APPENDIX 1: OFFSET MANAGEMENT PLAN

OFFSET MANAGEMENT PLAN

Citiswich Estate - Stage 7

4 November 2024

Litoria Consulting
PO Box 461
Paddington Qld 4064
Level 3/22 Wandoo Street
Fortitude Valley Q 4006
T 07 3852 4855
info@litoria.com.au
litoria.com.au

DOCUMENT ISSUE & COPYRIGHT NOTICE

Title:	Offset Management Plan
Client:	Walker Bremer Park Pty Ltd
Date:	4 November 2024
Version:	1.8
Distribution:	Sam Smith - Walker Corporation Department of Climate Change, Energy, the Environment and Water

LITORIA

CONTENTS

PREAMBLE

The following Offset Management Plan (OMP) has been prepared by Litoria Consulting in response to additional information requested by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) as part of a controlled action decision made on 18 March 2022 for the Citiswich development (EPBC 2021/9112).

The delegate of the Minister for the Environment considers that the proposed action is likely to have a significant impact on the following matters protected by the *Environment Protection and Biodiversity Conservation Act 1999*:

- Listed threatened species and communities (sections 18 and 18A).

As per the request for additional information, a cross-reference table below lists the information requested with the corresponding section in this report. The reference table below refers to *Attachment B: Information Required for EPBC Offset Proposals*. Although the report is intended to be read in the order it has been presented, the reference table displays where to find information in the order in which it was requested by DCCEEW. Other supporting material has been included in the Appendices.

Attachment B

Details in relation to the draft Offset Management Plan, including:		
No.	Request	Location
B1	A description of the proposed offset site(s) including location, size, condition, and relevant ecological/species values present and surrounding land uses.	The requested information is contained in the Preliminary Documentation Report Section 14.2: Offset Site Description.
B2	Maps and shapefiles to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes (e.g., physical address of the offset area/s, coordinates of the boundary points in decimal degrees, the relevant MNES that the environmental offset/s compensates for, and the size of the environmental offset/s in hectares).	Shapefiles of the Offset Area are included as an attachment as part of this submission to DCCEEW. The size, location, boundaries and coordinates of the Offset Area is contained in the Preliminary Documentation Report Section 14.4: Proposed Offset. Information about the physical attributes of the site and the relationship with the target MNES is contained in the Preliminary Documentation Report Section 14.2: Offset Site Description, and Section 14.3.2: Results (of the Offset Assessment).
B3	Baseline survey information to provide evidence of relevant MNES presence and the extent and quality of the respective habitat(s) at the proposed offset site(s) in accordance with the relevant survey guidelines or using a scientifically robust and repeatable methodology.	The requested information is contained in the Preliminary Documentation Report Section 14.2.3: Grey-headed Flying-fox Habitat, and Section 14.3: Offset Assessment.
B4	Summarised details of the nature of the conservation gain to be achieved for relevant MNES, including the creation, restoration and revegetation of habitat in the proposed offset area/s.	The requested information is contained in the Preliminary Documentation Report Section 14.5: Conservation Outcome
B5	An assessment with supporting evidence, of how the environmental offset/s meets the requirements of the department's EPBC Act Environmental Offsets Policy (2012) (Offsets Policy), available at: www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy	The requested information is contained the Preliminary Documentation Report Section 14.3.2.3: Statutory Requirements, specifically Table 17.
B6	Information about how the proposed offset area/s will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the relevant MNES. This should include information about	The requested information is contained in the Preliminary Documentation Report Section 14.3.2.3: Statutory Requirements, specifically Table 16, and Section 14.3.3: Summary (of the Offset Assessment).

Details in relation to the draft Offset Management Plan, including:		
No.	Request	Location
	how the proposed offset/s area contributes to any state and/or regional plan/s for the conservation of the protected matter.	
B7	How the offset area/s are like-for-like, i.e., the environmental values of the offset are of the same type or equivalent to that affected by the proposed action.	The requested information is contained the Preliminary Documentation Report Section 14.3.2.3: Statutory Requirements, specifically Table 16; and Section 14.3.3: Summary (of the Offset Assessment).
B8	Current and likely future tenure of the proposed offset site and details of how the offset site will be legally secured for the full duration of the impact.	The requested information is contained in the Preliminary Documentation Report Section 14.6: Legally Secured Offset Area.
B9	The methodology, with justification and supporting evidence, used to inform the inputs of the Offsets assessment guide in relation to the offset site/s for each relevant MNES, including: a) total area of habitat (in hectares), b) habitat quality (using a consistent methodology as agreed with the department in section 8 of the Preliminary documentation - request for further information).	The requested information is contained in the Preliminary Documentation Report Section 14.3: Offset Assessment.
B10	The methodology, with justification and supporting evidence, used to inform the inputs of the Offsets assessment guide in relation to each potential offset area for each relevant MNES, including: • 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 (%).	The requested information is contained in the Preliminary Documentation Report Section 14.3.1.2: Offsets Assessment Guide, specifically Table 15.
B11	Specific, measurable, achievable, relevant and timely (SMART) offset completion criteria (i.e., environmental outcomes) to be achieved, and	The requested information is contained in this Offset Management Plan in Section 8: Offset Completion Criteria.

Details in relation to the draft Offset Management Plan, including:		
No.	Request	Location
	reasoning for these in reference to relevant statutory recovery plans, conservation advice, and threat abatement plans (e.g., within 15 years of commencement of the action, there is an average of X amount of Koala habitat trees per ha. The department notes that if an offset is deemed to provide suitable compensation for the impacts of the proposed action, the offset completion criteria provided may be used to inform outcomes-based conditions of approval.	
B12	Interim milestones to demonstrate adequate progress towards achieving the environmental outcomes/completion criteria (e.g., within 10 years of commencement of the action the proponent must increase, by at least 20 per cent, the number of available Koala food trees at the offset site).	The requested information is contained in this Offset Management Plan in Section 8: Offset Completion Criteria, specifically, Section 8.4: Interim Targets.
B13	Details of the environmental management and threat mitigation activities that will attain and maintain the completion criteria.	The requested information is contained in this Offset Management Plan in Section 9: Risk Assessment and Section 10: Management Actions.
B14	Risk analysis and a risk management and mitigation strategy for all risks to the successful implementation of the OAMP and timely achievement of the offset completion criteria, including a rating of all initial and post-mitigation residual risks in accordance with a risk assessment matrix.	The requested information is contained in this Offset Management Plan in Section 9: Risk Assessment.
B15	A monitoring program to measure the progress towards the interim milestones and environmental outcomes/completion criteria.	The requested information is contained in this Offset Management Plan in Section 10: Management Actions and Section 11: Monitoring and Reporting.
B16	Proposed timing for the submission of monitoring reports which provide evidence demonstrating whether the interim milestones have been achieved.	The requested information is contained in this Offset Management Plan in Section 11: Monitoring and Reporting.

Details in relation to the draft Offset Management Plan, including:		
No.	Request	Location
B17	Timing for the implementation of tangible, on-ground corrective actions to be implemented if monitoring activities indicate the interim milestones have not been achieved.	The requested information is contained in this Offset Management Plan in Section 11: Monitoring and Reporting, and Section 12: Adaptive Management Plan and Review.

EXECUTIVE SUMMARY

This Offset Management Plan (OMP) has been prepared by Litoria Consulting on behalf of Walker Bremer Park Pty Ltd for Stage 7 of the Citiswich Estate commercial development located at Warrego Highway, Bundamba, Queensland. The Citiswich Estate is comprised of seven (7) stages. The controlled action relates to a single remaining stage: Stage 7. Stage 7 is comprised of three (3) separate land parcels (the impact site):

- Lot 13 on SP 238272 (11.6 ha),
- Lot 34 on SP 326668 (43.8 ha), and
- Lot 2 on RP 104683 (56.6 ha).

The OMP has been prepared as part of a Preliminary Documentation response to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for Stage 7, which was determined to be a controlled action under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The assessment by Preliminary Documentation determined that the proposed action is likely to have a residual significant impact on habitat critical to the survival of the Grey-headed Flying-fox (GHFF). As such, an environmental offset is required to mitigate the impacts of the development on habitat critical to the survival of the species in accordance with:

- *The Significant Impact Guidelines v1.1* (Department of the Environment 2013), and
- *The EPBC Act Environmental Offsets Policy* (Department of Sustainability Environment Water Population and Communities 2012).

This report is to be read in conjunction with the Preliminary Documentation Report, Litoria Consulting, November 2024 (PD Report). The aim of the OMP is to guide the rehabilitation efforts on the offset site and outline the requirements of adequately compensating for the significant residual impact on the GHFF as determined by the assessment by Preliminary Documentation contained in the PD Report.

The proposed offset is located on land described as [redacted] (the offset site). The offset site is located in the [redacted] locality in the Ipswich City Council local government area and has a [redacted]. The offset site contains a mix of bushland and cleared areas. Until recently, the offset site was used for grazing purposes and timber was harvested as part of a native forest logging operation. In terms of existing infrastructure, the land is undeveloped other than boundary fencing and a [redacted]

The site was assessed for offset suitability utilising the Modified Habitat Quality Assessment Tool (MHQAT) and the Offsets Assessment Guide spreadsheet (OAG) provided by the Department, as well as Litoria Consulting's species-specific methodology for determining habitat suitability specific to the GHFF.

In summary, the results of the offset assessment are as follows:

- The offset site and impact site are like-for-like,
- The offset site meets the requirements of *The EPBC Act Environmental Offsets Policy* (Department of Sustainability Environment Water Population and Communities 2012),
- Habitat quality on the offset site is 5/10,
- The proposed final habitat quality on the offset site is 7/10 (two-point uplift), and
- Integrating the results of the MHQAT with the OAG indicates that 54 ha will be required to meet 100% of the proponent's offset obligations for the GHFF for 17.4 ha of impacts to the species.

A two (2) point habitat quality uplift will be achieved by maximising the desirable characteristics of GHFF foraging habitat in accordance with habitat values that are considered critical to the GHFF as per the *National Recovery Plan for the Grey-headed Flying-fox (Department of Agriculture Water and the Environment 2021).* Statutory documentation identifies that loss of critical foraging habitat is a primary threat to the species. The offset completion criteria address Recovery Objective 1 (one) of the National Recovery Plan, being to protect and increase native foraging habitat that is critical to the survival of the GHFF. This objective is achieved by improving characteristics that underpin the quality of foraging habitat for the species, specifically, by maximising the following primary indicators from the paper *Ranking the feeding habitats of Grey-headed flying foxes for conservation management* (Eby 2008) including:

- Food tree productivity (volume of blossom nectar, indicated by flower scores),
- Food tree reliability (frequency and synchrony of flowering, indicated by flower scores),
- The density of fruiting trees,
- Seasonal continuity of resource availability (timing of flowering, which is particularly in winter, indicated by flowering windows), and
- Maximising modified BioCondition scores to ensure the rehabilitated habitat comprises a wholly functional and, therefore, resilient bushland ecosystem.

The OMP details the management activities, monitoring and reporting requirements of offset delivery including more detail on the proposed:

- Habitat rehabilitation and assisted natural regeneration activities that include:
  - Supplementary planting, and
  - Direct seeding.
- Fire management,
- Weed management,
- Erosion management, and
- Waste management.

The report also provides more information on the legal procurement of the offset areas as well as adaptive management techniques to ensure the offset completion criteria is achieved.

1 INTRODUCTION

This Offset Management Plan (OMP) has been prepared by Litoria Consulting on behalf of Walker Bremer Park Pty Ltd for Stage 7 of the Citiswich Estate commercial development located at Warrego Highway, Bundamba, Queensland. The Citiswich Estate is comprised of seven (7) stages. The controlled action relates to a single remaining stage: Stage 7. Citiswich Stage 7 is approximately 112.0 ha in size and is comprised of the following lots:

- Lot 13 on SP 238272 (11.6 ha)
- Lot 34 on SP 326668 (43.8 ha), and
- Lot 2 on RP 104683 (56.6 ha).

The proposed action (Stage 7) was determined to be a controlled action under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The OMP has been prepared to accompany an assessment of the proposed action by Preliminary Documentation prepared for the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

The assessment by Preliminary Documentation is contained in the Preliminary Documentation Report, Litoria Consulting, November 2024 (PD Report). The assessment determined that the proposed action would have a residual significant impact on habitat critical to the survival of the Grey-headed Flying-fox (GHFF). As such, an environmental offset is required to mitigate the impacts of the development on habitat critical to the survival of the species in accordance with:

- *The Significant Impact Guidelines v1.1* (Department of the Environment 2013), and
- *The EPBC Act Environmental Offsets Policy* (Department of Sustainability Environment Water Population and Communities 2012).

This report is to be read in conjunction with the PD Report. The aim of this OMP is to guide the rehabilitation efforts on the offset site that are required to adequately compensate for the significant residual impact on foraging habitat for the Grey Headed Flying Fox identified on the impact site (Stage 7).

The OMP is divided into the following sections:

- Proposed action and impacts,
- Offset objective,
- Offset site description,
- Offset assessment,
- Proposed offset,
- Conservation outcome,
- Offset completion criteria,
- Management activities,

- Risk assessment,
- Monitoring and reporting requirements,
- Legally secured offset area,
- Adaptive management, and
- References.

2 PROPOSED ACTION & IMPACTS

The proposed action is associated with Stage 7 of the Citiswich Estate development. Stage 7 is approximately 112.0 ha in size. The proposed action includes a subdivision of three (3) lots into twenty (20) industrial use lots on the Stage 7 site and operational works to develop and service the industrial lots.

The total proposed action (70.0 ha) is comprised of the:

- Development footprint (68.8 ha); and
- The haul road (1.2 ha).

Excluding the haul road, spatial analysis indicates that the total Stage 7 site consists of the following areas:

- Approximately 68.8 ha for mixed-use development; and
- Approximately 43.2 ha of balance land.

Including the haul road, the proposed development footprint includes:

- Approximately 17.4 ha of native regrowth woodland or forest, and
- Approximately 52.6 ha of already disturbed and/or cleared.

The site currently contains 36.2 ha of native vegetation. Although 17.4 ha of this will be cleared, 18.8 ha of vegetation will be retained in open space areas. The open space areas will be dedicated as parkland to Ipswich City Council, and Council will be responsible for ongoing management activities. Refer to the PD Report submitted alongside this Offset Proposal for further details on the proposed action and impact site.

An assessment of the significance of the impact of the proposed action on the relevant Matters of National Environmental Significance (the GHFF) was undertaken in accordance with the Significant Impact Guidelines (Department of the Environment 2013). Refer to the PD Report for the details of the significant impact assessment on the relevant MNES (the GHFF). The outcomes of the assessment indicated that:

- Although the site does not contain nor is adjacent to a roost site, the site supports critical winter foraging food trees for the species and is within the foraging distance of several roosts, including one Nationally Significant Roost.
- The proposed action will impact (i.e., remove) 17.4 ha of vegetation that is considered habitat critical to the survival of the GHFF.
- It is possible that the clearing may interfere with the recovery of the GHFF.
- Considering the above, the proposed action results in an impact that is considered to meet the EPBC Act guidelines for significant impacts on vulnerable species.

The impacted vegetation consists of the following Regional Ecosystems[1] (REs). Refer to Figure 1 for the location of retained and removed habitat.

Full details of the proposed action, impacts and impact assessment can be found in the PD Report.

TABLE 1: DESCRIPTION OF GHFF HABITAT AND IMPACTS ON HABITAT ON THE STAGE 7 IMPACT SITE.

