APPENDIX 6: MHQAT METHODS – GREY-HEADED FLYING-FOX

1 GREY-HEADED FLYING-FOX MODIFIED HABITAT QUALITY ASSESSMENT TOOL METHODOLOGY

1.1 INTRODUCTION

The following document outlines species-specific Modified Habitat Quality Assessment Tool (MHQAT) methods for assessment of habitat quality for the Grey-Headed Flying-fox at impact and offset sites for EPBC referral 2022/09397. This assessment has been conducted following the *Guide to Determining Terrestrial Habitat Quality* (State of Queensland 2017).

Habitat quality is determined based on an assessment of the following attributes:

Site condition + Site context + Species stocking rate = Habitat quality score

The default MHQAT spreadsheet is generalised so it may be applied to a number of species. The Department of Climate Change, Energy, Environment and Water (DCCEEW) require that modifications are made to the MHQAT to suit the unique species characteristics, which are listed in the EPBC Administrative Guidelines on Significance, the National Recovery Plan (NRP) and the Species Profile and Threats Database (Department of the Environment and Heritage 2003; Department of Climate Change Energy the Environment and Water 2022).

This methodology has been adopted and tailored / modified to assess the habitat quality score for the Grey-headed Flying-fox at the impact site and offset site. The method is derived from the *Guide to Determining Terrestrial Habitat Quality* (State of Queensland 2017), which provides the base methodology for the Guide to determining terrestrial habitat quality.

The MHQAT methods have been previously modified as part of the Preliminary Documentation process by Saunders Havill Group to complete impact site habitat quality assessments and to prepare offset strategy documents.

In preparing the Offset Management Plan, targeted modifications to the methods employed by Saunders Havill Group have been applied where necessary to ensure applicability to the species and site context.

Wherever changes have been made to the method, these have been made explicit in the text of the MHQAT method in this document and otherwise methods are consistent with the work of Saunders Havill Group. For each measure removed, changed or for which an

indicator has been chosen, justification has been provided. Changes and justifications have been made by previous consultants (Saunder's Havill Group) and modifications have only been made if necessary for continuity and simplicity. This document consolidated the Saunders Havill Group methods for clarity and increases exposition to provide a single reference material. The full methodology has been combined in this document for the sake of ensuring that all methods are contained succinctly and clearly in one document for future use.

1.2 MHQAT OVERVIEW

The following section outlines the modifications of the base MHQAT method that have been made for the Grey-headed Flying-fox.

MHQAT modifications must be based on species characteristics. Species information has been drawn from the EPBC Administrative Guidelines on Significance, the National Recovery Plan (NRP) and the Species Profile and Threats Database. In summary, modifications have been made on the basis of the following species characteristics:

- The Grey-headed Flying-fox is considered one population due to high genetic exchange and mobility across a unified range,
- The species is exclusively aerial and arboreal,
- Mobility and population dynamics are not influenced by terrestrial factors such as dispersal barriers and fragmentation,
- The Grey-headed Flying-fox rests, socialises and bears young in roosts (or camps) and only leaves for foraging activity,
- Increasing the availability of winter foraging resources is crucial to species recovery objectives, and
- The species can travel very large distances in a single day to forage and return to roost (average of 10-50km, however distances of up 150 km have been recorded).

The site was assessed as per the *Guide to Determining Terrestrial Habitat Quality* (State of Queensland 2017). In accordance with the guideline, Assessment Units (AUs) within the site were determined. Notably, the number of AUs were reduced[1] from three (3) to two (2) AUs following a field investigation completed by two (2) tertiary qualified ecologists in November 2025. The purpose of the change was to align the observed habitat types, being:

1. Regrowth vegetation (foraging value), and
2. Pasture with scattered trees or shrubs (limited value).

The reason for the modification was to separate the vegetation on the basis of present value for the species. The vegetated areas offer some regrowth foraging value, and cleared areas offer limited value. It was considered unnecessary to further segment the

[1] Compared to the previously submitted draft Offset Management Plan prepared by Terrestria.

regrowth vegetation, which provided the same habitat value. As such, they were consolidated to simplify management and represent the two types of habitats available.

