective. Effective control requires an integrated, collaborative approach where all stakeholders participate in planning, implementation and evaluation of the actions taken.

Fencing

Though an expensive option, fencing can provide effective pig control especially for high value crops grown on small areas. Research has indicated that the most successful pig-proof fences are also the most expensive.

The most effective pig-proof fences use fabricated sheep mesh held close to the ground by plain or barbed wire and supported on steel posts. Electrifying a conventional fence greatly improves its effectiveness, particularly if used before pigs have established a path through the fence. Pigs may charge at an electric fence and unless the fence incorporates fabricated netting they often successfully breach the fence.

For crop protection or to avoid lamb predation, pig-proof fences are best constructed before the pigs become a problem. Once pigs have adjusted to feeding on grain or lambs in a particular paddock, fencing may be challenging ineffective.

Trapping

Trapping is an important technique that is most useful in populated areas, on smaller properties

(e.g. <5000 ha), and where there are low pig numbers. Trapping can be particularly useful in 'mopping up' survivors from baiting programs. It is most successful when food resources are limited.

Trigger mechanisms for pig traps can be made pig-specific and therefore pose little danger to wildlife or domestic animals. There are also remote activated trap technologies available, and cameras to aid in monitoring for any captures.

Advantages

- Can be safely undertaken in closely populated areas with adequate precautions.
- It's flexible and can be incorporated into routine property activities, making economical use of labour and materials.
- Carcasses can be safely disposed of.
- Traps can be moved and re-used; good trapping makes use of opportunities as they arise.
- Normal pig behaviour is not altered, which allows a greater number of the total population in an area to be targeted.
- More humane to pigs and non-target species.
- The number of animals removed can be easily monitored.

Disadvantages

- Can be time consuming and expensive to construct and maintain.
- Must be checked regularly.
- Not practical for large-scale control.
- Some pigs are trap shy.

Tips

- Stop all activities that will disturb normal feeding (i.e. do not undertake any shooting or dogging).
- Pre-feeding (i.e. ensure that pigs are visiting trap and consuming bait) prior to activating traps is an essential part of successful trapping.

- Feeding sites should be placed where feral pigs are active (i.e. water points, holes in fences, areas containing old carcasses on which pigs have been feeding).
- Bait for traps must be food that pigs usually eat in that area. Pigs feeding on one crop (e.g. sugarcane) will often not take to alternative foods quickly. However, new, novel baits are sometimes attractive (e.g. fermented grains).
- The trap can be built around the feeding site, with feeding within the trap undertaken for several nights before it is set.
- Set the trap every night and check each day. Remote cameras can help with monitoring. If the trap cannot be checked daily then shade and water must be provided.
- Continue to trap until no more pigs are caught. A change of bait can be tried. Again, feed for at least one or two nights before re-setting the trap.
- Traps may be left permanently in locations used by pigs and can be utilised when fresh signs of pigs appear.
- If the trap is to be moved, start feeding at the new site before re-locating the trap.
- Avoid bringing in new objects into trap sites.

Design

There are several trap designs but all are principally an enclosed area with one-way gates (see figure 1). The main area of the trap can be any shape and be made from materials on the property. The best material is steel mesh with a grid 100 × 100 mm, with a minimum height of at least 1.5 m. Star pickets need to be placed no more than 1.5 m apart and imbedded far enough to ensure that adult pigs cannot push them over or lift them up out of the ground.

Alternative trap entrances

Funnel entrance

Formed by the two ends of the mesh forming a funnel, the ends are tied together at the top with wire or rope. The pig moves through the funnel forcing the bottom of the mesh ends apart and once it is in the trap, the ends spring back together (see Figures 1 and 2).

Tripped gate entrance

A side-hinged gate is pulled shut by springs and is held open by many systems that can be triggered to allow the gate to swing shut. Often trip wires or other systems are used; most of these systems are not selective for feral pigs and can be triggered by any animal attracted to the bait. Once triggered the trap is no longer effective in trapping pigs.

Pig-specific trigger

By far the simplest and most effective trigger system. The gate is held open by a bar (often a branch or piece of wood) which is hooked over the wire on the gate and on the side panel (see Figure 3). For a close up of the pig specific trigger (see Figure 4).

Pigs rooting for feed in the trap lift the bar allowing the gate to swing shut. The specific feeding habit of pigs insures they are the only animals that lift the trigger bar. The gate may be latched to prevent pigs from opening it once triggered. However, this will prevent more pigs pushing their way in to join those inside.

Shooting

Shooting pigs by helicopter is an effective and quick method to reduce feral pig populations. Aerial shooting is most efficient in areas where pigs exist in reasonable numbers and are readily observable from the air. An observer using a thermal camera may be helpful to locate feral pigs in areas with dense-canopy habitats, or when pig populations decline to low levels. When pig numbers are very low, aerial shooting may be supplemented or replaced with other control methods to improve efficiency. Applying regular control efforts will also ensure that pig populations do not recover to pre-control levels.

Studies have found that aerial culling operations do not impact the home range size or location of surviving feral pigs, supporting its use in future disease management programs. Ground shooting is not effective in reducing the pig population unless intense shooting is undertaken on a small, isolated and accessible population of pigs. The use of a thermal camera or scope can greatly aid detection.

Poisoning

Poisoning is the most effective control method available that can quickly reduce a pig population.

Pre-feeding is the most important step in ground-based poisoning operations. Free feeding with non-poisoned bait should be performed for several days prior to laying poisoned baits. By selecting bait wisely, landholders can be species-selective in their poisoning program and avoid the unintentional effects of secondary poisoning.

Bait material such as fermented grains are very attractive to pigs. It is a good idea to establish a free feeding routine so that pigs are the only animals feeding, which helps to keep other non-targets away from the feeding site.

Other options (like pig-specific feeders) are now commercially available, and can assist in reducing non-target species access to bait. Other options include burying baits; feral pigs are one of the few animals that will dig up bait.

Aerial poisoning is also available and typically used for broadscale control in western and northern regional areas. Bait is distributed from an aircraft under strict conditions. This is particularly useful for covering large, remote areas with restricted ground access. Aerial poisoning is a proven and cost-effective method for reducing pig populations.

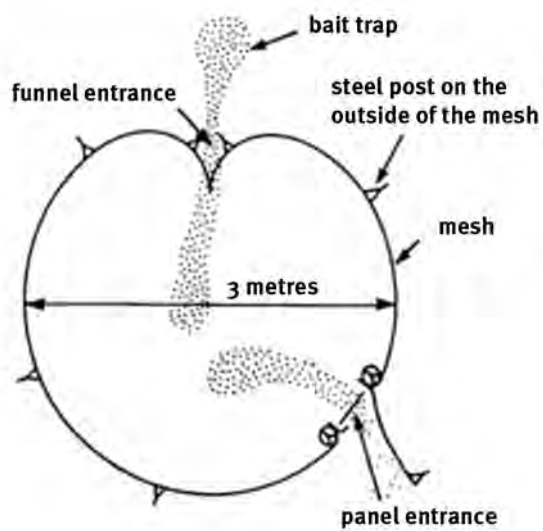


Figure 1. Alternative trap entrances – funnel entrance

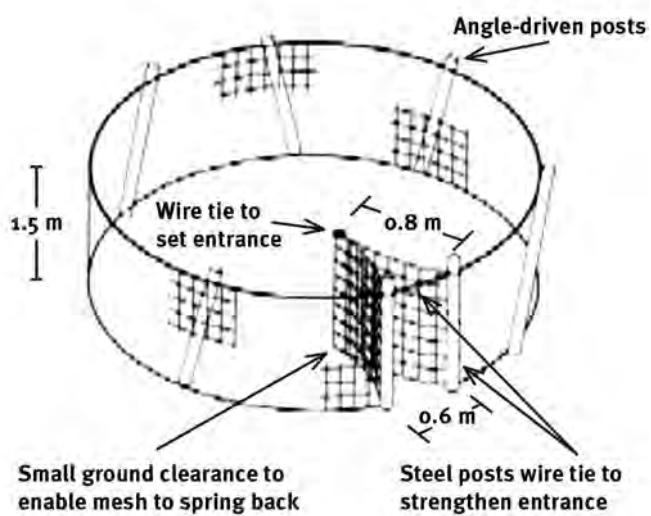


Figure 2. Silo trap with funnel entrance (14 m of silo mesh, diameter about 4.5 m)

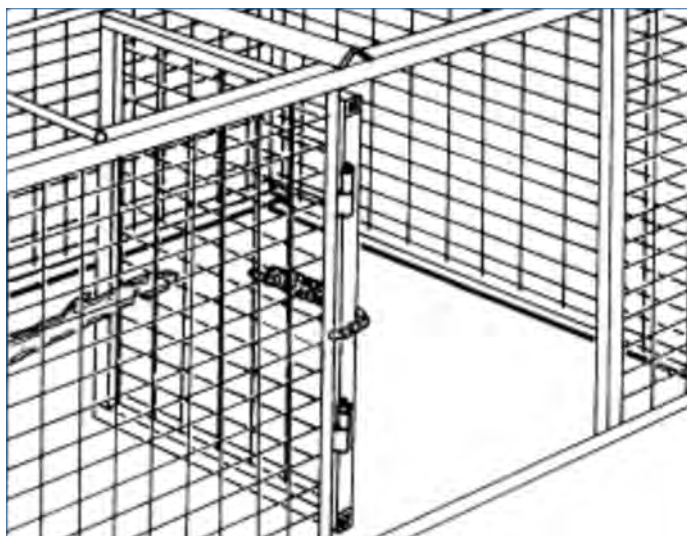
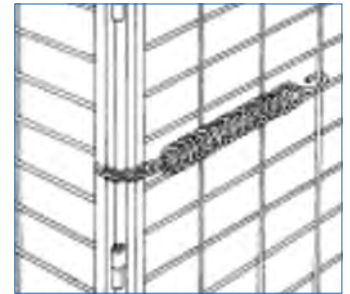


Figure 3. Pig-specific trigger



Figure 4. Close-up of pig-specific trigger



Feral pig trap



Three trapped feral pigs in large wire cage



A pig-specific bait station called hog hopper

More information

For more information contact your local government or visit biosecurity.qld.gov.au.

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Feral pig exclusion fencing

Fact sheets are available from biosecurity.qld.gov.au. The control methods recommended should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, the department does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.



Feral red deer

Cervus elaphus



Originally introduced in the 19th century from Europe and Asia as game animals by European settlers, Australia is now home to six species of deer; fallow deer, red deer, chital deer, hog deer, rusa deer and sambar deer. Queensland is home to four of the six species; fallow deer, red deer, chital deer and rusa deer.

While deer continue to be farmed for venison, the wild populations are causing significant environmental damage.

They can damage crops, pastures and forestry plantations and compete with livestock for pasture. Feral red deer can alter the structure and composition of endangered ecological communities, cause erosion and spread weed seeds. They stray onto roads becoming traffic hazards and may cause motor vehicle accidents in rural and urban areas. Deer may also play a role in transmitting diseases that affect livestock.

Legal requirements

Feral red deer is a category 3, 4 and 6 restricted invasive animal under the *Biosecurity Act 2014*. They must not be moved, fed, given away, sold, or released into the environment. The Act requires everyone to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive animals under their control. This is called a general biosecurity obligation (GBO).

At a local level, each local government must have a biosecurity plan that covers invasive animals in its area. This plan may include actions to be taken on feral red deer. Some of these actions may be required under local laws. Contact your local government for more information.

An animal ceases being considered an invasive restricted animal (feral) if a person is keeping it in a deer proof enclosure and has become a registerable biosecurity entity (RBE) to keep that designated animal. Feral red deer can be considered as designated animals if a person keeps them.

Description

Feral red deer have a glossy reddish-brown to brown summer coat and greyish brown winter coat. Feral red deer show a straw-coloured rump patch.

Adult stags stand up to 120 cm at the shoulder, while adult hinds stand up to 100 cm at the shoulder. Stags weigh up to 220 kg, hinds up to 100 kg. Stags develop a mane during winter and the best trophy stags have antlers with six or more points on each side.

Life cycle

Mature stags live apart from the hinds until the start of the rut. They are most active at dawn and dusk. Their preferred habitat is open, grassy glades in forests.

The mating season (the rut) is from March to April. Mature males compete to gather harems of females and hold them against rivals.

Calves are born from late November to December. The gestation period is about 233 days, and the females usually give birth to a single calf. At birth the coats of calves are reddish brown with distinct white spots. The white spots gradually fade and disappear in about three months.

Habitat and distribution

Red deer are native to Eurasia—the traditional continents of Europe and Asia. They were released in 1873 and 1874 by the Queensland Acclimatisation Society with the consent of the Queensland Government. The original animals were a gift from Queen Victoria to provide ‘... additional food and sport’ for the people of the state. The initial release of six hinds and three stags occurred at Cressbrook Station near Esk.

Feral red deer are concentrated throughout the upper reaches of the Brisbane River valley and into the headwaters of the Mary and Burnett rivers. It is estimated that there are around 10 000–15 000 feral red deer in this area of south-east Queensland. Regular sightings suggest that the species is expanding its range into environments contiguous to the core red deer area, including into the outer suburbs of Brisbane.

There are several isolated populations of feral red deer located in southern and central Queensland. Two of the more notable populations have been established by translocations—one in the Rockhampton region and another in the Roma–Injune–Mitchell area.

A large part of southern Queensland appears to offer suitable habitat for feral red deer. In the past, it was considered that agricultural activity on the boundaries of the traditional red deer range formed an effective barrier to further expansion. However, the recent assisted dispersal of feral red deer sounds a note of caution.

Impacts

Production losses

Feral deer are opportunistic and highly adaptable feeders that both graze and browse. Their diet is largely determined by what is locally and seasonally available and often overlaps with cattle. They will normally feed selectively on the highest quality plants in a pasture and are not constrained by fences like domestic livestock. Because of this, deer can impose substantial costs on primary producers.

Feral deer have been reported to cause damage to a wide variety of agricultural crops, pastures and forestry plantations.

Other impacts on rural enterprises include damage to fences, spreading of invasive plants and fouling of water holes.

Parasites and diseases

Feral deer are susceptible to exotic livestock diseases including foot-and-mouth disease, rinderpest, vesicular stomatitis, rabies and blue tongue. Unchecked, wild herds could play a major role in the spread of infection and act as a reservoir if these diseases are introduced to Australia.

Wild deer are also susceptible to a number of diseases and parasites currently in Australia including cattle tick, leptospirosis and ovine and bovine Johne’s disease.

The main concern is the cost in lost livestock production or the spread of disease to disease-free areas (e.g. bovine Johne’s disease). However, some of the diseases and parasites also have significant implications for human health.

Environmental impacts

Because deer are large animals, they are capable of damaging native vegetation by browsing and trampling understorey and seedling plants, and ring-barking young trees.

Deer are also selective feeders. Over time, their browsing will influence the variety and abundance of native plant species. A significantly lower diversity and abundance of plant species is evident in environments where deer densities are high.

Feral deer can significantly impact ecologically fragile areas and have the potential to eliminate threatened plant species from an area. Other environmental damage attributable to wild deer is the fouling of waterholes, the spreading of invasive plants and overgrazing causing erosion (including the subsequent degradation of water quality in creek and river systems).

Social impacts

Feral red deer occur in both rural and peri-urban areas of south-east Queensland. Grazing deer may damage parks, residential gardens and fences in outer urban areas. Where close to major roads, wandering deer represent a serious traffic hazard and may cause motor vehicle accidents.

There is also the potential threat to human health of rutting stags, particularly in peri-urban areas where deer may become habituated to people.

Beneficial considerations

Feral red deer can be trapped for the wild venison trade in accordance with Food Safety Standards. Trapping deer to use as foundation stock for a farmed herd is less viable due to the animal welfare and human safety aspects of handling feral deer.

Recreational deer hunting

The cost of deer control may be minimised by enlisting or utilising commercial or recreational hunters to assist in control. Landholders wishing to engage a third party to assist in deer control on their property should carefully consider a number of points before allowing access to their property, including conditions of access, public liability insurance, and references.

Control

Managing feral red deer

The GBO requires a person to take reasonable and practical measures to minimise the biosecurity risks posed by feral red deer. This fact sheet provides information and some options for controlling feral red deer.

In many cases, deer control is best done as a joint exercise, involving all land managers in the district. Local governments and landcare groups can assist coordinating efforts.

Prevention and early detection

The first and most effective step to managing the impacts of deer in Queensland must be to prevent more deer from entering the wild. Thirty-five percent of all current wild deer populations have resulted from deer farm escapes or releases, with a significant percentage of the remaining populations resulting from the deliberate translocation of deer.

Under Queensland legislation, the release or translocation of feral red deer is prohibited. Farmed deer and deer in game parks must be contained in deer-proof fences and it is the responsibility of the owner to ensure that deer are contained. Failure to do so is a breach of the *Biosecurity Act 2014*.

Shooting

Shooting must be carried out by trained personnel with appropriate firearms licenses. Shooters must possess the necessary skill and judgment to kill deer with a single shot. Lactating females should not be shot, but if they are inadvertently shot, efforts should be made to find the young and euthanase them.

Ground shooting

Although time consuming and labour intensive, ground shooting is considered to be the most effective and humane technique currently available for reducing feral deer populations. Such shooting is usually done at night from a vehicle, with the aid of spotlights and/or thermal equipment (such as a thermal scope fitted to a firearm).

Helicopter shooting

Helicopter shooting is most effective (highest kills per hour for a given deer density) in relatively open habitats such as broadacre crops, open rangeland and swamps.

Where deer populations are at comparatively low densities and in areas of thick cover, kills per hour will be lower for helicopter shooting, but it may still be the most economic option. There is no evidence that this form of control risks disturbing and dispersing the deer population.

Fencing

Generally, the minimum escape-proof enclosure for farmed deer or an exclusion fence for feral deer is a well maintained high netting fence or equivalent. An example of an effective deer fence is one that is 2.1 m high, has strainers and posts made of heavy duty material such as hardwood or metal that are set deeply into the ground and no more than 9 m apart.

The netting would be 17/190/15 or 13/190/30 for feral red deer, supported by well strained top, bottom and belly wires and pegged securely to the ground. Gates would be of a similar standard and the same height. Fence lines should preferably be cleared to minimise trees falling on the fence. Note that this is an example only and fence construction should be appropriate for the individual circumstances.

Trapping

Trapping may be an option for deer control in some circumstances, particularly in areas where shooting may not be an option such as urban and peri-urban locations. The simplest form of deer trap uses a trip wire to activate a self-closing gate. Deer may also be trapped in clover traps.

Traps must be monitored closely and deer should be promptly tranquilised or euthanased after trapping. Deer mortalities of 3–7% post-trapping have been recorded in United States studies and animal welfare issues must be considered in using this method.



More information

For more information contact your local government or to download a copy of the Queensland feral deer management strategy 2022–27, visit biosecurity.qld.gov.au.



Photo courtesy of Andrea Vonhoff

Fact sheets are available from biosecurity.qld.gov.au. The control methods recommended should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, the department does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.



Wild dog

Canis familiaris



The term wild dog refers collectively to purebred dingoes, dingo hybrids and dogs that are not owned by a person.

Wild dog control methods include baiting, trapping, shooting, fencing, and the use of guardian animals to protect stock. Effective management involves a planned strategy using a combination of these methods and considers wild dog behaviour.

Legal requirements

The wild dog is a category 3, 4 and 6 restricted invasive animal under the *Biosecurity Act 2014*. It must not be moved, kept (if a dingo), fed, given away, sold, or released into the environment. The Act requires everyone to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive animals under their control. This is called a general biosecurity obligation.



Queensland
Government

At a local level, each local government must have a biosecurity plan that covers invasive animals in its area. This plan may include actions to be taken on wild dogs. Some of these actions may be required under local laws. Contact your local government for more information.

Control

Managing wild dogs

Control programs should be coordinated among adjoining properties to increase effectiveness. This fact sheet provides information and some options for controlling wild dogs.

Queensland research has shown that in some situations wild dogs can quickly re-colonise baited areas. Re-colonisation can be due to a number of factors including inconsistent bait programs that do not provide comprehensive wild dog control across the landscape. Producers should work together using a variety of control methods to prevent livestock attacks and enhance wild dog management.

Wild dog ecology and seasonal variations can also influence the likelihood of wild dogs coming into contact with a control tool. The timing of control should consider seasonal variations and water availability. Control should target watering points where water is restricted. Many land owners bait using 1080 twice a year to target wild dogs during peaks in activity associated with breeding (March–May) and then again in September–November to target pups and juveniles. However, baiting and trapping is recommended at all times when wild dogs are active.

Fencing

Property fencing suitable to exclude wild dogs is expensive to build and requires continual maintenance to repair damage caused by fallen timber, fire, floods, feral and domestic animals, as well as vegetation regrowth. However, a properly maintained fence can restrict movement into an area where wild dogs have been controlled.

Electric fences suitable for wild dogs have been developed. Electrifying a fence creates a fear of the fence itself and deters wild dogs from approaching.

For property fencing to be successful, the fence must be maintained in good order and ongoing wild dog control conducted within the protected area to limit livestock impacts.

Fencing is the most effective method of protecting livestock and pets from wild dog attack on small acreage blocks. Regionally agreed cluster fencing arrangements where producers cooperatively fence adjacent properties can be particularly effective.

A fence can also be a good area to place baits and traps when wild dogs are active.

Trapping

A key success to trapping wild dogs (using foot-hold traps) depends on the skill of the operator. Visit feral.org.au to watch a PestSmart video on best practice techniques for wild dog trapping.

A mixture of dog faeces and urine is a popular lure used by trappers. Attractiveness of lures varies with seasons and locations. No single lure has yet been found that is consistently attractive to all wild dogs and repeated use of one lure can lead to aversion among remaining dogs.

Traps are best placed in areas of high wild dog activity (known as leads). Here the wild dog is most likely to find and investigate the decoy/odour.

A wild dog scent post is an area where urine or faeces have been deposited. It can be found by walking with a domestic dog on a lead along a known pad. Trap placement in relation to the scent post can be optimised by observing the domestic dog's behaviour as it approaches. Factors to consider are:

- where on the bush it smells
- placement of feet while urinating/defecating/sniffing
- how it approaches and where it scratches in relation to the pad and scent post.

Padded, laminated or offset foot-hold traps, in a well tuned and functioning state are recommended.

Shooting

Shooting is an opportunistic method, and mostly used for control of small populations or individual problem animals.

Livestock guardian animals

Livestock guardian animals have been used to protect livestock from predators in Europe, Asia and America. Some producers in Queensland have decreased predation on sheep and goats using this method. The use of trapping and poisoning in conjunction with guardian animals must be well planned and managed to ensure guardian animal safety.

Baiting

Poison baits are the most economic, efficient and effective method of controlling wild dogs, especially in inaccessible or extensive areas. Baits can be laid quickly by hand, from vehicles and from aircraft.

Currently there are two poisons legally available for wild dog control. These are 1080 (sodium fluoroacetate) and para-aminopropiophenone (PAPP).

Subject to restrictions, 1080 baits, either manufactured or prepared from fresh meat can only be obtained through a person approved under the Health (Drugs & Poisons) Regulation 1996. PAPP can only be supplied as a manufactured bait. Permits from Queensland Health are required for landowners to purchase, possess and use PAPP. The use of 1080 and PAPP require adherence to the associated conditions of supply.

All property neighbours must be notified at least 72 hours prior to baiting, and baiting signage should be erected at every property entrance and left for at least one month after baiting.

Meat baits are attractive both to wild dogs and a range of non-target species. When using meat baits, they can be strategically positioned as wild dogs' keen sense of smell enables them to find baits intentionally buried in

sand or otherwise hidden under bushes or in hollow logs. Meat baits may also be tied to prevent their loss to non-target species.

These meat bait placement techniques help to:

- reduce the risk of poisoning non-target species
- increase wild dog contact, hence receiving a lethal dose
- minimise bait removal by non-target scavengers
- deter ants (ant-covered baits are believed to be less attractive to wild dogs).

Heavy rain within two weeks of baiting can leach 1080 from baits, but baits may still remain toxic for a considerable time.

Ejectors are a new tool in the delivery of 1080. They require a wild dog or fox to pull the ejector head to be activated. This is done by attaching a lure reward to the ejector head. A capsule of lethal dose 1080 is propelled into the wild dog's or the fox's mouth. Ejectors are fixed in one stop and are only able to be activated by foxes and dogs.

Baiting activities should be coordinated among adjoining properties to effectively reduce the short- and long-term impact of wild dogs. Baiting on individual properties will only provide short-term success due to the high mobility of wild dogs resulting in rapid re-invasion.

More information

For more information contact your local government or visit biosecurity.qld.gov.au.



Wild dog exclusion fence



Fact sheets are available from biosecurity.qld.gov.au. The control methods recommended should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, the department does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.



Dingo

Canis familiaris dingo



The dingo is a primitive canid related to wolves and coyote. The dingo was not a part of the ancestral fauna of Australia. Though its origins are not clear, it is thought to have arrived in Australia 3500–4000 years ago.

It is the largest mammalian carnivore remaining in mainland Australia, and as such fills an important ecological niche. Females weigh about 12 kg and males 15 kg.

The dingo has been regarded as a serious predator of domestic stock since early European settlement in Australia.

Since European settlement domestic dogs have been released or escaped into the environment to cross with dingoes. These hybrids or crosses are colloquially called wild dogs (*Canis lupus familiaris*). Often the term wild dog covers both dingoes and dingo hybrids.

Wild dogs predate on livestock, native fauna and domestic pets.



Legal requirements

The dingo is a category 3, 4, 5 and 6 restricted invasive animal under the *Biosecurity Act 2014*. It must not be moved, kept, fed, given away, sold, or released into the environment. A permit to deal with dingoes maybe given in limited circumstances.

The Act requires everyone to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive animals under their control. This is called a general biosecurity obligation (GBO).

At a local level, each local government must have a biosecurity plan that covers invasive animals in its area. This plan may include actions to be taken on certain species. Some of these actions may be required under local laws. Contact your local government for more information.

Description

Red, ginger and sandy-yellow are the dominant coat colours, though dingoes can also be pure white, black and tan or solid black.

It is not difficult to distinguish between most dingoes and hybrids. The presence of domestic genes is suggested by broken colours—brindling and patchiness in the normally pure white feet and chest patch and sable colouration (black hairs along the back and sides).

Dingoes have a more heavily boned skull and larger teeth (especially the canine) than domestic dogs of similar size.

Life cycle

Dingoes have only one breeding season per year (usually April to June), whereas domestic bitches have two or more oestrus cycles per year. However, unless seasons are particularly favourable, or human sources of food are intentionally or inadvertently provided, feral domestic dogs are unlikely to successfully rear two litters per year.

After a nine-week gestation, dingo pups (usually four to six) are born in a hollow log or cave den. Bitches tend to use the same den each year. Pups are suckled at four to six weeks and generally weaned at four months. When large enough to travel, pups are taken from the den to kills, and other dens may be used. The range of pups is increased as they are moved from den to den. In this way the pups are gradually moved around the bitch's home range.

Independence may occur as early as six months of age when parents abandon them, but this results in high juvenile mortality. Pups that become independent around 12 months appear to disperse voluntarily. Being larger and more experienced, mortality is then usually low.

Where dingoes live alone or in small groups (most pastoral and semi-settled areas), mature females will breed successfully each year.

By contrast, dominant female infanticide results in only one litter being successfully raised each year within groups containing several adult females (e.g. undisturbed areas such as the Simpson Desert). The dominant (alpha)

female will kill all pups of the other females, and then use subordinate females to suckle and rear her litter.

Methods of spread

Dingoes in an undisturbed area generally belong to discrete packs (3–12 members), which occupy long-term, non-overlapping territories. The group rarely moves as a pack—rather, members meet and separate again throughout the day. Dingoes are most gregarious during the breeding season.

There is overlap of home ranges within a group. In contrast, boundaries between groups are more rigid, actively defended and infrequently crossed.

Olfactory communication (smell) is important in dingo social organisation. Dingo droppings are deposited along pads in specific areas where other dingoes will encounter them (creek crossings, intersections of roads and fences).

These 'scent posts' appear to delineate the home range boundary and act as a warning to neighbouring groups and individuals.

This strong site attachment of dingoes is contrary to the notion commonly held by property owners that dingoes will travel large distances to kill stock.

Habitat and distribution

Dingo numbers are believed to be higher today than in pre-European times. This is thought to be due to increased food availability via the introduced rabbit and cattle carcasses, and the development of permanent waters in arid areas of the state. Dingoes/wild dogs are present in all parts of the state.

The distribution of the wild dog in relation to purebred dingoes varies throughout the state. In far western areas, most dingoes sighted appear to be 'pure', with characteristic white points and broad heads. Closer to settled areas a greater number of feral domestic dogs produce a generally hybrid population. It has been estimated that dingoes are 50% pure in south-eastern Queensland and 90–95% pure in south-western and central Queensland.

Radio tracking studies show dingoes occupy a discrete area known as a 'home range'. The dingo visits the edge of this area frequently.

The home range can vary in size according to the productivity of the country—from 9 km² in rainforest areas to 300 km² on the Nullarbor Plain.

The edge of the home range is commonly associated with a major topographic feature (e.g. an escarpment, a major ridge or stream).

The home range is not used uniformly. Activity is centred on areas with highest food density.

Hunting movement is slow and exploratory, in contrast to frequent rapid movement around the home range boundary.

Pads follow well defined paths and are most likely associated with sociality and home range boundary maintenance. Activity is highest at dusk and dawn.

Diet

Dietary research of stomach content and faecal scats has shown dingoes are opportunistic predators.

Medium-size animals such as kangaroos, wallabies, rabbits and possums consistently form the major part of the dingo diet.

Studies by the Western Australia Agriculture Protection Board show dingoes in undisturbed refuge areas killed and ate kangaroos strictly according to need.

On grazing country, however, 'dingoes harassed, bit or killed sheep in large numbers, often without eating any'. The consumption of these sheep carcasses was the exception rather than the rule. Even kangaroos in these areas were sometimes killed in 'play' type behaviour rather than for food.

Such dietary studies could suggest dingo predation of domestic stock is low. There is, however, a need for caution in using such studies to assess dingo impact on stock.

Grouping increases foraging efficiency and appears necessary to exploit larger prey. Dingoes cooperating in groups are more successful in hunting kangaroos than lone dingoes are. While lone dingoes can easily kill sheep, it is less likely a solitary dingo would successfully attack a calf in the presence of a defending cow.

Disease threat

Dingoes are vectors of canid diseases (e.g. distemper, parvovirus) and parasites. The hydatid parasite *Echinococcus granulosus* is a major problem of dogs and domestic stock. It can cause illness and occasionally death in humans.

The dingo could pose a serious risk if the exotic disease rabies was introduced to Australia.

Beneficial considerations

The establishment of watering points during post-European settlement has resulted in a huge increase in the kangaroo population, with consequent strong pasture competition with domestic livestock.

Though it is widely accepted that sheep production is near impossible in the presence of dingoes, many cattle producers will tolerate dingoes because of their believed suppression of kangaroo numbers.

Research has shown that in some cases the dingo has the potential to mitigate population growth of native species during abundant seasons and it could also be an important limiting factor for many feral animal populations (e.g. feral pigs and goats).

There is some evidence that destruction of the dingo could cause increases in other pests to the grazing industry and result in widespread degradation of environmentally sensitive areas. However, this has not been proven.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland on 13 25 23 or visit biosecurity.qld.gov.au.



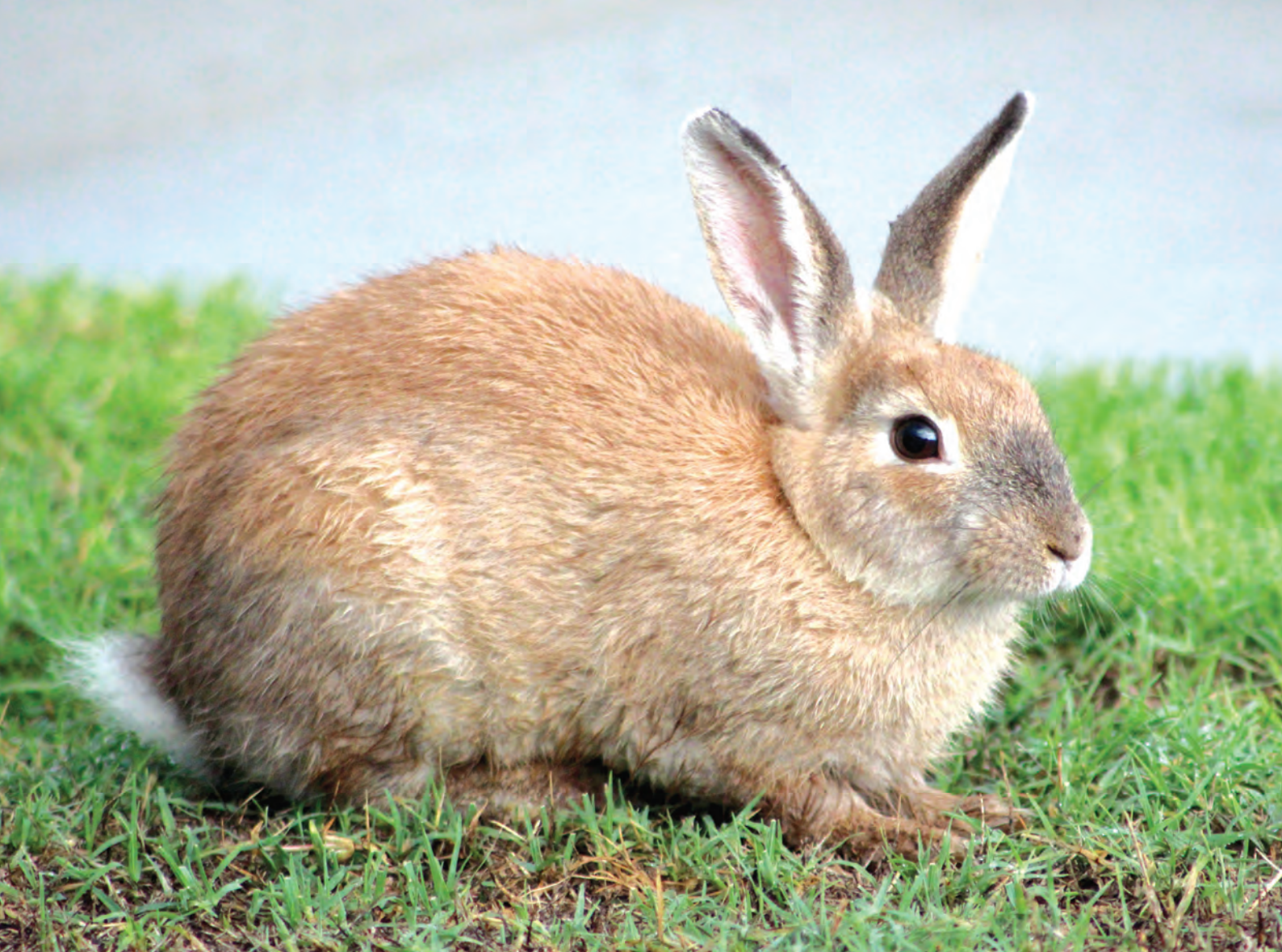


This fact sheet is developed with funding support from the Land Protection Fund.

Fact sheets are available from Department of Agriculture and Fisheries (DAF) service centres and our Customer Service Centre (telephone 13 25 23). Check our website at biosecurity.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this fact sheet should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, DAF does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

Rabbit

Oryctolagus cuniculus



Rabbits are one of Australia's major agricultural and environmental invasive animals. They compete with native animals, destroy the landscape and are a primary cause of soil erosion by preventing regeneration of native vegetation.

Legal requirements

The rabbit is a category 3, 4, 5 and 6 restricted invasive animal under the *Biosecurity Act 2014*. It must not be moved, kept, fed, given away, sold, or released into the environment. The Act requires everyone

to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive animals under their control. This is called a general biosecurity obligation (GBO).

At a local level, each local government must have a biosecurity plan that covers invasive animals in its area. This plan may include actions to be taken on rabbits. Some of these actions may be required under local laws. Contact your local government for more information.

Pet rabbits

Introducing and selling rabbits in Queensland is not permitted and penalties may apply. Limited numbers of permits for domestic rabbits are only available from Biosecurity Queensland for research purposes, public display, magic acts or circuses. Before a permit is granted, a number of guidelines need to be fulfilled.

Description

Rabbits are small mammals around 34–45 cm long, usually grey brown with pale belly fur, other colours include piebald, black and ginger. They have long ears 10 cm long and big eyes. They have long hind legs with hind feet measuring 9–11 cm and short front legs. The tail is fluffy brown with white underneath, 4–8 cm. Adult rabbits usually weigh around 1–2.1 kg. The male is called a buck, the female a doe and her young are called kittens.

Life cycle

Does (females) are pregnant for 28–30 days, but are able to mate within hours of giving birth. The average litter is 3–4 kittens but varies from two in a young doe, up to eight or more in a mature doe, and depends on the amount and quality of food available.

Five to six litters are possible in a good season. Young does can breed at four months of age if conditions are suitable.

Habitat and distribution

Rabbits prefer to live in warrens as protection against predators and extremes in temperature. However, they will survive in above-ground harbours such as logs, windrows and dense thickets of scrub (e.g. blackberry and lantana) or under built harbour, old sheds and machinery etc.

In newly colonised areas without warrens, rabbits tend to live in 'scrapes' (or 'squats').

Rabbits are adaptable and sometimes live in close association with people. They live in built environments such as:

- in and under buildings
- old machinery and storage containers
- in old dumps.

In rural environments rabbits frequently live in:

- felled timber and associated windrows
- tussock grasses and rocky areas
- warrens (if soils are easy to dig).

Control

Managing rabbits

The GBO requires a person to take reasonable and practical measures to minimise the biosecurity risks posed by rabbits. This factsheet information and some options for controlling rabbits.

Rabbit control is best done as a joint exercise involving all land managers in the district. Integrated control methods, such as fumigating, ripping warrens and harbour destruction, are essential for the continued long-term reduction of rabbit numbers. Cost-effective, long-term results can be achieved in rabbit control by following a combination of the methods outlined below.



Effective rabbit control cycle

Prevention and early detection

Rabbits will generally eat around 15% of their body weight per day—approximately 250 g. This compares dramatically with the averages for stock—sheep and cattle eat around 3% of their body weight per day. So even a low number of rabbits can be removing large amounts of livestock feed.

For effective long-term rabbit control, concentrate on destroying source areas. Source areas will all have well-established warrens or ready-made structures that are cool and provide protection from predators. A source area must also have a good supply of green feed during the cooler seasons.

Manual control

Harbour destruction

Where there is abundant surface harbour, a high proportion of rabbits may live above ground rather than in underground warrens. Rabbits can make their homes in windrows, dense thickets of shrubs (such as blackberries and lantana) and even in old machinery.

To eliminate these above-ground breeding areas, it may be necessary to:

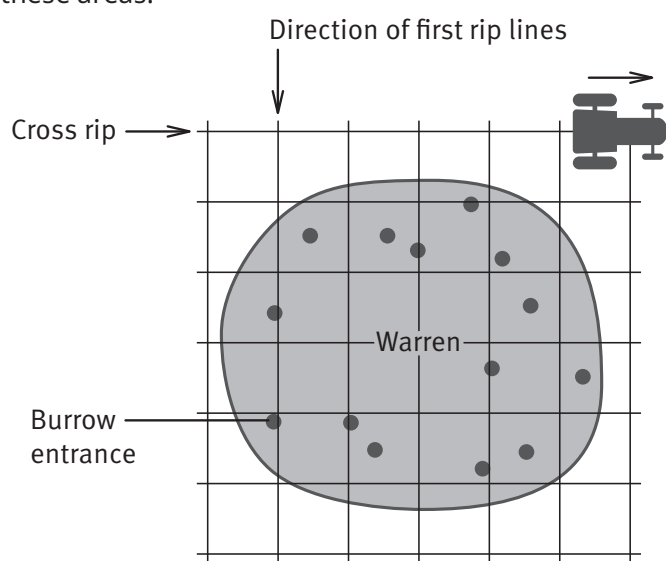
- burn windrows and log piles
- remove invasive plants through chemical and physical control
- remove movable objects (such as old machinery) from paddocks.

Sometimes removing harbour can expose warrens underneath. If this happens, the warrens need to be ripped.

Mechanical control

Warren ripping

In areas where rabbits live in warrens, ripping is the most effective method of long-term control. Ripping is so successful because warrens can rarely be reopened and rabbits are unable to recolonise these areas.

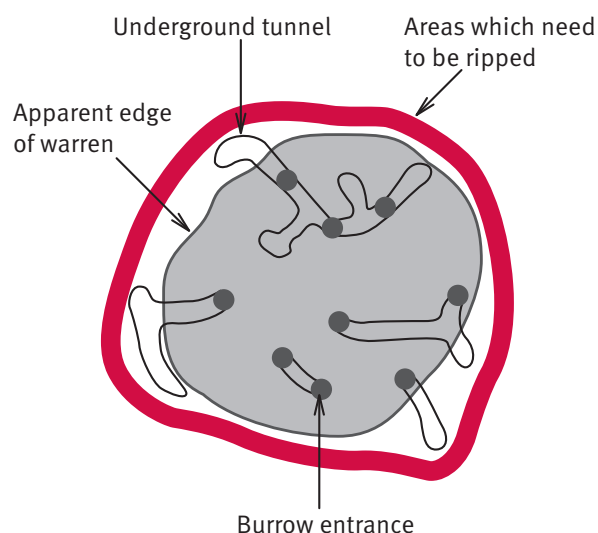


Direction to rip warrens (illustration courtesy Will Dobbie)



Tyne for ripping warrens (photo courtesy Mark Ridge)

To get the best results it is important to chase as many of the rabbits inside the warren as possible. Dogs can be used to drive rabbits into the warren before ripping starts. The aim of ripping is to completely destroy the warren. It involves using a tractor with a tynd (sharp-pronged) implement—one tyne or many—that rips through the warren and collapses it. Larger tractors and dozers are more appropriate for properties with many warrens as they are able to move faster and rip wider.