Description of habitat	Total area (ha)	Impact (ha)
Regrowth RE 12.9-10.2 (least concern). *Corymbia citriodora subsp. variegata +/- Eucalyptus crebra* open forest on sedimentary rocks.	13.2	12.7
Regrowth RE 12.3.3 (endangered). *Eucalyptus tereticornis* woodland on Quaternary alluvium.	14.2	2.2
Regrowth RE 12.3.7 (of concern). *Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +/- Melaleuca spp.* fringing woodland.	8.8	2.5
Total area/impact	**36.2**	**17.4**

[1] Regional ecosystems are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil (Sattler and Williams 1999, *Vegetation Management Act 1999*).

Legend

Site

Cadastre

Lot boundary

Easement

Proposed Development

Footprint

Native Vegetation

Removed (17.4 ha)

Retained (18.8 ha)

1:10,000

Date Created: 16/05/2024

FIGURE 1: IMPACT OF THE PROPOSED ACTION ON GREY-HEADED FLYING FOX HABITAT.

3 OFFSET OBJECTIVE

The objective of the offset is to compensate for residual significant impacts that remain on MNES impacted by the development (specifically GHFF) identified in the PD Report after the exhaustion of all reasonable avoidance and mitigation measures. The compensatory environmental offset is designed under the *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy (EPBC Environmental Offsets Policy). Offsets should align with conservation priorities for the impacted protected matter and be tailored specifically to the attributes of the protected matter to deliver a conservation gain.

The offset is to compensate for the proposed action by direct offset. Direct offsets are those actions that provide a measurable conservation gain for an impacted protected matter. Conservation gain is the benefit that a direct offset delivers to the protected matter, which maintains or increases its viability or reduces any threats of damage, destruction or extinction. A conservation gain may be achieved by (Department of Environment and Science 2018):

- Improving existing habitat for the protected matter,
- Creating new habitats for the protected matter,
- Reducing threats to the protected matter,
- Increasing the values of a heritage place, and/or,
- Averting the loss of a protected matter or its habitat that is under threat.

At the impact site, residual significant impacts have been identified as removing 17.4 ha of habitat critical to the survival of the species. Refer to the PD Report for a detailed assessment of residual significant impacts to the species. As such, the objective of the offset is to create, rehabilitate and protect habitat that exceeds the quality and quantity of habitat impacted at the impact site.

4 OFFSET SITE DESCRIPTION SUMMARY

The proposed offset is located on land described as [redacted] (the offset site). The offset site is located in the [redacted] locality in the Ipswich City Council local government area and has a total area of [redacted]. Figure 2 displays a recent aerial image of the offset site.

The offset site contains a mix of bushland and cleared areas. Until recently, the offset site was used for grazing purposes and timber was harvested as part of a native forest logging operation. In terms of existing infrastructure, the land is undeveloped other than boundary fencing and [redacted] that reduces the tenable land area [redacted]

The offset site is located in the South East Queensland bioregion in [redacted] roughly [redacted] The offset site is located nearby to conservation reserves, s[redacted] The site is also located within mapped [redacted] The offset site is located in the Ipswich City Council local government area and is zoned conservation under the Ipswich City Council planning scheme. [redacted]

The site is located within the foraging radius of roosts known to be utilised by the GHFF. The locations of flying fox roost throughout Queensland are available via the an interactive mapping system provided by the CSIRO, the National Flying Fox Monitoring Viewer (Australian Government 2022). [redacted]

The offset site is located approximately [redacted] of the impact site. [redacted] The closest Nationally Significant Roost[3] can be found at

[2] Statewide corridor buffer dataset depicts mapped terrestrial and riparian corridors across Queensland. Terrestrial corridors were derived from published Biodiversity Planning Assessments (BPA) and where BPAs are absent, corridors were derived from the Statewide Conservation Corridors, contained in Building Nature's Resilience: A Draft Biodiversity Strategy for Queensland (DERM, 2010). Similarly, riparian corridors are also derived from published BPAs of Queensland where available and where absent, major watercourses as depicted in the statewide GEODATA TOPO 250K Series 2 Topographic Data are used.

[3] Nationally important camps or Nationally significant roosts are those roosts that have contained ≥ 10,000 Grey-headed Flying-foxes in more than one year in the last ten (10) years or have been occupied by more than 2,500 Grey-headed flying foxes permanently or seasonally every year for the last ten (10) years (Department of Agriculture Water and the Environment (2021). National Recovery Plan for the Grey-headed Flying-fox 'Pteropus poliocephalus').

Mt Ommaney [redacted] This roost is the same Nationally Significant Roost within 10km of the impact site.

In summary, the existing environment of the offset site is characterised as follows:

- The offset site geology is wholly comprised of lithic labile and feldspathic labile sandstone, and the rock unit surface is known as *Gatton Sandstone* (Geological Survey of Queensland 2011).
- The offset site exhibits a topographical gradient characterised by a decline in elevation from the southern boundary to the northern boundary.
- Ephemeral waterways (drainage channels) bisect the offset site from north to south, characterised by deep furrows in the soil.
- The offset site differs from mapped REs 12.9-10.7/12.9-10.2 and is dominated in all areas by *Corymbia citriodora*, consistent with RE of 12.9-10.2.
- The offset site varies widely in vegetation condition and weed content.
- Weed invasion is a key threat to the native vegetation on the offset site due to the pockets of land dominated by invasive grasses and forbes near native forests.
- The vegetation condition is not uniform across the study area and a mesic sub-type exists inside waterway corridors. Therefore, the vegetation has been subdivided into four (4) assessment units based on vegetation quality and the mesic vegetation sub-type.
- The offset site is known to support trees that are productive during food shortages in winter and is within the foraging radius of several roosts utilised by the species, therefore, the vegetation is habitat critical to the survival of the species.
- The offset site is appropriately zoned (conservation) and because of this, it is not at risk from urban development itself. This means that the land is likely to be suitable as an environmental offset in the long-term.
- [redacted]
- The offset site is located in the same local government jurisdiction as the impact site (Ipswich City Council). This means that the benefits of the offset are located in the regional context of the impact and are not co-located to other bioregions.
- [redacted]

For an in-depth assessment of offset site characteristics, refer to the PD Report, Section 14.2, Offset Site Description.

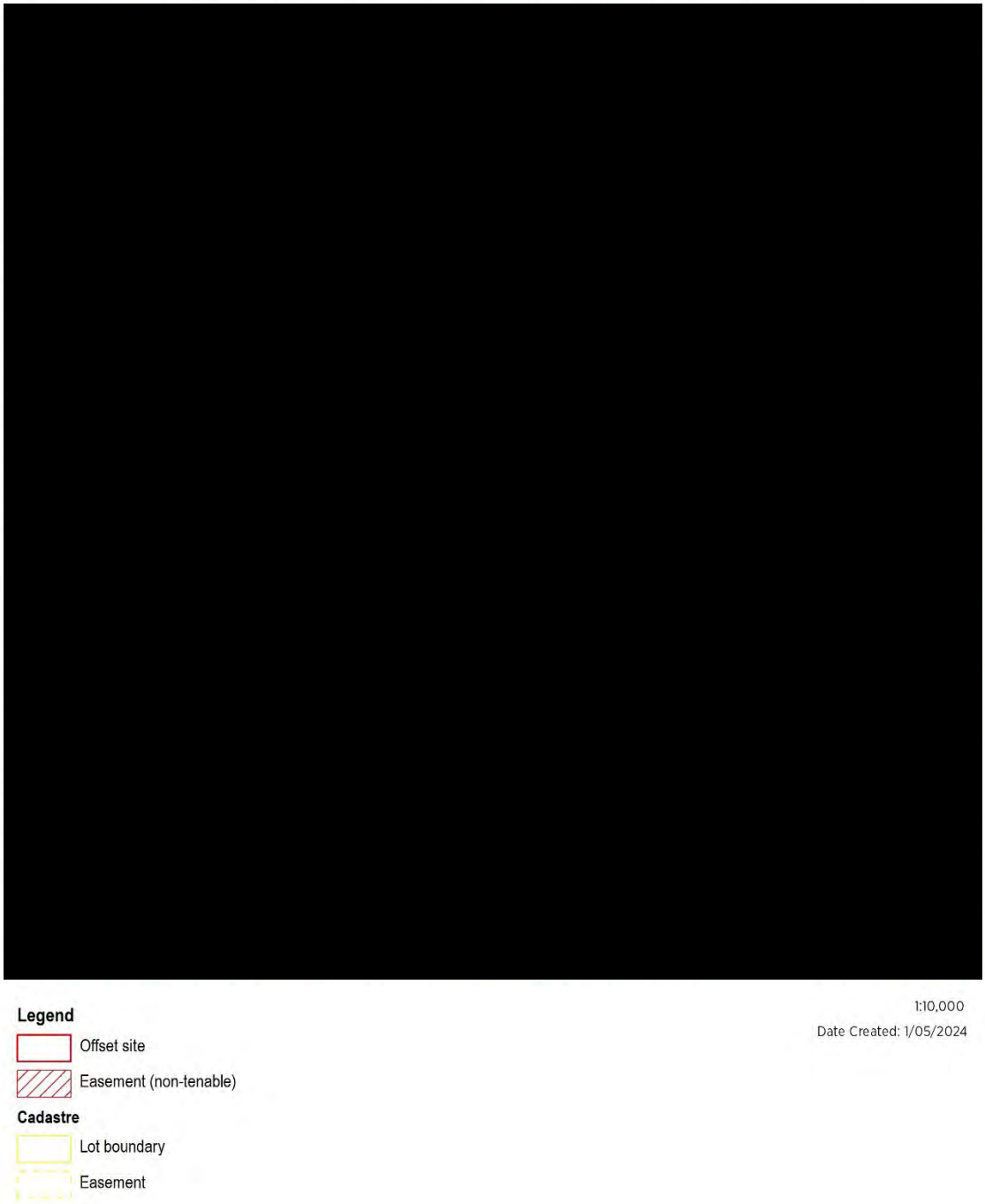

FIGURE 2: RECTIFIED DIGITAL AERIAL PHOTOGRAPH OF THE OFFSET SITE (IMAGE CAPTURED 01/04/2023, NEARMAP 2023).

5 OFFSET ASSESSMENT SUMMARY

The following section describes the offset assessment. Offset assessment was undertaken using Department material and included the development of a species-specific method for offsetting impacts tailored to the habitat requirements of the GHFF. The offset methodology has been built on two (2) key documents provided by the Department, including:

- **The Modified Habitat Quality Assessment Tool (MHQAT)** is an assessment tool for assessing habitat quality for MNES that is an adaptation of the *BioCondition Assessment Manual: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual* (Eyre et al., 2015), which is a standard method of assessing habitat quality developed for Queensland REs. The MHQAT was adjusted by Litoria Consulting at the request of DCCEEW to suit the Grey-headed flying fox. An in-depth description of the species-specific method for measuring GHFF habitat quality can be found in Appendix 17 of the Preliminary Documentation Report (Litoria Consulting, November 2024).
- **The Offsets Assessment Guide spreadsheet (OAG)** is used to determine the offset area required to compensate for 100% of the impacts of the proposed development. The OAG spreadsheet containing the results of the offset assessment can be found in Appendix 19 of the Preliminary Documentation Report (Litoria Consulting, November 2024).

The modified BioCondition assessment was undertaken generally in accordance with the methods described in *'BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual'* (Eyre et al., 2015). In summary, the results of the offset assessment are as follows:

- Habitat quality on the impact site: 5/10
- Habitat quality on the offset site: 5/10
- To meet offset obligations for habitat quality improvement, the offset proposal includes a habitat quality uplift of two (2) points at the offset site. After the implementation of management measures to meet the offset goals, the final offset site score will be 7/10.
- Integrating the results of the MHQAT with the OAG indicates that 54 ha will be required to meet 100% of the proponent's offset obligations for the GHFF for 17.4 ha of impacts to the species. The OAG spreadsheet can be found in Appendix 19 of the Preliminary Documentation Report (Litoria Consulting, November 2024).

The assessment of the site against the Department's EPBC Act Environmental Offsets Policy (2012) (Offsets Policy) suggests that the offset is appropriate due to the following considerations:

- The site provides a direct conservation outcome for the species and maintains or improves species viability by enhancing and protecting habitat critical to the survival of the species.
- The scale of the offset is appropriately sized according to the OAG and is proportional to the residual impacts on the species.
- The Offset Management Plan will include thorough risk management, auditing, contingency and adaptive management planning to ensure offset delivery.
- Improving existing habitat for the protected matter by rehabilitating habitat on the offset site, particularly habitat critical to the survival of the species.
- The offset will create new habitats for the protected matter by planting habitats in disturbed areas, focusing on establishing habitat critical to the survival of the species.
- The offset will reduce threats to the protected matter by locating the rehabilitated habitat outside urban disturbances or priority development areas.
- The offset site is appropriately zoned (conservation) and because of this, it is not at risk from urban development itself. This means that the land is likely to be suitable as an environmental offset in the long-term.
- [redacted]
- The offset site and impact site are like-for-like due to the following key reasons:
  - The offset and impact site both support critical habitat for the GHFF.
  - The offset site supports the same habitat type as most of the cleared habitats on the impact site (RE 12.9-102).
  - [redacted]
  - The offset site is located in the same local government jurisdiction as the impact site (Ipswich City Council). This means that the benefits of the offset are located in the regional context of the impact.

6 PROPOSED OFFSET

The following section outlines the proposed sub-area of the offset site over which the offset will be completed (Offset Area). The results of the offset assessment determined that to compensate for the impacts of the proposed action, 54 ha of offset area will be required to compensate for the significant residual impacts of the proposed action with a proposed two (2) point habitat quality uplift.

The proposed Offset Areas is situated over a sub-section of the offset site and is positioned to include disturbed areas and regrowth areas primarily, while also containing some mesic and remnant vegetated areas. The Offset Area has been positioned primarily over habitats of lesser quality to provide more benefit through rehabilitation activities. The proposed [redacted], rounded to the nearest whole hectare to allow for minor locational measurement discrepancies and for absolute confidence that the proponent's responsibility is satisfied. The balance of the land [redacted]s comprised of the [redacted] and remnant and regrowth land not proposed to be included in the Offset Area. The northern, western and southern-western boundaries of the proposed Offset Area are congruent with the northern and western boundaries of the offset site, and the northern boundary of the [redacted]. The eastern and southern boundaries of the Offset Area are parallel with the eastern and southern boundaries of the offset site [redacted]. All assessment units in the proposed offset area contain or are suitable to contain critical foraging habitat for the GHFF.

The coordinates of the boundary points of the Offset Area are located at the decimal degrees described in Table 2. Refer to Figure 3 for a map of the proposed Offset Area. Shapefiles of the proposed Offset Area will be included as an attachment with this submission to DCCEEW.

TABLE 2: COORDINATES IN DECIMAL DEGGREES (IN PROJECTION EPSG:7856 GDA2020 MGA ZONE 56)OF THE BOUNDARY POINTS OF THE PROPOSED OFFSET AREA.