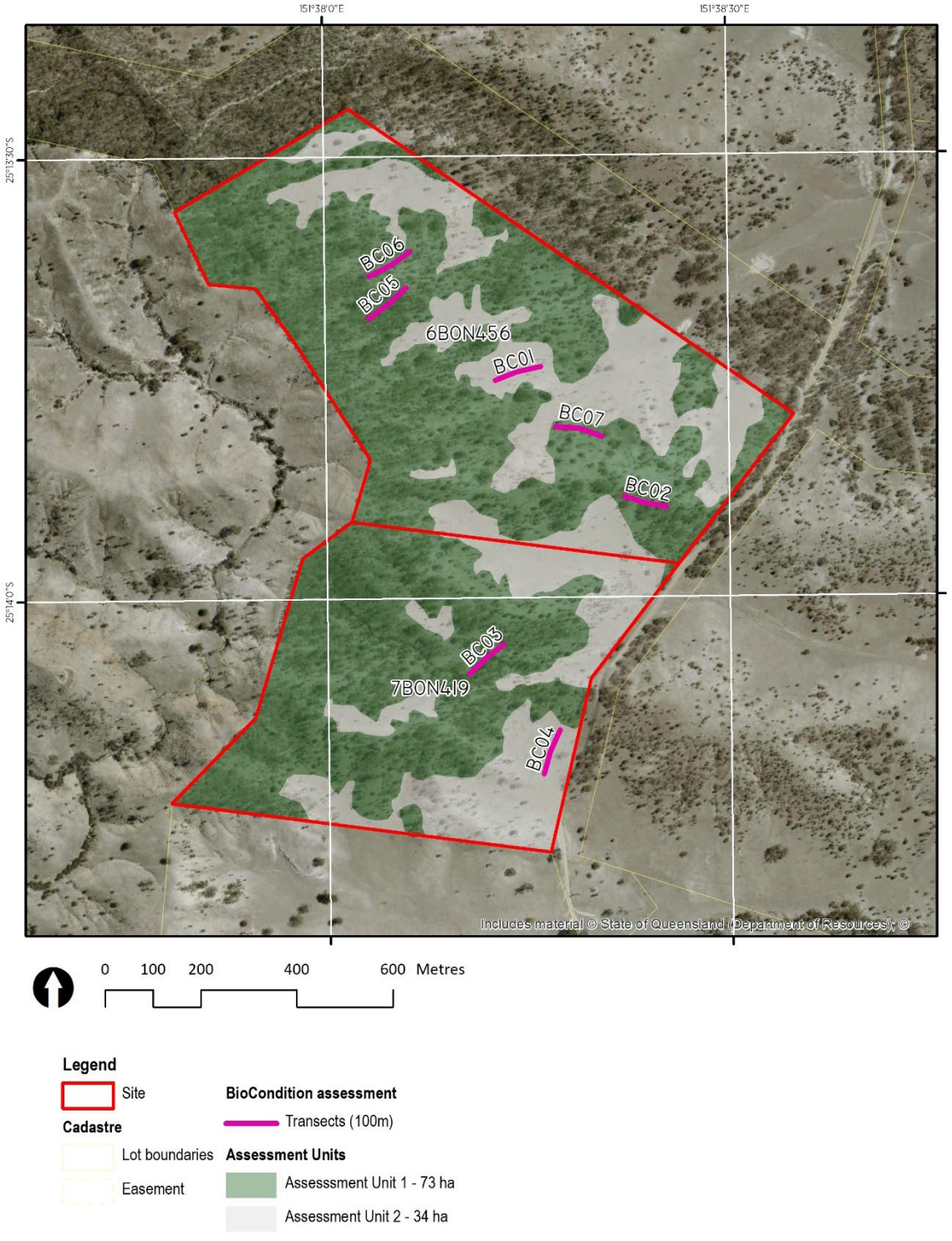

FIGURE 1: ASSESSMENT UNITS WITHIN THE OFFSET SITE.

1.3 OVERALL WEIGHTINGS

This section outlines the weightings of the three components of the MHQAT. The purpose, default weighting, proposed weighting, and justification for each is provided in Table 1.

TABLE 1: MHQAT CATEGORY DESCRITPTIONS, DEFAULT WEIGHTINGS AND PROPOSED WEIGHTINGS, AND JUSTIFICATION FOR PROPOSED WEIGHTINGS.

