APPENDIX B

Biodiversity Offsets Strategy

Issue

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project

Biodiversity Offsets Strategy

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Executive Summary

This Biodiversity Offset Strategy (the Strategy or BOS) has been prepared by Sunshine Coast Airport (SCA) to demonstrate how all residual impacts to matters of National and State environmental significance predicted as a result of the Sunshine Coast Airport Expansion Project (the Project or SCAEP) will be offset. The Project includes the construction of a new 2,450m runway, in a northwest/southeast alignment on existing SCA land that is predominantly former sugar cane farms. The development is supported by airport master planning and local planning instruments that have designated the Project site for a runway expansion since the 1980s.

On 1 July 2014, the Queensland *Environmental Offsets Act 2014* (Offset Act) and Queensland Environmental Offsets Policy commenced. It is noted that the EIS process for this Project commenced and the draft EIS was submitted to agencies for comment prior to the commencement of the Offsets Act. SCA has nonetheless developed this BOS having regard to the principles set out within the Queensland Offsets Policy. This BOS has also been prepared to demonstrate compliance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Environmental Offsets Policy.

The Sunshine Coast Airport Expansion Project Environmental Impact Statement 2014 (EIS) provides a detailed impact assessment of the Project and outlines commitments for various mitigation strategies to avoid or reduce these impacts during the design, construction and operational phases of the Project. Following the application of site-based mitigation strategies, the EIS assessment determined residual impacts to matters of National and State environmental significance including Wallum Sedgefrog, Wallum Rocketfrog, Wallum Froglet, Ground Parrot and Mount Emu She-oak.

The proposed offset package has been prepared by SCA to address all significant residual impacts to MNES and MSES as a result of the Project. The offset package consists of land-based offsets on SCC-owned land and indirect measures that, in combination, are designed to achieve an equivalent or better environmental outcome. In addition, contingency measures have been included in the Strategy as a risk management measure as outlined in Section 7.

For MNES, calculations using the EPBC Act Offsets Assessment Guide indicate that well over 100% of the offset commitments have been met for Wallum Sedgefrog and Mount Emu She-oak. Field based and desktop analysis using the Department of Environment and Heritage Protection (DEHP) offset calculators,

indicates that for MSES over 100% of the offset commitments have been met for Wallum Sedgefrog, Wallum Rocket Frog and Ground Parrot, however there is a small amount of residual impact not offset for the Mount Emu She-oak and the Wallum Froglet. It is recognised however the total biodiversity offset package provides an overall positive environmental outcome for these species at both the Project site and off-site at the Lower Mooloolah River Environmental Reserve (LMRER).

The land-based and indirect offset package proposed by SCA has been costed at $11,170,720 and consists of a suite of rehabilitation works to improve land at the SCA site and a site at LMRER at Palmview, adjacent to the Maroochy River National Park. This far exceeds the pure financial offset amount of $9,097,881.49 obtained using the DEHP financial offsets calculator for the same distinct matter area.

The total, costed package proposed by SCA to offset for the residual impacts is the preferred option to achieve a positive conservation outcome, rather than an option to pay a pure financial offset as is available under the current Queensland Offset Act. Offsets will be delivered on Sunshine Coast Council (SCC) owned land, will be managed in perpetuity for conservation purposes and contain elements that will promote the viability of the matters that have been impacted by the Project.

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Biodiversity Offsets Strategy (continued)

1 Introduction and Offset Principles

1.1 Background

Sunshine Coast Airport (SCA) is proposing to construct and operate a new runway to replace the existing runway at the Sunshine Coast Airport (SCA). The Sunshine Coast Airport Expansion Project (the Project or SCAEP), has been designated a coordinated project under the Queensland *State Development and Public Works Organisation Act 1971* (SDPWO Act) and a controlled action under the Australian *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Sunshine Coast Airport Expansion Project Environmental Impact Statement (EIS) has been prepared by SCA, with the EIS process being led by the Queensland Coordinator-General, with the Australian Department of Environment (DOE) carrying out an assessment of relevant matters of national environmental significance (MNES) under the bilateral agreement.

The Project includes the construction of a new 2,450m runway, in a northwest/southeast alignment on existing SCA land that is predominantly former sugar cane farms. The new alignment will result in clearing of intact native vegetation communities, habitat for fauna species, and other ecological values considered to be matters of National and State environmental significance, as listed in the Terms of Reference for the EIS. These matters include:

- Mount Emu She-oak *Allocasuarina emuina*;
- Wallum Sedgefrog *Litoria olongburensis*;
- Wallum Froglet *Crinia tinnula*;
- Wallum Rocketfrog *Litoria freycineti*; and
- Eastern Ground Parrot *Pezoporus wallicus*.

As well as the matters listed above, the project has considered offsets for corridor vegetation linking areas of protected (National Park) estate, as this matter has been listed in the current Queensland offset legislation as a matter of State Environmental Significance.

The EIS provides a detailed impact assessment of these features and outlines various mitigation strategies to avoid or reduce these impacts on the site. Following the application of site-based mitigation strategies, the EIS has identified residual impacts on these matters of State and National environmental significance.

The EIS for the Project has been published, with the public consultation period ending on 13 November 2014. This BOS will be submitted for assessment by the Coordinator-General and DOE as part of the Additional Information to the Environmental Impact Statement (AEIS).

1.2 Objectives of the Offset Strategy

This BOS has been developed to meet the requirements of the Coordinator-General's Terms of Reference for the Project under the SDPWO Act and to be in accordance with the *EPBC Act Environmental Offsets Policy* (EPBC Act Offsets Policy).

The new Queensland *Environmental Offsets Act 2014* (Offsets Act) and the *Queensland Environmental Offsets Policy* (Queensland Offsets Policy) do not affect or limit the functions and powers of the Coordinator-General under the SDPWO Act, including, for example, the power to impose conditions for a coordinated project. Notwithstanding this, SCA has developed this BOS having regard to the principles set out within the Queensland Offsets Policy.

The intent of the strategy is to provide an overarching document that summarises the quantum of residual impacts to areas and features proposed to be offset. It is a strategic document that aims to:

- Summarise the residual impacts to features to be offset, including matters of national environmental significance (MNES) under the EPBC Act and matters of State environmental significance (MSES) under the Queensland Offsets Policy;
- Describe the offset commitments and methods of delivery for direct, land based offsets (at the SCA site and at SCC owned land at Palmview) and other indirect measures to result in no net loss of supporting habitat for MNES and MSES (including loss of connectivity between National Park estate);
- Provide a summary of how the proposed land-based offsets can be secured in perpetuity to ensure the long-term protection of the offset sites;
- Outline how the offsets will be delivered, including a description of the timing and staging and actions required for the planning, management, maintenance and monitoring of land-based offsets.

2 Legislative Context

On 7 October 2011, the Australian Government determined that the Project was a 'controlled action' under the EPBC Act, due to the likely potential impacts on MNES (Referral no. EPBC 2011/5823). The controlling provisions under the EPBC Act are:

- wetlands of international importance (sections 16 and 17B);
- listed threatened species and communities (sections 18 and 18A); and
- listed migratory species (sections 20 and 20A).

The Australian Government also determined that the associated aviation airspace management referral (EPBC 2011/6104) will be assessed under the EPBC Act.

SCA has prepared this BOS having regard to the EPBC Act Offsets Policy, which outlines the Australian Government's approach to the use of offsets under the EPBC Act. See in particular Sections 3.1.1 and Table 8 below.

On 24 October 2011, the Queensland Coordinator-General declared the Project to be a 'significant project' (now referred to as a 'coordinated project') requiring an EIS under the SDPWO Act.

The Australian Government has determined that the bilateral agreement between the Australian and Queensland Governments applies to the assessment of the Project. This enables the EIS to be assessed under the accredited EIS process under Part 4 of the SDPWO Act to meet the assessment requirements under both Commonwealth and Queensland legislation.

The Coordinator General finalised Terms of Reference for the EIS on 9 May 2012. Amongst other things, the Terms of Reference require that the proponent present proposals for offsetting impacts of the Project and demonstrate compliance with the avoid, mitigate, offset hierarchy. These matters are addressed in the EIS and further details of the proponent's proposed offsets are detailed in this BOS.

On 1 July 2014, the Offsets Act and Queensland Offsets Policy commenced. As the EIS process for this Project commenced and the draft EIS was submitted to agencies for comment prior to the commencement of the Offsets Act. As noted in Section 1.2 above, SCA has nonetheless developed this BOS having regard to the principles set out within the Queensland Offsets Policy. See in particular Sections 3.1.2 and Table 8 below.

The Offsets Act and Queensland Offsets Policy do not affect or limit the functions and powers of the Coordinator-General under the SDPWO Act. This includes the Coordinator-General's power to impose conditions for a coordinated project.

3 Offset Rationale

An environmental offset is a set of measures that are implemented to compensate for residual adverse impacts of an action on the environment. Offsets are only to be applied where all reasonable and practicable measures have been undertaken to avoid impacts to MNES and MSES and to mitigate these impacts on the site as part of the project. Offsets address any residual impact on features after these avoidance and mitigation measures have been applied as part of the impact assessment process.

The broad intent and the integral principle of a biodiversity offset is to provide a *conservation outcome* for the specific features that are impacted. Under the Offsets Act a conservation outcome is achieved if the offset is selected, designed and managed to maintain the viability of the matter that is impacted.

Offset principles from the EPBC Act Offset Policy and Queensland Offset Policy 2014 are outlined below.

3.1 Offset principles

3.1.1 EPBC Act Offsets Policy

Suitable offsets must:

1. deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action;
2. be built around direct offsets but may include other compensatory measures;
3. be in proportion to the level of statutory protection that applies to the protected matter;
4. be of a size and scale proportionate to the residual impacts on the protected matter;
5. effectively account for and manage the risks of the offset not succeeding;
6. be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action);
7. be efficient, effective, timely, transparent, scientifically robust and reasonable;
8. have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

3.1.2 Queensland Offsets Policy

The following principles for an offset are described under the Queensland Offsets Policy:

1. Offsets will not replace or undermine existing environmental standards or regulatory requirements, or be used to allow development in areas otherwise prohibited through legislation or policy.
2. Environmental impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact.
3. Offsets must achieve a conservation outcome that achieves an equivalent environmental outcome.
4. Offsets must provide environmental values as similar as possible to those being lost.
5. Offset provision must minimise the time-lag between the impact and delivery of the offset.
6. Offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values.
7. Where legal security is required, offsets must be legally secured for the duration of the impact on the prescribed environmental matter.

3.2 Avoidance and mitigation measures

Measures to avoid impacts to MNES and MSES that are included in the design of the Project include:

- Relocation of the Air Traffic Control Tower and alignment of the main access road to avoid area of closed heathland providing habitat for Mount Emu She-oak and acid frogs;
- A south-east shift of the runway by approximately 310m has enabled the provision of a vegetated corridor connecting the north and south sections of Mount Coolum National Park;
- The use of a high density polyethylene liner placed on the cleared construction site prior to import of sand fill to minimise infiltration of saline water into the groundwater and inclusion of a cut off drain north of the northern perimeter drain to limit flow of saline water north into the adjacent Mount Coolum National Park and the Wallum Heath Management Area (WHMA); and
- Extension and maintenance of the perimeter fence (i.e., a predator proof fence) before commencement of construction.

A number of measures have also been included in the EIS to mitigate against any impacts that are likely as a result of the construction and operation of the Project. A comprehensive Environmental Management Plan (EMP) will be developed to protect retained vegetation communities, significant flora species and habitat for significant fauna. Specific measures relevant to MNES and MSES include:

- Installation of vegetation protection fencing and the establishment of no-go zones in areas of retained native vegetation;
- Weed hygiene measures to prevent the spread of declared pest plants during construction and targeted treatment of declared pest plants on SCA land;

- Control of salinity during tailwater discharge into the Marcoola Drain through a water quality management plan and associated surface and ground water monitoring;
- Continued works within the WHMA to maintain the extent of suitable Ground Parrot habitat within the SCA;
- Restriction of vegetation clearing periods to avoid Ground Parrot breeding times from July to September (inclusive); and
- Reduce indirect, construction impacts on adjacent fauna habitat during construction by including noise suppression of sand pumps, light shields and predator-proof fencing.