Coordinate ID	Description	X Coordinate	Y Coordinate
A	NW corner of the Offset Area	[redacted]	[redacted]
B	NE corner of the Offset Area	[redacted]	[redacted]
C	SW corner of the Offset Area	[redacted]	[redacted]
D	South (central) corner of the Offset Area	[redacted]	[redacted]
E	SE corner of the Offset Area	[redacted]	[redacted]

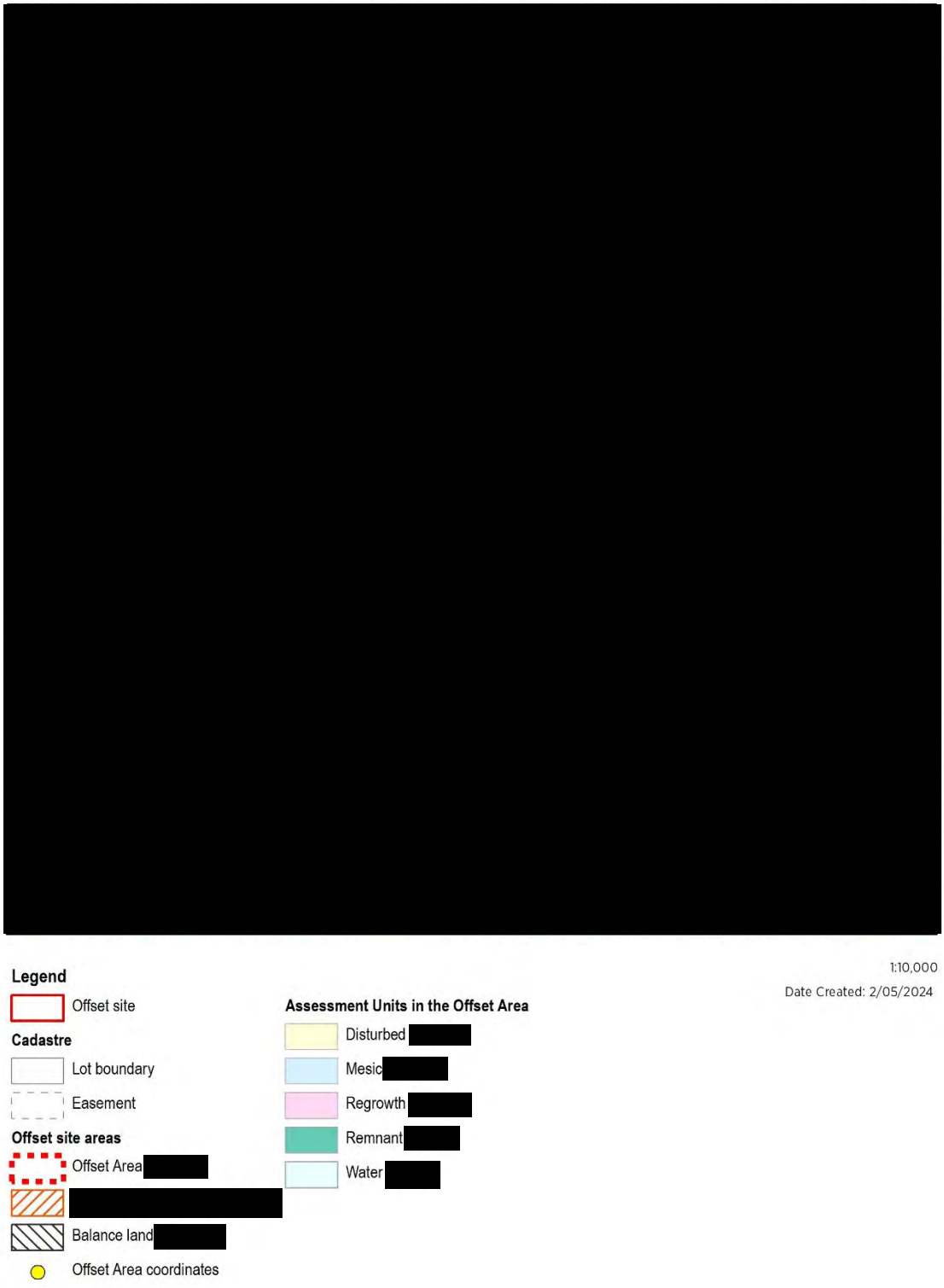

FIGURE 3: MAP OF THE PROPOSED OFFSET AREA AND ASSESSMENT UNITS.

7 CONSERVATION OUTCOME

Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter (Department of Environment and Science 2018), in this case the GHFF. In order to deliver a conservation gain, offsets should be customised to offset the specific matter that has been impacted, in this case, habitat critical to the survival of the GHFF. A conservation gain may be achieved by (Department of Environment and Science 2018):

- Improving existing habitat for the protected matter,
- Creating new habitats for the protected matter,
- Reducing threats to the protected matter,
- Increasing the values of a heritage place, and/or,
- Averting the loss of a protected matter or its habitat that is under threat.

In this instance, a conservation gain will be achieved by:

- Improving existing habitat with supplementary planting,
- Creating new habitat within cleared and disturbed areas, and
- Controlling weeds to reduce threats to foraging habitat.

Statutory documentation identifies that loss of critical foraging habitat is a primary threat to the species. An understanding of desirable foraging habitat characteristics has been established by review of federal material on the species as well as a literature review of the species preferences. Specifically, the conservation gain will improve habitat values that are considered critical to the GHFF as per the *National Recovery Plan for the Grey-headed Flying-fox (Department of Agriculture Water and the Environment 2021).* This address *Recovery Objective 1* (one) of the aforementioned document, which is to protect and increase native foraging habitat that is critical to the survival of the GHFF. This objective is achieved by improving characteristics that underpin the quality of foraging habitat for the species, specifically, by maximising the following primary indicators from the federally endorsed research paper *Ranking the feeding habitats of Grey-headed flying foxes for conservation management* (Eby 2008) including:

- Food tree productivity (volume of blossom nectar, indicated by flower scores),
- Food tree reliability (frequency and synchrony of flowering, indicated by flower scores),
- The density of fruiting trees,
- Seasonal continuity of resource availability (timing of flowering, which is particularly in winter, indicated by flowering windows), and
- Maximising modified BioCondition scores to ensure the rehabilitated habitat comprises a wholly functional and, therefore, resilient bushland ecosystem.

This conservation gain will be completed by utilising four different management approaches for each assessment unit, utilising appropriate regimes for the enhancement of disturbed, regrowth, mesic and remnant assessment units.

8 OFFSET COMPLETION CRITERIA

This offset completion criteria fulfils the offset objective and achieves a conservation outcome that satisfies the proponent's obligations.

The offset completion criteria ensures that habitat reflects the structure and function of the RE (12.9-10.2), while providing a variety of productive foraging resources that are potentially available year-round, particularly during critical food shortages (in winter).

This offset completion criteria are based on known habitat features that the GHFF prefers, as well as the expected structure and function of the RE on the Offset Area (12.9-10.2).

Selecting from species that are characteristic of RE 12.9-10.2, seven (7) *priority food trees* have been identified:

- Priority blossoming food trees include *Corymbia intermedia, C. citriodora, Eucalyptus tereticornis, E. crebra, E. melanophloia,* and *Lophostemon confertus*. These trees offer the most value (out of all food trees that can be found in RE 12.9-10.2) in terms of:
  - Timing of flowering (i.e., preferably in winter),
  - Flowering window (length of time in flower),
  - Productivity (volume of nectar), and
  - Reliability (consistency and synchrony of annual blooming).
- Priority fruiting trees include *Alphitonia excelsa*, which provides an additional food option during critical food shortages (in winter).

Canopy height and stem density targets in this offset completion criteria have been defined utilising stratum heights and stem densities according to the RE technical description for RE 12.9-10.2. Therefore, targets are based on the expected or the 'ideal'.

Utilising known habitat features and the expected structure and function of the RE, the offset completion criteria has been broken into the following key components:

- Goal,
- Objectives, and
- Targets.

8.1 GOAL

The goal of the offset management plan is to improve habitat for GHFF on the Offset Area by ensuring that habitat reflects the structure and function of the RE (12.9-10.2), while providing a variety of productive foraging resources that are potentially available year-

round, particularly during critical food shortages (in winter). Specifically, to achieve a 2-point uplift in habitat score to reach a score of 7 by the end of the offset.

8.2 OBJECTIVES

In order to achieve the goal, two main objectives must be met. Both objectives need to be met in order to achieve the goal:

- Food tree species reflect the structure of regional ecosystem RE 12.9-10.2.
- Food tree species include all seven (7) priority species:
  - Six (6) priority blossom species: *Corymbia intermedia, C. citriodora, Eucalyptus tereticornis, E. crebra, E. melanophloia,* and *Lophostemon confertus* and,
  - One (1) priority fruiting species: *Alphitonia excelsa*.

8.3 COMPLETION TARGETS

To fulfil the objectives, the following targets shall be met at the Offset Area:

1. Within 20 years of starting the offset, achieve and maintain an open forest structure typical of RE 12.9-10.2[4], which fulfils the following (site average):
   a. T1 has a minimum of 44 stems per hectare (± 10%), and
   b. T2 has a minimum of 44 stems per hectare (± 10%), and
   c. T3 has a minimum of 44 stems per hectare (± 10%).
2. Within 20 years of starting the offset, the average density of *Alphitonia excelsa* must meet the following criteria:
   a. T2 (≥10m, <18m) has a minimum of 17 stems per hectare (± 10%), and,
   b. T3 (≥5m, <10m) has a minimum of 6 stems per hectare (± 10%).
3. Within 20 years of starting the offset, every assessment unit must have all six (6) priority blossom species (*Corymbia intermedia, C. citriodora, Eucalyptus tereticornis, E. crebra, E. melanophloia,* and *Lophostemon confertus*) present at a minimum density of 2 stems per species per hectare (i.e., a total of 12 stems per hectare) with a minimum height of 10 meters.
4. Within 20 years of starting the offset, achieve and maintain a minimum blossom species score of 20/40[5].
5. Within 20 years of starting the offset, achieve and maintain a minimum habitat quality score of 7/10.

[4] Based on the 12.9-10.2 Regional Ecosystem technical description stratum heights.

[5] On-ground examples of blossom scores of 20/40 is represented by current remnant vegetation on the Offset Site before commencement of the offset. Offset starting average blossom score is approximately 12/40.

Targets 1, 2 and 5 contribute to Objective 1. Targets 2, 3, 4 and 5 contribute to Objective 2. All five targets must be achieved to meet the two objectives.

Target 5 has been included because the primary aim is to reach the minimum habitat quality score, and as such, aspects of the MHQAT without specifications must be at least maintained in addition to meeting Targets 1-4 to complete the offset. Target 5 allows the Offset Area manager flexibility of approach (within the constraints of best practice identified in Section 10) to maintain aspects of the MHQAT that do not have a specified target (i.e., weed management).

8.4 INTERIM TARGETS

The following section identifies interim targets to mark the progression towards the achievement of the completion targets (Table 3). Interim targets help to ensure that the offset is being correctly managed and help the manager of the Offset Area to assess the need for and priority of adaptive management measures and controls. The interim targets should be used as a guide for implementation of adaptive management only and should not be enforced.

TABLE 3: INTERIM TARGETS TO ASSESS PROGRESS TOWARDS THE OFFSET COMPLETION CRITERIA TARGETS.

Completion Targets (Section 8.3)	Interim Targets		
	Year five (5)	Year ten (10)	Year fifteen (15)
1	Within five (5) years of starting the offset, on average, each hectare has at least 132 stems (priority blossom tree species) (± 10%) successfully established or maintained per ha.	Within ten (10) years of starting the offset, fulfil the following (site average): • T1 has approximately 22 stems (priority blossom tree species) per hectare (± 10%), and • T2 has approximately 22 stems (priority blossom tree species) per hectare (± 10%), and • T3 has approximately 22 stems (priority blossom tree species) per hectare (± 10%).	Within fifteen (15) years of starting the offset, fulfil the following (site average): • T1 has approximately 33 stems (priority blossom tree species) per hectare (± 10%), and • T2 has approximately 33 stems (priority blossom tree species) per hectare (± 10%), and • T3 has approximately 33 stems (priority blossom tree species) per hectare (± 10%).
2	Within five (5) years of starting the offset, on average, each hectare has at least 23 stems (priority	Within ten (10) years of starting the offset, the average density of *Alphitonia*	Within fifteen (15) years of starting the offset, the average density of *Alphitonia*

Completion Targets (Section 8.3)	Interim Targets		
	Year five (5)	Year ten (10)	Year fifteen (15)
	blossom tree species) (± 10%) of *Alphitonia excelsa* successfully established or maintained per ha.	*excelsa* should meet the following criteria: • T2 (≥7m) has approximately 8 stems (priority blossom tree species) per hectare (± 10%), and, • T3 (≥5m) has approximately 3 stems (priority blossom tree species) per hectare (± 10%).	*excelsa* should meet the following criteria: • T2 (≥7m) has approximately 8 stems (priority blossom tree species) per hectare (± 10%), and, • T3 (≥5m) has approximately 3 stems (priority blossom tree species) per hectare (± 10%).
3	Within five (5) years of starting the offset, on average, each hectare has approximately 2 stems (priority blossom tree species) per species per hectare (i.e., a total of 12 stems per hectare) of the *priority blossom tree species* successfully established or maintained.	Within ten (10) years of starting the offset, every assessment unit should have all of the *priority blossom tree species* present at a minimum density of 2 stems (priority blossom tree species) per species per hectare (i.e., a total of 12 stems per hectare) with a minimum height of 7 meters.	Within fifteen (15) years of starting the offset, every assessment unit should have all of the *priority blossom tree species* present at a minimum density of 2 stems (priority blossom tree species) per species per hectare (i.e., a total of 12 stems per hectare) with a minimum height of 10 meters.
4	Within five (5) years of starting the offset, achieve and maintain a minimum blossom species score of 14/40.	Within ten (10) years of starting the offset, achieve and maintain a minimum blossom species score of 16/40.	Within fifteen (15) years of starting the offset, achieve and maintain a minimum blossom species score of 18/40.
5	Within five (5) years of starting the offset, achieve and maintain a minimum habitat quality score of 5/10.	Within ten (10) years of starting the offset, achieve and maintain a minimum habitat quality score of 6/10.	Within fifteen (15) years of starting the offset, achieve and maintain a minimum habitat quality score of 6.5/10.

9 RISK ASSESSMENT

The following section outlines a qualitative risk assessment which evaluates risks associated with achieving the targets set out in the offset completion criteria.

A qualitative offset risk assessment was undertaken in accordance with AS ISO 31000:2018 Risk management – Guidelines (Standards Australia 2018). A qualitative approach was utilised as it is suitable in this instance to gather information that can't easily be measured by or translated into numbers. Risk assessment first requires the establishment of the context and scope for the risk assessment. The context and scope of the offset risk assessment is to identify, assess and treat risks to achieving the offset goal and objectives, particularly the offset targets, described in the preceding section. The offset goal and objectives are achieved when the targets are achieved.

The offset risk assessment was comprised of three stages:

1. **Risk identification:** Identify risks which would prevent the offset completion criteria targets from being achieved.
2. **Risk analysis:** Analyse the likelihood and consequences (impact) of each of the identified risks on achieving the offset completion criteria targets.
3. **Risk evaluation**: Based on the outcomes of the risk analysis, determine whether the risk:
    a. is otherwise acceptable or tolerable (low risks),
    b. requires treatment or management to reduce the risk to acceptable or tolerable levels. The 'treatments' identified as part of the risk evaluation are equivalent to offset management actions which are subsequently described in Section 10 of the report.

The following subsections describe:

- Risk identification,
- Risk analysis,
- Risk evaluation, and
- The consolidated risk assessment.

9.1 RISK IDENTIFICATION

The purpose of risk identification is to generate a comprehensive list of risks based on those events that might prevent, degrade, or delay the achievement of the targets set out in the Offset Completion Criteria (Section 8.3). Risks were identified through a qualitative assessment involving expert elicitation and evidence-based methods.

Risks were identified having regard to the site context and the goal of the offset, including:

- the Offset Area's existing characteristics e.g., BioCondition,
- the location of the Offset Area within the landscape,
- desired environmental outcomes (offset completion targets).