Extent to rip warrens (illustration courtesy Will Dobbie)

Obviously, ripping is not suitable for warrens located underneath buildings or on steep rocky country. In such cases, other methods (poison baiting, releasing virus or fumigating burrows) should instead be used to reduce rabbit numbers. Warrens should then be either filled in or covered to stop rabbits from re-establishing. Burrows can be blocked with small boulders or rocks.



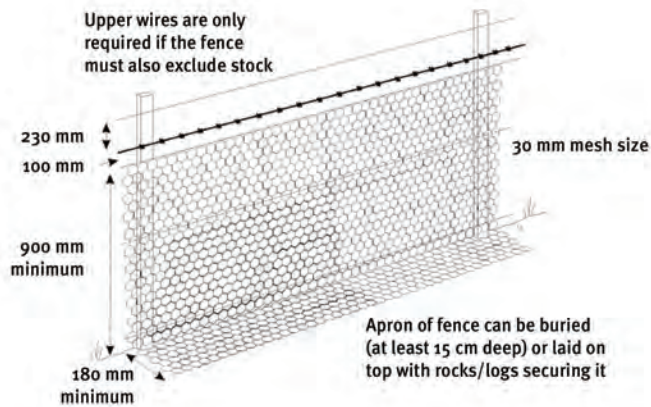
Rock blocking rabbit hole

Exclusion fencing

Rabbit exclusion fences are built with the aim of keeping rabbits out of a particular area. It is appropriate for small, high-value areas that require protection. A fully fenced area will only remain rabbit-free in the long term if all rabbits are removed from the enclosed area after fencing and the fence is regularly maintained and checked for holes.

Electric fencing is a cheaper alternative, but it is not a complete physical barrier and is also prone to damage from other pest animals and stock.

A rabbit-proof fence should be made of wire mesh (40 mm or smaller) and needs to be at least 900 mm high. The netting should also be buried to depth of at least 150 mm. Gates into the fenced area need to be rabbit-proof as well.



Exclusion fence for rabbits (illustration courtesy DEWHA)

Trapping

Trapping is an extremely labour-intensive control method and requires a skilled operator to set the traps to successfully capture rabbits. If you do plan to trap rabbits on your property, common sense and respect for animal welfare are essential. While there are currently no strict guidelines for the use of traps in Queensland, it is an area of growing concern for animal welfare advocates.

Cage trap

A cage trap has a lever that closes the cage when a rabbit steps on it. The rabbits are lured into the cage with bait—usually diced carrot. Traps need to be disabled and left open for two or three nights with bait leading into the cage. This entices rabbits to enter. A trap can be set once a rabbit has consumed a trail of bait all the way into that trap. Traps should be checked and emptied regularly—usually a couple of times a night.

This effective and humane technique is most useful for removing any remaining rabbits from places like hay sheds and after the shed has been fenced to prevent additional rabbits from entering and leaving. Free-feed then trap, and keep the shed rabbit-proof to prevent rabbits recolonising.

Barrel trap

A barrel trap is designed specifically for rabbits. It is cylindrical, made of light mesh, and is about 1 m long and 15 cm in diameter. The trap has one open end with two hinged trap doors along its side. The open end is placed in the burrow, and the hinged gates close and trap the rabbit after it enters from the burrow. The trap can be left in the burrow entrance for a number of days. However, it must be checked at least daily so that if a rabbit has been caught it does not suffer and animal welfare responsibilities are met.



Barrel rabbit trap in hole

Biological controls

Rabbit hemorrhagic disease virus (also known as rabbit calicivirus disease)

RHDV is a virus specific to rabbits which works by infecting the lining of the throat, lungs, gut and liver. RHDV relies primarily on direct rabbit-to-rabbit contact in order to spread. High rabbit numbers are therefore needed before this control method will be effective. After RHDV has infected an area, it is important to use another method for follow-up control to increase the likelihood that the population is eradicated before it is able to develop resistance and increase its numbers again.

Resistance to RHDV depends primarily on the age of the rabbit. Therefore, it is better for RHDV to go through a rabbit population after rabbits have bred and the young are old enough to be affected by the virus. Rabbits that survive RHDV develop antibodies against the virus. Breeding females can also pass these antibodies on to the young (through antibodies in their milk), conferring temporary protection on rabbits up to 12 weeks old.

Myxomatosis

Myxomatosis is no longer produced as a laboratory strain but field strains are still known to recur and affect rabbit populations.

RHDV1-K5

Recent research by state and federal agencies has identified a new strain of RHDV (called RHDV-K5) that will aid in controlling rabbits that have immunity to current strains.

Poison baiting

Baiting is not effective as a sole control method and will not eradicate an entire rabbit population. Numbers will quickly increase again, and you will have to continue baiting year after year with no permanent overall change in the rabbit population. Rabbits can also become 'bait shy' and this method becomes less and less effective over time. Ideally, baiting is best used either before ripping/fumigation to reduce a population, or after ripping/fumigation for removal.

Baiting works best when rabbits are not breeding. During breeding season the majority of the population feeds over a larger-than-normal area, and it is the young rabbits that are most likely to take baits. While numbers will be reduced, animals of breeding age are not likely to be affected.

1080—sodium fluoroacetate

Pre-feeding is required when using 1080 because rabbits will not readily take new feed. The poison-free bait should be laid at least three times over a one-week period before the poisoned bait is laid. (1080-impregnated carrot baits are the most common form of bait used.) The practice helps to ensure that, when the poisoned bait is laid, it will be eaten by most of the rabbit population. 1080 can only be supplied through persons authorised under the Health Act.

Your local biosecurity officer or your local government should be able to assist you.

Pindone

Pindone is an anticoagulant registered for rabbit control. This poison works by preventing blood from clotting. In Queensland, it is not recommended for broadacre use and is mainly used in urban areas and near farm buildings.

Pindone works best when given as a series of small doses/feeds over a period of three days. Although pre-feeding is not essential, it does enhance the bait uptake by shy rabbits as they get used to the feed prior to any poison bait being laid. To be effective, pindone requires multiple feeds so that the poison can build up to fatal levels in the rabbit's body. Feeding over a number of nights provides plenty of opportunity for most of the rabbit population to consume the required lethal dose. Rabbits poisoned with pindone will usually die within 10–20 days. Pindone baiting does not work well when there is a lot of green pick around for rabbits.

Poison bait trails

It is important that bait trails are laid properly to ensure the best results. 'Baitlayers' make it easier to put out bait trails at the correct rate, and they can be towed behind most 4WD vehicles, quad bikes and tractors.

When scratching and laying a trail, consider the following:

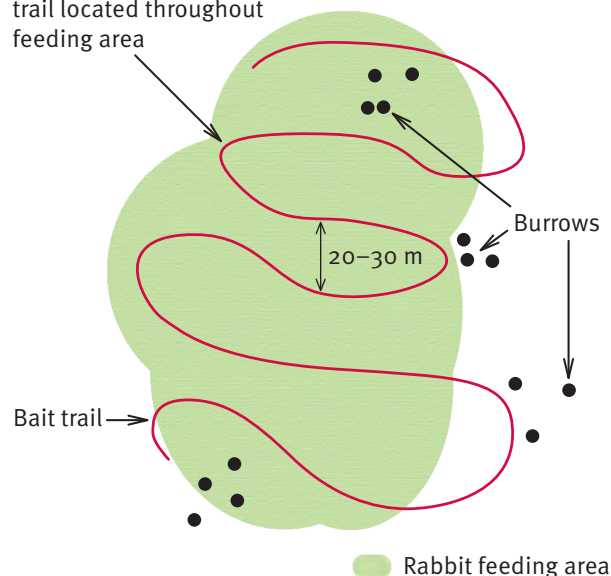
- Rabbits like freshly scratched/disturbed soil—this may be because rabbits are territorial and inspect newly disturbed soil, and/or the disturbed vegetation smell attracts them.
- Lay trails around warrens and in the areas where rabbits most often feed.
- Laying trails on slopes and hills requires care—it can cause erosion in some soils types (e.g. granite and traprock). Trails are best laid in a zigzag pattern in steep terrain to minimise erosion.
- A trail that has been scratched for the first feed is easy to follow for the rest of the baiting program.
- The soil should be turned only enough to scratch the surface—don't plough the ground.
- A trail that has been scratched too deep will spook the rabbits because they will not have full sight of their predators.
- Where vegetation is thick, or it is difficult to find the main feeding areas, lay bait trails in a grid pattern across the site.

As a general rule, avoid crossing the bait trail—it can cause confusion when you try to follow the same trail on subsequent occasions.

Bait trials will be most effective if you follow these guidelines:

- use good quality, non-contaminated bait material. (Simple rule: if you wouldn't eat it, the rabbit won't either)
- use enough feed to bait all the rabbits in the area. (The pre-feed will give an indication of the potential bait take)

Free-feed and poison feed trail located throughout feeding area



Method for laying a bait trail (illustration courtesy Animal Control Technologies)

- expect a greater uptake of pre-feed and bait material when vegetation is scarce, dried off or soured
- ensure that all the preparation equipment is clean and free of any chemical residues or smells—rabbits can be very shy of unusual odours
- when there are kittens in a warren, lay the bait trail close to the warrens.

Fumigation

Fumigation is labour intensive and time consuming, and is not usually an effective method if used alone. However, as a removal technique or control method for use in areas where ripping is not practical (e.g. steep and rocky terrain), it may be a good alternative.

Because this technique relies on directly affecting the rabbits, and does not affect the structure of the warren, it is crucial that as many rabbits as possible are underground when fumigation is carried out. Rabbits usually take refuge in their burrows from mid-morning to mid-afternoon and during hot weather so these are the best times to fumigate. Dogs can also be used to drive rabbits into their warrens.

For best results, fumigation should be carried out in two stages—initially, before the breeding season starts (as this reduces the breeding stock), and then again during the breeding season.

There are two types of warren fumigation—static and pressure. In Queensland, static fumigants are a more popular and safer option for controlling rabbits and will be explained below.

Static fumigation

This method is easy to use, and time- and cost-effective. Static fumigation comes in the form of aluminium phosphide (phosphine) tablets, which can be purchased from most agricultural suppliers. These tablets are small and round (about the size of a marble), and weigh 3 g. Trade names for phosphine

include Pestex®, Quickphos® and Gastion®. General directions for the use of phosphine tablets appear below, but always refer to the manufacturer's specific recommendations for use.

To fumigate warrens using phosphine tablets:

1. Find all warren entrances—both active and inactive.
2. Cut back the warren entrance at right angles using a shovel.
3. Separately wrap two tablets in moistened absorbent paper (toilet paper/paper towels).
4. Insert the tablets as far down into the entrance as possible (polypipe and a push rod can be used to help push the tablets down).
5. Push some scrunched-up newspaper down the hole to block the entrance and then cover it up with soil and, if possible, a rock.
6. Treat all entrances to the warren (active and inactive) the same way.
7. Check warrens about a week after fumigation and re-fumigate any reopened entrances.

Once in the warren, the moistened tablets react with air to release a toxic gas, which spreads quickly throughout the warren. The phosphine gas itself is invisible and odourless but leakages from the warren can be detected by the smell of ammonia. (This is a safety mechanism that is built into the tablet). Any leakages need to be blocked immediately.

Shooting

Shooting is most useful when used for removal after other control methods (such as ripping). To get the best results, shoot at the time of day when rabbits are active. This is usually in the early morning, late afternoon or at night. The best and most economical firearm to use is a .22 calibre rifle.

If your property is within an urban area, you will need to comply with local government regulations and the *Police Powers and Responsibilities Act 2000*, which restrict the use of firearms.

More information

For more information contact your local government or visit biosecurity.qld.gov.au.



Wild rabbit



Escaped or dumped pet rabbits



European fox

Vulpes vulpes



The European fox was deliberately introduced into Australia for hunting purposes. Foxes quickly became established following releases in the 1870's in southern Victoria. By 1893, foxes were a nuisance in north-eastern Victoria and by 1930 they occupied most of southern Australia.

Foxes are a major invasive species in Australia that threaten agriculture and native species alike.

Legal requirements

The European fox is a category 3, 4, 5 and 6 restricted invasive animal under the *Biosecurity Act 2014*. It must not be moved, kept, fed, given away, sold, or released into the environment. The Act requires everyone to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive animals under their control. This is called a general biosecurity obligation (GBO).

At a local level, each local government must have a biosecurity plan that covers invasive animals in its area. This plan may include actions to be taken on European foxes. Some of these actions may be required under local laws. Contact your local government for more information.

Description

The European fox is the most common and widespread of the world's many fox species.

Foxes are small, active canids with a reddish-brown coat and white underparts except for a black tipped nose and black lower legs. They also have a very large bushy, white-tipped tail. They have pointed muzzles, flattened slender skulls and large pointed ears.

Depending on geographic location they can vary in size, as body length can range from 45–90 cm, tail length from 30–55 cm and body mass from 3–14 kg. Usually adult male foxes weigh around 6 kg, while females weigh about 5 kg.

Diet

Foxes in Queensland are primarily carnivorous (meat-eating) scavengers and predators. However, foxes are opportunistic feeders and can consume an enormous variety of animal and plant material, such as rabbits, rodents, frogs, birds, insects and even fruit, vegetables and grain. This ability is key to the success of foxes in adapting to a variety of habitats and climates in Australia. It also means that foxes can impact on a range of wildlife and agricultural species.

Fox predation is considered the greatest threat to the long-term survival of many small marsupial species in Australia. Long-term studies have shown that rock wallaby and mallee fowl populations are likely regulated by fox predation.

Life cycle

Foxes breed once a year in winter with cubs born in spring. The fox's gestation period is 51–53 days. Cubs are generally born in burrows (dens) but litters have been found in hollow trees, rock crevices, under houses or in log piles. Litter size averages 3–6 cubs.

Foxes are generally monogamous. During breeding season, communal denning with subordinate vixen 'helpers' can occur. Australian studies suggest there are very few non-breeding females in fox populations.

As a result, fox populations can withstand high yearly mortality rates (~65%) and recover to pre-control population levels. Recovery rates are dependent on immigration rates and breeding success.

Mortality of young foxes is generally high, with up to 80% dying in the first year. Poisoning, hunting, road kill, disease, predation, food shortage and social factors contribute to mortality. Foxes in Australia have few natural predators. However, birds of prey and dogs can kill foxes, particularly cubs.

Most foxes live less than four years, although eight-year old foxes in the wild have been reported. Mange and distemper are thought to be important causes of mortality in wild fox populations; however, little is known about their role in regulating Australian fox populations.

Social behaviour

Foxes communicate by sound as well as by scent marking and body language. Young foxes use aggressive yapping and a resonant howl during the winter mating season. Vixens and pups will bark and whimper softly. Adult foxes also make vocalisations that can sound like screaming.

Habitat and distribution

Aside from wild dogs, the fox is the largest land-dwelling carnivorous mammal in Australia. Foxes are well-adapted to a variety of different habitats, ranging from deserts to urban environments. However, foxes are not found in tropical Australia. Climatic preferences and food supply most likely determine their northern distribution.

Foxes generally disperse from where they were born in autumn at 6–9 months of age. Dispersal behaviour varies between males and females and between individuals of the same litter. Males typically disperse further than females and distances of 300 km have been recorded.

Faeces and urine are used to define territories by scent-marking conspicuous landmarks like tussocks of grass and rabbit warrens. These scent marks are distributed throughout the fox's home range, especially in places that are visited often.

Foxes are solitary hunters, but evidence suggests that fox family groups occupy well-defined home ranges. Family groups usually consist of a male and female fox with cubs, but non-breeding, subordinate females may also be present. Home ranges in rural Australia are about 500 ha; however, this can vary widely and depends on resource availability.

Foxes are most active from dusk till dawn and usually rest during the day in a den. Foxes may also hunt and scavenge during the day.

Impacts

Predation on livestock

In some circumstances, foxes may kill lambs and goat kids. Fox predation on healthy, viable lambs is generally less than 5%; however, this varies between properties. Individual 'rogue' foxes can cause high stock losses. Foxes are noted for 'surplus killing' and can kill multiple easy prey animals despite an abundance of available food.

Foxes usually attack the throat of lambs and kids, although some are killed by multiple bites to the neck and back. Foxes do not have the size and strength to hold and immobilise large prey like adult sheep or

goats, or to crush large bones; therefore, repeated bites may be required to subdue prey.

Foxes generally prefer large internal organs and begin feeding through an entry behind the ribs. However, some individuals develop certain preferences and can target the nose and tongue and may consume the head of small prey. Foxes are noted for carrying small carcasses back to their dens to feed their young, which may account for some poultry, lambs and kids that disappear and are never found. Some food can also be cached (buried or hidden elsewhere) for later consumption.

One way to distinguish fox attacks from wild dog attacks is that foxes rarely cause severe bone damage to stock. However, poultry or other small prey can be badly damaged by fox attacks.

Urban foxes

Both in Australia and overseas, foxes readily survive and prosper in urban environments. Fox densities in Melbourne are reported to be as high as 16 per km² compared to densities generally less than 2 per km² in most semi-arid grazing areas.

The distribution of urban foxes depends on the availability and distribution of suitable shelter and food. While foxes in urban areas are generally found in remnant bushland or parks, foxes can find refuge under railway platforms, houses or sheds, or in quiet gardens. Bushland areas in and around cities provide ideal shelter.

In urban areas, foxes eat a diversity of food types including small birds, worms, insects, fruit and pet or other food put out by residents. Urban foxes will rarely attack people. However, foxes are wild animals and should be treated as such.

Urban foxes can be a nuisance by:

- attacking poultry and livestock in people's yards
- raiding garbage bins scavenging for food
- digging holes in lawns while scavenging for food
- causing domestic dogs to bark
- defecating on lawns.

Disease threat

Foxes, along with other feral animals could spread diseases such as rabies, should it be introduced into Australia. They would also provide a reservoir of infection, making rabies almost impossible to eliminate.

Rabies is a contagious disease of virtually all mammals, including humans. Once symptoms of rabies appear, the virus is almost always fatal to both humans and animals. This deadly virus is not established in Australia but is present in Asia.

We should not be complacent about the rabies issue. In the Northern Hemisphere foxes are the principal vectors and victims of the disease. Overseas, millions of foxes have been culled or vaccinated in attempts to control the disease.

Control

Managing European foxes

The GBO requires a person to take reasonable and practical measures to minimise the biosecurity risks posed by foxes. This fact sheet provides information and some options for controlling foxes.

Current options available for control of foxes in Queensland include poisoning, trapping, shooting, guard animals and exclusion fencing. The choice of control method should suit the individual circumstances.

Exclusion fencing

Exclusion fencing for foxes is expensive. Fences must be well constructed and maintained due to the climbing agility of foxes and their ability to squeeze through small holes. Fencing is most often used to protect high value stock, poultry or wildlife from fox predation in areas where other control methods cannot be used (i.e. in closely settled areas). Secure poultry runs and yards for small livestock should be considered in areas where foxes are a problem. Foxes can dig and climb so runs and yards need to be constructed with this in mind.

Trapping

Trapping is time consuming, labour intensive and generally ineffective for the broadscale reduction of fox populations. The success of trapping (using soft-catch traps and snares depends on the skill of the operator. Serrated steel-jawed traps are illegal. Trapping is predominantly used in urban areas where poisoning and shooting are restricted, where there is high risk to native species, or for live-capture for research purposes.

Shooting

Shooting of foxes is highly selective and used in rural Australia. Fox shoots are normally carried out at night from a vehicle using a centrefire rifle (e.g. .223 calibre) with the aid a spotlight. Although the success of this method varies, depending on the shooter's marksmanship and the wariness of the foxes, the technique is still considered ineffective for broadscale or long-term reductions of fox populations. Furthermore, the practice is biased towards young unwary juveniles and may do little to reduce the impact of foxes on lambs or wildlife. Shooting is best done in addition to other control techniques.

Guard animals

Guard animals, primarily maremma dogs and alpacas, are used to protect sheep and goats from fox predation in numerous countries, including Australia. The effectiveness of guard animals in reducing fox predation on lambs and goat kids is primarily unknown. Consequently, guard animals should supplement rather than replace other control techniques until proven successful.

Although dogs have traditionally been used for guarding, alpacas have the added advantage of being herbivores and therefore do not require additional feeding. They are also less likely to wander and become problem animals themselves. This control technique is most suited to small properties on the urban fringe.

Poisoning

Presently there are two poisons legally available for fox control in Queensland—sodium fluoroacetate (1080) and para-amino propiophenone (PAPP). These poisons can only be obtained from a supplier approved under the *Medicines and Poisons Act 2019*. The user may also require a separate approval.

Contact Queensland Health for further information. Visit health.qld.gov.au and search for 'invasive animal control'. All poisons must be used in accordance with product labels, permits and approval directions.

1080 and PAPP poison baits are economical and effective methods of controlling foxes. Only authorised persons can supply 1080 or PAPP baits to landholders. PAPP is only supplied as a shelf-stable manufactured bait. 1080 is supplied as shelf-stable manufactured baits or perishable fresh meat baits.

1080 baits are best placed along track and fence lines 200–500 m apart, 8–10 cm underground and covered with loose soil. Burying baits has the advantages of reducing non-target bait take and protecting baits from insect consumption (e.g. ants). All property neighbours must be notified at least 72 hours prior to baiting, and baiting signage should be erected at every property entrance and left for at least one month after baiting. Based on fox biology, the optimum time to bait is in spring followed by June/July when food demand is highest (this coincides with lambing on many properties). Foxes are also often killed by 1080 baiting programs that are designed primarily to control wild dogs or feral pigs.

Ejectors are a new tool in the delivery of 1080 or PAPP. They require a fox or wild dog to pull the ejector head to be activated. This is done by attaching a lure reward to the ejector head. A capsule of lethal dose 1080 or PAPP is propelled into the fox's or the dog's mouth. Ejectors are fixed in one spot and are only able to be activated by foxes and dogs. PAPP is a new poison and for advice on most effective way to use it consult your local government.

Baits can be selectively positioned or tethered to avoid access by native non-target species. This is particularly important in areas containing native carnivores such as quolls. A fox's keen sense of smell enables it to find baits intentionally buried or otherwise hidden.

To effectively reduce the short- and long-term impact of foxes, it is highly recommended that baiting activities be coordinated among adjoining properties. Baiting of individual properties will only provide short-term success due to the high mobility of foxes resulting in rapid re-invasion.

More information

For more information contact your local government or visit biosecurity.qld.gov.au.



Fact sheets are available from biosecurity.qld.gov.au. The control methods recommended should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, the department does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.



Feral cat

Felis catus



A descendant of the African wild cat (*Felis silvestris lybica*), the common 'house' cat (*Felis catus*) has now been domesticated for about 4000 years. Although the domestic cat has a long history of association with humans, it retains a strong hunting instinct and can easily revert to a wild (feral) state when abandoned or having strayed from a domestic situation.

Feral cats live around dump sites, alleys or abandoned buildings, relying on humans by scavenging rubbish scraps and sheltering in abandoned structures. The true feral cat does not rely on humans at all, obtaining its food and shelter from the natural environment.

Legal requirements

The feral cat is a category 3, 4 and 6 restricted invasive animal under the *Biosecurity Act 2014*. This is a cat that is not owned. The feral cat must not be moved, fed, given away, sold, or released into the environment.

The Act requires everyone to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive animals under their control. This is called a general biosecurity obligation (GBO).

At a local level, each local government must have a biosecurity plan that covers invasive animals in its area. This plan may include actions to be taken on feral cats. Some of these actions may be required under local laws. Contact your local government for more information.

Description

The feral cat differs little in appearance from its domestic counterpart; however, when in good condition, the feral cat displays increased overall muscle development, especially noticeable around the head, neck and shoulders, which gives the animal a more robust appearance. The average body weight of male feral cats is 3–6 kg, while females weigh 2–4 kg. Body weights vary with condition, with some extremely large specimens documented.

Australian feral cats are predominantly short-haired, with coat colours that range between ginger, tabby, tortoiseshell, grey and black. White markings may be present on the feet, belly, chest and throat; completely white feral cats are extremely rare. Coat colours are mostly the result of founding populations, although natural selection probably favours colours or patterns more suitable for each environment. The environment, predators and the ability to capture prey probably select coat colours to those that provide the most suitable camouflage and cause a predominance of these colours in subsequent offspring.

The feral cat is most active at night, with peak hunting activity occurring soon after sunset and in the early hours before sunrise. During the day it will rest in any number of den sites, which may include hollow logs, dense clumps of grass, piles of debris, rabbit burrows, and even the hollow limbs of standing trees.

The most obvious and characteristic field signs of feral cats are their scats (droppings). Unlike the domestic cat, the feral cat usually does not bury its scats, but leaves them exposed at prominent sites to warn other cats of its territorial boundary.

Life cycle

Male cats attain sexual maturity at about 12 months, whereas females are capable of reproduction at approximately seven months. Annually, and under ideal conditions, an adult female can produce up to three litters—each of usually four kittens, but varying from two to seven.

As the breeding instinct is triggered by the increasing length of daylight, litters are less frequent in winter. Most reproduction occurs during the spring and summer months, and is generally limited to two litters per year. Birth follows a gestation period of 65 days, and kittens may be reared in a single den site or may be frequently shifted to other sites within the female's home range. Family and litter bonding begin to break down when the kittens are approximately seven months old. The female's

ability to bear litters does not decrease with age, so reproduction continues for the course of her life.

Habitat and distribution

There is some evidence to suggest that the cat was present in Australia long before European settlement. This may have occurred as a result of Dutch shipwrecks and regular visits to northern Australia by early South-East Asian vessels as long as 500 years ago.

Post-settlement dispersal resulted from cats straying from areas of early colonisation. In the late 19th and early 20th centuries, large numbers of cats were purposely released in many rural areas to combat plague numbers of rabbits. Unwanted cats continue to be released into urban and rural areas by irresponsible pet owners.

The feral cat is now present Australia-wide, thriving under all climatic extremes and in vastly different types of terrain.

Feral cats maintain stable home ranges, the sizes of which depend upon the relative abundance of food and the availability of suitable den sites. Dominant male cats may have territories of up to 8 km², while the territories of females are smaller and may even be halved while kittens are being reared.

Scent glands are present on the chin, at the corners of the mouth, and in the anal region. Territorial boundaries are maintained by scent marking with the cheek glands, pole-clawing, urinating and leaving exposed faecal deposits. Although feral cats are often thought of as being solitary animals, studies show this behaviour is generally limited to hunting activities. At other times feral cats display a degree of social interaction that peaks during the breeding season. Group behaviour has been observed in wild populations, and it has been suggested that such behaviour is exhibited also in feral populations.

Groups usually comprise several related adult females, their young of both sexes, and an adult male—whose range may include other groups of females. Young females usually remain in a group, while young males either leave or are driven from the group as they reach sexual maturity.

Impacts

Effects on wildlife

The energy expended by an adult male cat requires it to consume 5–8% of its body weight in prey per day, while females raising kittens require 20%. Based on these figures, one study concluded that 375 feral cats on Macquarie Island would consume 56 000 rabbits and 58 000 sea birds per year. Where present on the mainland, rabbits may comprise up to 40% of a feral cat's diet. Cats are successful as a control mechanism only when rabbit densities are low. At other times cat predation does little to halt the build-up or spread of rabbit populations; rabbits merely help to support a larger number of cats.

When seasonal shortages of rabbits occur there is a corresponding rise in the number of native animals taken by cats.

The feral cat is an opportunistic predator, and dietary studies have shown that small mammals, birds, reptiles, amphibians, insects and even fish can be taken as prey.

Cat predation is particularly harmful in island situations, and a number of species have become extinct due to the introduction of cats. On the mainland, native animals—which already suffer due to the destruction of their habitats by man and other introduced animals—may be endangered further by cat predation. Actual competition for prey can cause a decline in the numbers of native predatory species such as quolls, eagles, hawks and reptiles. Not only do native animals bear the brunt of predation, but they also suffer the effects of a parasite that reproduces only in the intestine of the cat. This disease (toxoplasmosis) is particularly harmful to marsupials, which may develop blindness, respiratory disorders, paralysis, and suffer the loss of offspring through abortion and stillbirths.

Exotic disease—rabies

Due to their widespread distribution, feral cats may prove to be a major vector for this fatal viral disease if it ever enters Australia. Overseas studies have revealed that wounds inflicted by rabid cats are more dangerous than those caused by rabid dogs. While the bites of rabid dog are generally inflicted on the arms and legs, the cat attacks the head of its victim, biting and clawing viciously. These head and facial bites reduce the time taken for the virus to enter the central nervous system, lessening the chance of success from subsequent remedial treatment.

Control

Managing feral cats

The GBO requires a person to take reasonable and practical measures to minimise the biosecurity risks posed by feral cats. This fact sheet provides information and some options for controlling feral cats.

Exclusion fencing

Fencing is the only feasible method of control when special areas need total protection from cats. Feral cats have been successfully prevented from climbing over netted fences that use an electrified wire mounted 15 cm from the top and 10 cm outward from the fence. Non-electrified fencing should incorporate a netted ceiling, or a curved overhang, which prevents the cat from climbing straight up and over the fence.

Trapping

Rubber-jawed, leg-hold traps can be laid in the same manner as they are laid for dingoes and foxes. Leg-hold traps can help to capture true feral cats, which may avoid the live-capture box traps.

Ideal sites are those where territorial markers, such as faecal deposits and pole-clawing, are noticed. Tuna fish oil has shown some success as an attractant; however, feral cats seem more readily attracted to a site by some visual stimulus such as a bunch of bird feathers hung from a bush or stick.

Feral cats can be easily trapped in wire 'treadle-type' box traps (see diagram below). Attractants/lures include fresh meat or fish and should be placed so that they cannot be reached through the wire and be retrieved by clawing. A number of local governments hire cat traps for the purpose of removing stray and feral cats in urban situations.

Lures

Audible recorded lures for feral cats and other predators are available through a number of sources. These recordings mimic the distress call of a small animal and can be used to draw a predator to a bait or trap site. Visual lures (e.g. feathers) can also help attract cats.

Shooting

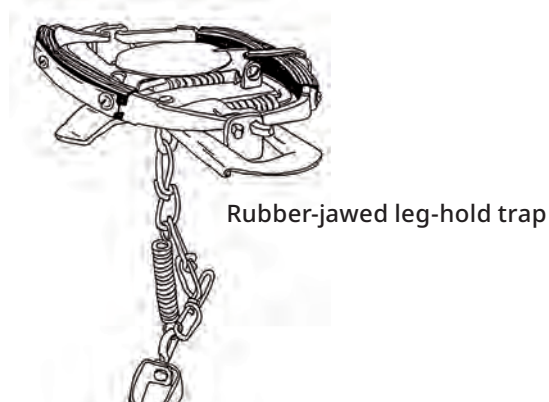
Night shooting is assisted by the cat's distinctive, green eyeshine under spotlight. Thermal imagers can also greatly assist in detecting cats at night. Cats have been successfully attracted by the use of a fox whistle.

Poisoning

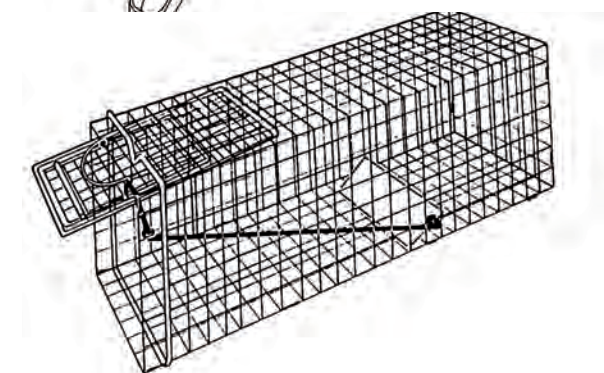
There are limited viable options currently available to target cats with poison or poison baits in Queensland

More information

For more information contact your local government or visit biosecurity.qld.gov.au.



Rubber-jawed leg-hold trap



Treadle box trap



Fact sheets are available from biosecurity.qld.gov.au. The control methods recommended should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, the department does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.



Attachment 2 - Baseline Weed Assessment

Technical Memorandum

Baseline Invasive Weed Assessment, Thagoona North (EPBC 2024/09825)

20 March 2026

1. Introduction

28 South Environmental (**28 South**) has been engaged by Sutgold Pty Ltd (**the Applicant**) to prepare a Preliminary Documentation (**PD**) Report responding to the further information requirements of the Department of Climate Change, the Environment, Energy and Water (**DCCEEW**) for Double Jump Road Residential Estate Development, Victoria Point, QLD (**EPBC 2024/09825**) dated 5 July 2024.

Where residual significant impacts have been identified for protected matters under the *Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)* (Cth), following the identification and inclusion of all reasonable avoidance and mitigation measures, a compensatory environmental offset must be established and proposed as a component of the PD Report. The PD Request identifies the requirement for “*up to date surveys and baseline data confirming the current condition/quality of vegetation on site (including the number of hollow bearing trees if relevant), the extent and presence of weeds and the extent of threats*”.

This technical memorandum details the extent and presence of invasive flora species within the proposed Offset Area (**OA**) and forms the baseline weed condition report to be used in conjunction with the Offset Management Plan (**OMP**) which stipulates management actions pertaining to weeds and their subsequent impact on the habitat quality of offset protected matters.

The proposed OA is located at 160 McGearys Road, Thagoona (Lot 1 on RP190542) within an area of broader forested area within the Ipswich City Council (**ICC**) Local Government Area (**LGA**). The vegetation surrounding the OA is categorised as Category A, Category X and Category C vegetation under the *Vegetation Management Act 1999 (VM Act)* (Qld). These parcels form a matrix of vegetated area surrounding the Bremer River and the floodplains immediately adjacent to it. The OA itself will occupy 17.68 ha of the 25.21 ha of Lot 1 on RP190542 and has been mapped as hosting category C and category X vegetation categorised as Eucalyptus tereticornis woodland on Quaternary alluvium (Regional Ecosystem (**RE**) 12.3.3).

The OA has been ground-truthed in accordance with the RE framework and delineated into two distinct assessment units (**AUs**). Each AU is representative of a distinct vegetation condition and is outlined in **Table 1**. Detailed ecological descriptions and baseline vegetation data are presented in Section 8 of the PD Report.

Table 1 Offset Site Details

Description	Assessment Unit	
	AU01	AU02
Ground-truthed RE and condition	Non-remnant (Category X) vegetation; Pre-clear RE 12.3.3	High Value Regrowth (Category C); RE 12.3.3

Description	Assessment Unit	
	AU01	AU02
Assessment Unit Description	This assessment unit is a matrix of Forest Red Gum (<i>Eucalyptus tereticornis</i>) canopy with a grassy understory and open paddock with a mixture of pastoral grasses and wetland species within the understory. The shrub layer is significantly impacted with sparse recruitment of canopy species forming the bulk of the sporadic and minimal shrub layer.	This assessment unit is dominated by mature and semi-mature Forest Red Gum (<i>Eucalyptus tereticornis</i>) and Moreton Bay Ash (<i>Blakella tessellaris</i>) canopy with a grassy understory with a mixture of pastoral grasses and wetland species within the understory. The shrub layer is significantly impacted with sparse recruitment of canopy species forming the bulk of the sporadic and minimal shrub layer.

The purpose of this weed assessment is to inform the OMP, which is produced to guide the restoration and habitat improvement of the OA through the management of invasive matters such as weeds. The purpose of the OMP is to demonstrate that the Applicant and the Offset Provider understands the requirements for ongoing management of invasive species. Invasive species in this context are Weeds of National Significance (**WoNS**), restricted matters listed under the *Biosecurity Act 2014* (**Biosecurity Act**) (Qld) and species listed by the ICC as weeds of local significance.

Furthermore, the OMP which this technical note informs is intended to demonstrate to DCCEE (through the PD Assessment process) that threats to the OA are known, understood and appropriate measures to manage and mitigate those threats are developed. This baseline weed assessment will show that reduction in distribution and diversity of invasive species is measurable and realistically attainable within the offset period for the OA (SMART Principles), and confidence in the result can be demonstrated.

To prioritise areas where ecological restoration in the OA will be most effective, invasive weed assessment was performed to assess the density and diversity of invasive species. In addition to improving habitat by removing invasive species the OA the client will be fulfilling their General Biosecurity Obligation (**GBO**) under the Biosecurity Act.

2. Techniques employed

Baseline invasive weed assessment and baseline BioCondition Assessment of the OA was undertaken between 28 and 30 January 2026 by suitably qualified ecologists in seasonally suitable conditions to facilitate accurate species identification.

The invasive species survey was undertaken through an informed random meander, parallel traverse assessment. This method was adopted as it is sufficient to develop an understanding of exotic flora population dynamics within the area, as well as obtaining a general inventory of all exotic flora species which occur on site.

The informed random meander, parallel traverse method comprised a modified random meander described by Cropper 1993 (Cropper SC 1993, Management of Endangered Plants, CSIRO Publications Victoria). In the project GIS a thirty-metre grid was overlayed onto the survey area and horizontal lines were deleted leaving a series of parallel lines. In the field the random meander was commenced at the western most point of the survey area and the survey conducted by meandering within the parallel corridor in a northerly direction. Weeds were recorded as encountered and a field assessment of density undertaken (**Figure 2**).

When the full extent of the corridor within the survey area was surveyed, the meandering assessment was continued in the next adjoining corridor and the meander was undertaken in a southerly direction. It is noted that although the random meander technique was derived for identifying threatened plants in the field across a range of habitat types, the underlying assessment approach is equally useful to achieve robust weed assessments.

When WoNS or Restricted matters were observed within the OA and point data was collected to record the species identity and density of infestation. Single point records were made and categorised as the following:

- low – 1-5 stems
- medium – 6-25 stems
- high - >25 stems.

2.1 Survey Conditions

In the three months preceding the survey the Amberly AMO meteorological station (station 040004), approximately 11.9 km from the township of Rosewood, recorded 365.4 mm of rainfall, significantly higher than the mean rainfall events for that period. The mean highest and lowest temperatures were 28.6°C and 17°C respectively which are both warmer than the long-term averages for this period. The long term monthly average maximum temperatures for October-December are 27.9°C, 29.7°C and 30.9°C respectively. The minimum long term average temperatures for October-December are 13.4°C, 16.3°C and 18.4°C respectively.

Survey conditions were considered optimal for detecting weeds present with all weeds in active growing phase as a result of seasonally and climatically favourable conditions.

3. Results

A total of 29 invasive species were detected as a result of the baseline invasive species survey and BioCondition assessments (Addenda 1). These consisted of three (3) WoNS (**Figure 2**), eight (8) species identified as Category 3 Restricted Matters (**Figure 3a-3i**) and eight (8) species identified as locally significant species under the ICC Biosecurity Plan (**Figure 4**). The abundance of these matters is indicated on the figures as per the categories identified in **Section 2**. These species and their status are included as **Table 2**.

Table 2: Baseline invasive species survey at Thagoona North Offset

Species name	Common name	WONS	Biosecurity Act 2014 Category	ICC Significant Weed
<i>Ambrosia artemisiifolia</i>	Annual Ragweed	no	Category 3	yes
<i>Asparagus africanus</i>	Climbing Asparagus	no	Category 3	yes
<i>Baccharis halimifolia</i>	Groundsel Bush	no	Category 3	yes
<i>Celtis sinensis</i>	Chinese Celtis	no	Category 3	yes
<i>Lantana camara</i>	Lantana	yes	Category 3	yes
<i>Opuntia tomentosa</i>	Velvet Tree Pear	yes	Category 3	yes
<i>Schinus terebinthifolius</i>	Broad-leaved Pepper Tree	no	Category 3	yes
<i>Senecio madagascariensis</i>	Fireweed	yes	Category 3	yes

A total of 233 points of weed infestation were recorded across the Thagoona North OA, as detailed in **Error! Reference source not found.** Much of the invasive species' biomass on site can be attributed to Groundsel bush (*Baccharis halimifolia*) (35.2%), Chinese celtis (*Celtis sinensis*) (15.5%) and Lantana (*Lantana camara*) (10.7%) which are all Category 3 Restricted Matters and Lantana (*Lantana camara*) is categorised as a WoNS.

Table 3: Baseline of WoNS, Category 3 Restricted Matters and Locally significant invasive species abundance scores within OA

Species name	Common name	Total observations	% of Total observations
<i>Ambrosia artemisiifolia</i>	Annual Ragweed	15	6.4
<i>Asparagus africanus</i>	Climbing Asparagus	19	8.2
<i>Baccharis halimifolia</i>	Groundsel Bush	82	35.2
<i>Celtis sinensis</i>	Chinese Celtis	36	15.5
<i>Lantana camara</i>	Lantana	25	10.7
<i>Opuntia tomentosa</i>	Velvet Tree Pear	4	9.9
<i>Schinus terebinthifolius</i>	Broad-leaved Pepper Tree	23	1.7
<i>Senecio madagascariensis</i>	Fireweed	21	9.0

4. Discussion

Weed distribution and abundance appears to be relatively uniform across the site with no significant trends for any species. This could be due to the low-lying nature of the site previous land uses and current community conditions. The relatively uniform topography of the site (between 30 and 36 m above sea level) and its relatively proximity to the Bremer River would allow for the easy transport of fertile material of invasive species in significant flooding events, accounting for one source of weed invasion. The flat nature of the site suggests that in any flooding event the OA would be affected relatively evenly, allowing for universal invasive species colonisation of the site.

Previous land use within the OA and the region can be categorised as broad-scale agricultural activities. Due to the nature of these activities, including the suppression of native species in favour of exotic pastoral grasses, the ground stratum has a significant percentage of invasive species occurring within the ground and shrub strata. This removal of native species also increases the number of ecological niches available for invasive species, reduces the potential for recolonisation by native species and will likely facilitate the colonisation of the site by faster growing, opportunistic invasive species. The movement of livestock, soil, seed matter and machinery will also facilitate introduction and proliferation of invasive species within the site, representing a significant vector for invasive species introduction.

In addition to the above explanations for the cosmopolitan distribution of invasive species the uniform land zone and vegetation community conditions across the site and its relatively small area reduces the number of micro-habitats within the site where natives will persist, or invasive species are unable to colonise, making it much more likely invasive species will colonise the site evenly with the only limiting factor to their establishment a lack of a transportation vector (e.g. birds, cattle or flood waters).

