Offset Management Plan

Glass Manufacturing and Recycling Facility 222 & 298 Stapylton Jacobs Well Road, Stapylton

Visy Glass Operations (Australia) Pty Ltd

13 October 2023

→ The Power of Commitment

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Abbreviations and acronyms

Abbreviation/acronym	Definition
CWD	Course woody debris
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DES	Queensland Department of Environment and Science
DoR	Department of Resources
EDL	Ecologically Dominant Layer
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
Ha	Hectares
Impact area	The area of the Project where the proposed action will occur. This is located within Lot 2 WD4654 and encompasses 11.95 ha
LBM	Legally binding mechanism
MQHQ	Modified Queensland Habitat Quality
OMP	Offset Management Plan
SARA	State Assessment and Referral Agency
the Project	Visy's Glass Recycling and Manufacturing Facility (EPBC 2022/09243)
Visy	The Visy group of companies, including Visy Glass Operations (Australia) Pty Ltd
Project area	The area of the Project where the proposed development will occur. This is all land within the boundaries of Lot 2 WD4654 and Lot 2 SP189558
Offset property	The land parcel within which the offset area is proposed (real property description Lot 908 SP280831)
Offset area	The area where the proposed direct land-based offset of rehabilitation and restoration will occur within the boundary of 908 SP280831
RE	Regional ecosystem
SAT	Spot Assessment Technique
SQP	Suitably qualified person
VDec	Voluntary declaration
VM Act	Queensland *Vegetation Management Act 1999*

1. Introduction

1.1 Purpose of this report

This Offset Management Plan (OMP) has been proposed to support an approvals process for Visy Glass Operations (Australia) Pty Ltd's (Visy) proposed Glass Recycling and Manufacturing Facility located at Stapylton in the City of Gold Coast (EPBC 2022/09243) ('the Project'). The OMP provides an overview of potential habitat values and impacts of the controlled action within the Project's impact area and outlines proposed offset compensation for the loss of habitat through rehabilitation and restoration measures at a local land-based offset area. The offset area objectives, methods of delivery, anticipated outcomes and compliance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) policies are detailed herein.

This OMP accompanies the preliminary documentation for EPBC 2022/09243 to allow the Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW) to assess the potential impacts of the Project. A declaration of accuracy is included in Appendix A.

The Project is considered likely to have a significant impact on matters of national environmental significance (MNES), in particular one species listed under the EPBC Act that is considered likely to occur:

– Koala (*Phascolarctos cinereus*) – Endangered.

This OMP has been prepared in response to a Request for Information from DCCEEW requesting:

– Strategies proposed to avoid, mitigate and offset impacts to listed threatened species and communities
– Any other relevant information on the matters protected under the EPBC Act.

Subsequent to the referral submission of EPBC 2022/09243, substantial opportunities have been identified to avoid and mitigate impacts of the Project on potential habitat for the koala. The degraded nature of existing habitat for the koala within the Project's impact area, including connectivity and mobility, has provided substantial opportunities to reduce the impact on habitat and resources by improving the values of habitat within a local offset area. After mitigation measures and the proposed offset have been considered, significant residual impacts to the koala are not anticipated from the Project.

1.2 Purpose of revision

The purpose of this revised OMP is to address Condition 8 of the EPBC Act Approval (EPBC 2022/09243);

*"8. Within 9 months of this approval, the approval holder must submit to the **department** a version of the **Visy Offset Management Plan**, revised to include:*
a. the methods, dates and results of the baseline surveys required under condition 7,
b. details of how the outcomes specified in conditions 11 and 12 will be achieved, and
a. a program of monitoring and a schedule to report progress against performance and completion criteria in respect of achieving the ecological outcomes specified in conditions 11 and 12.

*The approval holder must implement the revised **Visy Offset Management Plan** for the life of the approval."*

The revision includes updated information based on the results of the baseline survey for weed and feral animal abundance (Saunders Havill Group, 2023). All updated sections are specified in Section 2.1.

1.3 Report structure

This OMP contains the following sections:

– Section 1 – Introduction and scope of the report
– Section 2 – EPBC Act Information request response
– Section 3 – Project overview

– Section 4 – Overview of the proposed offset
– Section 5 – Suitability of the offset area
– Section 6 – Methods used to assess habitat quality
– Section 7 – Habitat quality scores
– Section 8 – Offset management principles
– Section 9 – Monitoring and reporting schedule
– Section 10 – Ongoing adaptive management
– Section 11– Risk assessment
– Section 12 – Compliance with EPBC Act Environmental Offsets Policy and Environmental Management Plan Guidelines
– Section 13 – References.

1.4 Definitions

For the purposes of this report, the following definitions are used:

– **Project area** – The project area includes all land within the boundary of the Lot 2 WD4654 and Lot 2 SP189558. The project area was that target of the field survey.
– **Impact area–-** The area where the proposed action will occur. This is located within Lot 2 WD4654 and encompasses 11.95 ha.
– **Offset property –** The offset property is the cadastral boundary of Lot 906 SP280831, which is located within northern Gold Coast suburb of Kingsholme.
– **Offset area –** The area within the offset property where the specific offset will be implemented and consists of two assessment units.

1.5 Scope and limitations

This report has been prepared by GHD for Visy Glass Operations (Australia) Pty Ltd and may only be used and relied on by Visy Glass Operations (Australia) Pty Ltd for the purpose agreed between GHD and Visy Glass Operations (Australia) Pty Ltd as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Visy Glass Operations (Australia) Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

1.6 Suitably qualified personnel

Commonwealth offsets typically require baseline surveys to be conducted by a suitably qualified person (SQP) in accordance with the following Commonwealth survey guidelines:

– Survey Guidelines for Australia's threatened mammals (DSEWPaC, 2011)

Further information on the guidelines used to inform the methodology is detailed in Section 6.

Within the definitions of EPBC 2022/09243, a SQP for this project is defined as a person who has professional qualifications, training, skills and at least three years' of relevant experience specific to locating, identifying and conserving the MNES. The SQP must be able to give authoritative independent assessment, advice and analysis specific to the koala using the relevant protocols, standards, methods and/or literature. Where the person does not have the appropriate professional qualifications, they must have at least five years' of relevant experience specific to the MNES.

In order to comply with this requirement, all work has been undertaken under the direction of the following SQP:

– Senior Ecologist at GHD – BSc (Adelaide), MSc (James Cook University), PhD (Griffith University). Senior ecologist designed the habitat scoring for the koala and undertook habitat scoring surveys for both the impact area and the offset area. The senior ecologist has over 20 years' experience in ecological research and consulting. The senior ecologist has extensive experience delivering ecological assessments to support Commonwealth environmental approvals for infrastructure projects in the renewables, mining, gas, defence, road, rail, power and water development sectors. The senior ecologist has developed Commonwealth environmental offsets for a range of MNES including the koala, southern black-throated finch, bare-rumped sheathtail bat and southern squatter pigeon.

1.7 Offset working group

An offset working group was established to support preparation of this OMP and to ensure it is prepared in accordance with the EPBC Act offsets requirements and will achieve outcomes to support the National Recovery Plan for the koala. Members of the offset working group, including experience and relevant qualifications, are provided in Table 1.1.

The offset working group has conducted several online meetings to develop and review the OMP, with provision of input to various aspects, including but not limited to:

– Framework and objectives
– BioCondition methodology and modified Queensland habitat quality (MQHQ) scoring
– Management measures and activities
– Monitoring and corrective actions.

An onsite workshop was attended by most of the offset working group on 21 September 2022 to collaboratively discuss the OMP and specifically to identify future MQHQ scoring for the offset area. At the workshop the current MQHQ scoring for the offset area was reviewed in a systematic manner. Achievable scores for each criteria and key management and monitoring actions were determined using guidance from the relevant scoring frameworks in BioCondition Assessment Manual (Eyre et al 2015) and A review of koala habitat assessment criteria and methods (DAWE 2022) to support achievement of the future MQHQ score at the offset receiving area.

The offset working group is suitably experienced to properly identify and assess information captured within the OMP including for:

– Scientific ecological and BioCondition methodology
– EPBC Act and koala protection legislation requirements
– EPBC Act offset objectives and management framework focused on the koala
– Offset area location and context to support long-term viability of regional koala populations
– Land restoration and management for koala habitat and conservation within City of Gold Coast
– Conservation monitoring and corrective actions for offset land restoration for koalas within City of Gold Coast.

Table 1.1 Offset working group

Organisation	Position	Experience
Visy	Environmental Manager, Build Run Repair	Environmental chemist with 30 years in research, environmental regulation, and industry. 10 years with Visy with expertise in obtaining regulatory approvals, preparing operations management plans, monitoring and reporting for regulatory compliance.
GHD	Senior Ecologist	Ecologist with over 20 years in research and consulting. Expertise in ecological assessments to support Commonwealth environmental approvals for infrastructure projects. Developed offsets for a range of MNES including the koala.
GHD	Senior Ecologist	Botanical ecologist with 20 years in research and consulting. Expertise in SEQ bioregion vegetation and ecosystems, habitat assessment, environmental offsets and ecological approvals.
GHD	Principal Civil/Structural Engineer	Principal engineer with over 24 years' experience based in Queensland in the design, design management, construction / project management, supervision and contract administration of structural / civil and multidisciplinary projects for GHD for a variety of residential, commercial, industrial and municipal clients throughout Queensland including architects, private developers, councils, municipal corporations and government departments.
GHD	Senior Town Planner	Senior Town Planner with extensive experience in addressing environmental management and approvals components for projects in Queensland. Experience in addressing planning and environmental approvals required under the Planning Act, Commonwealth EPBC Act, Queensland State environmental legislation.
Saunders Havill	Senior Environmental Scientist	Environmental Scientist with over 5 years' of consultancy experiencing specialising in matters of national environmental significance and the *Environment Protection and Biodiversity Conservation Act 1999*.
Saunders Havill	Principal Environmental Scientist	Experienced environmental consultant with scientific credentials established via publication in both local and international peer-reviewed journals as well as government requisitioned reviews and reports. With over 10 years in consultancy their experience includes the coordination of environmental assessment and strategy development to meet the regulatory requirements and offset obligations for significant resource projects and commercial developments.
City of Gold Coast	Principal Environmental Policy Officer	Ecologist with over 19 years of experience in environmental planning and policy development with the City of Gold Coast. Developed and implements the City of Gold Coast's environmental offset policies. Has project managed partnerships with multiple entities for the delivery of environmental offsets (under both Queensland and EPBC offset policies) on Council land by the City of Gold Coast.
City of Gold Coast	Natural Areas Management Unit	Operating for over 20 years, the Natural Areas Management Unit within City of Gold Coast manages more than 13,000 ha of an expanding Council owned natural areas estate, including over 3,000 ha of natural areas restored since 2008. The purpose of the Natural Areas Management Unit is to protect and enhance the natural and cultural values of Council's conservation estate on the Gold Coast. The Natural Areas Management Unit consists of over 40 Council officers with experience in conservation asset management, bushfire management, restoration, restoration planning and park management/maintenance. The Natural Areas Management Unit has delivered over 100 ha of koala habitat offset restoration projects across Council's conservation estate, and as a unit plants over 100,000 native tube stock each year.

1.8 Visy environment management protocols

Visy Glass Operations (Australia) Pty Ltd is a member of the Visy group of companies (Visy). Visy is an integrated packaging, paper and resource recovery company operating in Australia for over 70 years and with over 120 sites throughout Australasia and over 7,000 employees. Visy provides an innovative end-to-end approach for customers' needs including across paper, primary packaging (glass, plastic, cans) and fibre packaging (cardboard). Across Australia, Visy processes recyclables from more than three million households and workplaces in any year, including 521,000 tonnes of glass in FY2021.

Visy is the largest manufacturer of glass containers in Australia-New Zealand, making around 843,000 tonnes of glass in FY2021. Visy's commitment to sustainable development means Visy takes a whole of product lifecycle approach to ensure the activities, products and services undertaken enhance the environment in the communities in which Visy operates.

The establishment of a new state of the art Glass Recycling and Manufacturing Facility will ensure the glass bottles and jars Queenslanders consume and recycle will stay in Queensland. Visy's investment will represent a transformation for glass recycling and manufacturing in Queensland and the new facility will spearhead Visy's aim to increase the average amount of recycled content in glass containers manufactured by Visy to 70%, simultaneously improving recycling and lowering emissions.

1.9 City of Gold Coast's previous offset experience

The City of Gold Coast has an active environmental offsets program which to date has delivered over 125 ha of offset plantings in response to impacts on koala habitat by the development industry (through the *Planning Act 2016*) and state government infrastructure providers (through the State Government Supported Infrastructure Koala Conservation Policy, July 2017), as well as impacts to local vegetation values (through the City of Gold Coast City Plan). These environmental offsets have been delivered by the City of Gold Coast's experienced Natural Areas Management Unit and cover a wide range of the Gold Coast including Pimpama, Ormeau, East Coomera, Numinbah Valley, Lower Beechmont, Tallebudgera and Mudgeeraba. The City of Gold Coast's Natural Areas Management Unit has operated for over 20 years, and in this time has delivered countless restoration and revegetation projects across the city and is responsible for the management of over 13,000 ha of conservation estate.

The City of Gold Coast has been delivering environmental offset projects since 2013, when it delivered a 22 ha koala habitat restoration project at Pimpama River Conservation Area. This project was a full revegetation project to convert 22 ha of a cleared paddock into koala habitat. In just nine years since restoration was undertaken, vegetation at the offset property has reached a height of approximately 15 m and is reflective of the sites preclear regional ecosystem. Importantly, koala scats were recorded throughout the offset planting after only five years, and resident koalas have now been recorded using the offset planting areas as the entirety of their home range.

The City of Gold Coast also delivered a federal koala offset at Lower Beechmont in 2014. This offset was a combination of revegetation and assisted regeneration of an old farm site that was dominated by acacia regrowth. In the eight years since 2014, native vegetation cover has significantly improved, and Spot Assessment Technique (SAT) (Phillips and Cavanagh, 2011) surveys have identified the presence of koalas using the site, including visual identification.

Figure 1.1 is an extract from the annual report prepared in year six for the Lower Beechmont federal koala offset by City of Gold Coast. It shows the project's indicators of success and demonstrates the City of Gold Coast's capabilities in achieving meaningful native vegetation cover improvements over short periods of time.

Appendix B - Indicators of success

CITY OF GOLDCOAST.

Table 2. Offset indicators of success (year 6)

Success Indicator	Measure of Success Offset Management Plan end of year 5	Quadrat	Native vegetation cover (%) (Braun-Blanquet cover-abundance scale) Assessed in year 5			Total percentage increase In native cover (%)
			Prior to works	Year 3	Year 5	
Koala habitat at impact site offset through ecological restoration – **assisted regeneration** of 8.13 hectares of vegetation. (4,065 trees)	Native species cover abundance increasing in dominance at completion of years three and five. Measured using Braun-Blanquet cover-abundance scale at designated quadrats.	1	10	96	98	88
		4	35	100	100	65
		5	35	100	100	65
		7	95	100	100	5
Koala habitat at impact site offset through ecological restoration – **revegetation planting** of 4.67 hectares including koala habitat and co-occurring species. (23,350 trees)	Native species cover abundance increasing in dominance at completion of years three and five. Measured using Braun-Blanquet cover-abundance scale at designated quadrats.	2	5	59	66	61
		3	5	72	100	95
		6	5	34	100	95
		8	10	51	90	80
	80% of planted koala habitat trees are establishing.	Based on the current survival rates of plantings, plant densities observed on ground and desktop analysis of total area planted, more than 80% of planted koala trees are establishing.				

Figure 1.1 Extract from the annual report prepared in year 6 for the Lower Beechmont federal koala offset

2. EPBC Act Information request response

This section outlines the information requested by DCCEEW as part of the Preliminary Documentation for EPBC 2022/09243 in relation to environmental offsets and outlines how this OMP provides responses to the information request. Refer to Table 2.1 below.

Table 2.1 Summary of DCCEEW's information request

Item number	Description	Response
Section 6 – Proposed offsets		
6.1	Discuss how the proponent will provide offsets that meet the requirements of the EPBC Offsets Policy.	Item 6.1 is discussed in Section 4, Section 8 Section 9 and Section 10.
6.2	If potential offset site/s are identified, as far as possible please provide: a. A description of the proposed offset site(s) including location, size, condition, and relevant ecological/species habitat features, landscape context and cadastre boundaries of the offset site(s) (supported by mapping). b. Information about how the proposed offset/s area will provide connectivity with other relevant habitats and biodiversity corridors. c. Information how the proposed offset site/s contribute to relevant State and/or regional plan/s or initiatives for the conservation of the protected matter. d. A summary of consultation with the representative local council at the impact and offset site, and if relevant, state government, regarding the suitability of the offset area within any relevant local and state biodiversity and species plans, and any proposed legal security mechanisms. e. Evidence of the presence of, or usage by, relevant MNES on, or adjacent to the proposed offset site(s), and the presence and quality of habitat for MNES on the proposed offset site. f. An assessment of how the offset and impacts sites are like-for-like, i.e. the environmental values for the MNES at the offset are of the same type or equivalent to that affected by the proposed action. g. The methodology, with justification and supporting evidence, used to inform the inputs of the Offsets Assessment Guide in relation to the offset area for each relevant MNES, including: i. total area of habitat (in hectares (ha)); and ii. habitat quality (as discussed in section 8) iii. time over which loss is averted (max. 20 years); iv. time until ecological benefit; v. risk of loss (%) without offset; vi. risk of loss (%) with offset; and vii. confidence in result (%). h. Details and execution timing of the mechanism to legally secure the environmental offset/s (under Queensland legislation or equivalent) to provide enduring protection for the potential offset area/s against development incompatible with conservation. i. Costings of the proposed offset site/s and any on-going management required."	Item 6.2 is addressed in Section 4, Section 4.1.5, Section 6 and Section 7.

Item number	Description	Response
Section 7 – Habitat quality		
	A methodology that is suitable for each listed threatened species or threatened ecological community (i.e. approved by the department or supported by literature) where there is a residual significant impact must be used to assess habitat quality, noting the same scoring mechanism must be used at both impact and offset sites. The department currently prefers the use of the Modified Habitat Quality Assessment (MHQA) tool to provide a habitat quality score for the prescribed matters. Please consult the department if an alternative approach is proposed. The MHQA tool derives habitat quality scores using an adaptation of the Queensland Government's 'Guide to determining terrestrial habitat quality' version 1.2 (DEHP Guide). The MHQA method was developed with the intention to adapt the Queensland tool to reflect the requirements of the EPBC Act Environmental Offsets Policy for determining habitat quality. A copy of the DEHP Guide, a MHQA scoring guide and a MHQA scoring spreadsheet template is attached. When calculating offsets, please refer to the department's published guidance: How to use the Offsets Assessment Guide. If applying the MHQA tool and an offset is required to compensate for a significant residual impact, please note the following: – If you propose a habitat quality gain of more than 2 points, or an achieved habitat quality score of 9 or 10, it becomes less certain that the conservation outcome can be achieved. The justification of effectiveness of your proposed management measures and associated habitat quality score improvements and (reflected in the confidence in result) must be supported by substantial evidence. – Higher habitat quality gains will generally be associated with lower 'confidence in result' scores in the Offset Assessments Guide to reflect the difficulty associated with achieving the conservation outcomes. In these cases, it is likely that outcomes-based commitments will be required in the associated management plan for the site, including specifying binding metrics to be met to demonstrate quality improvement. For further information, please contact the department to discuss the metrics that will be used to demonstrate achievement of quality standards. If you wish to propose an alternative methodology for habitat quality assessment for any/all of the prescribed matters, the methodology used to provide the quality score for an area of habitat must: – Relate directly to habitat requirements of the species as aligned with the information in the SPRAT database and relevant statutory/departmental documents. – Be substantiated with appropriate field surveys in accordance with the relevant survey guidelines or using a scientifically robust and repeatable methodology. – Be applied per listed threatened species or threatened ecological community likely to experience a significant residual impact as a result of the proposed action. Where there is any variation or un-substantiation of the habitat assessment approach from the information available in the SPRAT database, it should be discussed with the department prior to the submission of the assessment documentation and must be supported by scientific evidence including published research, independent expert advice and information derived from field surveys.	Field surveys, offsets calculations and reporting have been conducted in accordance with the relevant Commonwealth and State guidelines. Specifically, – EPBC Act Offsets Assessment Guide (DSEWPaC, 2012). – Queensland BioCondition Assessment Manual (Eyre et al., 2015). – Modified QLD Habitat Quality spreadsheet. – Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES, 2020).

2.1 EPBC approval conditions

This section outlines the conditions included in the Projects EPBC Approval (2022/09243) in relation to weed and pest management for environmental offsets. Table 2.2 details how this revised OMP addresses the relevant conditions.

Table 2.2 Summary of EPBC Act Referral EPBC -2022/09243

Condition number	Description	Response
Offset site – Pest and Weed Management		
7	Within 6 months of this approval, the approval holder must ensure a suitably qualified field ecologist completes baseline surveys of the Kingsholme Offset Area in accordance with a scientifically valid, robust and repeatable methodology, to determine the: a. extent of weed cover, and b. abundance of feral animals.	The approval is dated 17th January 2023, the baseline survey has been completed and was undertaken in February and March 2023. The field survey report is provided in 0.
8	Within 9 months of this approval, the approval holder must submit to the **department** a version of the **Visy Offset Management Plan**, revised to include:	This revised version of the OMP specifically addresses condition 8 and will be submitted to DCCEEW within 9 months of this approval (i.e., by the 27th October 2023).
8.a	The methods, dates and results of the baseline surveys required under condition 7,	Condition 8.a is discussed in Section 8.3.3, Section 8.3.4, Section 8.4.3 and Section 8.4.1. The field survey report is provided in Appendix C.
8.b	Details of how the outcomes specified in conditions 11 and 12 will be achieved, and	Condition 8.b is discussed Table 8.6 and Table 8.9.
8.a	A program of monitoring and a schedule to report progress against performance and completion criteria in respect of achieving the ecological outcomes specified in conditions 11 and 12	Condition 8.a is discussed Table 8.6 and Table 8.9.
9	If the Minister writes to the approval holder stating that he/she considers that the revised Visy Offset Management Plan, required under condition 8 is not likely to achieve the requirements of conditions 11 and 12, all clearing and construction in the development area must cease within 48 hours of receiving notice from the Minister, or as otherwise directed by the Minister.	Not triggered. In the event that Visy receives a notification from DCCEEW the requirements of this condition will be followed.
10	Clearing and/or construction may only recommence once the Minister notifies the approval holder that the Minister approves the revised Visy Offset Management Plan, or otherwise with the Minister's written agreement.	Not triggered. In the event that Visy receives a notification from DCCEEW the requirements of this condition will be followed
11	The approval holder must, by the end of Year 10 , ensure that the highest abundance of each feral animal species is less than 10% of the maximum feral animal species abundance as determined by the baseline surveys required under condition 7.	Condition 11 is addressed in Table 8.6 and Table 8.9.
12	The approval holder must, by the end of Year 7, have reduced the extent of weed cover at the Kingsholme Offset Area by 95% relative to the extent of weed cover determined by the baseline surveys required under condition 7.	Condition 12 is addressed in Table 8.6 and Table 8.9.
13	Once the approval holder achieves the outcomes of condition 11 and 12, the outcomes must be maintained or improved for the rest of the period of effect of approval.	Condition 13 is addressed in Section 8.7.

3. Project overview and impact site summary

3.1 Project and site

Visy proposes to develop a Glass Recycling and Manufacturing Facility located over a vacant greenfield site at 222 Stapylton Jacobs Well Road, Stapylton (Lot 2 on WD4654) and part of the adjoining brownfield site located at 298 Stapylton Jacobs Well Road (Lot 2 SP189558) which has existing Visy packaging manufacturing facilities for beverage cans and cardboard. The Project's proposed development is for high impact industry comprising three new state-of-the-art operations integrated as a single facility, being:

– Recycled glass cullet plant (furnace ready recycled glass)
– Container glass manufacturing facility
– Finished goods warehouse and distribution centre.

The Project is located in an area predominantly zoned medium impact industry/future medium impact industry precinct with some adjacent sites zoned as high impact industry/future high impact industry precinct. The adjacent land uses comprise various industrial or commercial operations and undeveloped blocks. The area beyond remains rural, with agricultural cropping and farmland uses.

The Project location is within the Yatala-Stapylton-Beenleigh Regional Economic Cluster of which the Shaping SEQ report states, "*represents a significant manufacturing cluster, with specialisation in priority sectors of integrated food and beverage supply chains, and transport and logistics*" (DILGP, 2017).

The Project involves directly impacting 11.95 ha of suitable koala habitat on Lot 2 WD4654, comprising of 4.8 ha of medium value koala habitat and 7.15 ha of low value koala habitat as presented in Figure 3.3.

The OMP proposes land-based offsets for the following MNES species that will be subject to significant residual impacts due to the Project:

– Koala – due to clearance of 11.95 ha of habitat critical to the survival of the species.

Habitat for MNES cleared for the Project is summarised below.

3.2 Summary of matters being offset on the impact area

The Project involves directly impacting 11.95 ha of suitable koala habitat on Lot 2 WD4654, comprising of 4.8 ha of medium value koala habitat and 7.15 ha of low value koala habitat as presented in Figure 3.3.

The OMP proposes land-based offsets for the following MNES species that will be subject to significant residual impacts due to the Project:

– Koala – due to clearance of 11.95 ha of habitat critical to the survival of the species.

Habitat for MNES cleared for the Project is summarised below.

3.2.1 Vegetation communities impacted

The impact area of the Project within Lot 2 WD4654 comprises remnant and regrowth vegetation consistent with the Queensland Government's regulated vegetation mapping of Category B, C and X areas.

Through a review of historical aerial imagery, the impact area property appears to have been cleared of vegetation in 1993, apart from a selection of larger trees scattered across the property. The mapped remnant areas have regrown since that time and attained remnant status under Queensland *Vegetation Management Act 1999* (VM Act), with some areas within the regrowth mapped areas being selectively cleared around the edges and along access tracks.

Field surveys confirmed the following Queensland Regional Ecosystems (REs) are present within the impact area of the Project:

– Least concern RE 12.11.5
– Least concern RE 12.11.24.

The impact area vegetation communities are located on Lot 2 on WD465 and are described in Table 3.1. Vegetation communities were dominated by eucalypt open forest, with areas of lower and more dense regrowth from past clearing. There are disturbances across the impact area from clearing, access tracks, an abandoned house, fences, weed infestations (particularly relating to road verges, clearings and areas lacking vegetation structure), and dumped rubbish.

Table 3.1 BioCondition field-verified REs within the impact area

RE	VM Act status	Vegetation	Area
12.11.5 (Remnant)	Least concern	*Corymbia citriodora* subsp*. variegata* woodland to open forest +/- *Eucalyptus siderophloia*/*E. crebra*, *E. carnea, E. acmenoides, E. propinqua* on metamorphics +/- interbedded volcanics.	0.5 ha
12.11.5 (regrowth)	Least concern		10.8 ha
12.11.14 (remnant)	Least concern	*Eucalyptus carnea* or *E. tindaliae*, *Corymbia intermedia* +/- *E. siderophloia* or *E. crebra* woodland on metamorphics +/- interbedded volcanics.	0.41 ha
Non-remnant	N/A	Non-remnant community dominated by introduced grasses with scattered regenerating tree and shrub species characteristic of the pre-clear REs described above	0.24 ha

3.2.2 Koala habitat within the impact area

Field surveys confirmed the presence of suitable koala habitat within the impact area on Lot 2 WD4654. This represented 4.8 ha of moderate value habitat and 7.15 ha of low value habitat, as presented in Figure 3.3.

Koala habitat within the Project area forms part of a mosaic of existing habitats that are becoming increasing fragmented by development in the northern Gold Coast region. The quality of habitat for koala varies across the Project area. On Lot 2 WD4654, there is moderate value habitat present within the remnant and regrowth woodland areas, and low value habitat in the cleared and dense grassy areas, which is suitable for movement only. The areas containing the abandoned house and wetland ecosystem do not hold habitat value for the koala. On Lot 2 SP189558, the areas containing tree vegetation do not hold habitat for the koala as the site is developed with two large and three smaller industrial buildings and is perimeter fenced with koala exclusion fencing.

The value of the koala habitat within the impact area is reduced by the fragmented spatial arrangement and the high levels of threats and disturbance from surrounding land uses (i.e. busy roads, domestic dogs, multiple sources of stress). Whilst the adjacent roads would present a local mortality risk, they are unlikely to present a barrier to koala movement due to a lack of fencing. Despite the very limited koala sighting records within the surrounding landscape, transient koalas may be likely to move through the area and utilise the impact area as dispersal and foraging habitat.

3.3 Quality of habitats within the impact area

The following methodology has been used to identify and assess the value of habitats within the impact area:

– Targeted field surveys of the impact area were undertaken by suitably qualified ecologists from GHD and Astrebla Consulting in August 2022 to:
  - Field-verify RE mapping to identify and map areas with equivalent vegetation and habitat value (i.e. BioCondition assessment units)
  - Assess the habitat quality of sites within the impact. Habitat quality was scored in accordance with the Queensland BioCondition Assessment Manual (Eyre et al 2015), Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020), the Modified QLD Habitat Quality spreadsheet (provided by DCCEEW directly for this purpose), and the EPBC Act Offsets Assessment Guide (DSEWPaC 2012).

3.3.1 Habitat quality scoring methods

The EPBC Act Offsets Assessment Guide (DSEWPaC 2012) was used to determine the percentage of the offset liability that would be met by the proposed offset area, considering the following elements to assess habitat quality:

– Site condition
– Site context
– Species stocking rate

The Modified QLD Habitat Quality spreadsheet (provided by DCCEEW) was used to input data obtained during field surveys and desktop analysis for impact areas.

Habitat scores were weighted with the ratios of site condition 30%, site context 30%, and species stocking rate 40%, consistent with recommendations provided by DCCEEW.

Site condition and site context scores were calculated using the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020), including scores for fauna species habitat (refer to Section 6.4.2 and 6.4.3) as per the Modified QLD Habitat Quality spreadsheet. Species stocking rate was informed by the results of four targeted surveys of the impact area (GHD 2022) and historical koala records for the local area (Atlas of Living Australia, Koala Tracker, Australian Koala Foundation Koala Map, Wildlife Online).

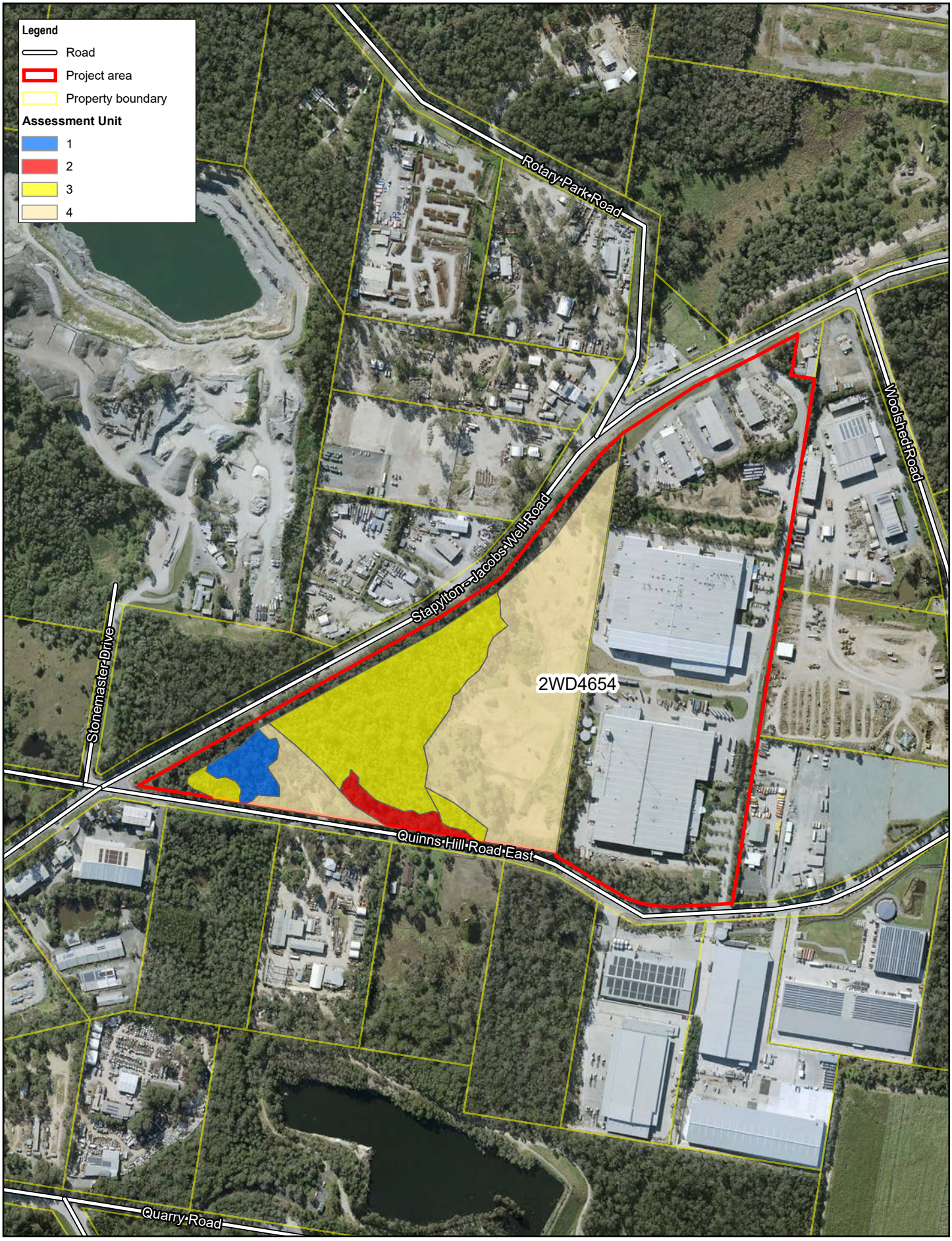
3.3.2 Overview of assessment units

Site conditions within the impact area was assessed within a series of assessment units as recommended in the Queensland environmental offsets framework, with four assessment units identified in the impact area, as summarised in Table 3.2 and shown in Figure 3.1. Within each assessment unit, a number of replicate condition plots was established in accordance with the number specified in Table 1.2 of the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020). Assessment at multiple condition plots is necessary to measure vegetation condition at representative locations across the spatial extent of each assessment unit.