4 Description of Residual Impacts

4.1 Introduction

A detailed impact assessment in accordance with the Coordinator-General's Terms of Reference has been completed in Chapter B7 of the EIS for Terrestrial Flora and B8 for Terrestrial Fauna. After all avoidance and mitigation measures have been applied, the impact assessment has determined that there is a risk of residual impacts to MNES and MSES. These residual impacts are summarised in **Table 1** and outlined in further detail in this chapter.

Table 1: Summary of residual impacts, descriptions and areas for MNES and MSES

Matter	Description of impact	Area impacted
Matter of National Environmental Significance		
Mount Emu She-oak *Allocasuarina emuina*	Direct loss of supporting habitat of closed heathland, resulting in a 5% reduction in the Finland Road population.	4.41ha
Wallum Sedgefrog *Litoria olongburensis*	Reduction in the extent of breeding habitat supporting a potentially important population.*	1.67ha#
Matters of State Environmental Significance		
Wallum Froglet *Crinia tinnula*	Reduction in the extent of breeding and non-breeding habitat in the Marcoola/SCA area.	60.63ha
Wallum Rocketfrog *Litoria freycineti*	Reduction in the extent of breeding and non-breeding habitat in the Marcoola/SCA area.	21.85ha#
Eastern Ground Parrot *Pezoporus wallicus*	Reduction in the extent of known habitat supporting a regionally-important population.	7.88ha

*Assessment of the SCA Wallum Sedgefrog population as 'important' (as defined under the EPBC Act Significant Impact Guidelines) is based on the precautionary principle, since comparative data from elsewhere on the northern Sunshine Coast [i.e., within the Peregian Management Unit] is lacking. See Chapter B8 of the EIS.

Area of habitat for the Wallum Sedgefrog and Wallum Rocketfrog is included within the 60.63ha of Wallum Froglet habitat impacted.

In addition to the residual impacts provided in Table 1, construction of the new runway will result in the loss of vegetation linking the northern and southern sections of Mt Coolum National Park, thereby limiting movement of fauna between areas of remnant habitat east and west of the SCA. Measures for offsetting the resulting impact on ecological values within the National Park either side of the proposed runway are also outlined in this document, as this matter has been listed in the current Queensland offset legislation as a matter of State Environmental Significance.

4.2 MNES - Mt Emu She-Oak

The Project will result in a direct loss of approximately 4.41ha of Mount Emu She-oak habitat. At the time of population survey completed for the EIS, this represented approximately 550 plants, or 5% of the Finland Road population **(Table 2** and **Figure 1**). It is acknowledged that this estimate is likely to be variable and depends on the time the survey was undertaken and the successional stage of the vegetation community. This is because Mount Emu She-oak populations have the potential to be much denser in heathland areas that have been subject to a suitable fire regime of a cool, winter burn every 5-10 years. This fire regime has been excluded from the northern areas of closed heath and the melaleuca open forest habitat types that support Mount Emu She-oak in the Project Area. All individuals located at the time of translocation will be translocated.

Table 2: Mount Emu She-oak impacts for each habitat type

Habitat type	Area impacted (ha)	Mount Emu She-oak density (plants/ha)	Estimated individuals impacted
Closed heath (north)	0.62	322	200
M. quin LOF/OF with heath	3.79	92	350
TOTAL	**4.41**	**-**	**550**
% impacted	**18%**	**-**	**5%**

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Biodiversity Offsets Strategy (continued)

Project Area
Known population area
Population area impact

Habitat type:

Closed heath
Open heath
Open heath with Melaleuca thickening
Melaleuca low open forest
Melaleuca open forest

Client
Sunshine Coast Council

Job Title
Sunshine Coast Airport Expansion Project

Map Title
Loss of Mount Emu She-oak habitat in the Projet Area

Meters
0 50 100 150 200

Issue	Date	By	Chkd	Appd
D1	5/12/2014	MJD	SXJ	LOM

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Map Status: **Final**
Coordinate System: **GDA 1994 MGA Zone 56**
Job No: **225480-00**
Figure No: **001**

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4.3 MNES - Wallum Sedgefrog Breeding Habitat

Construction of the proposed runway will result in the loss of 1.67ha of known (i.e., occupied) Wallum Sedgefrog habitat used for breeding, foraging and/or shelter (**Figure 2**). These areas of habitat include low wet heath and sedgeland in areas of surface water to the south of the WHMA and near the centre of the existing helicopter training area.

Intervening areas of non-breeding habitat, such as remnant and non-remnant regrowth heath or Broad-leaved Paperbark *Melaleuca quinquenervia* forest will also be lost. However, the loss of non-breeding habitat surrounding breeding areas is unlikely to limit foraging and sheltering opportunities; these needs are likely to be met within areas of breeding habitat, as evidenced by the continued presence of Wallum Sedgefrogs in areas during dry and wet periods.

Despite targeted searches, no populations of Wallum Sedgefrog have been located south of the proposed runway (i.e., within the southern section of Mount Coolum National Park). As such, the loss of non-breeding habitat is unlikely to affect movement between areas of known habitat adjacent the SCA.

The loss of Wallum Sedgefrog habitat will be mitigated through the establishment of compensatory habitat within the SCA (see Section 5.1.1.2), as well as offsite at Palmview (see Section 5.1.2), and with the success of these measures Wallum Sedgefrog habitat will increase in extent.

4.4 MSES - Habitat for State Listed Acid Frogs

Construction of the new runway will necessitate clearing and filling of Wallum Froglet (**Figure 3**) and Wallum Rocketfrog habitat within the SCA (**Figure 4**). Estimated loss of breeding and non-breeding habitat for these two species, as a result of resulting clearing and filling, is provided in **Table 3**.

Table 3: Estimated impacts to Wallum Froglet and Wallum Rocketfrog habitat

Species	Estimated Loss of Habitat (ha)*	
	Breeding	Non-breeding
Wallum Froglet	60.63 ha**	N/A
Wallum Rocketfrog	1.67 ha	20.18 ha

*Excludes areas of known habitat in which vegetation will be slashed but not cleared, as areas of slashed vegetation provide suitable habitat for acid frog species.

** Due to microhabitat preference and map-scale limitations, distinction between breeding and non-breeding habitat is not possible. The extent of breeding habitat loss is therefore likely to be an over-estimate.

Clearing and filling of wet heath and Broad-leaved Paperbark woodland and open forest during construction will result in the loss of 60.63ha of Wallum Froglet habitat. This includes 47.07ha of mapped Essential Habitat and a number of other non-remnant breeding habitats. Unlike other acid frog species, the Wallum Froglet is often found breeding in very small, less persistent, bodies of water. It is not possible to accurately map the extent of these smaller waterbodies, so this project has applied the precautionary principle and will offset all 60.63ha impacted despite recognising this is likely to over-estimate the extent of Wallum

Froglet values. Importantly, large areas of extensive ponded water, which support high densities of Wallum Froglets, will be retained maintain the local population of this species in the Project area

While 47.07ha of Essential Habitat is mapped for the Wallum Rocketfrog, less than half of this is known or likely to be used, based on field surveys completed for the EIS. Estimates of habitat with the Project Area have been based on known breeding habitats and immediately surrounding vegetation, including areas of non-remnant heath regrowth). The vast majority of known Wallum Rocketfrog habitat,including likely breeding habitat in the centre and north of the WHMA, will be retained. As such, the loss of habitat is unlikely to have a marked impact on juvenile recruitment and the SCA is likely to retain a sizeable population of Wallum Rocketfrogs.

The extent of habitat loss has not included areas subject to selective clearing to the north of the northern perimeter drain (ie, removal of tall woody vegetation through slashing to ensure vegetation does not exceed 1.5m). These habitats will remain, or possibly be more suitable, for acid frog species.

Figure 2
Loss of Walum Sedgefrog breeding habitat within the Project area

Scale:
1:3,689
0 0.1 0.2
Kilometers

Client: Sunshine Coast Airport | **Project:** Airport Expansion Project

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Biodiversity Offsets Strategy (continued)

Figure 3

Loss of Wallum Froglet habitat in the Project area

Scale: 1:7,277

0 0.1 0.2 0.4

Kilometers

Client: Sunshine Coast Airport

Project: Airport Expansion Project

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Figure 4

Loss of Wallum Rocketfrog habitat in the Project area

Scale:

1:7,500

0 0.1 0.2 0.4

Kilometers

Client: Sunshine Coast Airport

Project: Airport Expansion Project

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4.5 MSES – Ground Parrot

Construction and operation of the new 13/31 runway will result in the permanent loss of 15.06ha (37.5%) of vegetation within the WHMA (**Figure 5**). A subset of this area, approximately 7.88ha, is currently used by Ground Parrots, based on 95% confidence interval (CI) mapping of study records. The majority of active Ground Parrot habitat in the WHMA and existing helicopter training area is located north of proposed clearing. Importantly, areas of highest activity (representing 50% CI) will not be affected, while only 0.11ha of habitat supporting moderate activity (75% CI) would be permanently affected (**Table 4**). A narrow strip of open modified land to the immediate south-east of the retained WHMA will remain post-construction. Ground Parrots are reluctant to venture far from dense vegetation in their habitat range on the SCA site, never seen more than 50m from cover during Ground Parrot surveys. While currently used for foraging, the long-term value of this southern strip may be reduced due to increased distance from dense vegetation cover.

Table 4: Total existing, and anticipated loss, of Ground Parrot habitat based on survey/monitoring results carried out as part of the EIS.

Habitat	Total extent of available habitat (ha)	Extent lost (ha)				
		50% CI	75% CI	95% CI	Total	% of total habitat
Permanent habitat loss[#]	30.01	0	0.11	7.77	7.88	26.2%
Temporary habitat loss		0	0.31	0.51	0.81	2.70%

[#] Based on active areas assessed using kernel density analysis, as detailed in the EIS.

The proposed actions will lead to the loss of 7.88ha of habitat currently used by Ground Parrots, based on habitat mapping and population surveys completed as part of the EIS.

Figure 5

Loss of Ground Parrot habitat within the Project area (based on 2011/12 data)

Scale:

1:4,231

0 0.025 0.05 0.1 0.15 0.2 0.25

Kilometers

Client: Sunshine Coast Airport

Project: Airport Expansion Project

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4.6 Corridor Connectivity

Development of RWY 13/31 will result in the loss of remnant vegetation connecting the northern and southern sections of Mt Coolum National Park. The loss of remnant vegetation linking these areas will limit movement of cover-dependent, ground-dwelling fauna. Reduced movement of fauna between northern and southern sections of Mt Coolum National Park increases risk that fauna populations either side of the runway are more vulnerable to stochastic demographic and genetic processes affecting their long-term viability.

It is important to note that land use planning for the development of the new runway at SCA predates the gazettal of Mount Coolum National Park. The Project has been identified in land use planning documents, dating back to the 1982 *Airport Master Plan*, which is also reflected in local planning schemes and the current *Sunshine Coast Planning Scheme 2014*. These documents have zoned the area of land for the new RWY13/31 as Special Purpose land for the development of airport infrastructure.

The first section of Mount Coolum National Park, which covered a small area around the mountain, was gazetted in 1990. It wasn't until 2001 that additional areas were added to the national park area, on the lowland sections of coastal heath and open forest to the north and south of the airport.

5 Offset Delivery

A proposed offset package has been prepared to address all significant residual impacts to MNES and MSES as a result of the Project. The offset package consists of land-based offsets and indirect measures that, in combination, are designed to achieve an equivalent or better environmental outcome. In addition the Strategy contains contingency actions to account for the risk of failure of these matters as outlined in Section 7.

The direct, land-based elements include translocation, restoration and habitat creation works at the SCA site. Where there is unsuitable or an insufficient area to accommodate land-based offsets within or directly adjacent to the Project Area, offset works will be carried out off-site at another SCC owned property at the Lower Mooloolah River Environmental Reserve (LMRER) at Palmview. Land-based offsets are summarised in **Table 5**, with additional detail provided in this chapter.