Risk identification resulted in the establishment of five (5) 'risk groups' for subsequent risk analysis and risk evaluation:

1. Vegetation management risks,
2. Soil environment risks,
3. Biosecurity risks,
4. Anthropogenic risks, and
5. Stochastic event risks.

The risk groups are described in further detail in Table 4. Specific risks within each of the groups are listed in the consolidated risk assessment (Refer to Section 9.4) and are cross-referenced in the table below (Table 4).

TABLE 4: DESCRIPTION OF RISK GROUPS.

Risk Group	Description	Identified risks
Vegetation management risks	Vegetation management risks may affect the successful growth or establishment of vegetation that is existing (i.e., regrowth) or being rehabilitated (i.e., tubestock and direct seeding). For example, abiotic stressors resulting in slow or stunted plant growth is a vegetation management risk.	Items 1 – 7 of Table 10.
Soil environment risks	Soil environment risks are related to site suitability and soil health/integrity and issues that may arise due to erosion and/or nutrient imbalances. For example, intensification of gully erosion is a soil environment risk.	Items 8 – 9 of Table 10.
Biosecurity risks	Biosecurity risks may affect plant health and successful establishment due to pests, pathogens and disease, including factors such as weed competition and native plant herbivory. For example, myrtle rust infestation of *Eucalyptus* trees presents a biosecurity risk.	Items 10 – 15 of Table 10.
Anthropogenic risks	Anthropogenic risks are related to damages to vegetation or land resulting from various actions of people, including accidental damages, site access, disturbances, unauthorised site use, or dumping.	Items 16 – 20 of Table 10.
Stochastic event risks	Stochastic event risks are related to weather events and the possibility for some events to cause site damage and loss of environmental value. Such events are somewhat unpredictable	Items 21 – 25 of Table 10.

Risk Group	Description	Identified risks
	(stochastic) and are related to the frequency and intensity of storms, drought, flood and bushfire.	

Each of the five (5) risk groups identified may be independently and collectively associated with failing to achieve targets A, B, C and D of the offset completion criteria. The identified risks are analysed in the following section.

9.2 RISK ANALYSIS

Risk analysis involves developing an understanding of the identified risks, to provide input into risk evaluation and decision-making (i.e., whether a risk needs to be treated)(Standards Australia 2018). Risk is analysed by determining the likelihood and consequence of a risk, where likelihood refers to the probability of a particular identified risk occurring, and consequence is the expected severity of the risk (Standards Australia 2018). The determination of the likelihood and consequence for each risk is based on their respective association in achieving the offset completion criteria target(s) (Standards Australia 2018). A risk could have multiple consequences and affect multiple targets.

Each of the identified risks was given a rating in terms of the likelihood and consequence of the risk event occurring. The likelihood of a risk occurring was categorised according to Table 5 and the consequences were classified according to categories listed in Table 6 in accordance with AS ISO 31000:2018 (Standards Australia 2018).

Risks were qualitatively assessed using a combination of expert elicitation and evidence-based methods. Likelihood and consequence ratings were combined according to the AS ISO 31000:2018 risk rating matrix to generate a risk rating of either low, medium, high or severe (Refer to Table 7).

TABLE 5: LIKELIHOOD RISK RATING DESCRIPTION (STANDARDS AUSTRALIA 2018).

Descriptor	Description
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 is considered unlikely or doubtful to occur
Rare	May occur, but only in exceptional circumstances

TABLE 6: CONSEQUENCES RISK RATING DESCRIPTION (STANDARDS AUSTRALIA 2018).

Descriptor	Description
Minor	Minor incident of environmental damage that can be reversed

Descriptor	Description
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental features and danger of continuing
Critical	Severe widespread loss of environmental features and irrecoverable environmental damage

TABLE 7: RISK RATING MATRIX (STANDARDS AUSTRALIA 2018).

		Consequence				
		Minor	Moderate	High	Major	Critical
Likelihood	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 8: RISK RATING MATRIX RESULT DESCRIPTION (STANDARDS AUSTRALIA 2018).

Risk Matrix Result	Description
Low	Low risks do not pose a real threat to achievement of the targets of the offset completion criteria.
Medium	Medium risks may interfere with achievement of the targets of the offset completion criteria.
High	High risks may prevent the achievement of the targets of the offset completion criteria.
Severe	Severe risks are likely to prevent the achievement of the targets of the offset completion criteria.

The outcomes of the risk analysis, including overall risk ratings (inherent risks), was used to inform risk evaluation in the following section of the report. Risk evaluation involves the identification of management actions that could be adopted to reduce the inherent risk to an acceptable or tolerable level (residual risks).

9.3 RISK EVALUATION

The purpose of risk evaluation is to provide a framework for decision-making based on the outcomes of risk analysis. Risk evaluation enables the identification of appropriate treatments, management actions and priorities for management implementation. Using the results of the risk matrix, the costs and efforts of management implementation should be balanced against the benefits derived (Standards Australia 2018).

Offset risk treatment and appropriate management responses were evaluated through a qualitative assessment through expert elicitation and evidence-based methods. The risk evaluation determined:

- whether the risk is acceptable or tolerable,
- whether the risk needs to be managed,
- the appropriate management action, and
- the priority for management implementation.

Table 9 outlines the risk evaluation response required to address the aforementioned points. Appropriate management actions are identified in Section 10 and are cross-referenced in Table 10.

TABLE 9: RISK EVALUATION RESPONSE.

Inherent Risk	Action	Residual Risk
Low	Low inherent risks are accepted risks. Low risks do not necessitate a management response.	Low
Medium	Medium inherent risks are tolerable, however, some management of the risk may be required.	Medium/Low
High	High risks are intolerable. Risk management is required. Risk must be managed until the residual risk is Medium or below.	Medium/Low
Severe	Severe risks are intolerable. High-priority risk management required. Risk must be managed utilising one or multiple measures until the residual risk is Medium or below.	Medium/Low

Risk evaluation was the final step in the risk assessment process and included the determination of management actions to reduce the inherent risk to an acceptable or tolerable level, also known as the 'residual risk'. The outcomes of the risk identification, analysis and risk evaluation were combined and consolidated in the following section (Section 9.4). The management actions that arose from the risk evaluation and consolidated risk assessment form the basis for the offset management activities (Section 10).

9.4 CONSOLIDATED RISK ASSESSMENT

The following section contains the consolidated risk assessment table that combines the results of the Risk Identification (Section 9.1), Risk Analysis (Section 9.2) and Risk Evaluation (Section 9.3) assessments. Table 10 displays the results of identification, analysis, and evaluation in order of completion, from left to right. The consolidated risk assessment:

- Identifies risks which would prevent the offset completion criteria targets being achieved (risk category, and risks),
- Analyse the likelihood and consequences (impact) of each of the identified risks on achieving the offset completion criteria targets (likelihood and consequence, inherent risks), and
- Based on the outcomes of the risk analysis, determine whether the risk is otherwise acceptable or tolerable (low risks), or requires management to reduce or control the risk (management actions and residual risks).

The consolidated risk assessment (Table 10) must be updated by the Offset Manager (OM) at the following times:

- Prior to initial commencement of works,
- Prior to vegetation clearing operations,
- At the completion of vegetation clearing operations,
- As required following non-conformances or other changes to procedures, and,
- Annually, as part of the review and audit procedures.

TABLE 10: CONSOLIDATED RISK ASSESSMENT.

Item	Risks	Likelihood	Consequence	Inherent Risk[6]	Management Actions	Likelihood	Consequence	Residual Risk[7]
Vegetation management risks								
1	Incorrect rehabilitation timing	Unlikely	Major	High	• Section 10.1.2: Planting and Establishment, item 5. • Section 10.1.3: Direct Seeding, item 12.	Rare	Major	Medium
2	Slow or stunted plant growth (i.e., abiotic stresses)	Possible	Major	High	• Section 10.1.1: Site Preparation, all items. • Section 10.1.2, Planting and Establishment, all items. • Section 10.1.3: Direct Seeding, all items.	Possible	High	Medium
3	Target species fail to establish	Unlikely	Critical	High	• Section 10.1.1: Site Preparation, all items. • Section 10.1.2, Planting and Establishment, all items. • Section 10.1.3: Direct Seeding, all items.	Rare	Major	Medium
4	Intraspecies competition (i.e., dense regrowth)	Likely	Moderate	Medium	• Section 10.1.2: Planting and Establishment, item 14. • Section 10.1.3: Direct Seeding, item 11.	Rare	High	Low

[6] Indicates the likelihood and consequences of an action prior to planned mitigation measures from OMP implementation.

[7] Indicates the likelihood and consequences of an action following implementation of planned mitigation measures from the OMP.

Item	Risks	Likelihood	Consequence	Inherent Risk[6]	Management Actions	Likelihood	Consequence	Residual Risk[7]
5	Interspecies competition	Likely	Major	High	• Section 10.1.2: Planting and Establishment, item 14. • Section 10.1.3: Direct Seeding, item 11. • Section 10.3: Biosecurity, items 1-6.	Unlikely	High	Medium
6	Unsuitable microclimate for species	Possible	Moderate	Medium	• Section 10.1.2: Planting and Establishment, items 1-2. • Section 10.1.3: Direct Seeding, items 13.	Possible	Minor	Low
7	Seed predation in direct seeding treatment areas	Possible	Major	High	• Section 10.1.3: Direct Seeding, items 6-8.	Rare	Major	Medium
Soil environment risks								
8	Nutrient imbalance	Possible	High	Medium	• Section 10.2: Soil Environment, items 8-9.	Unlikely	Moderate	Low
9	Erosion, compromised soil structure and undermining	Possible	Major	High	• Section 10.2: Soil Environment, all items.	Unlikely	High	Medium
Biosecurity risks								
10	Weed competition	Highly likely	High	High	• Section 10.3: Biosecurity, items 1-6.	Possible	High	Medium
11	Spread of weeds	Likely	High	High	• Section 10.3: Biosecurity, items 1-6	Possible	High	Medium
12	Native species herbivory by insects	Possible	Moderate	Medium	• Section 10.3: Biosecurity, items 7-8.	Unlikely	Moderate	Low
13	Native species herbivory by mammals	Possible	Moderate	Medium	• Section 10.3: Biosecurity, items 7-8.	Unlikely	Moderate	Low

Item	Risks	Likelihood	Consequence	Inherent Risk[6]	Management Actions	Likelihood	Consequence	Residual Risk[7]
14	Plant parasites or fungal pathogens that degrade tree health	Possible	Major	High	• Section 10.3: Biosecurity, items 8-10.	Possible	High	Medium
15	Livestock intrusion from neighbouring properties	Possible	Minor	Low	• Acceptable risk, management not required	Rare	Minor	Low
Anthropogenic risks								
16	Unapproved tree removal	Unlikely	Moderate	Low	• Acceptable risk, management not required	Rare	Minor	Low
17	Accidental damage to trees	Unlikely	Moderate	Low	• Acceptable risk, management not required	Rare	Minor	Low
18	New / existing land contamination	Unlikely	High	Medium	• Section 10.4.1: Access, all items. • Section 10.4.2: Waste, all items.	Rare	High	Low
19	New / existing waste	Highly likely	Moderate	High	• Section 10.4.1: Access, all items. • Section 10.4.2: Waste, all items.	Unlikely	Moderate	Low
20	Purposeful damage to property (i.e., recreational vehicle usage)	Unlikely	High	Medium	• Section 10.4.1: Access, all items.	Rare	Moderate	Low
Stochastic event risks								
21	Extended drought periods	Possible	Major	High	• Section 10.5, Stochastic events, items 1-4.	Possible	High	Medium
22	Uncontrolled bushfire	Rare	Critical	High	• Section 10.5, Stochastic events, items 11-15.	Rare	High	Low

Item	Risks	Likelihood	Consequence	Inherent Risk[6]	Management Actions	Likelihood	Consequence	Residual Risk[7]
23	Inappropriate fire regimes	Unlikely	High	Medium	• Section 10.5, Stochastic events, items 11-15.	Rare	High	Low
24	Storms	Likely	Moderate	Medium	• Section 10.5, Stochastic events, items 5-6 & 15.	Likely	Minor	Low
25	Intensification / increased regularity of stochastic events due to climate change	Likely	High	High	• Section 10.5, Stochastic events, all items.	Likely	Moderate	Medium

10 MANAGEMENT ACTIONS

Management actions have been identified for each risk to the achievement of the offset completion criteria targets.

All offset activities will be undertaken by a suitably qualified person or organisation (the Offset Manager), with demonstrated experience and expertise in environmental or habitat offset delivery, revegetation, fire, weed and pest management. The OMP is to be administered by the Offset Manager and any nominated contractor(s) responsible for any works within the Offset Area or works outside of the Offset Area that may impact the habitat values of the Offset Area.

A copy of the OMP, together with a register of site personnel should be maintained by the Offset Manager for quality management, risk and safety purposes. The OMP will be included in all site inductions to ensure that employees, contractors and suppliers are aware of their responsibilities. Briefings for all relevant personnel should occur prior to any works and on each day that works take place to review risks, ensure quality management and manage safety and other hazards.

Evidence of management actions and assessment against the relevant performance outcomes should be monitored and reported annually to the proponent of the action. The following sections of the report contain a series of management plans that have been prepared to target the risks identified in Section 9 of the report. The management plans provide details of management actions, define the responsible person for the management action, indicate the timing and frequency for implementation of the action, as well as the monitoring and reporting requirements for each. Management success can be assessed through the performance measures identified in this section, and otherwise through monitoring, reporting and review (Section 11). Low risks do not require specific risk treatment or management actions and are not dealt with, however, can be carried out according to the procedures contain in the management tables at the discretion of the Offset Manager if necessary.

Management measures have been assigned based on best-practice guidance material that is both relevant and appropriate for the Offset Area. Management measures have been guided by:

- Australian Standards per the International Organisation for Standardization (ISO),
- State (Queensland) management guidelines and specifications, and
- Local Government (City of Ipswich) management guidelines and specifications.

The management tables provide examples of contingencies and corrective actions to be implemented if management measures are not appropriately executed or if risks are realised. More guidance on the implementation of contingencies and corrective actions,

which are to be applied on a case-by-case basis, is provided in Section 12: Adaptive Management & Plan Review.

The management plans have been divided into logical categories based on the risk groups identified in Section 9 for efficiency when seeking measures to avoid, minimise and mitigate risk in the Offset Area, including:

- Vegetation management (Section 10.1), including:
  - Site preparation,
  - Planting and establishment,
  - Direct seeding,
- Soil environment (Section 10.2),
- Biosecurity (Section 10.3),
- Anthropogenic (Section 10.4), including:
  - Access management, and
  - Waste management,
- Stochastic events (Section 10.5).

10.1 VEGETATION MANAGEMENT

Vegetation management refer to measures or activities to create, enhance or maintain GHFF habitat on the Offset Area for the achievement of offset completion criteria targets. Vegetation management measures include treatment options necessary to reduce or mitigate risks identified in the vegetation management risk group as part of Section 9 of this report. Vegetation management risks have been divided into key three groups, including:

- Site preparation,
- Planting and establishment, and
- Direct seeding.

Vegetation management measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, including industry, local (Ipswich/Southeast Queensland) and State guidelines. The OMP measures do not duplicate these measures, but rather, adopt or tailor them to site-specific risks and management needs.

10.1.1 SITE PREPARATION

Site preparation refers to measures to prepare the site for revegetation activities (direct seeding, or planting). Site preparation addresses vegetation management and soil environment risks. Site preparation is to be implemented prior to Planting and Establishment (10.1.2) as well as Direct Seeding (Section 10.1.3). The objective of site preparation is to contribute to the achievement of the offset completion criteria targets by (Table 11):

- Creating an optimal growth medium for establishment of new plants,
- Increasing the likelihood of seed germination (direct seeding),
- Reducing the likelihood of new plant mortality.