Site condition was assessed at six plots within the impact area. The locations of condition plots within the offset area are mapped in Figure 3.1. Sites and assessment units are detailed in Table 3.2.

Table 3.2 Summary of replicate BioCondition plots in each assessment unit

Assessment unit	Vegetation type	Area (ha)	Number of sites required	BioCondition plots
Impact area				
AU1	Remnant 12.11.14	0.5	2	BC1
AU2	Remnant 12.11.5	0.41	2	BC2
AU3	Regrowth 12.11.5	4	2	BC3, BC4
AU4	Non-remnant 12.11.5	6.8	2	BC5, BC6



Paper Size ISO A4

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

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Visy Offset Management Plan

Distribution of assessment units in the impact area

Project No. **12550313**
Revision No. **0**
Date **5/10/2022**

FIGURE 3.1

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Layout: 12550313_003_ImpactAreaAssessmentUnit_Rev0
Print date: 05 Oct 2022 - 22:15

Data source: GHD: assessment units (2022); Visy: project area (2022); DoR: roads (2021), cadastre (2022); Metromap Tile Service: imagery.
Created by: cburns2

3.4 Site condition assessment

Site condition was calculated for each assessment unit using the following criteria detailed in the EPBC Act Offset Assessment Guide (DSEWPaC, 2012), the BioCondition Assessment Manual (Eyre et al 2015) and consistent with the Queensland Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020).

When using the offset calculator, the averaging method as requested by DCCEEW was adopted. Specifically, the raw data measurements from each transect within an assessment unit were averaged, and that number was used to determine the average score for the attribute. Habitat quality was scored in accordance with the Queensland BioCondition Assessment Manual (Eyre et al 2015), Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020), the Modified QLD Habitat Quality spreadsheet (provided by DCCEEW), and the EPBC Act Offsets Assessment Guide (DSEWPaC 2012).

Habitat quality criteria for the koala were derived by suitably qualified ecologists from GHD. For each condition parameter, scores out of 10 were assigned to align with the EPBC Act Offsets Assessment Guide (DSEWPaC 2012) scoring framework as detailed in the Modified QLD Habitat Quality spreadsheet.

3.4.1 BioCondition plot methodology

Each BioCondition plot measured 100 m by 50 m and was established along the direction of the contour (i.e. along the slope rather than upslope or downslope). The location of the centre of each plot was marked with a GPS and representative photographs of the plot were taken in each aspect (i.e. north, east, south, west). Each plot was then divided into sub-plots, as illustrated by the plot layout diagram provided as Figure 3.2, and the following attributes were recorded:

- 100 m transect:
  - Tree canopy cover.
  - Shrub canopy cover.
- 100 m by 50 m plot:
  - Total number of large eucalypt and non-eucalypt trees.
  - Height of ecologically dominant layer and other canopy/sub-canopy/emergent layers.
  - Tree species richness.
  - Proportion of the dominant canopy species with evidence of recruitment.
- 50 m by 10 m plot:
  - Species richness of shrubs, grass, forbs and other native species.
  - Weed cover.
- Five 1 m by 1 m quadrats:
  - Percent cover of native perennial grass.
  - Percent cover of organic litter.

The data was entered into the DES scoring sheet and compared to representative benchmark data for each RE containing habitat for the MNES. The Queensland Herbarium has published benchmark data for individual RE's, which is based on the above BioCondition assessment method, outlined in the BioCondition Assessment Manual (Eyre et al., 2015) using field-based reference sites that are best-on-offer for that RE. Benchmark data is used as a comparison against the data collected on site to derive the habitat quality score for each assessment unit. These scores were then incorporated into the overall condition score for each assessment unit by combining with species foraging and shelter habitat values (refer Section 3.4.2).

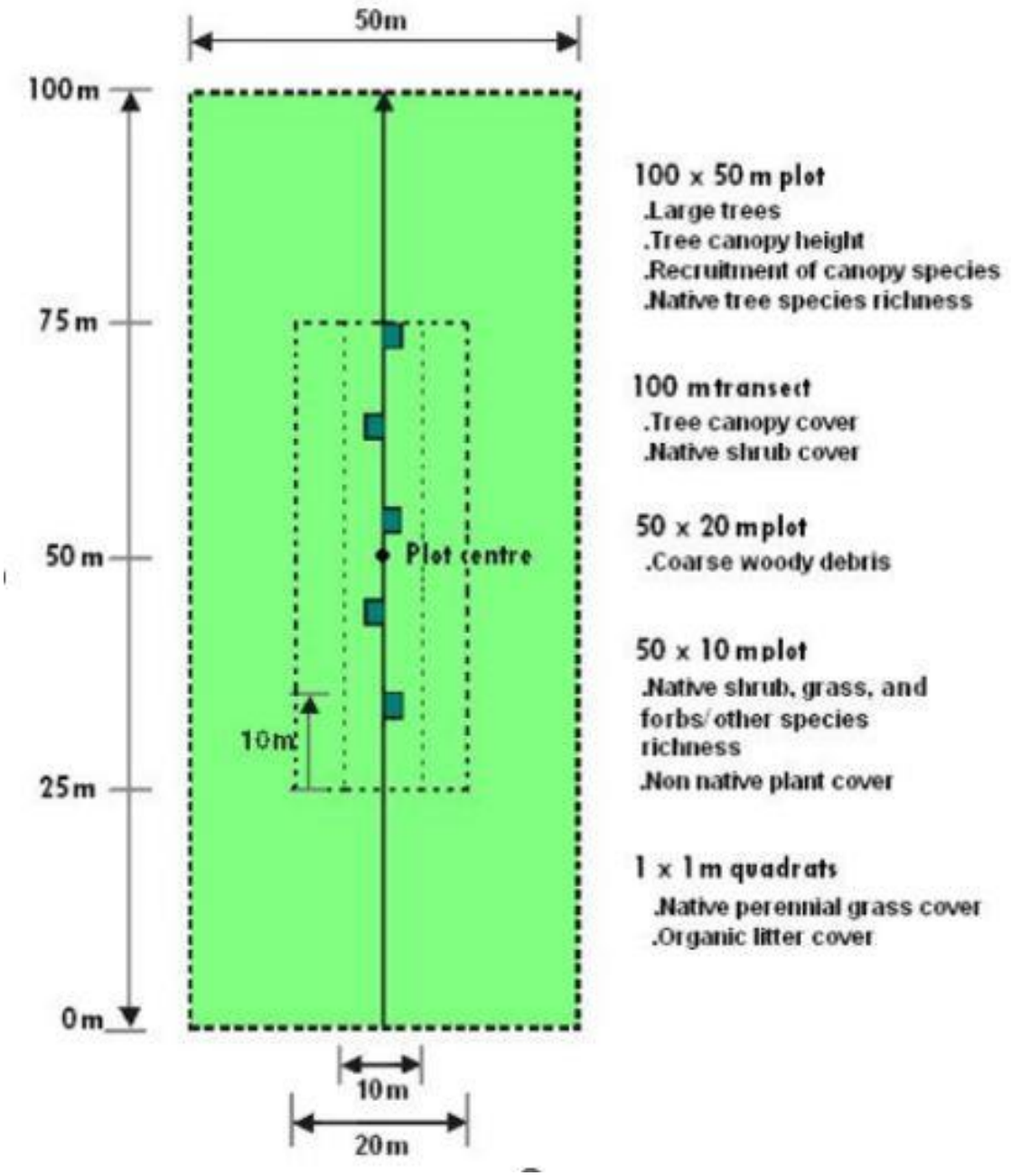


Figure 3.2 Layout of the BioCondition plot

3.4.2 Quality and availability of food and foraging habitat

The quality and availability of food and foraging habitat was determined for the koala using criteria detailed below. Food quality/availability scores were calculated for each assessment unit based on the average of all plot scores, with all criteria scored out of 25. Justification for all criteria is detailed below. Scoring parameters are summarised in Section 3.6.

The quality of food and foraging habitat for the koala was scored based on the average of the following criteria:

- **The abundance of non-juvenile locally important food trees**: The number of *locally important* koala food trees in each 50 m x 100 m BioCondition plot that meet the size criteria to qualify as non-juvenile koala food trees was calculated. This was based on the definition of *locally important* food trees as specified for the South-east Queensland bioregion in Youngentob et al. (2021) and the non-juvenile koala food tree definition outlined in the Queensland *Environmental Offsets Policy* (DES 2022) (i.e. any koala habitat tree that is more than 4 m high or has a trunk with circumference of more than 31.5 cm at 1.3 m above the ground). This criteria provides a measure of the biomass of food resources available to local koalas.
- **The relative diversity of locally important koala food tree species**: This was calculated by dividing the number of *locally important* koala food tree species present in each 50 m x 100 m BioCondition plot by the total number of locally important food tree species listed in the technical description for that RE community (Pollock 2018). Koalas are known to forage on a variety of food tree species. While koalas can persist in areas with only a single food tree species where that species meets its nutritional requirements, the provision of a diversity of food tree species increases the adaptability of foraging resources available to koalas. In south-east Queensland, koalas are known to utilise a broad range of food tree species and that diversity may increase drought tolerance as different species respond differently to changing climatic conditions.
- **Ease of movement**: This was scored based on the relative connectivity of habitat and the anticipated physical barriers (i.e. fences, waterbodies, dense vegetation) and behavioural barriers (i.e. large gaps that increase the risks of exposure to dog attack or busy roads that increase risk of vehicle strike) to koala movement. This observes that while koalas are capable of moving large distances across open ground when dispersing, during foraging activities, they tend to forage preferentially through habitats that have higher levels of connectivity and pose lower risks of mortality from dog attack and other forms of misadventure (Rus et al. 2020).

3.4.3 Quality and availability of shelter

The quality and availability of shelter was determined for each species using criteria detailed below. Shelter quality/availability scores were calculated for each assessment unit based on the average of all plot scores, with criteria scored out of 25 (as recommended in the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020) and in version 1.2) and then converted to scores out of 10 to align with the EPBC Act QLD Modified QLD Habitat Quality spreadsheet.

The quality and availability of shelter for the koala was scored, based on the average of the following criteria:

- **The abundance of non-juvenile *ancillary habitat* trees**: The number of *ancillary habitat* trees in each 50 m x 100 m BioCondition plot that meet the size criteria to qualify as non-juvenile koala habitat trees was calculated. This was based on the *ancillary habitat* trees identified for the Brigalow belt in Youngentob et al. (2021) and the non-juvenile koala food tree definition outlined in the Queensland *Environmental Offsets Policy* (DES 2022) (i.e. any koala habitat tree that is more than 4 m high or has a trunk with circumference of more than 31.5 cm at 1.3 m above the ground). This criteria provides a measure of the biomass of shelter resources available to local koalas.
- **Relative diversity of *ancillary habitat* trees**: This was calculated by dividing the number of *ancillary habitat* tree species present in each 50 m x 100 m BioCondition plot by the total number of locally *ancillary habitat* tree species listed in the technical description for that RE community (Pollock 2018). Ancillary habitat elements such as shelter vegetation may not contribute substantially to a koala's diet but are important for movement and thermoregulation. Shelter tree species that do not provide nutritional value can play an important role when they co-occur with *locally important* koala trees. Although these species do not constitute habitat in the absence of *locally important* koala trees, they are thought to make an important and potentially necessary contribution to koala habitat in many regions (Youngentob et al. 2021).

– **The relative abundance of shrub cover**: This was calculated directly from the shrub canopy cover scores calculated from the BioCondition plot data detailed in Section 6.4.1. As these scores have a maximum score of 5 in the *BioCondition Assessment Manual* (Eyre et al 2015), the score was multiplied by two to attain a score out of ten, consistent with the *Modified QLD Habitat Quality spreadsheet.* This provides an additional measure of shelter abundance for the koala.

3.5 Site context

For each assessment unit, site context scores were assigned based on the average of all plot scores for:

– Size of patch
– Connectedness
– Context
– Role of the site location to the overall population in the state
– Threats to the species
– Species mobility capacity.

3.5.1 GIS derived site context attributes

The first four GIS attributes of size of patch, connectedness, context and ecological corridors were calculated as part of the desktop analysis using the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020). This involved geospatial analysis to calculate the following indicators for each condition plot:

– Patch size, which involves measurement of the area of vegetation in which the assessment unit is contained and all other directly connecting areas of mapped remnant vegetation (total score of 10)
– Connectedness, which involves measurement of the length of remnant vegetation along the boundary of the site (total score of 5)
– Context, which involves measuring the percentage of remnant vegetation within a 1 km buffer around the site (total score of 5).

The information on each attribute was then used to determine the site context score in accordance with the framework provided by the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020), as shown in Table 3.3. These scores are then incorporated into the overall condition score for each assessment unit.

Table 3.3 Site context scoring framework

1 Size of Patch*	**Score**	0	2	5	7	10
	Description	<5ha	5-25ha	26-100ha	101-200ha	>200ha
2 Connectedness*	**Score**	0	2	4		5
	Description	0-10%	>10%-<50%	50-75%		>75% or >500ha
3 Context*	**Score**	0	2	4		5
	Description	<10% remnant	>10%-30% remnant	>30-75% remnant		>75% remnant
4 Distance to permanent watering point †	**Score**	0	2	5	10	20
	Description	0-500m	>500m-1km	>1-3km	>3-5km	>5km
5 Ecological corridors	**Score**	0	4		5	
	Description	Not within	Sharing a common boundary		Within (whole or part)	

** Measured for fragmented bioregions only*

† Measured for intact bioregions only

3.5.2 Role of the site location to the overall population in the state

As detailed in the *How to Use the Offsets Assessment Guide* (DAWE 2018), this value was obtained from the species stocking rate (detailed in Section 6.6), adjusted to a score of 10.

3.5.3 Threats to the species

At each assessment unit, threats to each species were assessed based on an average of all plot scores using criteria detailed below. The absence of threats was calculated as a score out of 25 using the risk matrix detailed in Table 3.4, taken from the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020), with the absence of threat score assigned based on the lowest score assigned for any threat. The score was then adjusted to a score out of 15 to align with the EPBC Act Modified QLD Habitat Quality spreadsheet.

Table 3.4 Threat matrix used to score absence of threats

Threat matrix			Severity				
			Very high	High	Medium	Low	Very low
			1	2	3	4	5
Scope	Very high	1	1	2	3	4	5
	High	2	2	4	6	8	10
	Medium	3	3	6	9	12	15
	Low	4	4	8	12	16	20
	Very low	5	5	10	15	20	25

Threats faced by the koala were scored out of 25, using the threat matrix above, scored for the following threats that are identified in the Conservation listing advice for the koala (DAWE 2022a):

- **Clearing and fragmentation of habitat:** Loss and fragmentation of koala habitat remains one of the principal threats to the species, resulting in critical reductions in resource availability and restriction on koala movement, increasing the exposure of individuals to increased risk of injury and mortality.
- **Risk of uncontrolled wildfire:** Koalas experienced extreme population losses throughout their range as a result of the 2020 Black Summer fires. Climate change has increased the level of threat faced by koalas from uncontrolled wildfires. While there has been a universal increase in the wildfire threat profile, inappropriate fire regimes can exacerbate the local threats by elevating fuel loads and increasing fire frequencies.
- **Risk of drought:** Changes in the climate are exposing koala populations to increased risk of decline from drought. This is particularly relevant for populations at the western edges of the species' range in habitats that are already more marginal in terms of their suitability.
- **Injury and mortality due to dog attacks:** Koalas are highly susceptible to injury and mortality from dog attacks. While this is particularly prevalent in peri-urban and residential areas, it is an ongoing threat to the species in all areas where wild or domestic dogs occur.
- **Collision with vehicles:** Injury and mortality of koalas represents a substantial threat to local koala populations in peri-urban and residential areas. This can exert negative pressures on local populations by increasing mortality and imposing barrier effects that restrict access to regional resources.

3.5.4 Species mobility capacity

Species mobility capability score was assigned for the koala at each assessment site. This was a score out of 25, based on an average of the following scores considering vegetation connectivity and the threat level faced during movement:

- **Habitat connectivity:** For each BioCondition plot a score of connectivity was assigned based on the following criteria: 0 (totally isolated), 2.5 partially isolated, 5 (periodically isolated), 7.5 major connectivity, 10 (totally connected).

3.6 Species stocking rate assessment

For each assessment unit in the impact area, a single value of species stocking rate was calculated using the criteria detailed in Table 3.5, based on the scoring system in the EPBC Act How to Use the Offsets Assessment Guide.

Table 3.5 Species stocking rate scoring criteria

Criteria	Score			
Presence detected on or adjacent to the site	0	5		10
	No	Yes – adjacent		Yes – on site
Species usage of the site	0	5	10	15
	Not habitat	Dispersal	Foraging	Breeding
Approximate density per ha	0	10	20	30
Role/importance of species population on site	0	5	10	15
	0	5 – 15	20 – 35	40 – 45

Scores for species stocking rate were based on information on the likely presence and abundance of the koala, based on the results of targeted assessments undertaken within the impact area, with survey effort summarised in Section 5.1.2. For species with low density (i.e. koala) nominal low density scores were used to calculate species stocking rate. As directed in the Modified QLD Habitat Quality spreadsheet, where information on changes in density is not available due to low density, these will be kept relatively constant and improvements in habitat quality will rely on increases in site condition scores (i.e. BioCondition, foraging habitat value, shelter habitat value, mobility habitat value) and reduction in threat scores.

3.6.1 Role/importance of the species population on site

For each assessment unit, the role / importance of the site for the species was assessed using the criteria detailed in Table 3.6 based on the supplementary table to the Species Stocking Rate in the EPBC Act Offsets Guide.

Table 3.6 Role/importance of the species population on site

Criteria	Score	
Key source population for breeding	0	10
	No	Yes/Possibly
Key source population for dispersal	0	5
	No	Yes/Possibly
Necessary for maintaining genetic diversity	0	15
	No	Yes/Possibly
Near the limit of the species range	0	15
	No	Yes

3.6.2 BioCondition results for the impact area

BioCondition scores at the impact area were low-moderate, scoring between 45 and 50 out of 80 at the remnant and regrowth assessment units and 5.5 at the non-remnant assessment unit. Refer to Table 3.7.

Table 3.7 BioCondition field results

	Assessment Unit			
	AU1	AU2	AU3	AU4
Regional Ecosystem	12.11.14	12.11.5	12.11.5	12.11.5
Rem/NR/Reg	Remnant	Remnant	Regrowth	Non-rem
Recruitment of woody perennial species in ecologically dominant layer (EDL)	5	5	5	0
Native plant species richness - trees	2.5	5	5	2.5
Native plant species richness - shrubs	5	2.5	3	0
Native plant species richness - grasses	5	5	5	0
Native plant species richness - forbs	2.5	2.5	5	0
Tree canopy height*	4	5	5	0
Tree canopy cover*	4	4	5	0
Shrub canopy cover	3	3	3	0
Native grass cover	1	3	1	0
Organic litter	5	5	3	3
Large trees	5	5	5	0
Coarse woody debris	0	0	0	0
Non-native plant cover	3	3	5	0
Total (Out of 80)	45	48	50	5.5
Score out of 1	0.56	0.6	0.63	0.07

3.6.3 Foraging habitat scores

Koala foraging habitat values at the impact area ranged between 0 for the non-remnant assessment unit and 6.67 for the remnant 12.11.5 (AU2), as shown in Table 3.8. Remnant areas supported a moderate-high abundance and diversity of food trees. Key food tree species present within the remnant and regrowth areas included *Eucalyptus carnea, E. siderophloia, E. tereticornis, E. fibrosa, E. microcorys*, *Corymbia citriodora*, However, regrowth and non-remnant areas that dominate the impact area attained moderate to low scores for food and foraging habitat.

Table 3.8 Foraging habitat values within the impact area

	AU112.11.14 Remnant	AU2 12.11.5 Remnant	AU3 12.11.5 Regrowth	AU4 12.11.5 Non-remnant	Average
Diversity of food tree species	7.5	5	5	0	4.36
Abundance of food trees	5	10	5	5	6.25
Accessibility	2.5	5	3.75	0	2.81
Average foraging score	5	6.67	4.58	0	4.06

3.6.4 Shelter habitat value

Koala shelter habitat scores for the impact area ranged between 0 and 6.17 for non-remnant and remnant areas respectively, as shown in Table 3.9. A range of shelter tree species were present in the remnant and regrowth areas. Key shelter tree species present included *Corymbia intermedia, C. tesselaris, Lophostomen confertus, L. suaveolens and Allocasuarina litoralis*. High tree densities in the regrowth areas were associated with relatively advanced regrowth trees that met the criteria for non-juvenile koala habitat trees.

Table 3.9 Shelter habitat values at the impact area

	AU1 12.11.14 Remnant	AU2 12.11.5 Remnant	AU3 12.11.5 Regrowth	AU4 12.11.5 Non-remnant	Average
Diversity of shelter tree species	7.5	7.5	6.25	0	5.31
Abundance of shelter trees	5	5	5	0	3.75
Shrub cover score	6	6	6	0	4.5
Average shelter score	6.17	6.17	5.75	0	4.52

3.6.5 Threats

Koala habitats within the impact area had low absence of threat scores (i.e. high threats). Key existing threats are associated with the risk of vehicle strike. The impact area is located in an industrial precinct on undulating terrain with an active quarry immediately to the north-west (Plate 3-1). The site is surrounded by roads that support high traffic levels with a large volume of heavy vehicle movements. The site is located on undulating terrain, with blind crests (Plate 3-2) and has little street lighting, providing low visibility to drivers and wildlife. The risk of vehicle strike is high, scoring 4 out of 25 due to high scope and conservatively scored as a medium severity. The risk of dog attack is also moderate-high, particularly in cleared open areas where there is no source of refuge available. Refer to Table 3.10.

Plate 3-1 *Context of the impact area, located within an industrial precinct*

Plate 3-2 *Blind crests on roads bordering the impact area on Stapylton Jacobs Well Road (left) and Quinns Hill Road East (right) increasing threat of vehicle strike to koalas in the impact area*

Table 3.10 *Absence of threat scores for the impact area*

	Assessment Unit				
	AU1 12.11.14 Remnant	AU2 12.11.5 Remnant	AU3 12.11.5 Regrowth	AU4 12.11.5 Non-remnant	Average
Uncontrolled wildfire	12	9	9	15	11.25
Drought	15	16	12	6	12.25
Dog attack	9	9	9	4	6.5
Vehicle strike	4	4	4	4	5.13

	Assessment Unit				
	AU1 12.11.14 Remnant	**AU2 12.11.5 Remnant**	**AU3 12.11.5 Regrowth**	**AU4 12.11.5 Non-remnant**	**Average**
Lowest score (from threat matrix – out of 25)	4	4	4	4	4.38
Final score (out of 15 for calculator)	2.4	2.4	2.4	2.4	2.4

3.6.6 Species mobility

Mobility scores for the impact area are summarised in Table 3.11. Koala mobility is substantially limited by the lack of connectivity and relatively intense behavioural deterrents to movement. While koalas have the capacity to move across all areas including across open ground in non-remnant areas, the capacity to move beyond the impact area is substantially restricted by the threats imposed by surrounding roads.

Table 3.11 Species mobility scores for the koala within the impact area

	AU112.11.14 Remnant	**AU2 12.11.5 Remnant**	**AU3 12.11.5 Regrowth**	**AU4 12.11.5 Non-remnant**	**Average**
Connectivity	5	5	2.5	0	3.13
Behavioural barriers	2.5	2.5	2.5	2.5	2.5
Score	3.75	3.75	2.5	1.25	2.81

3.6.7 Species stocking rate

Koalas scored a low species stocking rate score of 5 out of 70 for all assessment units at the impact area. Scoring for each criterion is shown in Table 3.12 below.

Table 3.12 Species stocking rate for koala within the impact area

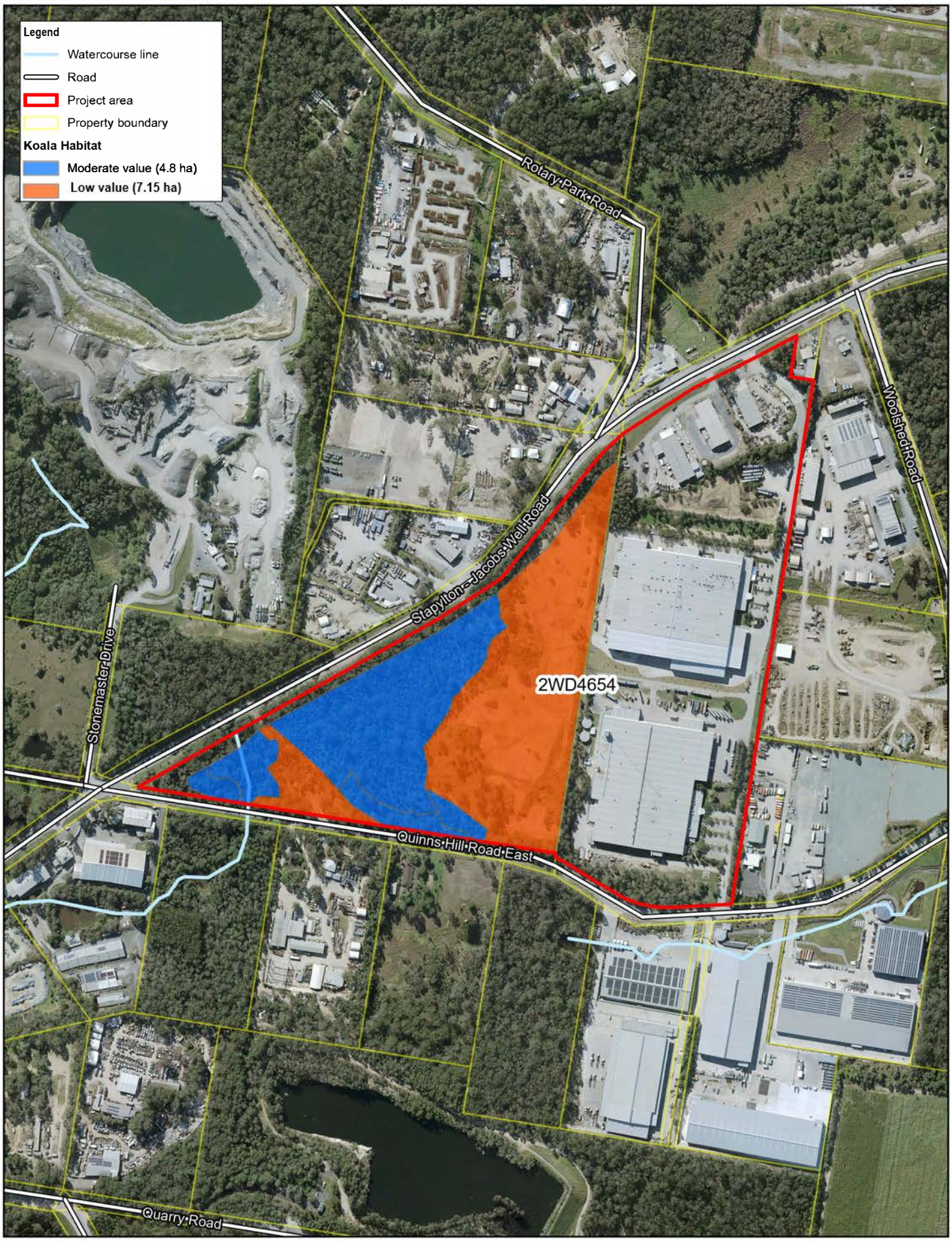
Criteria	Score			
Presence detected on or adjacent to the site	0	5		10
	No	Yes - adjacent		Yes – on site
Species usage of the site	0	5	10	15
	Not habitat	Dispersal	Foraging	Breeding
Approximate density per ha	0	10	20	30
	0%			
Role/importance of species population on site	0	5	10	15
	0	5 - 15	20 - 35	40 - 45
Species stocking rate	5 / 70			
SSR (out of 4)	**0.29**			

3.6.8 Role/importance of the impact site to the species population

Assessment units were assigned a score of 0 out of 45 for their importance in the population of the species using the criteria detailed in Table 3.13.

Table 3.13 Role/importance of the site to the koala population

Criteria	Score	
Key source population for breeding	0	10
	No	Yes/Possibly
Key source population for dispersal	0	5
	No	Yes/Possibly
Necessary for maintaining genetic diversity	0	15
	No	Yes/Possibly
Near the limit of the species range	0	15
	No	Yes



Paper Size ISO A4

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

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GHD

Visy Offset Management Plan

Distribution of koala habitat within the impact area

Project No. **12550313**
Revision No. **0**
Date **20/10/2022**

FIGURE 3.3

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Layout: 12550313_004_KoalaHabitatImpactArea_Rev0
Print date: 20 Oct 2022 - 10:39

Data source: GHD: koala habitat distribution (2022); Visy: project area (2022); DoR: roads and watercourse lines (2021), cadastre (2022); Metromap Tile Service: imagery.
Created by: cburns2

4. Overview of the proposed offset

4.1 Proposed offset

4.1.1 City of Gold Coast proposal for the delivery of the offset on Lot 906 SP280831

Visy has partnered with the City of Gold Coast to deliver a local direct land-based offset to compensate for the loss of habitat at the Project's impact area.

The City of Gold Coast is the custodian of over 13,000 ha of conservation estate across the Gold Coast, including Stage Coach Reserve in Kingsholme, which is the location for the proposed offset. Stage Coach Reserve is located directly adjacent to a state-mapped Koala Priority Area and contains significant areas of state-mapped Koala Restoration Areas and Koala Habitat Areas.

The City of Gold Coast has an active Environmental Offsets Program which to date has delivered over 125 ha of koala habitat plantings in response to impacts on koala habitat by the development industry (through the *Planning Act 2016*) and state government infrastructure providers (through the State Government Supported Infrastructure Koala Conservation Policy, July 2017). These environmental offsets have been delivered by the City of Gold Coast's experienced Natural Areas Management Unit and cover a wide range of the Gold Coast including Pimpama, East Coomera, Numinbah Valley, Lower Beechmont, Tallebudgera and Mudgeeraba.

Visy requested a proposal from the City of Gold Coast to deliver a federal koala habitat offset at Stage Coach Reserve including koala habitat rehabilitation, restoration, management, monitoring, reporting and protection mechanism. The proposed offset was selected through consultation between City of Gold Coast, DCCEEW, and Visy and habitat quality assessment by GHD.

The City of Gold Coast has provided Visy with a detailed proposal including a cost for the delivery of a koala habitat restoration project by the City of Gold Coast, in response to an impact of koala habitat from the Project. The federal koala habitat offset proposal from City of Gold Coast provides the following information:

– Cost for the delivery of a koala habitat restoration project by the City of Gold Coast
– Timeframes associated with management actions
– Contract details between Visy and City of Gold Coast
– Details of the management measures (refer to Table 8.1 to Table 8.11)
– Monitoring and reporting details (refer to Table 9.1)
– Details of protection of the offset using a legally binding mechanism (refer to Section 8.1).

4.1.2 Land tenure

The offset area is located within the offset property described as Lot 906 SP280831, which is a freehold parcel within the northern Gold Coast suburb of Kingsholme. The offset area within the offset property is 15.17 ha in size (Table 4.1). The offset property is 31.07 ha in size and includes areas of mapped remnant vegetation which are excluded from the offset area. In addition, a buffer area approximately 40 m in width runs between the offset area and the adjacent residential properties and does not form part of the offset area itself. The offset area is owned by the City of Gold Coast and is part of the City of Gold Coast conservation estate. However, the offset area does not form part of the City of Gold Coast's current active restoration areas.

Table 4.1 Summary of offset area

Lot and Plan	Ownership	Tenure	Offset area (ha)	Total offset property rea
908 SP280831	City of Gold Coast	Freehold	15.17 ha	31.07 ha

4.1.3 Landscape context

The offset area is located in Kingsholme, northern Gold Coast and approximately 10 km south of the impact area. Figure 4.1 shows the cadastral boundary of the offset property. The offset area is located 14 km from the coast and features low, rolling hills of eucalypt woodlands. Neighbouring land use consists of a mix of low density residential housing to the north and east of the offset area, whilst the southern and western boundaries adjoin Stage Coach Reserve. Despite recent residential expanses within the area, pockets of remnant woodlands remain and provide connectivity to the west towards the Gold Coast hinterland.

Two terrestrial corridors mapped under the Biodiversity Planning Assessment occur within the surrounding landscape (EHP, 2016), these being the Beenleigh to Springbrook Terrestrial Corridor (Corridor Number 41) and the Moreton Bay to Tamborine National Park Terrestrial Corridor (Corridor Number 42). The Beenleigh to Springbrook corridor is located 3.3 km west of the offset area and runs north to south. The Moreton Bay to Tamborine corridor runs east to west and occurs 4.1 km south of the offset area.

Distances were determined using the terrestrial corridor centreline and excluded buffers.

Terrestrial corridors are summarised in Table 4.2 and presented on Figure 4.2.