Table 5: Priority land-based offset actions

Matter	Offset action and location	Minimum Offset Extent (ha)	
		SCA	LMRER
Mount Emu She-oak	Heath translocation of 4.41ha of impacted supporting habitat to receiving site adjacent to the Project.	4.41	0
Wallum Sedgefrog	Creation of ponds/breeding habitat	2.43*	9.8**
Ground Parrot	Habitat creation at SCAEP – WHMA, northern corridor	8.12	0
Wallum Froglet	Creation of ponds/wet heath/melaleuca matrix	0#	60.63##
Wallum Rocketfrog	Creation of ponds/wet heath/melaleuca matrix	0#	60.63##
Connectivity between protected areas	Revegetation of 25 ha strip of largely cleared land linking fauna habitat within northern and southern sections of Mt Coolum National Park	25ha	0

* 2.25ha will be set aside for acid frog habitat creation in the WHMA and 5.84ha will be available in a linear strip to the north of the runway. It is estimated that 30% of this 8.09ha of land area will be used to create breeding ponds, so total offset area on the SCA land is 2.43ha.

** Area assessed to be suitable for the creation and augmentation of frog breeding ponds.

Improved habitat at the airport through the creation of additional breeding ponds

Including a minimum 5ha of specifically created breeding ponds.

While land-based offsets for the Ground Parrot exceed 1:1, the EIS recognised land-based offsets for this species has a degree of uncertainty. As such, indirect offset actions have been included and focus on improving Ground Parrot understanding and knowledge, particularly within the Sunshine Coast region, as well as public education. These actions will be directed by a Ground Parrot Recovery Plan, developed by a Ground Parrot Recovery Team. Funds for the Plan and to support subsequent research and conservation actions have been included in the offset package (see Section 7).

5.1 Land-based offsets

A key issue in identifying suitable receiving sites for offset on the Sunshine Coast is the general availability of land on the lowland coastal sand plain within the bioregion. Much of the land area in the region has been previously developed or had other competing land-use priorities. Areas containing existing remnant vegetation should not be used for offsetting as it is contrary to the principle of additionality. Competing land uses are particularly apparent for areas of flat, degraded land as these areas are often zoned for future development.

During the preparation of the Initial Advice Statement for the project, a review of areas on the Sunshine Coast that may be suitable for delivering the offsets was carried out. This review located a number of small (≤10ha) land parcels that contained the required features to support Broad-leaved Paperbark forest, heathland and sedgeland. The majority of these lots were predominantly freehold land, outside the ownership of SCC, making the process of long-term protection and management very difficult.

Two broad sites were identified during the preparation of the EIS as being suitable for delivering offsets for the Project. Surrounding cane lands around the SCA site will be used were possible to offset impacts associated with Mount Emu She-oak, Ground Parrot, acid frogs and corridor connectivity. The LMRER will also receive offsets, primarily for acid frogs. All land in both of these sites is owned in freehold by SCA and SCC, ensuring measures offsets delivered on these sites will be streamlined as agreements with external landholders will not be required.

5.1.1 Land-based offsets within SCAEP area and surrounds

Where possible, sites for land-based offsets have been selected within or directly adjacent to the Project site. Offsets for residual impacts to Mount Emu She-oak and Wallum Sedgefrog can be wholly achieved within the SCA property and immediately adjacent land. The loss of Wallum Rocketfrog breeding habitat will also be fully achieved within the SCA property, although additional areas are also planned for the LMRER. The total area of offsets proposed within the airport and surrounds is summarised in **Table 6** and **Figure 6**.

Table 6: Offset areas proposed within the airport and surrounds.

Assessment Unit (AU)	Description	Area (ha)
AU 6 - Wallum Heath Management Area	Balance of airside land that will be managed as wallum heath. Contains existing Ground Parrot and acid frog habitat.	25.46
AU7 - National Park revegetated corridor	Proposed area to be revegetated around the runway to provide an ecological corridor between the northern and southern sections of Mount Coolum National Park.	48.00
AU8 - Mount Emu She-oak	Heath tile translocation to establish remnant closed/open heathland. Will also provide habitat for acid frogs	4.41
AU9 - Linear patch north of the new runway	Currently remnant Broad-leaved Paperbark forest. Airport operations and safety require low vegetation heights. Will be managed as wallum heath and provide habitat for Ground Parrot and improved habitat acid frogs.	5.84
TOTAL		**83.66**

Project area

Offset Assessment Unit

6

7

8

9

Client
Sunshine Coast Airport

Job Title
Sunshine Coast Airport Expansion Project

Map Title
Offset Assessment Units Airport and surrounds

Meters

0 100 200 300 400 500 600 700

Issue	Date	By	Chkd	Appd
D1	8/05/2015	MJD	MJD	LOM

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Scale at A4	Map Status
1:15,737	Final

Coordinate System
GDA 1994 MGA Zone 56

Job No	Figure No
225480-00	006

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5.1.1.1 Mount Emu She-oak translocation

Transplanting of Mount Emu She-oak into alternative habitat areas will be undertaken to offset the residual impact associated with the 5% reduction in the Finland Road population. The proposed offset will involve transplanting all individuals in the entire 4.41ha of impacted closed heath and low melaleuca forest to a suitable location to the north (**Figure 7**).

Land to the north of the proposed extension is proposed as the offset receiving site for the heath tile translocation of the impacted Mount Emu She-oak population (Figure 5.2.2b). Soil and groundwater investigations completed during the EIS suggest that this area has a sandy topsoil and a shallow (<1.5m), indurated sand layer suitable for the establishment of Mount Emu She-oak. The existence of a smaller population of Mount Emu She-oak and heathland to the east also provides evidence that the area is likely to provide suitable soil and groundwater conditions for heathland translocation.

The estimated total quantum of impact is 550 plants, which includes 0.62ha of closed heath with a density of 322 Mount Emu She-oak plants/ha and 3.79ha of paperbark low open forest with a density of 92 plants/ha. The proposed offset is to translocate 4.41ha of closed heath and low paperbark open forest into a suitable area and manage the offset site as suitable habitat for Mt Emu She-oak (ie closed heathland).

Project area
Proposed Mt Emu She-oak Offset Area
AEP1 population area

Mount Emu She-oak habitat type

Closed heath
Open heath
Open heath with Melaleuca thickening
Melaleuca low open forest
Melaleuca open forest

Client
Sunshine Coast Airport

Job Title
Sunshine Coast Airport Expansion Project

Map Title
Proposed heath tile translocation area

Meters
0 100 200 300 400

Issue	Date	By	Chkd	Appd
D1	8/12/2014	SXJ	LOM	LOM

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Scale at A4	Map Status
1:11,767	**Final**

Coordinate System
GDA 1994 MGA Zone 56

Job No	Figure No
225480-00	**007**

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5.1.1.2 Wallum Sedgefrog breeding ponds

Breeding and recruitment of Wallum Sedgefrogs within furrows and table drains at SCA and also further south at Caloundra Downs shows creation of Wallum Sedgefrog habitat is possible under suitable soil and groundwater conditions. These include low-lying areas of acidic, sandy soil with a shallow, perched groundwater table. Loss of Wallum Sedgefrog habitat may therefore be offset by the creation of compensatory habitat that contains these soil, vegetation and groundwater elements (Error! Reference source not found.).

Soil and groundwater conditions in the north of the WHMA appear highly suitable for the creation of Wallum Sedgefrog breeding habitat, as evidenced by successful recruitment of Wallum Sedgefrogs in wet furrows beside vehicular access tracks in this area. Within areas of the WHMA that do not have priority ecological values (i.e., no existing acid frog breeding habitat or Ground Parrot habitat, as identified in the EIS) the extent and amenity of Wallum Sedgefrog habitat will be increased by removing soil to create low-lying areas with ponding water and planting these out with upright sedges native to the local area (e.g., *Baumea rubiginosa*, *Baumea teretifolia* and *Balloskion pallens*). Prior to excavation, ground and surface water investigations will be undertaken to determine pond depth and design for an appropriate hydroperiod (i.e., the persistence of surface water 6-8 weeks over summer, following heavy rain). Stringent weed control measures will be implemented during pond construction to avoid introducing weeds into sensitive surrounding habitats (i.e., retained acid frog habitat and Ground Parrot habitat within the WHMA).

Offsets for the Wallum Sedgefrog habitat will also be created in the wedge-shaped area of SCA land to the near north of the northern perimeter drain (an area of dense heath with emergent Melaleuca measuring 5.84ha). In this area, operational constraints will require the removal of tall woody tree species which, at current densities, render habitat unsuitable for Wallum Sedgefrog, due to increased drawdown of the groundwater table and/or reduced growth of upright sedges. Removal of dense tree and shrub cover and the excavation of seasonally inundated ponds will create a mosaic of wet heath and dry heath providing breeding, foraging and shelter opportunities for the Wallum Sedgefrog. As in the WHMA, construction of compensatory breeding habitat will be informed by studies investigating groundwater hydrology.

Given the proximity and connectivity of offset areas to known (occupied) habitat within the SCA, colonisation of newly created habitat is likely to occur naturally. Translocation of frogs from elsewhere within the SCA is therefore considered unnecessary.

In addition the proposed offset actions for other wallum frog species outside the SCA (i.e., LMRER, see Section 5.1.2) will also protect habitat for the Wallum Sedgefrog. These actions will create a minimum of 9.8ha of breeding ponds surrounded by a wet/dry heath matrix of 16 ha. As such, the successful implementation of offset actions proposed in this work will exceed development related impacts and result in a significant net increase in habitat for the Wallum Sedgefrog.

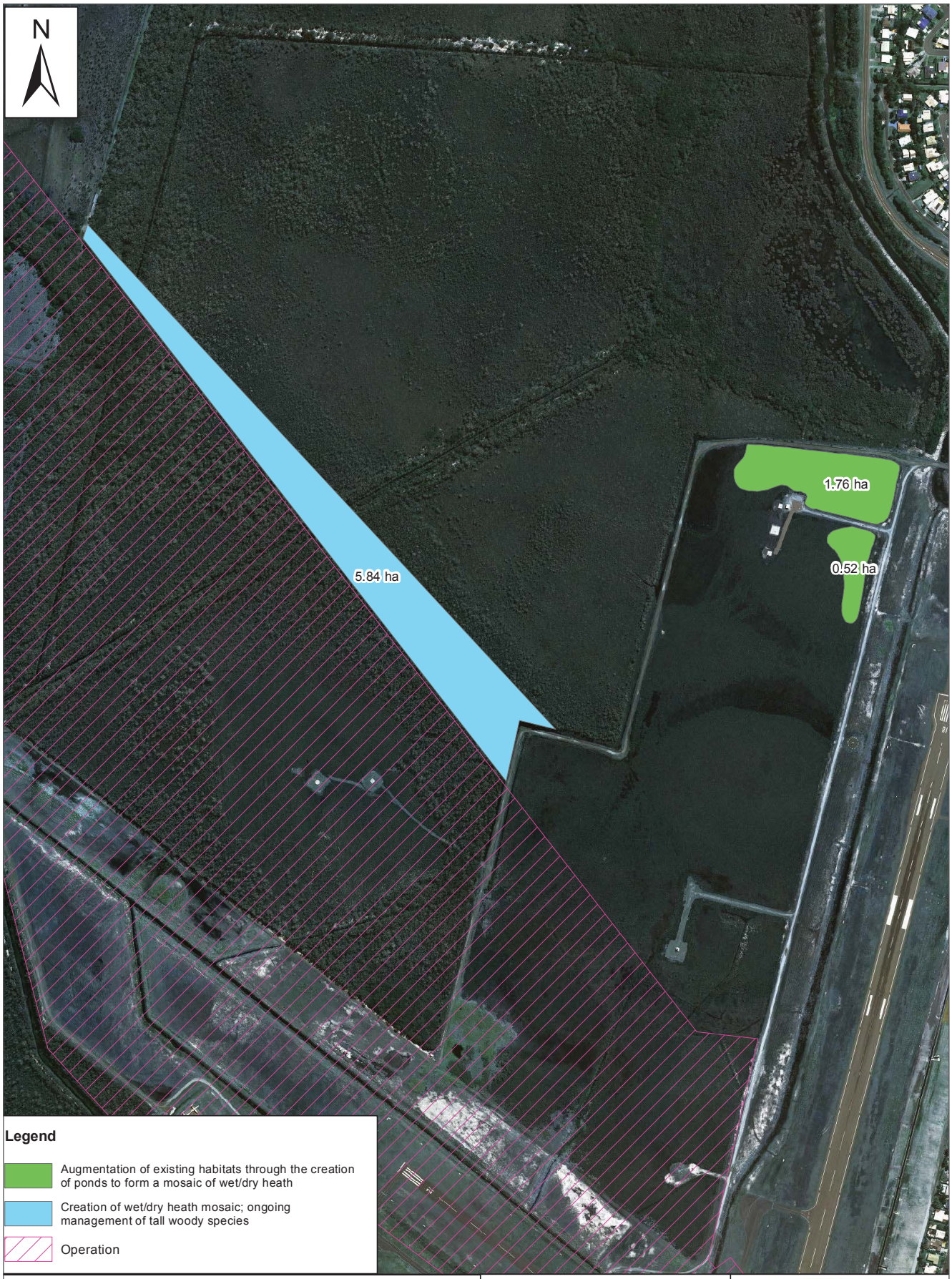


Figure 8

Acid frog habitat creation and management at the Project site

Scale:

1:5,000

0 0.03 0.06 0.12 0.18 0.24 0.3

Kilometers

Client: Sunshine Coast Airport

Project: Airport Expansion Project

ecosmart ECOLOGY

5.1.1.3 Habitat for other state-listed 'acid' frog species

The creation of Wallum Sedgefrog breeding habitat within the airport will also help compensate for the loss of Wallum Rocketfrog and Wallum Froglet breeding habitat. In the case of the Wallum Rocketfrog, all breeding habitat is estimated to be compensated within the SCA.

However the proposed creation of breeding ponds within the SCA land occurs within vegetation that could be viewed as existing (non-breeding) habitat for the Wallum Rocketfrog and Wallum Froglet. It is therefore recognised that additional offsets for these species will be required outside of the SCA. The SCA and Sunshine Coast Council have identified the LMRER (see Section 5.1.2) as the preferred offset site.

5.1.1.4 Ground Parrot habitat management and creation

The loss of Ground Parrot habitat will be offset by creating and maintaining additional areas of high quality habitat in the far north of WHMA and to the immediate north of the proposed northern perimeter drain (**Figure 9**).

Based on extensive surveys and monitoring work completed prior to and during the development of the EIS, Ground Parrots are largely absent from the very northern portion of the WHMA. Reasons for the lack of Ground Parrot activity in this area remain unclear, though it appears that suitable seed producing plants, in particular sedges, may be less common in this area than other parts of the WHMA that support larger numbers of Ground Parrot. The creation of acid frog breeding ponds in this area (as discussed above) is likely to encourage sedge growth, leading to an increase in Ground Parrot foraging resources. Seeding of this area with favoured food plants following pond creation (including *Caustis recurvata*, *Pseudanthus orientalis* and *Sprengelia sprengelioides*) may further increase the attractiveness of habitat in this area for Ground Parrots. This augmented area, consisting of approximately 2.28 ha, will not affect existing Ground Parrot habitat (see B8-413 in the EIS).

In addition to the above augmentation, the retained WHMA will be extended to include a 5.84 ha linear stretch of habitat alongside of the northern perimeter drain (see B8-413 in EIS). While vegetation within this area is currently dominated by Melaleuca forest, control of woody species will be required for airport visibility and safety. Vegetation in this area cannot exceed 1.5 m in height and will therefore require slashing on a semi-regular basis. These activities would promote seed-producing monocots, and simulate current management activities within the helicopter training area and WHMA. As such, management of this area could create an area structurally and floristically consistent with inhabited Ground Parrot habitats.

The wedge-shaped area of offset habitat discussed above will be different in shape (long and narrow) to the area lost. Linear stretches of habitat force inhabitants to move large distances in search of food, as well as having less resources per capita than similar sized consolidated fragments. The value of the offset will therefore be increased if adjacent land management practices (ie, within Mt Coolum NP) are improved to encourage the return of Ground Parrots to the adjoining National Park (see below). Actions to improve values in the adjacent National Park should be guided by the Ground Parrot Recovery Team/Plan.

To be successful the slashing program within the SCA will need to be guided by ongoing monitoring of habitat values and, as such, a carefully-considered adaptive management plan for the WHMA/SCA, will be prepared. This plan should include triggers for woody vegetation control. To be successful, slashing management of woody regrowth will be required in perpetuity.

If successful, habitat offset and augmentation will result in a 4.1% increase (7.19 ha lost; 8.12 ha gained) in available Ground Parrot habitat at the SCA. However, as these measures are largely untested, a number of contingency measures have been proposed to offset any residual habitat loss (see Section 7.4).

Similar to existing conditions, all created habitat within the airport compound will be enclosed within a continuous 2m high chainwire fence. This includes existing and created habitat within the WHMA as well as new habitat created to the immediate north of the northern perimeter drain. This fence, which will be regularly maintained for security, will also ensure the habitats remain free of introduced predators.

APPENDIX B

Biodiversity Offsets Strategy (continued)

Figure 9

Ground Parrot habitat creation and management at the Project area

Scale: 1:5,000

0 0.03 0.06 0.12 0.18 0.24 0.3
Kilometers

Client: Sunshine Coast Airport | **Project:** Airport Expansion Project

ecosmart ECOLOGY

5.1.1.5 Corridor connectivity

To compensate for loss of ecological connectivity between northern and southern sections of Mt Coolum National Park, a 2.5 km long, vegetated corridor will be established around the western extent of the development (**Figure 10**) within SCA land. Features and actions required to establish this corridor include:

- A minimum width of no less than 120m (along the western perimeter drain), though in the north this corridor is likely to be closer to 300m in width. The corridor has allowed for possible (future) construction of a 10 m water pipeline alignment along the motorway (Unitywater; works not associated with the SCA).
- Revegetation works to establish native vegetation of sufficient density to allow passage by cover-dependent fauna species. Along most of the corridor this vegetation will include native canopy tree species. However, due to aircraft safety and operational constraints, several vegetation management regimes will be required in selected locations:
  - Regime A: Stretching along the northern boundary of the proposed runway (including the proposed helipads and VOR relocation), vegetation within this area will be maintained to ensure height does not exceed 1.5m. The species composition of revegetation works in this area will consist of locally occurring native shrubs or wallum vegetation to assist with reduced maintenance to retain the low heights. Selective removal of taller shrubs and trees or pruning works may be required to maintain the required maximum height of 1.5m.
  - Regime B: Located either side at the northern end of the proposed runway, vegetation in these two areas will be managed to ensure that vegetation does not exceed 6m and will exclude flowering species such as those belonging to the genus *Melaleuca, Corymbia, Angophora, Lophostemon* and *Eucalyptus* (which could attract flying-fox, risking animal strike).
  - Regime C: Located at the very northern end of the proposed runway and within the runway splay area, vegetation here will be maintained to an approximate height of 2m due to safety and operational requirements stipulated by the Civil Aviation Safety Authority (CASA). No flowering species (Melaleuca/Eucalyptus) will be allowed to persist in this area to reduce the risk of bird or flying-fox strike.
- Fauna friendly culverts over major drains, including the northern perimeter drain and western perimeter drain, to promote dry passage will be required, particularly for small terrestrial vertebrates. Fauna crossings are recommended to be no less than 4 m in width and will include suitable native vegetation cover such as native grasses and low shrubs. The dual purpose crossing (i.e., fauna and vehicle maintenance crossing) will be 3 m wider than required for vehicular access to allow establishment of suitable vegetation. The safety/maintenance crossing at the northern end of the runway will include no special provision for fauna passage.
- The western drain, which runs south from the northern end of RWY 13/51, will be a deterrent to reduce animal access onto the Sunshine Coast Motorway. Should this drain not be required, a fauna-proof fence will be constructed along the length of the motorway/corridor.

APPENDIX B

Biodiversity Offsets Strategy (continued)

- A 450 m long fauna-proof chain wire fence running north along the Sunshine Coast Motorway to prevent animal movement onto the motorway. The length of this fence should fall short of the Marcoola Channel to ensure any current fauna movement, to the Maroochy River and associated habitats, under the Sunshine Coast Motorway bridge is maintained.
- A temporary construction compound will be located outside the proposed ecological corridor to ensure vegetation can be established within the early stages of works. To access the compound a temporary single-lane road will be required, probably paved to accommodate heavy traffic. The road will be decommissioned following project completion and revegetated.

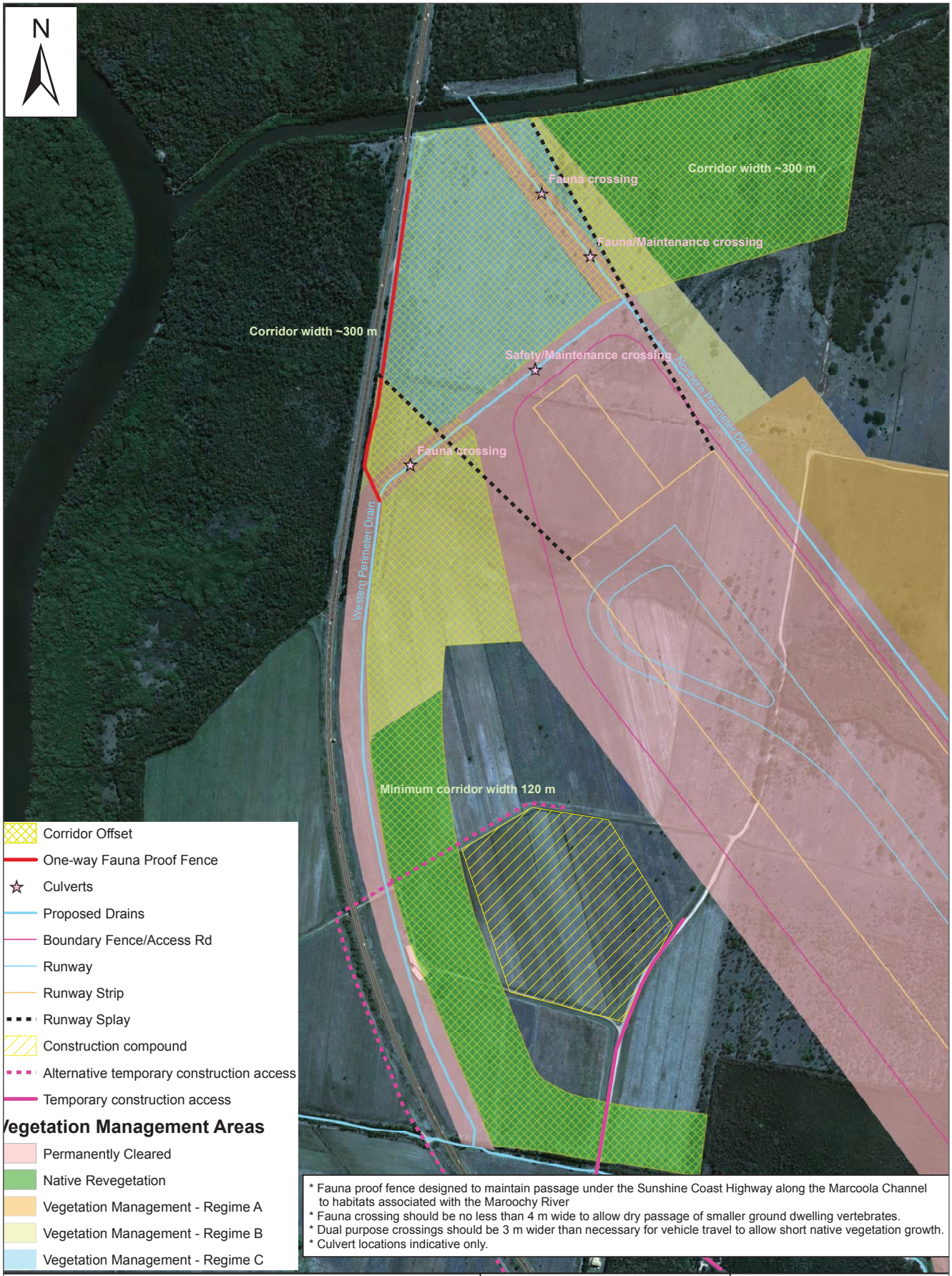


Figure 10

Proposed ecological corridor to be revegetated linking Mount Coolum National Park