Category	Description	Default Weighting	Proposed Weighting	Justification
Site Condition	Site condition measures the characteristics of the vegetation community compared to an undisturbed community of the same type (State of Queensland 2017).	**3/10**	**4/10**	Site Condition importance is increased. This is because the impacted habitat is foraging habitat and the species is almost exclusively a flighted, arboreal feeder with high mobility. As a result, context, and stocking rate, is less important to this species than the quality of feeding habitat, which is captured by site condition.
Site Context	The surrounding landscape and adjacent land uses can directly influence the quality and security of habitat through edge effects, environmental buffering, or threatening processes.	**3/10**	**3/10**	Site Context scores have been maintained. Connected feeding habitat that is less likely to be subject to land clearing or habitat degradation is desirable. Site context has been modified to consider the proximity of roosting populations as sources for foraging dispersal to the site.
Species Stocking Rate	A suitable offset must demonstrate that the species occurs in the area, and the site can support the reproduction and continued existence of species. Species stocking rate measures the capacity of a site to support a species.	**4/10**	**3/10**	Species Stocking Rate scores have been decreased. This is because this offset is for foraging habitat, and species stocking rate is less relevant for habitats to be used for foraging purposes only. Site Condition is considered preferable to be weighted higher in this instance.

The following sections of the report provide further justification on the measures of habitat quality that comprise the above categories.

1.4 SITE CONDITION

Site condition is assessed using a suite of attributes to describe the structure and function of the vegetation community and is benchmarked against the expected range for a relatively undisturbed community. The MHQAT methodology for Site Condition traditionally incorporates:

- From the *Guide to Determining Terrestrial Habitat Quality* (State of Queensland 2017), a BioCondition assessment is applied (Qld), and
- Species-specific measures of the MHQAT (Cth), including:

- The quality and availability of food and foraging habitat, and
- The quality and availability of shelter.

For the Grey-headed Flying-fox, the Preliminary Documentation by Saunders Havill Group (February 2024) overhauls site condition into a series of measures that focus specifically on the quality of the canopy as a foraging resource for the species. To maintain the consistency of assessment, measures and scores have not been modified from the Saunders Havill Group method in the Preliminary Documentation.

Modifications have been made to improve the focus on foraging trees and canopy composition and minimise focus on shrub and understory measures with minimal habitat relevance for the target MNES. Non-native plant cover may influence tree recruitment and has also been included. The weightings and chosen measures have been summarised in Table 2 below.

TABLE 2: SITE CONDITION PROPOSED MEASURES FOR THE GHFF AS COMPARED TO THE DEFAULT MEASURES.

Default			Proposed	
Measure	**Max. Score**		**Measure**	**Max. Score**
BioCondition				
Recruitment of woody perennial species in EDL	5	80	N/A	N/A
Native plant species richness – trees	5			
Native plant species richness – shrubs	5			
Native plant species richness – grasses	5			
Native plant species richness – forbs	5			
Tree canopy height (average of emergent, canopy, sub-canopy)	5			
Tree canopy cover (average of emergent, canopy, sub-canopy)	5			
Shrub canopy cover	5			
Native grass cover	5			
Organic litter	5			
Large trees (Eucalypt plus Non-eucalypt)	15			
Coarse woody debris	5			
Non-native plant cover	10			
Species specific site condition attributes				
Quality and availability of food and foraging habitat	10		Vegetation Management Status	20
			GHFF Tree Species Richness	20
			GHFF Tree Flower Score	10
			Timing of Biological Shortages	10
			Quality of Foraging Habitat	20
			Non-native Plant Cover	20
Quality and availability of shelter	10		N/A	N/A
Total				

Default		Proposed	
Measure	Max. Score	Measure	Max. Score
Total score	100	Total score	100

The scoring method for each measure is provided in the following sections.