Site preparation measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, including industry and State guidelines. The OMP measures do not duplicate these measures, but rather, adopt or tailor them to site-specific risks and management needs. Management measures have been guided by:

- Best Practice Erosion and Sediment Control from the International Erosion Control Association (IECA Australia, November 2008),
- Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017),
- AS 4419 Soils for landscaping and garden use.

Performance criteria that ensure the site preparation is being managed successfully include the following measures:

- Soil quality in rehabilitation areas achieve and maintain characteristics suitable for native vegetation establishment.
- High survival rate (>80%) for rehabilitated (planted or seeded) native vegetation.

TABLE 11: SITE PREPARATION MANAGEMENT DETAILS, RESPONSIBLE PERSON, TIMING FREQUENCY AND MONITORING.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
General requirements					
1	All vegetation management activities are to be performed by a suitably qualified contractor, with demonstrated experience in bushland rehabilitation. Relevant qualifications include a certificate in Conservation Land Management - Natural Area Restoration or a degree in a related field such as ecology or vegetation management. Contractors must hold ALL applicable licenses or permits such as: • Commercial operator's license (ground application of herbicides) issued under the Agricultural Chemicals Distribution Control Act 1966, • Senior First Aid certificate, • White Card i.e., General Safety Induction (Construction Industry), and,	OM and/or Offset Proponent	At all times	As required	Annually

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• Relevant environmental permits issued by the relevant State Government department.				
Weed competition					
2	The following must be completed in rehabilitation areas containing weed cover >25%: • Complete a cool burn prior to planting in accordance with the requirements of Bushfire (Section 10.5) management to reduce weed cover/abundance. • Remove residual weeds per the requirements of Biosecurity management prior to rehabilitation efforts (Section 10.3).	OM and/or Offset Proponent	Prior to rehabilitation	At commencement of the offset, then review annually	Annually
Soil structure					
3	Temporary erosion and sediment control fencing to be installed in accordance with Best Practice Erosion and Sediment Control (IECA Australia, November 2008) [8] where erosion risk is present.	OM and/or Offset Proponent	At commencement	At commencement of the offset, then review annually	Annually
4	If anthropogenic disturbances, such as waste, are identified in planting areas, the following must be completed prior to planting: • All latent waste and encumbrances are removed from planting areas. • Decompaction of soil e.g., ripping and reinstatement of topsoil.	OM and/or Offset Proponent	At all times	As required	Annually

[8] Best Practice Erosion and Sediment Control (IECA Australia, November 2008) is an essential reference for erosion and sediment control professionals and will prevent ground disturbance from planting from causing knock on effects for soils and therefore plant establishment issues.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
Topsoil quality					
5	Bare topsoil and/or subsoil in rehabilitation areas will be appropriately prepared in accordance with Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017) [9].	Contractor and/or Offset Proponent	Prior to rehabilitation	As required	Every three (3) months for first two (2) years, then annually.
6	If topsoil is required, utilise topsoil from the site as a first priority. If site topsoil is not available for use, import topsoil similar to naturally occurring topsoil, in accordance with Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017). Imported topsoil should be suitable for the establishment and on-going viability of the selected vegetation, free of weed propagules and contaminants, and which achieves the requirements of AS 4419 Soils for landscaping and garden use.	Contractor and/or Offset Proponent	Prior to rehabilitation	As required	
7	Avoid differential subsidence and excess compaction and produce a finished topsoil surface which has the following: • Smooth and free from stones or lumps of soil, • Graded to drain freely, without pending, to catchment points, • Graded to drain evenly into adjoining ground surfaces, and • Ready for planting.	Contractor and/or Offset Proponent	Prior to rehabilitation	As required	
Appropriate mulching					

[9] Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works is a detailed document that covers a broad range of applicable rehabilitation considerations including planting, seeding, soil preparation, establishment and amelioration in a variety of applicable conditions and/or landscapes relevant to Queensland.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
8	If required, native organic mulch is to be imported in accordance with AS 4454-2012 Composts, soil conditioners and mulches and achieve the requirements set out in Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017).	Contractor and/or Offset Proponent	During rehabilitation	As required	Every three (3) months for first two (2) years, then annually.
Examples of Contingencies and Corrective Actions					
Planting location is unsuitably prepared					
9	• Report and investigate as an incident. • Identify the cause of unsuitability. • If the issue can be resolved, arrange for immediate amelioration, i.e., waste removal or weed / pest control by a suitably trained contractor. • Increase management and monitoring until the issue is resolved. • If required, retrain relevant personnel in regard to OMP procedures and controls.	OM and/or Offset Proponent	In response to incidents	As required	Every three (3) months for first two (2) years, then annually.

10.1.2 PLANTING AND ESTABLISHMENT

Planting and establishment refers to measures for the planting of tubestock in the Offset Area and management of tubestock establishment for successful rehabilitation activities (Table 12). Planting and establishment addresses vegetation management and soil environment risks. Planting and establishment is to be applied on those areas of the Offset Area that already support remnant or regrowth native vegetation to supplement the canopy. Planting and establishment is to be implemented after Site Preparation (Section 10).

The objective of planting and establishment is to contribute to the achievement of the offset completion criteria targets by:

- Restoring and enhancing habitat for the GHFF by replanting native vegetation representative of RE 12.9-10.2, and
- Supplementing feeding habitat with priority food trees.

Planting and establishment measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, including industry, local (Ipswich/Southeast Queensland) and State guidelines. The OMP measures do not duplicate these measures, but rather, adopt or tailor them to site-specific risks and management needs. Management measures have been guided by:

- Regional Ecosystem Technical Descriptions for 12.9-10.2,
- Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017),
- Ipswich City Council Tubestock Planting Detail, and
- State of Queensland Regrowth Vegetation Code - Managing Regulated Regrowth Vegetation (State of Queensland 2023).

Performance criteria that ensure the site preparation is being managed successfully include the following measures:

- Any required rehabilitation works are to commence no less than two months after weeds have been treated in the Offset Area.
- 90% survivorship of plants within rehabilitation areas.
- Rehabilitated vegetation will display signs of native vegetation growth at rates expected for those species.

TABLE 12: PLANTING AND ESTABLISHMENT MANAGEMENT DETAILS, RESPONSIBLE PERSON, TIMING FREQUENCY AND MONITORING.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
Quality and appropriateness of plant procurement					
1	All canopy species used for revegetation must be in accordance with the *priority tree species* identified in Section 8.	OM and/or Offset Proponent	At all times	As required	Every three (3) months for first two (2) years, then annually.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
2	Plant substitution is not permitted for canopy species. Alternative native species in the shrub and understorey layer must be confirmed with the Offset Manager and must be in accordance with RE 12.9-10.2. [10]	OM and/or Offset Proponent	At all times	As required	
3	Supplied plants are to be consistent with the following requirements: • Tubestock size to be min. 75mm container size. • Plants are to be clearly and correctly labelled (water-resistant labels) according to botanical name. • Plants are to be delivered to the site in fully enclosed trucks. • All plant material is to be sourced from local provenance stock. • Plants will be supplied in weed-free containers of the required size. • Open rooted stock is not to be supplied. • All plants are to be healthy and vigorous. Root bound, diseased and poor stock will not be accepted.	OM and/or Offset Proponent	At all times	As required	
4	Supplied plants are to have the following characteristics: • Foliage size, texture and colour at time of delivery consistent with the size, texture and colour shown in healthy specimens of the nominated species. Plants are to be showing signs of	OM and/or Offset Proponent	At all times	As required	

[10] Regional Ecosystem Technical Descriptions provide a detailed description of the normal range in structure and floristic composition of remnant regional ecosystems.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	active growth relative to season and true to the form of the species. • With extension growth consistent with that exhibited in vigorous specimens of the species nominated. • Free from damage and from restricted habit due to growth in nursery rows. • Free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development. • Grown and hardened off to suit the conditions that could reasonably be anticipated to exist on site at the time of delivery. • Supply plants with foliage free from attack by pests or disease.				
Suitable planting timeline					
5	Planting must proceed within the specified timeframes to ensure progression towards completion targets as follows: • Planting must proceed within one (1) year of the commencement of the offset. • Any planting activity must proceed within one (1) month of the conclusion of site preparation. • Any planting activity must be concluded within six (6) months of commencement.	OM and/or Offset Proponent	At all times	For each rehabilitation activity	Annually

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
Suitable planting procedure					
6	Planting is to be carried out in accordance with Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017). For example, planting of tubestock is to ensure that: • Planting holes for trees are to be a minimum of 1.5 times the diameter of the root ball and twice the depth of the root ball. • Planting pit is to have roughened sides and de-compacted base. • Install water retention crystals to manufacturer's specifications (approximately 5 grams per plant). • Remove the plant from the container with minimum disturbance to the root ball, ensure that the root ball is moist and place it in its final position, in the centre of the hole and plumb, and with the topsoil level of the plant root ball level with the finished surface of the surrounding soil. • Backfill with topsoil mixture. Lightly tamp and water to eliminate air pockets. Ensure that topsoil is not placed over the top of the root ball so that the plant stem remains the same height above ground as it was in the container.	OM and/or Offset Proponent	At all times	As required	Every three (3) months for first two (2) years, then annually.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
7	Planting in accordance with Tubestock Planting Detail specifications per Ipswich City Council planting design standards in nominated planting areas[11], including: • Planting – Tubestock / groundcover / shrub in planting area (Drawing No. SP. 02, Rev. C), and • Planting – Tubestock / groundcover / shrub in grassed area (Drawing No. SP. 03, Rev. B).	Contractor and/or Offset Proponent	At all times	As required	
8	Avoid planting in unsuitable weather conditions such as extreme heat, cold, wind or rain. Avoid excavation when the soil is wet (except sandy soils), or during frost periods.	OM and/or Offset Proponent	At all times	As required	
9	As far as practical: • Tubestock planting of tree (canopy or T1/T2/T3) species are to be evenly spaced and at a density of one stem per 10 sqm (overall, allowing for an existing stems of canopy or T1/T2/T3) species). • Tubestock planting of shrub vegetation (S1/S2) species shall ensure that the overall density of stems is not greater than one stem per 10 sqm (allowing for an existing stems of S1/S2 species).	OM, and/or Offset Proponent	At all times	As required	

[11] Planting specifications for tubestock from City of Ipswich for areas containing grass or prepared earth to ensure planting design meets minimum standards suitable to the local area and acceptable by the local authority.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• Tubestock planting of ground strata (G1) species shall ensure that of stems is not greater than one stem per 2 sqm (allowing for an existing stems of G1 species).				
Replacement planting (loss of tubestock)					
10	Establishment and monitoring of plants is to be in accordance with Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017).	OM, and/or Offset Proponent	At all times	As required	As required
11	Maintain appropriate planting densities and replace dead / dying / diseased stock.	OM, and/or Offset Proponent	In response to incidents	As required	Every 3 months
12	Provide replacement plants as follows: • Of the same species as the plant that has been lost, • Of uniformly high-quality stock equal to the best commercially available, • Representative of optimum growth for the species as restricted by the container size, • With a balanced root system in relation to the size of the plant and conducive to successful transpiration. • Without signs of having been stressed at any stage during their development due to inadequate watering, excessive shade / sunlight, suffered physical damage or have restricted habit.	OM, and/or Offset Proponent	In response to incidents	As required	As required.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• Healthy, well grown, hardened off specimens of good shape and free from pests and disease. Been grown in their final containers for not less than twelve (12) weeks.				
Vegetation thinning					
13	Where regrowth or recruitment reaches densities that would hinder tree growth due to interspecies or intraspecific competition i.e. overcrowding, density is to be managed in accordance with the State of Queensland Accepted Development Vegetation Clearing Code for Managing Regulated Regrowth Vegetation (State of Queensland 2023). [12]	OM and/or Offset Proponent	At all times	At commencement of the offset, then review annually	Annually
Examples of Contingencies and Corrective Actions					
Target species fails to establish					
14	1. Report and investigate as an incident. 2. Identify the cause of growth failure. 3. If the issue can be resolved, arrange for immediate amelioration, i.e., weed / pest control by a suitably trained contractor.	OM and/or Offset Proponent	In response to incidents	As required	Every three (3) months for first two (2) years, then annually.

[12] State of Queensland Accepted Development Vegetation Clearing Code for Managing Regulated Regrowth Vegetation ensures thinning of vegetation is conducted within acceptable limits for vegetation thinning as regulated by the State of Queensland as appropriate for the vegetation type to maintain the structure and function of the RE and ensure the thinning achieves the intended purposes. The Offset Manager and/or Proponent is responsible for ensuring compliance and necessary statutory obligations under the Vegetation Management Act (1999) are met.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	4. Increase management and monitoring until the issue is resolved.				

10.1.3 DIRECT SEEDING

Direct seeding refers to measures for the direct seeding of disturbed areas in the Offset Area and management of species establishment for successful rehabilitation activities (Table 13). Direct seeding management addresses vegetation management risks. Direct seeding is to be applied on those areas of the Offset Area that are affected by exotic vegetation and support native vegetation at low densities. Direct Seeding is to be implemented after Site Preparation (Section 10). The objective of direct seeding is to contribute to the achievement of the offset completion criteria targets by:

- Providing an effective method for the rehabilitation of disturbed areas,
- Restoring and enhancing habitat for the GHFF,
- Restoring and enhancing forest consistent with RE 12.9-10.2.

Direct seeding measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, including industry and State guidelines. The OMP measures do not duplicate these measures, but rather, adopt or tailor them to site-specific risks and management needs. Management measures have been guided by:

- Regional Ecosystem Technical Descriptions for 12.9-10.2,
- Anticipated prescriptions of the direct seeding supplier and service expert (ecological/direct seeding expertise required),
- Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017), and
- State of Queensland Regrowth Vegetation Code - Managing Regulated Regrowth Vegetation (State of Queensland 2023).

Performance criteria that ensure the direct seeding is being managed successfully include the following measures:

- Any required direct seeding works are to commence no less than two months after weeds have been treated in the Offset Area.
- A 90% survival rate of plants within rehabilitation areas after 12 months of planting.
- Regeneration areas will display signs of native vegetation growth at rates expected for those species.