Scale: 1:5,745

0 0.1 0.2
Kilometers

Client: Sunshine Coast Airport

Project: Airport Expansion Project

ecosmart ECOLOGY

5.1.2 Lower Mooloolah River Environmental Reserve (LMRER)

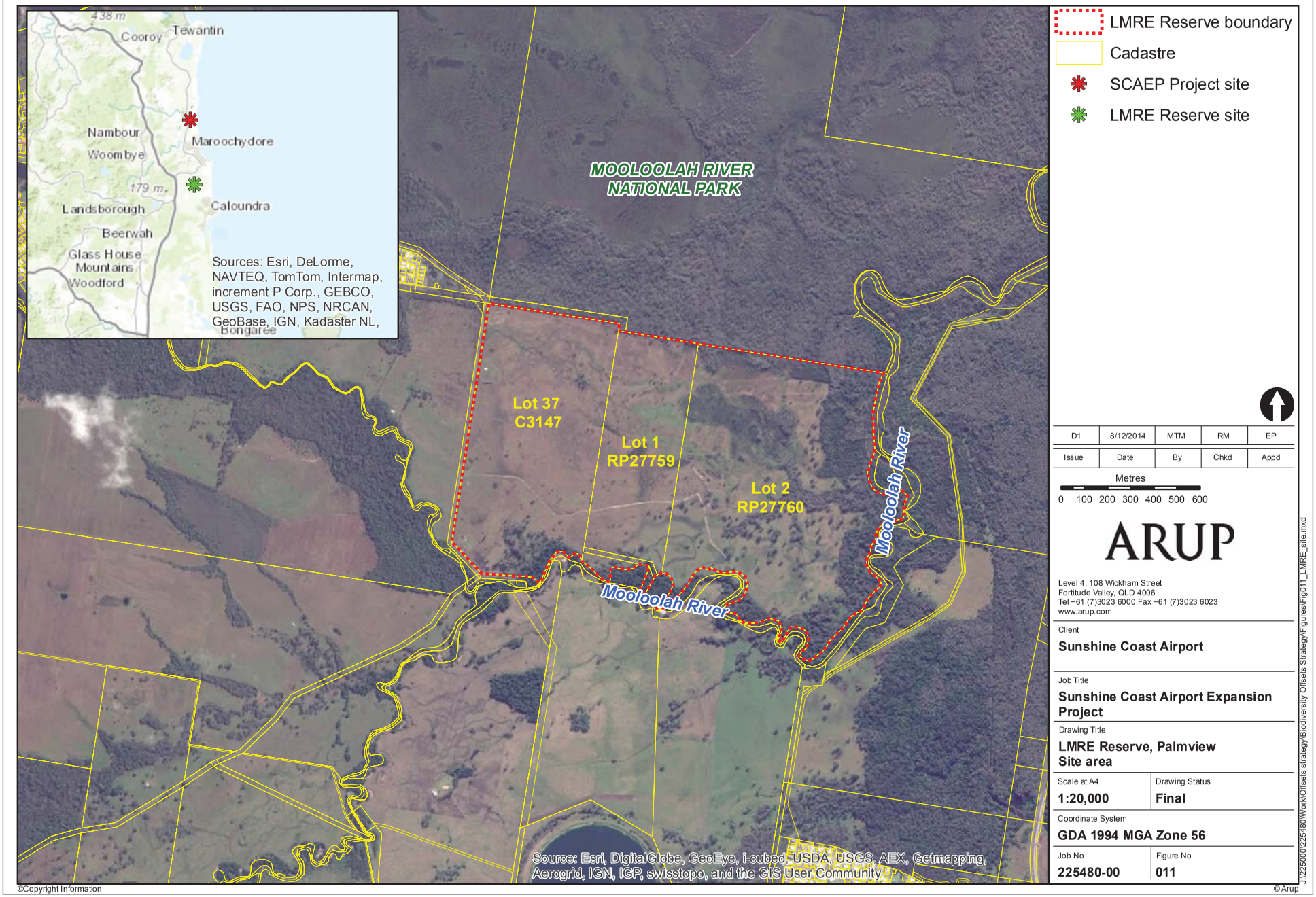
Due to a lack of suitable receiving sites within and adjacent to the SCA to compensate for the loss of ecological values, and in particular habitat for the Wallum Froglet and Wallum Rocketfrog, off-site works are proposed to offset the loss of habitat for these species.

SCA and SCC have identified a site for receiving these revegetation works at Palmview. The LMRER is owned in freehold by SCC and is located to the east of Claymore Road, Palmview and covers Lots 37 C3147, 1 RP27759 & 2 RP27760 (**Figure 11**). The site is bordered by the Mooloolah River to the south and east and Mooloolah River National Park to the north. To the west there are large tracts of grazing land and the whole area is currently used for cattle grazing. There are patches of remnant Regional Ecosystems on the eastern property boundary in Lot 2 RP27760, associated with drainage lines and depressions.

To provide a long-term, no net loss of impacted acid frog habitat, it is proposed to carry out compensatory revegetation and restoration works to plant new areas or restore degraded sites with similar vegetation groups as the impacted communities at the SCAEP project site.

A review of historical aerial photography shows that the eastern portion of the LMRER land was cleared prior to 1958. The northern and western portions of the site remained well vegetated until sometime between 1997 and 2003, when the clearing was extended to current conditions.

The historical aerial photos also show that prior to clearing the site was covered with an open forest vegetation community. This corresponds with the pre-clearing Regional Ecosystem mapping (DNRM 2013), which has the majority of the site mapped as RE 12.3.5 – Broad-leaved Paperbark open forest to woodland. This RE is included in Broad Vegetation Group 22a - Open forests and woodlands dominated by Broad-leaved Paperbark in seasonally inundated lowland coastal areas and swamps.



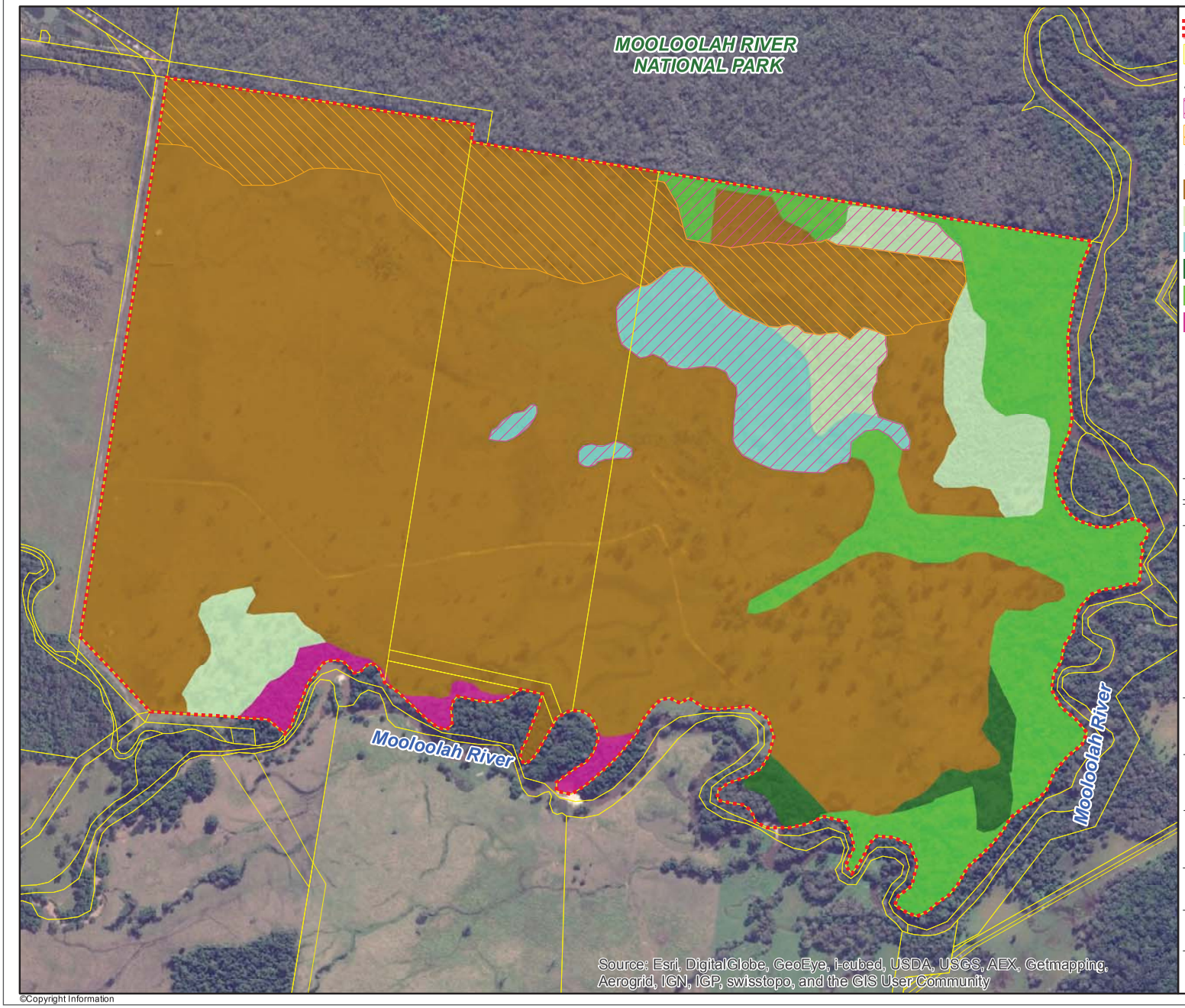
APPENDIX B

Biodiversity Offsets Strategy (continued)

Preliminary surveys of the LMRER property has identified six vegetation communities as currently present (**Table 7** and **Figure 12**).

Table 7: Existing vegetation communities at the LMRER site

Vegetation community	Description	Area (ha)
Pasture with regrowth and retained paperbark and eucalypts	Cleared, open grassland dominated by exotic grasses and sedges. There are scattered regrowth and remnant trees throughout including Broad-leaved Paperbark *Melaleuca quinquenervia,* Forest Red Gum *Eucalyptus tereticornis,* Pink Bloodwood *Corymbia intermedia,* Swamp Box *Lophostemon suaveolens* and Cabbage-tree Palm *Livistona australis*. The north-east corner of the site contains a higher density of Broad-leaved Paperbark regrowth.	145.8
Broad-leaved Paperbark regrowth (RE 12.3.5)	These areas contain advanced regrowth of Broad-leaved Paperbark trees, likely to be greater than 10-15 years old. Clearing and grazing appears to be excluded from these areas.	11.6
Sedgeland regrowth (RE12.3.8)	There is a lower drainage depression in this location, with pooling surface water, native sedges and emergent Broad-leaved Paperbark trees. Dominant groundcovers observed where Grey Sedge *Lepironia articulata*, Jointed Twigrush *Baumea articulata*, Bungwall *Blechnum indicum*	8.1
Non-native or non-remnant subtotal		**165.5**
Riparian vine forest regrowth (RE 12.3.1)	This vegetation community is at the ecotone between pasture and/or paperbark forest and the Mooloolah River. Tree species present include Weeping Lillypilly *Waterhousea floribunda* and Flooded Gum *Euclayptus grandis.*	2.8
Remnant paperbark/eucalypt forest (RE 12.3.5)	Intact open forest dominated by Broad-leaved Paperbark. Vegetation community is consistent with the RE description. The occurrence of these patches of remnant vegetation on the site is associated with low lying, wet areas and the Mooloolah River riparian zone.	22.8
Remnant riparian vine forest (RE 12.3.1)	Riparian vine forest associated with Mooloolah River. Floristic composition is consistent with RE description.	2.4
Remnant subtotal		**28.0**
TOTAL		**193.5**



LMRE Reserve boundary

Cadastre

Acid frog habitat quality

Moderate (assisted regeneration)

Low (habitat recreation)

Site-based vegetation

Pasture

Broad-leaved Paperbark regrowth

Sedgeland regrowth

Riparian vine forest regrowth

Remnant paperbark/eucalypt forest

Remnant riparian vine forest

Issue	Date	By	Chkd	Appd
D1	22/04/2015	MTM	RM	EP

Metres

0 100 200 300 400

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Client

Sunshine Coast Airport

Job Title

Sunshine Coast Airport Expansion Project

Drawing Title

LMRE Reserve, Palmview
Site-based vegetation communities

Scale at A4	Drawing Status
1:9,579	Final

Coordinate System

GDA 1994 MGA Zone 56

Job No	Figure No
225480-00	012

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APPENDIX B

Biodiversity Offsets Strategy (continued)

Preliminary investigations have identified existing areas of good quality habitat for acid frogs, and all three species have been recorded within the LMRER property. There is further potential for acid frog habitat creation along the northern boundary of the site, as well as in a number of other small low-lying areas.