The offset area is mapped as “Koala Restoration Area” by the Queensland Department of Environment and Science (DES), with Stage Coach Reserve bordering directly on an area mapped as Koala Priority Area. The offset area is adjacent to, and also encircles, areas mapped as Koala Habitat Area by DES. The offset area is located within close proximity to the City of Gold Coast’s northern critical corridor (Figure 4.2), which is essential to the east-west movement and long-term viability of the koala populations living within the State’s Koala Priority Area, as well as surrounding areas.

Table 4.2 Terrestrial corridors within the offset area and surrounding landscape

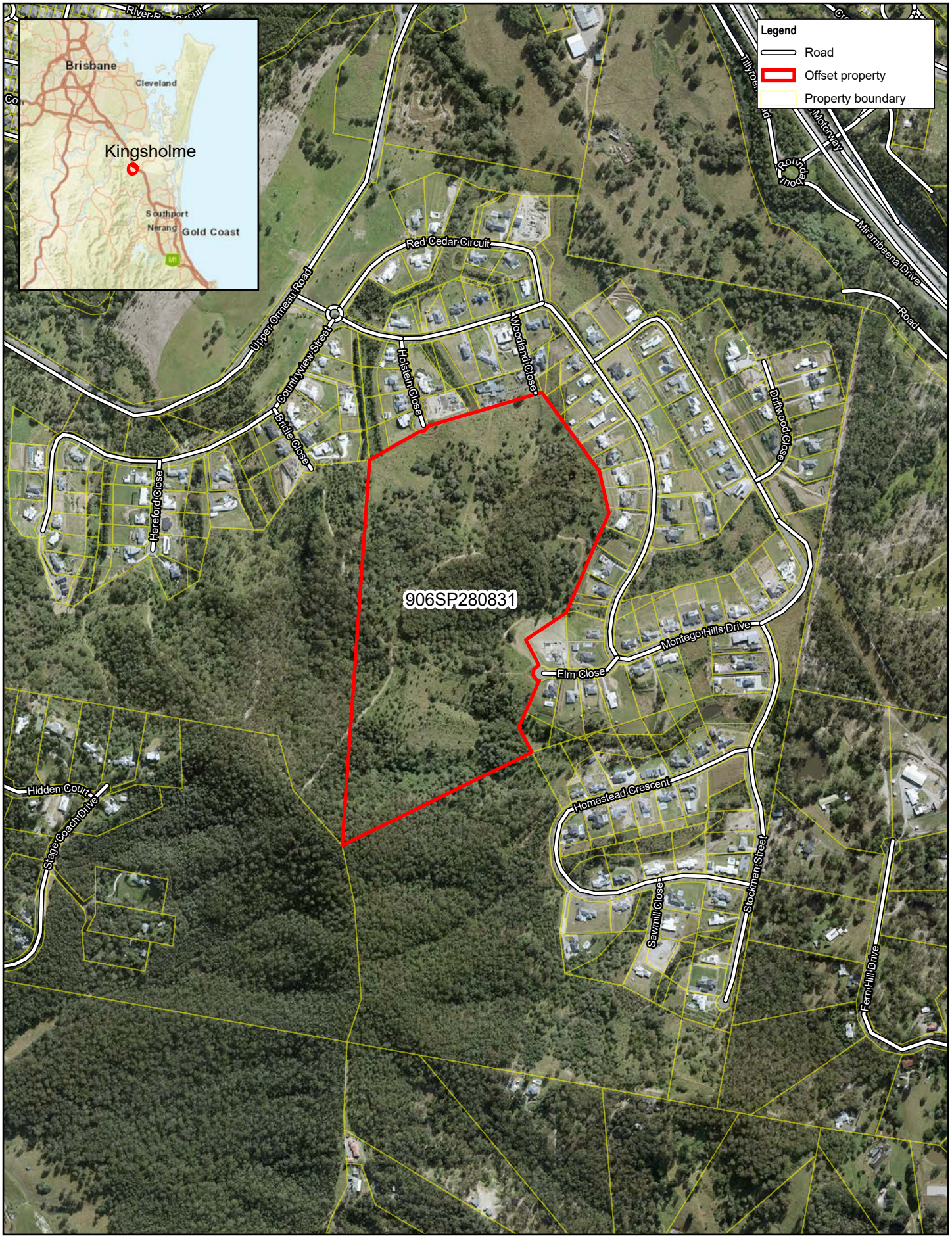
No.	Corridor name	Description	Significance
Corridor Number 41	Beenleigh to Springbrook Terrestrial Corridor:	Extends south from Logan Village / northern Jimboomba through Mundoolan to Birnham Range.	Regional
Corridor Number 42	Moreton Bay to Tamborine National Park Terrestrial Corridor	Extends south from Beenleigh to Springbrook National Park (via Tamborine National Park).	State

4.1.4 Vegetation communities

The offset property is located in a mix of remnant and non-remnant vegetation based on Department of Resources (DoR) Version 12 RE mapping. Based on the pre-clear extent RE mapping, the offset property supports vegetation consistent with the two REs presented in Table 4.3. Parts of the offset area support immature regrowth, dominated predominantly by *Acacia leiocalyx* (black wattle).

Table 4.3 Regional Ecosystem mapping within the offset property

Pre-clear extent RE	VM Act Status	Description	Area (ha)
12.11.5	Least concern	*Corymbia citriodora* subsp*. variegata* woodland to open forest +/- *Eucalyptus siderophloia*/*E. crebra*, *E. carnea, E. acmenoides, E. propinqua* on metamorphics +/- interbedded volcanics.	7.24
12.11.24	Least concern	*Eucalyptus carnea* or *E. tindaliae, Corymbia intermedia* +/- *E. siderophloia* or *E. crebra* woodland on metamorphics +/- interbedded volcanics.	14.09



Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Visy Offset Management Plan

Proposed offset property

Project No. **12550313**
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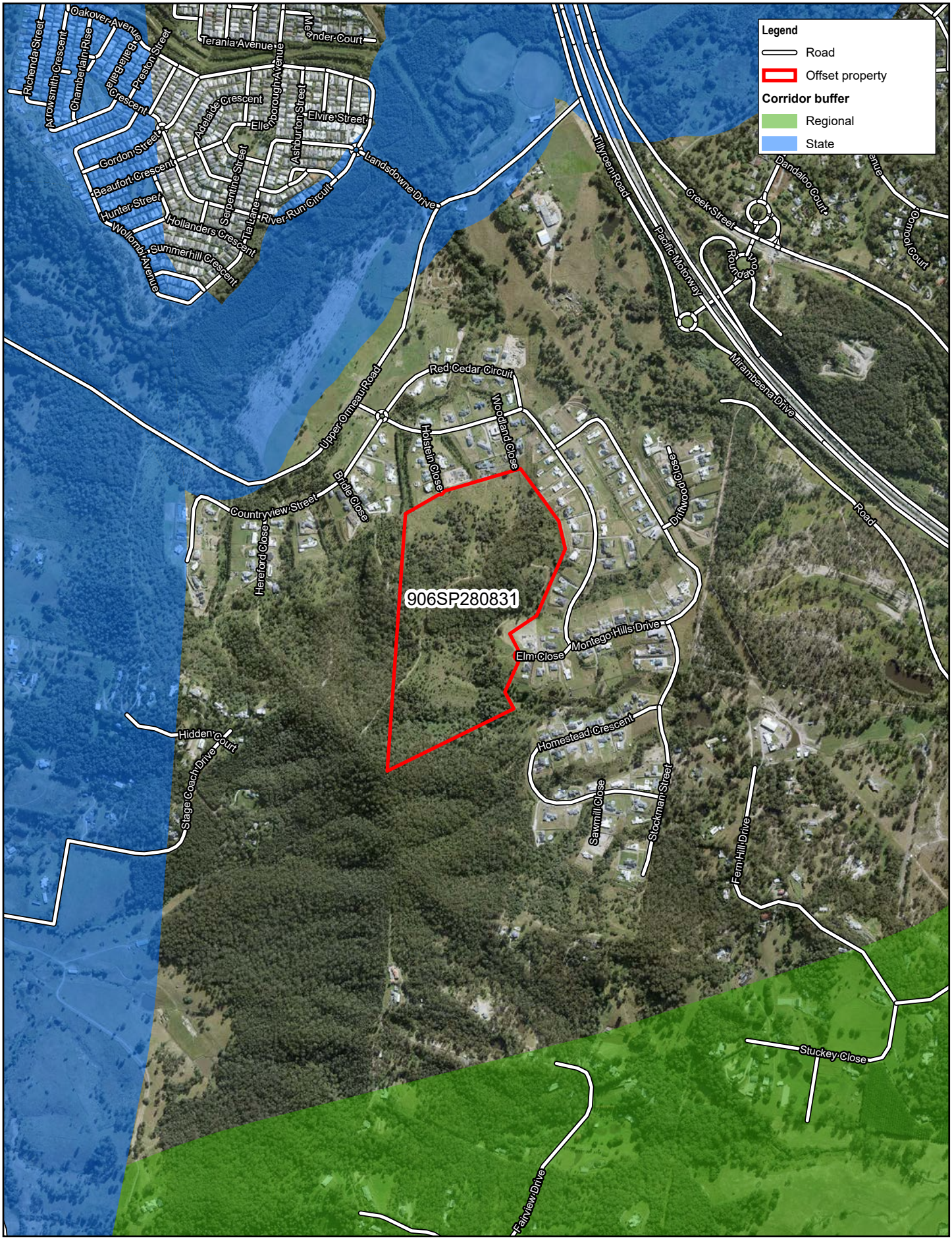
FIGURE 4.1

N:\AU\Mackay\Projects\42\12550313\GIS\Maps\Working\12550313_BioConditionAssessment\12550313_BioConditionAssessment.aprx
Layout: 12550313_010_ProposedOffsetArea_Rev0
Print date: 05 Oct 2022 - 21:42

Data source: Visy: project area (2022); DoR: roads (2021), cadastre (2022); Metromap Tile Service: imagery; Esri, HERE, Garmin, NGA, USGS: basemap and locations.
Created by: cburns2



Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Visy Offset Management Plan

Connectivity of the proposed offset area to state and regional biodiversity corridors

Project No. **12550313**
Revision No. **0**
Date **5/10/2022**

FIGURE 4.2

N:\AU\Mackay\Projects\42\12550313\GIS\Maps\Working\12550313_BioConditionAssessment\12550313_BioConditionAssessment.aprx
Layout: 12550313_001_BiodiversityCorridorsProposedOffsetArea_Rev0
Print date: 05 Oct 2022 - 22:18

Data source: Visy: project area (2022); DoR: corridor centrelines and buffer (2019), roads (2021), cadastre (2022); Metromap Tile Service: imagery.
Created by: cburns2

4.1.5 Water resource availability

The offset area does not support a permanent water resource; however the site is likely to receive run off from the surrounding landscape following rain events. Further, the Pimpama River is located 850 m northwest of the site. Several artificial dams also occur to the south of the offset area and remain connected by remnant eucalypt woodland. The location of water resources within and surrounding the offset property is presented in Figure 4.2.

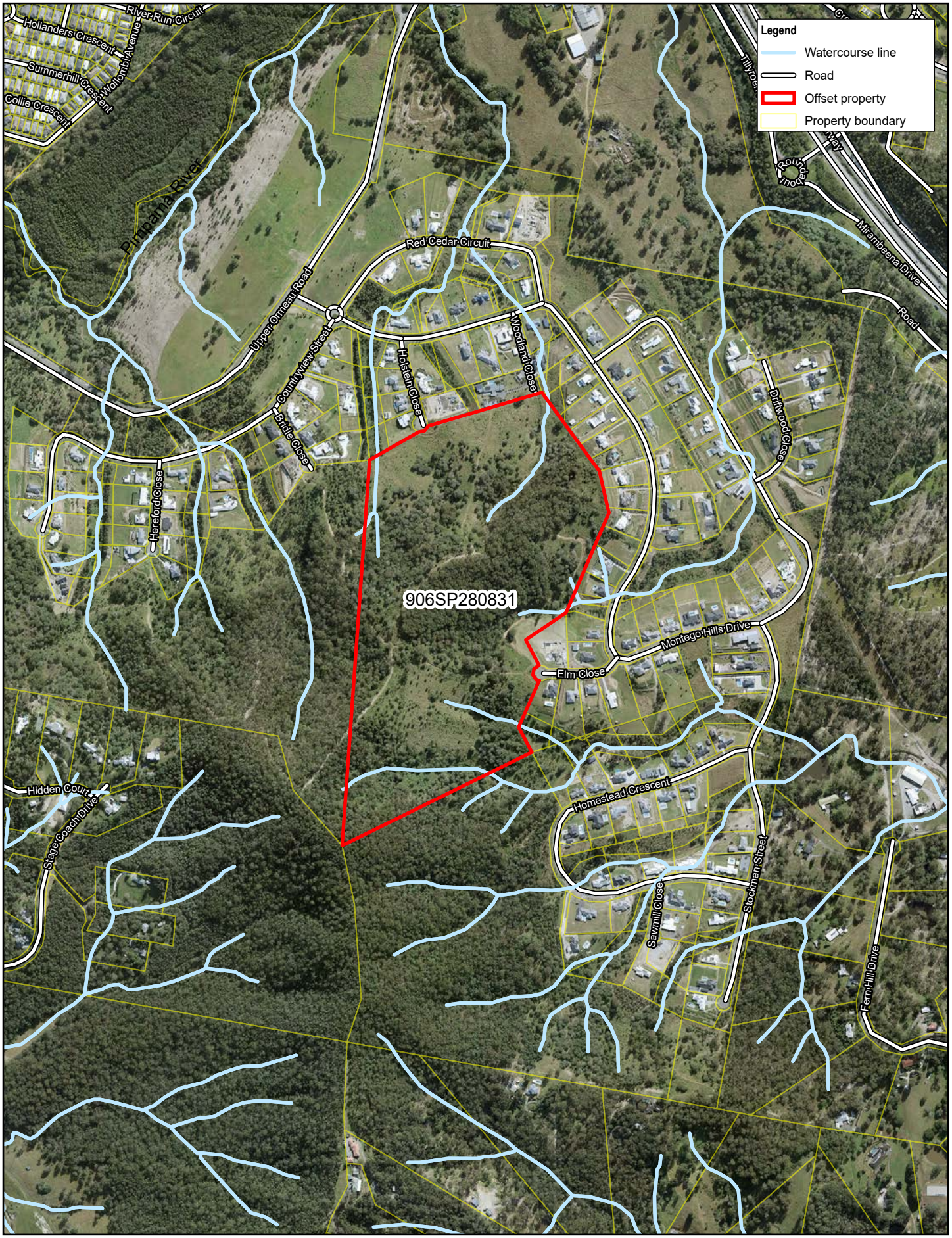
4.1.6 Existing land use and disturbances

The offset area has been subject to historical land clearing, with the removal of all canopy, shrub and ground-level vegetation. The offset area is a future part of the City of Gold Coast conservation reserve network, which is zoned as Rural and Rural, Rural landscape and environmental precinct, under the City of Gold Coast City Plan; however, the site is not actively managed, given the low current environmental value of non-remnant and regrowth areas. Existing management of the offset area is limited to periodic slashing of grassy weeds to maintain access and manage fire risks to adjacent residential housing areas. Other than the historical land clearing, the offset area within the site is not subject to high levels of ongoing disturbance. The site is gated to restrict vehicle access, though remains largely unfenced with low levels of human visitation. Road noise from the Pacific Motorway is prevalent across the offset area. However, the site is not adjacent to any busy roads that would pose local threats to koalas from vehicle collision. The adjacent residential areas are new, large lot estates. While these areas would hold some risk to koalas from dog attack, most properties are fenced and the area is developed to an extent that koalas are unlikely to move through the residential areas.

4.1.7 Potential to contribute to landscape connectivity

The offset area is located on the north-eastern extent of a 150 ha patch of remnant vegetation. Although connectivity immediately north and east of the offset area is restricted by residential housing, the offset area is connected to more extensive areas of woodland koala habitat that occurs within the offset area and immediately south and west across Stage Coach Reserve, which also has localised habitat linkages retained to areas further north. City of Gold Coast has been restoring land in the area, including a number of offset areas to the north as part of the northern critical corridor to preserve habitat corridors for east-west wildlife movement and long-term viability of the koala populations living within the state's Koala Priority Area as well as surrounding areas.

While the offset area is part of the existing Stage Coach Reserve, it is located entirely within Lot 906 SP280831, which has no existing or future planned active restoration or rehabilitation management, as the area has low value relative to other parts of the reserve estate. By enhancing the values of habitats within the offset area, the offset will contribute both locally and regionally to broader efforts that are being undertaken to increase habitat connectivity from the coast to the hinterland. The location of the offset area and its spatial relation to habitat networks in the surrounding landscape are shown in Figure 4.2.



Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

Visy Offset Management Plan
Project Apollo

Water sources located within the proposed offset property

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Revision No. **0**
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FIGURE 4.3

N:\AU\Mackay\Projects\42\12550313\GIS\Maps\Working\12550313_BioConditionAssessment\12550313_BioConditionAssessment.aprx
Layout: 12550313_011_WaterSourcesWithinProposedOffsetArea_Rev0
Print date: 05 Oct 2022 - 20:09

Data source: GHD: bio condition plots, assessment units (2022); Visy: project area (2022); DoR: roads and watercourse lines (2021), cadastre (2022); Metromap Tile Service: imagery.
Created by: cburns2

5. Suitability of the offset area

5.1 Overview

The suitability of the proposed 15.17 ha offset area has been assessed through a combination of desktop and field investigations.

5.1.1 Desktop assessments

A desktop review of the following sources was undertaken searching a 10 km radius of the approximate centre of the offset area:

- Commonwealth Protected Matters Search Tool
- DES Wildlife Online database
- DES Species Profile Search
- Atlas of Living Australia database search
- Birdata database search
- DES Biomaps mapping layers
- Biodiversity Planning Assessment mapping layers
- DES Essential Habitat mapping layer

5.1.2 Field surveys

The suitability of habitat within the proposed offset area has been assessed during a one-day ecological field survey. The field survey was conducted on 19 August 2022 using a team of three ecologists. Field surveys involved a combination of habitat assessments and active searches for koala evidence using the SAT. A total of 16 SAT searches were undertaken, eight within the offset areas (two in each BioCondition plot) and eight in patches of remnant woodland within the same lot boundary property. Active searches for koala faecal pellets were also conducted opportunistically throughout the survey. Field surveys were conducted in accordance with the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al., 2018) and the Survey Guidelines for Australia's Threatened Mammals (DSEWPC, 2011).

The koala was confirmed present from faecal pellets and scratches observed at all eight locations investigated in remnant woodland within the offset property (Plate 5-1). Faecal pellet samples were analysed by specialist subconsultant Georgeanna Story from Scats About. No koala pellets were found in the offset area (Plate 5-2). However, given koalas need to move through the offset area to reach the isolated woodland habitat patches within the offset area in which koala faecal pellets were recorded (Plate 5-3), the koala likely utilises the offset area at least for movement purposes.

Plate 5-1 Remnant koala habitat adjacent to the offset area, within the offset area

Plate 5-2 Non-remnant immature regrowth koala habitat within the offset area (regrowth)

Plate 5-3 Koala faecal pellets and scratches recorded in remnant woodland on the offset area

5.2 Suitability for the koala

5.2.1 Ecology of the koala

The koala occurs in coastal and inland habitats from the Herberton area in Queensland, westward into hotter and dryer semi-arid climates through central Queensland, and south into coastal and inland New South Wales and the Australian Capital Territory. The species' distribution is not continuous across this range (DAWE, 2022a).

Foraging habitat: The koala has a specialist diet, feeding on the leaves of select species of *Eucalyptus, Lophostemon, Corymbia, Angophora* and occasionally *Melaleuca* and *Leptospermum* (Martin and Handasyde, 1999; Moore and Foley, 2000). Consequently, koalas are reliant on access to stands of forest and woodland that support those key food-tree species. Shelter (non-food) tree species are also used to rest and assist in thermoregulation (Crowther et al., 2013; Briscoe et al., 2015).

Koala habitat is generally defined as coastal and inland areas characterised by *Eucalyptus* forests and woodlands (DAWE 2022a). Koala habitat includes places that contain resources necessary for foraging, survival, growth, reproduction and movement. This includes forests or woodlands, roadside and rail vegetation and paddock trees, safe intervening ground matrix for travelling between trees, and patches to forage, shelter and reproduce, and access to vegetated corridors or paddock trees to facilitate movement between patches (DAWE 2022a).

The way in which koalas move through the landscape also influences their use of habitat. In general, koalas are relatively sedentary, typically changing trees only a few times each day (DAWE 2021). Koala movement increases in spring when young dispersing males move distances of up to 10 km in urban south-east Queensland (Dique et al., 2003) and 16 km in rural south-east Queensland (White 1999). For the rest of the year koalas move relatively little within home ranges that vary between 8 ha and 135 ha (Ellis et al., 2002; Goldingay and Dobner, 2014). Home range size generally increases with distance from the coast, as inland koalas need to move more widely to derive sufficient sources of food and water (Davies et al., 2013).

Key factors that influence the quality of habitat for koalas are the presence and density of preferred food tree species, food trees' nutritional foliar chemistry, and shelter trees and vegetation structure. Koalas move between trees and patches, and the safety or hostility of these areas also contributes to the quality of koala habitat (DAWE 2022b). Broadly, these are determined by a number of factors including climate variables, disturbance (i.e. fire, vegetation clearance), and landforms of the natural and built environment. At a landscape scale, the total amount of available habitat and its quality are the primary factors that influence koala presence (DAWE, 2022b).

In the assessment of habitat quantity and quality, the National Recovery Plan for the koala (DAWE 2022b) highlights the importance of considering landscape patch size, form and spatial configuration within the context of the wider landscape, which can vary among landscapes and varies regionally (DAWE 2022b). In fragmented landscapes, the use of isolated paddock trees is commonly recorded, along with the use of roadside vegetation. In more arid areas, riparian habitats and surface water bodies are essential for the survival of koalas, particularly in the western margins of the species' distribution. Additionally, riparian vegetation facilitates local movement and provides important dispersal pathways for long-distance movement (DAWE 2022b).

Key threats: Known threats to the koala and koala habitat include loss and fragmentation of climatically suitable habitat due to land clearing, increased intensity and frequency of drought, increased intensity and frequency of heatwaves, increased intensity and frequency of uncontrolled bushfires, declining nutritional value of foliage, mortality due to dog attacks and vehicle collisions and increased incidence of disease including koala retrovirus (KoRV) and Chlamydia (*Chlamydia percorum*).

Status as important population: The concept of 'important populations' has been applied to the koala in general terms in the current Conservation Advice (DAWE 2022a). This considers important populations as those that are valued for cultural, social, and economic reasons as well as for the species conservation. For the species' conservation, it will be imperative to maintain populations that:

– Have the potential to act as source populations to adjacent areas of suitable, or potentially suitable, habitat
– Exist in areas of climatically suitable refugia during periods of environmental stress including droughts, heatwaves, and long-term climate change
– Are genetically diverse
– Are disease free and/or exhibit low rates of infection with important pathogens
– Contain genes which may confer adaptation to current and future environmental stressors
– Are geographical or environmental outliers within the species' range.

Populations that are also valued for social, cultural or economic reasons, and may or may not overlap with populations listed above:

– Cultural and spiritual importance to Indigenous people
– The social value and enjoyment of having koalas close to residential areas
– The economic value brought to local business and tourism
– The iconic species value at the national and international political and community level.

The low density of historical records within the Project area and geographical location would suggest the local population is not likely to be classified as an important population. However, at the national level, the Queensland subpopulation occurring north of the Clarence Valley in New South Wales is considered a genetically important population (DAWE 2022a).

Habitat critical to the survival of the species: The definition of habitat critical to the survival of the koala is formally defined in the Conservation advice for *Phascolarctos cinereus* (DAWE 2022a) as '*the areas that the species relies on to avoid or halt decline and promote the recovery of the species*.' The Conservation advice further defines habitat critical to the survival of the koala in general terms, outlining the definition that is relevant to all species protected under the EPBC Act as:

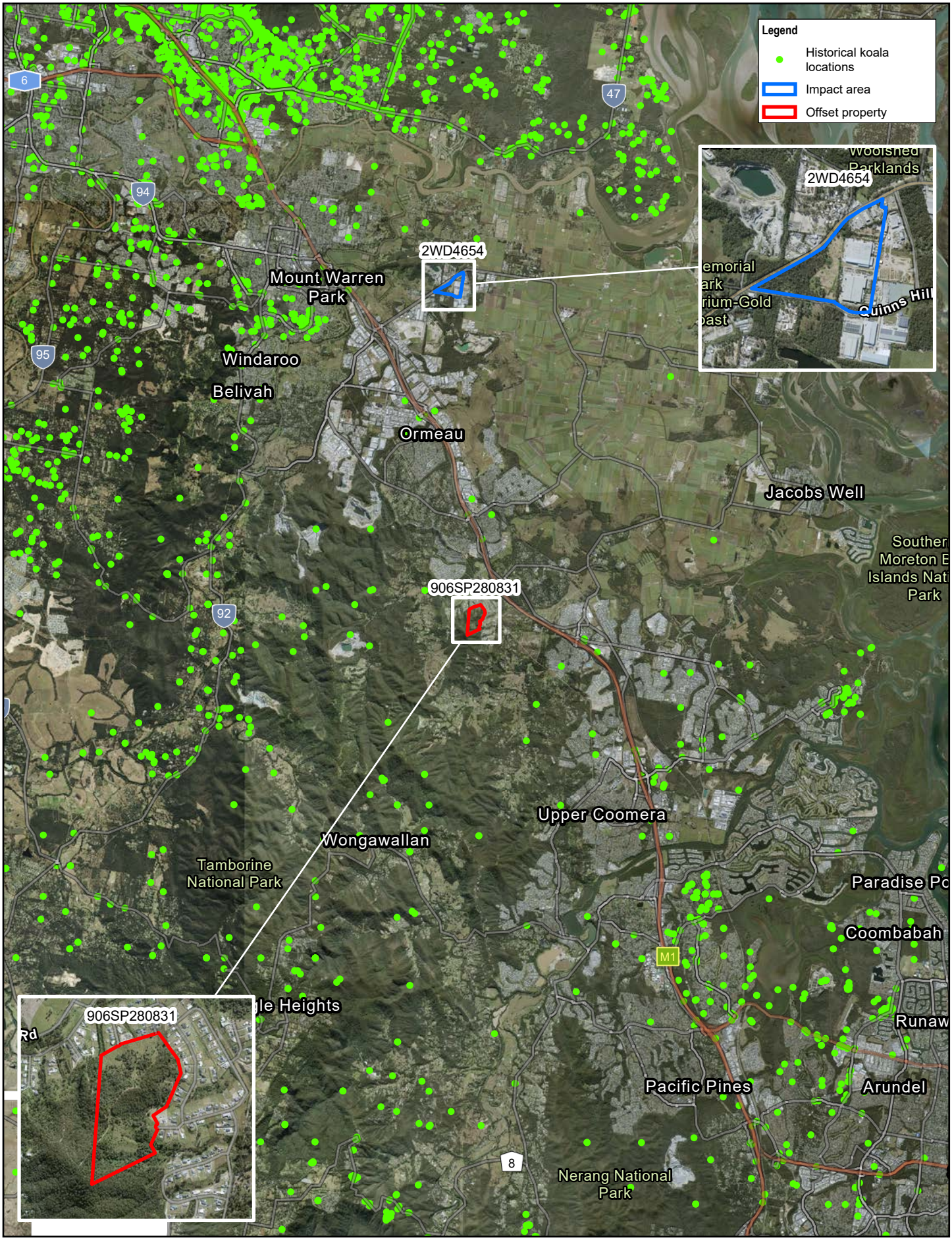
– Habitat that is used during periods of stress (examples: flood, drought or fire)
– Habitat that is used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes)
– Habitat that is used by important populations
– Habitat that is necessary to maintain genetic diversity and long-term evolutionary development
– Habitat that is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements
– Habitat that is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation
– Habitat that may in any other way be critical to the survival of a listed threatened species or a listed threatened ecological community.

5.2.2 Suitability of habitat for the koala within the offset area

The proposed offset area is composed entirely of non-remnant and immature regrowth vegetation (Plate 5-2). These areas currently support limited foraging and shelter habitat for the koala. Vegetation in non-remnant areas was dominated by invasive grasses that have been periodically slashed. Regrowth areas contain predominantly black wattle (*Acacia leiocalyx*), with small numbers of immature koala food and shelter trees, most < 2 m in height. While the offset area provides limited food and shelter, it is located immediately adjacent to patches of remnant woodland within the offset property and the adjacent land parcels of Stage Coach Reserve to the west and south that would provide foraging and breeding habitat for koalas. The offset area is currently likely to be utilised for koala movement between patches. Pre-clear extent RE mapping shows the offset area once supported RE 12.11.5 (*Corymbia citriodora* subsp*. variegata* woodland to open forest +/- *Eucalyptus siderophloia, E. crebra*, *E. carnea, E. acmenoides, E. propinqua* on metamorphics +/- interbedded volcanics). If allowed to revert to their

natural state, the non-remnant and regrowth vegetation within the offset area would provide foraging and breeding habitat for the koala and increase the connectivity of local koala habitat. Intervention via offset management will assist the process, for example, by increasing the quality of habitat via targeted planting of preferred food species and by reducing the time over which habitat becomes suitable via reduced competition through control of weeds.

The koala is known to occur within the surrounding landscape, with 4,291 records occurring within 20 km of the offset property, as presented in Figure 5.1.



Paper Size ISO A4

0 1 2 3 4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Visy Offset Management Plan

Historical records of the koala within the vicinity of the proposed offset area

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FIGURE 5.1

N:\AU\Mackay\Projects\42\12550313\GIS\Maps\Working\12550313_BioConditionAssessment\12550313_BioConditionAssessment.aprx
Layout: 12550313_006_KoalaLocationsOffsetArea_Rev0
Print date: 05 Oct 2022 - 21:59

Data source: Visy: project area (2022); Wildnet: koala locations (2022); DoR: roads (2021), cadastre (2022); Hybrid Reference Layer: Department of Resources, Dept.of Environment and Science, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS Metromap Tile Service: imagery and locations.
Created by: cburns2

5.3 Offset condition suitability and potential for enhancement

Habitat condition assessments were undertaken within the offset area, with the methods of assessment detailed in Section 6 and the results detailed in Section 7. These confirmed the presence of koalas adjacent to the proposed offset area and potentially suitable habitat for the koala within and adjacent to the proposed offset area. The type and condition of habitat at the impact and offset areas has been found to be consistent.

The impact area has been subject to existing impacts including;

– Historical loss and fragmentation of habitat
– Exposure to inappropriate fire regimes
– Localised coverage of invasive woody weeds (i.e. *Lantana camara* (lantana)) and grassy weeds (i.e. *Megathursus maximus* (Guinea grass) and *Sporobolus* sp. (rats tail grass))
– Moderate threats from vehicle strike (impact area), dog attack and fragmentation (impact area).

The offset area has been subject to existing impacts including:

– Historical loss and fragmentation of habitat
– Exposure to inappropriate fire regimes
– Localised coverage of invasive woody weeds (i.e. *Lantana camara* (lantana)) and grassy weeds (i.e. *Megathursus maximus* (Guinea grass) and *Sporobolus* sp. (rats tail grass))
– Moderate threats from dog attack and fragmentation (offset area).

Based on the extent and condition of habitat within the offset area, there are substantial opportunities for habitat improvement through replanting of non-remnant areas with canopy, sub-canopy and shrub-layer species to reinstate the pre-clear RE communities, supported rehabilitation of regrowth areas, weed control including removal of lantana and other woody weeds and removal of invasive grassy weeds. These improvements have the potential to make a real contribution to the koala by increasing the availability of resources for foraging, shelter and breeding and increasing mobility through increased habitat connectivity. Further, the offset has the potential to alleviate the risk associated with bushfire through the formation of fire breaks and reduction in shrubby biomass (lantana specifically) through active weed management.

The results of the habitat scoring presented in Section 7 indicate the offset area has the potential to meet the requirements of a successful direct land-based offset for the impact area.

6. Methods used to assess offset habitat quality

6.1 Overview of the approach

As detailed in Section 1, Visy intends to provide a direct land-based offset in partnership with the City of Gold Coast by protecting and managing areas of regrowth and non-remnant vegetation on Lot 906 SP280831 to increase the value as koala habitat. The following methodology has been used to identify and assess the value of habitats within the proposed offset area:

– The proposed offset area was selected in consultation with the City of Gold Coast Offsets team and Visy personnel.
– The offset area was selected by identifying an area in the same region and urban coastal floodplain that contains areas of disturbed land that would have once supported similar koala habitat (based on pre-clear extent RE mapping) and has the potential to be improved.
– Targeted field surveys of the offset area were undertaken by suitably qualified ecologists from GHD in August 2022 to:
    - Field-verify RE mapping to identify and map areas with equivalent vegetation and habitat value (i.e. BioCondition assessment units)
    - Assess the habitat quality of sites within the impact and offset area. Habitat quality was scored in accordance with the Queensland BioCondition Assessment Manual (Eyre et al 2015), Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020), the Modified QLD Habitat Quality spreadsheet (provided by DCCEEW directly for this purpose), and the EPBC Act Offsets Assessment Guide (DSEWPaC 2012).
– Identify site-specific offset management strategies and monitoring requirements, with specific ecological outcomes and performance indicators.
– A risk assessment was undertaken against the risk matrix template supplied by DCCEEW.

6.2 Habitat quality scoring methods

The EPBC Act Offsets Assessment Guide (DSEWPaC 2012) was used to determine the percentage of the offset liability that would be met by the proposed offset area, considering the following elements to assess habitat quality:

– Site condition
– Site context
– Species stocking rate

The Modified QLD Habitat Quality spreadsheet (provided by DCCEEW) was used to input data obtained during field surveys and desktop analysis for impact areas and offset areas.