TABLE 13: DIRECT SEEDING MANAGEMENT DETAILS, RESPONSIBLE PERSON, TIMING FREQUENCY AND MONITORING.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
Seed procurement					
1	Where direct seeding is required, seeding is to utilise tree, shrub and understory species consistent with RE 12.9-10.2. All tree species used for direct seeding must be in accordance with the priority tree species identified in Section 8. Shrub and understory species are to be selected by the direct seeding contractor and within the constraints of RE 12.9-10.2.[13] Plant substitution is not permitted for canopy (T1, T2 or T3) species, unless confirmed with a suitably qualified person who has assessed tree substitution in respect to the completion targets (Section 8.3).	OM and/or Offset Proponent	At all times	As required	Every three (3) months for first two (2) years, then annually.
3	Seeding application rate is to be determined by a suitably qualified person i.e., native seed supplier. Direct seeding application rate is designed to meet minimum plant densities specified for priority tree species identified in Section 8.	OM and/or Offset Proponent	At all times	As required	
Seeding					
4	All direct seeding activities are to be performed by a suitably qualified contractor, with demonstrated experience in bushland rehabilitation. Relevant qualifications include a certificate in Conservation Land Management - Natural Area Restoration or a degree in a related field such as ecology or vegetation management. Contractors must hold applicable licenses such as:	OM and/or Offset Proponent	At all times	As required	

[13] Direct seeding experts to allocate species based on a site assessment and determine the most suitable understory / shrub species to secure the site and support re-establishment of RE 12.9-10.2.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• Commercial operator's license (ground application of herbicides) issued under the Agricultural Chemicals Distribution Control Act 1966, • Senior First Aid certificate, • White Card i.e., General Safety Induction (Construction Industry), and, • Relevant Eco-access permits issued by the relevant State department.				
5	Do not seed in unsuitable weather conditions such as extreme heat, cold, wind, or rain.	OM and/or Offset Proponent	During rehabilitation	For each rehabilitation activity	Every three (3) months for first two (2) years after direct seeding, then annually
6	Seeding is to be undertaken in accordance with Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017) using all species in the seed supply proposal according to the seeding density or rate provided by the supplier.	OM and/or Offset Proponent	During rehabilitation	For each rehabilitation activity	
7	Install seed mix utilising the best practice methodology recommended by the direct seeding provider.	OM and/or Offset Proponent	During rehabilitation	For each rehabilitation activity	
Vegetation thinning					
8	Thick regrowth hindering tree growth (i.e., resulting in crowding) due to interspecies or intraspecies competition is to be managed in accordance with	OM and/or Offset Proponent	At all times	At commencement of the offset, then review annually	Annually

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	the State of Queensland Accepted Development Vegetation Clearing Code for Managing Regulated Regrowth Vegetation (State of Queensland 2023).[14]				
Suitable planting timeline					
9	Direct seeding must proceed within the specified timeframes to ensure progression towards completion targets as follows: • Direct seeding must proceed within one (1) year of the commencement of the offset. • Any scheduled direct seeding activity must proceed within one (1) month of the conclusion of site preparation. • Direct seeding must be concluded within six (6) months of commencement.	OM and/or Offset Proponent	At all times	Whenever rehabilitation activity is required	Every three (3) months for first two (2) years, then annually
Examples of Contingencies and Corrective Actions					
Seeding species do not germinate.					
10	• Report and investigate as an incident. • Investigate the extent of the substitution required. • Order relevant species as quickly as possible. • Once delivered, undergo tubestock planting of species per Section 10.1.2.	OM and/or Offset Proponent	At all times	As required	Annually

[14] The Offset Manager and/or Proponent is responsible for ensuring compliance and necessary statutory obligations under the Vegetation Management Act (1999) are met.

10.2 SOIL ENVIRONMENT

Soil environment refers to measures for stabilisation of soils. Soil environment management addresses soil environment, vegetation management and stochastic event risks. The objective of erosion management is to contribute to the achievement of the offset completion criteria targets to contribute to the achievement of the offset completion criteria targets by (Table 14):

- Maintaining site suitability and soil quality,
- Avoiding loss and damage to vegetation,
- Avoiding or minimising erosion,
- Managing the impacts of stormwater runoff, and
- Avoiding adverse impacts from and to adjacent properties.

Soil environment measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, including industry and State guidelines. The OMP measures do not duplicate these measures, but rather, adopt or tailor them to site-specific risks and management needs. Management measures have been guided by:

- Regional Ecosystem Technical Descriptions for 12.9-10.2,
- Soil Erosion and Sediment Control Engineering Guidelines for Queensland Construction Sites (The Institution of Engineers, Australia Queensland Division June 1996), and
- Best Practice Erosion and Sediment Control (International Erosion Control Association 2008).

Performance criteria that ensure the soil environment is being managed successfully include the following measures:

- No-worsening of erosion in the offset area.
- Address all complaints regarding erosion and stormwater runoff.
- No irreparable collapse or destabilisation of the site from erosion.

TABLE 14: EROSION MANAGEMENT DETAILS, RESPONSIBLE PERSON, TIMING, FREQUENCY AND MONITORING.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
General requirements					
1	Where required, erosion and sediment control measures installed in accordance with: • Soil Erosion and Sediment Control Engineering Guidelines for Queensland Construction Sites (The Institution of Engineers, Australia Queensland Division June 1996) [15], • Best Practice Erosion and Sediment Control (International Erosion Control Association 2008), and, • Any relevant permit conditions.	OM and/or Offset Proponent	At all times	As required	Annually
Site use					
2	Erosion is to be avoided and minimised by implementing the following elements of best practice: • Stormwater drainage structures shall be designed so that there is 'no worsening' of runoff beyond that which occurs on the existing undeveloped site. • Avoid the use of any heavy machinery in or around waterways or any area identified as being subject to or vulnerable to erosion.	OM and/or Offset Proponent	At commencement	At commencement of the offset, then review annually	Annually

[15] Soil Erosion and Sediment Control Engineering Guidelines for Queensland Construction Sites provides best practice soil and sediment guidelines for engineering and construction in the context of Queensland.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• Ponding of stormwater must not occur on the subject land, adjoining allotments or road reserve. • All unlined open drains shall be stabilised with vegetation.				
Assessment					
3	Visual inspection of drainage channels, gullies, and perimeter of site for signs of erosion, bank slumping, or the formation of rills and gullies.	OM and/or Offset Proponent	At commencement	At commencement of the offset, then review annually	Annually
Complaints management					
4	All complaints regarding erosion and water stormwater runoff are to be recorded within a Complaints Register immediately. All complaints regarding erosion and stormwater runoff are to be addressed within 24 hours if severe, or within one week for minor complaints.	OM and/or Offset Proponent	In response to incidents	As required	Annually
Diminished soil / substrate condition					
5	Stabilise with suitable groundcover species characteristic of the RE (12.9-10.2). If inappropriate for planting, soil amelioration is required. If required, import topsoil where planting required in accordance with relevant guidelines / standards.	OM and/or Offset Proponent	In response to incidents	As required.	Annually
Nutrient management					
6	Remain aware of issues that can be controlled with nutrient management: • Increase nutrients if required through the identification of plant or soil deficiency symptoms and implement remedial actions.	OM and/or Offset Proponent	At commencement	As required	Annually

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• Reduce nutrient load by removing offending high-nutrient material particularly when affected by exotic species out-competing native vegetation.				
Examples of Contingencies and Corrective Actions					
Signs of Erosion					
7	• Report and investigate as an incident. • Remediate erosion and stabilise. • 'Make good' any damage or non-performing erosion control devices and clean up any sediment that has left the site or is on the roads within and external to the site.	OM and/or Offset Proponent	In response to incidents	As required	Annually

10.3 BIOSECURITY

Biosecurity refers to measures for protecting existing and rehabilitated vegetation in the Offset Area. Biosecurity addresses vegetation management and biosecurity risks. The objective of biosecurity management is to is to contribute to the achievement of the offset completion criteria targets by (Table 15):

- Minimising spread of weeds and competition with native species.
- Ensuring trees remain free of pests, diseases or pathogens that have the potential to affect tree health.
- Preventing the spread or introduction of new weeds, pests, diseases or pathogens.
- Controlling existing weeds, pests, diseases or pathogens so as not to increase in prevalence.
- Avoidance, minimisation and mitigation of plant herbivory.

Biosecurity measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, including industry and State guidelines. The OMP measures do not duplicate these measures, but rather, adopt or tailor them to site-specific risks and management needs. Management measures have been guided by:

- Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017), and
- Queensland invasive plants and animals strategy 2019–2024 (State of Queensland 2019).

Performance criteria that ensure the site preparation is being managed successfully include the following measures:

- No spread or introduction of weeds, pests, diseases or pathogens on the site or neighbouring properties.
- No spread of pests, diseases or pathogens within the site.
- Herbivory, pests, diseases or pathogens that have the potential to affect tree health are controlled.
- No introduction of new weed or pest species to the site or neighbouring properties.
- No spread of weeds or pests within the site.
- To effectively control or eradicate existing weed or pest species within the site.

- Achieve and maintain <25% weed cover on the Offset Area.

TABLE 15: BIOSECURITY MANAGEMENT DETAILS, RESPONSIBLE PERSON, TIMING, FREQUENCY AND MONITORING.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
General requirements					
1	The following requirements must be adhered to at all times: • All weed technicians on site must be an accredited ACDC licensed operator. • Obtain weed free certificates from suppliers for materials such as sand and gravel which will be imported into the subject site. • Weed management is to be conducted in accordance with the Biosecurity Act 2014 (Qld), Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017), and Queensland invasive plants and animals strategy 2019–2024 (State of Queensland 2019)[16].	OM and/or Offset Proponent	At all times	As required	Annually
Weed assessment					
2	Weed assessment provisions include: • Contractor to inspect site to confirm weed species and/or extents for control.	OM and/or Offset Proponent	At commencement	At commencement of the offset, then review annually	Annually

[16] Queensland invasive plants and animals strategy 2019–2024 provides a clear framework and practical actions for preventing and controlling harmful invasive species, thereby protecting the offset site.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• Weed species / extents are flagged on-site (as required). • All weed species located on site are to be identified and recorded.				
Weed control					
3	Weed control programs are to be implemented as follows: • Observed weed species are to be removed, including all exotic and non-endemic trees. • All Weeds of National Significance (WONS) within the site are to be treated before other weeds. • Conduct weed control for target species on a seasonal basis as per optimal control for each target species. • During the vegetation establishment period, weed control is to be undertaken following planting and when monitoring identifies the need for action. • Any weed regrowth will be controlled in the ongoing maintenance program, weekly, fortnightly and monthly (or as required) weed management practices will be applied to suppress and prevent regrowth of weeds species in all areas of the Offset Area so as to maintain or improve habitat values. • Follow up weed inspections will be conducted during the growing seasons and chemical eradication will be applied to any perceived weed occurrence.	Contractor and/or Offset Proponent	At commencement	Every three (3) months for first two (2) years, then annually.	Every three (3) months for first two (2) years, then annually.
Weed removal					

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
4	Weed removal is to be conducted in accordance with: • The Biosecurity Act 2014 (Qld), • Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works (Department of Transport and Main Roads 2017), • Transport and Main Roads Specifications MRTS51 Environmental Management (Department of Transport and Main Roads 2023), and • Accepted Development Vegetation Clearing Code – Managing Weeds (State of Queensland 2023)[17]. In addition to the above, ensure the following site-specific requirements are implemented: • Manual removal of weeds required in areas adjacent to watercourses. • It is recommended that where possible, weed control is to be undertaken using non-mechanical manual methods. • Weed control will be undertaken in a manner which does not promote erosion or instability of soil, especially adjacent to the watercourse.	Contractor and/or Offset Proponent.	At all times	Every three (3) months for first two (2) years, then annually.	Every three (3) months for first two (2) years, then annually.

[17] The Offset Manager and/or Proponent is responsible for ensuring compliance and necessary statutory obligations under the Vegetation Management Act (1999) are met.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• When applying weed control methods, due diligence will be used to maintain and preserve surrounding or existing native vegetation and plant communities.				
Prevention of the introduction / spread of biosecurity risks					
5	Minimise the introduction, establishment and spread of non-native weeds through regular surveillance and treatment in accordance with Item No. 1-3, above.	OM and/or Offset Proponent	At all times	Every three (3) months for first two (2) years, then annually.	Annually
6	Implement biosecurity control measures, including: • Ensure vehicles and equipment entering the site undertake a vehicle weed wash down with a weed certificate prior to entering the site. • Personnel entering the site must ensure boots and other PPE has been inspected for weeds / pathogens. • Equipment and clothing should be decontaminated prior to entering the site. • Ensure soil and mulch used on site is uncontaminated, and free of weeds and pests.	Contractor and/or Offset Proponent	At every instance of new equipment, materials, vehicles, personnel (etc.) entry to site.	As required.	
Herbivory control					
7	Assess existing vegetation for evidence of herbivory. Identify the significance of herbivory. If herbivory is significant, identify the cause of herbivory. Install tree guards on all tubestock to reduce risk of herbivory during the establishment stage e.g. tree guards or protectors.	Contractor and/or Offset Proponent	At commencement	At commencement of the offset, then annually	Annually

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
8	If insect herbivory is causing severe decline in tree health, utilise insecticide control, following the application requirements of the treatment. Ensure tree guards on tubestock are securely installed.	Contractor and/or Offset Proponent	In response to incidents	At commencement of the offset, then annually	
Plant parasites / fungal pathogen control.					
8	Assess existing vegetation for evidence of plant parasites and/or fungal pathogens that pose risk to tree health for consequence management.	Contractor and/or Offset Proponent	At commencement	Every three (3) months for first two (2) years, then annually.	Annually
10	Remove dead or diseased parts of plants and dispose of off-site to minimise the spread of plant parasites or fungal pathogens. If pests are causing notable decline in tree health, apply fungicides or pesticides as necessary, following the application requirements of the treatment.	Contractor and/or Offset Proponent	In response to incidents	As required	
Examples of Contingencies and Corrective Actions					
New weed infestation occurring onsite					
11	• Report and investigate as an incident. • Arrange for weed or pest control by a suitably trained contractor. • Increase monitoring frequency until weed or pest occurrence has been controlled. • Retrain relevant personnel in regard to OMP procedures and controls.	Contractor and/or Offset Proponent	In response to incidents	Every three (3) months for first two (2) years, then annually	Annually

10.4 ANTHROPOGENIC

Anthropogenic impact management refers to measures to protect and maintain the Offset Area from risks of damage posed from anthropogenic sources. Anthropogenic management outlines best practice for site security and waste management, as well as management required to address risks identified in the anthropogenic risk group as part of Section 9 of this report.

Anthropogenic measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, including industry, local (Ipswich/Southeast Queensland) and State guidelines. The OMP measures do not duplicate these measures, but rather, adopt or tailor them to site-specific risks and management needs.

Anthropogenic management have been divided into two groups, including:

- Access, and
- Waste.

10.4.1 ACCESS

Access refers to measures for the control of site access and site security measures to ensure the site is protected from damages or disturbances (Table 16). Access management addresses anthropogenic risks. Access management contributes to the achievement of the offset completion criteria targets by protecting the existing and rehabilitated habitat values for the GHFF in the Offset Area. The objective of access management is to contribute to the achievement of the offset completion criteria targets by:

- Protecting the offset from accidental or purposeful damages related to site access and security.

Access measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, local (Ipswich/Southeast Queensland) guidelines. Management measures have been guided by:

- Ipswich City Council Standard Drawing ‘Gate: Natural Areas / Bushland Heavy Duty’ (Drawing No. SP. 102, Rev. A), and

- Rural Residential Accessway (Drawing No. SR. 41 Rev. A).

Performance criteria that ensure the site preparation is being managed successfully include the following measures:

- Only authorised personnel have access to and are able to modify the Offset Area.
- No intrusion of livestock or pests with the potential damage the Offset Area.