Areas recommended for focusing restoration works for delivering offsets are in the north-eastern corner of the property that is bordered by the national park and the Mooloolah River. This area has a good coverage of Broad-leaved Paperbark regrowth and would require less intensive, assisted regeneration works to improve the structure and condition of native vegetation cover. Assisted regeneration works would include grazing exclusion and management, weed and exotic grass removal and implementation of an appropriate fire regime. This area is also directly connected to the National Park and the riparian corridor of the river, providing mitigation of current edge effects on these sensitive areas.

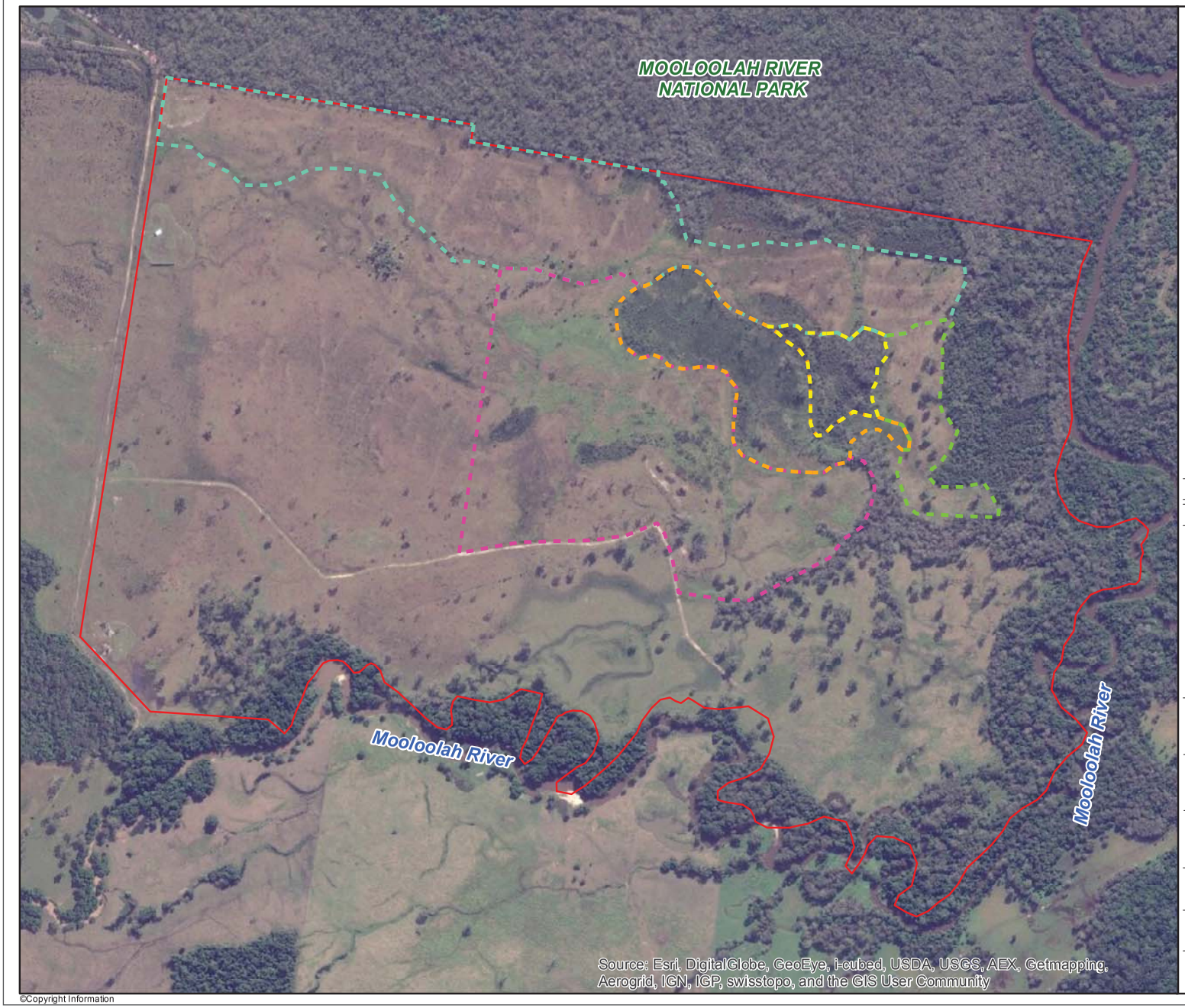
There may be suitable areas to establish closed heathland vegetation community along the northern property boundary; however this would require more intensive revegetation works to create a new vegetation community. This would require a more 'traditional' revegetation program, with site preparation and installation of plants required.

For the SCAEP, SCC has allocated a total area of 63.15ha across the LMRER site for receipt of offsets. Areas recommended for ecological rehabilitation works on the LMRER site are shown in **Figure 13** and **Table 8**. All of these areas are currently composed of either pasture used as grazing land or regrowth native vegetation communities.

By establishing native vegetation communities in these areas the proposal creates additional areas of native vegetation, as well as having other landscape scale benefits such as buffering the adjacent Mooloolah River National Park and contributing to the Mooloolah River corridor.

Table 8: Proposed offset areas and Assessment Units within the LMRER site.

Assessment Unit	Broad description	Area (ha)
1	Broad-leaved Paperbark regrowth, with elements of heathland shrubs. Elements of native sedgeland in drainage depressions.	24.05
2	Broad-leaved Paperbark regrowth, with retained eucalypt paddock trees.	3.82
3	Exotic pasture with very few native species and low habitat structure. Some areas of Broad-leaved Paperbark regrowth and native sedges.	25.48
4	Advanced regrowth of Broad-leaved Paperbark open forest. Retains native canopy, sub-canopy and ground layers. Ponding surface water and areas of open sedgeland.	2.30
5	Advanced regrowth of Broad-leaved Paperbark and sedgeland. Low canopy cover, very dense native sedge and fern cover.	7.50
TOTAL		**63.15**



LMRE Reserve boundary

Offset Assessment Unit

1
2
3
4
5

Issue	Date	By	Chkd	Appd
D1	22/04/2015	MTM	RM	EP

Metres

0 100 200 300 400

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Client
Sunshine Coast Airport

Job Title
Sunshine Coast Airport Expansion Project

Drawing Title
Offset Assessment Units LMRER, Palmview

Scale at A4	Drawing Status
1:9,579	**Final**

Coordinate System
GDA 1994 MGA Zone 56

Job No	Figure No
225480-00	**013**

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6 Assessment of offset package

The proposed offset package has been assessed using the relevant guides and calculators under current Queensland and Australian Government offset calculators. Both calculators are designed to assess the suitability of an offset area, based on the quantum of impact, current and improved value of the offset sites and management commitments to achieve the required improvements.

The EPBC Act *Offsets Assessment Guide* was used to assess the quantum of offset provided for residual impacts to MNES, which included the Mount Emu She-oak and Wallum Sedgefrog only.

For the remaining matters of State environmental significance with an assessed residual impact, the suite of Queensland offset tools were used to assess the offset package, including the *Guide to determining terrestrial habitat quality* and *Habitat quality scoring template,* the *Land-based Offset Multiplier Calculator*, the *Combined Offset Delivery Calculator* and the *Financial Settlement Offset Calculator.*

6.1 EPBC Act *Offsets Assessment Guide*

6.1.1 Mount Emu She-oak

The density of Mt Emu She-oak plants in the area of closed heathland impacted is 322 plants/ha, and it is assumed a similar density can be achieved in the translocation area. A time horizon of 10 years is considered sufficient for the translocated heath area to establish and evidence of Mt Emu She-oak recruitment to occur at the offset site. Over this time, based on the existing plant density of 322 plants/ha, it is likely that 1,420 plants will be present in the translocated area. A similar project at the Brightwater residential development and the University of the Sunshine Coast established a successful heath tile translocation composed of a similar vegetation community to that impacted by the SCAEP project. By translocating the entire vegetation community and the soil seed bank, it is considered that there will be a higher chance of success in establishing a viable Mount Emu She-oak population.

To ensure the receiving site is suitable for supporting coastal heath, soil and groundwater investigations were completed within the proposed Mount Emu She-oak offset area during the preparation of the EIS (**Appendix D**). Wallum and heathland vegetation communities are commonly associated with shallow water tables (particularly after rain), which perch (or semi-perch) on a hardpan layer such as coffee rock. Coffee rock can also inhibit the growth of large trees, such as Broad-leaved Paperbark by limiting root development. The boreholes in the proposed offset area indicate that there is a coffee rock layer between 0.5m and 1.2m below ground level and the upper soil horizons are sandy loams. These are similar ground conditions as the Mount Emu She-oak impact area.

Based on previous success of the tile translocation method, and promising results from soil and groundwater investigations, a 75% confidence score is justified for assessment in the EPBC Act *Offsets Assessment Guide*. For the purpose of taking a conservative approach with the EPBC Act offset calculator, we have adopted a 50% confidence score. Applying this level of confidence still shows that over 100% of the proposed, land-based offset is met by the proposal.

The proposed offset will achieve a positive conservation outcome for Mount Emu She-oak that it will maintain the population within the airport region and, through improved management, increase the habitat quality, extent and long term viability of the population.

Using the EPBC Act offset assessment guide, this proposal has been calculated to provide for over 100% of the offset requirements (**Appendix A1**) and there are no residual impacts required to be offset by indirect measures.

6.1.2 Wallum Sedgefrog

Offsets for the Wallum Sedgefrog will be established both onsite within the SCA precinct, as well as offsite at the LMRER. Onsite actions will create breeding ponds within the existing WHMA as well as a linear strip of land to the north of the proposed northern drain. A total of 8.09ha is available for these actions (2.25ha within the WHMA and 5.84ha in the linear strip). Assuming that 30% of this area is reformed to create ponds, 2.43ha of breeding habitat will be created at the SCA site. This alone exceeds the 1.67ha of breeding habitat lost to development.

Existing habitats within the LMRER will also contribute to mitigating the residual impacts to Wallum Sedgefrog. At the LMRER, approximately 9.8ha of habitat is currently suitable breeding habitat for the species. This area will be protected into perpetuity and improved to ensure an improvement in the habitat quality for Wallum Sedgefrog.

Combining the proposed areas both onsite and offsite, approximately 12.23ha of Wallum Sedgefrog breeding habitat will be provided as offset for the loss of 1.67ha of breeding habitat. Applying the EPBC Act offset guide, this offset proposal is expected to exceed 172% of impact.

A detailed summary of the inputs into the EPBC Act *Offsets Assessment Guide* for both Wallum Sedgefrog and Mount Emu She-oak is provided in Table 9.