Habitat scores were weighted with the ratios of site condition 30%, site context 30%, and species stocking rate 40%, consistent with recommendations provided by DCCEEW.

Site condition and site context scores were calculated using the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020), including scores for fauna species habitat (refer to Section 6.4.2 and 6.4.3) as per the Modified QLD Habitat Quality spreadsheet. Species stocking rate was informed by the results of the one targeted survey of the offset area (GHD 2022) and historical koala records for the local area (Atlas of Living Australia, Koala Tracker, Australian Koala Foundation Koala Map, Wildlife Online).

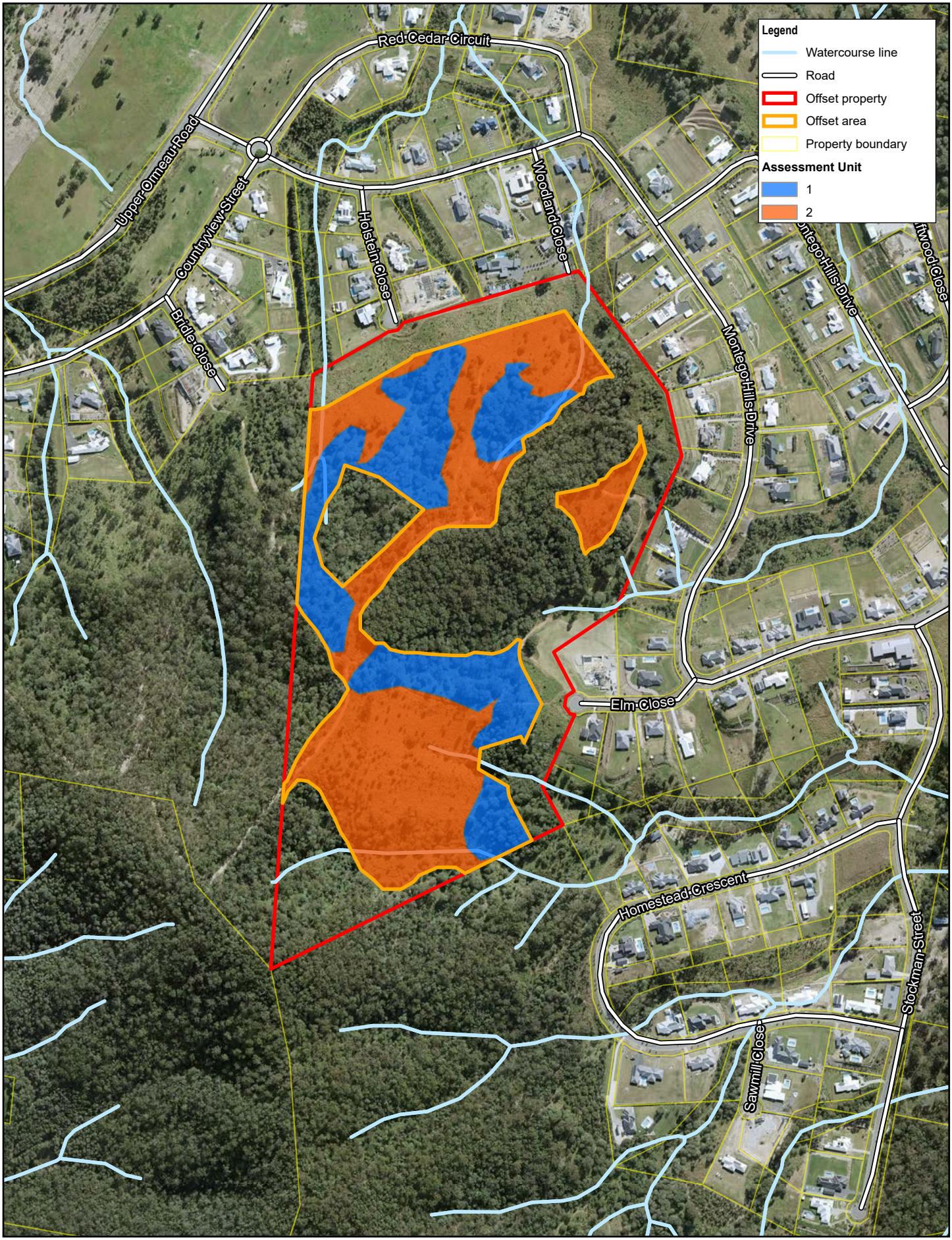
6.3 Overview of assessment units

Site conditions within the offset area were assessed within a series of assessment units as recommended in the Queensland environmental offsets framework, with two assessment units identified within the offset area, as summarised in Table 6.1 and shown in Figure 6.1 and Figure , respectively. Within each assessment unit, a number of replicate condition plots was established in accordance with the number specified in Table 1.2 of the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020). Assessment at multiple condition plots is necessary to measure vegetation condition at representative locations across the spatial extent of each assessment unit.

Site condition was assessed at four plots within the offset area. The locations of condition plots within the offset area are mapped in Figure . Sites and assessment units are detailed in Table 6.1.

Table 6.1 Summary of replicate BioCondition plots in each assessment unit

Assessment unit	Vegetation type	Area (ha)	Number of sites required	BioCondition plots
Offset area				
AU1	Regrowth 12.11.5	5.858	2	BC1, BC2
AU2	Non-remnant 12.11.5	9.315	2	BC3, BC4



Paper Size ISO A4

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Visy Offset Management Plan

Distribution of assessment units in the proposed offset area

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Date	**5/10/2022**

FIGURE 6.1

N:\AU\Mackay\Projects\42\12550313\GIS\Maps\Working\12550313_BioConditionAssessment\12550313_BioConditionAssessment.aprx
Layout: 12550313_008_OffsetAreaAssessmentUnit_Rev0
Print date: 05 Oct 2022 - 20:37

Data source: GHD: assessment units (2022); Visy: project area (2022); DoR: roads and watercourse lines (2021), cadastre (2022); Metromap Tile Service: imagery.
Created by: cburns2

6.4 Site condition assessment

Site condition was calculated for each assessment unit using the following criteria detailed in the EPBC Act Offsets Assessment Guide (DSEWPaC, 2012), the BioCondition Assessment Manual (Eyre et al 2015) and consistent with the Queensland Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020):

Habitat quality criteria for the koala were derived by suitably qualified ecologists from GHD. For each condition parameter, scores out of 10 were assigned to align with the EPBC Act Offsets Assessment Guide (DSEWPaC 2012) scoring framework as detailed in the Modified QLD Habitat Quality spreadsheet.

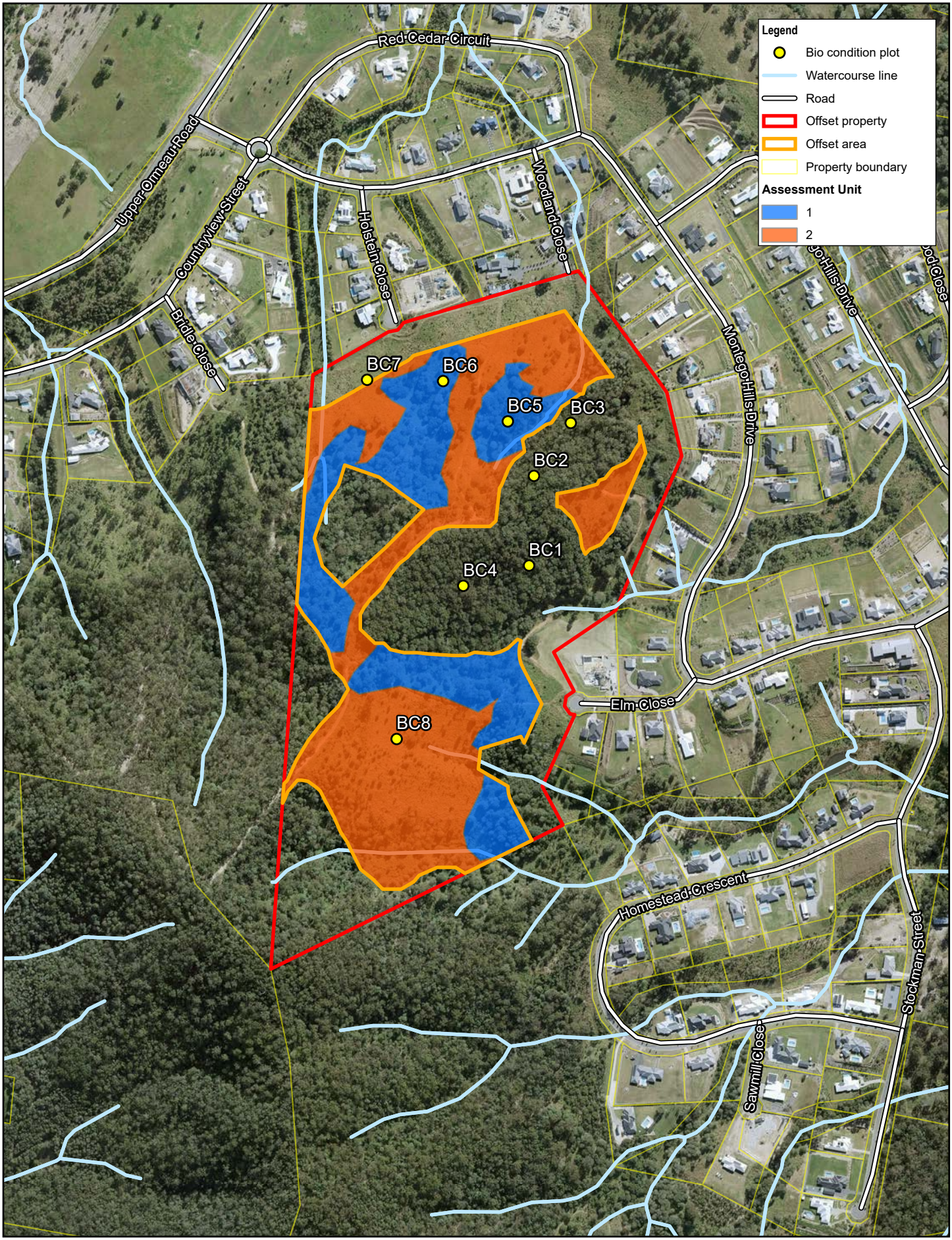
6.4.1 BioCondition plot methodology

Each BioCondition plot measured 100 m by 50 m and was established along the direction of the contour (i.e. along the slope rather than upslope or downslope). The location of the centre of each plot was marked with a GPS and representative photographs of the plot were taken in each aspect (i.e. north, east, south, west). Each plot was then divided into sub-plots, as illustrated by the plot layout diagram provided as Figure 3.2, and the following attributes were recorded:

– 100 m transect:
  - Tree canopy cover.
  - Shrub canopy cover.
– 100 m by 50 m plot:
  - Total number of large eucalypt and non-eucalypt trees.
  - Height of ecologically dominant layer and other canopy/sub-canopy/emergent layers.
  - Tree species richness.
  - Proportion of the dominant canopy species with evidence of recruitment.
– 50 m by 10 m plot:
  - Species richness of shrubs, grass, forbs and other native species.
  - Weed cover.
– Five 1 m by 1 m quadrats:
  - Percent cover of native perennial grass.
  - Percent cover of organic litter.

The data was entered into the DES scoring sheet and compared to representative benchmark data for each RE containing habitat for the MNES. The Queensland Herbarium has published benchmark data for individual REs, which is based on the above BioCondition assessment method, outlined in the BioCondition Assessment Manual (Eyre et al., 2015) using field-based reference sites that are best-on-offer for that RE. Benchmark data is used as a comparison against the data collected on site to derive the habitat quality score for each assessment unit. These scores were then incorporated into the overall condition score for each assessment unit by combining with species foraging and shelter habitat values (refer Section 6.4).

It is acknowledged that a portion of one of the plots lies external to the proposed offset area, as the boundary of the proposed offset area was refined subsequent to the field survey. The vegetation is contiguous and similar in condition across the entire plot, such that this plot provides data representative of the vegetation within the offset area and is sufficient for the purpose of the current assessment.



Paper Size ISO A4

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Visy Offset Management Plan

Location of habitat condition scoring plots within the proposed offset area

Project No. **12550313**
Revision No. **0**
Date **5/10/2022**

FIGURE 6.2

N:\AU\Mackay\Projects\42\12550313\GIS\Maps\Working\12550313_BioConditionAssessment\12550313_BioConditionAssessment.aprx
Layout: 12550313_002_HabitatConditionScoringPlots_Rev0
Print date: 05 Oct 2022 - 20:58

Data source: GHD: bio condition plots, assessment units (2022); Visy: project area (2022); DoR: roads and watercourse lines (2021), cadastre (2022); Metromap Tile Service: imagery.
Created by: cburns2

6.4.2 Quality and availability of food and foraging habitat

The quality and availability of food and foraging habitat was determined for the koala using criteria detailed below. Food quality/availability scores were calculated for each assessment unit based on the average of all plot scores, with all criteria scored out of 25. Justification for all criteria is detailed below. Scoring parameters are summarised in Section 3.6.3.

The quality of food and foraging habitat for the koala was scored based on the average of the following criteria:

- **The abundance of non-juvenile locally important food trees**: The number of *locally important* koala food trees in each 50 m x 100 m BioCondition plot that meet the size criteria to qualify as non-juvenile koala food trees was calculated. This was based on the definition of *locally important* food trees as specified for the South-east Queensland bioregion in Youngentob et al. (2021) and the non-juvenile koala food tree definition outlined in the Queensland *Environmental Offsets Policy* (DES 2022) (i.e. any koala habitat tree that is more than 4 m high or has a trunk with circumference of more than 31.5 cm at 1.3 m above the ground). This criteria provides a measure of the biomass of food resources available to local koalas.
- **The relative diversity of locally important koala food tree species**: This was calculated by dividing the number of *locally important* koala food tree species present in each 50 m x 100 m BioCondition plot by the total number of locally important food tree species listed in the technical description for that RE community (Pollock 2018). Koalas are known to forage on a variety of food tree species. While koalas can persist in areas with only a single food tree species where that species meets its nutritional requirements, the provision of a diversity of food tree species increases the adaptability of foraging resources available to koalas. In south-east Queensland, koalas are known to utilise a broad range of food tree species and that diversity may increase drought tolerance as different species respond differently to changing climatic conditions.
- **Ease of movement**: This was scored based on the relative connectivity of habitat and the anticipated physical barriers (i.e. fences, waterbodies, dense vegetation) and behavioural barriers (i.e. large gaps that increase the risks of exposure to dog attack or busy roads that increase risk of vehicle strike) to koala movement. This observes that while koalas are capable of moving large distances across open ground when dispersing, during foraging activities, they tend to forage preferentially through habitats that have higher levels of connectivity and pose lower risks of mortality from dog attack and other forms of misadventure (Rus et al. 2020).

6.4.3 Quality and availability of shelter

The quality and availability of shelter was determined for each species using criteria detailed below. Shelter quality/availability scores were calculated for each assessment unit based on the average of all plot scores, with criteria scored out of 25 (as recommended in the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020)) and then converted to scores out of 10 to align with the EPBC Act QLD Modified QLD Habitat Quality spreadsheet.

The quality and availability of shelter for the koala was scored, based on the average of the following criteria:

- **The abundance of non-juvenile *ancillary habitat* trees**: The number of *ancillary habitat* trees in each 50 m x 100 m BioCondition plot that meet the size criteria to qualify as non-juvenile koala habitat trees was calculated. This was based on the *ancillary habitat* trees identified for the Brigalow belt in Youngentob et al. (2021) and the non-juvenile koala food tree definition outlined in the Queensland Environmental Offsets Policy (DES 2022) (i.e. any koala habitat tree that is more than 4 m high or has a trunk with circumference of more than 31.5 cm at 1.3 m above the ground). This criterion provides a measure of the biomass of shelter resources available to local koalas.
- **Relative diversity of *ancillary habitat* trees**: This was calculated by dividing the number of ancillary habitat tree species present in each 50 m x 100 m BioCondition plot by the total number of locally ancillary habitat tree species listed in the technical description for that RE community (Pollock 2018). Ancillary habitat elements such as shelter vegetation may not contribute substantially to a koala's diet but are important for movement and thermoregulation. Shelter tree species that do not provide nutritional value can play an important role when they co-occur with *locally important* koala trees. Although these species do not constitute habitat in the absence of *locally important* koala trees, they are thought to make an important and potentially necessary contribution to koala habitat in many regions (Youngentob et al. 2021).

– **The relative abundance of shrub cover**: This was calculated directly from the shrub canopy cover scores calculated from the BioCondition plot data detailed in Section 6.4.1. As these scores have a maximum score of 5 in the BioCondition Assessment Manual (Eyre et al 2015), the score was multiplied by two to attain a score out of ten, consistent with the Modified QLD Habitat Quality spreadsheet. This provides an additional measure of shelter abundance for the koala.

6.5 Site context

For each assessment unit, site context scores were assigned based on the average of all plot scores for:

– Size of patch
– Connectedness
– Context
– Role of the site location to the overall population in the state
– Threats to the species
– Species mobility capacity.

6.5.1 GIS derived site context attributes

The first four GIS attributes of size of patch, connectedness, context and ecological corridors were calculated as part of the desktop analysis using the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020). This involved geospatial analysis to calculate the following indicators for each condition plot:

– Patch size, which involves measurement of the area of vegetation in which the assessment unit is contained and all other directly connecting areas of mapped remnant vegetation (total score of 10)
– Connectedness, which involves measurement of the length of remnant vegetation along the boundary of the site (total score of 5)
– Context, which involves measuring the percentage of remnant vegetation within a 1 km buffer around the site (total score of 5).

The information on each attribute was then used to determine the site context score in accordance with the framework provided by the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020), as shown in Table 6.2. These scores are then incorporated into the overall condition score for each assessment unit.

Table 6.2 Site context scoring framework

1 Size of Patch*	**Score**	0	2	5	7	10
	Description	<5ha	5-25ha	26-100ha	101-200ha	>200ha
2 Connectedness*	**Score**	0	2	4		5
	Description	0-10%	>10%-<50%	50-75%		>75% or >500ha
3 Context*	**Score**	0	2	4		5
	Description	<10% remnant	>10%-30% remnant	>30-75% remnant		>75% remnant
4 Distance to permanent watering point †	**Score**	0	2	5	10	20
	Description	0-500m	>500m-1km	>1-3km	>3-5km	>5km
5 Ecological corridors	**Score**	0	4		5	
	Description	Not within	Sharing a common boundary		Within (whole or part)	

** Measured for fragmented bioregions only*

† Measured for intact bioregions only

6.5.2 Role of the site location to the overall population in the state

As detailed in the *How to Use the Offsets Assessment Guide* (DAWE 2018), this value was obtained from the species stocking rate (detailed in Section 6.6), adjusted to a score of 10.

6.5.3 Threats to the species

At each assessment unit, threats to each species were assessed based on an average of all plot scores using criteria detailed below. The absence of threats was calculated as a score out of 25 using the risk matrix detailed in Table 6.3, taken from the Guide to Determining Terrestrial Habitat Quality, version 1.3 (DES 2020), with the absence of threat score assigned based on the lowest score assigned for any threat. The score was then adjusted to a score out of 15 to align with the EPBC Act Modified QLD Habitat Quality spreadsheet.

Table 6.3 Threat matrix used to score absence of threats

Threat matrix			Severity				
			Very high	High	Medium	Low	Very low
			1	2	3	4	5
Scope	Very high	1	1	2	3	4	5
	High	2	2	4	6	8	10
	Medium	3	3	6	9	12	15
	Low	4	4	8	12	16	20
	Very low	5	5	10	15	20	25

Threats faced by the koala were scored out of 25, using the threat matrix above, scored for the following threats that are identified in the Conservation listing advice for the koala (DAWE 2022a):

- **Risk of uncontrolled wildfire:** Koalas experienced extreme population losses throughout their range as a result of the 2020 Black Summer fires. Climate change has increased the level of threat faced by koalas from uncontrolled wildfires. While there has been a universal increase in the wildfire threat profile, inappropriate fire regimes can exacerbate the local threats by elevating fuel loads and increasing fire frequencies.
- **Risk of drought:** Changes in the climate are exposing koala populations to increased risk of decline from drought. This is particularly relevant for populations at the western edges of the species' range in habitats that are already more marginal in terms of their suitability.
- **Injury and mortality due to dog attacks:** Koalas are highly susceptible to injury and mortality from dog attacks. While this is particularly prevalent in peri-urban and residential areas, it is an ongoing threat to the species in all areas where wild or domestic dogs occur.
- **Collision with vehicles:** Injury and mortality of koalas represents a substantial threat to local koala populations in peri-urban and residential areas. This can exert negative pressures on local populations by increasing mortality and imposing barrier effects that restrict access to regional resources.

6.5.4 Species mobility capacity

Species mobility capability score was assigned for the koala at each assessment site. This was a score out of 25, based on an average of the following scores considering vegetation connectivity and the threat level faced during movement:

- **Habitat connectivity:** For each BioCondition plot a score of connectivity was assigned based on the following criteria: 0 (totally isolated), 2.5 partially isolated, 5 (periodically isolated), 7.5 major connectivity, 10 (totally connected).

6.7 Species stocking rate assessment

For each assessment unit in offset area, a single value of species stocking rate was calculated using the criteria detailed in Table 6.4, based on the scoring system in the EPBC Act How to Use the Offsets Assessment Guide.

Table 6.4 Species stocking rate scoring criteria

Criteria	Score			
Presence detected on or adjacent to the site	0	5		10
	No	Yes – adjacent		Yes – on site
Species usage of the site	0	5	10	15
	Not habitat	Dispersal	Foraging	Breeding
Approximate density per ha	0	10	20	30
Role/importance of species population on site	0	5	10	15
	0	5 – 15	20 – 35	40 – 45

Scores for species stocking rate were based on information on the likely presence and abundance of the koala, based on the results of targeted assessments undertaken within the offset area, with survey effort summarised in Section 5.1.2. For species with low density (i.e. koala) nominal low density scores were used to calculate species stocking rate. As directed in the Modified QLD Habitat Quality spreadsheet, where information on changes in density is not available due to low density, these will be kept relatively constant and improvements in habitat quality will rely on increases in site condition scores (i.e. BioCondition, foraging habitat value, shelter habitat value, mobility habitat value) and reduction in threat scores.

6.7.1 Role/importance of the species population on site

For each assessment unit, the role / importance of the site for the species was assessed using the criteria detailed in Table 6.5 based on the supplementary table to the Species Stocking Rate in the EPBC Act Offsets Guide.

Table 6.5 Role/importance of the species population on site

Criteria	Score	
Key source population for breeding	0	10
	No	Yes/Possibly
Key source population for dispersal	0	5
	No	Yes/Possibly
Necessary for maintaining genetic diversity	0	15
	No	Yes/Possibly
Near the limit of the species range	0	15
	No	Yes

6.8 Inputs used in the Offsets assessment guide

This section presents an overview of the approach that has been used to inform inputs to the EPBC Act Offsets Assessment Guide (DSEWPaC 2012):

- Time over which loss is averted (max. 20 years)
- Time until ecological benefit
- Risk of loss (%) without offset
- Risk of loss (%) with offset
- Confidence in result (%)

6.8.1 Time over which loss is averted

The proposed offset area will be owned and managed by City of Gold Coast and it is already part of the City of Gold Coast's conservation reserve network and being part of Stage Coach Reserve. While construction of the Project is proposed to last two years, the offset can be managed into the future. The impacts of construction are expected to be experienced for a period of 10 years. To maximise the benefits of the offset, the time over which loss is averted will be set at 20 years.

6.8.2 Time until ecological benefit

Enhancement of values for the koala are closely linked to the restoration and rehabilitation of regrowth and non-remnant woodland areas with the aims of increasing food availability and habitat connectivity. Koalas are known to forage in relatively immature regrowth (Youngentob 2021). The benefits of the offset are therefore likely to be achieved within a 15-year timeframe.

6.8.3 Risk of loss without the offset

Risk of loss has been informed by the Guidance for informing 'risk of loss' estimates when evaluating biodiversity offsets proposals under the EPBC Act (Maseyk et al. 2017) and knowledge on existing threats detailed in Section 5.2. The land within the proposed offset area represents a mix of regrowth and non-remnant vegetation on freehold and state land. Given there is no credible evidence that the offset area will be subject to development in the foreseeable future and is part of the City of Gold Coast conservation estate, an annual risk of loss value of 0 has been used.

6.8.4 Risk of loss with the offset

The potential for total loss of habitat at the site will be negligible with the land legally secured as an offset. The land as an offset will be managed and monitored specifically for the conservation of the koala and less likely to suffer from deterioration in habitat quality and decline of the population.

6.8.5 Confidence in the result

There is a high degree (100 percent) confidence in this assessment, given the use of the default risk of loss value from Maseyk et al (2017) and strong evidence for existing threats and factors limiting the shelter and foraging value. Active management of weeds and rehabilitation of the proposed offset areas provides a clear opportunity for substantial improvement in the ecological value of habitats and reduction in the threats facing the local population. To reflect the uncertainty around future outcomes, a more conservative score of 70 percent has been assigned for the future risk of loss. This confidence value reflects the expected chance of the offset being successful, inclusive of risk of loss and increase in quality. The estimated 70% is reflective of our confidence that the site can support shelter and forage habitat within 15 years based on strategic replanting, weeding and ongoing threat management.

7. Habitat quality scores

7.1 Existing quality of habitats in the offset area

7.1.1 BioCondition

BioCondition scores at the offset area were lower than those recorded on the impact area, scoring 35 out of 80 for the regrowth assessment unit and 13 out of 80 for the non-remnant assessment unit. The offset area has been subject to historical land clearing. The low scores were attributed to the relative absence of large canopy trees, which reduced vegetation cover scores and scores for large trees and the absence of ground-level complexity which lacked coarse woody debris, leaf litter and had a ground layer dominated by weedy grasses and shrubs across all BioCondition plots. BioCondition scores for the offset area are presented in Table 7.1.

Table 7.1 BioCondition scores for the offset area

	AU1	AU2
Regional Ecosystem	12.11.5	12.11.5
Rem/NR/Reg	Regrowth	Non-rem
Recruitment of woody perennial species in EDL	5	5
Native plant species richness - trees	5	5
Native plant species richness - shrubs	3	3
Native plant species richness - grasses	5	0
Native plant species richness - forbs	3	0
Tree canopy height*	3	0
Tree canopy cover*	0	0
Shrub canopy cover	3	0
Native grass cover	0	0
Organic litter	3	0
Large trees	5	0
Coarse woody debris	0	0
Non-native plant cover	0	0
Total (Out of 80)	35	13
Score out of 1	0.44	0.16

7.1.2 Foraging habitat scores

Koala foraging habitat values at the offset area were consistently low, with all metrics attaining scores of 2.5 out of 10, as shown in Table 7.2. Food tree species were similar to those present in the impact area, including *Eucalyptus carnea, E. siderophloia, E. tereticornis, E. microcorys* and *Corymbia citriodora*. However, the diversity and abundance of food tree species was consistently lower at the offset area than in the impact area. Accessibility was generally low due to the high level of clearing and potential susceptibility to dog attacks, given the presence of residential housing to the east of the offset area.

Table 7.2 Foraging habitat values within the offset area

	AU3 12.11.5 Regrowth	AU4 12.11.5 Non-remnant	Average
Diversity of food tree species	2.5	2.5	2.5
Abundance of food trees	2.5	2.5	2.5

	AU3 12.11.5 Regrowth	AU4 12.11.5 Non-remnant	Average
Accessibility	2.5	2.5	2.5
Average foraging score	2.5	2.5	2.5

7.1.3 Shelter habitat value

Koala shelter habitat scores for the offset area ranged between 1.67 and 3.08 for non-remnant and regrowth areas respectively out of a possible total of 10, as shown in Table 7.3. A range of shelter tree species were present in low densities. Shelter tree species present included *Corymbia intermedia, C. tesselaris* and *Lophostomen confertus*. The majority of regrowth vegetation across the offset was attributed to the black wattle *Acacia leiocalyx* which is not considered an ancillary shelter tree for the koala in south-east Queensland in Youngentob et al (2017).

Table 7.3 Shelter habitat values at the offset area

	AU3 12.11.5 Regrowth	AU4 12.11.5 Non-remnant	Average
Diversity of shelter tree species	3.75	2.5	3.13
Abundance of shelter trees	2.5	2.5	2.5
Shrub cover score	3	0	1.5
Average shelter score	3.08	1.67	2.38

7.1.4 Threats

Koala habitats within the offset area had higher absence of threat scores (i.e. lower threats) than were recorded at the impact area. Key existing threats at the offset area are associated with habitat fragmentation and the risk of dog attack. The offset area has been subject to high level of impact from previous land clearing and is now largely highly fragmented. The offset area is close to residential housing and therefore carries a moderate-high threat of dog attack for koalas. The risk of dog attack is particularly high in cleared open areas where there is no source of refuge available.

Table 7.4 Absence of threat scores for the offset area

	AU3 12.11.5 Regrowth	AU4 12.11.5 Non-remnant	Average
Uncontrolled wildfire	12	12	12
Drought	12	12	12
Dog attack	6	6	6
Vehicle strike	9	9	9
Lowest score (from threat matrix – out of 25)	6	6	6
Final score (out of 15 for calculator)	3.6	3.6	3.6

7.1.5 Species mobility

Mobility scores for the offset area are summarised in Table 7.5. Koala mobility within the offset area is limited by the lack of connectivity and moderate behavioural deterrents to movement likely to be imposed by cleared open areas. While koalas have the capacity to move across all areas within the offset area, including across open ground in non-remnant areas, the potential risks imposed by the potential for dog attacks would deter koala movement to a moderate extent.

Table 7.5 Species mobility scores for the koala within the offset area

	AU3 12.11.5 Regrowth	AU4 12.11.5 Non-remnant	Average
Connectivity	5	2.5	3.75
Behavioural barriers	2.5	2.5	2.5
Score	3.75	2.5	3.13

7.1.6 Species stocking rate

Koalas were assigned a species stocking rate score of 30 out of 70 for all assessment units. Scoring for each criterion is shown in Table 7.6.

Table 7.6 Species stocking rate for koala within the offset area

Criteria	Score			
Presence detected on or adjacent to the site	0	5		10
	No	Yes - adjacent		Yes – on site
Species usage of the site	0	5	10	15
	Not habitat	Dispersal	Foraging	Breeding
Approximate density per ha	0	10	20	30
	0%			
Role/importance of species population on site*	0	5	10	15
	0	5 - 15	20 - 35	40 - 45
Species stocking rate	35 / 70			
SSR (out of 4)	**2**			

7.1.7 Role/importance of the offset area to the species population

Assessment units were assigned a score of 30 out of 45 for their importance in the population of the species using the criteria detailed in Table 7.7.

Table 7.7 Role/importance of the site to the koala population

Criteria	Score	
Key source population for breeding	0	10
	No	Yes/Possibly
Key source population for dispersal	0	5
	No	Yes/Possibly
Necessary for maintaining genetic diversity	0	15
	No	Yes/Possibly
Near the limit of the species range	0	15
	No	Yes

7.2 Summary scores for the impact and existing offset areas

Habitat scores for the impact area and offset area are summarised in Table 7.8.

Table 7.8 Summary of koala habitat scores for the impact area and offset area

Value	Score	Impact area (Current)	Offset area (Current)
Condition			
BioCondition	80	36.5	20.25
Quality and availability of food and foraging habitat	10	4.07	2.5
Quality of habitat for shelter and breeding	10	3.78	2.4
Final condition score	**3**	**1.41**	**1.02**
Context			
Size of patch	10	10	10
Connectedness	5	2	5
Context	5	2	4
Ecological corridors	6	0	0
Role of site to species overall population in the state	5	5	5
Absence of threats	15	2.4	3.6
Species mobility capacity	10	2.85	3.15
Final context score	**3**	**1.30**	**1.65**
Species stocking rate			
Presence on the site	5	0	10
Species usage of the site	10	5	5
Approximate density	20	0	10
Role/importance of the site	10	0	10
Final species stocking rate score	**4**	**0.29**	**2.00**
Overall Habitat Quality Score	**10**	**2.38**	**4.43**

7.3 Commonwealth Offsets Assessment guide scores

Table 7.9 outlines the inputs used in the EPBC Act Offsets Assessment Guide (DSEWPaC, 2012) and a copy of the EPBC Act Offsets Assessment Guide is included in Appendix B. The results show 111.45% of the impact being directly offset (i.e. the minimum direct offset requirement of 90% will be met). The results of the Offsets Assessment Guide are provided in Table 7.9. The proposed offset areas are shown in Figure 6.1.