1.4.1 VEGETATION MANAGEMENT STATUS

In accordance with the methodology in the Preliminary Documentation (Saunders Havill Group, February 2024), habitat has been assessed on the basis on its maturity with reference to standardised Queensland methodologies. Vegetation management categories B, C and X are defined under the *Queensland Vegetation Management Act 1999* and associated statutory instruments. The categories are determined using field based structural thresholds that assess vegetation height, canopy cover and ecosystem form relative to benchmark conditions, and are supported by technical guidance from the Queensland Herbarium. While the categories have a statutory origin, they reflect ecologically meaningful vegetation condition states rather than being purely administrative classifications:

- **Category B** represents remnant vegetation and corresponds ecologically to mature native vegetation that retains the structural, floristic and functional characteristics of a Regional Ecosystem[2] (RE), including benchmark canopy height and cover, multiple vegetation strata and largely intact ecological processes. Category B vegetation is defined as areas that meet 70% of the expected height and 50% of the expected cover for the RE type in an undisturbed state.
- **Category C** represents high value regrowth and corresponds to structurally advanced regrowth vegetation that has re-established native canopy species and increasing ecological function but has not yet reached full remnant maturity, particularly in relation to large tree development and structural complexity. Category C vegetation is vegetation that meets a defined minimum canopy cover related to the structure of the RE (open woodland, woodland, etc.) when comprised of species consistent with the RE.
- **Category X** represents non-remnant vegetation and corresponds to cleared, heavily modified or early-stage regrowth vegetation that does not meet the minimum structural thresholds for Category C areas and therefore reflects low vegetation maturity and limited habitat function relative to benchmark conditions.

The use of these categories is considered appropriate because they are standardised, widely applied across Queensland, and provide a defensible proxy for vegetation maturity. The scoring should be independent of mapped vegetation status and based on the actual height, cover and structure of vegetation observed on the ground, as measured in accordance with the BioCondition assessment, and assessed in accordance with guides

[2] A specific vegetation community consistently linked to a unique combination of geology, landform, and soil within a larger bioregion, forming a distinct ecological unit for biodiversity management, described by a code (e.g., 12.3.1) representing Bioregion, Land Zone, and Vegetation type.

such as the *PMAV Application Guide* (Department of Resources 2021) and the *Guide to Determining Category C Areas* (Department of Natural Resources Mines and Energy 2019).

TABLE 3: VEGETATION CONDITION SCORING TABLE.

Vegetation Condition	
Thresholds	Score
Category X / non-remnant	5
Category C / regrowth	10
Category B / remnant	20

1.4.2 FOOD TREE SPECIES RICHNESS

This condition characteristic is measured in accordance with the methodology in the Preliminary Documentation (Saunders Havill Group, February 2024), the species richness of Grey-headed Flying-fox food trees in the canopy has been utilised in the Site Condition assessment. Canopy and subcanopy species richness is assessed within a 100 m by 20 m plot aligned with BioCondition transect. Within each plot, all observed Grey-headed Flying-fox food tree species are recorded. Food trees have been defined as:

- Species listed in the National Recovery Plan (Department of Agriculture Water and the Environment 2021), and,
- Species listed in peer reviewed literature on Grey-headed Flying-fox habitat, namely the key resource *Ranking the feeding habitats of Grey-headed flying foxes for conservation management* (Eby 2008).

Grey-headed Flying-fox rely on landscape scale diversity and temporal variability in flowering and fruiting such that resources are likely to be provided year-round. Species richness in the canopy and subcanopy therefore indicates the provision of many feeding options to increase chance of feeding opportunities, as well as increased habitat resilience, reliability and seasonal continuity of foraging habitat. Vegetation communities with higher native tree richness are more likely to provide staggered flowering and fruiting events, buffer against seasonal shortages, and support long term foraging function under variable climatic conditions.

TABLE 4: FOOD TREE SPECIES RICHNESS SCORING TABLE.

Food Tree Richness	
Thresholds	Score
0 GHFF foraging species	0
1 – 3 GHFF foraging species	5
4 – 6 GHFF foraging species	10
>6 GHFF foraging species	20

1.4.3 FLOWER SCORES (AVERAGE)

This condition characteristic is assessed in accordance with the Saunders Havill Group Preliminary Documentation (February 2024). It utilises flower scores as defined in the key peer reviewed paper on habitat *Ranking the feeding habitats of Grey-headed flying foxes for conservation management* (Eby 2008). In the paper, a number of commonly occurring foraging species have been assigned a 'flower score' reflecting its productivity and reliability as a nectar resource. Tree productivity represents the volume of nectar provided by the tree, and reliability indicates the seasonal availability of the tree, where it is valued higher on the basis of nectar availability during critical food shortages (i.e., during winter).

The flower score for each food tree species recorded in the plot is averaged to provide a flower score for the transect. To provide a benchmark, Saunders Havill Group translated the possible continuous score (between 0 and 1) into discrete classes of equal breaks.