APPENDIX B

Biodiversity Offsets Strategy (continued)

Table 9: EPBC Act Offset Assessment Guide inputs and justification

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
Impact site				
Residual impact	550 plants	1.67 ha	**Mount Emu She-oak** The population of Mount Emu She-oak was estimated from 57 quadrats spaced across different habitat types. The number of individual plants impacted was calculated by determining the area of habitat lost and multiplying by the estimated plant density. The project will result in a direct loss of approximately 4.4ha of Mount Emu She-oak habitat. At the time of survey, this represented approximately 550 plants, or 5% of the Finland Road population. **Wallum Sedgefrog** Construction of the proposed runway will result in the loss of 1.67 ha of known (i.e., occupied) Wallum Sedgefrog habitat used for breeding, foraging and/or shelter (i.e., low wet heath and sedgeland in areas of surface water to the south of the WHMA and near the centre of the existing helicopter training area).	EIS Section 7.2.2.3 and 7.6.2 BOS Section 4.2 EIS Section 8.16.2 BOS Section 4.3
Quality of impacted	-	7	**Mount Emu She-oak** The quantum of impact for Mount Emu She-oak has been determined using a number of plants and no input for quality of impacted habitat is required. **Wallum Sedgefrog** The quality of impacted habitat score is 7, which is an average of the scores for *Site Condition, Site Context* and *Species Stocking Rate*. Summary of the rationale for these scores is provided below. The *Site Condition* of Wallum Sedgefrog habitat lost is moderate and have been given a score of 6. The data collected during the EIS shows that, while present, frogs are less abundant in this area than in other locations within the WHMA. Furthermore, impacted habitats	EIS Section 8.7 BOS Section 4.3

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
			appear to be less frequently inundated (as indicated by vegetation composition), contain peatier soils (which do not hold surface water well) and are faster draining (aided by several artificial drains). The score for *Site Context* has been assessed to be moderate to high and a score of 7 has been allocated. The impact site is located adjacent to the Mount Coolum National Park, which consists of a mixture of movement, foraging and breeding habitat for the Wallum Sedgefrog. The score for *Species Stocking Rate* has been assessed as high and given a score of 8. The SCA population of Wallum Sedgefrog has some local significance, being the southern limit of the Peregian Management Unit (see Chapter C9 of the Caloundra South Public Environmental Report, 2014) and separated from other populations within the Unit by Mt Coolum. The site is therefore considered important in this context due to the location at the southern limit of the population Management Unit.	
Offset site				
Proposed offset area	4.41 ha	12.23ha	**Mount Emu She-oak** Transplanting of Mount Emu She-oak into alternative habitat areas will be undertaken to offset the residual impact associated with the 5% reduction in the Finland Road population. The proposed offset will involve transplanting the entire 4.41ha of impacted closed heath and low melaleuca forest to a suitable location to the north. **Wallum Sedgefrog** A total of 12.23ha of offset area is proposed for Wallum Sedgefrog. The proposed offset area is focused on breeding ponds, as this is the matter than is subject to significant impacts. 2.25ha will be set aside for acid frog habitat creation in the WHMA and 5.84ha will be available	EIS Section 7.7.1.2 BOS Section 5.1.1.1 EIS Section 8.17.1 BOS Section 5.1.1.2 and 5.1.2

APPENDIX B

Biodiversity Offsets Strategy (continued)

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
			in a linear strip to the north of the runway. It is estimated that 30% of this 8.09ha of land area will be used to create breeding ponds, so total offset area on the SCA land is 2.43ha. Within areas of the WHMA that do not have priority ecological values (i.e., no existing acid frog breeding habitat or Ground Parrot habitat, as identified in the EIS) the extent and amenity of Wallum Sedgefrog habitat will be increased by removing soil to create low-lying areas with ponding water and planting these out with upright sedges native to the local area (e.g., *Baumea rubiginosa*, *Baumea teretifolia* and *Balloskion pallens*) At the LMRER site preliminary investigations have identified existing areas of good quality habitat for acid frogs, and all three species have been recorded within the property. There is further potential for acid frog habitat creation along the northern boundary of the site, as well as in a number of other small low-lying areas. This preliminary assessment has identified 9.8ha of available land for the creation and augmentation of acid frog breeding ponds.	
Start quality	550 plants	7	**Mount Emu She-oak** The start value for Mount Emu She-oak has been set at 550 plants, equal to the quantum of impact, as all plants are assumed to be translocated to the area of new habitat. **Wallum Sedgefrog** The start value of 7 has been used in the Offset Assessment Guide calculator for Wallum Sedgefrog. This value has been obtained by calculating the weighted average of the *Site Condition, Site Context* and *Species Stocking Rate* scores for both the SCA and LMRER sites (6.87) and rounding up to 7. The weighted average score has been used to factor in the different sizes of the SCA and LMRER sites. The *Site Condition* of the areas of offset within the SCA site can be	EIS Section 7.7.1.2 BOS Section 5.1.1.1 BOS Section 6.1.2

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
			considered to be of relatively low quality for Wallum Sedgefrog and is given a score of 3 due to the lack of breeding resources. The *Site Context* for Wallum Sedgefrog is slightly higher and can be given a score of 5 due to some connection to existing habitat in the WHMA. *Species Stocking Rate* within the SCA offset area is also score as a 3 as no breeding animals were recorded in the offset area. The *Site Condition* of the LMRER is high, with a score of 8, as suitable habitat is already present and in relatively good condition. *Site Context* can be given a score of 7 as there is direct connection to the adjacent Maroochy River National Park, which contains large areas of remnant heathland and sedgeland. *Species Stocking Rate* on the LMRER site can also be assessed as an 8 due to surveys confirming the presence of Wallum Sedgefrog and surface water tests confirming suitable pH for breeding.	
Risk related time horizon	10	10	All proposed offset areas will be protected in perpetuity using a suitable conservation mechanism, such as a covenant on the title. Due to this it is possible to apply the maximum allowed value of 20 years in the EPBC Act offset assessment calculator. Despite this a conservative approach has been applied and a lower number of 10 years has been applied for both Mount Emu She-oak and Wallum Sedgefrog offsets. This score can be applied to both the SCA and LMRER sites, as the same conservation mechanism will be applied, both sites are currently owned in freehold by SCC and the same management regime will be applied to both sites.	NA

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Biodiversity Offsets Strategy (continued)

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
Time until ecological benefit	-	5	**Mount Emu She-oak** Time until ecological benefit is not a required input in the EPBC Act offset assessment calculator when using number of plants. **Wallum Sedgefrog** The time until ecological benefit for Wallum Sedgefrogs has been set at 5 years as this is considered a suitable time to allow for variation in seasonal and yearly rainfall to assess the water chemistry and hydroperiod of the constructed ponds. The ecological success of the offset will be evidence of successful breeding and recruitment in the created habitat ponds. This same time has been applied to both the SCA and LMRER offset sites, as the main driver around detecting ecological benefit is suitable rainfall to detect success of breeding ponds. Both offset sites are located within the same climatic zone and are likely to receive similar amounts of yearly rainfall.	BOS Section 9.1.2
Risk of loss without offset	-	2%	**Mount Emu She-oak** Risk of loss with offset is not considered in the EPBC Act offset assessment guide when using a number of plants. **Wallum Sedgefrog** The risk of loss of habitat without an offset is considered to be very low, as both the LMRER site is currently owned in freehold by Sunshine Coast Council with no current intent to develop the site. It is justifiable to adopt the same risk of loss for the SCA site as the area proposed to create frog breeding ponds will be within the existing Wallum Heath Management Area and the linear strip will be maintained as low, wallum vegetation for runway safety and operational purposes.	BOS 5.1.2

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
Future value / quality without offset	0	7	**Mount Emu She-oak** If the proposed translocation works proposed as part of the offset are not implemented there will be zero Mount Emu She-oak plants present in the offset area. **Wallum Sedgefrog** The score applied for 'Future quality without offset' is the same as the score obtained for 'Start quality' and uses the same methodology as above. A weighted average of start quality scores for *Site Condition, Site Context* and *Species Stocking Rate* for both the SCA and LMRER sites has been applied (6.87) and rounded up to 7.	EIS Section 7.7.1.2 BOS Section 6.1.1 BOS Section 6.1.2
Risk of loss with offset	-	0%	**Mount Emu She-oak** Risk of loss with offset is not considered in the EPBC Act offset assessment guide when using a number of plants. **Wallum Sedgefrog** Risk of loss with offset is considered to be 0% as a suitable conservation agreement, likely a covenant attached to the title will be entered into. There is a negligible chance that the area of available Wallum Sedgefrog habitat will reduce or become degraded to the extent that it will not support these species, with the offset actions and legal protection applied.	BOS Section 8
Future quality / value with offset	1420	9	**Mount Emu She-oak** Based on the existing plant density of 322 plants/ha in areas of good quality heathland, it is likely that 1,420 plants will be present in the translocated area. A time horizon of 10 years will also allow for two controlled burns, at the minimum recommended fire return interval of 5 years. This allows for the occurrence of fire which is an important component of the breeding system of this species. At least one seeding and recruitment event will occur in this time horizon to enable assessment of the success of a self-	EIS Section 7.7.1.2 BOS Section 6.1.1 EIS Section 8.17.1 BOS Section 6.1.2

APPENDIX B

Biodiversity Offsets Strategy (continued)

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
			sustaining population in the offset site. Measurable evidence of recruitment will need to show that the density of plants in the offset area have increased from 125 plants/ha to 322 plants/ha. **Wallum Sedgefrog** The same methodology used for the 'Start quality' and 'Future quality without offset' has been applied for this score. The score for 'Future quality with offset' of 9 has been used in the Offset Assessment Guide calculator for Wallum Sedgefrog. This value has been obtained by calculating the weighted average of the *Site Condition, Site Context* and *Species Stocking Rate* scores for both the SCA and LMRER sites (8.8) and rounding up to 9. It is likely the areas will support suitable habitat and both offset proposals are adjacent existing conservation reserves, augmenting and creating new habitat in areas that connect to existing reserves and provide resources for two distinct sub-populations. *Site Condition* for the LMRER site has been given a score of 9, as the design of the offset areas for Wallum Sedgefrog will focus on the creation of breeding habitat with the specific water chemistry and hydroperiod requirements. Offset management plans and detailed design will focus on creating high quality breeding habitat, connected by movement and foraging habitat, to improve the condition of the offset sites. *Site Context* for the LMRER site is considered to improve from the Start quality score, as the habitat creation works will improve connectivity between existing breeding habitat on the site and the adjacent Mooloolah River National Park. The works will also contribute to increasing the size of an existing conservation area. The *Site Context* score for the LMRER offset site has been given a 9. At the LMRER site, *Species Stocking Rate* has been scored a 9 as the increased	

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
			condition of Wallum Sedgefrog habitat will contribute towards maintaining populations within one of the three Wallum Sedgefrog Management Units on the Sunshine Coast. *Site Condition* for the SCA offset site will also be improved to a 9, as the design of the offset areas for Wallum Sedgefrog will focus on the creation of breeding habitat with the specific water chemistry and hydroperiod requirements. Offset management plans and detailed design will focus on creating high quality breeding habitat, connected by movement and foraging habitat, to improve the condition of the offset sites. *Site Context* will be improved to a 6 as the offset areas do not increase connectivity between existing areas, however they are adjacent to and can add to the area of Mount Coolum National Park. *Species Stocking* has been scored as a 9 as the proposed habitat creation and augmentation works will be designed with the specific habitat and breeding requirements for acid frogs. The species density and presence of breeding frogs in the offset areas will be high if the offset objectives are achieved. The site is also important, as it is the southernmost limit of the Peregian Management Unit subpopulation.	
Confidence in result	50%	78%	**Mount Emu She-oak** To ensure the receiving suite is suitable, geotechnical investigations were completed within the proposed She-oak offset area during the preparation of the EIS to understand the soil and groundwater conditions. Wallum and heathland vegetation communities (*A. emuina* habitat) are commonly associated with shallow water tables (particularly after rain), which perch (or semi-perch) on a hardpan layer such as coffee rock. Coffee rock can also inhibit the growth of large trees, such as Broad-leaved Paperbark by limiting root development. The boreholes in the	EIS Section 7.7.1.2 BOS Section 6.1.1

APPENDIX B

Biodiversity Offsets Strategy (continued)

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
			proposed offset area indicate that there is a coffee rock layer between 0.5m and 1.2m below ground level and the upper soil horizons are sandy. These are similar ground conditions as the Mount Emu She-oak impact area. Based on previous success of the tile translocation method, and promising results from geotechnical investigations, we believe a 75% confidence score is justified for this assessment. For the purpose of taking a conservative approach with the EPBC Act offset calculator and to account for unknown risks associated with translocation, we have adopted a 50% confidence score. **Wallum Sedgefrog** A weighted average of the two scores for confidence in result have been applied to take account for the difference in area. Both offset will involve the creation of acid frog breeding ponds in areas where no breeding habitat currently exists. A high confidence (85%) of success is applied for the offsets where existing breeding habitat is already present at the LMRER site. Breeding frogs have been detected at adjacent remnant sedgeland on the LMRER site and edaphic and water chemistry parameters have been measured as suitable for acid frog breeding. A moderate confidence (50%) is applied to offsets within the SCA, as less information is known about the soil and groundwater conditions were ponds will be created. In the WHMA the vegetation community is characteristic of good quality breeding habitat, with good native sedge cover. The 5.84ha linear strip is currently paperbark forest, which is less suitable for Wallum Sedgefrog breeding. A vegetation establishment and management regime will be adopted in this area that maintains a low wallum and sedgeland community and it is expected that this will improve the habitat values for Wallum Sedgefrogs.	BOS Section 6.1.2

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
			The weighted average of 85% for the 9.8ha offset site and 50% for the 2.43ha site is 78%, rounded to the nearest 1%	

6.2 Queensland Environmental Offsets calculators

The terrestrial habitat quality of the offset areas was assessed using the methodology outlined in the *Guide to determining terrestrial habitat quality* (version 1.1, December 2014). The proposed areas for receiving offsets were divided into Assessment Units, based on current condition and property boundaries (see **Figure 6** and **Figure 13**).