The removal of these invasive species should be undertaken by a suitable qualified Ecological Restoration Contractor using chemical and mechanical methods. These restoration efforts should actively target and manage all WoNS and Category 3 Restricted Matters within the OA, especially where they are smothering native species or inhibiting native recolonisation and germination. These should be carried out as per the OMP within the PD Report.

5. Conclusion and Recommendations

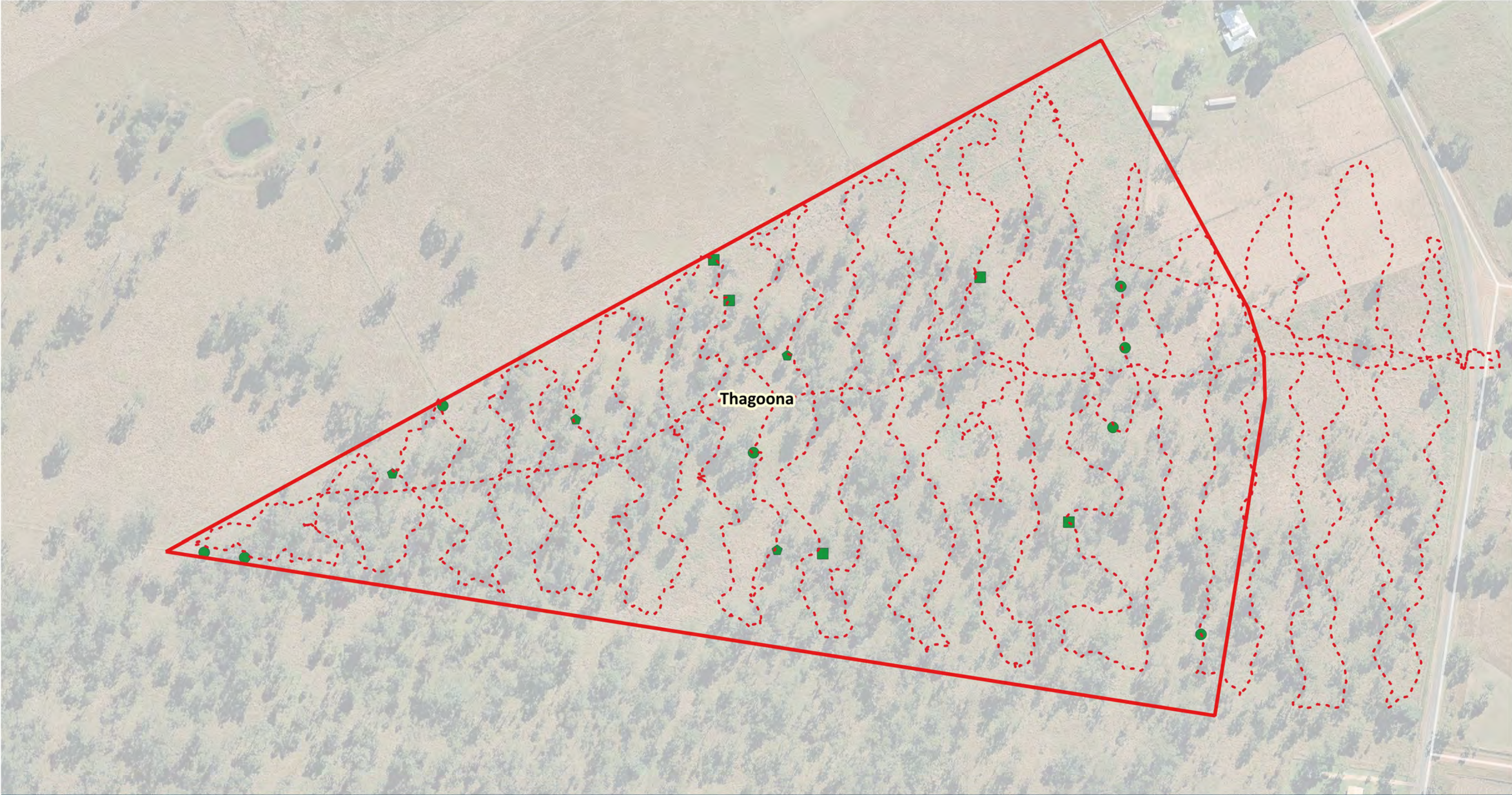
Eight (8) invasive species considered to be invasive weeds/locally important weeds were observed throughout the site. Invasive species identified as WoNS and Category 3 Restricted Matters or Locally Significant Species include:

- Chinese Celtis (*Celtis sinensis*)
- Groundsel Bush (*Baccharis halimifolia*)
- Lantana (*Lantana camara*)
- Annual Ragweed (*Ambrosia artemisiifolia*)
- Fireweed (*Senecio madagascariensis*)
- Broad-leaved Pepper Tree (*Schinus terebinthifolius*)
- Climbing Asparagus (*Asparagus africanus*)
- Velvet Tree Pear (*Opuntia tomentosa*).

Within the OA 61.4% of the records belonged to three (3) species, Groundsel Bush (*Baccharis halimifolia*), Chinese Celtis (*Celtis sinensis*) and Lantana (*Lantana camara*), with Groundsel Bush (*Baccharis halimifolia*) representing the greatest biomass. These invasive species do not show any broad-scale patterns in distribution within the OA due to the homogenous nature of the land zone, vegetation community and land use within the area. Additionally, such a small OA would without clear proximity to drainage features or significant changes topography means there are few environmental filters that exist which would alter or limit invasive species distribution or colonisation success throughout the site.

The background loading of weeds is low and can easily be addressed through an ongoing targeted and programmed weed abatement program over the life of the offset. On account of the offset size, biannual treatment of WoNS and Biosecurity Act (Category 3) weeds will be undertaken, with annual audits to map and track weed presence and abundance.

Figures



Woodbury Precincts

Figure 2 - Distribution of Weeds of National Significance (WoNS) and survey tracks

28 South Project Ref: 2019-100e

Source: C:\Users\Callum\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\2026 Woodbury additional offset area - Thagoona (GDA2020).qgz

The spatial data referenced within this map has been obtained from a variety of verified and licensed sources, as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DoR repositories QImagery and QGlobe.

28°SENVIRONMENTAL

Links to data sources can be provided upon request.

Legend

Lantana camara

●

 high

●

 medium

●

 low

Opuntia tomentosa

⬠

 high

⬠

 medium

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 low

Senecio madagascariensis

■

 high

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Offset Site Boundary

Weed Meander Tracks

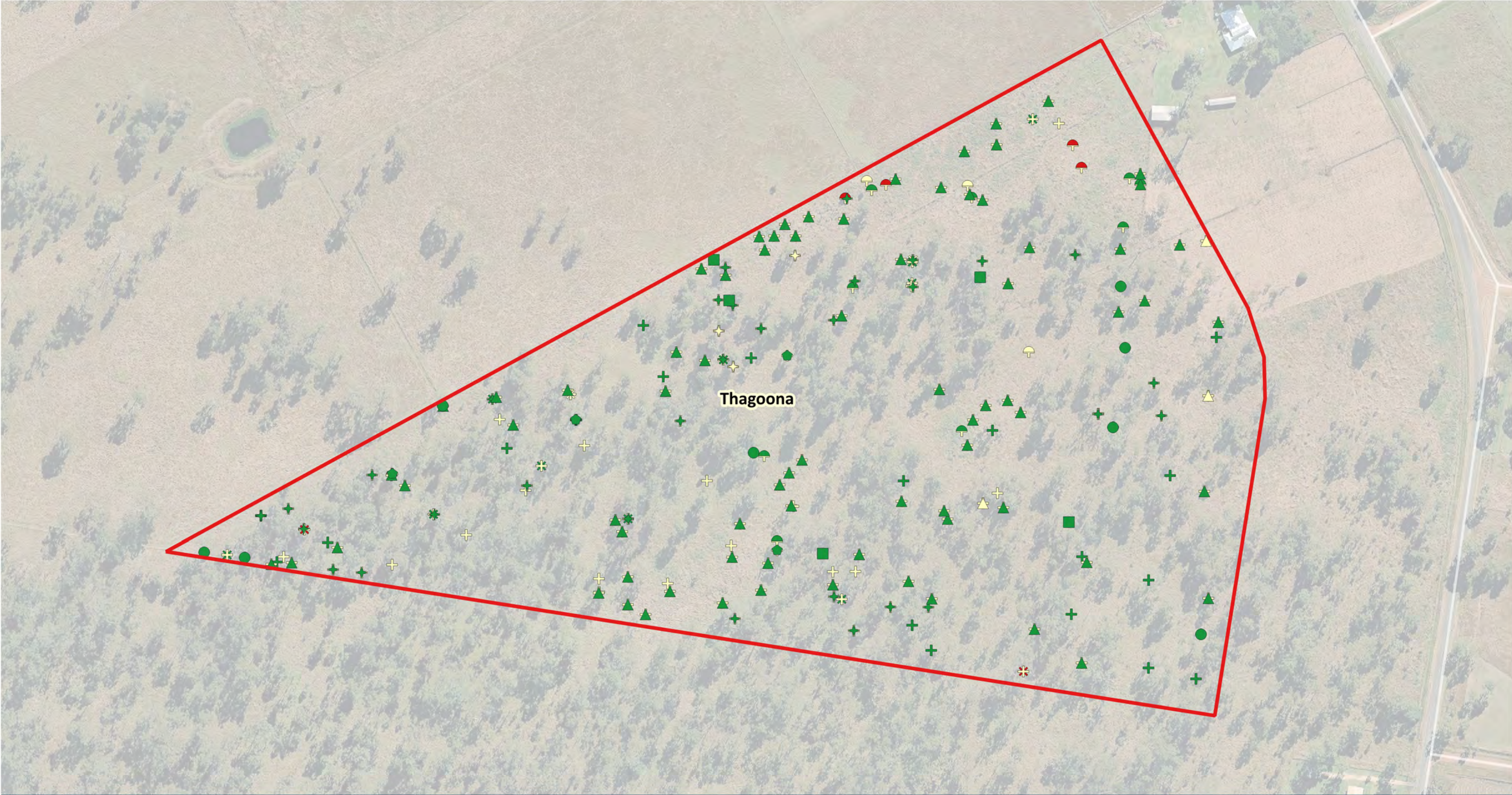
Issue Date	Dwg No.	Author
23-03-2026		CM
Approved	Revision Note	
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Woodbury Precincts

Figure 3a - Distribution of Category 3 Restricted Matters (Overview)

28 South Project Ref: 2019-100e

The spatial data referenced within this map has been obtained from a variety of verified and licensed sources, as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DoR repositories QImagery and QGlobe.

28°SENVIRONMENTAL

Links to data sources can be provided upon request.

Legend

Ambrosia artemisiifolia

high

medium

low

Baccharis halimifolia

high

medium

low

Celtis sinensis

high

medium

low

Lantana camara

high

medium

low

Opuntia tomentosa

high

medium

low

Schinus terebinthifolius

high

medium

low

Senecio madagascariensis

high

medium

low

Asparagus africanus

high

medium

low

Offset Site Boundary

Issue Date

Dwg No.

Author

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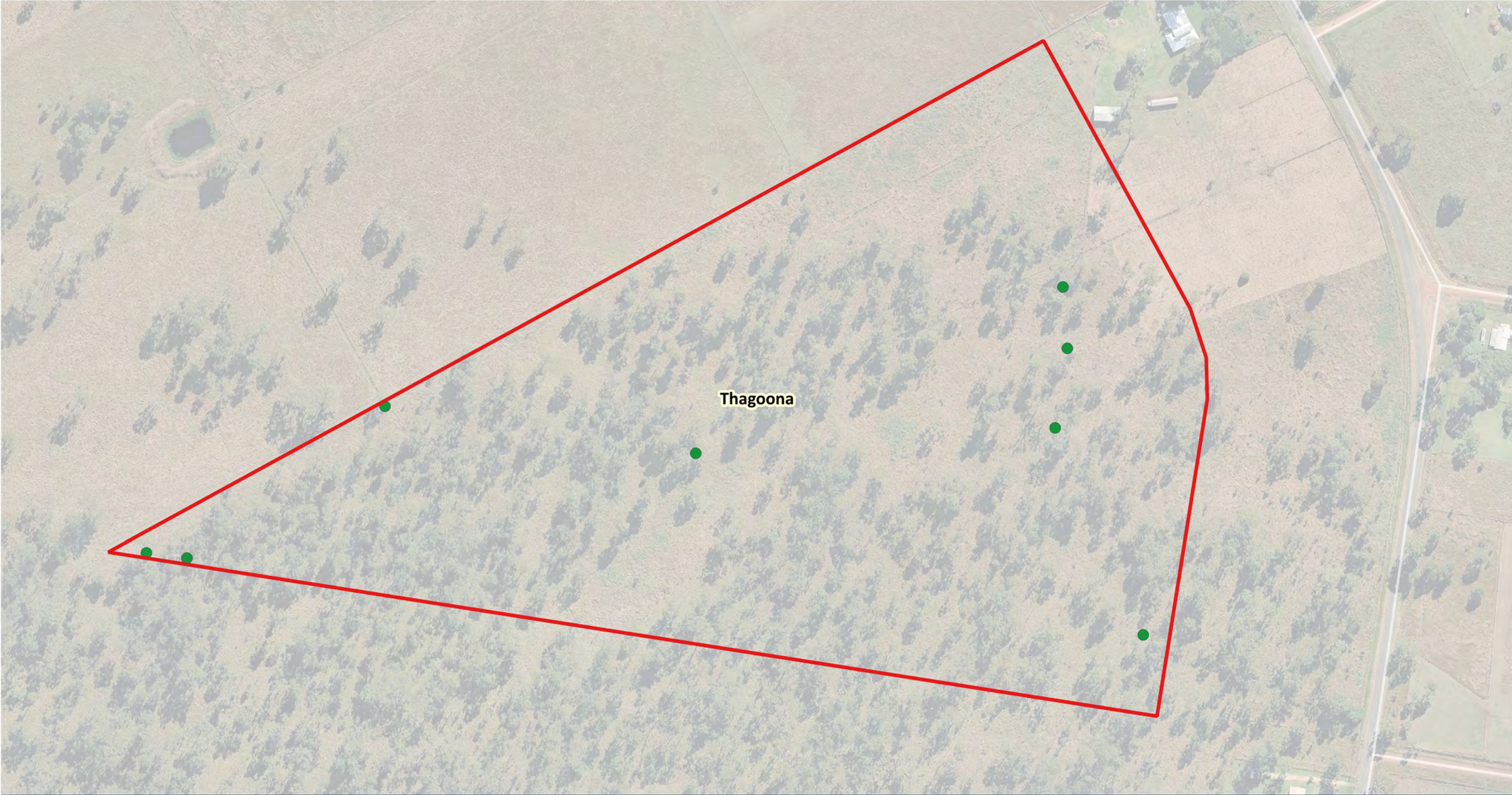
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Woodbury Precints

Figure 3b - Distribution of Lantana camara within the Offset Site

28 South Project Ref: 2019-100e

The spatial data referenced within this map has been obtained from a variety of verified and licensed sources, as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DoR repositories QImagery and QGlobe.

28°S ENVIRONMENTAL

Links to data sources can be provided upon request.

Legend

Lantana camara

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high

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Offset Site Boundary

Issue Date

Dwg No.

Author

23-03-2026

CM

Approved

Revision Note

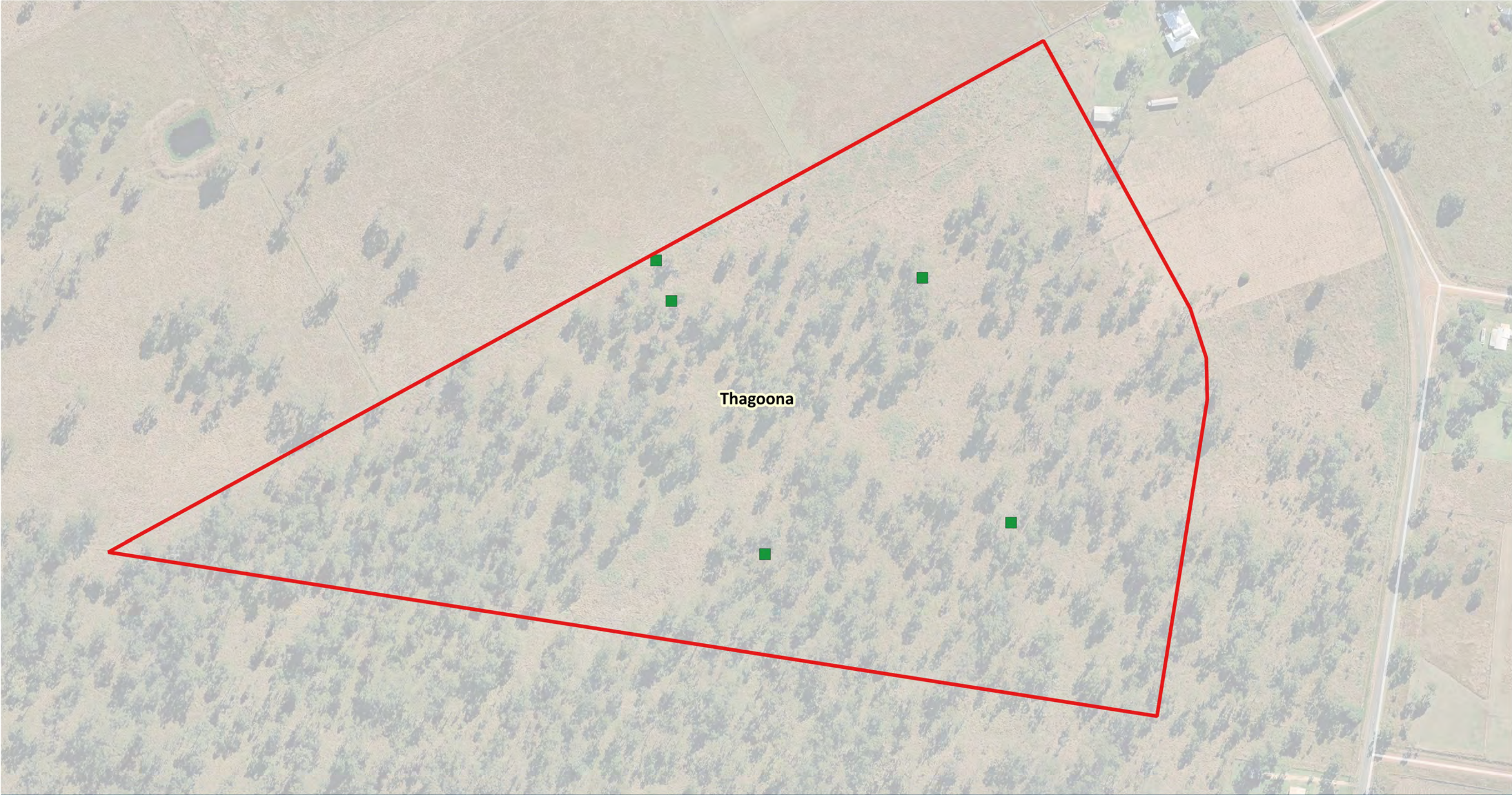
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Woodbury Precints

Figure 3c - Distribution of Senecio madagascariensis within the Offset Site

28 South Project Ref: 2019-100e

Source: C:\Users\Callum\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precints)\Data\GIS\2026 Woodbury additional offset area - Thagoona (GDA2020).qgz

The spatial data referenced within this map has been obtained from a variety of verified and licensed sources, as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DoR repositories QImagery and QGlobe.

28°SENVIRONMENTAL

Links to data sources can be provided upon request.

Legend

Senecio madagascariensis

high

medium

low

Offset Site Boundary

Issue Date

Dwg No.

Author

23-03-2026

CM

Approved

Revision Note

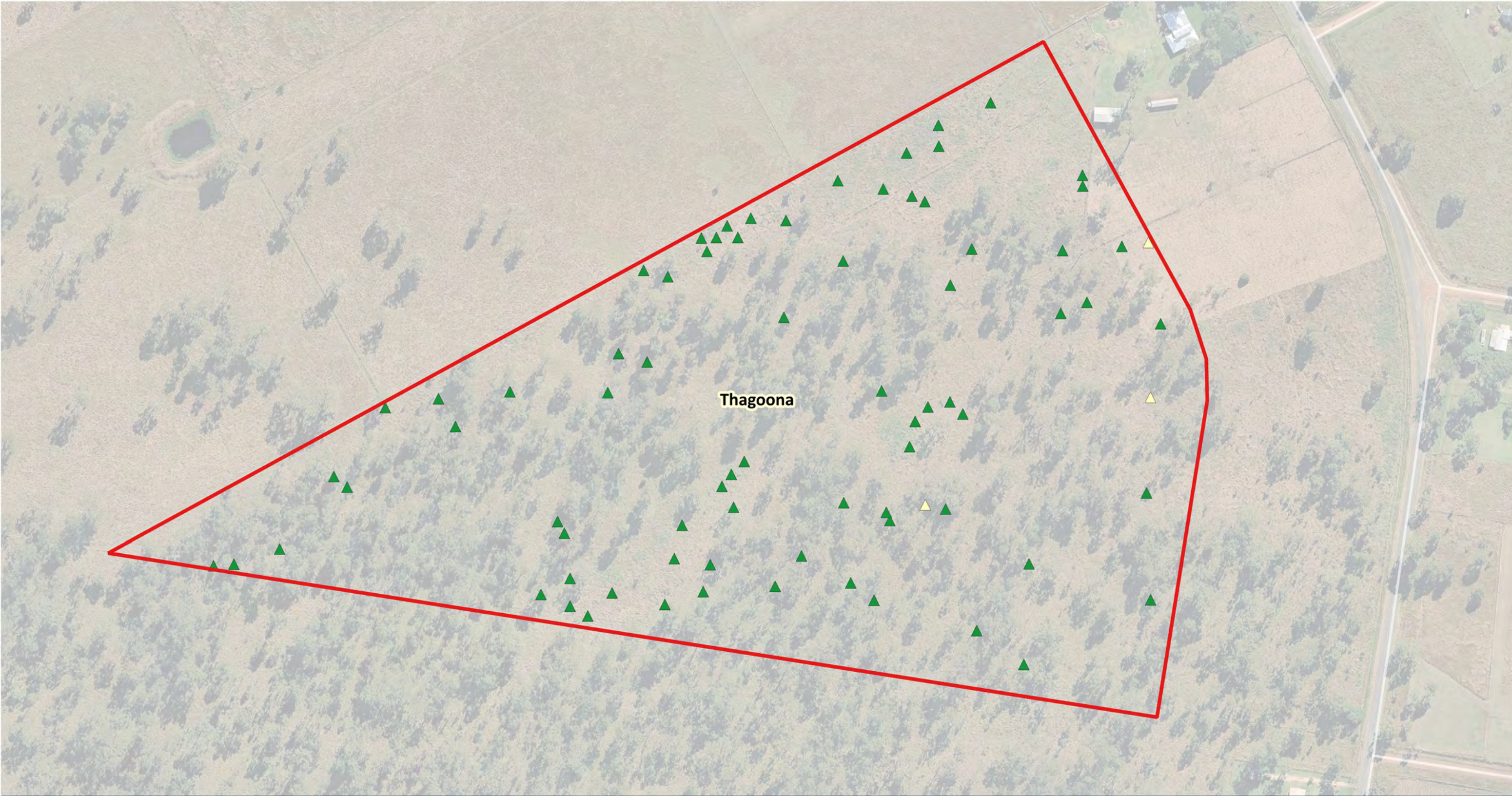
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GDA2020 MGA 56

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00.10.2 km

N



Woodbury Precincts

Figure 3e - Distribution of Baccharis halimifolia within the Offset Site

28 South Project Ref: 2019-100e

Source: C:\Users\Callum\Dropbox\Projects\2019-2026\2019-100e (Sutgold - EPBC Woodbury Precincts)\Data\GIS\2026 Woodbury additional offset area - Thagoona (GDA2020).qgz

The spatial data referenced within this map has been obtained from a variety of verified and licensed sources, as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DoR repositories QImagery and QGlobe.

Links to data sources can be provided upon request.

28°S

ENVIRONMENTAL

Legend

Baccharis halimifolia

▲

high

▲

medium

▲

low

Offset Site Boundary

Issue Date

Dwg No.

Author

23-03-2026

CM

Approved

Revision Note

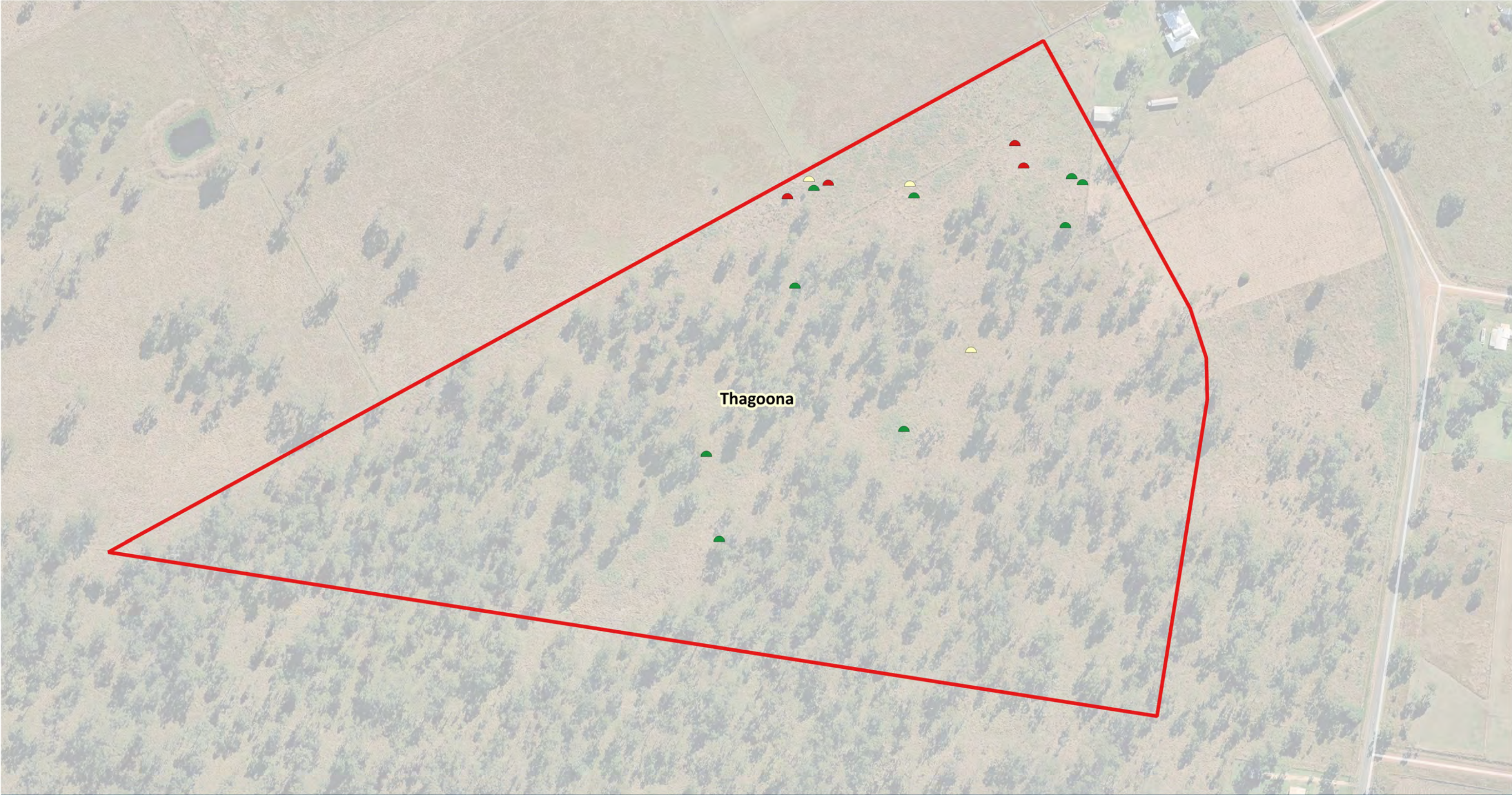
AD

GDA2020 MGA 56

1:2,500

00.10.2 km

N



Woodbury Precints

Figure 3g - Distribution of Ambrosia artemisiifolia within the Offset Site

28 South Project Ref: 2019-100e

Source: C:\Users\Callum\Dropbox\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precints)\Data\GIS\2026 Woodbury additional offset area - Thagoona (GDA2020).qgz

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28°S
ENVIRONMENTAL

Links to data sources can be provided upon request.

Ambrosia artemisiifolia

high

medium

low

Offset Site Boundary

Issue Date

Dwg No.

Author

23-03-2026

CM

Approved

Revision Note

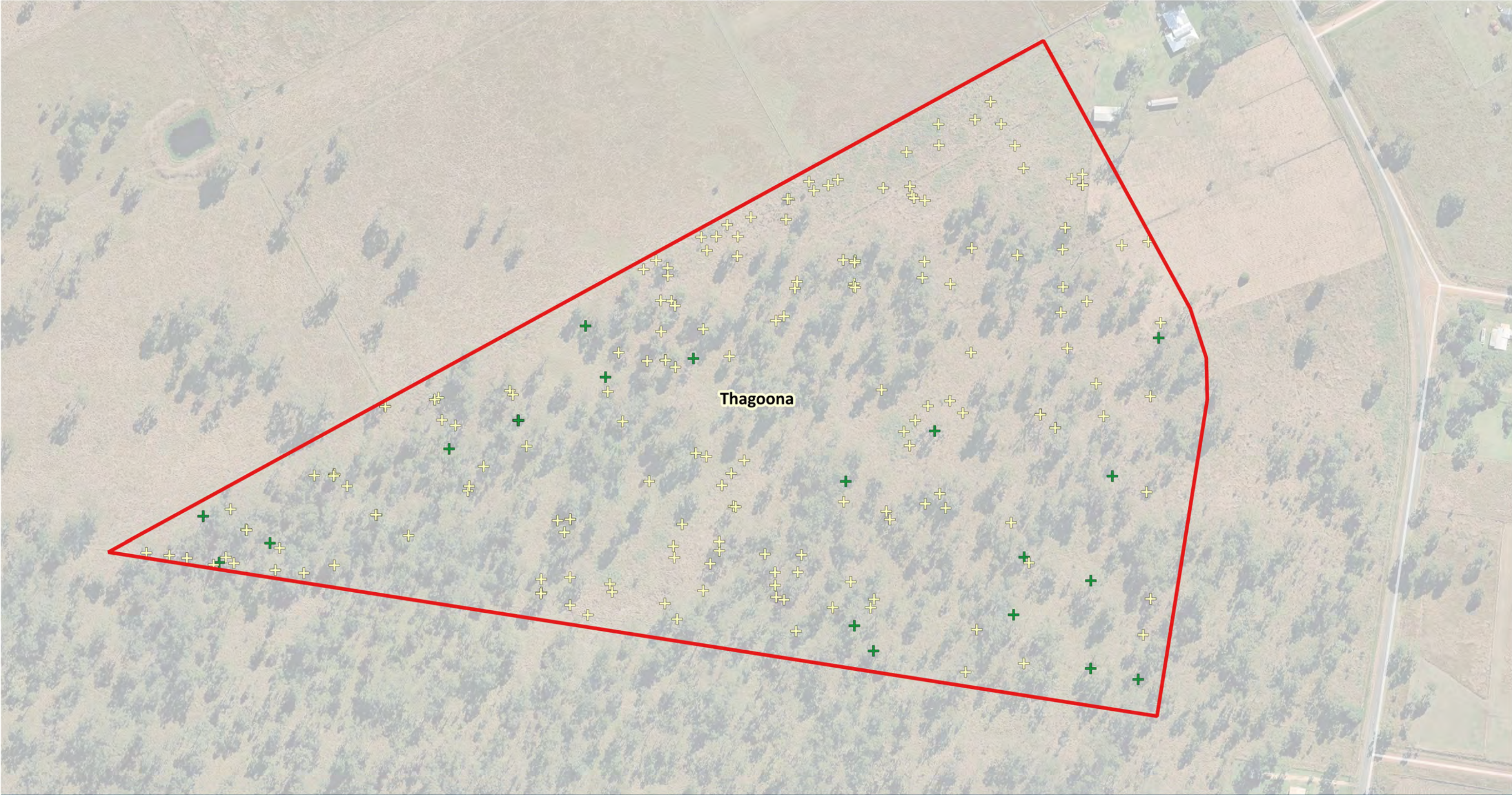
AD

GDA2020 MGA 56

1:2,500

00.10.2 km

N



Woodbury Precincts

Figure 3h - Distribution of Schinus terebinthifolius thin the Offset Site

28 South Project Ref: 2019-100e

Source: C:\Users\Callum\Dropbox\l\d Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\d Data\d GIS\2026 Woodbury additional offset area - Thagoona (GDA2020).qgz

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28°S
ENVIRONMENTAL

Links to data sources can be provided upon request.

Legend

Schinus terebinthifolius

+

high

+

medium

+

low

Offset Site Boundary

Issue Date

Dwg No.

Author

23-03-2026

CM

Approved

Revision Note

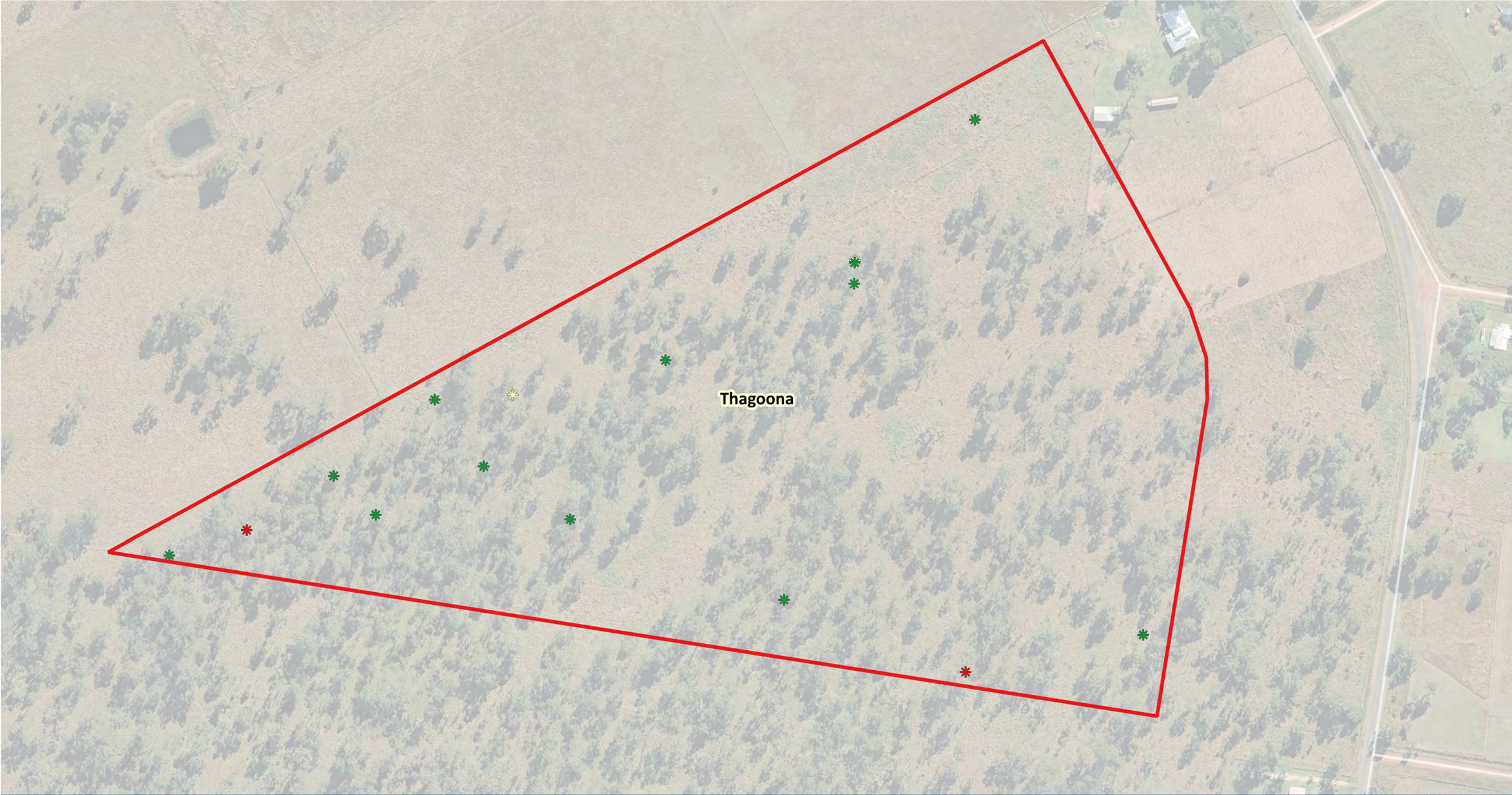
AD

GDA2020 MGA 56

1:2,500

00.10.2 km

N



Woodbury Precincts

Figure 3i - Distribution of *Asparagus africanus* thin the Offset Site

28 South Project Ref: 2019-100e

Source: C:\Users\Callum\Dropbox\l\Projects\2019\2019-100e (Sutgold - EPBC Woodbury Precincts)\l\Data\l\GIS\2026 Woodbury additional offset area - Thagoona (GDA2020).qgz

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28°S
ENVIRONMENTAL

Links to data sources can be provided upon request.

Legend

Asparagus africanus

●

high

✱

low

✱

medium

●

Offset Site Boundary

Issue Date

Dwg No.