Where trees are known to be significant food trees, but do not have a weighted flower score in accordance with the paper by Eby (2008) (for example, *Eucalyptus crebra*) they have been assigned a flower score that is the average of all trees assessed in the paper.

TABLE 5: GHFF FLOWER SCORES SCORING TABLE.

Flower Scores	
Thresholds	Score
Average flower score 0.01–0.25	2
Average flower score 0.26–0.50	5
Average flower score 0.51–0.75	8
Average flower score 0.76–1.00	10

1.4.4 TIMING OF BIOLOGICAL SHORTAGES

This condition characteristic is assessed similarly to the Saunders Havill Group Preliminary Documentation (February 2024). This category evaluates the capacity of the canopy species assemblage to provide reliable foraging resources for the species throughout the year and during periods of scarcity (i.e., in winter). Food tree species in the transect are assessed against the seasonality information provided in the key paper *Ranking the feeding habitat of Grey-headed Flying-foxes for conservation management* (Eby 2008).

In contrast to the method by Saunders Havill Group, categories for fruit industries, and for migration paths, which are both annual categories, have been removed. This is because fruit industries come with additional risks of entanglement and potentially illegal culling of individuals when they interfere with crops. This ensures the offset gains are focused on critical winter shortages and on periods of conception, pregnancy and lactation. The assessment places greater weight on foraging during winter bottlenecks, which is a pertinent risk to the species. This category is specifically focused on the potential for annual availability of resources rather than food tree species richness.

For each food tree species observed in the transect, the annual availability of the species is assessed in accordance with the paper by Eby (2008). If the flowering window is not

published in Eby (2008) but the tree is a known food tree, the flowering window should be researched through other reputable resources. If the window is matched by the flowering window of the present food tree, the score for the biological shortage is obtained. For example, if a transect has species present that flower across each biological shortage, a maximum score is obtained. If the transect has multiple trees, but they only flower during one shortage period, the transect would only obtain the score for that period (i.e., scores for trees are not summed).

TABLE 6: BIOLOGICAL SHORTAGES SCORING AND THRESHOLDING TABLE.

Biological Shortages													
Critical window	Score	Months											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Winter	4												
Pregnancy	2												
Lactation	2												
Conception	2												
TOTAL	10												
Example Grey-Headed Flying Fox tree species scores (in isolation) at the Offset Site													
Corymbia tessellaris	2												
Corymbia citriodora	8												
Eucalyptus crebra[3]	10												

1.4.5 QUALITY OF FORAGING HABITAT

This condition characteristic is assessed in accordance with the Saunders Havill Group Preliminary Documentation (February 2024). It evaluates the number of food trees that are considered *significant* food trees in accordance with:

- Species listed in the National Recovery Plan (Department of Agriculture Water and the Environment 2021),
- Species identified as significant food trees in *Ranking the feeding habitats of Grey-headed flying foxes for conservation management* (Eby 2008), where significant trees are those with a weighted flower score >0.65.

The number of significant food trees that were recorded during the food tree species richness assessment in the 20 x 100m has been assigned a score between 0 and 20, up to a maximum score for 6 food trees. This number provides for a reasonable number of food

[3] Referenced from Eucalyptus crebra (https://apps.lucidcentral.org/euclid/text/entities/eucalyptus_crebra.htm#Flowering%20Time)

trees to be present within the constraints of the RE benchmarks which provide for a benchmark of 6-9 canopy species richness between impact and offset sites.

TABLE 7: SIGNIFICANT FOOD TREES SCORING TABLE.

Significant Food Trees	
Thresholds	Score
0 significant GHFF foraging tree species	0
1 – 3 significant GHFF foraging tree species	5
4 – 6 significant GHFF foraging tree species	10
> 6 significant GHFF foraging tree species	20

1.4.6 NON-NATIVE PLANT COVER

This condition characteristic is assessed in accordance with the Saunders Havill Group Preliminary Documentation (February 2024). A 100 m X 20 m plot is used to assess non-native plant cover by estimating the cover of exotic species over the area in accordance with the non-native plant cover estimates in the *Guide to Determining Terrestrial Habitat Quality* (Version 1.2 April 2017).

Non-native plant cover may suppress the recruitment of foraging trees important to Grey-headed Flying-fox habitat and contribute to degradation of habitat and signal the presence of threatening processes such as disturbance and edge effects.