TABLE 16: ACCESS MANAGEMENT DETAILS, RESPONSIBLE PERSON, TIMING FREQUENCY AND MONITORING.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
Fencing					
1	The site boundary is identified and demarcated, and permanent fencing is erected along the perimeter of the site boundary. Permanent fencing is to: • Exclude domestic stock, • Have access gate/s and security (i.e., locked gates), • Prevent unauthorised access, • Be maintained in good condition, and, • Be fauna-friendly (i.e., allow for fauna movement from and into the site).	OM and/or Offset Proponent	At commencement	At all times	Annually
2	Complete regular inspections of the perimeter fencing to assess for damage or compromised integrity and amend fencing as required in response to identified issues.	OM and/or Offset Proponent	At commencement	At commencement of the offset, then review annually	
Access					

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
3	Access management is to be implemented as follows: • Gates are to be installed in accordance with Ipswich City Council Standard Drawing 'Gate: Natural Areas / Bushland Heavy Duty' (Drawing No. SP. 102, Rev. A). • Any access is to be designed and constructed in accordance with the Rural Residential Accessway (Drawing No. SR. 41 Rev. A)[18]. • Restrict access to all areas outside of the approved works areas. • Maintain stabilised access roads and tracks.	OM and/or Offset Proponent	At commencement	At commencement of the offset, then review annually	Annually
Signage					
4	Signs are securely erected in prominent locations (i.e., access points) and will: • Identify that the site is private property, • Identify that access into the site is restricted to authorized personnel only, • Be installed prior to the commencement of rehabilitation, and, • Be maintained in good, readable condition.	OM and/or Offset Proponent	At commencement	At commencement of the offset, then review annually	Annually
Vehicles					

[18] Standard access plans (City of Ipswich) implement best practice access suitable to the local area and acceptable by the local authority.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
5	The following specifications are mandatory for vehicle use on the Offset Area: • Vehicle access will be restricted to authorized vehicles only. • Vehicle movement will be limited to designated tracks and/or roads. • Speed limits of <30 km/h will be enforced on tracks and/or roads within the site through signage and vehicles will travel to tracks and/or road conditions.	OM and/or Offset Proponent	At all times	At all times	Annually
Examples of Contingencies and Corrective Actions					
Unauthorised site access occurs (i.e., recreational use of site)					
6	• Report and investigate as an incident. • Arrange for inspections of signs, site perimeter fencing, and access gate integrity. • Amend the point of entry. • Remediate any site or infrastructure damages.	OM and/or Offset Proponent	In response to incidents	As required.	As required.

10.4.2 WASTE

This section addresses management measures. Waste management addresses contaminated soil removal, waste removal and storage, toxic waste management, tracking, landfill and recycling, removal timeframe, waste burning and sanitary standards. The objective of waste management is to contribute to the achievement of the offset completion criteria targets by (Table 17):

- Avoiding, minimizing and managing waste during construction.
- No contamination of soils as a result of offset delivery activities.
- No adverse waste impacts to adjacent properties.

Waste measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, including industry and State guidelines. The OMP measures do not duplicate these measures, but rather, adopt or tailor them to site-specific risks and management needs. Management measures have been guided by:

- Environmental Protection (Waste Management) Regulation 2000, and
- Transport and Main Roads Specifications MRTS51 Environmental Management (Department of Transport and Main Roads 2023) (Section 8.13),
- Queensland Government guidance for Managing Contaminated Land (Queensland Government 2022).
- Environmental Protection Authority (EPA) (Contaminated Land Unit) under the *Environmental Protection Act 1994* (EP Act)

Performance criteria that ensure the site preparation is being managed successfully include the following measures:

- Waste management measures are being adhered to.
- No visible signs of waste on-site.

TABLE 17: WASTE MANAGEMENT DETAILS, RESPONSIBLE PERSON, TIMING, FREQUENCY AND MONITORING.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
General requirements					
1	Waste management should be undertaken in accordance with the Environmental Protection (Waste Management) Regulation 2000[19] and Transport and Main Roads Specifications MRTS51 Environmental Management (Department of Transport and Main Roads 2023) (Section 8.13), unless otherwise specified in this table.	Contractor and/or Offset Proponent	At all times	As required	Annually
Contaminated soil					
2	Contaminated soil management is to comply with the following at all times: • Avoid soil contamination by never storing hazardous chemicals or other hydrocarbons on Offset Area. All hazardous chemicals or other hydrocarbons shall be stored at a secure off-site location. • Potential issues are to be assessed by engaging a suitably qualified person and carry out investigations and actions according to Queensland Government guidance for Managing Contaminated Land (Queensland Government 2022).	Offset Manager and/or Offset Proponent	At all times	As required	As required

[19] The Environmental Protection (Waste Management) Regulation 2000 is useful for management because it provides clear guidelines and standards for handling waste, ensuring environmentally responsible practices and legal compliance.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• The removal of any contaminated soil from the site requires prior approval from the Environmental Protection Authority (EPA) (Contaminated Land Unit) under the *Environmental Protection Act 1994* (EP Act) under Section 424.				
On site waste management, removal and storage					
3	Waste removal and storage is to comply with the following at all times: • All waste should be placed in appropriate disposal containers and areas during construction. • All waste should be removed from site and disposed of appropriately. • Where possible ensure that waste onsite is appropriately covered. • Covered bins are provided to collect waste and prevent fauna being attracted to the work site. • Adequately sized refuse bins will be made available on-site and will have suitable lids to prevent access by animals. • An adequate number of an appropriate type of commercial and bulk waste containers shall be provided at a central location to accommodate all waste produced on the site. • All waste collected on the site to be removed not less than once per week. • Appropriate spill kits, personal protective equipment, operator instructions and emergency procedure guides for the	Contractor and/or Offset Proponent	At all times	As required	As required

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	management of wastes and chemicals must be in a place accessible to all employees. • Waste storage areas are to be signed and located away from environmentally sensitive areas.				
Toxic waste management					
12	All fuels and chemicals must be stored in an onsite containment system of a type suitable to prevent the spillage of the material and its discharge to the environment.	Contractor and/or Offset Proponent	At all times	As required	As required
Waste tracking					
13	All general and regulated waste records, including transfer station dockets and waste tracking certificates, are to be retained.	Contractor and/or Offset Proponent	At all times	As required	As required
Landfill and recycling					
14	Waste must be stored, pending its lawful disposal to landfill or to a recycling facility, or another place with the written approval of the administering authority, in a location at the authorised place where it is not visible to a person outside the authorised place.	Contractor and/or Offset Proponent	At all times	As required	As required
Removal timeframe					

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
15	Waste (other than wastewater or sludges in any evaporation pond) must be removed from the authorised place within the timeframe specified for the waste as follows: • If the waste is surplus from the construction of the development — within three (3) months after construction is completed, or, • Otherwise — within three (3) months of the waste being generated.	Contractor and/or Offset Proponent	Within three (3) months of construction or waste generation.	As required	As required
Waste burning					
16	Burning of waste is prohibited.	Contractor and/or Offset Proponent	At all times	As required	As required
Sanitary standards					
17	Construction site is to be kept in an orderly and hygienic standard, free of litter and waste.	Contractor and/or Offset Proponent	At all times	As required	As required
Examples of Contingencies and Corrective Actions					
Observation of incorrectly stored waste during work operations					
18	• Report and investigate as an incident. • Halt work within proximity of the area until waste is stored correctly. • Train relevant personnel in the correct waste management procedures.	Contractor and/or Offset Proponent	In response to incidents	As required	Annually
Complaint received					
19	• Complaint must be addressed within 24 hours if severe, or within one week for minor complaints.	OM and/or Offset Proponent	In response to incidents	As required	Annually

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	• Review procedures and adjust if required. • Retrain relevant personnel regarding procedures and controls.				

10.5 STOCHASTIC EVENTS

Stochastic events refers to measures for drought, floods, storms and bushfire. Stochastic events addresses the potential consequences droughts, floods, storms and bushfire can have on site integrity and habitat values. The objective of stochastic events is to contribute to the achievement of the offset completion criteria targets by (Table 18):

- Avoid and mitigate bushfire attack risks,
- Mitigate drought-related risks,
- Mitigate climate change risks, and
- Being suitably prepared to respond to the consequences of stochastic events.

Stochastic measures specified in this section are based on, and make use, established environmental management and ecological restoration best practice guidelines, including industry, local (Ipswich/Southeast Queensland) and State guidelines. The OMP measures do not duplicate these measures, but rather, adopt or tailor them to site-specific risks and management needs. Management measures have been guided by:

- The Queensland Herbarium,
- Clearing for Bushfire Management (The State of Queensland 2021)
- Climate Risk Management Guide - Technical Guidance (Commonwealth of Australia 2023).

Performance criteria that ensure the site preparation is being managed successfully include the following measures:

- Bushfire management is preventative and performed ahead the fire season (August – November).
- Bushfire management is responsive to site conditions, including vegetation structure, condition and age.
- Quick and effective responses to stochastic events are employed.

TABLE 18: STOCHASTIC EVENTS DETAILS, RESPONSIBLE PERSON, TIMING, FREQUENCY AND MONITORING.

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
Drought					
1	Where restoration / revegetation fails due to drought, steps must be taken to mitigate the impacts (e.g. replanting).	Contractor and/or Offset Proponent	In response to drought conditions	As required	Every three (3) months for first two (2) years, then annually.
2	Where informal monitoring indicates evidence of plant failure or poor growth, replacement planting is to be carried out.	Contractor and/or Offset Proponent	In response to drought conditions	Every three (3) months for first two (2) years, then annually.	
3	During the establishment period, water plants subject to prevailing weather conditions.	Contractor and/or Offset Proponent	In response to drought conditions	Water daily for first week (5 waterings). Water 3/week for weeks 2-4 (9 waterings). Water 2/week for weeks 5-8 (8 waterings).	
4	Where weed species recolonise the area first, follow the appropriate weed control mitigation measures.	Contractor and/or Offset Proponent	In response to drought conditions	Every three (3) months for first two (2) years, then annually.	
Storms					

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
5	To minimise the threat of storm damage (i.e. stochastic event), it is suggested that the initial planting be undertaken mid to late autumn so that they have the best likelihood of establishing before the summer storm months.	Contractor and/or Offset Proponent	During rehabilitation	As required	As required (in response to stochastic events)
6	Assess damage to vegetation after severe storm events. Where monitoring indicates evidence of plant failure or poor growth, replacement planting is to be carried out.	Contractor and/or Offset Proponent	In response to severe storms	As required	
Flood					
7	Temporary barriers / fencing should be placed around vegetation / habitat features that will be retained to minimise damage (where appropriate).	Contractor and/or Offset Proponent	At commencement	As required	As required (in response to stochastic events)
8	Develop and implement an appropriate flood management strategy for the management area based on topography, vegetation type, structure, age, and size.	Contractor and/or Offset Proponent	At commencement	As required	
9	Where restoration / revegetation fails due to flood, steps must be taken to mitigate the impacts (e.g. replanting, weed removal).	Contractor and/or Offset Proponent	In response to flood events	As required	
Bushfire					

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
10	Develop and implement an appropriate fire management strategy for the management area based on topography, vegetation type, structure, age, and size, including maintaining firebreaks relative to the management area, if appropriate.	Contractor and/or Offset Proponent	At commencement	As required	Annually
11	Construct a fire break around the Offset Area in accordance with Queensland government guidance for Clearing for Bushfire Management (The State of Queensland 2021).	Contractor and/or Offset Proponent	At commencement	Annual maintenance	
12	Monitor and maintain fire management in the area following guidelines outlined in Fire and Biodiversity Monitoring Manual published by South East Queensland Fire and Biodiversity Consortium 2002.	Contractor and/or Offset Proponent	At commencement	Annual maintenance	
13	Manage fuel loads and fire risk in accordance with the Queensland government fire management guidelines for RE 12.0-10.2 (Queensland Herbarium 2023).	Contractor and/or Offset Proponent	At commencement	Annual maintenance	
14	Rectify any areas of lost vegetation with supplementary planting after each fire event.	Contractor and/or Offset Proponent	In response to incidents	As required	
Climate Change					
15	Ensure climate risk is well understood in accordance with the Climate Risk Management Guide - Technical Guidance (Commonwealth of Australia 2023). Integrate an understanding of	OM and/or Offset Proponent	At commencement	As required	Annually

Management Actions					
Item No.	Management Details	Responsibility	Timing	Frequency	Monitoring / Auditing
	climate risk and opportunity management into Offset Area decision making. Ensure that climate projections and risk drivers are well understood and the responsive measures in place for stochastic events are sufficient to respond to current conditions and projected changes.				
Examples of Contingencies and Corrective Actions					
Storm / Drought / Flood / Bushfire					
16	• Halt work and investigate stochastic event as an incident. • Inspect and assess site for issues, i.e., intensification of erosion and/or damages to vegetation. • Implement remedial actions as a priority.	Contractor and/or Offset Proponent	After each stochastic event	As required	Reassess damages every three (3) months for two (2) years

11 MONITORING & REPORTING

This section outlines the monitoring and reporting requirements of the Offset Area. These activities ensure work conducted within the Offset Area is compliant with all federal legislative requirements and will ensure identification of all non-conformance issues. A significant risk can be the failure or ineffectiveness of the management measures. Monitoring needs to be an integral part of the risk treatment plan to give assurance that the measures remain effective.

Monitoring and reporting of the OMP is to be implemented by all site personnel and contractors and is to be administered by the Offset Manager or their agent, and the contractor(s) responsible for any works within the Offset Area or works outside of the Offset Area that may impact the habitat values of the Offset Area. In the case of non-conformance with any aspect of monitoring and reporting, the Offset Manager is to be notified immediately.

The following sections provide more information on:

- Monitoring requirements, and
- Reporting requirements.

11.1 MONITORING REQUIREMENTS

Monitoring shall be completed through two key monitoring methods. The first, including general monitoring, will monitor the success of management measures. The second will include habitat quality monitoring, including application of a BioCondition assessment, as well as the additional species-specific measures utilising the MHQAT, to determine the overall habitat quality score.

The following sections include further information on the monitoring approaches, including:

- Management monitoring, and
- Habitat quality monitoring.

11.1.1 MANAGEMENT MONITORING

This section contains guidance on the monitoring of the management measures required to achieve the interim targets and completion targets.

To ensure sufficient progress is being made, monitoring will be performed for each management task. The implementation of the monitoring will be the responsibility of the Offset Manager, or delegate, and will include:

- Coordinating sample collection and documentation,
- Coordination of sample and monitoring equipment,
- Ensuring monitoring frequency is in accordance with all approvals, permits, Australian Standards (AS), and any other industry standards,
- Data management and representation of results,
- Reporting non-conformance or incidents related to monitoring,
- Responsible parties for implementing any corrective actions related to non-conformance or incidents,
- Training of personnel in monitoring procedures, and,
- Arranging specialist consultants to conduct monitoring duties, as required.

All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this approval must be calibrated in the following way:

- If a statutory instrument or standard made under a law of the State prescribes standards for calibrating the equipment — in accordance with that statutory instrument or standard, or,
- Otherwise — according to any relevant AS applicable to the calibration of the equipment.

In addition to recording monitoring data, the following information will also be recorded:

- Name of recorder(s),
- Date and time of monitoring and/or sampling,
- Location of sampling, including general information such as nearest road, property name, descriptive information, as well as GPS coordinates, and,
- Photographs of monitoring location, as well as surrounding area.

The following table (Table 19) outlines the monitoring requirements for each of the management groups identified in Section 10.

TABLE 19: MANAGEMENT MONITORING REQUIREMENTS AND SCHEDULE.