Author

23-03-2026

CM

Approved

Revision Note

AD

GDA2020 MGA 56

1:2,500

0 0.1 0.2 km

N

Addenda 1

Invasive species list

Table A: Invasive species observed on site

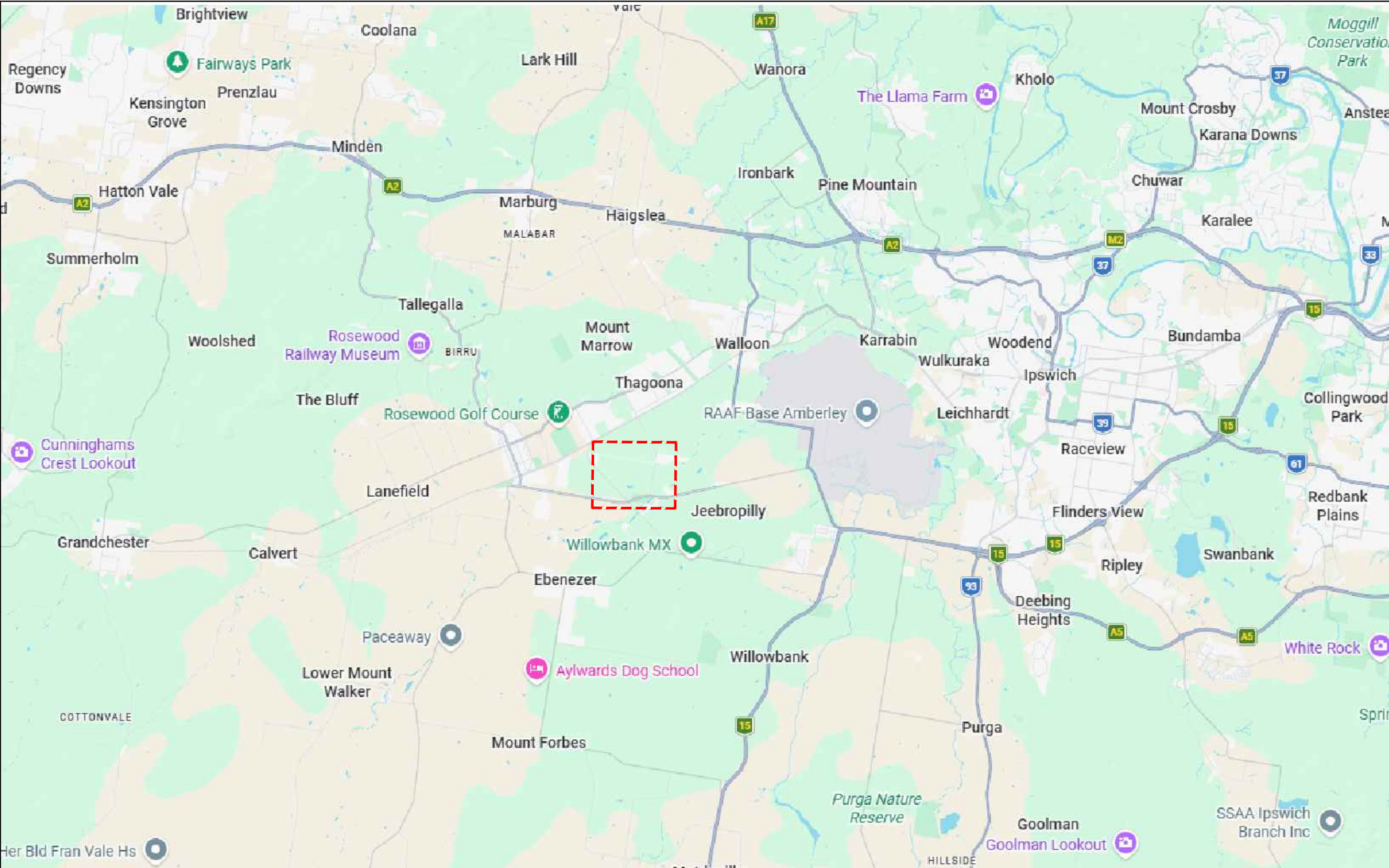
Species name	Common name	WONS	Biosecurity Act 2014 Category	ICC Significant Weed
<i>Ageratum houstonianum</i>	Blue Billy Goat Weed	no	no	no
<i>Ambrosia artemisiifolia</i>	Annual Ragweed	no	Category 3	yes
<i>Asparagus africanus</i>	Climbing Asparagus	no	Category 3	yes
<i>Aster subulatus</i>	Wild Aster	no	no	no
<i>Baccharis halimifolia</i>	Groundsel Bush	no	Category 3	yes
<i>Bidens pilosa</i>	Cobbler's Pegs	no	no	no
<i>Blakella torelliana</i>	Cadagi	no	no	no
<i>Celtis sinensis</i>	Chinese Celtis	no	Category 3	yes
<i>Cynodon dactylon</i>	Scutch Grass	no	no	no
<i>Cyperus rotundus</i>	Nutgrass	no	no	no
<i>Dichanthium aristatum</i>	Angleton Bluestem	no	no	no
<i>Digitaria violascens</i>	Bastard Summergrass	no	no	no
<i>Erigone bonariensis</i>	Fleabane	no	no	no
<i>Euphorbia prostrata</i>	Prostrate Spurge	no	no	no
<i>Gamochaeta coarctata</i>	Spiked Cudweed	no	no	no
<i>Gomphocarpus physocarpus</i>	Cotton Balloon Bush	no	no	no
<i>Gomphrena celosioides</i>	Gomphrena Weed	no	no	no
<i>Lantana camara</i>	Lantana	yes	Category 3	yes
<i>Macroptilium lathyroides</i>	Phasey Bean	no	no	no
<i>Mimosa pudica</i>	Sensitive Plant	no	no	no
<i>Opuntia tomentosa</i>	Velvet Tree Pear	yes	Category 3	yes
<i>Paspalum urvillei</i>	Vasey Grass	no	no	no
<i>Schinus terebinthifolius</i>	Broad-leaved Pepper Tree	no	Category 3	yes
<i>Senecio madagascariensis</i>	Fireweed	yes	Category 3	yes
<i>Sida rhombifolia</i>	Paddy's Lucerne	no	no	no
<i>Tipuana tipu</i>	Tipuana	no	no	no

Species name	Common name	WONS	Biosecurity Act 2014 Category	ICC Significant Weed
<i>Vachellia farnesiana</i>	Sweet Acacia	no	no	no
<i>Verbena littoralis</i>	-	no	no	no
<i>Verbena officinalis</i>	Common Verbena	no	no	no

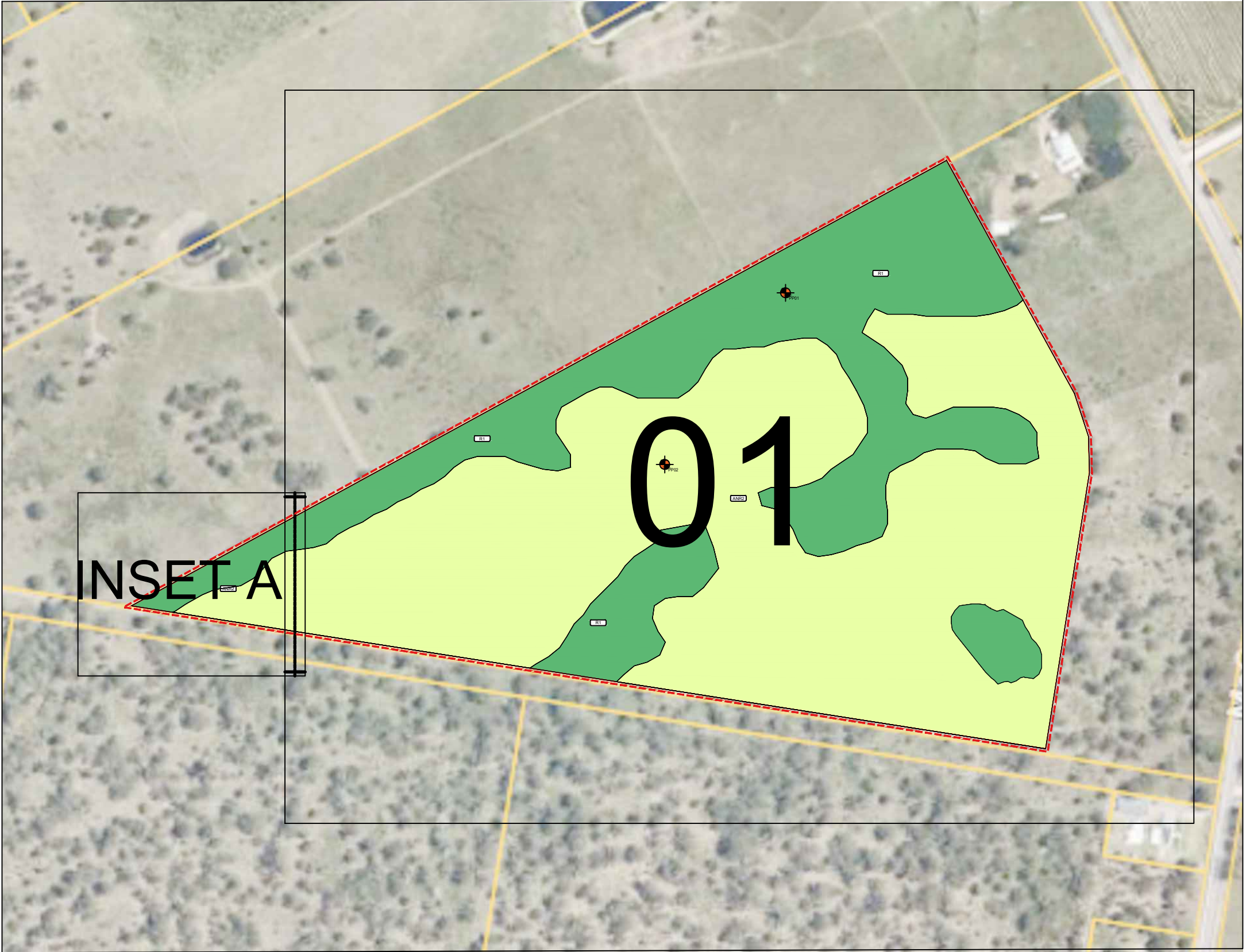
Attachment 3 – Thagoona Offset Rehabilitation Management Plan

2019-100e - THAGOONA OFFSET SITE

OFFSET SITE 2 REHABILITATION MANAGEMENT PLAN



SITE CONTEXT PLAN (NTS) 

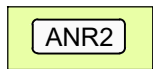
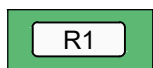


KEY PLAN (NTS) 

DRAWING REGISTER

Drawing Number	Title	Revision
2019-100E-OS2-100	Cover Sheet Plan	C
2019-100E-OS2-101	Background and Purpose	C
2019-100E-OS2-102	Rehabilitation Notes	C
2019-100E-OS2-103	Management Unit Schedule	C
2019-100E-OS2-104	Weed Mangement Schedule & Rehab Schedule	C
2019-100E-OS2-105	Plant Schedule	C
2019-100E-OS2-401	Rehabilitation Mangement Plan	C
2019-100E-OS2-901	Details	C

LEGEND

-  EXTENT OF WORKS
-  ASSISTED NATURAL REGENERATION - TYPE 2
REFER TO TYPICAL DETAIL AND REHAB SCHEDULE
-  RECONSTRUCTION - TYPE 1
REFER TO TYPICAL DETAIL AND REHAB SCHEDULE
-  PHOTO MONITORING POINT LOCATION

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Use figured dimensions in preference to scaled. Notify the Ecologist/ Ecological Designer before proceeding if any anomaly is found between this drawing and conditions on site. Location of existing services are indicative only, verify on site prior to commencing works.

Issue	Date	Details	Approved
A	24.03.26	FOR REVIEW	CP
B	24.07.26	OMP VERSION	CP
C	21.08.26	OMP VERSION	CP

Client:
SUTGOLD

Contact Name:
Client Address:

Consultants:

A L2, Cameron House 354 Brunswick Street,
Fortitude Valley, QLD 4006
E projects@28South.com.au

28°S
ENVIRONMENTAL

Project:
**2019-100e
THAGOONA - RMP
OFFSET SITE 2**

Designed by:	Drawn by:	Checked:
CM	JC	CP

Drawing Title:
COVER SHEET

Issue Detail:
OMP VERSION

Sheet No.:
PAGE 1

Issue:
C

Background and Purpose of this Plan

28 South Environmental Pty Ltd (28 South) has been engaged by Sutgold (the proponent) to prepare this Offset Rehabilitation Management Plan (**RMP**). This RMP has been prepared to demonstrate the proposed rehabilitation strategy for the offset site for the Woodbury North residential development located at 42-44, 48, 50, 52, 56 Double Jump Road, Victoria Point, Queensland (EPBC Reference: 2024/09825). The site can be more properly described as:

- Lot 1 on RP86773;
- Lot 2 on RP86773;
- Lot 5 on SP293881;
- Lot 23 on SP325035; and
- Lot 2 on RP165178.

The Offset Site is located 64 km to the west of the Impact Area and is less than 1 km to the south east of Rosewood, in the Ipswich City Council (ICC) Local Government Area (LGA). The offset property at 160 Mcgearys Road, Thagoona (Lot 1 on RP190542) is categorised as Rural land under the ICC City Plan 2024. The Offset Site is described as Lot 1 on RP190542, and comprises 25.21ha. The Offset Site comprises 17.68ha.

The life of the offset will be 20 years with active onsite management occurring over this period.

The site represents a modified agricultural landscape, historically impacted by broad scale clearing and some pasture improvement. In recent years, agricultural pressures have decreased and patchy canopy regeneration has occurred. The regrowth canopy is dominated by Queensland Blue Gum. The ground and shrub layers have been almost entirely replaced by pastoral grasses and invasive species in parts in line with the broader areas historic land uses. The site ranges in elevation from 32 m above sea level (ASL) to 36 m ASL. The site is made up of alluvial flats and deposits coming from the Bremer River less than a kilometre to the south of the site.

Existing Site

Ecological assessments have categorised the vegetation communities within the offset site as the following:

- 12.3.3 (endangered);

RE 12.3.3 is described as:

Eucalyptus tereticornis woodland. *Eucalyptus crebra* and *E. moluccana* are sometimes present and may be relatively abundant in places, especially on edges of plains and higher level alluvium. Other species that may be present as scattered individuals or clumps include Broad-leaved Apple (*Angophora subvelutina*), Rough Apple (*Angophora floribunda*), Long-fruited Bloodwood (*Corymbia clarksoniana*), Pink Bloodwood (*Corymbia intermedia*), Moreton Bay Ash (*Corymbia tessellaris*), Swamp Box (*Lophostemon suaveolens*), and Silver-leaved Ironbark (*Eucalyptus melanophloia*). Occurs on Quaternary alluvial plains, terraces and fans where rainfall is usually less than 1000mm/y. Not a Wetland. (BVG1M: 16c).

The ultimate goal of this rehabilitation plan for the offset site is to achieve continuous canopy cover to meet remnant status by the end of the 20-year maintenance period or sooner if the criteria are achieved. Weeds of National Significance (WoNS) and invasive species legislated against within the Biosecurity Act 2014 (Qld) will also be eradicated from the site by year 10 (based on baseline weed results (**Thagoona Offset Management Plan, Attachment 2**), with a reduction to 5% of locally significant weed species by Year 20. To achieve this a variety of rehabilitation practices will be implemented including cool burns to reduce weed cover and promote native growth and germination and mechanical and chemical weed removal.

The offset site has been divided into two assessment units which have been overlaid with two management units to inform the rehabilitation works required. These management units are described below:

ANR-2 - Assisted Natural Rehabilitation Type 2 - Weed Management and Infill Planting

Assisted Natural Rehabilitation Type 2 (ANR-2) is associated with large portions of the site and characterised by more open or sparsely canopied areas with moderate invasive species infestations. Much of the canopy and sub-canopy is native.

This existing ground and shrub layer, while containing significant populations of Angleton bluestem (*Dichanthium aristatum*) and other invasive forbs and invasive shrub species including Chinese Celtis (*Celtis sinensis*) and Broad-Leaved Pepper (*Schinus terebinthifolius*) however they are not dominant within the vegetation communities.

The proposed activities to occur within this management unit include carrying out initial and ongoing weed management and infill planting.

Planting will only be required in areas where weed treatment does not yield significant native species germination after two years. Planting will occur sequentially, starting with canopy and sub-canopy species planted within the first year with establishment maintenance such as watering and replacement planting.

Establish maintenance such as watering and replacement planting will be required.

The aim is to achieve overall planting densities (see success criteria) of:

- 1 native plant per 1m² across the ground stratum of the MU
- 1 native plant per 5 m² across the shrub stratum of the MU
- 1 native plant per 10 m² across the sub-canopy stratum of the MU
- 1 native plant per 10 m²across the canopy stratum of the MU

Plant species will be selected to reflected the preclear REs.

Additionally, seed collection from the site should be carried out for canopy species over the period of the rehabilitation works and be spread into rehabilitation areas where canopy is lacking. Once invasive shrub species have been removed the shrub and ground layer species will be spread throughout the site to promote the colonisation of these species in areas previously dominated by invasive species.

R-1 - Reconstruction - Weed Management and Planting

Reconstruction Type 1 is associated with large open grassed areas that have been cleared and used predominantly for grazing and other agricultural practices. Evidence of regrowth or remnant vegetation

is not present or it is only occurring sporadically.

These areas are located predominantly along the edges of the offset areas where the vegetation transitions to more regularly used areas for agricultural activities. The existing ground layer is dominated by pasture grasses and the soil is compacted.

The target for this unit is to carry out initial and ongoing weed management and planting.

Gound preparation such as ripping or furrowing to improve water infiltration into the ground should be carried out in the first year, with rows three (3) metres apart and parallel with the contour lines to a depth of a minimum of 200 mm.

Once the ripped soil has settled after a number of rainfall events or a period of min three months, rehabilitation planting should be carried out. Planting is to be either done into mulch rings of 100mm thick well composted forest mulch or with jute squares.

Planting is to occur sequentially with canopy and sub canopy/ shrub species planted within the first year. Establishment maintenance such as watering and replacement planting will be required.

Establish maintenance such as watering and replacement planting will be required.

Groundcovers do naturally occur on site and are not seen required to be planted.

Plant species will be selected reflective of the preclear regional ecosystem (RE 12.3.3).

The existing ground layer has some native grasses and forbs and should be managed and maintained to preserve soil and minimize scour and erosion.

The aim is to achieve overall planting densities (see success criteria) of:

- 1 native plant per 1m² across the ground stratum of the MU
- 1 native plant per 5 m² across the shrub stratum of the MU
- 1 native plant per 10 m² across the sub-canopy stratum of the MU
- 1 native plant per 10 m²across the canopy stratum of the MU

Seed collection from site should be carried out over the period of the rehabilitation works and be spread into rehabilitation areas. Seed should predominantly be distributed into cultivated or scarified areas where soil is exposed and will form a seed bed. The strike rate will be a lot higher than in grass areas

Existing Site Conditions



Eucalyptus tereticornis open forest with 15-22m sparse shrub layer. Dense groundcover dominated by native sedges and grasses, representative of ANR-2.



Eucalyptus tereticornis open forest to woodland, representative of ANR-2.



Open Grass Area dominated by Cyperus spp., and Aster subulatus. Patchy Eucalyptus tereticornis regrowth to 2m, representative of R-1.



Open paddock with native and exotic herbaceous/grass species. Occasional Eucalyptus tereticornis, some regeneration, representative of R-1.

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Client:
SUTGOLD

Contact Name:
Client Address:

Consultants:

A L2, Cameron House 354 Brunswick Street,
Fortitude Valley, QLD 4006
E projects@28South.com.au



Project:
**2019-100e
THAGOONA - RMP
OFFSET SITE 2**

	Designed by: CM	Drawn by: JC	Checked: CP
--	---------------------------	------------------------	-----------------------

Drawing Title:
**BACKGROUND AND PURPOSE
EXISTING CONDITIONS**

Issue Detail:
OMP VERSION

Sheet No.:
PAGE 2

Issue:
C

Rehabilitation Approach and Goals

GENERAL NOTES

All works described in these specification notes and on the drawings shall be carried out by Rehab Contractor. Any works required by regulation or law to be carried out by others shall be engaged by Rehab Contractor. Rehab Contractor shall pay all fees and charges for such works.

All stout on site to be confirmed prior to construction.

SET-OUT

All setout is shown indicatively only and to be confirmed on site. Setting out all works is to be in accordance with the drawings. Rehab Contractor as offset provider shall be responsible for the accuracy of the whole of the works during their progress and make good any errors caused by negligence or poor workmanship.

SAFETY

Rehab Contractor shall develop safe work method statements and safety plans for all works to ensure that work site complies with all requirements from health authorities and WHS requirements.

SERVICES

Rehab Contractor shall make themselves aware of all underground and overhead services prior to commencement of works. The Rehab Contractor shall also be responsible for determining the locations as-built and to be constructed services during the works. The locations of services on these drawings are indicative only.

SEDIMENT AND EROSION CONTROL:

The rehabilitation contractor must install silt control fencing as required on site, to prevent soil material from entering the water courses, dams, and other water bodies. Sediment and erosion control measures should be implemented in accordance with IPWEA standard drawings. It should be noted that it is the responsibility of the engaged contractor to comply with the erosion and sediment control measures and if necessary, identify where further measures could be installed within rehabilitation zones to assist in the avoidance, minimization and mitigation of soil loss.

CONTRACTOR QUALIFICATIONS

Rehabilitation works should be carried out by qualified and experienced Bush Regeneration Contractors. Contractors will need to provide a Commercial Operators licence. Employees and Contractors applying pesticides in Queensland are obliged to have a Commercial Operators Licence, (ACDC licence) issued under the *Agricultural Chemicals Distribution Control Act 1966* (Qld). This will also mean that Contractors have to demonstrate compliance with Occupational Health and Safety laws as well as environmental and heritage protection legislation. Bush Regenerators must comply with the requirements of the *Workplace Health and Safety Act 2011* (Qld). Bush Regeneration Contractors should also obtain all relevant permits required under State and Commonwealth legislation (e.g. *Nature Conservation Act 1992* (Qld), *Fisheries Act 1994* (Qld), *Vegetation Management Act 1999* (Qld) and *Biosecurity Act 2014* (Qld). Contractors must also be aware of and adhere to cultural heritage protection obligations under the *Aboriginal Cultural Heritage Act 2003* (Qld) and where chemicals are in use, the *Agricultural Chemicals Distribution Control Act 1966* (Qld).

FIRE ANT MOVEMENT CONTROLS

To prevent the spread of fire ants, the Queensland Government has implemented controls that apply to individuals and commercial operators, to restrict the movement of materials that could carry fire ants including soil, turf, potted plants, mulch, baled hay or straw, animal manures mining or quarry products.

Penalties apply for non-compliance with the movement controls. If the engaged contractors are unsure of their obligations under the *Biosecurity Act 2014* (Qld) they must contact the relevant Queensland State Government Department.

CONTROLLING DOMESTIC PETS AND WILDLIFE

It is important to exclude domestic pets and wildlife from Management Units during the formative periods of the restoration efforts. This will help avoid the loss of tube stock or regenerating vegetation from being impacted and or loss through foraging.

MONITORING

Monitoring to demonstrate compliance in achieving the Success Criteria of this plan will be carried out via the annualised monitoring procedures defined within Section 6.6 of the overarching Offset Management Plan.

Monitoring described within this section is to assist in the scrutiny of day-to-day works carried out within this plan. This is not a part of annual reporting obligations, though data from such day-to-day works monitoring can be used within annual compliance reports where necessary.

Monitoring locations must remain consistent throughout the implementation period and be supported by repeat photographic records.

- Photographs shall be taken in directions of true north, east, south and west at each monitoring site.
- The plot should be marked with star pickets and a yellow safety cap securely fixed for ease of identification in the field. All works and chemicals used should be logged and documented as part of the Monitoring Program.

Monitoring will be defined by three distinct periods:

- Establishment Period
 - 3 Month reporting
- Maintenance Period Years
 - 6 Month reporting
- Ongoing Maintenance Period
 - 12 Month reporting

Monitoring should incorporate the matters described within this plan to track progress towards the Success Criteria of this RMP (however this monitoring is not to inform compliance within annual reporting, but instead assist the Rehab Contractor and all other parties involved determine ongoing management methods).

Monitoring Data Collection Requirements

The following information must be collected during monitoring events and included in progress reporting:

- Survival and condition of planted vegetation, including an estimate of the number of dead or declining plants;
- Number and species of replacement plants installed since the previous monitoring event;
- Estimated percentage weed cover within each ANR area and management unit;
- Extent and density of natural regeneration within each ANR area and management unit;
- Photographic records from established permanent photo monitoring points;
- Evidence of weed treatment effectiveness and any follow-up actions undertaken;
- General observations regarding vegetation health, site condition and restoration trajectory; and
- Recommendations for corrective actions or adaptive management measures where required.

Monitoring results should be used to assess progress toward the Success Criteria, and inform any necessary adaptive management responses.

SUCCESS CRITERIA

Successful Natural Regeneration parameters within the rehabilitation areas must reflect the following:

- An average of:
 - 1 native plant per 1m² across the ground stratum of the MU;
 - 1 native plant per 5 m² across the shrub stratum of the MU;
 - 1 native plant per 10 m² across the sub-canopy stratum of the MU;
 - 1 native plant per 10 m² across the canopy stratum of the MU; or
 - at a density representative of the defined in the REDD. Native sedges species and other native emergent macrophytes can be considered as plants within each RMU;
 - Will be assessed through annualised reporting procedures to track progress in achieving interim habitat quality gains (see **Thagoona Offset Management Plan, Section 6.5 and Section 6.6**).
 - The acceptable target for rehabilitation within all Management Units is 90% success rate of all planted tubestock following a comprehensive planting, monitoring and maintenance during the rehabilitation stage
 - Will be assessed through annualised reporting of habitat quality gains (see **Thagoona Offset Management Plan, Section 6.5 and Section 6.6**), though internal monitoring /reporting defined in the Works/monitoring Checklist can assist in tracking success.
- This will assist in achieving compliance with the overarching Thagoona Offset Management Plan by:
- Eradiation of WoNS and weeds listed under the *Biosecurity Act 2014* (Qld) (**Thagoona Offset Management Plan, Attachment 2**).
 - Less than 5% of locally significant weeds on Site.
 - Will be assessed through annualised reporting procedures to track progress in weed reduction against baseline data (see **Thagoona Offset Management Plan, Section 6.2 and Section 6.6**).
 - Achieving interim habitat quality gains (see **Thagoona Offset Management Plan, Section 6.5 and Section 6.6**).

MAINTENANCE

The minimum following maintenance measures are required to be undertaken by the engaged restoration contractor:

- where specified, planting areas must be regularly watered for a period of 4-6 weeks or as deemed necessary by the contractor to ensure establishment is successful;
- recurrent listed WoNS and *Biosecurity Act 2014* (Qld) pest plants within the Management Units are to be removed (weed management measures are outlined within the Weed Management Table and as per the South East Queensland Ecological Restoration Framework;
- all fallen debris and hollow logs are to be retained in situ to retain terrestrial microhabitats; and
- hollow-bearing limbs and suitable hollow logs removed during operational works must be salvaged and relocated into the Management Units to enhance the microhabitats available within the Site; and
- all stock planted within the Management Units area must be replaced as required to maintain a minimum of 1 native plant per m² across each Management Unit or as indicated in the plant schedule.

CORRECTIVE ACTIONS

The following corrective actions are to be implemented in instances of non-compliance with the success criteria:

- If retained trees show signs of ill health (i.e. dead or poor health):
 - An arborist is to be engaged to identify likely causes and to recommend mitigation measures to improve regeneration conditions.
 - The Rehab Contractor will engage a suitably qualified professional to identify the likely cause of health decline and apply recommended mitigation measure/s to improve growing conditions (as recommended by the suitably qualified professional).
 - Remove ill or dead plantings, within six months of detection and undertake any remediation works and re-establishment planting.
- Where plant failure of >10% of the planted stock occurs during the establishment period:
 - Supplementary planting will be undertaken within six months or the next appropriate planting period (whichever comes first) of detection.
 - Should the planting fail again, within one month of detection, the Rehab Contractor is to engage a suitably qualified professional to identify the likely cause of plant failure.
 - Apply recommended mitigation measure/s to improve growing conditions (as recommended by the suitably qualified professional).
- Where weed re-establishment occurs, additional treatment and removal works are to be instigated:
 - Within three months of detection, noting that treatment during non-growth periods may be ineffective and are best targeted during growth periods for greater effectiveness treat all WoNs and Category 3 (Restricted) Biosecurity Act 2014 (Qld) weeds with methods to avoid impacts to restoration works (mechanically or chemically dependent on circumstances).
 - Within 3 months of detection undertake an investigation of the potential source point of seeding.
 - Within six months of detection undertake additional treatment and removal works are to be followed up during the next potential growth period to avoid regeneration and potential seeding events.

- Where planted specimens within the establishment and monitoring period (i.e. 48 months) fail to strike:
 - Supplementary planting will be undertaken within six months or the next appropriate planting period (whichever comes first) of detection.
 - Should the planting fail again, within one month of detection, the Rehab Contractor is to engage a suitably qualified professional to identify the likely cause of plant failure.
 - Apply recommended mitigation measure/s to improve growing conditions

- Where growth rates are not as expected (following BioCondition / MHQA assessment at years 1, 3, 5, 7, 9, 11, 13, 15, 17 ,19):
 - within three months of detection engage a suitably qualified professional to review the plantings and advise on methods to increase growth rates through other interventions.
 - within three months of detection undertake soil testing to determine what rate of soil ameliorants or fertilizers may be required to improve the chemical balance of the soils for improved plant growth.
 - within 12 months of detection revise management plan for rehabilitation revise management actions for the offset.
 - within 24 months of detection if the corrective actions have not amended the slowing Discuss with the Department to negotiate changes to timeframes to meet the completion criteria.
 - Within 12 months of discussing growth rates with the Department Revise the OMP and submit to Minister for approval.

- Where growth rates are not as expected (following establishment monitoring Year 0 - Year 5 post planting):
 - within three months of detection engage a suitably qualified professional to review the plantings and advise on methods to increase growth rates through other interventions.
 - within three months of detection undertake soil testing to determine what rate of soil ameliorants or fertilizers may be required to improve the chemical balance of the soils for improved plant growth.
 - within 12 months of detection revise management plan for rehabilitation revise management actions for the offset.
 - within 24 months of detection if the corrective actions have not amended the slowing Discuss with the Department to negotiate changes to timeframes to meet the completion criteria.
 - within 12 months of discussing growth rates with the Department Revise the OMP and submit to Minister for approval.

CONTROLLING DOMESTIC PETS AND WILDLIFE

Domestic pets will be excluded from the offset site. Feral herbivores which may damage the offset area (pigs, deer etc) will be actively controlled during the 20 year offset period).

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A	24.03.26	FOR REVIEW	CP
B	24.07.26	OMP VERSION	CP
C	21.08.26	OMP VERSION	CP

Client:
SUTGOLD

Contact Name:
Client Address:

Consultants:

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28°S
ENVIRONMENTAL

Project:
**2019-100e
THAGOONA - RMP
OFFSET SITE 2**

	Designed by: CM	Drawn by: JC	Checked: CP
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Drawing Title:
REHABILITATION NOTES

Issue Detail:
OMP VERSION

Sheet No.:
PAGE 3

Issue:
C

Rehabilitation Approach and Goals

WEED REMOVAL METHOD

All weeding should be undertaken with reference to all relevant actions under Section 6 of the Thagoona Offset Management Plan.

All environmental and declared weed tree and shrub species within the extent of revegetation area are to be treated as follows: Refer to the weed schedule for weeds encountered on site.

- a. Initial treatment:
 - Trees and large shrubs to be cut at ground level, spray immediately with water:glyphosate. Removal and chipping of the cut trunk and branches to be done off site.
 - Large infestations of woody vines to be cut at stump to ground level and left to die in place. Smaller infestations to be cut at stump to ground level and removed from host or dig out where practical.
 - Exotic groundcovers, small shrubs and saplings to be treated with foliar spray "Roundup Bioactive" or equivalent.
- b. Follow-up treatment
 - The above steps are to be repeated at monthly intervals for the duration of the maintenance period for all species within the rehabilitation area.
 - Rate of weed kill for exotic trees and shrubs must be 100% at end of maintenance period.

For Existing Weeds encountered on site refer to SEQ Ecological Restoration Framework Part 3 for weed treatment.

KEY

- G = Glyphosate 360 g/L
- MM = Metsulfuron methyl
- /10L = per 10L water
- CS&P = Cut, scrape and paint with: G(neat) or G(1:1.5) = 1 part Glyphosate: 1.5 parts water
- Adj = recommended adjuvant(s) (see below for 'Spray Adjuvants')

NOTE

- All 'spray' treatments infer through wetting of the target foliage to the point of run-off
- All 'crown-out' treatments infer complete elevation from contact with ground, composted/chipped on-site, and/or removal from site
- 'Inject' infers industry standard treatment for tree weeds in environmental areas.

SPRAY ADJUVANT

L1700tm (spray adjuvant/penetrant) at 25-30ml per 10-15L AND Spray oil (adjuvant/surfactant) at 20-25ml per 10-15L i.e. Protec Oil or Spraytec Oil) OR Pulsestm at 20ms per 10L

PROTECTION OF WORKS

The Rehab Contractor shall ensure works are adequately demarcated and protected for the duration of construction. All domestic animals are to be excluded from the rehabilitation area. Ensure that only authorized personnel access the site. All existing native vegetation is not to be disturbed.

WEED SUPPRESSION

In areas where Assisted Natural Regeneration is to occur, juvenile endemic plants are to be identified through flagging or staking. The contractor is to establish a weed suppression method around each juvenile plant to suppress weed and pasture grasses. Weed suppression can be either:

- 1m diameter 100mm layer of high-quality weed-free well composted forest mulch - mulch material can be sourced from cleared vegetation material if adequately seasoned; or
- 600 x 600mm jute mat square pinned down with biodegradable stakes as per detail for tubestock planting.

RE-VEGETATION PLANTING SPECIFICATION NOTES

The success criteria for rehabilitation within all Management Units is 90% success rate of all planted tubestock following a comprehensive planting, monitoring and maintenance during the rehabilitation stage (success of this will ultimately be achieved through annualised reporting of habitat quality gains (see **Thagoona Offset Management Plan, Section 6.6**).

Refer to the Management Unit Schedule for planting specification, planting schedules and planting details.

The following outlines planting measures for rehabilitation works:

- All Management Units are revegetated using native species of local provenance where practicable. Should species be unavailable within the planting palette tables assigned to each Management Units, the contractor should contact 28South Environmental to identify an appropriate replacement species. This should at first be sought from the Regional Ecosystems technical descriptions;
- The planting density in revegetation areas should reflect that outlined in the planting schedules for each Management Unit. This has been identified to simulate natural regeneration densities and provide a dense buffer and to function as weed suppressant. Distribution of planting densities across the management units can vary and the contractor is to allow for this across the management units at the time of planting to achieve a satisfactory outcome at the end of the maintenance period.
- Any additional native species found regenerating through the soil seed bank and the seed found in the cleared, mulched material should be retained and protected as a part of the rehabilitation maintenance;
- No canopy species plantings should occur 6 meters of future residential property boundaries and kept a safe distance away from built structures and services as outlined in the plant schedule notes.
- No tree species to be planted within 1m of underground services.
- One fertilizer tablet should be placed in each planting hole at the time of planting. The plants should be watered in at planting and then watered weekly for the first 12 weeks following planting.
- Topsoil (imported or site topsoil) should comply with AS4419 for native species. Site topsoil may require amelioration in accordance with recommendations of topsoil test results.
- Mulch should be well composted forest mulch to a depth of 100mm, it should be free of exotic plant material and non-organic material (e.g. plastics or asbestos) and comply with AS 4454.
- Erosion control netting in areas of higher velocities and inundation should be coir mesh as specified and be installed as per manufacturers specification (key in trenches 200mm deep, install perpendicular to direction of flow and overlap in roof tile pattern, use min 300mm long U-shape pins at 3m/2.
- Weed mats should be from Jute thick and be installed as per manufacturers specification.

WATER RETENTION ADDITIVE

- Where possible watering to the rehabilitation areas should be carried out as a minimum through the first three months of the establishment period through either water truck application or temporary irrigation.

In areas not accessible or remote, Hydrocell flakes to be applied at the rate of 100ml per plant. Ensure the hydrocell is thoroughly saturated before application.

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[illegible]

Client:
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28°S
ENVIRONMENTAL

Project:
2019-100e
THAGOONA - RMP
OFFSET SITE 2

Designed by:	Drawn by:	Checked:
CM	JC	CP

DrawingTitle:
REHABILITATION NOTES

Issue Detail:
OMP VERSION

Sheet No.: PAGE 4	Issue: C
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Management Unit Schedule

Management Unit Schedule						
Project Name:	Thagoona Rehabilitation Management Plan					
Project Number:	2019-100e					
Revision:	A					
Date:	17/03/2026					
Code	Management Unit	Description	Area (m2	Material Specification	Remarks/ Comments	Sample
ANR-2	Assisted Natural Regeneration Type 2	This Management Unit has experienced significant disturbance including the thinning of canopy trees and the invasion of the ground stratum by pastoral grasses and other weeds. The vegetation is analogous with RE 12.3.3, with the canopy dominated by forest red gum (<i>Eucalyptus tereticornis</i>) with Moreton Bay ash (<i>Blakella tessularis</i>) and Sally wattle (<i>Acacia salicina</i>). It is the aim for the MU is to restore the vegetation to a remnant status with a vegetation community representing 12.3.3. This will be achieved by removing the invasive species within the MU and install infill plantings to help to increase canopy cover and the native species density and diversity within the ground and shrub layers.	121,304.20	Tree guards: 45 cm corflute Jute Matting: 60 cm x 60 cm		
R-1	Reconstruction Type 1	This management unit has been denuded of canopy cover and native species and the ground layer has been largely replaced with pastoral grasses in keeping with the agricultural history of the site. The pre-clear RE of this MU is 12.3.3 with the canopy of adjacent management units dominated by forest red gum (<i>Eucalyptus tereticornis</i>). The low-lying nature of the site and its proximity to the Bremer River has allowed wetland ground cover species such as rice grass (<i>Leersia hexandra</i>), yellow eclipta (<i>Eclipta platyglossa</i>), juncus (<i>Juncus usitatus</i>) and a variety of cyperus sp. (<i>Cyperus</i> sp.). The target RE for this MU is to reinstate a native canopy, shrub layer and ground stratum analogous with 12.3.3. This will be achieved by the removal of invasive species from the MU and the installation of native species within these areas.	58,435.99	* Cultivation of existing site topsoil(ripping, furrowing) * Initial weed management * Follow up weed management * Mulch: 100mm well composted forest mulch or *Weed mat 600 x 600 Jute (Supplier: Aussie Environmental or approved equal) * Tree Guard with Bamboo stake (Grow Rite or approved equal) * Planting or, *Seeding of native canopy and subcanopy species		Soil test certificate to prevent the spread of fire ants

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Project:
2019-100e
THAGOONA - RMP
OFFSET SITE 2

	Designed by: CM	Drawn by: JC	Checked: CP
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Drawing Title:
MANAGEMENT UNIT SCHEDULE

Issue Detail:
OMP VERSION

Sheet No.: PAGE 5	Issue: C
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Weed Management Schedule

The following weeds have been identified on site through inspection. The list of weeds may not be complete and any other weeds encountered should be targeted. Refer to the table for removal and treatment methodology. All chemical treatments to be undertaken by suitably qualified persons.

Botanical Name	Common Name	Treatment Method	WON/ Biosecurity requires removal	Remove if ecologically inhibiting
<i>Agerantum houstonianum</i>	Blue Billy Goat Weed	Foliar spray	no	n/a
<i>Ambrosia artemisifolia</i>	Annual Rag Weed	Foliar spray	no	n/a
<i>Asparagus africanus</i>	Climbing Asparagus Fern	Foliar spray	no	Category 3
<i>Aster subulatus</i>	Wild Aster	Foliar spray	no	n/a
<i>Baccharis halimifolia</i>	Groundsel Bush	Foliar spray Stump Cut and paste	no	Category 3
<i>Bidens pilosa</i>	Copplers Pegs	Foliar spray	no	n/a
<i>Blakella torelliana</i>	Cadagi	Foliar spray Stump, Basal bark, Stem inject	no	n/a
<i>Celtis sinensis</i>	Chinese Celtis	Stump Cut and paste, Stem inject	no	Category 3
<i>Cynodon dactylon</i>	Scutch Grass	Foliar spray	no	n/a
<i>Cyperus rotundus</i>	Nut grass	Foliar spray	no	n/a
<i>Dichanthium aristatum</i>	Angleton bluestem	Foliar spray	no	n/a
<i>Digitaria sp.</i>	Crab Grass	Foliar spray	no	n/a
<i>Erigone bonariensis</i>	Fleabane	Foliar spray	no	n/a
<i>Euphorbia prostrata</i>	Euphorbia	Foliar spray Stump Cut and paste	no	n/a
<i>Gamochaeta sp.</i>	Cudweed	Foliar spray	no	n/a
<i>Gomphocarpus frutescens</i>	Narrow Leaf Cotton Bush	Foliar spray	no	n/a
<i>Gomphrena celosioides</i>	Gomphrena Weed	Foliar spray	no	n/a
<i>Lantana camara</i>	Lantana	Foliar spray Stump, Basal bark	yes	Category 3
<i>Indigofera spicata</i>	Creeping Indigo	Foliar spray	no	n/a
<i>Lespedeza juncea</i>	Lespedeza	Foliar spray	no	n/a
<i>Macroptilium lathyroides</i>	Siratro	Foliar spray	no	n/a
<i>Mimosa pudica</i>	Sensitive plant	Foliar spray	no	n/a
<i>Opuntia tomentosa</i>	Velvet Tree Pear	Stump Cut and paste, Stem inject	yes	Category 3
<i>Paspalum urvillei</i>	Vasey Grass	Foliar spray, Slashing and mowing, Wick wipe	no	n/a
<i>Pinus elottii</i>	Slash Pine	Cut/ Drill and inject	no	n/a
<i>Phyla nodiflora</i>	Carpet Weed	Foliar spray	no	n/a
<i>Schinus terebinthifolius</i>	Broad-leaved Pepper	Stump Cut and paste	no	Category 3
<i>Senecio madagascariensis</i>	Fire Weed	Foliar spray	no	Category 3
<i>Sida rhombifolia</i>	Arrow Leaved Sida	Foliar spray	no	n/a
<i>Tipuana tipu</i>	Tipuana	Foliar spray Stump, Basal bark, Stem inject	no	n/a
<i>Vachellia farnesiana</i>	Sweet Acacia	Foliar spray Stump Cut and paste	no	n/a
<i>Verbena littoralis</i>	-	Foliar spray	no	n/a
<i>Verbena officinalis</i>	Common verbena	Foliar spray	no	n/a

MONITORING CHECKLIST

All timings and progress checklists should be informed through collective assessment of the Thagoona Offset Management Plan and supporting Actions (see **Thagoona Offset Management Plan, section 6**). This checklist is to be used to scrutinise the day-to-day progress of rehabilitation and should will not inform annualised reporting.