Table 7.9 Offsets assessment guide for the koala

Category	Description	Calculator Input
Impact calculator		
Area of habitat	Disturbance footprint of koala within the Project area (impact area)	11.95 ha
Quality	Weighted habitat quality score of 2.38 (rounded to 2 for input to the calculator). Refer to Section 6.4 for inputs to habitat quality scores.	2
Total quantum of impact		2.39 (adjusted ha)
Offset calculator		
Time over which loss is averted (max 20 years)	The time over which loss is averted will extend for the life of the proposed Project. The construction of the project is proposed to last 20 years. Management of the proposed offset area will be undertaken over the maximum timeframe.	20 years
Time until ecological benefit	As the proposed offset is based on existing non-remnant and regrowth woodland forest, the management and improvement over time will be linked to habitat quality associated with the increase in the quality of foraging and sheltering habitat, and a decline in the present and future threats, including shrubby weed infestations, particularly Lantana. This is proposed to be achieved over a 15-year minimum time frame. The proposed offset will be managed by the City of Gold Coast offset team who have proven experience managing and delivering successful offsets for the koala.	15 years
Start area (ha)	15.17 ha	15.17 ha
Start quality (scale of 0-10)	Weighted habitat quality score of 3.96 (rounded to 4 for input to the calculator) Refer to Section 7.1 for inputs to habitat quality scores.	4
Future quality without offset	The offset area has extensive early-stage invasion by woody and weeds (lantana and rats tail grass) and is anticipated to deteriorate in quality due to weed infestation without active management. To maximise reliability of the offset, a conservative approach has been taken and no change in habitat quality has been applied to the Offsets calculator.	4
Future quality with offset	It is anticipated that the securing, managing, improving and monitoring of the offset areas will increase the habitat quality for the koala. A number of management actions have been proposed that will improve the habitat quality at the offset area and surrounds. Key management measures include active planting of non-remnant and regrowth areas with koala food and shelter tree species to reinstate the pre-clear extent RE community. This will increase the value of foraging and shelter habitat for the koala, BioCondition scores and increase the context and connectivity scores. Considering the proposed management actions, it is likely that the future quality of the habitat for the species will increase over 15 years to be a score of at least 4, as per the Offset Assessment Guide calculator inputs.	7
Risk of loss (%) without offset	As the offset is part of the Gold Coast City Council reserve network, (not subject to active management), the risk of total habitat loss has been set at 0 to reflect the current protection afforded.	0
Risk of loss (%) with offset	The potential total loss of habitat at the site will be negligible with the land legally secured as an offset. The land as an offset will be managed and monitored specifically for the conservation of the koala and less likely to suffer from deterioration in habitat quality and decline of the population.	0%

Category	Description	Calculator Input
Confidence in result (%)	There is a moderate-high degree of confidence in this assessment due to strong evidence for existing threats and factors limiting the shelter and foraging value. Active management of weeds and rehabilitation of the proposed offset areas provides a clear opportunity for substantial improvement in the ecological value of habitats and reduction in the threats facing the local population. Assessment methods are consistent and undertaken at representative locations. Management, monitoring and reporting measures proposed provide confidence that the offset areas will improve the habitat quality and protect the species from future threats and disturbances. However, there are external factors that can threaten the success of the habitat and its management as an offset area, as per the risk of loss factors described above (thereby lowering the confidence level).	70%

8. Offset area management principles

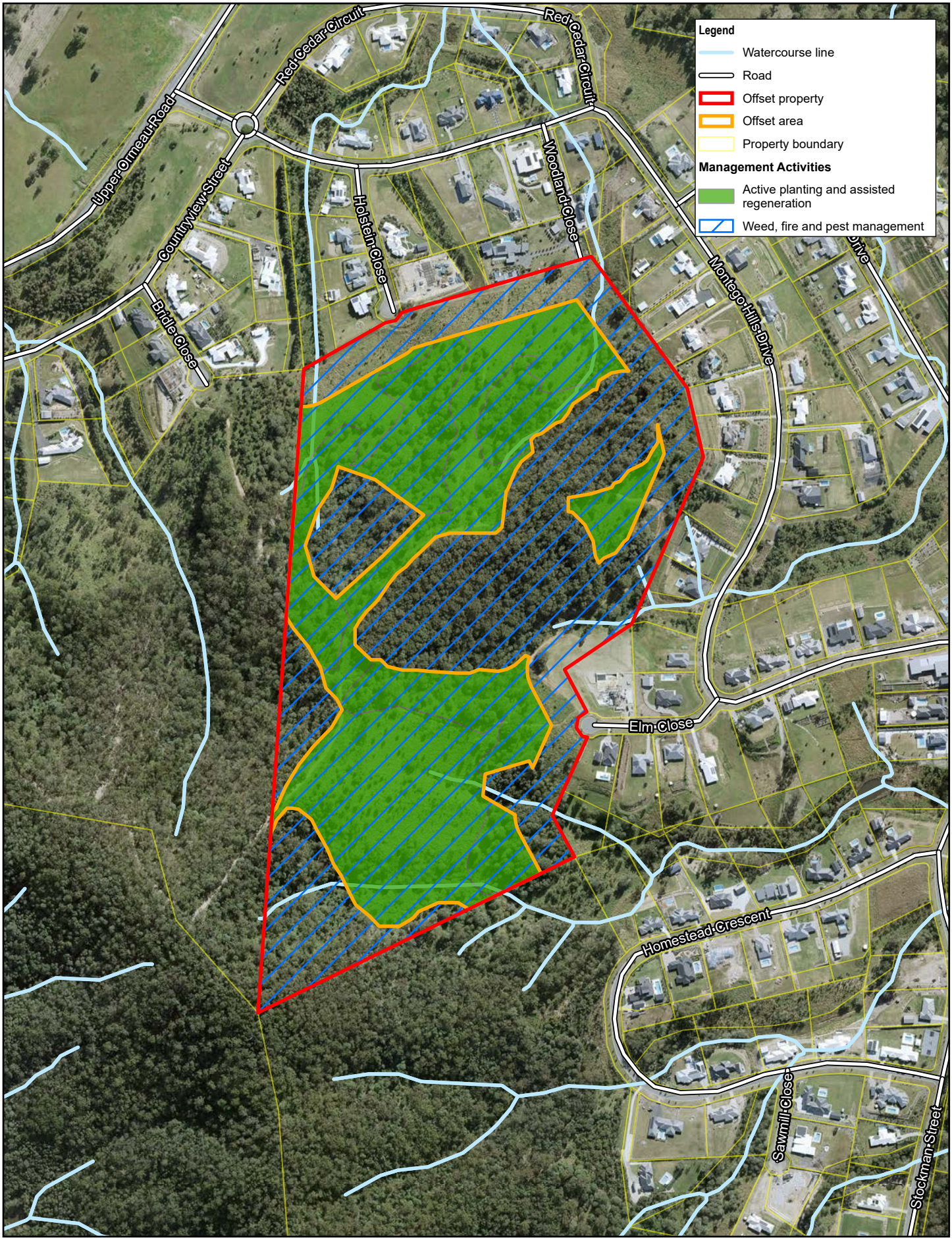
This section outlines management principles that will be implemented to increase the ecological value of habitats for the koala at the offset area. The results of preliminary ecological surveys and habitat quality assessments have confirmed there are substantial opportunities to improve the value of habitats within the offset area. While the proposed offset area supports areas of habitat for the koala, the extent and quality of habitats has been substantially degraded by existing and historical threats and can be substantially improved through active management.

Management principles have been proposed with consideration of the National Recovery Plan for the Koala (DAWE, 2022), site-specific desktop and field assessments, and numerous studies and peer-reviewed literature relevant to the species.

Key management principles include:

1. Legally secure the offset area
2. Revegetation and regeneration, including planting of suitable foraging species
3. Weed management
4. Management of pest fauna
5. Fire management.

A description of each of these management principles is provided below in the following five sections. Figure 8.1 shows the location where the management principles will be implemented within the offset area.



Paper Size ISO A4

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 56

N

GHD

Visy Offset Management Plan

Preliminary map of indicative land management actions proposed within the offset area

Project No. **12550313**
Revision No. **0**
Date **6/10/2022**

FIGURE 8.1

N:\AU\Mackay\Projects\42\12550313\GIS\Maps\Working\12550313_BioConditionAssessment\12550313_BioConditionAssessment.aprx
Layout: 12550313_007_ManagementActivitiesProposedOffsetArea_Rev0
Print date: 06 Oct 2022 - 08:40

Data source: GHD: management activities (2022); DoR: roads and watercourse lines (2021), cadastre (2022); Metromap Tile Service: imagery.
Created by: cburns2

8.1 Legally securing the offset area

The offset area on Lot 906 SP280831 will be secured through the legally binding mechanism (LBM) of a voluntary declaration (VDec) under the VM Act. The VDec process provides a simplified and streamlined protection procedure for landholders seeking to voluntarily protect areas of generally non-remnant native vegetation on their land. A VDec must be accompanied by a management plan that outlines the activities required to achieve the management intent and outcomes.

The VDec is declared by DoR, is registered in title, and is binding on all current and future owners of the land until the intent and outcomes of the management plan have been achieved. The VDec provides protection for native vegetation for a range of purposes, including legal security for offset areas and addressing Federal offset requirements under the EPBC Act.

The City of Gold Coast will provide active works and maintenance of the offset area under this OMP for 15 years, and then continue ongoing management of the site as part of the City of Gold Coast's conservation estate after this time. The offset area is within the City of Gold Coast's northern critical corridor, which is essential to the east-west movement and long-term viability of the koala populations living within the state's Koala Priority Area, as well as surrounding areas.

Visy understands that DCCEEW generally prefers the offset area LBM to be secured prior to commencement of the controlled action (clearing). However, in this circumstance of a critical timeline to commence construction of Visy's proposed Glass Recycling and Manufacturing Facility, and considering the secure nature of both the proponent, Visy, and offset provider, City of Gold Coast, Visy requests that DCCEEW do not condition the LBM to be secured prior to the controlled action commencing. Visy proposes to provide a letter to DCCEEW outlining its intention to obtain a VDec within six months of the action commencing as a guarantee that the VDec will be obtained.

Table 8.1 below provides further information about how the management actions that will be carried out to legally secure the offset area on Lot 906 SP280831 and project the offset area from vegetation clearing in the future, when the actions will be undertaken, the related monitoring activity and corrective actions.

Table 8.1 Management plan implementation for legally securing offset area

ID	Management objective/ outcome	Performance targets and/or completion criteria	How the management action will be carried out	Where	When	Who	Related monitoring activity	Adaptive management response	Future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented
8.1A	Legally securing the offset	Mechanisms to ensure that the state government applies certain management and protection strategies over the offset area	VDec under the VM Act	Proposed offset area	Lodgement of application within 6 months of the action commencing	Visy	Provide evidence to DCCEEW of LBM completed	It is the responsibility of Visy to provide the spatial data to Department of Resources. Department of Resources is responsible for having the offset area appropriately mapped.	Assessment Unit - Regional Ecosystem / **AU 1 Regrowth 12.11.5** / **AU 2 Non-remnant 12.11.5** Site Reference / **2037 AU1** / **2037 AU2** Average Score / Average Score **Site Condition AU1 regrowth** Role of site location to species overall population in the state: 5 / 5
8.1B	Exclude all incompatible land uses	No development occurs on the offset property.	Install project information signage near the 3 main entry gates to the offset restoration site and remove at the end of the project period.	Proposed offset area	Within 6 months of offset project commencing	Visy	Not applicable.	Not applicable	

8.2 Revegetation and regeneration, including planting of suitable foraging species

8.2.1 Justification

Large parts of the proposed offset area have been historically cleared and now support non-remnant or regrowth REs. Loss and fragmentation of habitat is a key threat to the koala. Remnant woodland provides key resources for the koala. The proposed offset provides a substantial opportunity to increase the value of habitats for the koala through active restoration and rehabilitation of woodland REs within non-remnant and regrowth areas. Reinstating the natural RE community has the potential to increase habitat connectivity and increase the availability of key resources including food and shelter trees for the koala.

Rehabilitation and revegetation is a key action that will improve habitat values within the offset area, while also expanding habitat values in areas that have been subject to weed infestations. These actions aim to reinstate existing degraded areas and areas exposed as a result of weed management (refer section 8.3).

8.2.2 Proposed action

This section outlines the actions proposed at the offset area to address revegetation and regeneration.

Strategic planting of tube stock is proposed for areas of non-remnant and regrowth woodland at the offset area. Revegetation will be undertaken to align with the timing for planting works being subject to suitable planting conditions but will be no later than 18 months following commencement of the project.

Areas of non-remnant and regrowth vegetation will be rehabilitated at the commencement of the offset to increase the coverage and connectivity of woodland habitat across the offset area. Non-remnant areas will be subject to active planting of tube stock. The composition of species' plantings will be informed by the dominant canopy, sub-canopy and shrub species in each RE likely to have occurred prior to clearing as assessed from pre-clear RE mapping and on-ground investigations of the land zone and remaining vegetation.

Within mapped regrowth areas, natural regeneration is preferred to the reconstruction of the vegetation community (i.e. importation of soil, dense planting etc). Management of these areas will focus on controlling weeds and restricting access from vehicles, or other existing significant disturbances, in order to promote further growth and new seedlings. Where natural regeneration is unsuccessful, minor infill planting will be implemented to facilitate recovery.

The proposed offset area comprises of REs 12.11.5 and 12.11.24, therefore the species selection for the offset area will consists of species listed in DoR's descriptions of each RE. These are outlined below:

- RE12.11.5
  - *Corymbia citriodora* subsp. *variegata* woodland to open forest +/- *Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua* on metamorphics +/- interbedded volcanics
- RE 12.11.24
  - *Eucalyptus carnea or E. tindaliae, Corymbia intermedia +/- E. siderophloia or E. crebra* woodland on metamorphics +/- interbedded volcanics.

The revegetation and regeneration works will be undertaken by a suitably qualified bush regeneration contractor and will include measures to ensure the maintenance and survival of new trees in the offset area.

A monitoring and maintenance schedule will be implemented to provide adequate watering, weed control and replacement of stock, as necessary.

Existing hollow logs, regenerated native plants and natural fallen debris are to be retained in situ to retain habitat for various fauna species.

All planted areas to be appropriately protected by sediment erosion controls.

Table 8.2 provides further information about the various management measures that will be carried out to regenerate and revegetate the offset area on Lot 906 SP280831. Table 8.2 outlines the management objectives,

the performance targets and management actions, who will undertake the actions, the timing of the actions, the type of monitoring activities that will be undertaken and adaptive management measures. It also outlines the future habitat score for AU1 Regrowth 12.11.5 and AU2 Non-remnant 12.11.5 once the management actions are implemented.

Table 8.2 Management plan implementation for revegetation and regeneration

ID	Management objective/outcome	Performance targets and/or completion criteria	How the management action be carried out	Where	When	Who	Related monitoring activity	Adaptative management measures	Future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented
8.2A	Increase native plant richness	Plant richness is>90% RE benchmark of species within each life-form	A planting program will be developed based on site-specific information from baseline surveys to locate planting areas, select species and densities, describe site establishment and planting methods, and an inspection and maintenance schedule for watering, weeding and stock replacement, if necessary. The proposed offset area comprises of REs 12.11.5 and 12.11.24, therefore the species selection for the offset area will consist of species listed in DoR's descriptions for each RE. Plantings will be adequately spaced, with protective tree guards (to prevent opportunistic grazing).	Offset area on Lot 906 SP280831	Dependant on optimal planting conditions, planting will be scheduled for the first favourable weather window following commencement of the project (not longer than 18 months) with an inspection and maintenance schedule implemented immediately to provide adequate watering, weed control and replacement of stock, as necessary. Note – the optimal planting window is typically between February and April.	Visy in conjunction with City of Gold Coast	Conduct photo and drone monitoring of the offset area and provide this evidence to VISY in the form of monitoring reports in years 1, 3, 7, 10 and 14. BioCondition surveys undertaken in years 5, 10 and 14. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	Any illegal clearing of the plants within the offset area recorded in landowner records and identified during the monitoring and reporting program. Infill planting of targeted species to maintain richness target; selective removal of species to maintain shrub cover <200%.	
8.2B			Access to planting areas to follow existing walking or vehicle tracks wherever possible, with no new vehicle access tracks to be constructed.	Offset area on Lot 906 SP280831	During the project period.	Visy in conjunction with City of Gold Coast	Conduct photo and drone monitoring of the offset area and provide this evidence to VISY in the form of monitoring reports in years 1, 3, 7, 10 and 14. BioCondition surveys undertaken in years 5, 10 and 14. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	During the project period existing access tracks will be inspected and any new tracks within the offset area will be revegetated.	
8.2C	Establish watering regime for planted area.	Survival of >90 percent of tubestock within the proposed offset area.	The following watering program is to be implemented, with consideration of prevalent conditions and recent or forecast rainfall: – Watering immediately prior to and post	Planted area within the offset area	As required, including up to weekly months 1-2 months after planting	Visy in conjunction with City of Gold Coast	Conduct photo and drone monitoring of the offset area and provide this evidence to VISY in the form of monitoring reports in years 1, 3, 7, 10 and 14.	During the revegetation establishment phase, plant health will be monitored and water frequency and/or duration will be adjusted if necessary.	

Assessment Unit - Regional Ecosystem	AU1 Regrowth 12.11.5		AU2 Non-remnant 12.11.5	
Site Reference	2029 (year 7) AU1	2037 AU1	2029 (year 7) AU2	2037 AU2
	Average Score		Average Score	
Site Condition				
Recruitment of woody perennial species in EDL	5	5	5	5
Native plant species richness - trees	5	5	5	5
Native plant species richness - shrubs	5	5	5	5
Native plant species richness - grasses	5	5	5	5
Native plant species richness - forbes	5	5	5	5
Tree canopy height (average of emergent, canopy, sub-canopy)	1.5	3	1.5	3
Tree canopy cover (average of emergent, canopy, sub-canopy)	2.5	5	2.5	5
Shrub canopy cover	2.5	5	2.5	5
Native grass cover	3	5	3	5
Organic litter	3	5	3	5
Large trees (euc plus non-euc)	7.5	10	2.5	5
Coarse woody debris	2.5	5	2.5	5
Non-native plant cover	10	10	10	10
Quality and availability of food and foraging habitat	5	10	5	10
Quality and availability of shelter	5	10	5	10
Connectedness	5	5	5	5
Ecological Corridors	0	0	0	0
Role of site location to species overall population in the state	5	5	5	5
Species mobility capacity	7	7	7	7

ID	Management objective/outcome	Performance targets and/or completion criteria	How the management action be carried out	Where	When	Who	Related monitoring activity	Adaptative management measures	Future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented
			planting (as specified above) – Once per week for up to three months (two months if wet conditions; three months if dry conditions) Increased frequency or total duration may be required if heatwave or prolonged dry conditions experienced.				BioCondition surveys undertaken in years 5, 10 and 14. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works		
8.2D	Increase large trees to at least 50% of RE benchmark	>50% eucalypt trees achieving DBH > RE threshold	Protection of regrowth trees suitable for RE large tree species through inclusion of site into City of Gold Coast conservation estate actively managed by the Natural Area Management Unit.	Offset area on Lot 906 SP280831 (AU1 and AU2) within the offset area	Years 1-5	Visy in conjunction with City of Gold Coast	Conduct photo and drone monitoring of the offset area and provide this evidence to VISY in the form of monitoring reports in years 1, 3, 7, 10 and 14. BioCondition surveys undertaken in years 5, 10 and 14. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	Diversity of the establishing vegetation will be monitored, and additional revegetation works will be undertaken if targeted diversity is not being achieved.	
8.2E			Fire management to reduce fuel load and uncontrolled fire risk. Exclusion of fire from newly installed plant stock. Control lines and individual trees to be raked to prevent canopy fires for all burns conducted in the project area.	Targeted areas of non-native plant cover within the offset area	Manual mitigation control measures annually (i.e., ecological restoration works to reduce exotic plant material. Where deemed to be of benefit, hazard reduction burns conducted onsite (in reference to appropriate fire regimes for vegetation type).	Visy in conjunction with City of Gold Coast	Conduct photo and drone monitoring of the offset area and provide this evidence to VISY in the form of monitoring reports in years 1, 3, 7, 10 and 14. BioCondition surveys undertaken in years 5, 10 and 14. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	Fuel load and introduced plant presence is to be monitored to inform fire management requirements.	
8.2F	Implement appropriate bushfire	Bushfires within the site are controlled	Fire management burns to reduce heavy infestation of	Targeted areas of non-native	Burn 1 Years 1-3 (where suitable conditions allow) Burn 2 Years 8-12	Visy in conjunction	Conduct photo and drone monitoring of the offset area and	Investigate additional bushfire management	

ID	Management objective/outcome	Performance targets and/or completion criteria	How the management action be carried out	Where	When	Who	Related monitoring activity	Adaptative management measures	Future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented
	management practices		introduced grasses and weeds and stimulate in situ generation of native plants.	plant cover within offset area	Burns scheduled by City of Gold Coast are dependent on fuel loads, consequence modelling and revegetation status. Burns conducted in mosaic pattern, with portions of site fragmented/excluded where retention of canopy species is of concern.	with City of Gold Coast	provide this evidence to VISY in the form of monitoring reports in years 1, 3, 7, 10 and 14. BioCondition surveys undertaken in years 5, 10 and 14. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	practices including additional fire management breaks/lines or additional exercises to reduce fuel loads. All prescribed burns are to be planned as low- moderate intensity bans.	
8.2G	Reduce non-native plant cover within offset area	Reduce non-native plant species to <5%	Conduct BioCondition survey to determine the occurrence and distribution of weed infested areas. Identify and map priority weed management areas. Control of native and exotic weed species that encroach on koala habitat species within the protected offset zone. Methods may involve a combination of physical, chemical and/or biological methods and/or fire management. Weed control techniques will vary depending upon the species being targeted and its location within the site and landscape. In areas of limited native vegetation (i.e. within access tracks, densely infested areas devoid of native trees etc) broad scale application of herbicide or mechanical removal will be appropriate. Within the retained predominately native bushland areas and proximate to gullies more selective removal techniques (i.e. hand tool removal) and spot	Targeted areas of non-native plant cover within offset area	Annual program Years 1-15	Visy in conjunction with City of Gold Coast	Conduct photo and drone monitoring of the offset area and provide this evidence to VISY in the form of monitoring reports in years 1, 3, 7, 10 and 14. BioCondition surveys undertaken in years 5, 10 and 14. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	In the event of increased non-native plant cover or non-response of treated areas during monitoring: – Re-treat the area and increase the re- inspection/re-application rate to ensure any juvenile recruitment is eradicated before it can become established. – Investigate alternative weed management regimes or techniques for species which do not respond to treatment – Revise hygiene protocols.	

ID	Management objective/outcome	Performance targets and/or completion criteria	How the management action be carried out	Where	When	Who	Related monitoring activity	Adaptative management measures	Future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented
			application or broad scale application of a non-residual herbicide (i.e. roundup bioactive) will be necessary.						
8.2H	Habitat quality retention	The proposed offset area must achieve 80% retention of fallen logs, rocks, trunk hollows, leaf litter	Offset area should be monitored for habitat quality characteristics	Offset area on Lot 906 SP280831	Ongoing for the duration of the offset delivery period (15 years)	Visy in conjunction with City of Gold Coast	Conduct Koala Surveys on the offset area to determine species presence and stocking rate, and provide this evidence to Visy in the form of result reports in years 1, 10 and 14. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	During the revegetation establishment phase, plant health will be monitored.	
8.2I	Re-plant (if required)	The proposed offset area must achieve a density of native vegetation reflective of that of the relevant RE benchmark	If the density of native vegetation is below the required density for the appropriate RE, the area must be replanted with suitable species to bring plant densities back up to RE thresholds.	Offset area on Lot 906 SP280831	Yearly (continued) to supplement natural regeneration	Visy in conjunction with City of Gold Coast	Re-plant will require additional planting at the proposed offset area. The final offset delivery plan progress report shall include recommendations for re-plant if the offset area did not achieve the required regional ecosystem.	The establishing vegetation will be monitored, and additional revegetation works will be undertaken if targeted diversity is not being achieved.	
8.2J	Erosion and sediment control to protect planted areas	Any areas of erosion or soil loss are remediated and stable	Presence of erosion will be managed with sediment control structures and soil remediation where necessary.	Offset area on Lot 906 SP280831	Ongoing for the duration of the offset delivery period (15 years)	Visy	Substantial erosion and sediment loss to be managed and remediated within 6 weeks of becoming aware. Erosion and sediment control observations and management actions to be included in the yearly offset delivery plan progress reports.	All erosion and sediment loss to be managed and remediated within 6 weeks of becoming aware.	

8.3 Weed management

8.3.1 Justification

The vegetation communities within the offset area were observed to be in an altered condition due to weed infestation. Many parts of the site contain a mid-dense to dense shrub layer of lantana *(Lantana camara)* (listed under the *Biosecurity Act 2014*).

Under normal conditions, these communities would have a grassy woodland to open woodland structure suitable for the koala.

The field investigations identified the following weed species that are classified as Weeds of National Significance (WONS) that are likely to lead to the degradation of koala habitat:

– Woody weeds:
  - Lantana (Lantana camara)
– Exotic forbs
  - Snakeweed (*Stachytarpheta jamaicensis*)
– Exotic grasses
  - Rat's Tail Grass *(Sporobolus* sp. American Rat's Tail Grass. *S. jacquemontii)*
  - Grader Grass *(Themeda quadrivalis).*

Additional weeds identified that are not classified as WONS but may still impact vegetation quality and fauna movement include:

- Molasses Grass (*Melinis minutifolia*)

To improve habitat value, the removal and control of lantana and other invasive weeds is required to return the vegetation community to an open woodland structure with a sparse shrub stratum. Weed management (in conjunction with reinstatement of the ground layer) will increase food resource availability for the koala by allowing germination of canopy and sub-canopy species that provide key resources for the koala, that would otherwise be suppressed by weed infestations.

8.3.2 Proposed action

Within 12 months of legally securing the offset area, weed management will occur across the entire offset area and treatment options will be undertaken using an integrated approach. Methods may involve a combination of physical, chemical and/or biological methods and/or fire management.

Prior to any use of mechanical clearing, proposed treatment sites should be examined, and desirable trees and regrowth clearly marked with pink flagging tape to help reduce accidental clearing of native vegetation.

Appropriate minor use permits from the Commonwealth Australian Pesticides and Veterinary Medicines Authority may apply.

Table 8.6 provides further information about how the management actions that will be carried out to manage weeds at the offset area on Lot 906 SP280831, Table 8.6 outlines the management objectives, the performance targets and management actions, who will undertake the actions, the timing of the actions, the type of monitoring activities that will be undertaken and adaptive management measures. It also outlines the future habitat score for AU1 Regrowth 12.11.5 and AU2 Non-remnant 12.11.5 once the management actions are implemented.

8.3.3 Baseline weed survey methodology

In line with Condition 7 of the Project EPBC approval 2022/09243, Saunders Havill Group, conducted baseline weed and feral animal surveys across the Offset property. Their survey methodology is summarised in Table 8.3.

Table 8.3 Weed survey methodology summary

EPBC Condition	Methodology	Survey dates
7 (a) extent of weed cover	Diurnal observations	15 – 16 February 2023 6 March 2023
	Weed cover extent survey	

The weed extent surveys were conducted on 15 & 16 February 2023 and 6 March 2023. Saunders Havill Group survey team conducted diurnal observations of flora including recording all weed species observed across the offset property. A separate weed cover extent survey was completed to identify patches of weed cover by locating and tracing them using a hand-held GPS. This survey addressed Condition 7a; to determine the extent of weed cover across the offset site and area.

8.3.4 Results from baseline weed survey

All weed species recorded across the offset area are presented in Table 8.4.

Table 8.4 Recorded weed species (Saunders Havill Group, 2023)

Scientific name	Common name	*Biosecurity Act 2014* Restricted Matter	Weeds of National Significance (WoNS)
Ageratum houstonianum	Blue billygoat weed		
Ambrosia artemisiifolia	Annual ragweed	Category 3	
Andropogon virginicus	Whisky grass		
Ascelias curassavica	Red-head cotton bush		
Asparagus aethiopicus	Climbing asparagus fern	Category 3	WoNS
Baccharis halimifolia	Groundsel bush	Category 3	
Bidens pilosa	Cobbler's pegs		
Cassytha glabella	Devil's twine		
Celtis sinensis	Chinese elm	Category 3	
Cestrum parqui	Green cestrum		
Chloris gayana	Rhodes grass		
Cirsium vulgare	Spear thistle		
Commelina diffusa	Wandering jew		
Conyza bonariensis	Flaxleaf fleabane		
Conyza sumatrensis	Tall fleabane		
Corymbia torelliana	Cadaghi		
Cyperus polystachyos	Bunchy sedge		
Desmodium rhytidophyllum	Hairy trefoil		
Eremophila debilis	Winter apple		
Gomphocarpus physocarpus	Balloon cotton bush		
Heliotropium amplexicaule	Blue heliotrope		
Hypochaeris radicata	Flatweed		
Lantana camara	Lantana	Category 3	WoNS
Lantana montevidensis	Creeping lantana		
Leucaena leucocephala	Leucaena		
Macroptilium lathyroides	Phasey bean		

Scientific name	Common name	*Biosecurity Act 2014* Restricted Matter	Weeds of National Significance (WoNS)
Megathyrsus maximus	Guinea grass		
Melinis repens	Red natal grass		
Murraya paniculata	Mock orange		

During the survey, the extent of weed cover across the entire offset site was recorded with a hand-held GPS. The area of weed extents are detailed in Table 8.5. The total extent of weed cover across the site is approximately 50.87 %.

Table 8.5 Extent of dominant weed species and groupings (Saunders Havill Group, 2023)

Dominant species	Area (m^2)	Total offset area (%)
Lantana camara (lantana)	2,504.45	1.65
Lantana camara (lantana) / *Solanum mauritianum* (wild tobacco)	66.65	0.04
Lantana camara (lantana) / *Urena lobata* (Urena Burr)	1601.2	1.06
*Lantana camara (*lantana*)* / *Urena lobata* (Urena Burr) / *Solanum chrysotrichum* (giant devil's fig) / *Passiflora suberosa* (corky passion vine)	165.48	0.11
Lantana camara (lantana) / *Urena lobata* (Urena Burr) / *Solanum chrysotrichum* (giant devil's fig)	402.88	0.27
Setaria dominated vegetation	62,720.18	41.34
Setaria dominated / *Sporobolus pyramidalis* (giant rats tail grass)	4,828.27	3.18
Solanum chrysotrichum (giant devil's fig)	849.48	0.56
Solanum chrysotrichum (giant devil's fig) / *Solanum mauritianum* (wild tobacco)	119.16	0.08
Solanum chrysotrichum (giant devil's fig) / *Lantana camara* (lantana)	63.31	0.04
Solanum mauritianum (wild tobacco)	85.83	0.06
Solanum mauritianum (wild tobacco) / *Solanum chrysotrichum* (giant devil's fig)	139.94	0.09
Sporobolus pyramidalis (giant rats tail grass)	1,687.27	1.11
Urena lobata (Urena Burr)	1,614.21	1.06
Urena lobata (Urena Burr) and *Chloris gayana* (Rhodes grass)	337.03	0.22
Totals	**77,185.34 m2 (7.71ha)**	**50.87%**

The results from the baseline survey aligns with the existing weed data for the offset area and includes a comprehensive list of the weed species and extent of cover for each (0).

Table 8.6 Management plan implementation for weed management

ID	Management objective/outcome	Performance targets and/or completion criteria	How the management action be carried out	Where	When	Who	Related monitoring activity	Adaptative management measures	Future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented
8.3A	Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats	Undertake rehabilitation works (including weed management and 'assisted natural regeneration') within the offset area to progressively reduce the potential impacts of existing weed infestations on retained vegetation/habitats. Eradication of introduced weed species throughout the delivery phase. To address Condition 12 of the Project EPBC Approval, the extent of weed cover at the Kingsholme Offset Area will be reduced by 95% relative to the extent of weed cover identified in the baseline surveys, or equal to maximum weed extent of 2.54 ha.	Conduct weed survey to determine the occurrence and extent of weed infested areas. Identify and map priority weed management areas. Control of native and exotic weed species that encroach on koala habitat species within the protected offset zone. Methods may involve a combination of physical, chemical and/or biological methods and/or fire management. Weed control techniques will vary depending upon the species being targeted and its location within the site and landscape. In areas of limited native vegetation (i.e. within access tracks, densely infested areas devoid of native trees etc) broad scale application of herbicide or mechanical removal will be appropriate. Within the retained predominately native bushland areas and proximate to gullies more selective removal techniques (i.e. hand tool removal) and spot application or broad scale application of a non-residual herbicide (i.e. roundup bioactive) will be necessary.	Offset area on Lot 906 SP280831	Conduct BioCondition survey to determine the occurrence and distribution of weed infested areas during year 1. Control weeds on an annual basis.	Visy in conjunction with City of Gold Coast	Years 1 -3: weed maintenance program at the offset area to prevent encroachment of native and introduced weed species will occur monthly during warmer months and bi-monthly during colder months. All identified weeds, management techniques, frequency and intensity should be included in the yearly offset delivery plan progress reports. Years 3 – 10, weed maintenance quarterly or as required. Years 11 – 15, frequency of weed maintenance will be variable and determined by site characteristics.	In the event of increased weed cover or non-response of treated areas during monitoring: – Re-treat the area and increase the re-inspection/re-application rate to ensure any juvenile recruitment is eradicated before it can become established – Investigate alternative weed management regimes or techniques for species which do not respond to treatment – Revise hygiene protocols.	
8.3B	Maintain the existing restoration area within the offset area	Undertake rehabilitation works (including weed management and 'assisted natural regeneration') within the offset area to progressively reduce the potential impacts of existing weed infestations on retained vegetation/habitats. Maintain the existing restoration area within the offset area	Access to weed management areas to follow existing walking or vehicle tracks wherever possible, with no new vehicle access tracks to be constructed.	Offset area on Lot 906 SP280831	During the project period.	Visy in conjunction with City of Gold Coast	Monthly (for years 1 – 3) weed maintenance program at the offset area to prevent encroachment of native and introduced weed species. All identified weeds, management techniques, frequency and intensity should be included in the yearly offset delivery plan progress reports. Years 3 – 10, weed maintenance would be quarterly.	In the event of increased weed cover or non-response of treated areas during monitoring: – Re-treat the area and increase the re-inspection/re-application rate to ensure any juvenile recruitment is eradicated before it can become established – Investigate alternative weed management	

Assessment Unit - Regional Ecosystem	AU 1 Regrowth 12.11.5	AU 2 Non-remnant 12.11.5
Site Reference	2037 AU1	2037 AU2
	Average Score	Average Score
Site Condition		
Non-native plant cover	10	10
Threats to the species	7	7

ID	Management objective/outcome	Performance targets and/or completion criteria	How the management action be carried out	Where	When	Who	Related monitoring activity	Adaptative management measures	Future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented
							Years 11 – 20, frequency of weed maintenance will be variable and determined by site characteristics.	regimes or techniques for species which do not respond to treatment – Revise hygiene protocols.	
8.3C	Reduce the extent of weed infestations within the offset area.	Undertake rehabilitation works (including weed management and 'assisted natural regeneration') within the offset area to progressively reduce the potential impacts of existing weed infestations on retained vegetation/habitats.	Inspections and maintenance will be undertaken that include observations on success of previous treatments in terms of extent, abundance and any regrowth of weed infestations, new weed introductions or spread, additional disturbances, follow-up treatment such as spot-spray of new shoots and removal of seedlings. Inspection and maintenance activities (or other works) shall be recorded on a checklist. The following inspection and maintenance program is to be implemented, with consideration of prevalent conditions and recent rainfall: – Initial treatment of targeted weed infestations within six months of weed surveys – Inspection of targeted areas and follow-up treatment every month in years 1 -3 – Inspections and follow-up treatment every three months in years 3 - 10 – Treatments as needed in years 11 – 20	Offset area on Lot 906 SP280831	During the project period.	Visy in conjunction with City of Gold Coast	Monthly (for years 1 – 3) weed maintenance program at the offset area to prevent encroachment of native and introduced weed species. All identified weeds, management techniques, frequency and intensity should be included in the yearly offset delivery plan progress reports. Years 3 – 10, weed maintenance would be quarterly. Years 11 – 20, frequency of weed maintenance will be variable and determined by site characteristics.	In the event of increased weed cover or non-response of treated areas during monitoring: – Re-treat the area and increase the re-inspection/re-application rate to ensure any juvenile recruitment is eradicated before it can become established – Investigate alternative weed management regimes or techniques for species which do not respond to treatment – Revise hygiene protocols.	