Management Group / Sub-group	Monitoring Frequency	General Monitoring Requirements
Vegetation Management – Site Preparation	As per the management action requirements outlined in Section 10.	Annual photo-point monitoring, GPS locational and extent survey techniques, will be utilised for offset monitoring for general success of management and maintenance activities. The following monitoring procedures shall be included in the monitoring program for GPS photo point monitoring: • The coordinates of the photo monitoring points will be recorded using a handheld GPS to assist locating the monitoring points when undertaking subsequent monitoring, and permanently marked using star-pickets hammered into the ground. Photo-point monitoring is to occur annually at the same time of year at each monitoring site. • Record the time of year, weather conditions, and any other useful data that may assist monitoring and comparison of habitat management against previous years monitoring data. • For each photo-point image include photographic records, including: o GPS coordinates of the photo point, o Date, time and photo number, o Direction in which the photo was taken (north, east, south and west aspects) across the rehabilitation or regeneration site. • Monitoring data will be used to compare changes in habitat quality against previous monitoring results. • Monitoring data shall be used to create up to date mapping to assist ongoing offset management practices.
Vegetation Management – Planting and Establishment	As per the management action requirements outlined in Section 10.	
Vegetation Management – Direct Seeding	As per the management action requirements outlined in Section 10.	
Soil Environment Management	As per the management action requirements outlined in Section 10.	The presence of erosion, stormwater runoff, and siltation within the Offset Area will be monitored annually and will be undertaken at the same time of year as the initial erosion baseline survey to ensure consistency across annual erosion monitoring. The following erosion monitoring procedures shall be included in the erosion monitoring program: • The location(s) of erosion, siltation or sedimentation are to be mapped using GPS waypoint locations for areas of erosion within or at the boundaries of the Offset Area. Where large areas are found to be impacted by erosion, the use of GPS polygons or tracks shall be used to mark out the extent of the erosion. • Record the time of year, weather conditions, and any other useful data that may assist monitoring and comparison of erosion and siltation management against previous years monitoring data.

Management Group / Sub-group	Monitoring Frequency	General Monitoring Requirements
		• For each data entry (e.g., erosion or sedimentation location and/or notes) include photographic records, consisting of four photographs (in the order of north, east, south and west aspects) of the surrounding environment, and make notes of erosion extent and possible direction of erosion/water flow across the property. Also include a photograph of the soil/ground layer to provide information on soil/sediment type and condition. • Monitoring data will be used to compare changes in erosion management against previous monitoring results. • Monitoring data shall be used to create up to date mapping to assist ongoing erosion management practices.
Biosecurity Management	As per the management action requirements outlined in Section 10.	The presence of weeds within the Offset Area will be monitored and will be undertaken at the same time of year as the initial baseline survey to ensure consistency. The following weed monitoring procedures shall be included in the weed monitoring program: • The location(s) of WONS and Category Two or Three restricted invasive plants of Queensland are to be mapped using GPS waypoint locations for individual plants or clusters. Where a large weed infestation is present, the use of GPS polygons for the extent of the infestation shall be used. • The identification and general location of all other weeds, other than WONS and Category Two or Three restricted invasive plants of Queensland, shall be recorded and described. • Record the time of year, weather conditions, and any other useful data that may assist monitoring and comparison of weed management against previous monitoring results. • For each monitoring site, include photographic records, consisting of four photographs (in the order of north, east, south and west aspects) of the surrounding environment, and make notes of weed identification(s), density, and coverage. Also include a photograph of the soil/ground layer to provide information on soil type and condition. • Monitoring data will be used to compare changes in weed infestations and densities against previous monitoring results. • Monitoring data shall be used to create up to date mapping to assist ongoing weed management practices.

Management Group / Sub-group	Monitoring Frequency	General Monitoring Requirements
Anthropogenic - Access	As per the management action requirements outlined in Section 10.	• Inspections for the integrity of physical access restrictions to be completed, i.e., inspections of all perimeter fencing and signage. Otherwise, monitoring of access shall be conducted as part of general inspections and recorded if/when issues are observed.
Anthropogenic – Waste	As per the management action requirements outlined in Section 10.	• Monitoring of waste shall be conducted as part of general inspections and recorded if/when issues are observed.
Stochastic Events	As per the management action requirements outlined in Section 10.	• Monitoring of the effects of storms and floods will be conducted in response to the occurrence of the extreme weather event after which the impacts of the event, if requiring remediation, will require further regular monitoring. • Monitoring requirements for drought will be conducted in response to recorded drought conditions, to assess the health of vegetation and for evidence of drought stressors. • Monitoring requirements for fire management will include regular review of access tracks, fire breaks, fuel loads and outcomes of controlled ecological burns or other management techniques such as the use of livestock. Fire management monitoring will also include surveys of vegetation composition within the Offset Area will be conducted to ensure the habitat(s) is not negatively affected by fire regime.

11.1.2 HABITAT QUALITY MONITORING

Assessment of the habitat quality score in the Offset Area should be completed at set intervals to assess progress against time-based markers until the habitat quality uplift has been achieved. At each review of habitat quality, the progress toward the goal should be re-assessed such that efforts can be tailored, and adaptive management measures can be implemented to ensure the habitat quality uplift will be achieved prior to the conclusion of the currency period (20-year time window to deliver ecological benefit). Monitoring results will be used to determine if offset targets are being met.

Habitat quality monitoring will be completed within the Offset Area, coinciding with the anniversary of commencement of the offset to assess progress of the offset against the interim targets (Section 8.4). Habitat quality will be assessed by conducting MHQAT BioCondition transects to ensure progression towards completion criteria.

The Modified Habitat Quality Assessment Tool (MHQAT) is an assessment tool for assessing habitat quality for MNES that is an adaptation of the *BioCondition Assessment Manual: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual* (Eyre et al., 2015).

For the methodology of assessing habitat quality on the Offset Area, refer Section 14.3: Offset Assessment of the PD Report (Litoria Consulting, November 2024), which contains further information on:

- The MHQAT methodology,
- The *BioCondition Assessment Manual: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual* (Eyre et al., 2015), and
- Litoria's species-specific method for measuring GHFF habitat quality, found in Appendix 17 of the PD Report.

Habitat quality monitoring should be completed at the following intervals in accordance with interim targets and assess progression towards completion targets. If interim targets are not met, adaptive management measures must be implemented as per Section 12.

For the schedule of habitat quality monitoring, refer to Table 20.

TABLE 20: HABITAT QUALITY MONITORING SCHEDULE.

Habitat quality monitoring	Timing	Outcome of Monitoring & Follow-up Action	
		Interim Targets Achieved	Interim Targets Not Achieved
Baseline monitoring	Completed as part of the offset assessment.	N/A	N/A
Progress monitoring	Five (5) years after commencement		Implement an adaptive management approach

Habitat quality monitoring	Timing	Outcome of Monitoring & Follow-up Action	
		Interim Targets Achieved	Interim Targets Not Achieved
Progress monitoring	Ten (10) years after commencement	Continue management actions and monitoring as per OMP.	(Section 12) that responds to the specific issues identified. Complete a follow-up habitat quality assessment after two (2) years to assess the effectiveness of intervention.
Progress monitoring	Fifteen (15) years after commencement		

11.2 REPORTING REQUIREMENTS

The Offset Manager is responsible for maintaining accurate records and substantiating all activities associated with, or relevant to, the conditions of approval.

No later than 60 days after the conclusion of every five (5) year period after the commencement of the offset until the completion criteria have been achieved, a report shall be prepared and submitted to the Commonwealth Government which includes details of the following:

- Progress reporting,
- Reporting of non-conformance issues,
- Incident reporting,
- Complaint reporting, and,
- Reporting of any necessary corrective actions.

The following sections outline the requirements of the various reporting.

11.2.1 PROGRESS REPORTING

The Offset Manager is responsible for preparing Progress Reports no later than 60 days after the conclusion of every year stipulated for interim target assessment (Table 3). The Progress Report will address:

- General management monitoring per Section 11.1.1, and,
- Habitat quality monitoring per Section 11.1.2.

Progress Reports must include as a minimum:

- Details of management actions undertaken,
- Results of management monitoring,

- Results of habitat quality monitoring,
- Assessment against interim targets and/or completion criteria (as relevant), and,
- Details of any adaptive management measures.

11.2.2 NON-CONFORMANCE PROCEDURE

Non-conformance with the OMP will be immediately reported to the Offset Manager for remedial action. Actions taken shall reflect the magnitude of environmental impact.

For minor non-conformance incidents, the Offset Manager shall specify appropriate remedial actions. An example of a minor incident is the inadequate maintenance of erosion control structures.

For major non-conformance:

- Works will immediately cease,
- The applicable authority will be notified of extent of non-conformance, and,
- Remedial actions to be carried out in consultation with relevant officers and Offset Manager as necessary.

An example of major non-conformance is the unapproved removal of vegetation within the Offset Area.

If, at any time, monitoring identifies that there has been a decrease in the extent or habitat quality of baseline condition within the Offset Area, the approval holder must report to the Department in writing within 20 business days of becoming aware. The report must state the cause, the response measures (including timeframes for reporting the success of those measures to the Department) and the actions to prevent further occurrences. Additionally, the Offset Manager, or delegate, must report any potential or actual contravention of the conditions to the Commonwealth Government in writing within 5 business days of the approval holder becoming aware of the potential or actual contravention.

11.2.3 INCIDENT REPORTING

Ongoing monitoring includes the assessment of incidents and hazards identified by site personnel. It is the responsibility of all personnel to report any incidents to the Offset Manager. An environmental incident is any unplanned action detrimental to the environment.

All environmental incidents must be recorded using an Incident Reporting Form along with any corrective and preventative actions taken to address the environmental incident. The details of the incident are to be recorded by the Offset Manager, or delegate, in a Corrective Actions Register.

As reports are submitted, it is the Offset Manager's role to ensure that the forms are completed, and management measures are initiated or updated accordingly to reflect the

information provided. The OMP is to be updated to reflect any changes or additions to management measures.

If the incident results in a severe impact on MNES, the Offset Manager, or delegate, is to provide an incident investigation report to the Commonwealth Government within one (1) week of being notified of the incident. Examples of a severe incident include impacts on a species or community listed as an MNES, for example fauna injury or mortality, or unapproved clearing of critical fauna habitat.

11.2.4 COMPLAINT REPORTING

The Offset Manager will maintain a register of complaints. Complaints relating to environmental aspects will be treated as environmental incidents in terms of investigation and will include a record of any action taken with respect to the complaint.

The person undertaking the activity to which this approval relates must record the following information for each complaint received about the activity:

- Time, date, name and contact details of the complainant,
- Reasons for the complaint,
- Any investigations undertaken by the person undertaking the activity to which this approval relates,
- Conclusions formed by the person undertaking the activity to which this approval relates following the investigation, and,
- Any actions taken by the person undertaking the activity to which this approval relates to resolve the complaint(s).

11.2.5 CORRECTIVE ACTIONS

All corrective actions identified for incidents, complaints and non-conformance audit results are to be recorded in a Corrective Actions Register, administered by the Offset Manager. The register will be monitored weekly by the Offset Manager to ensure that corrective actions listed in the register are completed.

The register is to include the following details:

- Date and location of incident / complaint / non-conformance,
- Details of incident / complaint / non-conformance,
- Actions taken to control the incident / complaint / non-conformance and prevent any future occurrence,
- Date by which the corrective action will be completed (unless ongoing), and,
- Appropriate sign-off, indicating that the incident / complaint / non-conformance was investigated and followed up appropriately.

12 ADAPTIVE MANAGEMENT & PLAN REVIEW

The offset management actions respond not only to existing threatening processes and risks but have also been designed to change over time due to a range of factors both internal and external to the offset site, including climate and weather factors, changing condition of vegetation on site and the reduction of threatening processes over time. Further, it is anticipated that new techniques and management practices may become available over the life of the offset.

The offset shall be managed via a best-practice adaptive environmental management (AEM) approach. The AEM approach not only helps to manage project delivery risk, but also allows for improved techniques and resources to be incorporated into the offset management regime. Adaptive management allows for monitoring of the offset and for best practice environmental management to be implemented as technologies develop over time.

The AEM approach is compatible with, and complementary to, project risk mitigation and management described in AS ISO 31000:2018 Risk management – Guidelines (Standards Australia 2018). The AEM process is shown in Figure 44.

The OMP will be reviewed by the project manager as required if any additional activities are to be carried out. Each review period will investigate:

- Potential gaps between the OMP management measures and on-site construction activities,
- Assessment of any incidents or near misses that occurred since the previous review, and,
- Employee and workplace compliance.

Ongoing audit and review of the OMP ensures that risk identification and management measures are constantly assessed, ensuring the efficiency and effectiveness of the OMP.

Adaptive management will be used to incorporate changes in any of the following areas:

- Incorporation of information or advice related to the OMP,
- Updates to conservation advice or new threat abatement plans relevant to the GHFF,
- New techniques to monitor vegetation and habitat quality, GHFF presence/absence and abundance, or weed presence etc.,
- To update management actions where performance criteria are not being met,
- To manage unforeseen disruptions to monitoring and works scheduling such as inclement weather disruptions, and,

- To refresh the mitigation measures should new threats be identified, or severe weather events such as unplanned fires or floods occur.

Any updates to the OMP that do not result in changes to environmental outcomes or performance criteria can be made without informing DCCEEW. If updates to the OMP do result in changes to environmental outcomes or performance criteria, the amendments and justification for the changes must be provided to DCCEEW.

The revised OMP must be published on the approval holder's website at least 10 business days before being implemented and must remain on the approval holder's website until the end date of the project. Any changes to the OMP as a result of the audit and review process must also be published.

FIGURE 44: ADAPTIVE MANAGEMENT PROCESS (CSIRO).

13 REFERENCES

Australian Government (2022). National Flying-fox monitoring viewer. Department of Agriculture Water and the Environment.

Commonwealth of Australia (2023). "Climate Risk Management Guide - Technical Guidance."

CSIRO. "Marine and Atmospheric Research." from http://www.cmar.csiro.au/research/mse/.

Department of Agriculture Water and the Environment (2021). National Recovery Plan for the Grey-headed Flying-fox 'Pteropus poliocephalus'

Department of Environment and Science (2018). Queensland Environmental Offsets Policy v1.6. Brisbane, State of Queensland,.

Department of Sustainability Environment Water Population and Communities (2012). Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy.

Department of the Environment (2013). EPBC Act Policy Statement 1.1: Significant Impact Guidelines. Department of the Environment. Canberra, Commonwealth Government.

Department of the Environment (2013). Matters of National Environmental Significance: Significant Impact Guidelines 1.1. Canberra, Commonwealth of Australia.

Department of Transport and Main Roads (2017). Technical Specification: Transport and Main Roads Specifications MRTS16 Landscape and Revegetation Works. Department of Transport and Main Roads. Queensland, State of Queensland,.

Department of Transport and Main Roads (2023). Technical Specification: Transport and Main Roads Specifications MRTS51 Environmental Management. Department of Transport and Main Roads, State of Queensland,.

Eby, P. L., Bradley; (2008). Ranking the feeding habitats of Grey-headed flying foxes for conservation management. The Department of Environment and Climate Change (NSW).

Geological Survey of Queensland (2011). Digital Geoscience Vector Data. Queensland Geological Mapping (polygonised vector) Digital Data - Detailed and Regional Dec 2011 DVD. Brisbane, Queensland, Geological Survey of Queensland.

Ipswich City Council (2006). Ipswich Planning Scheme, Ipswich City Council.

Nearmap. (2023). "Nearmap PhotoMaps." from https://www.nearmap.com/au/en.

Queensland Government. (2022). "Managing Contaminated Land." from https://www.qld.gov.au/environment/management/environmental/contaminated-land/assessing.

Queensland Herbarium (2023). Regional Ecosystem Fire Guidelines (May 2023) Queensland Department of Environment, Science and Innovation: Brisbane.

Standards Australia (2018). "ISO 31000:2018 Risk management – Guidelines ".

State of Queensland (2019). "Queensland invasive plants and animals strategy 2019–2024."

State of Queensland (2023). "Accepted development vegetation clearing code - Managing Weeds ".

State of Queensland (2023). "Regrowth vegetation code—On freehold and Indigenous land and leasehold land for agriculture and grazing—version 1 - Managing regulated regrowth vegetation ".

The State of Queensland. (2021). "Clearing for Bushfire Management." from https://www.qld.gov.au/environment/land/management/vegetation/clearing-guides/fire.