Item	Works to be completed/ Task	Parties required	Completed (Y/N)
1.00	Construction Phase		
1.01	Carry out a pre-start site meeting to confirm the scope of works.	Contractor/ 28 South	
1.02	Complete initial weed clearing, assisted natural regeneration work and reconstruction planting works or fabrication in accordance with the plan, details and specification.	Contractor	
1.03	Two weeks prior to the end of construction, call for a practical completion meeting to inspect the works.	Contractor	
1.04	Undertake an inspection to determine if the works are suitable to meet the on Maintenance requirements prior arranging meeting with the Approval Authority.	Contractor/ 28 South	
1.05	Undertake a practical completion meeting of the works, ensure the KPIs are achieved. This will be assessed by 28South Environmental and the Approval Authority at the time and performance is subject to Council's discretion.	Contractor/ 28 South/ Approval Authority	
1.06	If required, carry-out any rectification works as identified from the practical completion meeting	Contractor	
1.07	Initiate 3 month establishment period once confirmed from Approval Authority.	Contractor/ 28 South	
2.00	Maintenance/Establishment Period		
2.01	For a minimum of 3 months, manage the works in accordance with the SEQ Ecological Restoration Manual, including: - Carry out monthly progress site inspections; - Manage the reduction of all non-invasive and environmental weeds; - Manage planting to promote their health and vigour, Irrigation if required; - Replace dead and dying plants as soon as possible; - Infill planting to ANR areas that have not achieved requires KPIs - Top up mulch where required; - Remove plant protection where required; and - Remove litter from rehabilitation areas.	Contractor	
	Intense Maintenance Period - 1 to 4 years	Contractor	
2.02	Submit a progress report at 3monthly intervals identifying: - Estimate number of plants that have died or are dying - Confirm number and species of replacement plants installed - Estimate percentage of weed coverage in the ANR areas - Estimate the quantity of natural regeneration in the ANR areas. - Supporting photographic evidence from pre-determined photo monitoring locations	Contractor	
	Ongoing Maintenance Period - 5 to 20 years	Contractor	
2.03	Manage the works in accordance with the SEQ Ecological Restoration Manual, including: - Carry out monthly progress site inspections; - Manage the reduction of all non-invasive and environmental weeds; - Manage planting to promote their health and vigour, Irrigation if required; - Replace dead and dying plants as soon as possible; - Infill planting to ANR areas that have not achieved requires KPIs - Top up mulch where required; - Remove plant protection where required; and - Remove litter from rehabilitation areas.	Contractor	
2.04	Submit a progress report at 3monthly intervals identifying: - Estimate number of plants that have died or are dying - Confirm number and species of replacement plants installed - Estimate percentage of weed coverage in the ANR areas - Estimate the quantity of natural regeneration in the ANR areas. - Supporting photographic evidence from pre-determined photo monitoring locations	Contractor	
2.05	Two weeks prior to the end of the Maintenance period, call for an inspection of the works	Contractor	
2.06	Undertake an inspection to determine if the works are suitable to meet the Off Maintenance requirements prior arranging meeting with the Approval Authority.	Contractor/ 28 South	
2.07	Undertake an inspection of the works to confirm the following: -Key Performance Indicators have been met, -All works identified in the approved plans have been met; For the avoidance of doubt, if it is determined that the nominated assessment benchmarks have not been achieved, the establishment/maintenance periods will continue until such time as 28South/Approval Authority determines the assessment benchmarks are satisfied.	Contractor/ 28 South/ Approval Authority	
2.08	If required, carry-out any rectification works as identified from the inspection.	Contractor	
2.09	Submit to the Approval Authority confirmation the works have been carried out in accordance with the approved plan	Contractor/ 28 South	
2.10	Approval Authority to confirm the works have achieved the KPIs and the maintenance period can commence	Contractor	
2.11	If required, carry-out any rectification works as identified from the inspection.	Contractor	
2.12	Submit to the Approval Authority confirmation the works have been carried out in accordance with the approved plan	Contractor/ 28 South	
2.13	Issue a certificate of Final Completion to the contractor following written approval from the Approval Authority that the completion of the conditions have been met	Contractor	

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Project:
**2019-100e
THAGOONA - RMP
OFFSET SITE 2**

	Designed by: CM	Drawn by: JC	Checked: CP
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Drawing Title:
**WEED MANAGEMENT SCHEDULE
& REHAB SCHEDULE**

Issue Detail: OMP VERSION	
Sheet No.: PAGE 6	Issue: C

PLANT SCHEDULE

Planting Schedule						
Project Name:	Thagoona Rehabilitation Management Plan					
Project Number:	2019-100e					
Revision:	C					
Date:	21.08.26					
Code	Botanical Name	Common Name	Container Size	Height at Installation	Spread	Density/m2
R-1- RE 12.3.3			Total Area:	58436 m2		1.5
Trees - Total of 15% mix proportion, mix species evenly across area						
EUCter	Eucalyptus tereticornis	Forest Red Gum	tube			8.00%
EUCcre	Eucalyptus crebra	Narrow Leaf Ironbark	tube			2.00%
CORcla	Bakellia clarksoniana	Clarksons Bloodwood	tube			2.00%
ANGlei	Angophora leiocarpa	Rusty Gum	tube			0.50%
ANGsub	Angophora subvelutina	Broad Leaf Apple	tube			0.50%
CORint	Bakellia intermedia	Pink Bloodwood	tube			0.50%
CORTes	Bakellia tessellaris	Moreton Bay Ash	tube			0.50%
EUCmol	Eucalyptus moluccana	Gum topped Box	tube			0.50%
LOP sua	Lophostemon suaveolens	Swamp Box	tube			0.50%
						15.00%
Shrubs - Total of 20% mix proportion, mix species evenly across area						
ACAdis	Acacia disparrima subsp. Disparrima	Black Wattle	tube			0.50%
BANint	Banksia integrifolia	Coatal Banksia	tube			2.00%
ALLlue	Allocasuarina luehmannii	She Oak	tube			3.00%
DODtri	Dodonea triquetra	Hforest Hop Bush	tube			3.00%
JACsco	Jacksonia scoparia	Dogwood	tube			2.00%
ALPexc	Alphitonia excelsa	Soap Ash	tube			4.00%
ACAlei	Acacia leiocalyx	Early Flowering Black Wattle	tube			0.50%
ACAmal	Acacia maidenii	Maiden Wattle	tube			0.50%
ACAcon	Acacia concurrens	Curracabah	tube			0.50%
ACA gla	Acacia glaucocarpa	Hickory Wattle	tube			0.50%
ACAsal	Acacia salicina	Sally Wattle	tube			0.50%
BREobl	Breynia oblongifolia	Coffee Bush	tube			3.00%
						20.00%
Groundcovers - Total of 65% mix proportion, mix species evenly across area						
IMPcyl	Imperata cylindrica	Bady Grass	tube			17.00%
HETcon	Heteropogon contortus	Black Spear Grass	tube			15.00%
THEtri	Themeda triandra	Kangaroo Grass	tube			15.00%
CYMref	Cymbopogon refractus	Barbed Wire Grass	tube			5.00%
BOTdec	Bothriochloa decipiens var. decipiens	Pitted Blue Grass	tube			5.00%
LOMfil	Lomandra filiformis	Fine leaf Mat Rush	tube			2.00%
LOMmul	Lomandra multiflora subsp. multiflora	Many Flowered Mat Rush	tube			2.00%
HARvio	Hardenbergia violacea	False Sarsaprilla	tube			2.00%
DIArev	Dianella revoluta	Rax Lilly	tube			2.00%
						65.00%
ANR-2- RE 12.3.3			Total Area:	121304 m2		1.5
Trees - Total of 15% mix proportion, mix species evenly across area						
EUCter	Eucalyptus tereticornis	Forest Red Gum	tube			8.00%
EUCcre	Eucalyptus crebra	Narrow Leaf Ironbark	tube			2.00%
CORcla	Bakellia clarksoniana	Clarksons Bloodwood	tube			2.00%
ANGlei	Angophora leiocarpa	Rusty Gum	tube			0.50%
ANGsub	Angophora subvelutina	Broad Leaf Apple	tube			0.50%
CORint	Bakellia intermedia	Pink Bloodwood	tube			0.50%
CORTes	Bakellia tessellaris	Moreton Bay Ash	tube			0.50%
EUCmol	Eucalyptus moluccana	Gum topped Box	tube			0.50%
LOP sua	Lophostemon suaveolens	Swamp Box	tube			0.50%
						15.00%
Shrubs - Total of 20% mix proportion, mix species evenly across area						
ACAdis	Acacia disparrima subsp. Disparrima	Black Wattle	tube			0.50%
BANint	Banksia integrifolia	Coatal Banksia	tube			2.00%
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ALPexc	Alphitonia excelsa	Soap Ash	tube			4.00%
ACAlei	Acacia leiocalyx	Early Flowering Black Wattle	tube			0.50%
ACAmal	Acacia maidenii	Maiden Wattle	tube			0.50%
ACAcon	Acacia concurrens	Curracabah	tube			0.50%
ACA gla	Acacia glaucocarpa	Hickory Wattle	tube			0.50%
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BREobl	Breynia oblongifolia	Coffee Bush	tube			3.00%
						20.00%
Groundcovers - Total of 65% mix proportion, mix species evenly across area						
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LOMmul	Lomandra multiflora subsp. multiflora	Many Flowered Mat Rush	tube			2.00%
HARvio	Hardenbergia violacea	False Sarsaprilla	tube			2.00%
DIArev	Dianella revoluta	Rax Lilly	tube			2.00%
						65.00%
NOTES						
1. Ensure crowns of grasses are free from mulch to prevent crown rot.						
2. Ensure tree trunks are free from mulch min 50mm to prevent collar rot.						
3. Infill planting to ANR areas to occur where required and not sufficient canopy exists or ground conditions do require infill planting.						
4. Extent of species suitable to environmental conditions to be confirmed on site.						
5. Plant numbers are a total maximum allowance.						
6. Trees and Shrubs should be planted initially and groundcovers added in once weeds are suppressed.						
7. Rootbound plant stock is to be rejected. Shall rootbound stock be planed and fail, the contractor is to replace at their own cost.						

Note: Planting is only required in areas where weed treatment does not yield significant native regeneration. If natural regeneration is not occurring, actual planting areas will be identified in-situ with planting cells established such that planting area is understood. Planting will be undertaken in order to achieve the Success Criteria.

Planting is only required where no natural regeneration occurs. Densities indicated in the plant schedules are maximum densities per meter square if required.

The spatial data referenced has been obtained from a variety of verified and licenced sources as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DOR repositories QImagery and QGlobe.

Use figured dimensions in preference to scaled. Notify the Ecologist/ Ecological Designer before proceeding if any anomaly is found between this drawing and conditions on site. Location of existing services are indicative only, verify on site prior to commencing works.

Issue	Date	Details	Approved
A	24.03.26	FOR REVIEW	CP
B	24.07.26	OMP VERSION	CP
C	21.08.26	OMP VERSION	CP

Client:
SUTGOLD

Contact Name:
Client Address:

Consultants:

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Fortitude Valley, QLD 4006
E projects@28South.com.au



Project:
2019-100e
THAGOONA - RMP
OFFSET SITE 2

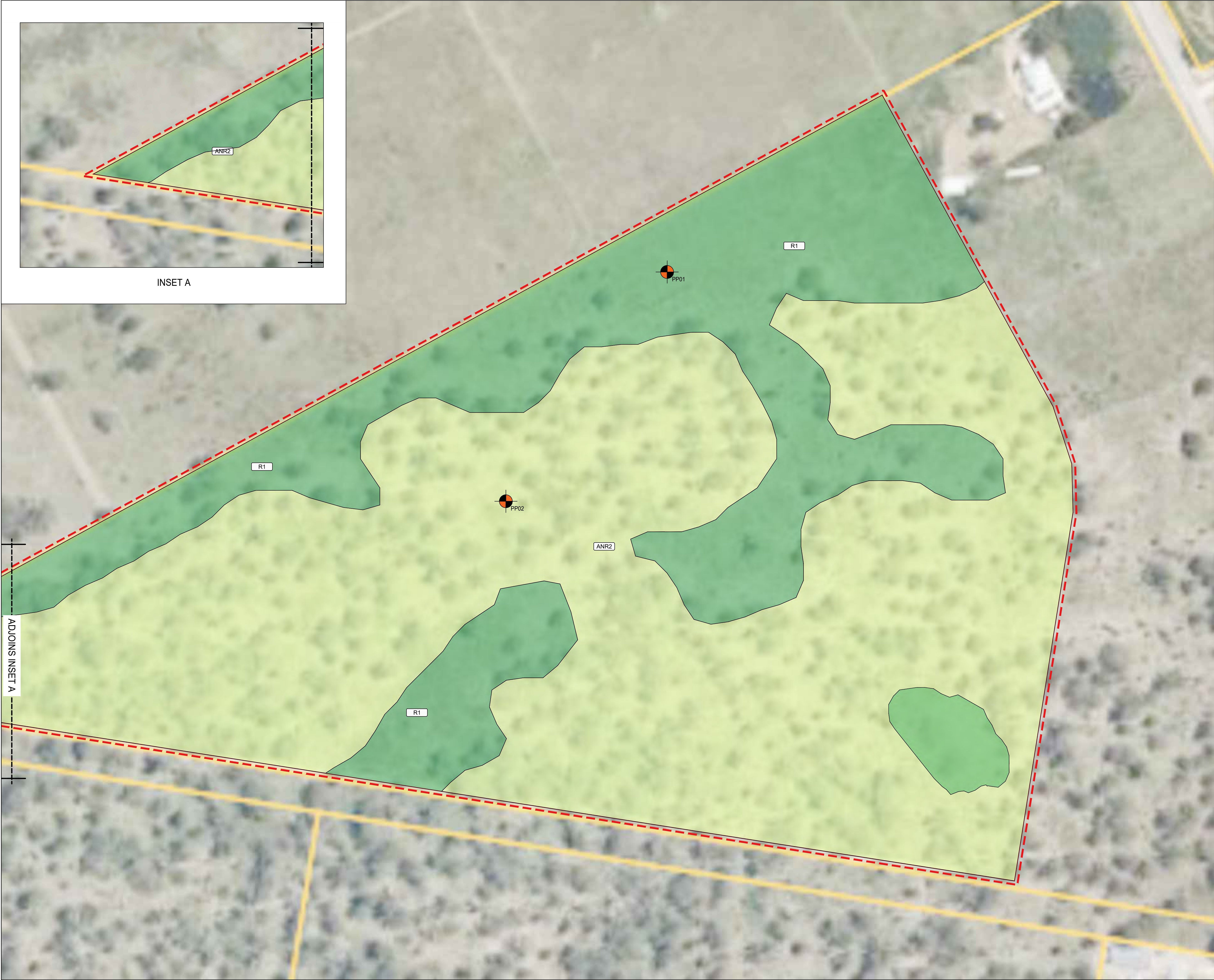
	Designed by: CM	Drawn by: JC	Checked: CP
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Drawing Title:
PLANT SCHEDULE

Issue Detail:
OMP VERSION

Sheet No.:
PAGE 7

Issue:
C



LEGEND

EXTENT OF WORKS

ANR2

ASSISTED NATURAL REGENERATION - TYPE 2
REFER TO TYPICAL DETAIL AND REHAB SCHEDULE

R1

RECONSTRUCTION - TYPE 1
REFER TO TYPICAL DETAIL AND REHAB SCHEDULE

PP##

PHOTO MONITORING POINT LOCATION

The spatial data referenced has been obtained from a variety of verified and licenced sources as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DOR repositories QImagery and QGlobe.

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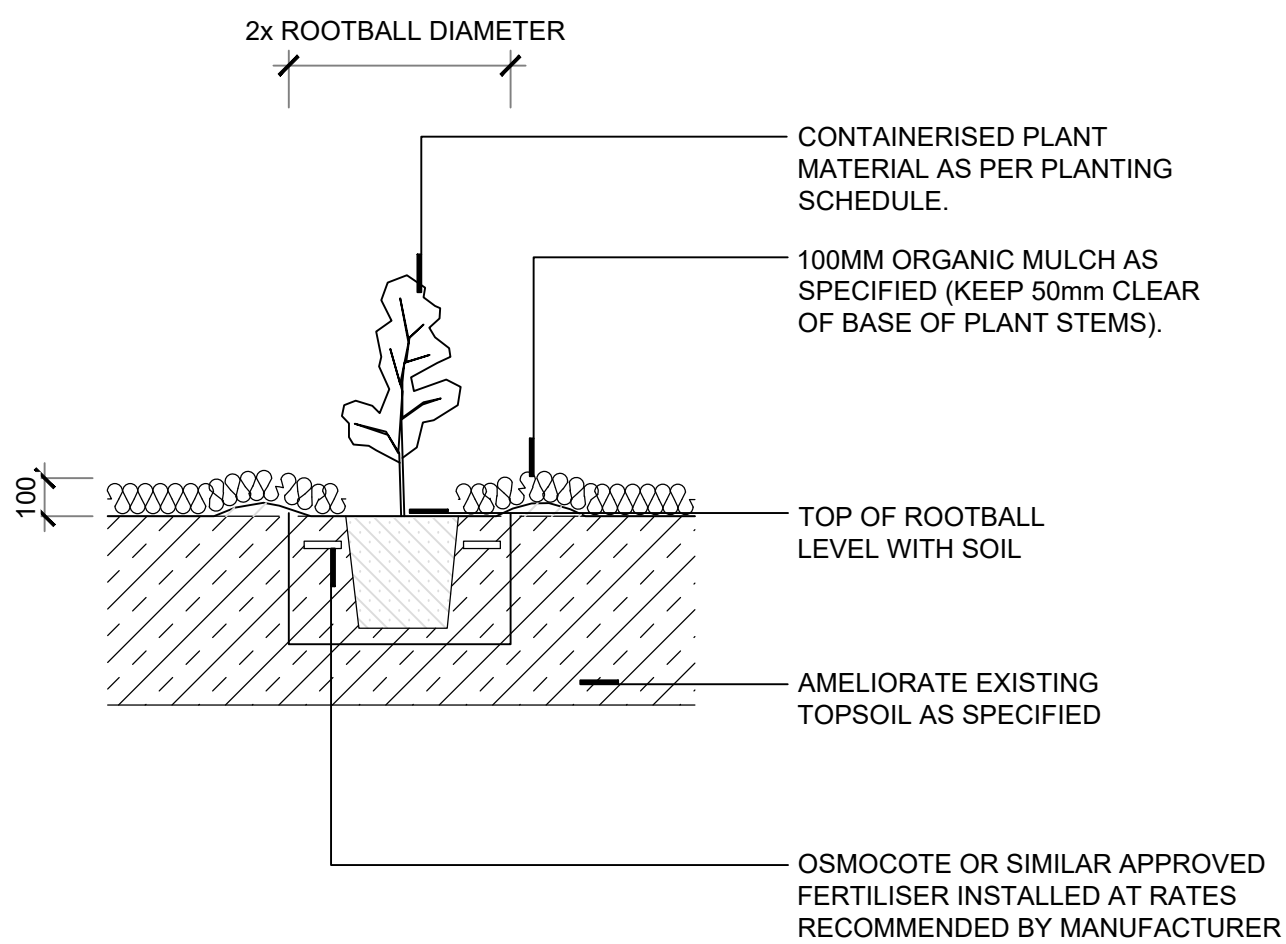
Project:
**2019-100e
THAGOONA - RMP
OFFSET SITE 2**

Designed by:	Drawn by:	Checked:
CM	JC	CP

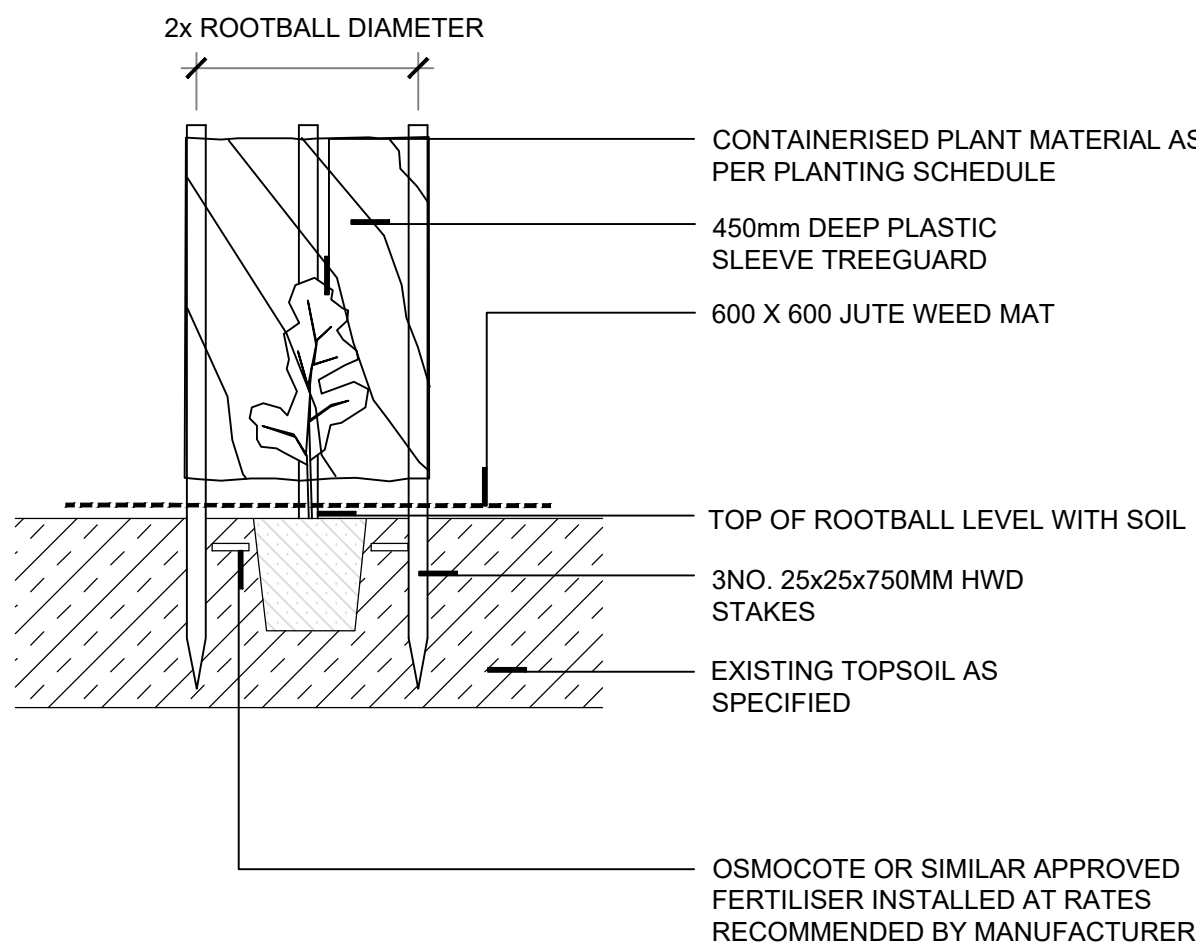
Drawing Title:
**REHABILITATION MANAGEMENT
PLAN**

Issue Detail:
OMP VERSION

Sheet No.: PAGE 8	Issue: B
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- PLANTING METHODOLOGY
1. PREPARE AND CULTIVATE TOPSOIL
 2. PLACE ORGANIC MULCH
 3. EXCAVATE PLANTING HOLE 2 x DIAMETER THE SIZE OF THE ROOTBALL
 4. REMOVE PLANT CAREFULLY FROM POT
 5. CHECK FOR QUALITY (HEALTHY, NO SPIRAL ROOTING OR ROOT BOUND)
 6. PLACE PLANT INTO HOLE AND BACKFILL WITH TOPSOIL AND PLACE 2 TABLETS OSMOCOTE SLOW RELEASE FERTILIZER
 7. WATER IN SUFFICIENTLY WITH MIN 5L PER PLANT



ASSISTED NATURAL
REHABILITATION PLANTING - TYPICAL DETAIL

01
-
RECONSTRUCTION PLANTING - TYPICAL DETAIL
1:20 @ A1

02
-
ASSISTED NATURAL
REHABILITATION PLANTING - TYPICAL DETAIL
1:20 @ A1

The spatial data referenced has been obtained from a variety of verified and licenced sources as follows: Relevant local government data portals, DoR's QSpatial data catalogue, 28 South Environmental, clients and associates. Aerial imagery is sourced from NearMap, Google Satellite and the DOR repositories QImagery and QGlobe.

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A	24.03.26	FOR REVIEW	CP
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28°S
ENVIRONMENTAL

Project:
**2019-100e
THAGOONA OFFSET SITE - RMP
OFFSET SITE 2**

	Designed by: CM	Drawn by: JC	Checked: CP
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Drawing Title:
DETAIL

Issue Detail:
OMP VERSION

Sheet No.:
PAGE 9

Issue:
B

Attachment 4 – Vertebrate Pest Management Plan



Double Jump Road Residential Development

Thagoona North – Vertebrate Pest Management Plan

21 August 2026

Document Control

Project No: 2019-100e

Project: Double Jump Road Residential Development

Document: Thagoona North Vertebrate Pest Management Plan

Client: Sutgold Pty Ltd

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Document History and Status

Revision	Date	Description	By	Review
0.1	7 July 2026	Draft for Review	GM	AD
1.0	28 July 2026	Final for Issue	GM	AD
2.0	21 August 2026	Final for Issue	GM	AD

Approval for Issue

Name	Position	Date
Andrew Dickinson	Technical Director, Ecology	21 August 2026

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1. Introduction

1.1 Background

This Vertebrate Pest Management Plan (**VPMP**) has been prepared by 28 South Environmental Pty Ltd (**28 South**) on behalf of Sutgold Pty Ltd (the **Proponent**) to support the development of a master planned residential community known as Double Jump Road Residential Development (**Proposed Action**) (EPBC Referral Number 2024/09825) – Thagoona Offset Area Offset Management Plan (**OMP**). The Thagoona North Offset Area subject of the VPMP is located at 160 McGearys Road, Thagoona, QLD 4306 or more formally described as Lot 1 on RP190542. The total size of the Thagoona Offset Area is 17.68 ha.

The Offset is provided in response to the loss of 32.82 ha of Koala (*Phascolarctos cinereus*) habitat and 27.87 ha Grey-headed Flying-fox (*Pteropus poliocephalus*) at the site of the Proposed Action at 42-44, 48, 50, 52, 56 Double Jump Road, Victoria Point, Queensland (**Impact Site**). The Impact Site is located within Redland City Council (**RCC**), whilst the Thagoona Offset Area is located within Ipswich City Council (**ICC**).

The strategies and procedures implemented within this VPMP will be subject to monitoring, with the results to be provided within the Annual Compliance Report (**ACR**) per the OMP. The ACR is to be prepared on the 12-month anniversary of the approval.

2. Legislative Framework

The *Biosecurity Act 2014* (Qld) (**Biosecurity Act**) commenced on the 1 July 2016. The Biosecurity Act imposes an overarching General Biosecurity Obligation (**GBO**) which requires reasonable and practical measures to prevent or manage biosecurity risks and not to exacerbate already present effects. This preventative approach relies on a common duty of care owed by all Queensland residents and implementing measures to prevent or minimise biosecurity risks, such as problems caused by pest plants and animals.

A further requirement of the GBO is the management of high priority pest animals in line with restricted matter obligations prescribed by the Biosecurity Act.

Restricted matters include pest plants and animals that have established populations in Queensland and have a significant impact on human health, social amenity, the economy or the environment. The State has allocated specific actions (seven categories) to regulate encounters with restricted matters on public or private land and minimise the spread and adverse impacts of the matter (**Table 1**). The Biosecurity Act will allocate an invasive species a particular category (or categories) that should influence any management initiative implemented by a party who encounters them (see **Table 1**).

These actions form the foundation of obligations associated with interaction of prohibited and restricted matters. Subject to the circumstances, a person may be required to take other reasonable and practical measures to reduce or mitigate biosecurity risks e.g. undertaking weed or pest animal control activities on land they occupy.

Table 1: Restricted Matter Specific Condition Categories - *Biosecurity Act 2014* (Qld)

Restricted Matter Categories (summary provided by (BCC, 2022))
Category 1 – must be reported to a Queensland Government inspector within 24 hours.
Category 2 – must be reported to a Queensland Government inspector or a local government authorised officer.
Category 3 – must not be distributed. This means it must not be released into the environment unless the distribution or disposal is authorised in a regulation or under a permit.
Category 4 – must not be moved.
Category 5 – must not be possessed or kept (unless there is a permit issued in accordance with the Act or another act)
Category 6 – must not be fed except for the purpose of preparing for or undertaking a control program.
Category 7 - must be destroyed and disposed of in accordance with Queensland Government requirements as soon as practicable.

The *Pest Management Act 2001* (Qld) controls the use of toxins for pest management in Queensland and requires any use to be carried out by persons with a Pest Management Technician License. The *Animal Care and Protection Act 2001* (Qld) requires all persons to ensure animal welfare, consequently imposing a duty of care on all parties associated to this VPMP to ensure the humane management of pests on the Offset. With implementation of routine shooting initiatives to manage pest vertebrates onsite, all obligations under the *Weapons Act 1990* (Qld) and *PestSmart National Standard Operating Procedures* will be followed and incorporated into this VPMP. The *PestSmart National Standard Operating Procedures* will inform all trapping initiatives implemented.

3. Target Species

3.1 Summary

The OMP identified a number of vertebrate pest species that posed a threat to the establishment and quality of the offset and / or the MNES for which the offset was required. Species known to be present¹, or suspected of being present² were included in the OMP (**Section 4**; and Action 1 – Vertebrate Pest Management Plan). The OMP identified **six target species** to be subject of specific management. These species and their allocated restricted matter category under the Biosecurity Act are outlined in **Table 2**.

Table 2: Target Species

Common Name	Binomial Name (species)	Restricted Matter Category	Risk to rehabilitation success
Rabbit	<i>Oryctolagus cuniculus</i>	3, 4, 5 and 6	Nil
Fox	<i>Vulpes vulpes</i>	3, 4, 5 and 6	Nil
Wild/Feral Dog	<i>Canis familiaris</i> ; <i>Canis familiaris dingol</i> ; <i>Canis lupus familiaris</i> ; <i>Canis lupus dingo</i>	3, 4 and 6	Nil
Feral Cat	<i>Felis catus</i>	3, 4 and 6	Ringbarking, grazing and browsing, and preventing regeneration of seedlings
Feral Pig	<i>Sus scrofa</i>	3, 4 and 6	Ringbarking, grazing and browsing, and preventing regeneration of seedlings
Feral Rusa Deer	<i>Dama</i> sp.; <i>Cervus</i> sp.; <i>Rusa</i> sp.; <i>Axis</i> sp.	3, 4 and 6	Grazing and browsing, and preventing regeneration of seedlings

3.2 Baseline Monitoring

The OMP outlined the need for a detailed baseline assessment of Vertebrate Pest distribution and abundance. Presence has been identified through a number of techniques including:

- Incidental observation – observation of presence by site personnel whilst undertaking other offset specific actions.
- Indirect observation – observation of tracks, scats, warrens and other traces whilst undertaking other offset specific actions by targeted searches (e.g. for warrens) and incidental observation.
- Camera trapping – total of 16 trail cameras were deployed between 17 January 2025 and 3 February 2025 .

3.2.1 Incidental and Indirect Observation

There have been no incidental or indirect observations made by field personnel.

¹ Based on observation by 28 South ecologists, reports of presence by landowners and discussions with ICC personnel

² Based on records of regional presence identified by database inspections of Atlas of Living Australia and WildNet

3.2.2 Camera Trapping

The full technical memo outlining the assessment is attached (**Attachment 1 of OMP**).

3.2.2.1 Survey Conditions

Survey conditions are listed for the fourteen (14) days in which the camera traps were deployed; 08-March-2026 to 22-03-2026. Survey conditions over the duration of the time cameras were in field ranged from 15.2 to 35.2 degrees, with wind reaching a maximum speed of 57 km/h Total rainfall over the survey period was 36.2 mm ^[2].

3.2.2.2 Survey Effort

This assessment consisted exclusively of a camera trap survey. Four (4) Browning Patriot “black flash” cameras were deployed across the Offset, encompassing all assessment units. Cameras were deployed for 14 days from the 8th to the 22nd of March 2026. After collection the data revealed that all the cameras reached a capacity of 10,000 photos, prior to collection, denoted with an (*). Total survey effort as a result was 18 camera trap-nights.

Camera trap locations within **Attachment 1 of OMP**.

3.2.2.3 Results

Target and other vertebrate pest species recorded by Camera Trapping are outlined in **Table 3**. All fauna species identified by camera traps during the survey are identified as **Attachment 1 of OMP**.

Table 3: Baseline Recording of Target Species – Camera Traps

Camera ID	Vegetation Condition	House Mouse (<i>Mus musculus</i>)	Cane Toad (<i>Rhinella marina</i>)	Total
Camera 04	Grassland/Open grassy woodland	4	-	4
Camera 05	Grassland/Open grassy woodland	-	-	nil
Camera 06	Regrowth	-	2	2
Camera 07	Regrowth	-	-	nil
Total	-	4	2	6

3.3 Discussion

In relation to the Target Vertebrate Pest Species, no direct or indirect observation was made of Deer, Feral Cat and Feral Pig. This does not rule these species out of potential site presence meaning control should be catered to these species, as well as those identified through survey efforts.

4. Management Strategies

Pest management techniques and strategies which have been adopted are designed to utilise techniques reactive to the current condition of the Offset and the surrounding areas. A variety of techniques will be utilised to create an integrated approach to pest management. These techniques are, in most circumstances are suitable for, or adaptable to necessary management of species identified in **Table 2**.

These strategies should be implemented with other fencing, access and signage measures empowered via the OMP (despite not being prescribed within this plan).

Sections 4.1 to 4.5 are prepared to inform the intensive phase of offset management (Years 1-10). At Year 10 (for implementation in Years 11 – 20), these measures should be contemporised (unless deemed not necessary) to reflect the improved conditions of the Offset. It is recommended that these strategies should underpin all pest management (in some capacity) for the duration of Offset delivery.

The ultimate goal, which will be tracked through annual camera trap surveying (see locations at **Attachment 1 of OMP**) (as well as the results of shooting will be to observe a 10% reduction in camera trap recordings species by Year 10, with reduced occurrence of Koala (*Phascolarctos cinereus*) mortality or injury within 5 years.

4.1 Monitoring

Pest management throughout the course of offset delivery will be adaptive, and measures implemented will be subject to routine monitoring of the Offset, to ensure measures appropriately address pest vertebrates. Consequently, formal monitoring of pest species over the 20 year offset period will be carried out to review the progress of pest management and evaluate whether strategy adjustments are required.

Monitoring will replicate the assessments methods described herein (camera trapping, incidental observation, indirect observation) and results will be compared with the baseline and preceding years to detect trends in occupancy. Monitoring will take place during Spring (September to November), as this period facilitates peak fauna activity and would provide the best insight of the true extent of pest presence within the Offset.

Monitoring will be defined by:

- 1- Dedicated pest abundance monitoring
- 2- Results from managements (i.e. observed pest destruction)

This monitoring is described below in **Table 4**.

Table 4: Monitoring Schedule

Monitoring	Method/Indicator	Occurrence
Camera trap	Camera trap monitoring will be undertaken each spring to inform annual compliance reporting.	During Spring (September to November) This will be undertaken: ▪ Each Year 1 to Year 10 ▪ Every second year after Year 11
Observed pest destruction	Pest abundance/management success will be observed throughout the course of each year. Shooting/baiting activities can provide ongoing data via:	▪ At all times

Monitoring	Method/Indicator	Occurrence
	- Baits taken - Pests shot	
Corrective Actions		
Event	Action	
Formal monitoring identifies an increase in pest presence from baseline monitoring results	- Contact ICC, investigate if increase has been observed within the region. - Investigate matters that may have led to this increase. This would determine the intensity of correction.	

Results of monitoring and management will be provided within the ACR. The ACR must be submitted within 30 days of each 12-month anniversary of the commencement of this Action.

The Offset Area will be monitored for vertebrate pest animal activity to respond to *Management Action 1– integrated vertebrate pest management* of the OMP.

Vertebrate pest monitoring will be undertaken to inform species composition, species' habitat preference, and rate of activity throughout the Offset Area. Monitoring activities will be reported as a Memorandum and attached to the Annual Compliance Report.

The following survey approach has been employed to inform the *Baseline Vertebrate Pest Assessment Memorandum (OMP, Attachment 1)*, and will be repeated in general accordance with the monitoring schedule in **Table 4**. Spatial location data concerning the placement of each camera trap is provided in the Memorandum to allow for the accurate repetition of survey and subsequent comparative platform for species' activity index.

4.1.1.1 Camera Trap Survey

Camera trap data will be analysed to record each encounter with a target vertebrate pest fauna species. A single encounter (or trigger) is defined as the series of photographs programmed to result from motion detection. The rate of encounter does not inform population dynamics in terms of population measures of abundance or density, nor is the data statistically robust. Instead, the results demonstrate a rate of species-specific *activity* which allows for a comparative platform between monitoring events. The resulting rate of activity can be compared between monitoring events under the following methodology assumptions:

- The rate of species-specific activity, represented by the rate of encounter, will change in response to species population density;
- Where animal management has been undertaken, it is expected that this will be reflected in reduced species activity across the Offset Area; and
- Where animal management is insufficient, this will be reflected in relatively unchanged or increased activity scores.

The rate of vertebrate pest fauna activity will be used as the measurable and comparable index to inform management actions and success between monitoring years. The activity index will be categorised into an activity scale, as detailed in **Table 5** below.

Table 5: Vertebrate pest fauna activity index – scoring scale

Scaled score	Activity index range
Absent	0
Very low	1-10

Scaled score	Activity index range
Low	11-30
Medium	31-80
High	81-150
Very high	>150

Survey timing, conditions, method, data analysis, and results reporting style will be adopted from the *Baseline Vertebrate Pest Assessment Memorandum (OMP, Attachment 1)*. The Memorandum contained in **Attachment 1** of the OMP will be updated following each monitoring event to form and guide pest management efforts. The Memorandum will be submitted to the proponent and relevant contractors as necessary.

4.1.1.2 Opportunistic observation

Both direct and indirect (tracks, scats, and other traces) observations of vertebrate pest fauna will be captured throughout all Offset Area site visits. This may include the following events:

- Targeted fauna survey – spotlight survey
- Baits taken
- Pests destroyed via shooting events
- Vegetation survey
- Site inspections

Observations of vertebrate pest fauna will be compiled and reported in the Annual Compliance Report, and may inform adaptive management processes.

4.1.2 Communication & Engagement

In conjunction with formal monitoring, ongoing communication with surrounding landowners and ICC representatives will be carried out to further inform pest management strategies. To align with annual monitoring, communication with surrounding landowners must occur at least annually, or upon identification of an extreme increase in a particular pest species. These surrounding properties are likely to be the most appropriate to gather information regarding pest management. The Offset Holder (the Applicant/Approval Holder) and the Offset Manager (Cherish the Environment Foundation Limited) will undertake regular spoken communication with adjoining landholder whereby weed and vertebrate pest management and bushfire management are discussed.

4.2 Baiting

A baiting program will be investigated during Year 1 of offset delivery, with direct management to focus on monitoring and implementing fence controls in the meantime.

4.3 Trapping

Species specific trapping initiatives are sometimes employed to control pest animals. Padded-jaw traps and cage traps are commonly used to manage the species targeted by this VPMP. However, on account of causing inhumane suffering and distress to not only pest species but also native fauna, livestock and domestic pets, padded jaw traps **will not be used** within the Offset. Cage traps may be deployed for Feral Cat's, European Fox and Feral Pigs in

areas that monitoring has identified to be of high usage by target species (should these be detected). **Table 6** outlines application strategies to effectively establish traps.

On the basis of the baseline assessment, presently trapping is not proposed.

Table 6: Trapping Procedures

Strategy	Discussion	Timing
Suitable Location	The risks of traps causing suffering and death to non-target species is high. Traps should only be established in locations where there is high activity of the target species.	At all times. The establishment of traps should be well informed and justified at all times
Suitable Trap Selection	To reduce suffering of trapped species, suitable trap types for each species should be selected. Any use of jaw traps must ensure that the jaws have rubber padding. - European Fox: Cage trap - Feral Cat: Cage Trap - Feral Pig: Cage Trap	At all times
Frequent Trap Monitoring	To reduce the time of suffering for a trapped animal, traps if established will be monitored daily.	Daily

4.4 Shooting

Shooting is a time and costs effective means of destroying species targeted by this IVPMP. Shooting can be a humane means of pest control, as destruction is fast.

Experienced and skilled marksman will be employed as a minimum quarterly or at greater intensity during periods of high pest activity if reported by personnel working on the site. Specific procedures for pest shooting are provided in **Table 7**. Despite Wild Dogs being the pest of particular focus of shooting initiatives, all target species may be addressed by this method of control. All Marksmen engaged will be suitably skilled and qualified (*AHCPMG304 – Use firearms to humanely destroy animals*).

Where shooting is implemented, all activities must be conducted in a southerly or south-westerly direction to ensure site safety and maintain appropriate buffers.

- Based on this constraint, baiting, monitoring and fencing will be established in the first instance control pest.

Table 7: Shooting Procedures

Strategy	Discussion	Timing
Adaptive Shooting Schedules	Shooting quarterly will assist in maintaining pest populations within the Offset. It will also provide frequent review of pest populations onsite. Marksmen will alert if there is increased presence of pest or signs of pest.	Quarterly Shooting will occur nominally in the months January-March-June-September. These months are based on breeding cycles of target species. However, the months provided in this plan are nominal and may vary.
Avoid shooting of pests with dependant young.	Marksmen will be informed before shooting periods to avoid destruction of pests with	At all times.

Strategy	Discussion	Timing
	dependant young. If adult with dependent young are destroyed, searches for dependant young must be carried out to reduce suffering.	
Shooting of animal should only occur when marksmen is sure the pest will be killed with one shot	Marksmen must have clear vision and be satisfied that they will euthanise the pest with one shot. Head (brain) and Chest (lung/heart) should be the only locations of a pest's body targeted.	At all times.
Assurance that animal is dead before moving onto the next target	Marksmen must be sure all shot pests are dead. They must locate and euthanise wounded pests.	At all times.
Record of Pests Euthanised	Records must be kept of Pest Shooting. This reporting must coincide with monitoring results and act as an audit against recorded pests. Records will supplement annual ACR, to inform of pest presence onsite.	At all times.
Use of appropriate firearm calibre to humanely euthanise	Rabbit: .22 rimfire. Centre-fire rifles e.g. .22 Hornet, .223 Rem, could be used in areas where long shots are required. Hollow-point or soft-nosed ammunition should be used.	At all times.
	European Fox, Wild Feral Dog, Feral Cat: .22-250, .22 Hornet, .222 Remington, .223 or .243 Winchester. Hollow-point or soft-nosed ammunition should always be used.	
	Feral Pig: Large calibre, high-powered rifles (at least equal to .243 performance), fitted with a telescopic sight are recommended. Hollow-point or soft-nosed (minimum 80 grain) ammunition should be used.	
	Feral Rusa Deer: .270, .308	
All procedures have been informed by the <i>PestSmart National Standard Operating Procedures</i> .		

4.5 Overall Management

Table 8 provides an overall schedule of how the strategies discussed in this section should be implemented.

Table 8: Overall Management Procedures

Action	Locations	Technique	Timing	Discussion
Monitoring	Across the entirety of the Offset. Previous monitoring efforts should inform allocation of resources for future monitoring.	Baited Camera Trapping - (Rabbit, Wild Dog, Feral Pig, Feral Cat, Feral Rusa Deer) Inspection of Scat, Soil Disruption and Signs of Predation. - (Rabbit, Wild Dog, Feral Pig, Feral Cat, Feral Rusa Deer)	During Spring (September to November) This will be undertaken: - Each Year 1 to Year 10 - Every second year after Year 11	Monitoring informs all initiatives to manage pests for the entirety of the offset delivery period.
Communication & Engagement	Surrounding properties	Must reach out to surrounding landowners to discuss pest prevalence on surrounding properties. Ongoing communication must be maintained with ICC to keep informed with baiting and trapping initiatives.	Annually in conjunction with Monitoring. Ongoing communication with ICC.	Communication must be recorded.
Baiting	Will be arranged in Year 1.	Application of 1080 targeted at Wild Dogs, but its application will vicariously manage other targeted pest species.	Will be arranged in Year 1.	Will be investigated in Year 1. Whilst arranging baiting, shooting will be implemented within Year 1.
Shooting	Across the Site.	Carried out in accordance with the details provided in Table 7 . In general, any shooting that occurs must be humane and take all precautions necessary to reduce suffering of pests.	Quarterly for two-week intervals. Will occur nominally in: January-March-June-September	All Marksmen engaged will be suitably skilled and qualified.