8.4 Management of pest fauna

8.4.1 Justification

Feral animals are common in the proposed offset area, including the potential for wild dogs or unrestrained domestic dogs and have the potential to impose negative pressures on the koala. Dogs represent a key mortality threat to koalas particularly in urban and agricultural grazing areas where domestic or wild dogs can occur in elevated densities.

8.4.2 Proposed action

The project will be managed in line with the City of Gold Coast's Biosecurity Management Plan 2019–2024, as a statutory requirement of the Queensland *Biosecurity Act 2014* to reduce pest impacts.

No monitoring for pest animals has been undertaken at Stage Coach Reserve to date; however the City of Gold Coast has confirmed there are known sightings of foxes within Stage Coach Reserve and a high likelihood of wild dogs within the reserve given there have been sightings of wild dogs in an adjacent, connected reserve.

Baseline monitoring for pest animals will be undertaken by Visy within the offset area in the first year of the offset.

The City of Gold Coast has confirmed that if/when a restoration project commences at Stage Coach Reserve, annual monitoring and trapping (if required as an outcome of monitoring activities) of pest animals will be undertaken within the reserve. The City of Gold Coast's Pest Animal Management Officers may undertake annual pest animal monitoring and trapping within the offset site to eradicate or contain incursions of new pests and pests with limited distribution based on a prioritised risk assessment; however, the timing of such works would be undertaken as part of the City of Gold Coast's pest management team's rotation of works and may not align with the management requirements of the offset. As such, Visy has committed to undertake ongoing pest animal monitoring (indicatively within years 1, 5, 10 and 15).

Where practical and appropriate, the proponent will participate cooperatively in pest management planning and implementation with local land managers (government departments, local governments and utility providers) to ensure effective pest management in the locality of the offset area.

Management of pest fauna will be undertaken across the entire offset area for the life of the offset, with the goal of reducing the risks of koala injury and mortality.

Table 8.9 provides further information about how the management actions that will be carried out to manage pests at the offset area on Lot 906 SP280831. Table 8.9 outlines the management objectives, the performance targets and management actions, who will undertake the actions, the timing of the actions, the type of monitoring activities that will be undertaken and adaptive management measures. It also outlines the future habitat score for AU1 Regrowth 12.11.5 and AU2 Non-remnant 12.11.5 once the management actions are implemented.

8.4.3 Baseline pest survey methodology

To fulfill Condition 7b, the Saunders Havill Group conducted a survey to assess feral animal abundance. The survey was conducted between between 15 February 2023 and 6 March 2023. A summary of the feral animal abundance survey effort is detailed in Table 8.7. The surveys included diurnal observations of fauna, documenting all feral animals observed on the offset property and deploying infrared sensing cameras.

Table 8.7 Survey methodology summary

EPBC Condition	Methodology	Survey dates
7 (b) abundance of feral animals.	Diurnal observations	15 February 2023 – 6 March 2023
	Infrared sensing camera survey	

8.4.3.1 Motion-triggered infrared camera survey

Infrared sensing cameras were deployed at six locations across the offset property, including one in the offset area. These cameras were left in situ for 19 days and nights, for a total of 114 survey nights between February 15 and March 6, 2023. The remote cameras were deployed in representative areas likely used by koala predators (i.e. near animal trails).

8.4.3.2 Relative Abundance Index

To determine the abundance of feral animals in a certain area, a relative abundance index (RAI) is calculated using the formula RAI = D/TN x 100. D represents the number of times the animals were detected and TN represents the total number of camera-trap nights across all cameras. This approach ensures that the surveys are conducted evenly across the entire offset area and can be repeated for future monitoring programs.

8.4.1 Results from baseline pest survey

The field surveys did not identify any evidence of koala mortalities across the offset property or offset site.

Between February 15 and March 6, 2023, a total of six motion-activated cameras were strategically placed across the offset property, with one camera located within the offset area, to capture baseline data on feral animal abundance.

During the duration of the survey period, there were a total of eight sightings of feral animals over a total of 114 survey nights. The survey detected the presence of an introduced predator *Vulpes vulpes* (red fox) on four camera traps, with one occurrence within the offset site. There was one sighting of a *Bos taurus* (cow) within the offset site. The results from the feral animal abundance survey are detailed in Table 8.8.

Using the methodology outlined in the Baseline Survey Report (Saunders Havill Group, 2023) Saunders Havill Group determined the Relative Abundance Index (RAI) for the offset property as 7.02.

Table 8.8 Non-native koala predator survey results summary (Saunders Havill Group, 2023)

Camera	Survey duration (nights)	Species	Occurrence	Within offset site	RAI
1	19	*Vulpes vulpes* (red fox)	1		7.02
2	19	*Vulpes vulpes* (red fox)	1		
3	19	*Vulpes vulpes* (red fox)	2	Yes	
		Bos taurus (cow)	1		
4	19	Nil	-		
5	19	Nil	-		
6	19	*Vulpes vulpes* (red fox)	3		
Total	**114**		*Vulpes vulpes* (red fox) – 7 *Bos taurus* (cow) - 1		

Table 8.9 Management plan implementation for pest management

ID	Management objective/outcome	Performance targets and/or completion criteria	How the management action be carried out	Where	When	Who	Related monitoring activity	Adaptative management measures	Future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented
8.4A	Minimising feral pests within the offset area and restricting native species from entering residential areas and roadways.	Reduction in key feral predator densities (i.e. fox and wild dog) by 90% of baseline level sightings within 10 years. No koala injury/mortality as a result of pest animal interactions for the life of the offset. Protection for native species as per SC.6.8 – City Plan Policy – Environmental Management Plans To address Condition 11 of the Project EPBC Approval, the abundance of each feral animal species (red fox, cow) recorded during the baseline survey will be reduced by 90% by the end of Year 10 of the OMP.	Fauna management and exclusion fencing along neighbouring properties that have yet to erect fencing. Control of feral pests that impact the ecological success of the offset area (i.e competition with other species) as per City of Gold Coast's Biosecurity Management Plan 2019–2024. Provides protection of native species (e.g Koala) from entering and becoming trapped in neighbouring properties and roadways.	Offset area on Lot 906 SP280831	At inception of planting and continuous assessment throughout the duration of the offset delivery period (15 years) Baseline monitoring of pest fauna species will be undertaken in Year 1. Annual monitoring of pest fauna will only occur as part of the City of Gold Coast's pest management team's schedule of works	Visy in conjunction with City of Gold Coast	Given the Lot 906 SP280831 is owned by City of Gold Coast pest management practices will be undertaken by City of Gold Coast as per City of Gold Coast's Biosecurity Management Plan 2019–2024. Restoration and rehabilitation monitoring reports. BioCondition survey Reporting of any koala incident with pest animal species within years 1, 5, 10, 15. Dog/fox monitoring within years 1, 5, 10, 15.	If an increase in pest species are observed via monitoring, the landholder will implement a pest animal management programme to control the feral animal population in consultation with Department of Agriculture and Fisheries.	Assessment Unit - Regional Ecosystem: **AU 1 Regrowth 12.11.5** / **AU 2 Non-remnant 12.11.5** **Site Context AU1 regrowth**: **2037 AU1** / **2037 AU2** Threats to the species: 7 / 7

8.5 Fire management

8.5.1 Justification

Fire is considered a threatening process to koalas (DAWE, 2022a, 2022b). Both wildfire and inappropriate prescribed burns can affect koala habitat quality or reduce remnant patches, as well as directly impact population numbers through mortalities (Phillips et al., 2021; van Eeden et al., 2020). Especially concerning are planned or unplanned fires that raise temperature in the canopy and produce burning and scorching of the canopy that destroy koala habitat and result in koala mortalities (Bentley and Penman, 2017; Parkins et al., 2019). An important consideration for fire management is the presence of unburnt refuge areas in the landscape, which can improve the probability of local population survival and recolonization of habitat as the vegetation recovers.

Management should aim to prevent extensive and uncontrolled fires which poses threats to the koala and local fauna. This is especially an issue in areas that have high fuel loads, such as lands not grazed by cattle (NRA, 2011).

Recommendations for managing fire in koala habitats are listed in Section 6 of better managing fires and their impacts for koala conservation (Negret, et al., 2021) and include:

– Maintain landscapes that have variety in burning regimes, e.g. variety in the timing and intensity of fires and the areas burnt each year. This can be achieved by adopting a fire regime that involves burning fire breaks earlier in the season then following up with early dry season (May to July) patch burns (cool burns) in discrete areas (i.e. don't burn entire landscapes at once). Areas should be left unburnt for 5 or more years apart from fire breaks which may require more frequent treatment.
– Burn when there is good soil moisture. Spell grasslands after fire to reduce woody vegetation thickening and assist in the recovery of native perennial grasses.
– A fire regime recommended by the Queensland Herbarium for REs 12.11.5 and 12.11.14 is suitable for most koala habitat within the offsets area. Igniting fires under appropriate weather conditions is essential for achieving these outcomes.

These fire management measures are considered appropriate for the koala.

8.5.2 Proposed action

The offset area will be incorporated into City of Gold Coast's hazard reduction burn program. This means that the offset area will be included into an overarching risk assessment which incorporates factors such as fire frequency, vegetation types, overall fuel loads, proximity to neighbouring structures and their associated vulnerability. Sites are then prioritised based on this risk assessment with areas of higher vulnerability taking precedence.

City of Gold Coast undertakes on average twelve hazard reduction burns per annum with a number of alternative mitigation methods being implemented where possible. This includes mechanical treatments, establishment of Interface Management Zones, weed suppression or vegetation restoration works. As the offset area will be supporting active planting and assisted rehabilitation works, fire management on the offset will be modified to allow for plant establishment.

The offset area includes existing fire breaks that are shown in Figure 8.2.

Figure 8.2 Existing firebreaks within offset area

Fire management guidelines for each of the REs that occur within the offset area are described in Table 8.10.

Table 8.11 provides further information about how the management actions that will be carried out to manage fires at the offset area on Lot 906 SP280831. Table 8.11 outlines the management objectives, the performance targets and management actions, who will undertake the actions, the timing of the actions, the type of monitoring activities that will be undertaken and adaptive management measures. It also outlines the future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented.

Table 8.10 DES fire management guidelines for each of the Queensland Regional Ecosystems in the offset area

Regional Ecosystem	Short description	DES Fire Management Guidelines
12.11.5	*Corymbia citriodora woodland* to open forest +/- *Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua* on metamorphics +/- interbedded volcanics	SEASON: Summer to winter INTENSITY: Low to moderate. INTERVAL: 4-25 years STRATEGY: Aim for 40-60% mosaic burn. Burn with soil moisture and with a spot ignition strategy so that a patchwork of burnt/unburnt country is achieved. ISSUES: The fire regime should maintain a mosaic of grassy and shrubby understoreys. Control of weeds is a major focus of planned burning in most areas. Careful thought should be given to maintaining ground litter and fallen timber habitats by burning only with sufficient soil moisture. Burning should aim to produce fine scale mosaics of unburnt areas. Variability in season and fire intensity is important, as well as spot ignition in cooler or moister periods to encourage mosaics.
12.11.14	*Eucalyptus crebra, E. tereticornis* and *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics	SEASON: Summer to late-autumn. INTENSITY: Low INTERVAL: 3-6 years. STRATEGY: Aim to burn 40-60% of any given area. Spot ignition in cooler or moister periods encourages mosaics. ISSUES: Control of weeds is a major focus of planned burning in most areas. Maintain ground litter and fallen timber habitats by burning only with sufficient soil moisture. Burning should aim to produce fine scale mosaics of unburnt areas.

Table 8.11 Management plan implementation for fire management

ID	Management objective/outcome	Performance targets and/or completion criteria	How the management action be carried out	Where	When	Who	Related monitoring activity	Adaptative management measures	Future habitat score for AU 1 Regrowth 12.11.5 and AU 2 Non-remnant 12.11.5 once the management actions are implemented
8.6A	Managing bushfires within the offset area whilst still maintaining habitat quality characteristics	Reduce the severity of and intensity of bushfires whilst still allowing ecological succession of fire reliant species	Offset area to be included in Council's bushfire reduction program whilst still maintaining habitat quality characteristics (e.g. fallen logs, hollows and leaf litter). Bushfire management strategies such as construction of fire breaks, access tracks, routine slashing and reduction burns should be minimized within the offset area until the area has reached a suitable density of native vegetation for the appropriate regional ecosystem.	Offset area on Lot 906 SP280831	Complete initial fire management burn within 3 years to reduce non-native plant cover (weeds) and stimulate in situ generation of native shrubs, grasses, and forbes. Forecast to be one burn during years 1 – 3 of the project, with potential for one further burn in years 8 – 12 depending on site conditions).	Visy in conjunction with City of Gold Coast	City of Gold Coast only undertakes on average twelve hazard reduction burns per annum within the local government area with a number of alternative mitigation methods being implemented where possible to do so. Given the Lot 906 SP280831 is owned by City of Gold bushfire management practices will be undertaken by City of Gold Coast as outlined above.	Investigate additional bushfire management practices including additional fire management breaks/lines or additional exercises to reduce fuel loads such as winter prescribed burns. Any such prescribed burns are to be planned as low-moderate intensity bans	
8.6B	Preventing unplanned fire events within the offset area	Prevent unplanned fire events within the offset area. Any incidence of wildfire or illegal burning is to be identified during inspections and documented within the monitoring and reporting program. Fire breaks are maintained and not overgrown with heavy fuel loads. Fire trails are navigable by the rural fire brigade.	All fires (including domestic fires such as burning of garden refuse) are prohibited from the offset area. Maintain existing fire breaks and fire trails on the perimeter of the offset area to minimise the risk of fire spreading to the offset area.	Offset area on Lot 906 SP280831	At all times	Visy in conjunction with City of Gold Coast	City of Gold Coast only undertakes on average twelve hazard reduction burns per annum within the local government area with a number of alternative mitigation methods being implemented where possible to do so. Given the Lot 906 SP280831 is owned by City of Gold Coast bushfire management practices will be undertaken by City of Gold Coast as outlined above.	Investigate additional bushfire management practices including additional fire management breaks/lines or additional exercises to reduce fuel loads such as winter prescribed burns. Any such prescribed burns are to be planned as low-moderate intensity bans	

Assessment Unit - Regional Ecosystem	**AU 1 Regrowth 12.11.5**	**AU 2 Non-remnant 12.11.5**
Site Reference	**Future AU1**	**Future AU2**
	Average Score	Average Score
Site Condition AU1 regrowth		
Native plant species richness - trees	5	5
Native plant species richness - shrubs	5	5
Native plant species richness - grasses	5	5
Native plant species richness - forbes	5	5
Tree canopy height (average of emergent, canopy, sub-canopy)	3	3
Tree canopy cover (average of emergent, canopy, sub-canopy)	5	5
Shrub canopy cover	5	5
Native grass cover	5	5
Organic litter	5	5
Large trees (euc plus non-euc)	10	5
Coarse woody debris	5	5

8.6 Offset improvement calculations

This section outlines the offset improvement calculations used to calculate the benchmark condition of the offset area and the future condition of the offset area after all management actions are implemented. The calculator was developed using the EPBC Act Offsets Assessment Guide (DSEWPaC 2012), which includes the following three criteria that are assessed to achieve a final habitat quality score:

– Site condition
– Site context
– Species stocking rates.

Table 8.12 outlines the current and year 15 (2037) scores calculated for each assessment unit (AU1 and AU2) within the offset area for each of the criteria for assessing site condition and site context.

Table 8.12 Offset improvement calculations

OFFSET – Fauna Species									
Assessment Unit – Regional Ecosystem	**AU1 Regrowth 12.11.5**				**AU2 Non-remnant 12.11.5**				**Management actions outlined in Section 8 to achieve scores**
Site reference	**Current AU1**			**2037 AU1**	**Current AU2**			**2037 AU2**	
	Benchmark 12.11.5	Average % benchmark	Average Score	Average Score	**Benchmark 12.11.5**	Average % benchmark	Average Score	Average Score	
Site Condition AU1 regrowth									
Recruitment of woody perennial species in EDL	100	100	5	5	100	100	5	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.2J Erosion and sediment control to protect planted areas – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Native plant species richness - trees	7	128.58	5	5	7	114.29	5	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area

OFFSET – Fauna Species									
Assessment Unit – Regional Ecosystem	**AU1 Regrowth 12.11.5**				**AU2 Non-remnant 12.11.5**				**Management actions outlined in Section 8 to achieve scores**
Site reference	**Current AU1**			**2037 AU1**	**Current AU2**			**2037 AU2**	
	Benchmark **12.11.5**	Average % benchmark	Average Score	Average Score	**Benchmark** **12.11.5**	Average % benchmark	Average Score	Average Score	
Native plant species richness - shrubs	11	54.55	3	5	11	27.27	2.5	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Native plant species richness - grasses	8	93.75	5	5	8	0	0	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Native plant species richness - forbes	17	76.47	3	5	17	0	0	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Tree canopy height (average of emergent, canopy, sub-canopy)	24/10	29.17/35	3	3	24/10	12.5/2.0	0	3	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area

OFFSET – Fauna Species									
Assessment Unit – Regional Ecosystem	**AU1 Regrowth 12.11.5**				**AU2 Non-remnant 12.11.5**				**Management actions outlined in Section 8 to achieve scores**
Site reference	**Current AU1**			**2037 AU1**	**Current AU2**			**2037 AU2**	
	Benchmark **12.11.5**	Average % benchmark	Average Score	Average Score	**Benchmark** **12.11.5**	Average % benchmark	Average Score	Average Score	
Tree canopy cover (average of emergent, canopy, sub-canopy)	60/14	0/230	0	5	60/14	0/20.7	0	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset property – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Shrub canopy cover	14	13.21	3	5	14	0	0	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset property – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Native grass cover	30	3.34	0	5	30	0	0	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Organic litter	50	22	3	5	50	0	0	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2F Restore RE native plant species richness – 8.2H Habitat quality retention – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset property – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area

OFFSET – Fauna Species									
Assessment Unit – Regional Ecosystem	**AU1 Regrowth 12.11.5**				**AU2 Non-remnant 12.11.5**				**Management actions outlined in Section 8 to achieve scores**
Site reference	**Current AU1**			**2037 AU1**	**Current AU2**			**2037 AU2**	
	Benchmark **12.11.5**	Average % benchmark	Average Score	Average Score	**Benchmark** **12.11.5**	Average % benchmark	Average Score	Average Score	
Large trees (euc plus non-euc)	26	40.38	5	10	26	0	0	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Coarse woody debris	457	1.1	0	5	457	0	0	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2F Restore RE native plant species richness – 8.2H Habitat quality retention – 8.3B Maintain the existing restoration area within the offset property – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Non-native plant cover	0	88	0	10	0	100	0	10	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area
Quality and availability of food and foraging habitat			5	10			5	10	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2H Habitat quality retention – 8.2I Replant (if required) – 8.4A Minimising feral pests within the offset area and restricting native species from entering residential areas and roadways. – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area

OFFSET – Fauna Species									
Assessment Unit – Regional Ecosystem	**AU1 Regrowth 12.11.5**				**AU2 Non-remnant 12.11.5**				**Management actions outlined in Section 8 to achieve scores**
Site reference	**Current AU1**			**2037 AU1**	**Current AU2**			**2037 AU2**	
	Benchmark 12.11.5	Average % benchmark	Average Score	Average Score	**Benchmark 12.11.5**	Average % benchmark	Average Score	Average Score	
Quality and availability of shelter			5	10			5	10	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2H Habitat quality retention – 8.2I Replant (if required) – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics
Site Condition Score			40.6	93			17.2	88	
MAX Site Condition Score			*100*	*100*			*100*	*100*	
Site Condition Score – out of 3			**1.22**	**2.79**			**0.52**	**2.64**	
Assessment Unit – Regional Ecosystem	**AU1 Regrowth 12.11.5**				**AU2 Non-remnant 12.11.5**				**Management actions outlined in Section 8 to achieve scores**
Site Context AU1 regrowth	**Current AU1**			**2037 AU1**	**Current AU2**			**2037 AU2**	
Size of patch			10	10			10	10	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2H Habitat quality retention – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Connectedness			5	5			5	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2H Habitat quality retention – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Context			4	4			4	4	N/A as context relates to the percentage of remnant vegetation in a 1 km buffer of the offset area (i.e. management measures within the offset site will not change remnant vegetation in the surrounding landscape)

OFFSET – Fauna Species									
Assessment Unit – Regional Ecosystem	**AU1 Regrowth 12.11.5**				**AU2 Non-remnant 12.11.5**				**Management actions outlined in Section 8 to achieve scores**
Site reference	**Current AU1**			**2037 AU1**	**Current AU2**			**2037 AU2**	
	Benchmark **12.11.5**	Average % benchmark	Average Score	Average Score	**Benchmark** **12.11.5**	Average % benchmark	Average Score	Average Score	
Ecological Corridors			0	0			0	0	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2H Habitat quality retention – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Role of site location to species overall population in the state			5	5			5	5	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2H Habitat quality retention – 8.2I Replant (if required) – 8.2J Erosion and sediment control to protect planted areas – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.4A Minimising feral pests within the offset area and restricting native species from entering residential areas and roadways – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Threats to the species			3.6	7			3.6	7	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2H Habitat quality retention – 8.2I Replant (if required) – 8.2J Erosion and sediment control to protect planted areas – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.4A Minimising feral pests within the offset area and restricting native species from entering residential areas and roadways – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area

OFFSET – Fauna Species									
Assessment Unit – Regional Ecosystem	**AU1 Regrowth 12.11.5**				**AU2 Non-remnant 12.11.5**				**Management actions outlined in Section 8 to achieve scores**
Site reference	**Current AU1**			**2037 AU1**	**Current AU2**			**2037 AU2**	
	Benchmark **12.11.5**	Average % benchmark	Average Score	Average Score	**Benchmark** **12.11.5**	Average % benchmark	Average Score	Average Score	
Species mobility capacity			3.8	7			2.5	7	– 8.2A Increase native plant richness to >90% RE benchmark of species within each life-form – 8.2D Increase large trees to at least 50% of RE benchmark – 8.2F Restore RE native plant species richness – 8.2G Reduce non-native plant cover within offset area – 8.2H Habitat quality retention – 8.2I Replant (if required) – 8.3A Weed management to reduce the potential impacts of existing weed infestations on retained vegetation/habitats – 8.3B Maintain the existing restoration area within the offset area – 8.3C Reduce the extent of weed infestations within the offset area – 8.6A Managing bushfires within the offset area whilst still maintaining habitat quality characteristics – 8.6B Preventing unplanned fire events within the offset area
Site Context Score			31.4	38			30.1	38	
MAX Site Context Score			*56*	*56*			*56*	*56*	
AU1 Site Context Score – out of 3			**1.68**	**2.04**			**1.61**	**2.04**	
	OFFSET Future Quality Workshop								
Final habitat quality score (weighted)	**AU1**	**AU2**	**Average/ Final**	**AU1**	**AU2**	**Average/ Final**			
Site Condition score (out of 3)	1.22	0.52	0.87	2.79	2.64	2.72			
Site Context Score (out of 3)	1.68	1.61	1.65	2.04	2.04	2.04			
Species Stocking Rate Score (out of 4)	2	2	2.00	2	2	2.00			
Habitat Quality score (out of 10)	4.9	4.13	4.52	6.83	6.68	6.75			
Assessment Unit area (ha)	5.858	9.315		7.24	11.86				
Total offset area (ha) for this MNES	15.173	15.173	15.173	15.17	15.17				
Size Weighting	0.39	0.61		0.39	0.61				
Weighted Habitat Quality Score	***1.89***	***2.54***	***4.43***	***2.63***	***4.10***	***6.73***			
NOTE - AU1 site condition score was 1.01 (cell not linked with E25).									

8.7 Completion criteria and performance targets

Implementation of this OMP is intended to achieve the following key environmental criteria and performance targets across the offset area for koala habitat over the 15 year timeframe:

– Restore the RE vegetation across non-remnant and regrowth areas to achieve native plant species richness benchmark for trees, shrubs, grasses, and forbs
– Increase the number of large trees across non-remnant and regrowth areas to a minimum of 13 large trees per hectare to achieve 50-100% of the benchmark
– Improve koala habitat across the offset area by achieving foraging habitat and shelter habitat scores of 10
– Improve offset area context and leverage its location within a mapped bioregional corridor by reducing threats to the koala and improving koala mobility capacity to achieve scores of 7

The overall completion target is to achieve an overall MHQA gain from 4/10 to 7/10.

During the management period, a set number of performance completion criteria have been proposed to track the trajectory of habitat quality towards the desired final completion criteria. The timing of the interim targets corresponds with the management actions in Section 8 and the monitoring in Section 9.

The targets were derived by identifying the attributes expected to increase over the period of the approval. The values were determined by differentiating between specific, longer term metrics (e.g. species richness, tree canopy cover, number of large trees) and those where an initial benefit could be realised early (e.g. recruitment of woody species, non-native plant cover). Completing management actions identified in Section 8 will enable the offset area to attain the completion criteria identified in Table 8.13 and maintaining the stated completion criteria for the duration of the approval.

Table 8.13 Performance indicators and completion criteria for offset area management

ID	Ecological outcome	Year 1 performance indicator	Year 3 performance indicator	Year 7 performance indicator	Year 10 performance indicator	Year 15 performance indicator	Completion criteria	Relevant attributes	Relevant management principle
8.8A	Increase the koala offset area habitat quality, when compared to baseline data for the offset area.	Revegetation and regeneration of REs within 18 months of OMP approval by DCCEEW. The monitoring program for the offset area commenced one year after baseline.	Revegetation and regeneration of REs within 18 months of OMP approval by DCCEEW. The monitoring program for the offset area commenced one year after baseline. No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	Within 7 years of legally securing, habitat quality and extent has been maintained across the koala offset areas. No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	Revegetation and regeneration of REs within 18 months of OMP approval by DCCEEW. The monitoring program for the offset area commenced one year after baseline. No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	Restore the RE vegetation across non-remnant and regrowth areas to achieve native plant species richness benchmark for trees, shrubs, grasses, and forbes	Recruitment of woody perennial species in EDL Native plant species richness - trees Native plant species richness - shrubs Native plant species richness - grasses Native plant species richness - forbes Tree canopy height (average of emergent, canopy, sub-canopy) Tree canopy cover (average of emergent, canopy, sub-canopy) Shrub canopy cover Native grass cover Organic litter Large trees (euc plus non-euc)	8.2 Revegetation and regeneration, including planting of suitable foraging species 8.3 Weed management
8.8B	Increase the number of koala habitat trees within the offset area.	Revegetation and regeneration of REs within 18 months of OMP approval by DCCEEW. The monitoring program for the offset area commenced one year after baseline	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	Replanted areas do not require further direct maintenance (they are established/ surviving independently) and demonstrate evidence of natural recruitment of koala food trees. No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	Increase the number of koala habitat trees within the offset area.	Recruitment of woody perennial species in EDL Native plant species richness - trees Native plant species richness - shrubs Native plant species richness - grasses Native plant species richness - forbes Tree canopy height (average of emergent, canopy, sub-canopy) Tree canopy cover (average of emergent, canopy, sub-canopy) Shrub canopy cover Native grass cover Organic litter Large trees (euc plus non-euc)	8.2 Revegetation and regeneration, including planting of suitable foraging species 8.3 Weed management
8.8C	Provide habitat enhancements for the koalas by improving the condition of koala habitat, forging and shelter across the offset area.	Revegetation and regeneration of REs within 18 months of OMP approval by DCCEEW. The monitoring program for the offset area commenced one year after baseline	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	Improve koala habitat across the offset area by achieving foraging habitat and shelter habitat scores of 10	Recruitment of woody perennial species in EDL Native plant species richness - trees Native plant species richness - shrubs Native plant species richness - grasses Native plant species richness - forbes Tree canopy height (average of emergent, canopy, sub-canopy)	8.2 Revegetation and regeneration, including planting of suitable foraging species 8.3 Weed management

ID	Ecological outcome	Year 1 performance indicator	Year 3 performance indicator	Year 7 performance indicator	Year 10 performance indicator	Year 15 performance indicator	Completion criteria	Relevant attributes	Relevant management principle
								Tree canopy cover (average of emergent, canopy, sub-canopy) Shrub canopy cover Native grass cover Organic litter Large trees (euc plus non-euc) Connectedness Ecological Corridors	
8.8D	Enhance landscape connectivity between the offset area and surrounding biodiversity corridors to improve regional dispersal opportunities.	LBM secured (VDec approved by DoR within 6 months. Revegetation and regeneration of REs within 18 months of OMP approval by DCCEEW. The monitoring program for the offset area commenced one year after baseline.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	No net increase in non-native plant cover. Maintain a net increase in canopy species recruitment. A net increase in canopy and / or sub-canopy cover. Continued development of landscape connectivity between the offset property and regional biodiversity corridors.	Improve offset area context and leverage its location within a mapped bioregional corridor by reducing threats to the koala and improving koala mobility capacity to achieve scores of 7	Recruitment of woody perennial species in EDL Native plant species richness - trees Native plant species richness - shrubs Native plant species richness - grasses Native plant species richness - forbes Tree canopy height (average of emergent, canopy, sub-canopy) Tree canopy cover (average of emergent, canopy, sub-canopy) Shrub canopy cover Native grass cover Organic litter Large trees (euc plus non-euc)	8.1 Legally secure the offset area 8.2 Revegetation and regeneration, including planting of suitable foraging species 8.3 Weed management 8.4 Management of pest fauna 8.5 Fire management

8.8 Indicative timeframes

Timing and indicative dates for delivery of the offset are provided in Table 8.14.

Table 8.14 Indicative timeframes for offset delivery

Action	Timing	Indicative date
Submit OMP to DCCEEW	Prior to commencement	Q4 2022
OMP approved by DCCEEW	Prior to commencement	November 2022
Commence controlled action	Prior to LBM	November 2022
LBM secured (VDec approved by DoR) Refer to Section 8.1	Within 6 months of OMP approval by DCCEEW	Q2 2023
Revegetation and regeneration of REs reference Section 8.2	Commenced within 18 months of OMP approval by DCCEEW and continued in line with this OMP, subject to favourable planting conditions and a contract between City of Gold Coast and Visy being agreed upon and signed	Commence 2023
Develop and implement monitoring Refer to Section 9	Conduct photo and drone monitoring of the site and provide this evidence to Visy in the form of monitoring reports in years 1, 3, 7, 10 and 14 of the project (in line with State Government requirements). Conduct drone monitoring of the site in years 1, 3, 7, 10 and 14 of the project. Conduct koala surveys on site and provide this evidence to Visy in the form of result reports in years 1, 10 and 14. BioCondition survey in Years 5, 10 and 14. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	Photo monitoring and drone monitoring – year 1 (2023), year 3 (2025), year 7 (2029) and year 10 (2033) and year 14 (2037) Koala surveys - Q2 in year 1 (2023), year 3 (2025) and year 10 (2033) and year 14 (2037)
Compliance reporting - Restoration and rehabilitation monitoring reports.	Annually	Annually from time of commencement

9. Monitoring and reporting schedule

The monitoring methods discussed in Table 9.1 will enable comparative changes in vegetation condition against baseline data collected on the offset area, as well as attainment and maintenance of the offset completion criteria (Section 9). Furthermore, the monitoring and subsequent reports identified in Table 9.1 will measure changes resulting from the management actions and variability due to climatic conditions. This will inform the nature and frequency of management intervention required.

The monitoring schedule is outlined in Table 9.1 and identifies the monitoring activities, the measured parameters, the monitoring guidelines, where and when the monitoring will be undertaken.