TABLE 8: NON-NATIVE PLANT COVER SCORING.

Non-Native Plant Cover	
Thresholds	Score
> 50 % non-native plant cover	1
25 – 50 % non-native plant cover	5
5 – 25 % non-native plant cover	10
< 5 % non-native plant cover	20

1.5 SITE CONTEXT

Site context refers to the configuration and location of the habitat and whether the characteristic of the surrounding landscape places the habitat in a favourable or unfavourable context.

Site context is assessed using the following default measures:

- From the *Guide to Determining Terrestrial Habitat Quality:*
  - *size of patch*,
  - *connectedness*,
  - *context*,
  - *ecological corridors*, and,

    - *role of site location to species overall population in the state.*
- Species-specific measures introduced by the MHQAT:
    - *threats to the species*, and,
    - *species mobility capacity.*

The default methodology from the *Guide to Determining Terrestrial Habitat Quality* has not been applied to the related Site Context measures (with the exception of 'size of patch') as the GHFF is a flighted and highly mobile species that is not effected by terrestrial barriers to movement in the same way other ground-dwelling species area. Though the measures have been labelled with the same names, the methods of measuring them have been modified to suit the species.

Species-specific habitat attributes including threats and mobility do not have a 'default' measure as they are not part of the *Guide to Determining Terrestrial Habitat Quality* and are additions of the federal EPBC Act offsets process. They are 'species specific' because threats and mobility capacity vary between species. Species specific habitat attributes must be selected by the consultant and suited to the target species.

The methods and overall weightings of each measure in the Saunders Havill Preliminary Documentation have been based on species ecology, and have not been modified by Litoria to maintain consistency (Table 9). The site context assessment focuses on a much wider landscape context including the presence of roosts in accordance with the following characteristics of the GHFF:

- The species is exclusively aerial and arboreal, and mobility and population dynamics are not influenced by terrestrial factors such as dispersal barriers and fragmentation,
- The Grey-headed Flying-fox rests, socialises and bears young in roost (or camps) and only leaves for foraging activity,
- The species can travel very large distances in a single day to forage and return to roost (average of 10-50km, however distances of up 150 km have been recorded).

TABLE 9: SITE CONTEXT DEFAULT AND PROPOSED MEASURES.

Default		Proposed	
Measure	**Score**	**Measure**	**Score**
Size of patch	10	Size of patch	10
Connectedness	5	Connectedness	10
Context	5	Context	10
Ecological corridors	6	Ecological corridors	10
Role of site location to species overall population in the state	5	Role of site location to species overall population in the state	10
Threats to the species	15	Threats to the species	10
Species mobility capacity	10	*Removed*	N/A
Total score	**56**	**Total score**	**60**
Overall weighting	**3/10**	**Overall weighting**	**3/10**

The scoring method for each measure is provided in the following sections.

1.5.1 SIZE OF PATCH

Patch size is the area of vegetation being assessed, including any directly connecting remnant vegetation. Size of patch can influence the quality of habitat through edge effects, habitat security, carrying capacity, and proximity of anthropogenic disturbance (such as vehicles, light and noise).

Patch size is important for the Grey-headed Flying-fox because larger habitat patches are more likely to support sufficient food trees, reduce edge effects and disturbance, and sustain viable populations. Larger patches provide more variety of foraging opportunity and increase likelihood of flowering canopies within an area.

The method for measuring size of patch has not been altered from the method in the *Guide to Determining Terrestrial Habitat Quality* (Version 1.2 April 2017) (State of Queensland 2017).

TABLE 10: SIZE OF PATCH SCORING TABLE.

Size of Patch	
Thresholds	Score
<5 ha	0
5-25 ha	2
26-100 ha	5
101-200 ha	7
>200 ha	10

1.5.2 CONNECTEDNESS

Connectedness relates to the capacity for species to disperse through the landscape between suitable patches of habitat as described in the Guide to Determining Terrestrial Habitat Quality (State of Queensland 2017).

The method has been altered to reflect the number of roosts within the lower average foraging radius of the site (20km). As the species is exclusively flighted and arboreal, and travels to feed over a large radius from roosts, this assessment determines how many source populations fall within the lower average, presumably comfortable-foraging radius for feeding.