5. References

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Attachment 5 – Biosecurity Management Plan

Attachment 6 – Site
Condition attribute score
progression Summary
Table for Koala and Grey
Headed Flying Fox

Measurable attribute		Management, Monitoring and Interventions	Assessment Unit	Year 0 - Baseline	Year 5		Year 10		Year 15		Year 20	
					Change in attribute score	Potential score uplift	Change in attribute score	Potential score uplift	Change in attribute score	Potential score uplift	Change in attribute score	Potential score uplift
Recruitment of woody perennial species in EDL <i>Number of tree species which are naturally recruiting within the 100*50 m plot (i.e. occurring as saplings <5cm DBH).</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP	AU1	5	Recruitment score changes are not predicted between years 0 and 5 due to assisted revegetation works.	5	Recruitment score changes are not predicted between years 0 and 5 due to assisted revegetation works.	5	After 15 years of Offset management practices, including the management of vertebrate pest fauna and weeds, it is expected that all AUs will have natural canopy regeneration.	5	All AUs are expected to maintain dominant canopy regeneration.	5	
	AU2	2.5	2.5		2.5		5		5			
Native plant species richness - trees <i>Number of native tree species occurring in the 10*50 metre plot.</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	1.3	Although canopy species have been planted, these have not reached the adequate height to contribute to tree species richness score	1.3	All planted tree species are likely to reach minimum requirements to contribute to species richness of the tree strata. Tree species richness score is expected to increase to the maximum score of 5.	5	Maximum tree species richness score attained, trees continue to increase in height.	5	Maximum tree species richness score attained, trees continue to increase in height.	5	
		AU2	1.3		1.3		5		5		5	
Native plant species richness - shrubs <i>Number of native shrub species occurring in the 10*50 metre plot.</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	1.3	Infill planting will occur across both assessment units with species diversity corresponding to the Aus species richness benchmark. Planted shrub species will take up to 5-10 years to be functionally considered as a shrub layer as per the BioCondition Manual i.e. woody in nature, <2 meters in height and single stemmed, or <8 meters in height and multi stemmed.	1.3	Planted shrub species have likely formed a functional shrub strata layer after up to 10 years. Shrub species richness score is expected to increase to the maximum score of 5.	5	Functional shrub layer with species richness corresponding to benchmark is maintained.	5	Functional shrub layer with species richness corresponding to benchmark is maintained.	5	
		AU2			2.5		5		5		5	5
Native plant species richness - grasses <i>Number of native grass species occurring in the 10*50 metre plot.</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	0	Grass species richness is expected to increase slowly over the course of the Offset lifetime. Early year increases my be limited due to site plantings, burning practices, and early stages of weed management. Assisted revegetation will ensure one to two native grass species are present.	2.5	Grass species richness continues to increase with the removal/management of weeds, burning practices, and generation of upper canopy and subcanopy layers. Assisted revegetation will add one to two native grass species per assessment interval.	2.5	Grass species richness continues to increase with the removal/management of weeds, burning practices, and generation of upper canopy and subcanopy layers. Assisted revegetation will add one to two native grass species per assessment interval.	2.5	Grass species richness is expected to be consistent with benchmark scores.	5	
		AU2	2.5		2.5		2.5		3.8		5	
Native plant species richness - forbs <i>Number of native forb species occurring in the 10*50 metre plot.</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	2.5	Forb species richness is expected to increase slowly over the course of the Offset lifetime. Early year increases my be limited due to early stages of weed management. Estimated at 2-5 new species.	2.5	Forb species richness is expected to increase slowly over the course of the Offset lifetime. 10 year increases expected to improve with weed management. Estimated at 2-5 new species.	2.5	Forb species richness continues to increase with the removal/management of weeds, burning practices, and generation of upper canopy and subcanopy layers.	3.8	Forb species richness score continues to increase to be close to that of the BioCondition benchmark.	5	
		AU2	2.5		2.5		3.8		5		5	
Tree canopy height (average of emergent, canopy, sub-canopy) <i>Average score of each strata layer median height value (i.e. emergent, canopy, sub-canopy layers)</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	4	Tree canopy height is expected to increase over time. Conservative estimate of 50 cm of growth is expected at each vegetation survey year (every 5 years), until benchmark value is attained. Both AUs start with high baseline scores.	4	Tree canopy height is expected to increase over time. Conservative estimate of 50 cm of growth is expected at each vegetation survey year (every 5 years), until benchmark value is attained.	4	Tree canopy height is expected to increase over time. Conservative estimate of 50 cm of growth is expected at each vegetation survey year (every 5 years), until benchmark value is attained.	5	Tree canopy height is expected to increase over time. Conservative estimate of 50 cm of growth is expected at each vegetation survey year (every 5 years), until benchmark value is attained.	5	
		AU2	5		5		5		5		5	
Tree canopy cover (average of emergent, canopy, sub-canopy) <i>Percentage of 100m transect within the monitoring site that is covered by canopy and sub-canopy.</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	2	Limited change is expected at year 5 as regenerating canopy species have not attained the appropriate height for this strata. Canopy of existing trees increases.	2	Some change is expected at year 10 as regenerating canopy species have not attained the appropriate height for this strata. Canopy of existing trees increases.	3.5	At year 15, 67% (of average corresponding benchmark value) canopy growth is expected as assisted regrowth trees now contribute to canopy strata.	5	At year 20, 90% (of average corresponding benchmark value) canopy growth is expected.	5	
		AU2	5		5		5		5		5	
Shrub canopy cover <i>Percentage of 100m transect within the monitoring site that is covered by shrub.</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	1.5	Very high increase in shrub canopy cover due to assisted regeneration.	5	High shrub cover maintained at year 10 due to assisted revegetation and regrowth conditions.	5	All AUs are expected to maintain a shrub layer which meets or exceeds benchmark value.	5	All AUs are expected to maintain a shrub layer which meets or exceeds benchmark value.	5	
		AU2	1.5		4		4		4		5	
Native grass cover <i>The extent/occurrence of native grass cover (average cover across 1x1 monitoring plots).</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	0	Estimate of ~10% native grass cover is expected to accumulate between interim survey years.	1	Estimate of ~10% native grass cover is expected to accumulate between interim survey years.	1	Estimate of ~10% native grass cover is expected to accumulate between interim survey years.	3	Estimate of between 10%-20% native grass cover is expected to accumulate following year 15 and the conclusion of major assisted revegetation works, including weed management. Scores are expected to be within 90% of benchmark values.	5	
		AU2	1.5		2		3		3		5	
Organic litter <i>The extent/occurrence of organic litter (average cover across 1x1 monitoring plots).</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	5	Benchmark value has been attained, management practises unlikely to influence raw data.	5	Benchmark value has been attained, management practises unlikely to influence raw data	5	Benchmark value has been attained, potential slight increase as canopy matures.	5	Benchmark value has been attained, potential slight increase as canopy matures.	5	
		AU2	5		5		5		5		5	
Large trees (each plus non-each) <i>Number of large trees above the DBH size threshold defined by the target Regional Ecosystem bio-condition benchmark.</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	2.5	Based on baseline data, no new large trees are predicted to occur in AU2, two large trees pre hectare are predicted to accumulate in AU1. See large tree predictions.	5	Based on baseline data, no new large trees are predicted to occur in AU2, one large trees pre hectare are predicted to accumulate in AU1. See large tree predictions	5	Based on baseline data, no new large trees are predicted to occur in AU1, two large trees pre hectare are predicted to accumulate in AU2. See large tree predictions	5	Based on baseline data, no large trees are predicted to accumulate in year 20. See large tree predictions	5	
		AU2	2.5		2.5		2.5		5		5	
Coarse woody debris <i>Amount of coarse woody debris occurring within the monitoring site (in metres per site) (collected the length of wood debris that is >10cm in width and >0.5m in length).</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP.	AU1	0	No change is predicted in the fifth year as there is little change in canopy cover.	0	No change is predicted in the tenth year as there is little change in canopy cover	0	No change is predicted in the fifteenth year as there is little change in canopy cover	0	Some increase in coarse woody degree as matured canopy species senescence	2	
		AU2	1		1		1		1		2	
Non-native plant cover <i>Includes the extent/occurrence of non-endemic (weeds) species listed under the Census of Queensland Plants 2024, and includes invasive weeds listed under the Biosecurity Act 2014 and Weeds of National Significance as a WONS (percentage coverage within the monitoring site)</i>	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from the Queensland Government Guide to Determining Terrestrial Habitat Quality version 1.2. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP Annual weed monitoring - monitor for progressive annualised decreases in spatial abundance of weeds against baseline.	AU1	1.5	Non native plant cover is reduced to 25% through management practices.	5	Non native plant cover is reduced to 15% through management practices.	5	Non native plant cover remains at <10% through management practices.	5	Non native plant cover is reduced to less than 5% through management practices.	10	
		AU2	3		5		5		5		10	
Stem count predictions and large tree accumulation (estimated raw values input into Habitat index)												
LIKTI only ≥100 mm DBH (Koala MHQA only)	Total stems (pe ha)	AU1	47	Assisted revegetation outcomes are not expected to be reflected in stem count scores at year 5 due to a DBH range of less than 100 mm. No change in score is predicted.	47	Trees <100 mm DBH at baseline, and trees planted as a component of assisted revegetation works are expected to begin to reach and exceed 100 mm DBH at year 10 due to accelerated growth rates in early years. Approximately 10%-20% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	80.5	Trees <100 mm DBH at baseline, and trees planted as a component of assisted revegetation works are expected to reach and exceed 100 mm DBH at year 15 due to accelerated growth rates in early years. An additional 10%-20% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	114	Natural and assisted regeneration trees are expected to reach and exceed 100 mm DBH at year 20. An additional 5%-10% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	154	
		AU2	84		84		113.5		141.5		168	
	% of stem count average (cumulative T1/T2)	AU1	17.00%		17.00%		29.36%		41.45%		56.00%	
		AU2	30.00%		30.00%		41.27%		51.45%		61.00%	
All trees ≥100 mm DBH (Koala MHQA only)	Total stems (pe ha)	AU1	47	Assisted revegetation outcomes are not expected to be reflected in stem count scores at year 5 due to a DBH range of less than 100 mm. No change in score is predicted.	47	Trees <100 mm DBH at baseline, and trees planted as a component of assisted revegetation works are expected to begin to reach and exceed 100 mm DBH at year 10 due to accelerated growth rates in early years. Approximately 10%-20% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	87.5	Trees <100 mm DBH at baseline, and trees planted as a component of assisted revegetation works are expected to reach and exceed 100 mm DBH at year 15 due to accelerated growth rates in early years. An additional 10%-20% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	128	Natural and assisted regeneration trees are expected to reach and exceed 100 mm DBH at year 20. An additional 5%-10% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	171	
		AU2	89		89		123		156.5		185	
	% of stem count average (cumulative T1/T2)	AU1	17.00%		17.00%		31.88%		46.58%		62.00%	
		AU2	32.00%		32.00%		44.73%		56.98%		67.00%	
GHFF Forage tree stems ≥300 mm DBH (GHFF MHQA only)		AU1	12	Assisted revegetation outcomes are unlikely to be reflected in stem count scores for GHFF. Existing stems at baseline are unlikely to have experienced enough growth between years 0 and 10 due to time required to reach 300 mm DBH. No change in score is predicted.		Some baseline trees between stem range of 100-300 mm DBH are expected to reach and exceed 300 mm DBH.	12		27	Some baseline trees between stem range of 100-300 mm DBH are expected to reach and exceed 300 mm DBH.	60	
		AU2	49				49		54		86	
New large trees (DBH ≥540 mm DBH)		AU1	0	An annual growth rate of 0.2cm is applied. A total of 40 mm of growth will result over the 20 year offset period. To achieve and exceed a benchmark value of 540 mm DBH, only trees of 500 mm and greater are captured in large tree upswing predictions.	2	An annual growth rate of 0.2cm is applied. A total of 40 mm of growth will result over the 20 year offset period. To achieve and exceed a benchmark value of 540 mm DBH, only trees of 500 mm and greater are captured in large tree upswing predictions.	1	An annual growth rate of 0.2cm is applied. A total of 40 mm of growth will result over the 20 year offset period. To achieve and exceed a benchmark value of 540 mm DBH, only trees of 500 mm and greater are captured in large tree upswing predictions.	0	An annual growth rate of 0.2cm is applied. A total of 40 mm of growth will result over the 20 year offset period. To achieve and exceed a benchmark value of 540 mm DBH, only trees of 500 mm and greater are captured in large tree upswing predictions.	0	
		AU2	0		0		0		0		1	

Attribute	Scoring section	Measurable attribute	Management, Monitoring and Interventions	Assessment Unit	Year 0 - Baseline	Year 5		Year 10		Year 15		Year 20					
						Change in attribute score	Potential score uplift	Change in attribute score	Potential score uplift	Change in attribute score	Potential score uplift	Change in attribute score	Potential score uplift				
Site Condition - Habitat Index	Quality and availability of food and foraging habitat	Proportion of canopy cover of LIKT trees within the 100x50 meter BioCondition plot	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. KPI's have been adopted from Koala MHQA method. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat creation Implement RMP Annual weed monitoring - monitor for progressive annualised decreases in spatial abundance of weeds against baseline.	AU1	20	These Assessment Units already achieve maximum score.	20	These Assessment Units already achieve maximum score.	20	These Assessment Units already achieve maximum score.	20	These Assessment Units already achieve maximum score.	20				
		AU2		20	20		20		20								
		Forage tree species richness (LIKTs as per Youngentob et al., 2022) (Only trees >100 DBH)		AU1	5	Although species richness has increased due to assisted regeneration of native LIKT (foraging and ancillary), it is uncertain if trees will be > 100 mm DBH at year 5 and thus available for foraging to koala. Scores therefore do not change at year 5.	5	Although species richness has increased due to assisted regeneration of native LIKT (foraging and ancillary), it is uncertain if trees will be > 100 mm DBH at year 10 and thus available for foraging to koala. Scores therefore do not change at year 10.	5	At year 15, planted LIKTs have exceeded 100mm DBH and are counted towards the species richness, however the species identified for planting by the OMP and RMP will not increase species richness enough to increase the score.	5	At year 20, planted LIKTs have exceeded 100mm DBH and are counted towards the species richness, however the species identified for planting by the OMP and RMP will not increase species richness enough to increase the score.	5				
		AU2		5	5		5		5								
		Tree density (per hectare stem count) of LIKT species		AU1	7.5	Assisted revegetation outcomes are not expected to be reflected in stem count scores at year 5 due to a DBH range of less than 100 mm. No change in score is predicted.	7.5	Trees <100 mm DBH at baseline, and trees planted as a component of assisted revegetation works are expected to begin to reach and exceed 100 mm DBH at year 10 due to accelerated growth rates in early years. Approximately 10%-20% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	7.5	Trees <100 mm DBH at baseline, and trees planted as a component of assisted revegetation works are expected to reach and exceed 100 mm DBH at year 15 due to accelerated growth rates in early years. An additional 10%-20% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	12.5	Natural and assisted regeneration trees are expected to reach and exceed 100 mm DBH at year 20. An additional 5%-10% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	12.5				
		AU2		7.5	7.5		7.5		10		12.5						
		Recruitment of LIKT species only (% of total LIKT within plot)		AU1	10	These Assessment Units already achieve maximum score.	10	These Assessment Units already achieve maximum score.	10	These Assessment Units already achieve maximum score.	10	These Assessment Units already achieve maximum score.	10				
		AU2		10	10		10		10								
		Quality and availability of shelter		Presence of preferred ancillary trees (Listed in Youngentob et al.)	AU1	0	Ancillary trees not present in year 5. Planted trees have not reached 100mm DBH and no not count towards scoring	0	Ancillary trees not present in year 10. Planted trees have not reached 100mm DBH and no count towards scoring	0	Ancillary trees not present in year 15. Size will increase through management period, however may not exceed 100 mm DBH at each site during this time.	1	Ancillary trees now present. Size will increase through management period a now exceed 100 mm DBH.	5			
				AU2	0.5	Ancillary trees present at baseline at some sites. Planted trees have not reached 100mm DBH and do not count towards scoring by year 5.	0.5	Ancillary trees present at baseline at some sites. Planted trees have not reached 100mm DBH and do not count towards scoring by year 10	0.5	Ancillary trees not present at baseline. Size will increase through management period, however may not exceed 100 mm DBH at each site during this time.	1	Ancillary trees present at baseline and planted trees now contributing to score. Size will increase through management period a now exceed 100 mm DBH.	5				
	Canopy cover of all trees within the 100x50 meter BioCondition plot		AU1	7.5	Although canopy species have been planted, these have not reached the adequate height to contribute to tree species richness score. Score reflects existing trees.	7.5	Although canopy species have been planted, these have not reached the adequate height to contribute to tree species richness score. Score reflects existing trees.	7.5	Although canopy species have been planted, these have not reached the adequate height to contribute to tree species richness score. Score reflects existing trees.	7.5	All planted tree species are likely to reach minimum requirements to contribute to species richness of the tree strata. Tree species richness score is expected to increase to the maximum score.	20					
	AU2		15		15		15		15	20							
	Recruitment of all Forage/Shelter tree species (% of total tree species diversity within plot)		AU1	10	Little change for years 0-15 until natural recruitment and rehabilitation achieves >100mm DBH / enters T2 strata)	10	Little change for years 0-15 until natural recruitment and rehabilitation achieves >100mm DBH / enters T2 strata)	10	Little change for years 0-15 until natural recruitment and rehabilitation achieves >100mm DBH / enters T2 strata)	10	High score attained. Maturing planting and recruitment reaching T1 and T2	10					
	AU2		7.5		7.5		7.5		7.5	10							
	Tree density (per hectare stem count) of all tree species which contribute to the emergent, canopy, and subcanopy layers (i.e. trees which exceed 100mm DBH and therefore can serve as feed and or sitting trees)		AU1	10	Assisted revegetation outcomes are not expected to be reflected in stem count scores at year 5 due to a DBH range of less than 100 mm. No change in score is predicted.	10	Trees <100 mm DBH at baseline, and trees planted as a component of assisted revegetation works are expected to begin to reach and exceed 100 mm DBH at year 10 due to accelerated growth rates in early years. Approximately 10%-20% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	12.5	Trees <100 mm DBH at baseline, and trees planted as a component of assisted revegetation works are expected to reach and exceed 100 mm DBH at year 15 due to accelerated growth rates in early years. An additional 10%-20% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	12.5	Natural and assisted regeneration trees are expected to reach and exceed 100 mm DBH at year 20. An additional 5%-10% of RE stem count average (cumulative T1/T2 average) is predicted to accumulate.	17.5					
	AU2		7.5	7.5		10		10		15							
	Proximity to habitat refugia		AU1	5	Both sites within the Assessment Unit fall between 1,000m and 300 m from a watercourse of stream order 2 and higher. Score will no change over time.							5					
	AU2		5	Both sites within the Assessment Unit fall between 1,000m and 300 m from a watercourse of stream order 2 and higher. Score will no change over time.								5					
	Site Context	Species mobility	Physical barriers - structures / fences / powerlines / services / dams / watercourses	Annual monitoring of performance at each of the four established Baseline BioCondition plots - OMP Figure 4. Key Actions: 3. Fencing, Access and Signage Plan Monitoring of perimeter fencing, signage and monitor for uncontrolled access. Corrective actions as outlined in Section 6.3	AU1	10		No detrimental barriers to Koala movement were identified within the Offset Area at baseline survey. High score is attained, and no change is predicted to occur.							10		
			AU2		10	No detrimental barriers to Koala movement were identified within the Offset Area at baseline survey. High score is attained, and no change is predicted to occur.							10				
Exotic vegetation barriers			AU1	20	No exotic vegetated barriers occur within the Offset Area at baseline survey. High score is attained, and no change is predicted to occur.							20					
AU2			20	No exotic vegetated barriers occur within the Offset Area at baseline survey. High score is attained, and no change is predicted to occur.								20					
Fuel hazard rating				15	A low fuel hazard rating is presumed at year 0 based on the absence of woody weeds and low cover of woody debris and shrubby vegetation. A low fuel hazard rating is presumed to be maintained over the lifetime of the OMP.							15					
Wild/domestic dog activity index				15	Baseline remote camera survey did not detect Wild Dog within the Offset Area. The Offset Area will be monitored and managed to maintain absence / low use. High score is attained at baseline, and as such no score change is predicted.							15					
Evidence of wild dog				15	Baseline site survey did not detect Wild Dog within the Offset Area. The Offset Area will be monitored and managed to maintain absence / low use. High score is attained at baseline, and as such no score change is predicted.							15					
Percentage of site bounded by roads.				7	A semi-rural road traverses close to the eastern boundary of the Offset Area. At year-0, 16-75% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads. In consideration of urban expansion, the relative risk of nearby roads should be monitored at interim performance years. However, change to road conditions is not predicted.							7					
Type of road				15	A semi-rural road traverses close to the eastern boundary of the Offset Area. At year-0 the road is considered to be low traffic and low risk. In consideration of urban expansion, the relative risk of the road should be monitored at interim performance years. However, change to road conditions is not predicted.							15					
Proportion of wooded vegetation				15	Greater than 75% of the site is wooded at year 0. High score is attained.							15					
Size of patch		N/A		10	Patch size is >200 ha, high score is attained at baseline for each AU.							10					
Connectedness		N/A		2	35% of the Offset Area boundary (along the southern boundary) is connected to existing Category A Regulated Vegetation, which is characteristic of wooded Eucalyptus woodland suitable to koala. Change cannot be predicted at time of baseline survey.							2					
Context		N/A		4	51% of area within 1km from the Offset Area boundary is categorised as either Category A, B, or C Regulated Vegetation, which is wooded and suitable to habitat requirements of koala. Change cannot be predicted at time of baseline survey.							4					
Ecological Corridors		N/A		6	The Offset Area is located within an Ecological Corridor. High score is attained at year 0.							6					
Species Stocking Rate		Role of site location to species overall population in the state	N/A	All Aus	5	Habitat on site meets the definition of 'habitat critical to the survival of koala' at year 0. High score of 5 is attained.							5				
	Presence detected on or adjacent to site (neighbouring property with connecting habitat)	N/A		10	Evidence of Koala was detected on site through scratch marks and possible scat. In the interest of adopting a precautionary approach, koala is consider to occur on site.							10					
	Species usage of the site (habitat type & evidenced usage)	N/A		15	Foraging and breeding resources occur on site as regrowth <i>Eucalyptus tereticornis</i> woodland community. Breeding (score 15) is assigned as 'species usage' of the site.							15					
	Approximate density (per ha)	N/A		10	Low density assigned. Koala presence identified through potential scratch and scat evidence. Score uplift is not predicted over the lifetime of the Offset due to the uncertainty involved with predictions based on population dynamics and site utilisation.							10					
	Role/importance of species population on site	N/A	All Aus	(5-15 range)	Supplementary score table result of 5 - assigned as 'key source population for dispersal'. Score uplift is not predicted over the lifetime of the Offset due to the uncertainty involved with predictions based on population dynamics and site utilisation.							5					

Scoring section	Measurable attribute	Management, Monitoring and Interventions	Assessment Unit	Year 0 - Baseline	Year 5		Year 10		Year 15		Year 20	
					Change in attribute score	Potential score uplift	Change in attribute score	Potential score uplift	Change in attribute score	Potential score uplift	Change in attribute score	Potential score uplift
Habitat quality site-based scoring	Vegetation condition (out of 20)	Baseline BioCondition plots – OMP Figure 4. KPI's have been adopted from GHFF MHQA method. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat Creation Implement RMP.	AU1	6.9	BioCondition score progression in accordance with the Site Condition upswing table.	8.6	BioCondition score progression in accordance with the Site Condition upswing table.	12.1	BioCondition score progression in accordance with the Site Condition upswing table.	12.7	BioCondition score progression in accordance with the Site Condition upswing table.	14.6
			AU2	8.9		10.6		12.1		12.7		15.5
	Species richness	Annual monitoring of performance at each of the four established Baseline BioCondition plots – OMP Figure 4. KPI's have been adopted from GHFF MHQA method. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat Creation Implement RMP.	AU1	5	Revegetation efforts within non-remnant areas will be undertaken within 5 years of offset establishment. Habitat benefit are not expected in year 5 as planted species have not entered the upper strata.	5	Revegetation efforts within non-remnant areas will be undertaken within 5 years of offset establishment. Habitat benefit are not expected in year 10 as planted species have not entered the upper strata.	5	Revegetation efforts within non-remnant areas will be undertaken within 5 years of offset establishment. Habitat benefit are not expected in year 15 as planted species have not entered the upper strata.	5	As revegetated species begin to enter the upper strata the species richness score increases.	10
			AU2	5		5		5		5		10
	Flower score	Annual monitoring of performance at each of the four established Baseline BioCondition plots – OMP Figure 4. KPI's have been adopted from GHFF MHQA method. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat Creation Implement RMP.	AU1	8	Minimal change in year 5 as species regenerating and planted are already recognised in high flower score	8	Minimal change in year 10 as species regenerating and planted are already recognised in high flower score	8	Minimal change in year 15 as species regenerating and planted are already recognised in high flower score	8	Minimal change in year 20 as species regenerating and planted are already recognised in high flower score	8
			AU2	8		8		8		8		8
	Timing of biological shortages	Annual monitoring of performance at each of the four established Baseline BioCondition plots – OMP Figure 4. KPI's have been adopted from GHFF MHQA method. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat Creation Implement RMP.	AU1	8.5	Little change in year 5 as there has been no significant winter flowering species entering T1 (strata)	8.5	Little change in year 10 as there has been no significant winter flowering species entering T1 (strata)	8.5	Little change in year 15 as there has been no significant winter flowering species entering T1 (strata)	8.5	Maturing plantings and natural recruitment entering T1 and T2 strata, large tree recruitment beginning.	10
			AU2	8.5		8.5		8.5		8.5		10
	Quality of foraging habitat	Annual monitoring of performance at each of the four established Baseline BioCondition plots – OMP Figure 4. KPI's have been adopted from GHFF MHQA method. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat Creation Implement RMP.	AU1	5	Little change in year 5 as there has been no significant winter flowering species entering T1 (strata)	5	Little change in year 10 as there has been no significant winter flowering species entering T1 (strata)	5	Little change in year 15 as there has been no significant winter flowering species entering T1 (strata)	5	Maturing plantings and natural recruitment entering T1 and T2 strata, large tree recruitment beginning.	5
			AU2	5		5		5		5		5
	Non-native plant cover	Annual monitoring of performance at each of the four established Baseline BioCondition plots – OMP Figure 4. KPI's have been adopted from GHFF MHQA method. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat Creation Implement RMP.	AU1	3	Non native plant cover is reduced to 25% through management practices.	3	Non native plant cover is reduced to 15% through management practices.	3	Non native plant cover remains at <10% through management practices.	10	Non native plant cover is reduced to less than 5% through management practices.	20
			AU2	4		5		4		10		20
Habitat quality site-context attributes	Size of patch	N/A		10	This attribute already scores the maximum score with >200 ha size of patch.						10	
	Connectedness	N/A		10	This attribute already scores the maximum score with 10 active GHFF camps within 20 km of the site since 2021.						10	
	Context	N/A	All AUS	3	This attribute cannot be improved through management actions. The site scores 3, which correlates to 26% of potential foraging habitat within 20 km of the Offset Site. Foraging habitat is considered to be all remnant vegetation of either Regulated Vegetation Category A, B or C status.						3	
	Ecological corridors	N/A		10	This attribute already scores the maximum score as the Offset site is located within a state and regional corridor.						10	
	Rate of site location to species overall population in the state	N/A		1	This attribute cannot be improved through offset management actions.						1	
Threats	Fuel hazard rating	Annual monitoring of performance at each of the four established Baseline BioCondition plots – OMP Figure 4. KPI's have been adopted from GHFF MHQA method. Key Actions: 2. Biosecurity Management Plan 3. Fencing, Access and Signage Plan 4. Fire Management Plan 5. Revegetation and Habitat Creation Implement RMP.		15	A low fuel hazard rating is presumed at year 0 based on the absence of woody weeds and low cover of woody debris and shrubby vegetation. A low fuel hazard rating is presumed to be maintained over the lifetime of the OMP.						15	
	Presence of top-strand barbed-wire fencing or similar		All AUS	7	All fencing surrounding the Offset Area / property will be replaced in accordance with the OMP to be fauna friendly, and contain smooth top and bottom strand wire.						15	
	Presence of powerlines			7	Presence of powerlines in the area cannot be changed.						7	
	Proportion of wooded vegetation			15	Greater than 75% of the site is wooded at year 0. High score is attained.						15	
Species stocking rate	GFF foraging tree density - per hectare	Annual monitoring of performance at each of the four established Baseline BioCondition plots – OMP Figure 4. KPI's have been adopted from GHFF MHQA method. Key Actions: 2. Biosecurity Management Plan 4. Fire Management Plan 5. Revegetation and Habitat Creation Implement RMP.	AU1	2	Assisted revegetation outcomes are unlikely to be reflected in stem count scores for GHFF. Existing stems at baseline are unlikely to have experienced enough growth between years 0 and 10 due to time required to reach 300 mm DBH. No change in score is predicted until year 15.			2	Some baseline trees between stem range of 100-300 mm DBH are expected to reach and exceed 2300 mm DBH.	3	Some baseline trees between stem range of 100-300 mm DBH are expected to reach and exceed 2300 mm DBH.	4
		AU2	2	2				4		4		

Attachment 7 – MHQA Baseline to Year 20, Koala

Assessment Unit - Regional Ecosystem		AU1 - Non-rem - 12.3.3								AU 2 - HVR 12.3.3								Total average % benchmark	Total average score				
Site Reference	Benchmark 12.3.3	BC06			BC08			Average % benchmark	Average Score	Benchmark 12.3.3	BC05			BC07			Average % benchmark			Average Score			
		Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score							
Site Condition																							
Recruitment of woody perennial species in EDL	100	100	100%	5.0	100	100%	5.0	100%	5.0	100	0	0%	0.0	100	100%	5.0	50%	2.5	75%	3.8			
Native plant species richness - trees	5	1	20%	0.0	2	40%	2.5	30%	1.3	5	1	20%	0.0	2	40%	2.5	30%	1.3	30%	1.3			
Native plant species richness - shrubs	5	1	20%	0.0	2	40%	2.5	30%	1.3	5	3	60%	2.5	2	40%	2.5	50%	2.5	40%	1.9			
Native plant species richness - grasses	9	2	22%	0.0	2	22%	0.0	22%	0.0	9	4	44%	2.5	6	67%	2.5	56%	2.5	39%	1.3			
Native plant species richness - forbes	25	8	32%	2.5	13	52%	2.5	42%	2.5	25	19	76%	2.5	17	68%	2.5	72%	2.5	57%	2.5			
Tree canopy height (average of emergent, canopy, sub-canopy)	17	10.5	62%	3.0	16	94%	5.0	78%	4.0	17	18	106%	5.0	18.75	110%	5.0	108%	5.0	93%	4.5			
Tree canopy cover (average of emergent, canopy, sub-canopy)	24	5.1	21%	2.0	7.5	31%	2.0	26%	2.0	24	16.45	69%	5.0	18	75%	5.0	72%	5.0	49%	3.5			
Shrub canopy cover	4	2	50%	3.0	0	0%	0.0	25%	1.5	4	0	0%	0.0	11.5	288%	3.0	144%	1.5	84%	1.5			
Native grass cover	52	1	2%	0.0	0	0%	0.0	1%	0.0	52	27.6	53%	3.0	0	0%	0.0	27%	1.5	14%	0.8			
Organic litter	20	11	55%	5.0	25.4	127%	5.0	91%	5.0	20	13.4	67%	5.0	15	75%	5.0	71%	5.0	81%	5.0			
Large trees (euc plus non-euc)	14	2	14%	5.0	0	0%	0.0	7%	0.0	14	0	0%	0.0	4	29%	5.0	14%	2.5	11%	2.5			
Coarse woody debris	588	0	0%	0.0	0	0%	0.0	0%	0.0	588	0	0%	0.0	120	20%	2.0	10%	1.0	5%	0.5			
Non-native plant cover	0	70	70%	0.0	50	50%	3.0	60%	1.5	0	50	50%	3.0	50	50%	3.0	50%	3.0	55%	2.3			
Quality and availability of food and foraging habitat	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0	28%	5.0			
Quality and availability of shelter	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0	28%	5.0			
Site Condition Score				35.5					37.5	36.5				38.5				53				41.1	
MAX Site Condition Score				100					100	100				100				100				100	
Site Condition Score - out of 3				1.07					1.13	1.10				1.16				1.59				1.23	
Site Context																							
Size of patch	10			10			10		10.0	10	>200 ha		10			10	10	10.0	10	10.0			
Connectedness	5			2			2		2.0	5	0.35%		2			2	2	2.0	2	2.0			
Context	5			4			4		4.0	5	0.51%		4			4	4	4.0	4	4.0			
Ecological Corridors	6			6			6		6.0	6	within		6			6	6	6.0	6	6.0			
Role of site location to species overall population in the state	5			5			5		5.0	5	at critical due to breeding.		5			5	5	5.0	5	5.0			
Threats to the species	15			15			15		15.0	15	low/level threats		15			15	15	15.0	15	15.0			
Species mobility capacity	10			10.00			10.00		10.0	10	Minimal barriers		10.00			10.00	10	10.0	10	10.0			
Site Context Score				52					52	52				52				52.0					
MAX Site Context Score				56					56	56				56				56					
Site Context Score - out of 3				2.79					2.79	2.79				2.79				2.79					
Habitat Quality																							
Quality and availability of food and foraging habitat																							
Proportion of canopy cover of LIKT trees within the 100x50 meter BioCondition plot	20		1.00	20.00		1.00	20.00		20.00	20		1.00	20.00		1.00	20.00		20.00		20.00			
Forage tree species richness (LIKTs as per Youngentob et al., 2022) (Only trees >100 DBH)	10		1.00	5.00		1.00	5.00		5.00	10		1.00	5.00		1.00	5.00		5.00		5.00			
Tree density (per hectare stem count) of LIKT species	20		0.06	5.00		0.27	10.00		7.50	20		0.50	10.00		0.01	5.00		7.50		7.50			
Recruitment of LIKT species only (% of total LIKT within plot)	10		1.00	10.00		1.00	10.00		10.00	10		1.00	10.00		1.00	10.00		10.00		10.00			
Total Score	60			40.00			45.00		42.50	60			45.00			40.00		42.50		42.50			
% of total score				66.67			75.00		70.83				75.00			66.67		70.83		70.83			
scaled score				5.00			5.00		5.00				5.00			5.00		5.00		5.00			
Quality and availability of shelter																							
presence of preferred ancillary trees (listed in Youngentob et al.)	10		0.00	0.00		0.00	0.00		0.00	10		0.00	0.00		1.00	1.00		0.50		0.25			
Canopy cover of all trees within the 100x50 meter BioCondition plot	20		0.21	5.00		0.31	10.00		7.50	20		0.69	15.00		0.75	15.00		15.00		11.25			
Recruitment of all Forage/Shelter tree species (% of total tree species diversity)	10		1.00	10.00		1.00	10.00		10.00	10		1.00	10.00		0.50	5.00		7.50		8.75			
Tree density (per hectare stem count) of all trees >100 mm DBH	20		0.06	5.00		0.27	10.00		7.50	20		0.50	10.00		0.14	5.00		7.50		7.50			
Proximity to habitat refugia	10		5.00	5.00		5.00	5.00		5.00	10		5.00	5.00		5.00	5.00		5.00		5.00			
Total Score	70			25.00			35.00		30.00	70			40.00			31.00		35.50		32.75			
% of total score				35.71			50.00		42.86				57.14			44.29		50.71		46.79			
scaled score				5.00			5.00		5.00				5.00			5.00		5.00		5.00			
Species mobility																							
Physical barriers – structures / fences / powerlines / services / dams / waterways	10		Low	10.00		Low	10.00		10.00	10		Low	10.00		Low	10.00		10.00		10.00			
Exotic vegetation barriers	20		0.00	20.00		0.00	20.00		20.00	20		0.00	20.00		0.00	20.00		20.00		20.00			
MAX Score	30			30.00			30.00		30.00	30			30.00			30.00		30.00		30.00			
% of total score				100.00			100.00		100.00				100.00			100.00		100.00		100.00			
scaled score				10.00			10.00		10.00				10.00			10.00		10.00		10.00			

Species Stocking Rate (SSR)	Score	0	5	10	Matter Area
Presence detected on or adjacent to site (neighbouring property with connecting habitat)		No	Yes - adjacent	Yes - on site	10
Species usage of the site (habitat type & evidenced usage)		0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)		0	10	20	30
		0%	low	medium	high
Predictions pertaining to species' population within the Offset Area is Role/importance of species population on siteChange in attribute score	Score (Total from supplementary table below)	0	5	10	15
		0	5 - 15	20 - 35	40 - 45
Total SRR score (out of 70)					40
SRR Score (out of 4)					2.29

*SSR Supplementary Table	Score	0	10	Matter area
*Key source population for breeding		No	Yes/ Possibly	0
*Key source population for dispersal		0	5	5
		No	Yes/ Possibly	
*Necessary for maintaining genetic diversity		0	15	0
		No	Yes/ Possibly	
*Near the limit of the species range		0	15	0
		No	Yes	
Total for SSR Supplementary Table				5

Final habitat quality score (weighted)	AU1	AU2	Average/ Final
Site Condition score (out of 3)	1.10	1.37	1.23
Site Context Score (out of 3)	2.79	2.79	2.79
Species Stocking Rate Score (out of 4)	2.29	2.29	2.29
Habitat Quality score (out of 10)	6.17	6.44	6.31
Assessment Unit area (ha)	5.84	11.84	17.68
Total offset area (ha) for this MNES	17.68	17.68	17.68
Size Weighting	0.33	0.67	1.00
Weighted Habitat Quality Score	2.04	4.32	6.35

Site	SAT Results
BC05	N/A
BC07	0
BC06	N/A
BC08	N/A

Koala occupancy is presumed to be low based on absence of scat evidence. Scratch marks and possible scat suggest koala do utilise the habitat. Previous survey observed koala and back young. In the interest of adopting a precautionary approach, koala is consider to occur on site.

Supplementary table for threats scoring			Score			Result		Final result
Listed threatening process	Scoring indicator	Score weighting	1	7	15	Score	Average / Weighted score	
Altered fire regimes	Fuel hazard rating	30%	Extreme or Very High fuel hazard rating	Moderate or High fuel hazard rating	Low fuel hazard rating	15	4.5	14.4
Mortality from dogs	Wild/domestic dog activity index		An activity index score of very high or high	An activity index score of low or medium	An activity index score of absent or very low	15		
	Evidence of wild dog	15%	Traces of dogs detected through scats and/or tracks	Anecdotal evidence (i.e. landholder and/or local community discussion)	No traces of wild dog are detected on site / no anecdotal evidence	15	2.25	
Mortality from vehicles	Percentage of site bounded by roads.		>75% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads	16-75% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads.	<15% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads.	7		
	Type of road	15%	Highway / motorway / high traffic	Street / main road / moderate traffic and/or busy during peak hour	Unsealed / low and/or occasional traffic	15	1.65	
Habitat loss, fragmentation, and degradation	Proportion of wooded vegetation	40%	0-25% wooded vegetation occupies the site	26-75% wooded vegetation occupies the site	>75% wooded vegetation occupies the site	15	6	
	Threats score out of 15							
Scaled score (1-5=1; 6-10=7; 11-15=15)								15

Thagoona North Offset - Landscape Scoring

AU	Patch size		Connectedness		Context		Ecological corridors	
	area	score	area	score	area	score	result	score
1	>200 ha	10	0.35	2	0.51	4	Within (whole or part)	6
2	>200 ha	10	0.35	2	0.51	4	Within (whole or part)	6

BASELINE

Thagoona North Offset - Koala - stem counts for Habitat Quality scoring

REDD Technical- Description stem count	RE	12.3.3
	T1	115
	T2	160
	Sum of average stem counts for combined T1/T2 layer	275
	10% of TD average	27.5

LIKt stem counts - foraging tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	0	30	0	18	70	6
	total stems per ha	138		30		18		76	
	% of TD total	50.18		10.91		6.55		27.64	

Averages
AU2 AU1

84.00 47.00
30.55 17.09

All tree stem counts - shelter tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	0	30	0	18	70	6
	Blakella tessellaris				10				
	total stems per ha	138		40		18		76	
	% of TD average	50.18		14.55		6.55		27.64	

89.00 47.00
32.36 17.09

Year 5									
LIK T stem counts - foraging tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	0	30	0	18	70	6
	total stems per ha	138		30		18		76	
	% of TD total	50.18		10.91		6.55		27.64	

assissted regen species are not expected to exceed 100 mm DBH by year 5.

84.00 47.00
30.55 17.09

All tree stem counts - shelter tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	0	30	0	18	70	6
	Blakella tessellaris				10				
	total stems per ha	138		40		18		76	
	% of TD average	50.18		14.55		6.55		27.64	

89.00 47.00
32.36 17.09

Year 10									
LIK T stem counts - foraging tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	30	30	27	18	70	6
	Eucalyptus crebra	20		9		20		20	
	total stems per ha	158		69		65		96	
	% of TD total	57.45		25.09		23.64		34.91	

assissted regen species should be exceeding 100 mm DBH by year 10.
10-20% of stem count is estimated to have accumulated.

113.50 80.50
41.27 29.27

All tree stem counts - shelter tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	30	30	27	18	70	6
	Blakella tessellaris	2		1	10	2		2	
	Eucalyptus crebra	20		7		20		20	
	Corymbia intermedia	3		1		3		3	
	other species.	2		2		2		2	
	total stems per ha	165		81		72		103	
	% of TD average	60.00		29.45		26.18		37.45	

123.00 87.50
44.73 31.82

Year 15									
LIK T stem counts - foraging tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	60	30	54	18	70	6
	Eucalyptus crebra	40		15		40		40	
	total stems per ha	178		105		112		116	
	% of TD total	64.73		38.18		40.73		42.18	

assissted regen species should occur between 100 and 300 mm DBH.
another 10-20% of stem count is estimated to have accumulated.