Table 9.1 Monitoring schedule

ID	Monitoring activity	Management needs/ questions addressed	Parameter/s measured	Survey/monitoring guidelines	Where	When	Reliability	Relevant Management Principles
9.1A	Koala surveys (SAT surveys)	Presence/absence of koalas Koala density	Activity levels via faecal pellets Presence absence at point of survey Koala density estimates via transects	As per the Spot Assessment Technique: A tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus Steve Phillips and John Callaghan.	Offset area	Provision of koala surveys in years 1, 10 and 14 of the project. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	The Philips and Callaghan method is highly reliable as it is a scientifically robust and commonly accepted method of evaluating koala activity,	8.2 Revegetation and regeneration, including planting of suitable foraging species
9.1B	Photo and drone monitoring	Plant establishment and success	Indicative native vegetation cover and density	Standardised drone flight protocols for the creation of orthomosaics: 8 m/s speed (28 km/hr) 120 m above ground flying height (for safety reasons) Spacing between flying lines of 20 m Photos every 2 seconds Orthomosaics also to be supported by aerial photography in cardinal directions. In accordance with the Queensland Government. Koala Deliver Offset Plan Template. Part C – Monitoring and Reporting, Section I - Types of monitoring actions).	Offset area	Years 1, 3, 7, 10 and 14 of the project. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	Drone monitoring for vegetation cover is highly reliable, providing a precise level of data capture superior to that that could be captured via on-ground transects.	8.2 Revegetation and regeneration, including planting of suitable foraging species
9.1C	Given the Lot 906 SP280831 is owned by City of Gold Coast pest management practices will be undertaken by City of Gold Coast as per City of Gold Coast's Biosecurity Management Plan 2019–2024.	Management of pest species	Types of pest species	City of Gold Coast's Biosecurity Management Plan 2019–2024.	Offset area	Every 5 years	This is a reliable practice by the City of Gold Coast.	8.4 Management of pest species
9.1D	Dog/fox monitoring	Management of pest species	Types and number of pest species	Monitoring techniques for vertebrate pests Department of Agriculture, Fisheries and Forestry wild dogs 2007 Queensland Government Department of Agriculture and Fisheries Invasive plant and animal publications	Offset area	Years 1, 5, 10, 15	These methods are highly reliable as it is a scientifically robust and commonly accepted method of monitoring pest species.	8.4 Management of pest species

ID	Monitoring activity	Management needs/ questions addressed	Parameter/s measured	Survey/monitoring guidelines	Where	When	Reliability	Relevant Management Principles
9.1E	City of Gold Coast undertakes on average twelve hazard reduction burns per annum within the local government area with a number of alternative mitigation methods being implemented where possible to do so.Given the Lot 906 SP280831 is owned by City of Gold Coast bushfire management practices will be undertaken by City of Gold Coast as outlined above.	Plant establishment and success Weed management	Non plant cover	City of Gold Coast bushfire management practices	Offset area	Complete initial fire management burn within first year to reduce non-native plant cover (weeds) and stimulate in situ generation of native shrubs, grasses, and forbes. Forecast to be one burn during years 1 – 3 of the project, with potential for a further burn during years 4 – 20 depending on site conditions).	This is a reliable practice by the City of Gold Coast.	8.5 Fire Management
9.1F	Restoration and rehabilitation monitoring reports.	Plant establishment and success Weed management	Recruitment of woody perennial species – includes koala canopy feed and shelter tree species. Native plant species richness (trees, shrubs and grasses) – as an indicator of ecological succession and regeneration progress after mitigating ecosystem threats. Tree canopy height – indicates progress towards ecological maturity and increases in Koala habitat availability. Tree canopy cover – indicates progress towards ecological maturity and increases in Koala habitat availability. Shrub canopy cover – indicates progress towards ecological maturity and increases in Koala habitat availability. Native perennial grass cover – which supresses weeds and thereby encourages recruitment of juvenile eucalypt feed and shelter trees. Organic litter cover – important for surface soil moisture retention, cycling of nutrients and providing interstitial spaces to enhance tree seed germination and growth and recruitment of canopy species including actively-growing Koala feed and shelter species. Large trees per hectare – as a measure of important as shelter trees for Koalas and the production of seeds for recruitment. Coarse woody debris per hectare – an increase relative to the benchmark could indicate a decline in canopy tree health / increase in senescence. Invasive plant cover – which can compete with native plants for light, moisture and nutrients, especially recruiting koala food and shelter tree canopy species. Invasive plants can increase fuel load and change fire regimes and susceptibility to unplanned fires. Quality and availability of food and foraging – e.g., Number, size and health of feed trees. Quality and availability of shelter – e.g., Density and health of shelter trees. Threats to species	Queensland Environmental Offset Framework Offset Delivery Plan Template – Section 3, Part C – Monitoring and Reporting	Offset area	Years 3, 7, 10 and 14 of the project. Note – The surveys in year 14 are to allow contingent time for variation to approval if necessary, given the 15 year target of works	Monitoring reports will need to be prepared with a high level of detail to allow for repetition in methods over time to provide reliable information.	8.2 Revegetation and regeneration, including planting of suitable foraging species 8.4 Management of pest fauna

ID	Monitoring activity	Management needs/ questions addressed	Parameter/s measured	Survey/monitoring guidelines	Where	When	Reliability	Relevant Management Principles
9.1G	BioCondition survey	Plant establishment and success Weed management	Recruitment of woody perennial species – includes koala canopy feed and shelter tree species. Native plant species richness (trees, shrubs and grasses) – as an indicator of ecological succession and regeneration progress after mitigating ecosystem threats. Tree canopy height – indicates progress towards ecological maturity and increases in Koala habitat availability. Tree canopy cover – indicates progress towards ecological maturity and increases in Koala habitat availability. Shrub canopy cover – indicates progress towards ecological maturity and increases in Koala habitat availability. Native perennial grass cover – which supresses weeds and thereby encourages recruitment of juvenile eucalypt feed and shelter trees. Organic litter cover – important for surface soil moisture retention, cycling of nutrients and providing interstitial spaces to enhance tree seed germination and growth and recruitment of canopy species including actively-growing Koala feed and shelter species. Large trees per hectare – as a measure of important as shelter trees for Koalas and the production of seeds for recruitment. Coarse woody debris per hectare – an increase relative to the benchmark could indicate a decline in canopy tree health / increase in senescence. Invasive plant cover – which can compete with native plants for light, moisture and nutrients, especially recruiting koala food and shelter tree canopy species. Invasive plants can increase fuel load and change fire regimes and susceptibility to unplanned fires. Quality and availability of food and foraging – e.g., Number, size and health of feed trees. Quality and availability of shelter – e.g., Density and health of shelter trees. Threats to species	BioCondition Assessment Framework for Terrestrial Biodiversity in Queensland - Assessment Manual Version 2.2 (2015)	Offset area	Years 5, 10 and 15.	The BioCondition survey method is highly reliable as it is a scientifically robust and commonly accepted method and will allow for consistent data collection over time.	8.2 Revegetation and regeneration, including planting of suitable foraging species 8.3 Weed management

10. Ongoing adaptive management

This plan has been prepared to be implemented until the offset completion criteria have been achieved and monitored until the 31 December 2037, when the offset period ceases (noting that the approval for EPBC 2022/09243 is expected to have a 25 year approval period, which would be until 2047). Management principles and their success or failure will be reported on in the Offset Area Reports, and adapted, where required, if triggers are reached and corrective actions need to be implemented (see Section 8). If management measures need substantial adjustment, Visy may review this plan in consultation with the City of Gold Coast.

Adaptative management measures have been identified for each of the management principles in Table 8.1, Table 8.2, Table 8.6, Table 8.9, and Table 8.11 to assist Visy in achieving the performance criteria for this offset plan.

The adaptive management approach will reduce uncertainty over time and facilitate achievement of the performance targets and completion criteria. In reviewing the success of the OMP, the adaptive management approach will include the following:

– Incorporation of new data/information identified as a result of implementing the plan or from external sources (e.g. academic literature, EPBC policy statements), where appropriate
– Effectively coordinating, scheduling and/or triggering monitoring, risk management, auditing and reporting activities
– Periodically reviewing risks, including in response to the risk level, changing circumstances or the results from implementing contingency response/corrective actions
– Frequent review of the effectiveness of management measures with significant levels of uncertainty, relatively long implementation timeframes, and upon which the plan is highly dependent
– Addressing and remediating the consequences of significant environmental incidents (planned and unanticipated).

The adaptive management measures for each management principle are discussed in detail in Sections 8.1, 8.2, 8.3, 8.4 and 8.5.

11. Risk assessment

A risk assessment has been conducted by the offset working group on 7 October 2022 to consider and evaluate events or circumstances that may inhibit achieving the completion criteria for the offset area. The risks have been assessed against the risk matrix in Table 11.1, supplied by the DCCEEW. The risk analysis:

– Identifies events and threats that will, may, or are likely to impact the attainment of the completion criteria
– Assesses the likelihood and consequences of those events and threats eventuating, both before and after risk controls are applied, and assesses residual risk levels
– Identifies levels of uncertainty in mitigating the risks, with appropriate corrective actions and associated trigger criteria should risks and threats eventuate.

Table 11.1 Risk matrix

Risk matrix	
Likelihood (L): A qualitative measure of how likely it is that this event/circumstance will occur both before and after management activities are implemented	
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
Consequence (C): Qualitative measure of what will be the consequence/result if the issue does occur	
Minor	Minor incident of environmental damage that can be reversed *(e.g.short-term delays to achieving strategy objectives, implementing low-cost, well-characterised corrective actions)*
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts (*e.g. short-term delays to achieving strategy objectives, implementing well-characterised, high cost/effort corrective actions*)
High	Substantial instances of environmental damage that could be reversed with intensive efforts (*e.g. medium-long term delays to achieving objectives, implementing uncertain, high-cost/effort corrective actions*)
Major	Major loss of environmental amenity and real danger of continuing (*e.g. strategy objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies*)
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage (*e.g. strategy objectives are unable to be achieved, with no evidenced mitigation strategies*)

Final Risk Rating (R): A function of multiplying Likelihood (L) and Consequence (C)

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

Table 11.2 Assessment of events or circumstances that may inhibit achieving completion criteria for the offset area

ID	Event/Circumstance	Risk Description	Initial Risk Rating			Management Measures / Actions	Residual Risk Rating			Performance Criteria	Corrective Action Triggers	Corrective Actions
			L	C	R		L	C	R			
Project Risks												
11.2A	Offset contract and funding	Offset objectives not achieved as a result of contract or funding not adequately supporting attainment of outcomes	Possible	Major	High	Offset quote provided by City of Gold Coast and contract signed with Visy, including funding details. Offset working team for this OMP including Visy and City of Gold Coast. City of Gold Coast active Environmental Offsets Program and previous delivery of over 125 ha koala habitat offset. Visy company scale and structure.	Rare	Major	Medium	Offset contract signed including funding.	City of Gold Coast site management identifies significant shortfall in funding to continue offset delivery in line with contract.	Report to DCCEEW within 3 months of identifying likely offset funding shortfall. Develop action plan in consultation with DCCEEW, Visy and City of Gold Coast to retore funding shortfall.
11.2B	Legally securing offset property	Offset not protected due to not securing Legally Binding Mechanism	Possible	Major	High	Offset property is freehold parcel owned by City of Gold Coast. Secure Voluntary Declaration under VMA for Lot 906 SP280831 offset property.	Rare	Major	Medium	VDec in place within 6 months of OMP approval.	Not applicable	Report to DCCEEW if LBM not secured within timeframe. Complete VDec LBM process.
11.2C	Incompatible surrounding development	Offset habitat context improvement not achieved due to incompatible surrounding development	Possible	Moderate	Medium	Selection of offset property appropriately located and zoned to prevent incompatible development in close proximity. Offset property mapped by State as “Koala Restoration Area” and borders an area mapped as Koala Priority Area. Offset property part of Stage Coach Reserve with adjacent boundary to the west and south. Offset property within City of Gold Coast’s northern critical corridor which is actively restoring habitat.	Unlikely	Moderate	Low	Not applicable	Not applicable	Not applicable
11.2D	Localised Bushfire event		Possible	High	Medium	City of Gold Coast hazard reduction burn program at regional scale. Inclusion of offset area into hazard reduction burn program. Removal and control of non-native plant species.	Unlikely	Moderate	Low	Course woody debris (CWD), woody weeds, and shrub cover managed in line with RE benchmark.	CWD, woody weeds or shrub cover assessed as high or unacceptable fuel load hazard for fire risk.	Removal/reduction of CWD, woody weeds and shrub cover via management actions identified in Table 8.6. Reporting via annual compliance report.
Force Majeure Events												
11.2E	Drought	Degradation of habitat and food availability as a result of drought	Likely	Moderate	Medium	Supported rehabilitation of regrowth and recruitment. Select habitat and food species from RE for planting. Watering regime following planting stages. Removal and control of non-native plant species. Increase species richness to achieve RE benchmark. Erosion and sediment controls.	Likely	Minor	Low	Refer Table 8.2 for Regeneration planting actions Weed management actions	Monitoring identifies negative impact on survival of planting success and is correlated to drought conditions.	Increase watering regime for plantings as practicable to improve survival during drought conditions.
11.2F	Severe storm events (ie. Cyclone, Intense tropical low)	Damage to habitat as a result of severe storm event	Likely	Moderate	Medium	Supported rehabilitation of regrowth and recruitment. Planting to increase species richness to achieve RE benchmark.	Likely	Minor	Low	Refer Table 8.2 for Regeneration planting actions	Monitoring identifies significant damage to habitat and is correlated to severe storm event.	Manage fallen timber to prevent further damage to native vegetation. Replant as required to maintain RE species richness.

11.2G	Major Bushfire event	Extensive bushfire event causing regional scale habitat damage, including the offset area	Possible	Major	High	City of Gold Coast hazard reduction burn program at regional scale. Inclusion of offset area into hazard reduction burn program. Removal and control of non-native plant species.	Possible	High	Medium	CWD, woody weeds, and shrub cover managed in line with RE benchmark. No uncontrolled bushfire events within circa 10 km.	CWD, woody weeds or shrub cover assessed as high or unacceptable fuel load hazard for fire risk.	Removal/reduction of CWD, woody weeds and shrub cover via management actions identified in Table 8.6. Reporting via annual compliance report.

12. Compliance with EPBC Act Policies

12.1 EPBC Act Environmental Offsets Policy

The proposed offsets have been developed in accordance with the overarching principles and aims of the EPBC Act and EPBC Act Environmental Offsets Policy (Commonwealth of Australia, 2012), as outlined in Table 12.1.

Table 12.1 EPBC Act Environmental Offsets Policy Principles

Policy Principle	Compliance
1. Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matters.	The proposed offset area will be legally secured and contain suitable habitat for the koala that will be maintained through removal or management of major threats (i.e. weeds), including at a property-scale for some aspects, improved the quality and extent of foraging and sheltering habitat for the koala and regular monitoring and reporting of the existing populations and habitat characteristics, which will provide data for the ongoing successful management of the populations to maintain their viability. The proposed offset areas will increase connectivity to the adjacent surrounding region.
2. Suitable offsets must be built around direct offsets but may include other compensatory measures.	The proposed offset area results in 111.45% of the impact being directly offset (i.e. the minimum direct offset requirement of 90% will be met).
3. Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.	The offset proposal has been defined based on the EPBC Act Offsets Assessment Guide (DSEWPaC, 2012) and therefore is considered consistent with the statutory protection that applies to the koala.
4. Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter.	The offset proposal has been defined based on the EPBC Act Offsets Assessment Guide (DSEWPaC, 2012) and therefore is considered to be of a size and scale proportionate to the residual impacts on the koala.
5. Suitable offsets must effectively account for and manage the risks of the offset not succeeding.	The offset area contains suitable habitat for the koala (as outlined in Section 5) and is currently owned by City of Gold Coast Council and Visy will secure the offset area through a LBM of a VDec under the VM Act prior to the impacts on the impact site and hence protected from clearing or other major disturbances and undergo management of the koala population and existing threats such as weed infestation and bushfire. Risks of the offset not succeeding will be managed through the management actions to be implemented, monitoring and timeframes, and performance indicators and ecological outcomes to be achieved. Management measures will include weed management, extensive rehabilitation and habitat enhancements, provision of artificial roosts and ongoing monitoring, and maintenance as appropriate. The residual risk ratings for impacts to the offset area were reduced sufficiently through proposed management, monitoring and corrective action, to result in low to medium risk of the offset not succeeding.
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.	The offset area will form part of the City of Gold Coast Conservation Estate though is not otherwise protected or managed as habitat for the koala. The offset area is located on freehold tenured land owned by the City of Gold Coast but will be further protected through the Voluntary Declaration process to become a Category A area regulated under the VM Act. This will be substantial additional protection to the existing status of Least Concern remnant vegetation (Category B). The proposed management of the offset areas will be additional to requirements and enforcement under law or planning regulations, such as the *Biosecurity Act 2014.* The Queensland Environmental Offsets Policy recognises that requirements for offsets for MNES under the EPBC Act do not need to be duplicated where the same impact and prescribed matter have been subject to assessment under the EPBC Act as a controlled action. The proposed rehabilitation areas which is part of the wider City of Gold Coast local government area will improve connectivity and quality of habitats within the refuge.

Policy Principle	Compliance
7. Suitable offsets must be efficient, timely, transparent, scientifically robust and reasonable.	The proposed delivery of the offset has been based on established and standard scientific survey and management methods and will be commenced prior to the impacts occurring to the MNES. Assessments and monitoring and management programs proposed are based on documented management strategies and land management techniques that have been adapted to the locations and site characteristics, with input from species experts and other suitably qualified persons, and reference to priority management actions and species profile information, recovery plans and threat abatement plans.
8. Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	The Offset Area Management Plan will include details in relation to responsible parties, management actions, timeframes, baseline survey and monitoring programs, review processes, reporting, and remedial action triggers and measures. Compliance reporting and non-compliance notification to DCCEEW will also be included. The OAMP will be built upon foundation presented in this OMP.

12.2 EPBC Act Environmental Management Plan Guidelines

The proposed offsets have been developed in accordance with the overarching principles and aims of the EPBC Act Environmental Management Plan Guidelines (Commonwealth of Australia, 2014), as outlined in Table 12.2.

Table 12.2 Offset compliance with EMP guidelines

Relevant EMP Guideline section	Compliance
2.1 Key principles	This offset proposal meets the key principles of an EMP, as relevant, including: – Being balanced, objective and concise. – Stating the purpose of the use of the document and any assumptions made. – Identifying gaps in information requiring further detail (such as information to be updated following baseline surveys or monitoring events). – Using adaptive management strategies. – Being clearly presented and written. – Identifying roles and responsibilities for the commitments made.
2.2 Including commitments in management plans	Commitments in the offset proposal are specific and measurable with clear timeframes. The offset management and monitoring program will be submitted to DoR as part of approval of the VDec legally securing process.
3. Content of the EMP	The offset proposal is structured appropriately for its purpose as a guide to the delivery of the offsets. This includes: – Project description, purpose, roles and responsibilities, report structure and limitations sections. – Reporting of baseline surveys, monitoring surveys and other management requirements. – Management measures that describe the activities and control programs to be designed and undertaken at the offset areas, including timeframes and measurable performance indicators and completions criteria. – Site maps are included. – Monitoring programs are described, including triggers for remedial actions and reporting processes. – Audit and review processes.
4. Evaluating risk	A risk assessment will be prepared with regard to the EMP Guidelines risk assessment method. This will be presented in OAMP.

13. References

Bentley, P.D., Penman, T.D., 2017. Is there an inherent conflict in managing fire for people and conservation? *International Journal of Wildland Fire*, 26, 455–468.

Briscoe, N.J., Krockenberger, A., Handasyde, K.A., Kearney, M.R. (2015) Bergmann meets Scholander: geographical variation in body size and insulation in the koala is related to climate. *Journal of Biogeography*, 42**(4)**: 791–802.

Crowther, M.S., Lunney, D., Lemon, J., Stalenberg, E., Wheeler, R., Madani, G., Ross, K.A., Ellis, M. (2014) Climate-mediated habitat selection in an arboreal folivore, *Ecography*, 37: 336–343.

Davies, N, Gramotnev, G, Seabrook, L, Bradley, A, Baxter, G, Rhodes, J, Lunney D & McAlpine, C (2013) Movement patterns of an arboreal marsupial at the edge of its range: a case study of the Koala, *Movement Ecology*, vol. 1, no. 1, p. 8

Department of Agriculture, Water and the Environment (DAWE) (2022a) Conservation advice for *Phascolarctos cinereus* (koala) combined populations of Queensland, New South Wales and the Australian Capital Territory.

Department of Agriculture, Water and the Environment (DAWE) (2022b) National Recovery Plan for the koala (*Phascolarctos cinereus*) combined populations of Queensland, New South Wales and the Australian Capital Territory.

Department of Climate Change, Energy, Environment and Water (DCCEEW) (2022) Species Profile and Threats Database, Accessed November 2021. Department of Agriculture, Water and the Environment. Available from: **http://www.environment.gov.au/cgibin/sprat/public/sprat.pl**

Department of Environment (DoE) (2014) Environmental Management Plan Guidelines.

Department of Environment and Heritage Protection (EHP) (2016). Corridor Identification through Biodiversity Planning Assessments. Queensland Government.

Department of Environment and Science (DES) (2020) Guide to Determining Terrestrial Habitat Quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy version 1.3

Department of Infrastructure, Local Government and Planning (DILGP) (2017) *Shaping SEQ: South East Queensland Regional Plan 2017*, State of Queensland, accessed October 2021, https://planning.statedevelopment.qld.gov.au/planning-framework/plan-making/regional-planning/south-east-queensland-regional-plan#:~:text=ShapingSEQ%20provides%20a%20regional%20framework,growth%20in%20existing%20urban%20areas

Department of Sustainability, Environment, Water, Populations and Communities (2011) Survey guidelines for Australia's threatened mammals.

Department of Sustainability, Environment, Water, Populations and Communities (2012a) EPBC Act Environmental Offset Policy

Department of Sustainability, Environment, Water, Populations and Communities (2012b) How to use the Offsets Assessment Guide.

Dique, David S, Thompson, J, Preece, HJ, de Villiers, DL & Carrick, FN 2003b, Dispersal patterns in a regional Koala population in south-east Queensland, *Wildlife Research*, 30**(3):** 281–290.

Ellis, W, Hale, PT & Carrick, F (2002) Breeding dynamics of Koalas in open woodlands, *Wildlife Research*, vol. 29, no. 1, p. 19

Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2015). BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2. Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane.

Goldingay, R.L. and Dobner, B. (2014) Home range areas of koalas in an urban area of north-east New South Wales. Australian Mammalogy 36(1), pp. 74–80.

Martin R. and Handasyde K.A (1999) *The Koala: natural history, conservation and management* 2nd Edition, UNSW press, Sydney

Maseyk, F.J.F., Evans, M.C. and Maron, M. (2017) Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act Report to the National Environmental Science Programme Department of the Environment and Energy.

Moore, B.D. and Foley, W.J. (2000) A review of feeding and diet selection in koalas (*Phascolarctos cinereus*), *Australian Journal of Zoology*, 48**(3)**: 317–333.

Munks S, Corkrey R and Foley W (1996) Characteristics of arboreal marsupial habitat in the semiarid woodlands of northern Queensland. *Wildlife Research* 23,185

Negret P. J., Lunney, D., Rhodes, J., 2021. Better managing fires and their impacts for koala conservation. NESP Threatened Species Recovery Hub Project 8.4.5 report, Brisbane.

Parkins, K., Cirulis, B.A., Penman, T.D., 2019. Fire risk management of populations of the koala (*Phascolarctos cinereus*) in the NSW southern tablelands: A simulation study 1–22.

Phillips, S., Wallis, K., Lane, A., (2021). Quantifying the impacts of bushfire on populations of wild koalas (*Phascolarctos cinereus*): Insights from the 2019/20 fire season. *Ecological Management and Restoration*, 22, 80–88.

Queensland Government (2019) Waste Management and Resource Recovery Strategy, Queensland Government.

Rus, A.I., McArthur, C., Mella, V.S.A, Crowther, M.S. (2020) Fragmentation affects movement and space use of a specialist foliovore, the koala. *Animal Conservation*, 24: 26–37.

Saunders Havill Group (2023) Baseline Survey Report - EPBC -2022/09243 - Baseline Offset Area. Prepared for Visy Industries Australia Pty Ltd. Published 5 May 2023.

van Eeden, L.M., Nimmo, D., Mahony, M., Herman, K., Ehmke, G., Driessen, J., O'Connor, J., Bino, G., Taylor, M., Dickman, C.R., (2020). Impacts of the unprecedented 2019-2020 bushfires on Australian animals. Report prepared for WWF-Australia, Ultimo, NSW.

White, NA (1999) Ecology of the Koala (*Phascolarctos cinereus*) in rural south-east Queensland, Australia, *Wildlife Research*, vol. 26, no. 6, pp. 731–744.

Woinarski, J.C.Z. and Catterall, C.O. (2004) Historical changes in the bird fauna at Coomooboolaroo, northeastern Australia, from the early years of pastoral settlement 1873 to 1999. *Biological Conservation* 116: 379-401.

Youngentob, K.N, Marsh, K.F., Skewes, J., (2022) *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.

Appendix A

Declaration of Accuracy

Declaration of accuracy

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this Management Plan, Offset Management Plan – Glass Manufacturing and Recycling Facility, September 2022, is complete, current and correct.

2. I am the designated proponent or the approval holder for this action.

3. I am aware that:

a. Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.

b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) where the person knows the information or document is false or misleading.

c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed 

Full name

Robert Andrew Kaye

Organisation

Visy Glass Operations (Australia) Pty Ltd

Date

27/10/2022

Appendix B

Offset Assessment Guide

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Koala
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	No		**Area**			
				Quality			
				Total quantum of impact	0.00		
	Threatened species habitat						
	Area of habitat	Yes		**Area**	11.95	Hectares	Based on BioCondition assessments undertaken by suitably qualified ecologists from GHD and Astrebla in August 2022, with 6 BioCondition sites at the impact area and 4 at the offset area.
				Quality	**2**	Scale 0-10	
				Total quantum of impact	2.39	Adjusted hectares	
	Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
	Number of features e.g. Nest hollows, habitat trees	No					
	Condition of habitat Change in habitat condition, but no change in extent	No					
	Threatened species						
	Birth rate e.g. Change in nest success	No					
	Mortality rate e.g Change in number of road kills per year	No					
	Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Offset calculator	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
	Ecological Communities																				
	Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
										Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
						Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
	Threatened species habitat																				
	Area of habitat	Yes	2.39	Adjusted hectares	Rehabilitation of 15 ha of non-remnant and regrowth vegetation at Offset area	**Time over which loss is averted (max. 20 years)**	15	**Start area (hectares)**	15.17	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	100%	0.00	0.00	2.66	111.45%	Yes	
										Future area without offset (adjusted hectares)	15.2	**Future area with offset (adjusted hectares)**	15.2								
						Time until ecological benefit	15	**Start quality (scale of 0-10)**	**4**	**Future quality without offset (scale of 0-10)**	**4**	**Future quality with offset (scale of 0-10)**	**7**	3.00	70%	2.10	1.76				
	Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
	Number of features e.g. Nest hollows, habitat trees	No																			
	Condition of habitat Change in habitat condition, but no change in extent	No																			
	Threatened species																				
	Birth rate e.g. Change in nest success	No																			
	Mortality rate e.g Change in number of road kills per year	No																			
	Number of individuals e.g. Individual plants/animals	No																			

Summary

Summary	Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
						Direct offset ($)	Other compensatory measures ($)	Total ($)
	Birth rate	0				$0.00		$0.00
	Mortality rate	0				$0.00		$0.00
	Number of individuals	0				$0.00		$0.00
	Number of features	0				$0.00		$0.00
	Condition of habitat	0				$0.00		$0.00
	Area of habitat	2.39	2.66	111.45%	**Yes**	$0.00	N/A	$0.00
	Area of community	0				$0.00		$0.00
						$0.00	**$0.00**	**$0.00**

Appendix C

Baseline Survey Report

Baseline Survey Report

EPBC -2022/09243

Baseline Offset Area

Prepared for Visy Industries Australia Pty Ltd

5 May 2023

Job No. 11510

Document Control

Document: EPBC Act Offset Baseline Surveys for Lot 906 SP280831, Kingsholme under EPBC 2022/09243 prepared by Saunders Havill Group for Visy Industries Australia Pty Ltd.

Document Issue

Issue	Date	Prepared By	Checked By
A	09/05/23	LF	AR

Prepared by

ABN 24 144 972 949
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Reports and plans by others may be included in this document.

Table of Contents

Plans

Tables

Figures

Abbreviations and Acronyms

DAM	Declared Area Map
DAWE	Department of Agriculture, Water and the Environment
DES	Department of Environment and Science (Qld)
DoR	Department of Resources (Qld) (formerly DNRME, Department of Natural Resources, Mines and Energy)
EDQ	Economic Development Queensland (Qld)
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*
GHFF	Grey-headed Flying-fox *(Pteropus poliocephalus)*
NCA	*Nature Conservation Act 1992* (Qld)
NCPR	Nature Conservation (Plants) Regulation 2020
OMU	Operational Management Unit
PDA	Priority Development Area (herein referencing the Greater Flagstone Priority Development Area)
PMAV	Property Map of Assessable Vegetation
RAI	Relative Abundance Index
RE	Regional Ecosystem
SEQ	South-east Queensland
SHG	Saunders Havill Group
VMA	*Vegetation Management Act 1992* (Qld)
WONS	Weeds of National Significance

Terminology

Kingsholme Offset Area means the area within the property located on Lot 906 SP280831, Kingsholme, Queensland.

Kingsholme Offset Property means the property located on Lot 906 SP280831, Kingsholme, Queensland.

1. Introduction

The *Environmental Management Division* of Saunders Havill Group (SHG) was engaged by Visy Industries Australia Pty Ltd to prepare a Baseline Survey Report for the Kingsholme offset site associated with the impact for the approved 'Glass Recycling and Manufacturing Facility located at Stapylton in the City of Gold Coast (EPBC ref: 2022/09243) '. The approval pertains to the development of a Glass Recycling and Manufacturing Facility located over a vacant greenfield site at 222 Stapylton Jacobs Well Road, Stapylton (Lot 2 on WD4654) and part of the adjoining brownfield site located at 298 Stapylton Jacobs Well Road (Lot 2 SP189558) which has existing Visy packaging manufacturing facilities for beverage cans and cardboard. The action involves directly impacting 11.95 ha of suitable koala habitat on Lot 2 WD4654. The proponent has partnered with the City of Gold Coast to deliver a local direct land-based offset to compensate for the loss of 11.95 ha of koala habitat within the impact area. The City of Gold Coast is the custodian of over 13,000 ha of conservation estate across the Gold Coast, including Stage Coach Reserve in Kingsholme, which is the location for the offset. The offset area is located within the offset property described as Lot 906 SP280831, which is a freehold parcel approximately 31.07 ha in size. The offset area within the Kingsholme offset property is 15.17 ha.

The action was approved under the EPBC Act subject to conditions on 17 January 2023 with effect until 17 January 2048. Condition 7 of the approval requires that the approval holder must complete and provide the Department with the results and dates of the following surveys:

7. *Within 6 months of this approval, the approval holder must ensure a suitably qualified field ecologist completes baseline surveys of the Kingsholme Offset Area in accordance with a scientifically valid, robust and repeatable methodology, to determine the:*

    a) extent of weed cover, and
    b) abundance of feral animals.

The surveys must be conducted by a suitably qualified person, consistent with the Department's approved survey guidelines and designed to provide results that are representative of the entire areas of the offset site.

This report has been prepared to satisfy the requirements of the conditions of approval.