TABLE 11: DESCRIPTION AND SCORES FOR CONNECTIVITY IN THE LANDSCAPE.

Connectedness	
Thresholds	Score
< 1 active Grey-headed Flying-fox camp within a 20 km radius	0
1 – 3 active Grey-headed Flying-fox camp within a 20 km radius	3
4 – 6 active Grey-headed Flying-fox camp within a 20 km radius	6
> 6 active Grey-headed Flying-fox camp within a 20 km radius	10

1.5.3 CONTEXT

Context relates to the composition of landscapes surrounding the proposed site. Site context describes the broader landscape setting of a site, including its connectivity to surrounding habitat, degree of fragmentation, and exposure to adjacent land uses and disturbances.

Connectivity and landscape integrity influence movement between feeding and breeding areas, gene flow, and the species' ability to avoid threats such as roads, urban areas, and habitat isolation. In this instance, the assessment determines how much of the landscape provides resources for the species.

In accordance with the Saunders Havill Group Preliminary Documentation (February 2024), the method for measuring context has been altered from the method in the *Guide to Determining Terrestrial Habitat Quality* (Version 1.2 April 2017) (State of Queensland 2017).

TABLE 12: SITE CONTEXT SCORING THRESHOLDS.

Context	
Thresholds	Score
10 % Grey-headed Flying-fox foraging habitat within a 20 km radius	0
10 – 30 % Grey-headed Flying-fox foraging habitat within a 20 km radius	3
31 – 75 % Grey-headed Flying-fox foraging habitat within a 20 km radius	6
> 75 % Grey-headed Flying-fox foraging habitat within a 20 km radius	10

1.5.4 ECOLOGICAL CORRIDORS

Ecological corridors relate to habitat linkages that allow fauna to move safely between core habitat areas across a fragmented landscape. Corridors maintain ecological connectivity, enable dispersal and support the long-term viability of species and ecological processes. This is true for Grey-headed Flying-fox foraging habitat.

The method for measuring context has not been altered from the method in the *Guide to Determining Terrestrial Habitat Quality* (Version 1.2 April 2017) (State of Queensland 2017).

Ecological Corridors position the offset in areas that are designed to act as wildlife and riparian corridors and are more likely to support strategic connected habitat and species strongholds with long term protections.

TABLE 13: ECOLOGICAL CORRDIORS SCORING THRESHOLDS.

Ecological Corridors	
Thresholds	Score
Not within	0
Sharing a common boundary	5
Within (whole or part)	10

1.5.5 ROLE OF SITE LOCATION TO SPECIES OVERALL POPULATION IN THE STATE

Role of site location to species overall population in the state refers to how important the assessed site is to the long-term survival of the listed species.

In accordance with the Saunders Havill Group Preliminary Documentation (February 2024), the method has been altered to reflect the number of significant roosts within the lower average foraging radius of the site (20km). Significant roosts are those that contain a high level of GHFF activity and have been identified as part of the National Flying Fox Monitoring Program (NFFMP) for which data is publicly available.

The impact site and offset site both had no active roosts within the radius.

TABLE 14: ROLE OF SITE LOCATION SCORING GUIDE.

Role of Site Location to Koala Overall Population in the State	
Thresholds	Score
1 – 2 active level 3 Grey-headed Flying-fox camp within a 20 km radius	1
2 – 4 active level 3 Grey-headed Flying-fox camp within a 20 km radius	6
> 4 active level 3 Grey-headed Flying-fox camp within a 20 km radius	10

1.5.6 THREATS TO THE SPECIES

Threats to the species is a species-specific habitat attribute that does not have a 'default' measure as they are not part of the *Guide to Determining Terrestrial Habitat Quality* and are additions of the federal EPBC Act offsets process. They are 'species specific' because threats vary between species.

Threats to the species refers to the current and foreseeable pressures that directly affect the survival, reproduction or habitat of MNES at the site and within its broader population context. It requires identifying the type, severity and immediacy of threats.

For the Grey-headed Flying-fox, threats to the species within impact and offset sites have previously been assessed qualitatively within the Preliminary Documentation (Saunders Havill Group, February 2024). This methodology has been continued to provide consistency and to avoid exclusions, misinterpretations or errors. The method has been reapplied within the following framework for a qualitative assessment.