141.50 114.00
51.45 41.45

All tree stem counts - shelter tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	60	30	54	18	70	6
	Blakella tessellaris	4		4	10	4		4	
	Eucalyptus crebra	40		13		40		40	
	Corymbia intermedia	8		2		8		8	
	other species.	2		2		2		2	
	total stems per ha	192		121		126		130	
	% of TD average	69.82		44.00		45.82		47.27	

156.50 128.00
56.91 46.55

Year 20									
LIK T stem counts - foraging tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	64	45	80	29	74	6
	Eucalyptus crebra	40	20	15	15	40	20	40	20
	total stems per ha	198		139		169		140	
	% of TD total	72.00		50.55		61.45		50.91	

assissted regen species may begin to exceed 300 mm DBH
5-10% of stem count is estimated to have accumulated.

168.50 154.50
61.27 56.18

All tree stem counts - shelter tree scoring	Assessment Units (AU)	AU2		AU2		AU1		AU1	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	64	45	80	29	74	6
	Blakella tessellaris	4	1	4	10	4	1	4	1
	Eucalyptus crebra	40	20	13	15	40	20	40	20
	Corymbia intermedia	8	2	2	1	8	2	8	2
	other species.	2		2		2		2	
	total stems per ha	215		156		186		157	
	% of TD average	78.18		56.73		67.64		57.09	

185.50 171.50
67.45 62.36

Year 0					
year 0 Large tree predictions	Assessment Units (AU)	AU2		AU1	
	BioCondition Transect	BC05	BC07	BC06	BC08
	Equivalent Regional Ecosystem	12.3.3	12.3.3	12.3.3	12.3.3
	Eucalyptus large tree DBH	540			
		340,360,490,470,330,390,310,510,		410,410,470,310,220,440,380,530,56	
		390,300,340,480,510,350,460,370,	500,360,250,250,410,400,330,1345	5,460	520,530, 410,380,250
		350,440,330,390,390,330,350,350,	390,370,250,360,470,825,450,410,		
	Eucalyptus tereticornis	380,320,320,390,420	220,420,480,180		
	New large trees	0	0	0	0
	Total large trees	0	2	1	0
	Total large trees per hectare (*2)	0	4	2	0

Year 5					
year 5 Large tree predictions	Assessment Units (AU)	AU2		AU1	
	BioCondition Transect	BC05	BC07	BC06	BC08
	Equivalent Regional Ecosystem	12.3.3	12.3.3	12.3.3	12.3.3
	Eucalyptus large tree DBH	540			
		340,360,490,470,330,390,310,520,		410,410,470,310,220,440,380,540,56	
		390,300,340,480,520,350,460,370,	510,360,250,250,410,400,330,1345	5,460	530,540,410,380,250
		350,440,330,390,390,330,350,350,	390,370,250,360,470,825,450,410,		
	Eucalyptus tereticornis	380,320,320,390,420	220,420,480,180		
	New large trees	0	0	1	1
	Total large trees	0	2	2	1
	Total large trees per hectare (*2)	0	4	4	2

Year 10					
year 10 Large tree predictions	Assessment Units (AU)	AU2		AU1	
	BioCondition Transect	BC05	BC07	BC06	BC08
	Equivalent Regional Ecosystem	12.3.3	12.3.3	12.3.3	12.3.3
	Eucalyptus large tree DBH	540			
		340,360,490,470,330,390,310,530,		410,410,470,310,220,440,380,540,56	
		390,300,340,480,530,350,460,370,	520,360,250,250,410,400,330,1345	5,460	540,540,410,380,250
		350,440,330,390,390,330,350,350,	390,370,250,360,470,825,450,410,		
	Eucalyptus tereticornis	380,320,320,390,420	220,420,480,180		
	New large trees	0	0	0	1
	Total large trees	0	2	2	2
	Total large trees per hectare (*2)	0	4	4	4

Year 15					
year 15 Large tree predictions	Assessment Units (AU)	AU2		AU1	
	BioCondition Transect	BC05	BC07	BC06	BC08
	Equivalent Regional Ecosystem	12.3.3	12.3.3	12.3.3	12.3.3
	Eucalyptus large tree DBH	540			
		340,360,490,470,330,390,310,540,		410,410,470,310,220,440,380,540,56	
		390,300,340,480,540,350,460,370,	530,360,250,250,410,400,330,1345	5,460	540,540,410,380,250
		350,440,330,390,390,330,350,350,	390,370,250,360,470,825,450,410,		
	Eucalyptus tereticornis	380,320,320,390,420	220,420,480,180		
	New large trees	2	0	0	0
	Total large trees	2	2	2	2
	Total large trees per hectare (*2)	4	4	4	4

Year 20					
yr 20 Large tree predictions	Assessment Units (AU)	AU2		AU1	
	BioCondition Transect	BC05	BC07	BC06	BC08
	Equivalent Regional Ecosystem	12.3.3	12.3.3	12.3.3	12.3.3
	Eucalyptus large tree DBH	540			
		340,360,490,470,330,390,310,540,		410,410,470,310,220,440,380,540,56	
		390,300,340,480,540,350,460,370,	540,360,250,250,410,400,330,1345	5,460	540,540,410,380,250
		350,440,330,390,390,330,350,350,	390,370,250,360,470,825,450,410,		
	Eucalyptus tereticornis	380,320,320,390,420	220,420,480,180		
	New large trees	0	1	0	0
	Total large trees	2	3	2	2
	Total large trees per hectare (*2)	4	6	4	4

An estimated annual diameter growth rate of **0.2 cm/year** was adopted for *Eucalyptus tereticornis* as a conservative assumption for south-east Queensland conditions. This estimate is supported by the long-term growth analysis of Ngugi et al. (2015), who quantified diameter increments from over 86,000 trees monitored across subtropical Queensland over a 75-year period. The study found that 94% of annual diameter increments in native forests ranged between 0.01 and 0.50 cm/year, with growth varying according to species, rainfall and stem diameter class. *Eucalyptus tereticornis* was identified as one of the species exhibiting increased diameter growth with increasing mean annual rainfall across the study gradient (approximately 500–2,000 mm/year), consistent with the rainfall conditions typical of south-east Queensland. Although growth rates in favourable environments may exceed 0.2 cm/year, the adopted value lies toward the lower end of the observed range for the species and is therefore considered an appropriately conservative estimate for modelling long-term habitat development within native forest restoration contexts.

An annual growth rate of 0.2cm is applied. A total of 40 mm of growth will result over the 20 year offset period. To achieve and exceed a benchmark value of 540 mm DBH, only trees of 500 mm and greater are captured in large tree upswing predictions.

Assessment Unit - Regional Ecosystem		AU1-Non-rem - 12.3.3										AU 2 - HVR 12.3.3										Total average % benchmark	Total average score
Site Reference	Benchmark 12.3.3	BC06			BC08			Average % benchmark	Average Score	Benchmark 12.3.3	BC05			BC07			Average % benchmark	Average Score					
Site Condition		Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score			Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score								
Recruitment of woody perennial species in EDL	100	100	100%	5.0	100	100%	5.0	100%	5.0	100	33	33%	3.0	100	100%	5.0	67%	4.0					
Native plant species richness - trees	5	1	20%	0.0	2	40%	2.5	30%	1.3	5	1	20%	0.0	2	40%	2.5	30%	1.3					
Native plant species richness - shrubs	5	1	20%	0.0	2	40%	2.5	30%	1.3	5	3	60%	2.5	2	40%	2.5	50%	2.5					
Native plant species richness - grasses	9	3	33%	2.5	3	33%	2.5	33%	2.5	9	5	56%	2.5	7	78%	2.5	67%	2.5					
Native plant species richness - forbes	25	12	48%	2.5	17	68%	2.5	58%	2.5	25	21	84%	2.5	19	76%	2.5	80%	2.5					
Tree canopy height (average of emergent, canopy, sub-canopy)	17	11	65%	3.0	16	94%	5.0	79%	4.0	17	18	106%	5.0	18.75	110%	5.0	108%	5.0					
Tree canopy cover (average of emergent, canopy, sub-canopy)	24	5.1	21%	2.0	7.5	31%	2.0	26%	2.0	24	16.45	69%	5.0	18	75%	5.0	72%	5.0					
Shrub canopy cover	4	7	175%	5.0	5	125%	5.0	150%	5.0	4	5	125%	5.0	14	350%	3.0	238%	4.0					
Native grass cover	52	11	21%	1.0	10	19%	1.0	20%	1.0	52	37.6	72%	3.0	10	19%	1.0	46%	2.0					
Organic litter	20	11	55%	5.0	25.4	127%	5.0	91%	5.0	20	13.4	67%	5.0	15	75%	5.0	71%	5.0					
Large trees (euc plus non-euc)	14	4	29%	5.0	2	14%	5.0	21%	5.0	14	0	0%	0.0	4	29%	5.0	14%	2.5					
Coarse woody debris	588	0	0%	0.0	0	0%	0.0	0%	0.0	588	0	0%	0.0	120	20%	2.0	10%	1.0					
Non-native plant cover	0	25	25%	5.0	25	25%	5.0	25%	5.0	0	25	25%	5.0	25	25%	5.0	25%	5.0					
Quality and availability of food and foraging habitat	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0					
Quality and availability of shelter	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0					
Site Condition Score				46			53		49.5				48.5			56		52.3					
MAX Site Condition Score				100			100		100				100			100		100					
Site Condition Score - out of 3				1.38			1.59		1.49				1.46			1.68		1.57					
Site Context																							
Size of patch	10			10			10		10.0	10	>200 ha		10			10	10	10.0					
Connectedness	5			2			2		2.0	5	0.35%		2			2	2	2.0					
Context	5			4			4		4.0	5	0.51%		4			4	4	4.0					
Ecological Corridors	6			6			6		6.0	6	within		6			6	6	6.0					
Role of site location to species overall population in the state	5			5			5		5.0	5	critical due to breeding.		5			5	5	5.0					
Threats to the species	15			15			15		15.0	15	Low level threats		15			15	15	15.0					
Species mobility capacity	10			10.00			10.00		10.0	10	Minimal barriers		10.00			10.00	10	10.0					
Site Context Score				52			52		52.0				52			52		52.0					
MAX Site Context Score				56			56		56				56			56		56					
Site Context Score - out of 3				2.79			2.79		2.79				2.79			2.79		2.79					
Habitat Quality																							
Quality and availability of food and foraging habitat																							
Proportion of canopy cover of LIKT trees within the 100x50 meter BioCondition plot	20			1.00			1.00		20.00	20			1.00			1.00		20.00					
Forage tree species richness (LIKTs as per Youngentob et al., 2022)	10			1.00			5.00		5.00	10			1.00			5.00		5.00					
(Only trees >100 DBH)	20			0.06			5.00		0.27	10.00			0.50			10.00		7.50					
Tree density (per hectare stem count) of LIKT species	10			1.00			10.00		10.00	10			1.00			10.00		10.00					
Recruitment of LIKT species only (% of total LIKT within plot)	60			40.00			45.00		42.50	60			45.00			40.00		42.50					
Total Score				66.67			75.00		70.83				75.00			66.67		70.83					
% of total score				5.00			5.00		5.00				5.00			5.00		5.00					
scaled score																							
Quality and availability of shelter																							
presence of preferred ancillary trees (listed in Youngentob et al.)	10			0.00			0.00		0.00	10			0.00			1.00		0.50					
Canopy cover of all trees within the 100x50 meter BioCondition plot	20			0.21			0.31		10.00	20			0.69			15.00		11.25					
Recruitment of all Forage/Shelter tree species (% of total tree species d	10			1.00			10.00		10.00	10			1.00			10.00		7.50					
Tree density (per hectare stem count) of all trees >100 mm DBH	20			0.06			5.00		0.27	10.00			0.50			10.00		7.50					
Proximity to habitat refugia	10			5.00			5.00		5.00	10			5.00			5.00		5.00					
Total Score	70			35.00			35.00		30.00	70			40.00			31.00		32.75					
% of total score				35.71			50.00		42.86				57.14			44.29		46.79					
scaled score				5.00			5.00		5.00				5.00			5.00		5.00					
Species mobility																							
Physical barriers – structures / fences / powerlines / services / dams / v	10			Low			10.00		10.00	10			Low			10.00		10.00					
Exotic vegetation barriers	20			0.00			0.00		20.00	20			0.00			20.00		20.00					
MAX Score	30			30.00			30.00		20.00	30			30.00			30.00		30.00					
% of total score				100.00			100.00		66.67				100.00			100.00		100.00					
scaled score				10.00			10.00		7.00				10.00			10.00		10.00					

logic

assumed full planting - although not yet reflected in scores.
assumed full planting - although not yet reflected in scores.

assisted revegetation will plant native stock to meet benchmark values native to the area and RE. - not yet reflected

assisted revegetation will plant native stock (or spread seed) to meet benchmark values native to the area and RE. One-
two new native grass species are expected to accumulate each interim performance target year.
Native forbs are expected to regenerate naturally over time, especially following good rain years. Estimated at 2-5 new
species each assessment interval.
Tree canopy height is expected to increase over time. Conservative estimate of 50 cm of growth is expected at each
vegetation survey year (every 5 years), until benchmark value is attained.

no change expected at year 5.
assumed full planting - higher shrub cover due to regrowth. No growth estimates of shrubs are made due to regrowth
condition and subsequent inflation of shrub layer raw values. However, reduction in shrub cover at BC07 by
approximately 2 metres each interim performance year is estimated. This accounts for the progression of regrowth into
T1 and T2 layers, resulting in a presumed thinning of shrub raw values.
Expected gradual increase in raw data between each vegetation survey year. Especially following weed management
actions. A 10% increase in estimated at year 5.
potential increase in raw data. Not estimated as benchmark value is already attained at baseline.

up to 2 large trees are predicted to accumulate, based on BioCondition data collected at baseline. See large tree tab.
no predicted change at year 5
reduced to less than 25%.
no meaningful change predicted change at year 5
no meaningful change predicted change at year 5

will not change.
will not change.
will not change.
will not change.
high score already attained
change predicted at year 20.
high score already attained

will not change.

Species Stocking Rate (SSR)	Score	0	5	10	Matter Area
Presence detected on or adjacent to site (neighbouring property with connecting habitat)		No	Yes - adjacent	Yes - on site	10
Species usage of the site (habitat type & evidenced usage)		0	5	10	15
		Not habitat	Dispersal	Foraging	
		Not habitat	Dispersal	Foraging	
Approximate density (per ha)		0	10	20	30
		0%	low	medium	high
Role/importance of species population on site*	Score (Total from supplementary table below)	0	5	10	15
		0	5 - 15	20 - 35	40 - 45
Total SSR score (out of 70)					40
SSRR Score (out of 4)					2.3

Site	SAT Results
BC05	N/A
BC07	0
BC06	N/A
BC08	N/A

Koala occupancy is presumed to be low based on absence of scat evidence. Scratch marks and possible scat suggest koala do utilise the habitat. Previous survey observed koala and back young. In the interest of adopting a precautionary approach, koala is consider to occur on site.

Supplementary table for threats scoring			Score			Result		Final result
Listed threatening regimes	Scoring indicator	Score weighting	1	7	15	Score	Average / Weighted score	
Altered fire regimes	Fuel hazard rating	30%	Extreme or Very High fuel hazard rating	Moderate or High fuel hazard rating	Low fuel hazard rating	15	4.5	
Mortality from dogs	Wild/domestic dog activity index		An activity index score of very high or high	An activity index score of low or medium	An activity index score of absent or very low	15		
	Evidence of wild dog	15%	Traces of dogs detected through scats and/or tracks	Anecdotal evidence (i.e. landholder and/or local community disclosure)	No traces of wild dog are detected on site / no anecdotal evidence	15	2.25	
Mortality from vehicles	Percentage of site bounded by roads.		>75% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads	16-75% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads.	<15% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads.	7		
	Type of road	15%	Highway / motorway / high traffic	Street / main road / moderate traffic and/or busy during peak hour	Unsealed / low and/or occasional traffic	15	1.65	
Habitat loss, fragmentation, and degradation	Proportion of wooded vegetation	40%	0-25% wooded vegetation occupies the site	26-75% wooded vegetation occupies the site	>75% wooded vegetation occupies the site	15	6	
Threats score out of 15						15		14.4
Scaled score (1-5=1; 6-10=7; 11-15=15)								15

*SSR Supplementary Table	Score	0	10	Matter area
*Key source population for breeding		No	Yes/ Possibly	0
*Key source population for dispersal		0	5	5
		No	Yes/ Possibly	
*Necessary for maintaining genetic diversity		0	15	0
		No	Yes/ Possibly	
*Near the limit of the species range		0	15	0
		No	Yes	
Total for SSR Supplementary Table				5

Final habitat quality score (weighted)	AU1	AU2	Average/ Final
Site Condition score (out of 3)	1.49	1.57	1.53
Site Context Score (out of 3)	2.79	2.79	2.79
Species Stocking Rate Score (out of 4)	2.29	2.29	2.29
Habitat Quality score (out of 10)	6.56	6.64	6.60
Assessment Unit area (ha)	5.84	11.84	17.68
Total offset area (ha) for this MNES	17.68	17.68	17.68
Size Weighting	0.33	0.67	1.00
Weighted Habitat Quality Score	2.17	4.45	6.61

Cell linked

Assessment Unit - Regional Ecosystem		AU1 - Non-rem - 12.3.3										AU 2 - HVR 12.3.3										Total average % benchmark	Total average score
Site Reference	Benchmark 12.3.3	BC06		Score	BC08		Score	Average % benchmark	Average Score	Benchmark 12.3.3	BC05		Score	BC07		Score	Average % benchmark	Average Score					
Site Condition		Raw Data	% Benchmark		Raw Data	% Benchmark					Raw Data	% Benchmark		Raw Data	% Benchmark								
Recruitment of woody perennial species in EDL	100	100	100%	5.0	100	100%	5.0	100%	5.0	100	33	33%	3.0	100	100%	5.0	67%	4.0					
Native plant species richness - trees	5	5	100%	5.0	5	100%	5.0	100%	5.0	5	5	100%	5.0	5	100%	5.0	100%	5.0					
Native plant species richness - shrubs	5	5	100%	5.0	5	100%	5.0	100%	5.0	5	5	100%	5.0	5	100%	5.0	100%	5.0					
Native plant species richness - grasses	9	5	56%	2.5	5	56%	2.5	56%	2.5	9	6	67%	2.5	8	89%	2.5	78%	2.5					
Native plant species richness - forbes	25	16	64%	2.5	21	84%	2.5	74%	2.5	25	23	92%	5.0	21	84%	2.5	88%	3.8					
Tree canopy height (average of emergent, canopy, sub-canopy)	17	11.5	68%	3.0	16	94%	5.0	81%	4.0	17	18	106%	5.0	18.75	110%	5.0	108%	5.0					
Tree canopy cover (average of emergent, canopy, sub-canopy)	24	7.1	30%	2.0	12.5	52%	5.0	41%	3.5	24	16.45	69%	5.0	18	75%	5.0	72%	5.0					
Shrub canopy cover	4	7	175%	5.0	5	125%	5.0	150%	5.0	4	5	125%	5.0	12	300%	3.0	213%	4.0					
Native grass cover	52	21	40%	1.0	20	38%	1.0	39%	1.0	52	47	90%	5.0	20	38%	1.0	64%	3.0					
Organic litter	20	11	55%	5.0	25.4	127%	5.0	91%	5.0	20	13.4	67%	5.0	15	75%	5.0	71%	5.0					
Large trees (euc plus non-euc)	14	4	29%	5.0	4	29%	5.0	29%	5.0	14	0	0%	0.0	4	29%	5.0	14%	2.5					
Coarse woody debris	588	0	0%	0.0	0	0%	0.0	0%	0.0	588	0	0%	0.0	120	20%	2.0	10%	1.0					
Non-native plant cover	0	15	15%	5.0	15	15%	5.0	15%	5.0	0	15	15%	5.0	15	15%	5.0	15%	5.0					
Quality and availability of food and foraging habitat	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0	10	10.00	10%	10.0	5.00	50%	5.0	30%	7.5					
Quality and availability of shelter	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0					
Site Condition Score				56			61	58.5					65.5			61	63.3						
MAX Site Condition Score				100			100	100					100			100	100						
Site Condition Score - out of 3				1.68			1.83	1.76					1.97			1.83	1.90						
Site Context																							
Size of patch	10			10			10	10.0	10		>200 ha		10			10	10.0	10					
Connectedness	5			2			2	2.0	5		0.35%		2			2	2.0	2					
Context	5			4			4	4.0	5		0.51%		4			4	4.0	4					
Ecological Corridors	6			6			6	6.0	6		within		6			6	6.0	6					
Role of site location to species overall population in the state	5			5			5	5.0	5		critical due to breeding.		5			5	5.0	5					
Threats to the species	15			15			15	15.0	15		Low level threats		15			15	15.0	15					
Species mobility capacity	10			10.00			10.00	10.0	10		Minimal barriers		10.00			10.00	10.0	10					
Site Context Score				52			52	52.0					52			52	52.0						
MAX Site Context Score				56			56	56					56			56	56						
Site Context Score - out of 3				2.79			2.79	2.79					2.79			2.79	2.79						
Habitat Quality																							
Quality and availability of food and foraging habitat																							
Proportion of canopy cover of LUKT trees within the 100x50 meter BioCondition plot	20			1.00	20.00		1.00	20.00	20.00	20			1.00	20.00		1.00	20.00	20.00					
Forage tree species richness (LUKTs as per Youngentob et al., 2022) (Only trees >100 DBH)	10			1.00	5.00		1.00	5.00	5.00	10			1.00	5.00		1.00	5.00	5.00					
Tree density (per hectare stem count) of LUKT species	20			0.23	5.00		0.34	10.00	7.50	20			0.57	15.00		0.25	5.00	10.00					
Recruitment of LUKT species only (% of total LUKT within plot)	10			1.00	10.00		1.00	10.00	10.00	10			1.00	10.00		1.00	10.00	10.00					
Total Score	60			40.00			45.00	42.50	60				50.00			40.00	43.75	43.75					
% of total score				66.67			75.00	70.83					83.33			66.67	75.00	72.92					
scaled score				5.00			5.00	5.00					10.00			5.00	5.00	5.00					
Quality and availability of shelter																							
presence of preferred ancillary trees (listed in Youngentob et al.)	10			0.00	0.00		0.00	0.00	0.00	10			0.00	0.00		1.00	1.00	0.50					
Canopy cover of all trees within the 100x50 meter BioCondition plot	20			0.30	5.00		0.52	15.00	10.00	20			0.69	15.00		0.75	15.00	12.50					
Recruitment of all Forage/Shelter tree species (% of total tree species d	10			1.00	10.00		1.00	10.00	10.00	10			1.00	10.00		0.50	5.00	7.50					
Tree density (per hectare stem count) of all trees >100 mm DBH	20			0.26	10.00		0.37	10.00	10.00	20			0.60	15.00		0.29	10.00	12.50					
Proximity to habitat refugia	10			5.00	5.00		5.00	5.00	5.00	10			5.00	5.00		5.00	5.00	5.00					
Total Score	70			40.00			40.00	35.00	70				45.00			36.00	40.50	37.75					
% of total score				42.86			57.14	50.00					64.29			51.43	57.88	53.93					
scaled score				5.00			5.00	5.00					5.00			5.00	5.00	5.00					
Species mobility																							
Physical barriers – structures / fences / powerlines / services / dams / v	10			Low	10.00		Low	10.00	10.00	10			Low	10.00		Low	10.00	10.00					
Exotic vegetation barriers	20			0.00	20.00		0.00	20.00	20.00	20			0.00	20.00		0.00	20.00	20.00					
MAX Score	30				30.00			30.00	30.00	30				30.00			30.00	30.00					
% of total score					100.00			100.00	66.67					100.00			100.00	100.00					
scaled score					10.00			10.00	7.00					10.00			10.00	10.00					

57.4545455

25.09090909

23.63636364

34.90909091

Species Stocking Rate (SSR)	Score	0	5	10	Matter Area
Presence detected on or adjacent to site (neighbouring property with connecting habitat)		No	Yes - adjacent	Yes - on site	10
Species usage of the site (habitat type & evidenced usage)		0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)		0	10	20	30
		0%	low	medium	high
Role/Importance of species population on site*		0	5	10	15
		0	5 - 15	20 - 35	40 - 45
Total SSR score (out of 70)					40
SSR Score (out of 4)					2.3

*SSR Supplementary Table	Score	0	10	Matter area
*Key source population for breeding		No	Yes/ Possibly	0
		0	5	
*Key source population for dispersal		No	Yes/ Possibly	5
		0	15	
*Necessary for maintaining genetic diversity		No	Yes/ Possibly	0
		0	15	
*Near the limit of the species range		No	Yes	0
Total for SSR Supplementary Table				5

Final habitat quality score (weighted)	AU1	AU2	Average/ Final
Site Condition score (out of 3)	1.76	1.90	1.83
Site Context Score (out of 3)	2.79	2.79	2.79
Species Stocking Rate Score (out of 4)	2.29	2.29	2.29
Habitat Quality score (out of 10)	6.83	6.97	6.90
Assessment Unit area (ha)	5.84	11.84	17.68
Total offset area (ha) for this MNES	17.68	17.68	17.68
Size Weighting	0.33	0.67	1.00
Weighted Habitat Quality Score	2.25	4.67	6.92

6

Site	SAT Results
BC05	N/A
BC07	0
BC06	N/A
BC08	N/A

Koala occupancy is presumed to be low based on absence of scat evidence. Scratch marks and possible scat suggest koala do utilise the habitat. Previous survey observed koala and back young. In the interest of adopting a precautionary approach, koala is consider to occur on site.

Supplementary table for threats scoring			Score			Result		Final result
Listed threatening activity	Scoring indicator	Score weighting	1	7	15	Score	Average / Weighted score	
Altered fire regimes	Fuel hazard rating	30%	Extreme or Very High fuel hazard rating	Moderate or High fuel hazard rating	Low fuel hazard rating	15	4.5	
Mortality from dogs	Wild/domestic dog activity index		An activity index score of very high or high	An activity index score of low or medium	An activity index score of absent or very low	15		
	Evidence of wild dog	15%	Traces of dogs detected through scats and/or tracks	Anecdotal evidence (i.e. landholder and/or local community discussion)	No traces of wild dog are detected on site / no anecdotal evidence	15	2.25	
Mortality from vehicles	Percentage of site bounded by roads		>75% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads	<75% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads	<15% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads	7		
	Type of road	15%	Highway / motorway / high traffic	Street / main road / moderate traffic and/or busy during peak hour	Unsealed / low and/or occasional traffic	15	1.65	
Habitat loss, fragmentation, and degradation	Proportion of wooded vegetation	40%	0-25% wooded vegetation occupies the site	26-75% wooded vegetation occupies the site	>75% wooded vegetation occupies the site	15	6	
Threats score out of 15								14.4
Scaled score (1-5=1; 6-10=7; 11-15=15)								15

Assessment Unit - Regional Ecosystem		AU1-Non-rem - 12.3.3										AU 2 - HVR 12.3.3										Total average % benchmark	Total average score
Site Reference	Benchmark 12.3.3	BC06			BC08			Average % benchmark	Average Score	Benchmark 12.3.3	BC05			BC07			Average % benchmark	Average Score					
Site Condition		Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score							
Recruitment of woody perennial species in EDL	100	100	100%	5.0	100	100%	5.0	100%	5.0	100	100	100%	5.0	100	100%	5.0	100%	5.0					
Native plant species richness - trees	5	5	100%	5.0	5	100%	5.0	100%	5.0	5	5	100%	5.0	5	100%	5.0	100%	5.0					
Native plant species richness - shrubs	5	6	120%	5.0	6	120%	5.0	120%	5.0	5	7	140%	5.0	6	120%	5.0	130%	5.0					
Native plant species richness - grasses	9	9	100%	5.0	9	100%	5.0	100%	5.0	9	9	100%	5.0	9	100%	5.0	100%	5.0					
Native plant species richness - forbes	25	24	96%	5.0	23	92%	5.0	94%	5.0	25	23	92%	5.0	23	92%	5.0	92%	5.0					
Tree canopy height (average of emergent, canopy, sub-canopy)	17	12.5	74%	5.0	16	94%	5.0	84%	5.0	17	18	106%	5.0	18.75	110%	5.0	108%	5.0					
Tree canopy cover (average of emergent, canopy, sub-canopy)	24	21.6	90%	5.0	21.6	90%	5.0	90%	5.0	24	21.6	90%	5.0	21.6	90%	5.0	90%	5.0					
Shrub canopy cover	4	7	175%	5.0	5	125%	5.0	150%	5.0	4	5	125%	5.0	8	200%	5.0	163%	5.0					
Native grass cover	52	47	90%	5.0	47	90%	5.0	90%	5.0	52	47	90%	5.0	47	90%	5.0	90%	5.0					
Organic litter	20	12.1	61%	5.0	25.4	127%	5.0	94%	5.0	20	14.74	74%	5.0	16.5	83%	5.0	78%	5.0					
Large trees (euc plus non-euc)	14	4	29%	5.0	4	29%	5.0	29%	5.0	14	4	29%	5.0	6	43%	5.0	36%	5.0					
Coarse woody debris	588	150	26%	2.0	150	26%	2.0	26%	2.0	588	150	26%	2.0	150	26%	2.0	26%	2.0					
Non-native plant cover	0	4.9	5%	10.0	4.9	5%	10.0	5%	10.0	0	4.9	5%	10.0	4.9	5%	10.0	5%	10.0					
Quality and availability of food and foraging habitat	10	10.00	10%	10.0	10.00	100%	10.0	55%	10.0	10	10.00	10%	10.0	10.00	100%	10.0	55%	10.0					
Quality and availability of shelter	10	5.00	5%	5.0	5.00	50%	5.0	28%	5.0	10	10.00	10%	10.0	5.00	50%	5.0	30%	7.5					
Site Condition Score				82			82		82.0				87			82		84.5					
MAX Site Condition Score				100			100		100				100			100		100					
Site Condition Score - out of 3				2.46			2.46		2.46				2.61			2.46		2.54					
Site Context																							
Size of patch	10			10			10		10.0	10	>200 ha		10			10		10.0					
Connectedness	5			2			2		2.0	5	0.35%		2			2		2.0					
Context	5			4			4		4.0	5	0.51%		4			4		4.0					
Ecological Corridors	6			6			6		6.0	6	within		6			6		6.0					
Role of site location to species overall population in the state	5			5			5		5.0	5	not critical due to breeding.		5			5		5.0					
Threats to the species	15			15.0			15.0		15.0	15	Low level threats		15.0			15		15.0					
Species mobility capacity	10			10.00			10.00		10.0	10	Minimal barriers		10.00			10		10.0					
Site Context Score				52			52		52.0				52			52		52.0					
MAX Site Context Score				56			56		56				56			56		56					
Site Context Score - out of 3				2.79			2.79		2.79				2.79			2.79		2.79					
Habitat Quality		Raw Data	Score		Raw Data	Score		Average Score		Raw Data	Score		Raw Data	Score		Average Score		Average Score					
Quality and availability of food and foraging habitat																							
Proportion of Canopy cover of LIKT trees within the 100x50 meter BioCondition plot	20	0.75	20.00	0.75	20.00		20.00	20	0.75	20.00	0.75	20.00	0.75	20.00		20.00		20.00					
Forage tree species richness (LIKTs as per Youngentob et al., 2022) (Only trees >100 DBH)	10	3.00	5.00	3.00	5.00		5.00	10	3.00	5.00	3.00	5.00	3.00	5.00		5.00		5.00					
Tree density (per hectare stem count) of LIKT species	20	0.61	15.00	0.51	15.00		15.00	20	0.72	15.00	0.51	15.00	0.51	15.00		15.00		15.00					
Recruitment of LIKT species only (% of total LIKT within plot)	10	1.00	10.00	1.00	10.00		10.00	10	1.00	10.00	1.00	10.00	1.00	10.00		10.00		10.00					
Total Score	60		50.00		50.00		50.00	60		50.00		50.00		50.00		50.00		50.00					
% of total score			83.33		83.33		83.33		83.33			83.33		83.33		83.33		83.33					
scaled score			10.00		10.00		10.00		10.00			10.00		10.00		10.00		10.00					
Quality and availability of shelter																							
presence of preferred ancillary trees (listed in Youngentob et al.)	10	5.00	5.00	5.00	5.00		5.00	10	5.00	5.00	5.00	5.00	5.00	5.00		5.00		5.00					
Canopy cover of all trees within the 100x50 meter BioCondition plot	20	0.90	20.00	0.90	20.00		20.00	20	0.90	20.00	0.90	20.00	0.90	20.00		20.00		20.00					
Recruitment of all Forage/Shelter tree species (% of total tree species diversity)	10	1.00	10.00	1.00	10.00		10.00	10	1.00	10.00	1.00	10.00	1.00	10.00		10.00		10.00					
Tree density (per hectare stem count) of all trees >100 mm DBH	20	0.67	15.00	0.57	15.00		15.00	20	0.78	20.00	0.56	15.00	0.56	15.00		17.50		16.25					
Proximity to habitat refugia	10	5.00	5.00	5.00	5.00		5.00	10	5.00	5.00	5.00	5.00	5.00	5.00		5.00		5.00					
Total Score	70		55.00		55.00		55.00	70		55.00		55.00		55.00		57.50		56.25					
% of total score			78.57		78.57		78.57		78.57			80.00		78.57		82.14		80.36					
scaled score			5.00		5.00		5.00		5.00			10.00		5.00		10.00		10.00					
Species mobility																							
Physical barriers	10		Low	10.00		Low	10.00	10		Low		Low	10.00		Low	10.00		10.00					
Exotic vegetation barriers	20		0.00	20.00		0.00	20.00	20		0.00		0.00	20.00		0.00	20.00		20.00					
MAX Score	30			30.00			30.00	30				30.00				30.00		30.00					
% of total score				100.00			100.00		100.00				100.00			100.00		100.00					
scaled score				10.00			10.00		10.00				10.00			10.00		10.00					

Species Stocking Rate (SSR)						Matter Area
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5		10	10
		No	Yes - adjacent		Yes - on site	
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15	15
		Not habitat	Dispersal	Foraging	Breeding	
Approximate density (per ha)	Score	0	10	20	30	10
		0%	low	medium	high	
Role/importance of species population on site*	Score (Total from supplementary table below)	0	5	10		5
		0	5 - 15	20 - 35		
Total SSR score (out of 70)						40
SSR Score (out of 4)						2.3

*SSR Supplementary Table				Matter area
*Key source population for breeding	Score	0	10	0
	No	Yes/ Possibly		
*Key source population for dispersal	Score	0	5	5
	No	Yes/ Possibly		
*Necessary for maintaining genetic diversity	Score	0	15	0
	No	Yes/ Possibly		
*Near the limit of the species range	Score	0	15	0
	No	Yes		
Total for SSR Supplementary Table				5

Final habitat quality score (weighted)	AU1	AU2	Average/ Final
Site Condition score (out of 3)	2.46	2.54	2.50
Site Context Score (out of 3)	2.79	2.79	2.79
Species Stocking Rate Score (out of 4)	2.29	2.29	2.29
Habitat Quality score (out of 10)	7.53	7.61	7.57
Assessment Unit area (ha)	5.84	11.84	17.68
Total offset area (ha) for this MNES	17.68	17.68	17.68
Size Weighting	0.33	0.67	1.00
Weighted Habitat Quality Score	2.49	5.09	7.58

Site	SAT Results
BC05	N/A
BC07	0
BC06	N/A
BC08	N/A

Habitat usage is improved to breeding after 20 years: this is based on the assumption that the recovery of habitat to remnant forest condition is adequately supportive of meeting all habitat requirements to koala. Koala density score remains at 10, this is a precautionary approach as koala occupancy cannot be guaranteed.

Supplementary table for threats scoring			Score			Result		Final result
Listed threatening process	Scoring indicator	Score weighting	1	7	15	Score	Average / Weighted score	
Altered fire regimes	Fuel hazard rating	30%	Extreme or Very High fuel hazard rating	Moderate or High fuel hazard rating	Low fuel hazard rating	15	4.5	
Mortality from dogs	Wild/domestic dog activity index		An activity index score of very high or high	An activity index score of low or medium	An activity index score of absent or very low	15		
	Evidence of wild dog	15%	Traces of dogs detected through scats and/or tracks	Anecdotal evidence (i.e. landholder and/or local community discussion)	No traces of wild dog are detected on site / no anecdotal evidence	15	2.25	
Mortality from vehicles	Percentage of site bounded by roads.		>75% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads	16-75% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads.	<15% of Site boundary is either bounded by roads (within 200 meters) or intersects with roads.	7		
	Type of road	15%	Highway / motorway / high traffic	Street / main road / moderate traffic and/or busy during peak hour.	Unsealed / low and/or occasional traffic	15	1.63	
Habitat loss, fragmentation, and degradation	Proportion of wooded vegetation	40%	0-25% wooded vegetation occupies the site	26-75% wooded vegetation occupies the site	>75% wooded vegetation occupies the site	15	6	
Threats score out of 15								14.4
Scaled score (1-5=4; 6-10=7; 11-15=15)								15

Attachment 8 – MHQA
Baseline to Year 20, Grey-
headed Flying-fox

Assessment Unit - Regional Ecosystem	AU1 - Non-rem - 12.3.3										AU 2 - HVR 12.3.3										Total	
Site Reference	Benchmark 12.3.3	BC06			BC08			Average % benchmark	Average Score	Benchmark 12.3.3	BC05			BC07			Average %	Average Score	average %	Total average %		
		Raw Data	% Benchmark	Score	Raw Data	Benchmark	Score				Raw Data	% Benchmark	Score	Raw Data	Benchmark	Score						
Site Condition																						
Recruitment of woody perennial species in EDL	100	100	100%	5.0	100	100%	5.0	100%	5.0	100	0	0%	0.0	100	100%	5.0	50%	2.5	75%	3.8		
Native plant species richness - trees	5	1	20%	0.0	2	40%	2.5	30%	1.3	5	1	20%	0.0	2	40%	2.5	30%	1.3	30%	1.3		
Native plant species richness - shrubs	5	1	20%	0.0	2	40%	2.5	30%	1.3	5	3	60%	2.5	2	40%	2.5	50%	2.5	40%	1.9		
Native plant species richness - grasses	9	2	22%	0.0	2	22%	0.0	22%	0.0	9	4	44%	2.5	6	67%	2.5	56%	2.5	39%	1.3		
Native plant species richness - forbes	25	8	32%	2.5	13	52%	2.5	42%	2.5	25	19	76%	2.5	17	68%	2.5	72%	2.5	57%	2.5		
Tree canopy height (average of emergent, canopy, sub-canopy)	17	10.5	62%	3.0	16	94%	5.0	78%	4.0	17	18	106%	5.0	18.75	110%	5.0	108%	5.0	93%	4.5		
Tree canopy cover (average of emergent, canopy, sub-canopy)	24	5.1	21%	2.0	7.5	31%	2.0	26%	2.0	24	16.45	69%	5.0	18	75%	5.0	72%	5.0	49%	3.5		
Shrub canopy cover	4	2	50%	3.0	0	0%	0.0	25%	1.5	4	0	0%	0.0	11.5	288%	3.0	144%	1.5	84%	1.5		
Native grass cover	52	1	2%	0.0	0	0%	0.0	1%	0.0	52	27.6	53%	3.0	0	0%	0.0	27%	1.5	14%	0.8		
Organic litter	20	11	55%	5.0	25.4	127%	5.0	91%	5.0	20	13.4	67%	5.0	15	75%	5.0	71%	5.0	81%	5.0		
Large trees (euc plus non-euc)	14	2	14%	5.0	0	0%	0.0	7%	2.5	14	0	0%	0.0	4	29%	5.0	14%	2.5	11%	2.5		
Coarse woody debris	588	0	0%	0.0	0	0%	0.0	0%	0.0	588	0	0%	0.0	120	20%	2.0	10%	1.0	5%	0.5		
Non-native plant cover	0	70	70%	0.0	50	50%	3.0	60%	1.5	0	50	50%	3.0	50	50%	3.0	50%	3.0	55%	2.3		
Site Condition Score				25.5			27.5		26.5				28.5			43		35.8		31.1		
MAX Site Condition Score				80					80				80			80		80		80		
Site Condition Score - out of 20				6.38			6.88		6.63				7.13			10.75		8.94		7.78		
Quality and availability of food and foraging habitat + Quality and availability of shelter	Benchmark	Raw data	Score	Raw data	Score	Average % benchmark	Benchmark	% contribution	Raw data	Score	Raw data	Score	Average % benchmark	Raw data	Score	Total average score						
Species richness	20	1	5.0	1	5.0	5.0	20	22.2	1	5.0	1	5.0	5.0	1	5.0	5.0						
Flower score	10	0.65	8.0	0.65	8.0	8.0	10	11.1	0.65	8.0	0.65	8.0	8.0	0.65	8.0	8.0						
Timing of Biological shortages	10	8.5	8.5	8.5	8.5	8.5	10	11.1	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5						
Quality of foraging habitat	20	1	5.0	1	5.0	5.0	20	22.2	1	5.0	1	5.0	5.0	1	5.0	5.0						
non-native plant cover	20	0.7	1.0	0.5	5.0	3.0	20	22.2	0.5	5.0	0.5	5.0	5.0	0.5	5.0	4.0						
Q+A foraging habitat + Q+A shelter habitat score			27.5		31.5	29.5				31.5		31.5	31.5		31.5	123.9						
MAX Score	80		80		80	80				80		80	80		80	60						
Site condition score	20		6.4		6.9	6.6	20	22.2		7.1		10.8	8.9		10.8	7.8						
Q+A foraging habitat + Q+A shelter habitat score	80		27.5		31.5	29.5	80	88.9		31.5		31.5	31.5		31.5	30.5						
Combined Habitat Quality Score			33.9		38.4	36.1				38.6		42.3	40.4		42.3	38.3						
MAX Habitat Quality Score	100		100		100	100				100		100	100		100	100						
Combined HQ Score- out of 4			1.36		1.54	1.45				1.55		1.69	1.62		1.69	1.53						
Site Context	Benchmark	Data	Score	Data	Score	Average Score	Benchmark	Data	Score	Data	Score	Average Score	Data	Score	Total average score							
Size of patch	10	> 200 ha of cat A/B/C reg v	10		10	10.0	10		10		10	10.0		10	10.0							
Connectedness	10	12 camps within 20 km of t	10		10	10.0	10		10		10	10.0		10	10.0							
Context	10	26% of area within 20 km it	3		3	3.0	10		3		3	3.0		3	3.0							
Ecological Corridors	10	Within state corridor	10		10	10.0	10		10		10	10.0		10	10.0							
Role of site location to species overall population in the state	10	1 significant camp within 2	1		1	1.0	10		1		1	1.0		1	1.0							
threats to the species	10	low level threats	10		10	10.0	10		10		10	10.0		10	10.0							
Site Context Score			44		44	44.0			44		44	44.0		44	44.0							
MAX Site Context Score			60		60	60			60		60	60		60	60							
Site Context Score - out of 3			2.20		2.20	2.20			2.20		2.20	2.20		2.20	2.20							
Species Stocking Rate	Benchmark					Average Score	Benchmark					Average Score			Total average score							
GHFF tree density per/ha	10		2	2	2	2	10		2	2	2	2	2	2	2.0							
Site Context Score			2		2	2.0			2		2	2.0		2	2.0							
MAX Site Context Score			10		10	10			10		10	10		10	10							
Site Context Score - out of 3			0.60		0.60	0.60			0.60		0.60	0.60		0.60	0.60							