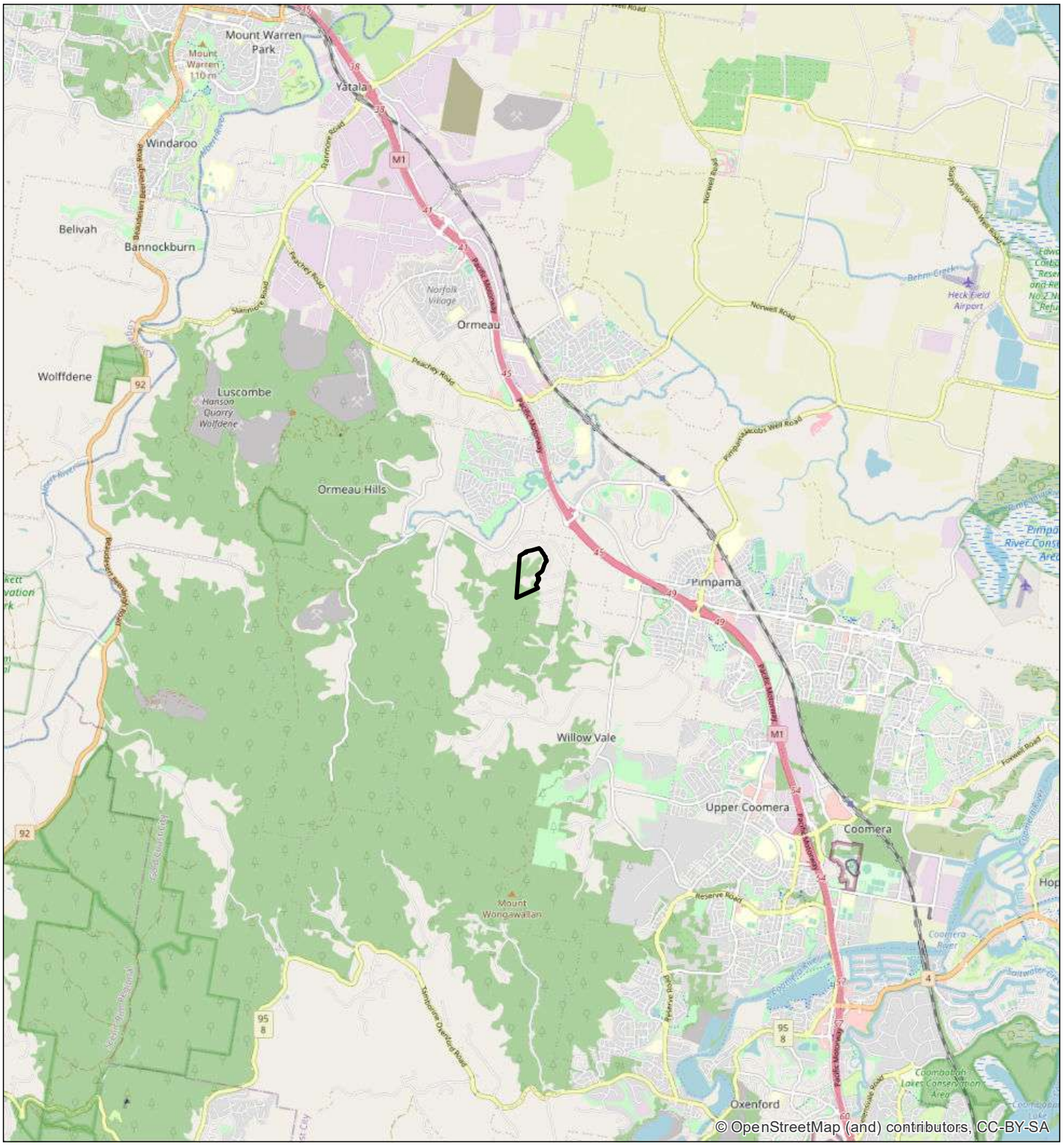
1.1. Offset Area Summary

The proponent has partnered with the City of Gold Coast to deliver a local direct land-based offset to compensate for the loss of 11.95 ha of koala habitat within the impact area. The offset area is located within the offset property described as Lot 906 SP280831, which is a freehold parcel approximately 31.07 ha in size, hereafter referred to as the Kingsholme offset property. The offset area within the Kingsholme offset property is 15.17 ha, hereafter referred to as the Kingsholme offset area.

The Kingsholme offset property is located in the Gold Coast City Council, 2 kilometres (km) south of Ormeau and approximately 43.5km from the Queensland-New South Wales state border. The Offset property is zoned rural and Rural, Rural landscape and environment precinct located within the suburban boundary of Kingsholme. Key details relating to the Kingsholme offset site are located in **Table 1**.

Table 1: Kingsholme offset site summary

Address	Lot 906 Elm Cl, Kingsholme, Queensland, 4208
Lot / Plan	Lot 906 on SP280831
Property Area	31.1 ha
Offset Area	15.17ha
Tenure	Freehold
Local government area	Gold Coast City Council



Legend

Site DCDB

Figure 1

Site Context

Visy Industries Australia Pty Ltd

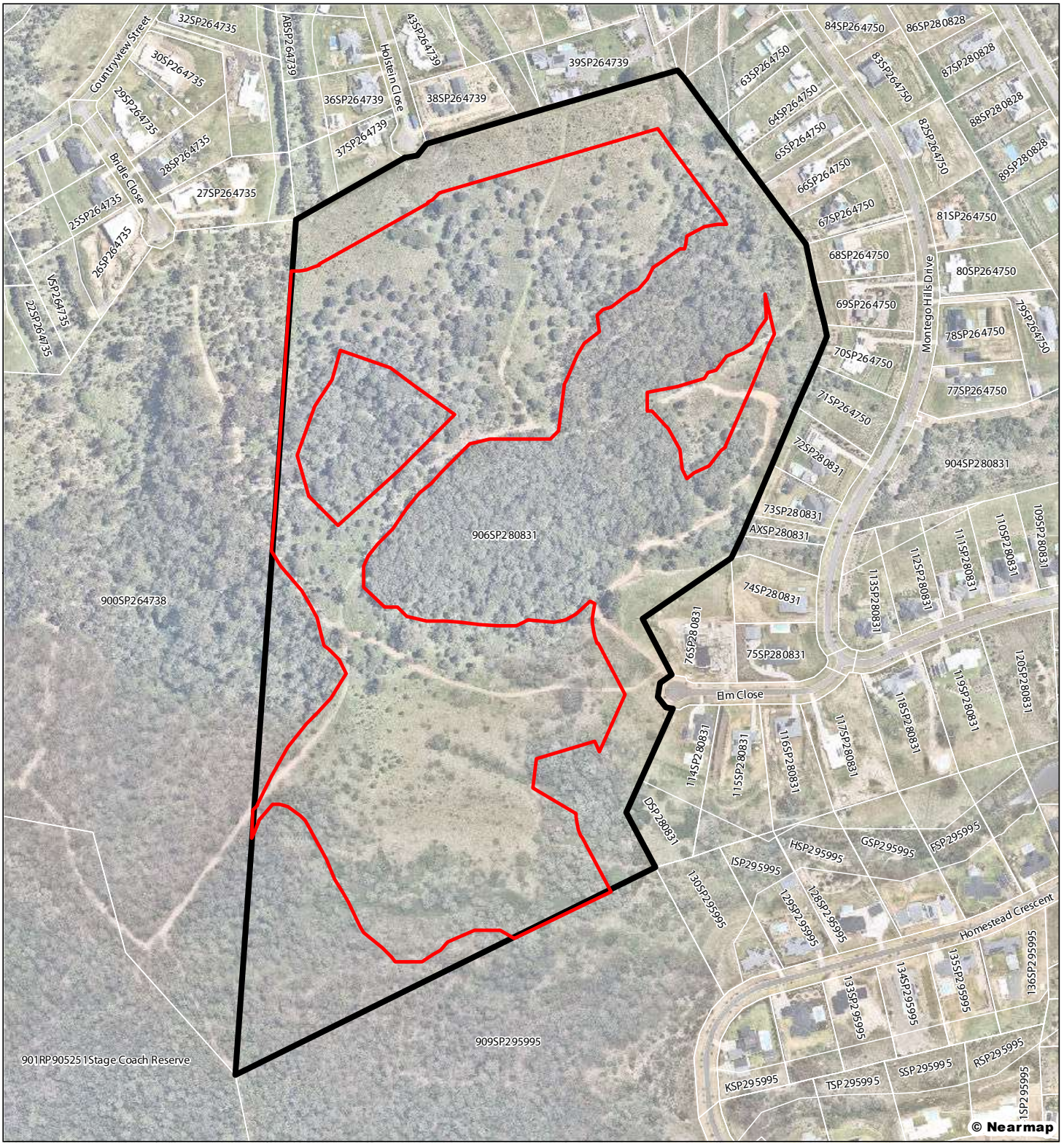
File ref. 11510 E Figure 1 Site Context A
Date 31/03/2023
Project Stapylton Jacobs Well Road, Stapylton

0 1 2 3 4 km

Scale (A4): 1:100,000 [GDA 2020 MGA Z56]

N

saunders havill group



Legend

- Offset Property
- Offset Area
- Qld DCDB

Figure 2

Site Aerial

Visy Industries Australia Pty Ltd

File ref. 11510 E Figure 2 Site Aerial A
Date 5/04/2023
Project Stapylton Jacobs Well Road, Stapylton

0 40 80 120 160 m

N

Scale (A4): 1:5,000 [GDA 2020 MGA Z56]

saunders havill group

Layer Source: © State of Queensland 2023

2. Baseline survey methodology

These surveys have been conducted by the Saunders Havill Group, and suitably qualified personnel consistent with the Department's approved survey guidelines and designed to provide results that are representative of the entire Kingsholme offset site.

Condition 7 states that within 6 months of the date of the approval, the approval holder must ensure a suitably qualified field ecologist completes baseline surveys of the **Kingsholme Offset Area** in accordance with a scientifically valid, robust and repeatable methodology, to determine the:

a. **extent of weed cover**, and
b. abundance of **feral animals**.

The methodology of each survey detailed within the following sections incorporates the required baseline surveys outlined above. A summary of the surveys conducted is provided within **Table 2**.

Table 2: Survey Methodology Summary

Condition	Methodology	Date
7 (a)	Diurnal observations Weed cover extent survey	15 & 16 February 2023 and 6 March 2023
7 (b)	Diurnal observations Motion Sensor Camera survey	15 February 2023 to 6 March 2023

All surveys were conducted by a suitably qualified person with professional qualifications and experience related to the nominated subject matter, ensuring an independent assessment and analysis in accordance with relevant standards and methodologies (refer **Table 3**).

Table 3: Surveyor Details

Position	Qualifications	Survey Date	Years of experience
Principal Ecologist	Bachelor of Applied Science (Natural Systems and Wildlife Management) Diploma of Arboriculture	15 February 2023 6 March 2023	~24 years
Ecologist	Bachelor of Science (Ecology and Conservation Biology)	16 February 2023 6 March 2023	~14 years
Ecologist	Bachelor of Biological Sciences (Biotechnology and Genomics / Urban and Regional Town Planning)	15 & 16 February 2023	~3 years

2.1. Diurnal observations

Diurnal observations of flora and fauna or signs of fauna activity were conducted simultaneously with all other surveys conducted throughout the surveying period and across the Kingsholme Offset site (detailed in following sections). Diurnal observations included the recording of all weed species and feral animals observed across the offset property.

2.2. Extent of Weed Cover Survey

Where patches of weed cover were identified within the Kingsholme Offset Area, these were located and traced using a hand-held GPS. The result of this survey methodology is illustrated in **Plan 2**. Additionally, as discuss above, all weed species identified across the site were recorded and listed in **Section 3.1.**

This survey method was utilised to address Condition 7a to determine the extent of weed cover across the Kingsholme Offset Area.

2.3. Feral Animal Abundance Survey

Together with the weed cover extent survey, an assessment of feral animal abundance to address Condition 7b was conducted via the use of camera trapping along with assessing and recording evidence of predators (e.g. scats, tracks, den count and traces) and/or Koala mortalities attributable to predators. Feral animal means any non-native predator or non-native herbivore, including those known to predate on the Koala, or with the potential to impact on vegetation habitat regeneration that is consistent with Koala habitat.

Camera traps have the advantage of potentially obtaining a wide range of significant information. Automatic camera systems are triggered by an animal passing in front of a sensor that detects movement, changes in ambient light, or a thermal differential (Moen & Lindquist 2004). Cameras allow for the detection of species that are difficult to study due to their elusive and nocturnal habits (Mace *et al.* 2004). They are less time consuming, less costly, and less invasive than long-term direct observation of animals. They are also beneficial in studying animals in inaccessible or difficult to access locations such as dens and nest cavities, or in rugged terrain (Mace *et al.* 1994). In addition, they enable the collection of valuable information about multiple species within any given community (Rosellini *et al.* 2008) and provide data that is more permanent and less disputable than data gathered by direct observation.

The use of camera trapping and den count is considered to be an effective method in capturing, assessing and monitoring pest management.

2.3.1 Motion-triggered infrared camera trap

Camera trapping involves setting up a fixed motion-triggered infrared camera to capture images or video of animals which pass in front of camera or are lured by bait. This set-up identifies fauna activity beyond the scope of direct observational studies and in the absence of potential observer impacts.

Infrared sensing cameras with an infrared flash were deployed, which use motion to trigger. Cameras were attached 30-50 cm from the ground on a tree or post, and directed towards the bait which is placed about 1.5-2 m from the mounted camera. The bait generally consisted of chicken bones/carcasses. The programming was consistent across all cameras, and cameras were set up in a consistent manner to maintain similar detection probabilities. For detecting Koala predators, cameras were placed in the vicinity of an animal trail. Cameras may be placed in alternate locations where active trails are identified.

Six (6) cameras were deployed across the Kingsholme Offset Property, located throughout the site for 114 survey nights between 15 February and 6 March 2023.

2.3.2 Relative Abundance Index

A relative abundance index (RAI) is then calculated for feral animal abundance, using the formula RAI= D/TN x 100, where D is numbers of detection and TN is the total number of camera-trap nights (all cameras combined). This methodology ensures that the surveys are representative of the entire offset area and are repeatable for future monitoring requirements.

Photo set 1: **Camera trap set-up at Kingsholme Offset Property (Camera 1).**

Photo set 2: **Camera trap set-up at Kingsholme Offset Property (Camera 2).**

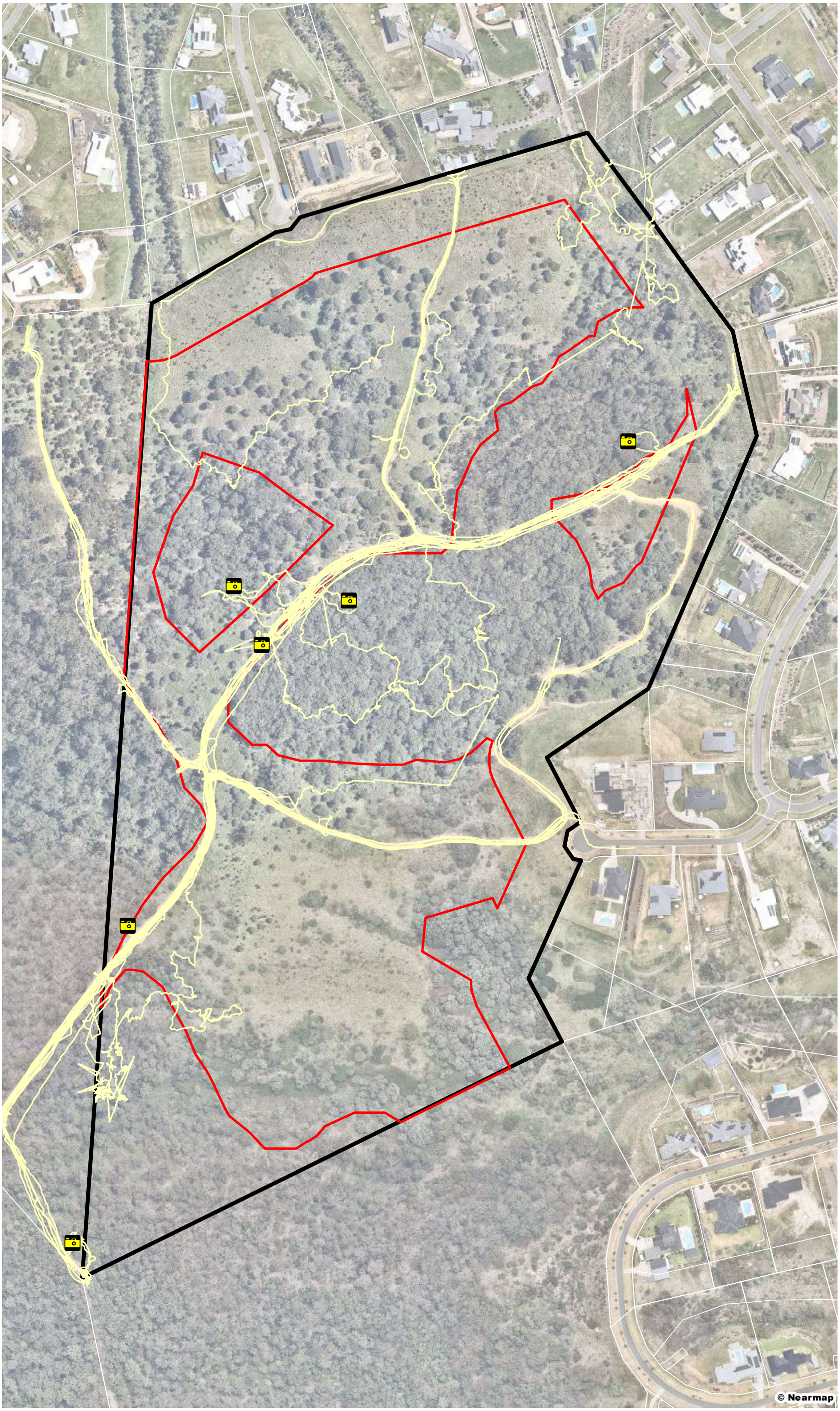
Photo set 3: **Camera trap set-up at Kingsholme Offset Property (Camera 3).**

Photo set 4: **Camera trap set-up at Kingsholme Offset Property (Camera 4).**

Photo set 5: **Camera trap set-up at Kingsholme Offset Property (Camera 5).**

Photo set 6: **Camera trap set-up at Kingsholme Offset Property (Camera 6).**

01. Baseline Survey Effort



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Legend

- Offset Property
- Offset Area
- Qld DCDB
- GPS Track Log
- Camera Trap Locations

Issue	Date	Description	Drawn	Checked
A	5/04/2023	Preliminary	LS	LF

0 20 40 60 m

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5/04/2023 | 11510 E 01 Survey Effort A

3. Baseline Survey Results

3.1. Extent of Weed Cover

All weed species recorded across the Kingsholme offset area were recorded.
A list of the recorded weed species is provided in **Table 4**.

Table 4: Recorded Weed Species – Kingsholme Offset Property

Scientific Name	Common Name	Biosecurity Act 2014 Restricted Matter	Weeds of National Significance (WONS)
Ageratum houstonianum	Blue Billygoat Weed		
Ambrosia artemisiifolia	Annual Ragweed	Category 3	
Andropogon virginicus	Whisky Grass		
Ascelias curassavica	Red-head Cotton Bush		
Asparagus aethiopicus	Climbing Asparagus Fern	Category 3	WONS
Baccharis halimifolia	Groundsel Bush	Category 3	
Bidens pilosa	Cobbler's Pegs		
Cassytha glabella	Devil's Twine		
Celtis sinensis	Chinese Elm	Category 3	
Cestrum parqui	Green Cestrum		
Chloris gayana	Rhodes Grass		
Cirsium vulgare	Spear Thistle		
Commelina diffusa	Wandering Jew		
Conyza bonariensis	Flaxleaf Fleabane		
Conyza sumatrensis	Tall Fleabane		
Corymbia torelliana	Cadaghi		
Cyperus polystachyos	Bunchy Sedge		
Desmodium rhytidophyllum	Hairy Trefoil		
Eremophila debilis	Winter Apple		
Gomphocarpus physocarpus	Balloon Cotton Bush		
Heliotropium amplexicaule	Blue Heliotrope		
Hypochaeris radicata	Flatweed		

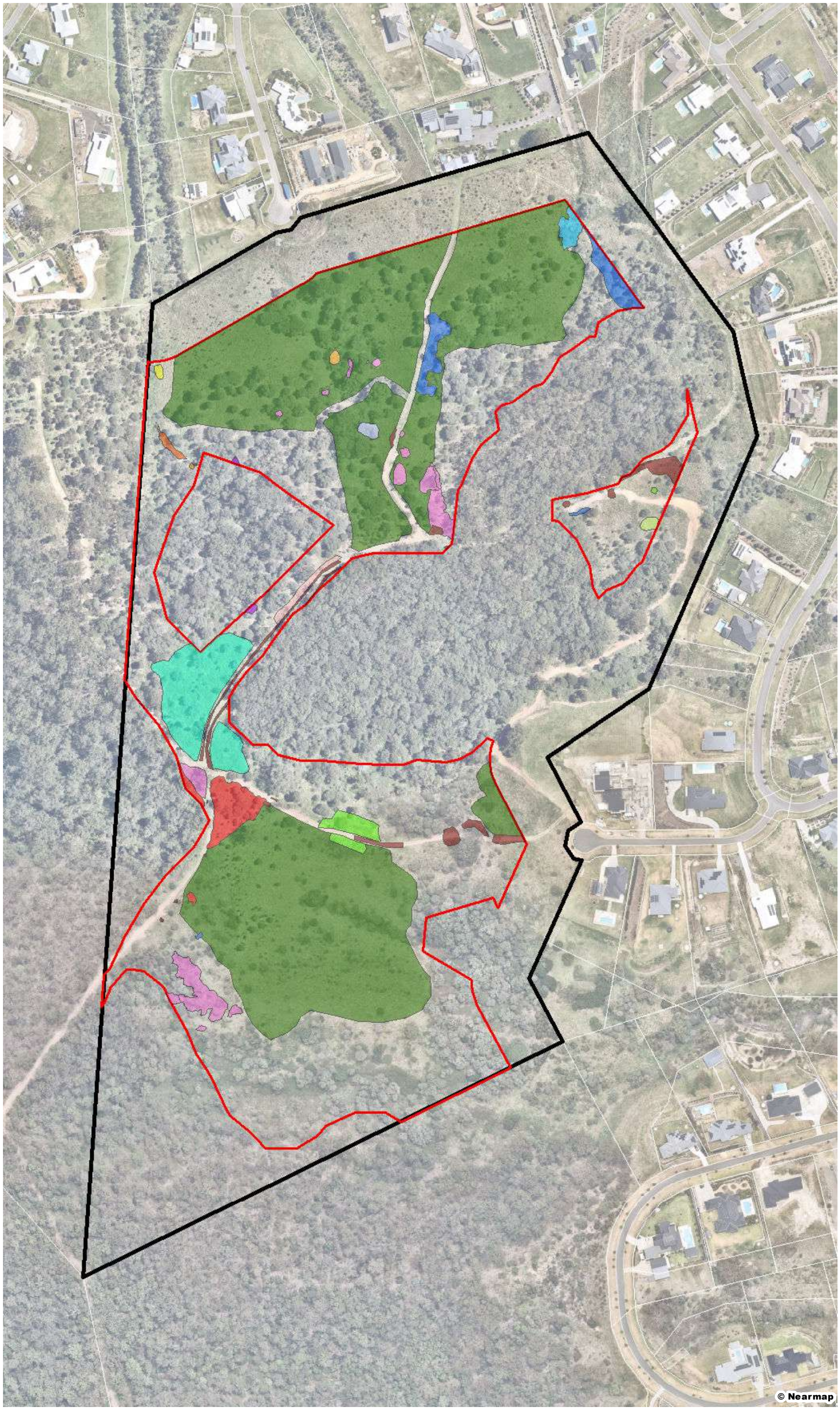
Scientific Name	Common Name	Biosecurity Act 2014 Restricted Matter	Weeds of National Significance (WONS)
Lantana camara	Lantana	Category 3	WONS
Lantana montevidensis	Creeping Lantana	Category 3	
Leucaena leucocephala	Leucaena		
Macroptilium lathyroides	Phasey Bean		
Megathyrsus maximus	Guinea Grass		
Melinis repens	Red Natal Grass		
Murraya paniculata	Mock Orange		

The extent of weed cover across the Kingsholme offset area was recorded by locating and tracing weed cover extent with hand-held GPS. These extents are then illustrated on **Plan 2**. The area of weed extents are provided in **Table 5**. The total extent of weed cover across the site is approximately 50.87 %.

Table 5: Weed Extent

Dominant Species	Area (m^2)	Percentage Of Offset Area (%)
Lantana camara (Lantana)	2504.45	1.65
Lantana camara (Lantana) / Solanum mauritianum (Wild Tobacco)	66.65	0.04
Lantana camara (Lantana) / Urena lobata (Urena Burr)	1601.2	1.06
Lantana camara (Lantana) / Urena lobata (Urena Burr) / Solanum chrysotrichum (Giant Devil's Fig) / Passiflora suberosa (Corky Passion Vine)	165.48	0.11
Lantana camara (Lantana) / Urena lobata (Urena Burr) / Solanum chrysotrichum (Giant Devil's Fig)	402.88	0.27
Setaria dominated vegetation	62720.18	41.34
Setaria dominated / *Sporobolus pyramidalis* (Giant Rats Tail Grass)	4828.27	3.18
Solanum chrysotrichum (Giant Devil's Fig)	849.48	0.56
Solanum chrysotrichum (Giant Devil's Fig) / *Solanum mauritianum (Wild Tobacco)*	119.16	0.08
Solanum chrysotrichum (Giant Devil's Fig) / Lantana camara (Lantana)	63.31	0.04
Solanum mauritianum (Wild Tobacco)	85.83	0.06
Solanum mauritianum (Wild Tobacco) / Solanum chrysotrichum (Giant Devil's Fig)	139.94	0.09
Sporobolus pyramidalis (Giant Rats Tail Grass)	1687.27	1.11
Urena lobata (Urena Burr)	1614.21	1.06
Urena lobata (Urena Burr) *and Chloris gayana* (Rhodes Grass)	337.03	0.22
Total:	**77,185.34 m^2 (7.71ha)**	**50.87%**

02. Baseline Weed Cover Extent



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Legend

- Offset Property
- Offset Area
- Qld DCDB
- Lantana camara (Lantana)
- Lantana camara (Lantana) / Solanum mauritianum (Wild Tobacco)
- Lantana camara (Lantana) / Urena lobata (Urena Burr)
- Lantana camara (Lantana) / Urena lobata (Urena Burr) / Solanum chrysotrichum (Giant Devil's Fig) / Passiflora suberosa (Corky Passion Vine)
- Lantana camara (Lantana) / Urena lobata (Urena Burr) / Solanum chrysotrichum (Giant Devil's Fig)
- Setaria dominated / Sporobolus pyramidalis (Giant Rats Tail Grass)
- Setaria Dominated Vegetation
- Solanum chrysotrichum (Giant Devil's Fig)
- Solanum chrysotrichum (Giant Devil's Fig) / Solanum mauritianum (Wild Tobacco)
- Solanum chrysotrichum (Giant Devil's Fig) / Lantana camara (Lantana)
- Solanum mauritianum (Wild Tobacco)
- Solanum mauritianum (Wild Tobacco) / Solanum chrysotrichum (Giant Devil's Fig)
- Sporobolus pyramidalis (Giant Rats Tail Grass)
- Urena lobata (Urena Burr)
- Urena lobata (Urena Burr) / Chloris gayana (Rhodes Grass)

Issue	Date	Description	Drawn	Checked
A	14/04/2023	Preliminary	LS	LF

0 20 40 60 m

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14/04/2023 | 11510 E 02 Weed Cover A

3.2. Feral Animal Abundance Survey

Field surveys did not identify any evidence of Koala mortalities.

Six (6) motion activated cameras were deployed across the Kingsholme offset property, one (1) within the Kingsholme offset area from 15 February to 6 March 2023. Surveys across the entire Kingsholme Offset Property are relevant for the baseline surveys and future monitoring and management actions to be implemented following the approval of the Offset Management Plan.

The Kingsholme Offset Property cameras detected eight (8) individual sightings of feral animals over a total of 114 survey nights (refer to **Table 5**). The introduced predators of *Vulpes vulpes* (Red Fox) and *Bos taurus* (Cow) were recorded across the six (6) camera traps (refer **Photo set 1**). Other fauna species were captured during this survey. A full list of animals captured throughout this survey is provided in **Appendix E**.

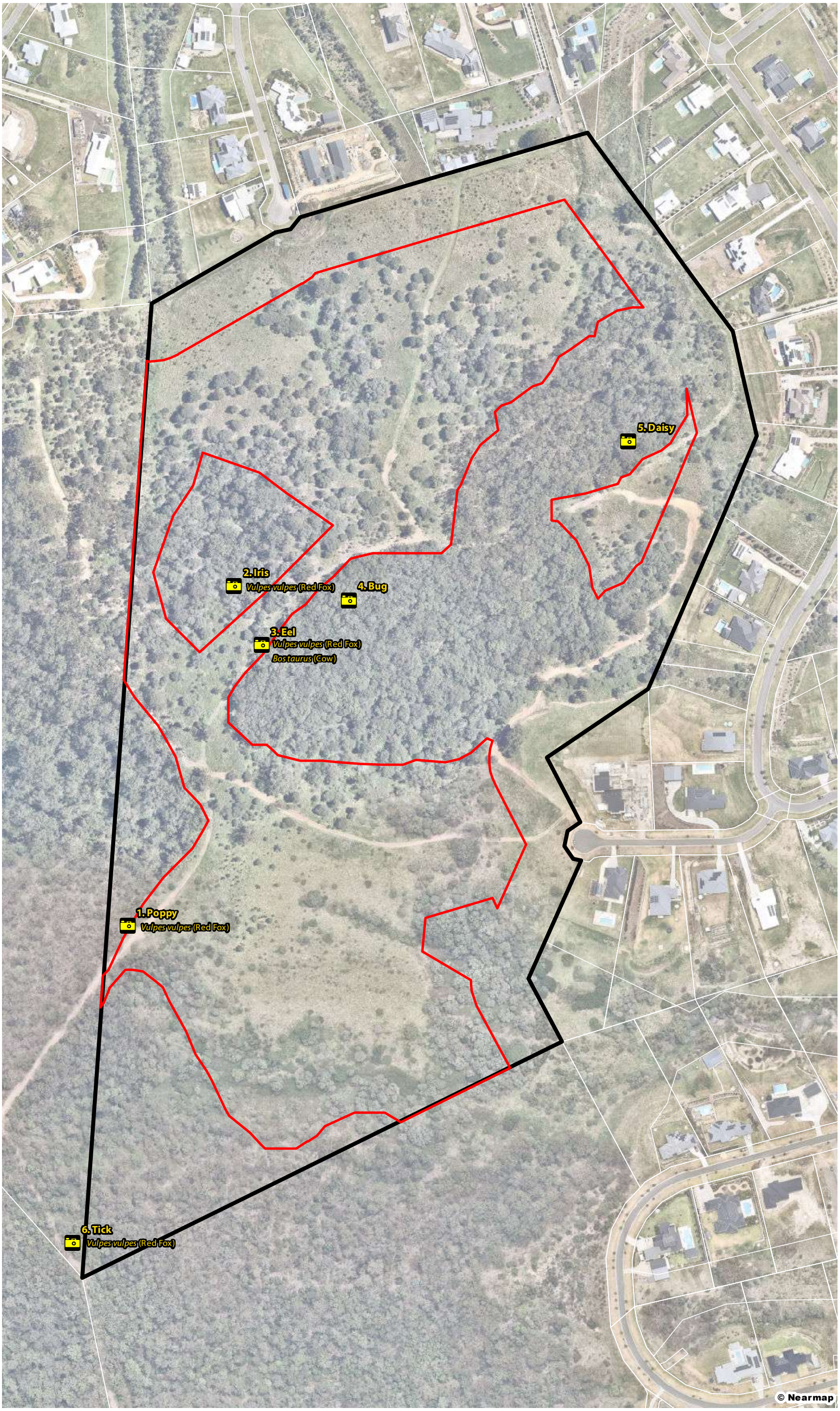
Using the methodology described in **Section 2.3.2** the RAI for Kingsholme Offset property is **7.02** (refer **Table 5)**.

Table 6: Non-native Koala Predator Survey Results Summary – Kingsholme Offset Property

Camera	Camera Name	Survey Duration (nights)	Species	Detection	Within offset site	RAI
1	Poppy	19	*Vulpes vulpes* (Red Fox)	1		**7.02**
2	Iris	19	*Vulpes vulpes* (Red Fox)	1		
3	Eel	19	*Vulpes vulpes* (Red Fox) *Bos taurus* (Cow)	2 1	✓	
4	Bug	19	Nil	-		
5	Daisy	19	Nil	-		
6	Tick	19	*Vulpes vulpes* (Red Fox)	3		
Total		**114**		**8**		

Photo set 1: *Vulpes vulpes* (Red Fox) and *Bos taurus* (Cow) captured on Kingsholme Offset Property.

03. Baseline Predators



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Legend

- Offset Property
- Offset Area
- Qld DCDB
- Camera Trap Locations

Issue	Date	Description	Drawn	Checked
A	12/04/2023	Preliminary	LS	LF

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4. Completion Criteria

4.1. Extent of Weed Cover

In accordance with condition 12 of the EPBC Act approval, the approval holder must, by the end of Year 7, have reduced the extent of weed cover at the Kingsholme Offset Area by 95% relative to the extent of weed cover determined by the baseline surveys required under condition 7. Using the extent of weed cover recorded in the baseline surveys the weed extent cover will need to be reduced to 3,859.27 m^2 (0.39 ha) or 2.54% of the Kingsholme offset area.

4.2. Feral Animal Abundance

In accordance with condition 11 of the EPBC Act approval, the approval holder must, by the end of Year 10, ensure that the highest abundance of each feral animal species is less than 10% of the maximum feral animal species abundance as determined by the baseline surveys required under condition 7. Using the RAI recorded in the baseline surveys the RAI to achieve the Year 10 milestone would be <0.702.

Once the approval holder achieves the outcomes of condition 11 and 12, the outcomes must be maintained or improved for the rest of the period of effect of approval, 17 January 2048.

5. Appendices

Appendix A

Fauna Species List

Appendix A

Fauna Species List

Site Fauna Species		Taxa	Native/Introduced
Scientific Name	Common name		
Alectura lathami	Australian Brush-turkey	Bird	Native
Cracticus nigrogularis	Pied Butcherbird	Bird	Native
Cygnus atratus	White throated gerygone	Bird	Native
Egretta novaehollandiae	White-faced Heron	Bird	Native
Eopsaltria australis	Eastern Yellow Robin	Bird	Native
Gymnorhina tibicen	Australian Magpie	Bird	Native
Manorina melanocephala	Noisy Miner	Bird	Native
Bos taurus	Domestic Cow	Mammal	Introduced
Macropus giganteus	Eastern Grey Kangaroo	Mammal	Native
Macropus parryi	Whiptail Wallaby	Mammal	Native
Macropus rufogriseus	Red-necked Wallaby	Mammal	Native
Phascolarctos cinereus	Koala	Mammal	Native
Trichosurus vulpecula	Common Brushtail Possum	Mammal	Native
Vulpes vulpes	Red Fox	Mammal	Introduced
Wallabia bicolor	Swamp Wallaby	Mammal	Native
Cryptoblepharus pulcher	Elegant Snake Eyed Skink	Reptile	Native
Varanus varius	Lace Monitor	Reptile	Native

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