Threats listed in key species resources such as the conservation advice should be understood and each one must be assessed by an experienced senior ecologist with reference to field observations and desktop data. Important threats to the Grey-headed Flying-fox include (Department of Agriculture Water and the Environment 2021):

- Habitat loss, degradation and fragmentation,
- Camp disturbance,
- Mortality in commercial fruit crops,
- Heat stress,
- Entanglement in netting and barbed wire fencing,

- Altered fire regimes,
- Climate change,
- Electrocution on power lines,
- Public misunderstanding of disease risk, and
- Water stress and drought.

Experts consider each threat then complete the assessment by drawing a conclusion based on the likelihood or probability that survival of the Grey-headed Flying-fox would be influenced by threats as outlined in Table 15.

TABLE 15: SCORING TABLE FOR THREATS TO THE SPECIES (ADAPTED FROM PRELIMINARY DOCUMENTATION; SAUNDERS HAVILL GROUP, FEBRUARY 2024).

Threats to the Species	
Thresholds	Score
High threat level: Many threatening processes are present that are likely to result in stress, death or a local population decline.	1
Moderate threat level: Some threatening processes are present that could possibly contribute to stress, death or a local population decline.	7
Low threat level: Limited threatening processes are present and are unlikely to contribute to stress, death or a local population decline.	10

1.5.7 SPECIES MOBILITY CAPACITY

Species mobility capacity refers to how easily the target species can move across the landscape to access resources, recolonise habitat or avoid threats. It considers the intrinsic movement ability of the species (for example, whether it is highly mobile, moderately mobile or dispersal-limited) and how that interacts with the surrounding landscape condition.

For the Grey-headed Flying-fox, species mobility capacity has been removed in accordance with the Saunders Havill Group methodology: "*This attribute is not scored for the grey-headed flying-fox, as it is a highly mobile species capable of flying large distances whilst foraging and migrating.*"

1.6 SPECIES STOCKING RATE

Species stocking rate refers to the typical density or number of individuals of the target species that a given habitat area can naturally support under current ecological conditions. It reflects how well the site can sustain viable numbers of the species, with higher stocking rates indicating higher habitat suitability and contribution to population persistence.

The MHQAT incorporates species stocking rate as an attribute not discussed under the traditional terrestrial habitat assessment methodology. The MHQAT defines scoring thresholds however the consultant must consider how these should be interpreted for the target species.

For the Grey-headed Flying-fox, species stocking rate has not been estimated utilising the traditional species stocking rate assessment. Instead, it has been assessed utilising a stem density assessment that compares the present canopy density of food trees with that expected of the regional ecosystem based on a count of stems in the T1 and T2 canopy. This is considered appropriate as it reflects the resources available for feeding.

The stem density of potential food trees are recorded within a 20x100m area within the transect. This count is multiplied by five (5) to produce a stem density per hectare in accordance with the stem density count method from *Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland (version 5.0)* (Neldner *et al.* 2020). This number is compared to the benchmark stem density per hectare based on the sum of the T1 and T2 stem densities for the relevant regional ecosystem in accordance with the technical description (Table 16), where the technical description is per the *Technical Descriptions of Regional Ecosystems of Southeast Queensland* (Ryan 2018[4]). It is then scored in accordance with Saunders Havill and the draft OMP scaling density scoring tables where low and excessive stem density is undesired and within a range of the ideal is scored highest.

TABLE 16: BENCHMARK STEM DENSITY FOR THE CANOPY STRATUM.

Benchmark Stem Density			
Site	T1 count	T2 count	Total
Impact (12.5.4)	242	313	555
Offset (12.12.5)	280	400	680

TABLE 17: STEM DENSITY RESULT SCORING TABLE.

Stem Density Scoring		
Score	Impact area (12.5.4 stem count per hectare)	Offset site (12.12.5 stem count per hectare)
2	0-69	0 – 79
4	70-301	80 – 179
6	302-509	180 – 379
8	510-543	380 – 579
10	544-567	580 – 779
8	568-601	780 – 979
6	602-809	980 – 1109
4	810-1041	1110 – 1209
2	>1042	> 1210

[4] Ryan, T.S. (ed.) (2018) Technical Descriptions of Regional Ecosystems of Southeast Queensland, (10 November 2018) (Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts: Brisbane). * Date shown in footnote of individual descriptions (23/05/2012).

2 REFERENCES

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