Final habitat quality score (weighted)	AU1	AU2	Average/ Final
Site Condition score (out of 3)	1.45	1.62	1.53
Site Context Score (out of 3)	2.20	2.20	2.20
Species Stocking Rate Score (out of 4)	0.60	0.60	0.60
Habitat Quality score (out of 10)	4.25	4.42	4.33
Assessment Unit area (ha)	5.84	11.84	17.68
Total offset area (ha) for this MNES	17.68	17.68	17.68
Size Weighting	0.33	0.67	1.00
Weighted Habitat Quality Score	1.40	2.96	4.36

Supplementary table for threats scoring			Score			Result		Final result
Listed threatening process	Scoring indicator	Score weight	1	7	15	Score	Weighted score	
Altered fire regimes	Fuel hazard rating	30%	Extreme or Very High fuel hazard rating	Moderate or High fuel hazard rating	Low fuel hazard rating	15	4.5	12.6
Entanglement in netting and barb wire fences	Presence of top-strand barbed-wire fencing or similar	15%	Site is entirely bounded by top-strand barbed-wire fencing	Top-strand barbed-wire fencing in present on at least one fence boundary or internal fenceline	Site is absent of top-strand barbed-wire fencing	7	1.05	
Electrocution on powerlines	Presence of powerlines	15%	Powerline/s intersect site	Powerline/s run parallel with a site boundary (within 100 metres)	Powerlines are not present as per the above	7	1.05	
Habitat loss, fragmentation, and degradation	Proportion of wooded vegetation	40%	0-25% wooded vegetation occupies the site	26-75% wooded vegetation occupies the site	>75% wooded vegetation occupies the site	15	6	
Threats score out of 15								
Scaled score (1-5=1; 6-10=5; 11-15=10)								
10								

Thagoona North Offset - GHFF

baseline and year 5	Assessment Units (AU)	AU1		AU1		AU2		AU2	
	BioCondition Transect	BioCon 5		BioCon 7		BioCon 6		BioCon 8	
	Equivalent Regional Ecosystem	12.3.3		12.3.3		12.3.3		12.3.3	
	Stem Counts from Data sheets mm	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	0	30	0	18	70	6
	Blakella tessellaris				10				
	Total stems		58		40		18		6
	score	2		2		2		2	
Biological score (trees >300 mm only)		8.5		8.5		8.5		8.5	

Stem count thresholds for relevant REs	12.3.3		
	T1		260
	T2		260
	lower value	upper value	score
		0.0	32.5
		33.6	140.8
		141.9	238.3
		239.4	254.6
		255.7	265.4
		266.5	281.7
		282.8	379.2
	380.3	487.5	
	487.5		

Timing of biological shortages			month period						Wt p*r	adapted score
			Food shortages: Jul-Sept	Pregnancy: Jul-Nov	Lactation: Oct-Mar	Mating and conception : Dec-May	Migration paths: all years	Fruit industries : Aug-Mar		
	Tree species	sum	2.5	1.5	1.5	1.5	1.5	1.5		
	Corymbia citriodora	4	2.5	1.5					0.65	0.65
	Eucalyptus tereticornis	8.5	2.5	1.5	1.5		1.5	1.5	0.37-0.88	
	Corymbia intermedia	3			1.5	1.5			0.86	
	Blakella tessellaris	4.5		1.5	1.5	1.5			0.4	0.65
	Eucalyptus crebra	4	2.5	1.5					0.45-0.81	
	Eucalyptus melanophoila	3		1.5		1.5			0.45-0.54	
	Corymbia trachyphloia	3			1.5	1.5			0.45	0.65
	Eucalyptus melliodora	4.5			1.5	1.5		1.5	0.39	
	Lophostemon confertus	6		1.5	1.5	1.5		1.5	0.46	
	Melaleuca quinquenervia	4.5			1.5	1.5		1.5	0.88	
	E. moluccana	4.5			1.5	1.5		1.5	0.35-0.65	
	Eucalyptus fibrosa	7.5		1.5	1.5	1.5	1.5	1.5	0.54	
	Eucalyptus acmenoides	4.5			1.5	1.5		1.5	0.43	
	gevillia robusta	3		1.5	1.5				1	
	Eucalytpus siderophloia	10	2.5	1.5	1.5	1.5	1.5	1.5	0.81	
	Delete and add tree species above as are present on site									

Year 10

	Assessment Units (AU)	AU2				AU1			
	BioCondition Transect	5		7		6		8	
	Equivalent Regional Ecosystem	12.3.3 Non-remnant				12.3.3 HVR			
	Stem Counts from Data sheets								
	mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	80	58	30	30	27	18	70	6
	Blakella tessellaris	2		1	10	2		2	
	Eucalyptus crebra	20		7		20		20	
	Corymbia intermedia	3		1		3		3	
	other species.	2		2		2		2	
Total stems			58		40		18		6
score		2		2		2		2	
Biological score (trees >300 mm only)		8.5		8.5		8.5		8.5	

year 15

	Assessment Units (AU)	AU2				AU1			
	BioCondition Transect	5		7		6		8	
	Equivalent Regional Ecosystem	12.3.3 Non-remnant				12.3.3 HVR			
	mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	70	68	60	30	54	18	50	36
	Blakella tessellaris	4		4	10	4		4	
	Eucalyptus crebra	40		13		40		40	
	Corymbia intermedia	8		2		8		8	
	other species.	2		2		2		2	
Total stems		68		40		18		36	
score		4		4		2		4	
Biological score (trees >300 mm only)		8.5		8.5		8.5		8.5	

year 20

	Assessment Units (AU)	AU2				AU1			
	BioCondition Transect	5		7		6		8	
	Equivalent Regional Ecosystem	12.3.3 Non-remnant				12.3.3 HVR			
	Stem Counts from Data sheets								
	mm DBH	100-299	>300	100-299	>300	100-299	>300	100-299	>300
	Eucalyptus tereticornis	60	78	60	45	80	29	40	46
	Blakella tessellaris	4	1	4	10	4	1	4	1
	Eucalyptus crebra	40	20	13	15	40	20	40	20
	Corymbia intermedia	8	2	2	1	8	2	8	2
	other species.	2		2		2		2	
Total stems			101		71		52		69
score		4		4		4		4	
Biological score (trees >300 mm only)		8.5		8.5		8.5		8.5	

flower scor 0.5875

Assessment Unit - Regional Ecosystem Site Reference	AU1 - Non-rem - 12.3.3										AU 2 - HVR 12.3.3										Total	
	Benchmark 12.3.3	BC06			BC08			Average %	Average Score	Benchmark 12.3.3	BC05			BC07			Average %	Average Score	average % benchmark	Total average score		
Site Condition		Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score				Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score						
Recruitment of woody perennial species in EDL	100	100	100%	5.0	100	100%	5.0	100%	5.0	100	33	33%	3.0	100	100%	5.0	67%	4.0	83%	4.5		
Native plant species richness - trees	5	1	20%	0.0	2	40%	2.5	30%	1.3	5	1	20%	0.0	2	40%	2.5	30%	1.3	30%	1.3		
Native plant species richness - shrubs	5	1	20%	0.0	2	40%	2.5	30%	1.3	5	3	60%	2.5	2	40%	2.5	50%	2.5	40%	1.9		
Native plant species richness - grasses	9	2	22%	0.0	2	22%	0.0	22%	0.0	9	4	44%	2.5	6	67%	2.5	56%	2.5	39%	1.3		
Native plant species richness - forbes	25	8	32%	2.5	13	52%	2.5	42%	2.5	25	19	76%	2.5	17	68%	2.5	72%	2.5	57%	2.5		
Tree canopy height (average of emergent, canopy, sub-canopy)	17	11	65%	3.0	16	94%	5.0	79%	4.0	17	18	106%	5.0	18.75	110%	5.0	108%	5.0	94%	4.5		
Tree canopy cover (average of emergent, canopy, sub-canopy)	24	5.1	21%	2.0	7.5	31%	2.0	26%	2.0	24	16.45	69%	5.0	18	75%	5.0	72%	5.0	49%	3.5		
Shrub canopy cover	4	7	175%	5.0	5	125%	5.0	150%	5.0	4	5	125%	5.0	16.5	413%	3.0	269%	4.0	209%	4.5		
Native grass cover	52	11	21%	1.0	10	19%	1.0	20%	1.0	52	37.6	72%	3.0	10	19%	1.0	46%	2.0	33%	1.5		
Organic litter	20	11	55%	5.0	25.4	127%	5.0	91%	5.0	20	13.4	67%	5.0	15	75%	5.0	71%	5.0	81%	5.0		
Large trees (euc plus non-euc)	14	2	14%	5.0	0	0%	0.0	7%	2.5	14	0	0%	0.0	4	29%	5.0	14%	2.5	11%	2.5		
Coarse woody debris	588	0	0%	0.0	0	0%	0.0	0%	0.0	588	0	0%	0.0	120	20%	2.0	10%	1.0	5%	0.5		
Non-native plant cover	0	25	25%	5.0	25	25%	5.0	25%	5.0	0	25	25%	5.0	25	25%	5.0	25%	5.0	25%	5.0		
Site Condition Score				33.5			35.5		34.5				38.5			46		42.3		38.4		
MAX Site Condition Score				80			80		80				80			80		80		80		
Site Condition Score - out of 20				8.38			8.88		8.63				9.63			11.50		10.56		9.59		
Quality and availability of food and foraging habitat + Quality and	Benchmark	Raw data	Score		Raw data	Score		Average Score		Benchmark	% contribution	Raw data	Score	Raw data	Score		Average Score		Total average score			
Species richness	20	1	5.0		5.0	5.0		5.0	20	20	22.2	1	5.0	1	5.0		5.0		5.0			
Flower score	10	0.65	8.0		8.0	8.0		8.0	10	10	11.1	0.65	8.0	0.65	8.0		8.0		8.0			
Timing of Biological shortages	10	8.5	8.5		8.5	8.5		8.5	10	10	11.1	8.5	8.5	8.5	8.5		8.5		8.5			
Quality of foraging habitat	20	1	5.0		5.0	5.0		5.0	20	20	22.2	1	5.0	1	5.0		5.0		5.0			
non-native plant cover	20	0.7	5.0		5.0	5.0		5.0	20	20	22.2	0.5	5.0	0.5	5.0		5.0		4.0			
Q+A foraging habitat + Q+A shelter habitat score			27.5		31.5	29.5		29.5				31.5	31.5	31.5	31.5		31.5		133.0			
MAX Score	80		80		80	80		80	80	80	80	80	80	80	80		80		60			
Site condition score	80		8.4		8.9	8.6		8.6	20	20	22.2	9.6	11.5	11.5	11.5		10.6		9.6			
Q+A foraging habitat + Q+A shelter habitat score	20		27.5		29.5	31.5		31.5	80	80	88.9	31.5	31.5	31.5	31.5		30.5		30.5			
Combined Habitat Quality Score			35.9		40.4	38.1		38.1				41.1	43.0	43.0	42.1		40.1		40.1			
MAX Habitat Quality Score	100		100		100	100		100	100	100	100	100	100	100	100		100		100			
Combined HQ Score- out of 4			1.44		1.62	1.53		1.53				1.65	1.72	1.72	1.68		1.60		1.60			
Site Context	Benchmark	Data	Score		Data	Score		Average Score		Benchmark		Data	Score	Data	Score		Average Score		Total average score			
Size of patch	10	> 200 ha of cat A/B/C reg	10		10	10		10.0	10	10	10	10	10	10	10		10.0		10.0			
Connectedness	10	12 camps within 20 km of	10		10	10		10.0	10	10	10	10	10	10	10		10.0		10.0			
Context	10	26% of area within 20 km	3		3	3		3.0	10	10	3	3	3	3	3		3.0		3.0			
Ecological corridors	10	Within state corridor	10		10	10		10.0	10	10	10	10	10	10	10		10.0		10.0			
Role of site location to species overall population in the state	10	1 significant camp within 2	1		1	1		1.0	10	10	1	1	1	1	1		1.0		1.0			
threats to the species	10	Low level threats	10		10	10		10.0	10	10	10	10	10	10	10		10.0		10.0			
Site Context Score			44		44	44		44.0				44	44	44	44		44.0		44.0			
MAX Site Context Score			60		60	60		60	60	60	60	60	60	60	60		60		60			
Site Context Score - out of 3			2.20		2.20	2.20		2.20				2.20	2.20	2.20	2.20		2.20		2.20			
Species Stocking Rate	Benchmark							Average Score		Benchmark							Average Score		Total average score			
GHFF tree density per/ha	10		2	2		2	2	2	2	10		2	2		2	2	2	2	2			
Site Context Score			2		2	2		2.0	2			2	2		2	2	2.0		2.0			
MAX Site Context Score			10		10	10		10	10			10	10		10	10	10		10			
Site Context Score - out of 3			0.60		0.60	0.60		0.60				0.60	0.60		0.60	0.60	0.60		0.60			

Final habitat quality score (weighted)	AU1	AU2	Average/ Final
Site Condition score (out of 3)	1.53	1.68	1.60
Site Context Score (out of 3)	2.20	2.20	2.20
Species Stocking Rate Score (out of 4)	0.60	0.60	0.60
Habitat Quality score (out of 10)	4.33	4.48	4.40
Assessment Unit area (ha)	5.84	11.84	17.68
Total offset area (ha) for this MNES	17.68	17.68	17.68
Size Weighting	0.33	0.67	1.00
Weighted Habitat Quality Score	1.43	3.00	4.43

Supplementary table for threats scoring			Score			Result		Final result
Listed threatening process	Scoring indicator	Score weight	1	7	15	Score	Weighted score	
Altered fire regimes	Fuel hazard rating	30%	Extreme or Very High fuel hazard rating	Moderate or High fuel hazard rating	Low fuel hazard rating	15	4.5	
Entanglement in netting and barb wire fences	Presence of top-strand barbed-wire fencing or similar	15%	Site is entirely bounded by top-strand barbed-wire fencing	Top-strand barbed-wire fencing is present on at least one fence boundary or internal fence line	Site is absent of top-strand barbed-wire fencing	15	2.25	
	Electrocution on powerlines	Presence of powerlines	15%	Powerline/s intersect site	Powerline/s run parallel with a site boundary (within 100 metres)	Powerlines are not present as per the above	7	1.05
Habitat loss, fragmentation, and degradation	Proportion of wooded vegetation	40%	0-25% wooded vegetation occupies the site	26-75% wooded vegetation occupies the site	>75% wooded vegetation occupies the site	15	6	
Threats score out of 15								
Scaled score (1-5=1; 6-10=5; 11-15=10)								

Assessment Unit – Regional Ecosystem		AU1 -Non-rem - 12.3.3										AU 2 - HVR 12.3.3										Total average	
Site Reference		Benchmark		BC06		BC08		Average		Benchmark		BC05		BC07		Average		Total average					
12.3.3		Raw Data		% Benchmark		Score		%		12.3.3		Raw Data		% Benchmark		Score		%					
Site Condition		100		100%		5.0		100%		100		33		33%		3.0		67%					
Recruitment of woody perennial species in EDL		100	100	100%	5.0	100	100%	5.0	100%	5.0	100	100%	5.0	67%	4.0	83%	4.5						
Native plant species richness - trees		5	5	100%	5.0	5	100%	5.0	100%	5.0	5	100%	5.0	100%	5.0	100%	5.0						
Native plant species richness - shrubs		5	5	100%	5.0	5	100%	5.0	100%	5.0	5	100%	5.0	100%	5.0	100%	5.0						
Native plant species richness - grasses		9	3	33%	2.5	3	33%	2.5	33%	2.5	9	56%	2.5	78%	2.5	50%	2.5						
Native plant species richness - forbes		25	10	40%	2.5	15	60%	2.5	50%	2.5	25	84%	2.5	19	76%	65%	2.5						
Tree canopy height (average of emergent, canopy, sub-canopy)		17	11.5	68%	3.0	16	94%	5.0	81%	4.0	17	106%	5.0	18.75	110%	94%	4.5						
Tree canopy cover (average of emergent, canopy, sub-canopy)		24	7.1	30%	2.0	12.5	52%	5.0	41%	3.5	24	69%	5.0	18	75%	56%	4.3						
Shrub canopy cover		4	7	175%	5.0	5	125%	5.0	150%	5.0	4	125%	5.0	16.5	413%	209%	4.5						
Native grass cover		52	11	21%	1.0	10	19%	1.0	20%	1.0	52	37.6	72%	3.0	10	19%	33%						
Organic litter		20	11	55%	5.0	25.4	127%	5.0	91%	5.0	20	13.4	67%	5.0	15	75%	81%						
Large trees (euc plus non-euc)		14	4	29%	5.0	2	14%	5.0	21%	5.0	14	0	0%	0.0	4	29%	18%						
Coarse woody debris		588	0	0%	0.0	0	0%	0.0	0%	0.0	588	0	0%	0.0	120	20%	5%						
Non-native plant cover		0	15	15%	5.0	15	15%	5.0	15%	5.0	0	15	15%	5.0	15	15%	15%						
Site Condition Score						46.0		51						46		51		48.5					
MAX Site Condition Score						80		80						80		80		80					
Site Condition Score - out of 20						11.50		12.75						11.50		12.75		12.13					
Quality and availability of food and foraging habitat + Quality and availability of shelter		Benchmark		Raw data		Score		Average Score		Benchmark		% contribution		Raw data		Score		Average Score					
Species richness		20	1	5.0	1	5.0		5.0	20	22.2	1	5.0	1	5.0	5.0	5.0	5.0						
Flower score		10	0.65	8.0	0.65	8.0		8.0	10	11.1	0.65	8.0	0.65	8.0	8.0	8.0	8.0						
Timing of Biological shortages		10	8.5	8.5	8.5	8.5		8.5	10	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5						
Quality of foraging habitat		20	1	5.0	1	5.0		5.0	20	22.2	1	5.0	1	5.0	5.0	5.0	5.0						
non-native plant cover		20	0.7	1.0	0.5	5.0		5.0	20	22.2	0.5	5.0	0.5	5.0	5.0	5.0	4.0						
Q+A foraging habitat + Q+A shelter habitat score						27.5		31.5						31.5		31.5		145.6					
MAX Score						80		80						80		80		60					
Site condition score		20		11.5		12.8		12.1		20		22.2		11.5		12.8		12.1					
Q+A foraging habitat + Q+A shelter habitat score		80		27.5		31.5		29.5		80		88.9		31.5		31.5		90.5					
Combined Habitat Quality Score		100		39.0		44.3		41.6		100		43.0		44.3		43.6		42.6					
MAX Habitat Quality Score				100		100		100		100		100		100		100		100					
Combined HQ Score- out of 4				1.56		1.77		1.67				1.75		1.75		1.71							
Site Context		Benchmark		Data		Score		Average Score		Benchmark		Data		Score		Average Score		Total average score					
Size of patch		10		> 200 ha of cat A/B/C reg	10	10		10.0	10	10		10		10	10		10.0	10.0					
Connectedness		10		12 camps within 20 km of	10	10		10.0	10	10		10		10	10		10.0	10.0					
Context		10		26% of area within 20 km of	10	3		3.0	10	3		10		3	3.0		3.0	3.0					
Ecological Corridors		10		Within state corridor	10	10		10.0	10	10		10		10	10.0		10.0	10.0					
Role of site location to species overall population in the state		10		1 significant camp within 2	10	1		1.0	10	1		10		1	1.0		1.0	1.0					
threats to the species		10		Low level threats	10	10		10.0	10	10		10		10	10.0		10.0	10.0					
Site Context Score						44		44.0						44		44.0		44.0					
MAX Site Context Score						60		60						60		60		60					
Site Context Score - out of 3						2.20		2.20						2.20		2.20		2.20					
Species Stocking Rate		Benchmark		Data		Score		Average Score		Benchmark		Data		Score		Average Score		Total average score					
GHFF tree density per/ha		10		2	2		2	2	10		2	2		2	2		2.0	2.0					
Site Context Score						2		2.0						2		2.0		2.0					
MAX Site Context Score						10		10						10		10		10					
Site Context Score - out of 3						0.60		0.60						0.60		0.60		0.60					

assumed full planting - although not yet reflected in scores.

assumed full planting to make a tree diversity of 5 throughout the offset area. Expected that trees will begin to move into the T2 layer by year 10.

Native shrub layer will increase, largely due to assisted regen (shrubs and trees in shrub form). This will then out again in years 15 and 20.

assisted regeneration will plant native stock (or spread seed) to meet benchmark values native to the area and RE. One native grass species is expected to accumulate each vegetation survey year.

Native forbs are expected to regenerate naturally over time, especially following good rain years.

Estimated at 2 new species each assessment year.

Tree canopy height is expected to increase over time. Conservative estimate of 50cm of growth is expected at each vegetation survey year (every 5 years), until benchmark value is attained.

Tree canopy cover is expected to increase over time from the growth of existing canopy trees, and then more rapidly accumulate at years 15-20 when assisted regen trees are contributing to the canopy layer with more certainty. Conservative estimate of 2 m of growth is expected at year 10.

change between years 5 and 10 is expected to be similar during initial stages of regeneration.

Expected gradual increase in raw data between each vegetation survey year. Especially following weed management actions. In consideration of revegetation, grass cover between years 5 and 10 is expected to remain similar

potential increase in raw data. Not estimated as benchmark value is already attained at baseline.

up to 2 large trees are predicted to accumulate, based on BioCondition data collected at baseline.

See large tree tab.

no predicted change at year 10

reduced to less than 15%.

Final habitat quality score (weighted)	AU1	AU2	Average/ Final
Site Condition score (out of 3)	1.67	1.75	1.71
Site Context Score (out of 3)	2.20	2.20	2.20
Species Stocking Rate Score (out of 4)	0.60	0.60	0.60
Habitat Quality score (out of 10)	4.47	4.55	4.51
Assessment Unit area (ha)	5.84	11.84	17.68
Total offset area (ha) for this MNES	17.68	17.68	17.68
Size Weighting	0.33	0.67	1.00
Weighted Habitat Quality Score	1.47	3.04	4.52

Supplementary table for threats scoring			Score			Result	
Listed threatening process	Scoring indicator	Score weight	1	7	15	Score	Weighted score
Altered fire regimes	Fuel hazard rating	30%	Extreme or Very High fuel hazard rating	Moderate or High fuel hazard rating	Low fuel hazard rating	15	4.5
Entanglement in netting and barb wire fences	Presence of top-strand barbed-wire fencing or similar	15%	Site is entirely bounded by top-strand barbed-wire fencing	Top-strand barbed-wire fencing in present on at least one fence boundary or internal fence line	Site is absent of top-strand barbed-wire fencing	15	2.25
Electrocution on powerlines	Presence of powerlines	15%	Powerline/s intersect site	Powerline/s run parallel with a site boundary (within 100 metres)	Powerlines are not present as per the above	7	1.05
Habitat loss, fragmentation, and degradation	Proportion of wooded vegetation	40%	0-25% wooded vegetation occupies the site	26-75% wooded vegetation occupies the site	>75% wooded vegetation occupies the site	15	6

Threats score out of 15
Scaled score (1-5=1; 6-10=5; 11-15=10)

13.8

Assessment Unit – Regional Ecosystem Site Reference		AU1 -Non-rem - 12.3.3										AU 2 - HVR 12.3.3										Total average							
Benchmark		BC06						Average %		Benchmark		BC05						Average %		Average Score									
12.3.3		Raw Data		% Benchmark		Score		Raw Data		% Benchmark		Score		Raw Data		% Benchmark		Score		Raw Data		% Benchmark		Score		Average %		Average Score	
Site Condition		Raw Data		% Benchmark		Score		Raw Data		% Benchmark		Score		Raw Data		% Benchmark		Score		Raw Data		% Benchmark		Score		Average %		Average Score	
Recruitment of woody perennial species in EDL	100	100	100%	5.0	100	100%	5.0	100%	5.0	100	100%	5.0	100%	5.0	100	100%	5.0	67%	4.0	83%	4.5								
Native plant species richness - trees	5	5	100%	5.0	5	100%	5.0	100%	5.0	5	100%	5.0	100%	5.0	5	100%	5.0	100%	5.0	100%	5.0	100%	5.0	100%	5.0	100%	5.0		
Native plant species richness - shrubs	5	5	100%	5.0	5	100%	5.0	100%	5.0	5	100%	5.0	100%	5.0	5	100%	5.0	100%	5.0	100%	5.0	100%	5.0	100%	5.0	100%	5.0		
Native plant species richness - grasses	9	4	44%	2.5	4	44%	2.5	44%	2.5	9	6	67%	2.5	8	89%	2.5	78%	2.5	61%	2.5									
Native plant species richness - forbes	25	12	48%	2.5	17	68%	2.5	58%	2.5	25	23	92%	5.0	21	84%	2.5	88%	3.8	73%	3.1									
Tree canopy height (average of emergent, canopy, sub-canopy)	17	12	71%	5.0	16	94%	5.0	82%	5.0	17	18	106%	5.0	18.75	110%	5.0	108%	5.0	95%	5.0									
Tree canopy cover (average of emergent, canopy, sub-canopy)	24	12.1	50%	5.0	17.5	73%	5.0	62%	5.0	24	16.45	69%	5.0	18	75%	5.0	72%	5.0	67%	5.0									
Shrub canopy cover	4	5	125%	5.0	4	100%	5.0	113%	5.0	4	4	100%	5.0	14.5	363%	3.0	231%	4.0	172%	4.5									
Native grass cover	52	16	31%	1.0	20	38%	1.0	35%	1.0	52	48.6	93%	5.0	20	38%	1.0	66%	3.0	50%	2.0									
Organic litter	20	16	80%	5.0	25.4	127%	5.0	104%	5.0	20	13.4	67%	5.0	15	75%	5.0	71%	5.0	87%	5.0									
Large trees (euc plus non-euc)	14	4	29%	5.0	2	14%	5.0	21%	5.0	14	4	29%	5.0	4	29%	5.0	29%	5.0	25%	5.0									
Coarse woody debris	588	0	0%	0.0	0	0%	0.0	0%	0.0	588	0	0%	0.0	120	20%	2.0	10%	1.0	5%	0.5									
Non-native plant cover	0	10	10%	5.0	10	10%	5.0	10%	5.0	0	10	10%	5.0	10	10%	5.0	10%	5.0	10%	5.0									
Site Condition Score				51.0			51		51.0				55.5			51		53.3		52.1									
MAX Site Condition Score				80			80		80				80			80		80		80									
Site Condition Score - out of 20				12.75			12.75		12.75				13.88			12.75		13.31		13.03									
Quality and availability of food and foraging habitat + Quality and availability of shelter																													
Benchmark		Raw data		Score		Raw data		Score		Average Score		Benchmark		% contribution		Raw data		Score		Raw data		Score		Average Score		Total average score			
Species richness	20		11	5.0		1	5.0		5.0		5.0	20		22.2		11	5.0		5.0		5.0		5.0		5.0		5.0		
Flower score	10		0.65	8.0		0.65	8.0		8.0		8.0	10		0.65		8.0		8.0		8.0		8.0		8.0		8.0			
Timing of Biological shortages	10		8.5	8.5		8.5	8.5		8.5		8.5	10		11.1		8.5		8.5		8.5		8.5		8.5		8.5			
Quality of foraging habitat	20		1	5.0		1	5.0		5.0		5.0	20		22.2		1	5.0		5.0		5.0		5.0		5.0		5.0		
non-native plant cover	20		0.1	10.0		0.1	10.0		10.0		10.0	20		22.2		0.1	10.0		10.0		10.0		10.0		10.0		10.0		
Q+A foraging habitat + Q+A shelter habitat score				36.5			36.5		36.5		36.5						36.5		36.5		36.5		36.5		150.2				
MAX Score	80			80			80		80		80	80		80			80		80		80		80		60				
Site condition score	20			12.8			12.8		12.8		12.8	20		22.2		13.9		12.8		13.3		13.0		13.0		36.5			
Q+A foraging habitat + Q+A shelter habitat score	80			36.5			36.5		36.5		36.5	80		88.9		36.5		36.5		36.5		36.5		36.5		36.5			
Combined Habitat Quality Score				49.3			49.3		49.3		49.3					50.4		49.3		49.8		49.5		49.5		49.5			
MAX Habitat Quality Score	100			100			100		100		100	100		100		100		100		100		100		100		100			
Combined HQ Score - out of 4				1.97			1.97		1.97		1.97					2.02		1.97		1.99		1.98		1.98		1.98			
Site Context																													
Benchmark		Data		Score		Data		Score		Average Score		Benchmark		Data		Score		Data		Score		Average Score		Data		Total average score			
Size of patch	10			10		10		10		10		10	10			10		10		10		10		10.0		10.0		10.0	
Connectiveness	10			10		10		10		10		10	10			10		10		10		10		10.0		10.0		10.0	
Context	10			3		3		3		3		3	10			3		3		3		3		3.0		3.0		3.0	
Ecological Corridors	10			10		10		10		10		10	10			10		10		10		10		10.0		10.0		10.0	
Role of site location to species overall population in the state	10			1		1		1		1		1	10			1		1		1		1		1.0		1.0		1.0	
threats to the species	10			10		10		10		10		10	10			10		10		10		10		10.0		10.0		10.0	
Site Context Score				44			44		44		44					44		44		44		44		44.0		44.0		44.0	
MAX Site Context Score				60			60		60		60					60		60		60		60		60		60		60	
Site Context Score - out of 3				2.20			2.20		2.20		2.20					2.20		2.20		2.20		2.20		2.20		2.20		2.20	
Species Stocking Rate																													
Benchmark										Average Score		Benchmark												Average Score		Total average score			
Guif tree density per/ha	10			2	2		4	4	4		3	10			4	4		4	4		4	4		4		3.5			
Site Context Score				2					4		3					4		4		4		4		4.0		3.5			
MAX Site Context Score				10					1.20		0.90					10		10		10		10		10		10		10	
Site Context Score - out of 3				0.60					1.20		0.90					1.20		1.20		1.20		1.20		1.20		1.20		1.05	

assumed full planting – though not yet reflected in scores.

assumed full planting to achieve a tree diversity of 5 throughout the offset area. Expected that trees will begin to move into the T2 layer by year 10.

Native forbs are expected to regenerate naturally over time, especially following good rain years.

Native grass layer will increase, largely due to assisted regen (shrubs and trees in shrub form). This will thin out again in years 15 and 20.

assisted revegetation will plant native stock (or spread seed) to meet benchmark values native to the area and RE. One new native grass species is expected to accumulate each vegetation survey year.

Native forbs are expected to regenerate naturally over time, especially following good rain years.

Estimated at 2 new species each assessment year.

Tree canopy height is expected to increase over time. Conservative estimate of 50cm of growth is expected at each vegetation survey year (every 5 years), until benchmark value is attained.

Tree canopy cover is expected to increase over time from the growth of existing canopy trees, and then new trees will accumulate at years 15-20 when assisted regen trees are contributing to the canopy layer with more certainty. Increased canopy is expected to reach 5 m of growth is expected at year 10 due to assigned regeneration.

Exchange between years 10 and 15 is expected to reduce regeneration rates by 2.

Expected gradual increase in raw data between each vegetation survey year. Especially following weed control and grass seed sowing.

Assessment of revegetation, grass cover between years 5 and 10 is expected to remain similar.

potential increase in raw data. Not estimated as benchmark value is already attained at baseline.

Up to 2 large trees are predicted to accumulate, based on BioCondition data collected at baseline. See large tree tab.

no predicted change at year 10.

reduced to less than 15%.

Final habitat quality score (weighted)	AU1	AU2	Average/ Final
Site Condition score (out of 3)	1.97	1.99	1.98
Site Context Score (out of 3)	2.20	2.20	2.20
Species Stocking Rate Score (out of 4)	0.90	1.20	1.05
Habitat Quality score (out of 10)	5.07	5.39	5.23
Assessment Unit area (ha)	5.84	11.84	17.68
Total offset area (ha) for this MNES	17.68	17.68	17.68
Size Weighting	0.33	0.67	1.00
Weighted Habitat Quality Score	1.67	3.61	5.29

Supplementary table for threats scoring			Score			Result		Final result
Listed threatening process	Scoring indicator	Score weight	1	7	15	Score	Weighted score	
Altered fire regimes	Fuel hazard rating	30%	Extreme or Very High fuel hazard rating	Moderate or High fuel hazard rating	Low fuel hazard rating	15	4.5	
Entanglement in netting and barb wire fences	Presence of top-stand barbed-wire fencing or similar	15%	Site is entirely bounded by top-stand barbed-wire fencing	Top-stand barbed-wire fencing in present on at least one fence boundary or internal fence line	Site is absent of top-stand barbed-wire fencing	15	2.25	
Electrocution on powerlines	Presence of powerlines	15%	Powerline/s intersect site	Powerline/s run parallel with a site boundary (within 100 metres)	Powerlines are not present as per the above	7	1.05	
Habitat loss, fragmentation, and degradation	Proportion of wooded vegetation	40%	0-35% wooded vegetation occupies the site	36-75% wooded vegetation occupies the site	>75% wooded vegetation occupies the site	15	6	
Threats score out of 15								
Scaled score (1-5=1; 6-10=5; 11-15=10)								
								13.8

Assessment Unit - Regional Ecosystem		AU1 - Non-rem - 12.3.3								AU 2 - HVR 12.3.3								Total		
Site Reference	Benchmark	BC06			BC08			Average %	Average Score	Benchmark	BC05			BC07			Average %	Average Score	average %	
	12.3.3	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score			12.3.3	Raw Data	% Benchmark	Score	Raw Data	Benchmark	Score			benchmark	
Site Condition																			Total average score	
Recruitment of woody perennial species in EDL	100	100	100%	5.0	100	100%	5.0	100%	5.0	100	100	100%	5.0	100	100%	5.0	100%	5.0	5.0	
Native plant species richness - trees	5	5	100%	5.0	5	100%	5.0	100%	5.0	5	5	100%	5.0	5	100%	5.0	100%	5.0	5.0	
Native plant species richness - shrubs	5	6	120%	5.0	6	120%	5.0	120%	5.0	5	7	140%	5.0	6	120%	5.0	130%	5.0	5.0	
Native plant species richness - grasses	9	7	78%	2.5	7	78%	2.5	78%	2.5	9	7	78%	2.5	7	78%	2.5	78%	2.5	2.5	
Native plant species richness - forbes	25	16	64%	2.5	21	84%	2.5	74%	2.5	25	27	108%	5.0	25	100%	5.0	104%	5.0	3.8	
Tree canopy height (average of emergent, canopy, sub-canopy)	17	12.5	74%	5.0	16	94%	5.0	84%	5.0	17	18	106%	5.0	18.75	110%	5.0	108%	5.0	5.0	
Tree canopy cover (average of emergent, canopy, sub-canopy)	24	21.6	90%	5.0	21.6	90%	5.0	90%	5.0	24	21.6	90%	5.0	21.6	90%	5.0	90%	5.0	5.0	
Shrub canopy cover	4	5	125%	5.0	4	100%	5.0	113%	5.0	4	4	100%	5.0	4	100%	5.0	100%	5.0	5.0	
Native grass cover	52	50	96%	5.0	50	96%	5.0	96%	5.0	52	50	96%	5.0	50	96%	5.0	96%	5.0	5.0	
Organic litter	20	12.1	61%	5.0	25.4	127%	5.0	94%	5.0	20	14.74	74%	5.0	16.5	83%	5.0	78%	5.0	5.0	
Large trees (euc plus non-euc)	14	4	29%	5.0	4	29%	5.0	29%	5.0	14	4	29%	5.0	6	43%	5.0	36%	5.0	5.0	
Coarse woody debris	588	150	26%	2.0	150	26%	2.0	26%	2.0	588	150	26%	2.0	150	26%	2.0	26%	2.0	2.0	
Non-native plant cover	0	4.9	5%	10.0	4.9	49%	3.0	27%	6.5	0	4.9	5%	10.0	4.9	5%	10.0	5%	10.0	8.3	
Site Condition Score				62.0			55		58.5				64.5			64.5		64.5	61.5	
MAX Site Condition Score				80			80		80				80			80		80	80	
Site Condition Score - out of 20				15.50			13.75		14.63				16.13			16.13		16.13	15.38	
Quality and availability of food and foraging habitat + Quality and availability of shelter	Benchmark	Raw data	Score		Raw data	Score		Average Score		Benchmark	% contribution	Raw data	Score		Raw data	Score		Average Score	Total average score	
Species richness	20	4	10.0		4	10.0		10.0		20	22.2	4	10.0		4	10.0		10.0	10.0	
Flower score	10	0.58	8.0		0.58	8.0		8.0		10	11.1	0.58	8.0		0.58	8.0		8.0	8.0	
Timing of Biological shortages	10	10	10.0		10	10.0		10.0		10	11.1	10	10.0		10	10.0		10.0	10.0	
Quality of foraging habitat	20	3	5.0		3	5.0		5.0		20	22.2	3	5.0		3	5.0		5.0	5.0	
non-native plant cover	20	0.049	20.0		0.049	20.0		20.0		20	22.2	0.049	20.0		0.049	20.0		20.0	20.0	
Q+A foraging habitat + Q+A shelter habitat score			53.0			53.0		53.0					53.0			53.0		53.0	166.9	
MAX Score	80		80			80		80		80			80			80		80	60	
Site condition score	20		15.5			13.8		14.6		20	22.2		16.1			16.1		16.1	15.4	
Q+A foraging habitat + Q+A shelter habitat score	80		53.0			53.0		53.0		80	88.9		53.0			53.0		53.0	53.0	
Combined Habitat Quality Score			68.5			66.8		67.6					69.1			69.1		69.1	68.4	
MAX Habitat Quality Score	100		100			100		100		100			100			100		100	100	
Combined HQ Score- out of 4			2.74			2.67		2.71		100			2.77			2.77		2.77	2.74	
Site Context	Benchmark	Data	Score		Data	Score		Average Score		Benchmark	Data	Score		Data	Score		Average Score	Data	Total average score	
Size of patch	10	> 200 ha of cat A/B/C reg v	10			10		10.0		10		10			10		10.0		10.0	
Connectedness	10	12 camps within 20 km of	10			10		10.0		10		10			10		10.0		10.0	
Context	10	26% of area within 20 km of	3			3		3.0		10		3			3		3.0		3.0	
Ecological Corridors	10	Within state corridor	10			10		10.0		10		10			10		10.0		10.0	
Role of site location to species overall population in the state	10	1 significant camp within 2	1			1		1.0		10		1			1		1.0		1.0	
threats to the species	10	Low level threats	10			10		10.0		10		10			10		10.0		10.0	
Site Context Score			44			44		44.0					44			44		44.0	44.0	
MAX Site Context Score			60			60		60					60			60		60	60	
Site Context Score - out of 3			2.20			2.20		2.20					2.20			2.20		2.20	2.20	
Species Stocking Rate	Benchmark							Average Score		Benchmark							Average Score		Total average score	
GHFF tree density per/ha	10		4	4		4	4	4		10		4	4		4	4	4		4.0	
Site Context Score			4			4		4.0				4			4		4.0		4.0	
MAX Site Context Score			10			10		10				10			10		10		10	
Site Context Score - out of 3			1.20			1.20		1.20				1.20			1.20		1.20		1.20	

Final habitat quality score (weighted)	AU1	AU2	Average/ Final
Site Condition score (out of 3)	2.71	2.77	2.74
Site Context Score (out of 3)	2.20	2.20	2.20
Species Stocking Rate Score (out of 4)	1.20	1.20	1.20
Habitat Quality score (out of 10)	6.11	6.17	6.14
Assessment Unit area (ha)	5.84	11.84	17.68
Total offset area (ha) for this MNES	17.68	17.68	17.68
Size Weighting	0.33	0.67	1.00
Weighted Habitat Quality Score	2.02	4.13	6.15

Supplementary table for threats scoring			Score			Result		Final result
Listed threatening process	Scoring indicator	Score weight	1	7	15	Score	Weighted score	
Altered fire regimes	Fuel hazard rating	30%	Extreme or Very High fuel hazard rating	Moderate or High fuel hazard rating	Low fuel hazard rating	15	4.5	
Entanglement in netting and barb wire fences	Presence of top-strand barbed-wire fencing or similar	15%	Site is entirely bounded by top strand barbed-wire fencing	Top-strand barbed-wire fencing in present on at least one fence boundary or internal fence/line	Site is absent of top-strand barbed-wire fencing	15	2.25	
Electrocution on powerlines	Presence of powerlines	15%	Powerline/s intersect site	Powerline/s run parallel with a site boundary (within 100 metres)	Powerlines are not present as per the above	7	1.05	
Habitat loss, fragmentation, and degradation	Proportion of wooded vegetation	40%	0-25% wooded vegetation occupies the site	26-75% wooded vegetation occupies the site	>75% wooded vegetation occupies the site	15	6	
Threats score out of 15								
Scaled score (1-5=1; 6-10=5; 11-15=10)								
13.8								