A Site Condition Assessment was completed in each Assessment Unit by Arup ecologists, over two days on 31st March and 10th April 2015. The sampling methodology was completed in accordance with Chapter 5 of the *Guide to determining terrestrial habitat quality.* The Site Context Assessment was completed by Arup ecologists using the ArcGIS (v10.1) package to score patch size, connectedness, landscape context, distance to permanent water and ecological corridors.

Input into the Fauna Species Habitat Assessment score was provided by Ecosmart Ecology, based on field investigations and the sampling habitat parameters (especially water pH) undertaken during the EIS process.

The raw data inputs for Site Condition, Site Context and Fauna Species Habitat for each Assessment Unit were recorded in the Habitat Quality Scoring spreadsheet to determine a final total habitat quality score for the combined offset package (**Appendix B1**). The final total habitat quality score for the offset sites was **4.97**

This habitat quality score was used in the Offset Multiplier Calculator to determine the required offset multiplier for offsets delivered in regrowth communities (**Appendix B2**). The rapid assessment methodology for the impact site was used, giving a score of 7. With commitments[1] to managing the ecological restoration of the offset site it is considered reasonable that a gain of habitat quality of 2 can be achieved. Using these scores the required offset area multiplier is **3.30**.

The amount of land available to deliver offsets for the project are limited to available land that is owned in freehold by the SCC. Based on the offset multiplier of 3.30, the Combined Offsets Calculator was used to demonstrate how much of the offset package met the land-based areas requirements specified in the Queensland offset policy tools.

[1] For details on the strategy, commitments, program and costs to carry out ecological restoration in the offset sites refer to Chapters 8, 9 and 10 of this Biodiversity Offsets Strategy

APPENDIX B

Biodiversity Offsets Strategy (continued)

An assessment of the areas in each Assessment Unit that would be suitable for each threatened fauna species was carried out (Table 10). These areas were entered in to the Combined Offset Delivery Calculator to quantify the total proportion of the required offset that has been acquitted by the land-based offset package and the amount of residual impact to be offset (**Appendix B3**).

Table 10: Area in each offset Assessment Unity that meets requirements for each protected State matter that requires offsets

	Offset Area Assessment Unit (ha and % of total AU)									
Species	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total area**
Wallum Froglet	24.05 (100%)	3.82 (100%)	2.55 (10%)	2.30 (100%)	7.50 (100%)	25.46 (100%)	16.8 (35%)	4.41 (100%)	5.84 (100%	92.73
Wallum Rocket Frog	9.62 (40%)	1.53 (40%)	2.55 (10%)	2.30 (100%)	7.50 (100%)	25.46 (100%)	16.8 (35%)	4.41 (100%)	5.84 (100%	76.01
Wallum Sedgefrog[2]	2.41 (10%)	0.38 (10%)	1.27 (5%)	2.30 (100%)	7.50 (100%)	25.46 (100%)	16.8 (35%)	4.41 (100%)	5.84 (100%	66.37
Ground Parrot	0.00 (0%)	0.00 (0%)	0.00 (0%)	0.00 (0%)	0.00 (0%)	25.46 (100%)	0.00 (0%)	4.41 (100%)	5.84 (100%	35.71
Mount Emu She-oak	6.01 (25%)	0.00 (0%)	0.00 (0%)	0.00 (0%)	0.00 (0%)	0.00 (0%)	0.00 (0%)	4.41 (100%)	0.00 (0%)	10.42

The Combined Offset Delivery Calculator shows that over 100% of the land based offset obligations have been met for the majority of species, with only a residual area required for Wallum Froglet and Mount Emu She-oak. Using this calculator there is an area of **11.22ha** still required to be offset via a financial payment. When this area is applied through the financial calculator, a payment of $1,981,048.08 is obtained (**Appendix C1**). The majority of this of this residual offset area is for Wallum Froglet, with only 1.25ha remaining as residual offset area for Mount Emu She-oak. Using the EPBC Act calculator has demonstrated that 100% of the offset for Mount Emu She-oak has been met when the Commonwealth offset policy is applied.

The balance of the offset amount, as obtained using the DEHP calculators, has been accounted for in the land-based and indirect commitments that SCA will make to improve the offset areas at the SCA land and LMRER at Palmview, as outlined in this BOS.

As detailed in Section 10 of this document, SCA does not propose to contribute the $1,981,048.08 as a financial offset, as the proposed full strategy incorporating direct and indirect offset commitments effectively offsets all residual impacts as a result of the project and provides a positive environmental outcome at both the project site and LMRER.

[2] This assessment applies a larger area of suitable habitat than applied in the EPBC Act calculator, as the State calculators require assessment of all suitable habitat (ie foraging, movement and breeding). The assessment in the EPBC Act calculator relies on loss and offset of breeding habitat only.

7 Indirect offset commitments and contingency measures

7.1 Mount Emu She-oak

Seed will be collected from the impacted Mount Emu She-oak plants, and stored as a contingency for revegetation or replanting works. The species is known to be relatively easy to propagate from seed. The collected seed should be appropriately stored in a seed bank, or measures taken to propagate new plants in a nursery for replanting works in suitable habitat within the species known range. The collection and storage of seed is in accordance with Action 1.3 of the Recovery Plan for Mount Emu She-oak, which notes maintain a representative collection of seed ex situ and develop efficient propagation and cultivation techniques in order to generate suitable stock for strategic ex situ and in situ plantings. As a contingency site for establishing Mount Emu She-oak, Assessment Unit 1 on the LMRER is considered suitable for establishing this species.

The balance of the Mount Emu She-oak population within SCA land to the south of the drainage channel will be managed to maintain and improve the habitat quality to protect the long-term viability of the population. A fire management plan is recommended to set out the temporal and seasonal requirements for controlled burns within the area. A key element of this management will be to coordinate fire regimes and manage any weed infestations

This management strategy for the offset site is in accordance with Action 2.1 of the Recovery Plan for Mount Emu She-oak. This action requires the development and implementation of a strategy for appropriate fire management practices to manage existing and new populations. The maintenance and monitoring plans for the translocation site will also include details on appropriate fire regimes.

7.2 Wallum Sedgefrog

The creation of Wallum Froglet and Wallum Rocketfrog habitat at LMRER is also likely to benefit the Wallum Sedgefrog (a species which is known to occur at LMRER and the adjoining Mooloolah River National Park). The successful creation of 'acid' frog habitat at LMRER will therefore lead to a net increase of Wallum Sedgefrog habitat and help offset any residual loss of Wallum Sedgefrog habitat at SCA should successful habitat recreation not be met.

7.3 State-listed 'acid' frog species

If success criteria for the recreation of acid frog habitat loss at LMRE and/or SCA are not met, impacts of habitat loss on acid frog species will be offset with research funding. Funds totalling $113,000 will be made available for surveys and genetic research aimed at identifying important populations of these species. Timing for success and success criteria will be detailed in an Offset Management Plan (see Section 7.1).

7.4 Ground Parrot

In recognition that proposed Ground Parrot offset strategies within the SCA are untested, the proposed offset mitigation for this species includes funding for the establishment and operation of a Ground Parrot recovery team overseeing the development and implementation of a Ground Parrot recovery plan. Unlike other contingency measures, which may be subject to the success of land-based offsets, Ground Parrot contingency actions will be included as part of the initial mitigation package.

The recovery team will guide, prioritise and oversee Ground Parrot recovery actions both within the SCA and across the broader Sunshine Coast region. This team should include, as a minimum, a SCA representative, a university researcher, a QPWS representative and an experienced fire ecologist. Previous experience and understanding of Ground Parrot ecology will be preferred (where possible).

The recovery team will prepare a recovery plan which should be outcome-oriented, practical, easily understood and contain actions that are achievable and cost effective. Importantly, the plan will be completed within 6 to 12 months of the team being established and thereafter updated in accordance with new knowledge or changed conditions. In addition to guiding recovery actions (including fire management and feral predator control), the team will formulate research priorities, both for the SCA (ie, identification of habitat features which predict Ground Parrot abundance and can therefore be used as rehabilitation criteria) and the broader Sunshine Coast region (eg, population estimates, current movement and gene flow between subpopulations, and response of Ground Parrots to fire).

Any successful recovery plan should be based on strong scientific understanding. The SCAEP will commit $70,000 total towards the Ground Parrot research through development and initial implementation of the Recovery Plan process over a period of 5 years. Further, a one-off ‘in kind’ contribution of $150,000 will be provided for the species management (in addition to works undertaken within the SCA). Allocation of these funds will be at the discretion of the Ground Parrot Recovery team, as guided by the produced Ground Parrot Recovery Plan. However it is anticipated that the significant portion of funds will be used for on-ground management of the species.

8 Securing Offset Sites

8.1 Tenure

The majority of sites proposed for receiving land-based offsets are owned in freehold by SCC and no additional land is required to purchase, lease or otherwise be acquired by SCA to receive the land-based offsets proposed. The only exception is the parcel of land proposed for the Mount Emu She-oak translocation. This land is currently a State reserve, with SCC as lessee. SCC is currently going through the processes to have this land transferred in freehold to SCC ownership.

8.2 Mechanisms to secure conservation land-use

All sites subject to land-based offset works will require a mechanism to provide long term protection of the conservation land use over the offset areas. These measures can include:

- Gazettal as a nature refuge under the *Nature Conservation Act 1992*;
- Declaration of an area as high conservation value under the *Vegetation Management Act 1999* or the *Environmental Protection Act 1994*;
- A covenant under the *Land Title Act 1994* or the *Land Act 1994*; or
- Another mechanism approved by the State, which may include transfer to the State as part of the Queensland National Park estate.

It is likely that an environmental covenant will be the simplest option to ensure a conservation land use is attached to the title of each lot subject to offsets, however the final mechanism will be confirmed prior to offset delivery.

The offset sites will be secured prior to the commencement of construction works at the SCAEP. The mechanism used to secure the conservation tenure of the offset sites will also need to ensure any ongoing management, maintenance and monitoring to achieve the desired conservation outcomes.

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9 Risk Management and Offset Delivery

Any offset package that includes a large revegetation component can be subject to risk of failure. Key components to reducing this risk are the contingency measures outlined in Section 7 above, as well as the preparation of detailed management plans to be completed by suitably qualified ecologists or bushland restoration contractors.

Creation and monitoring of offsets will be guided by a formal management plan detailing construction methods, criteria for evaluating the success of compensatory habitat and guidelines for monitoring frog numbers and recruitment success. The preparation and implementation of these management plans are expected to be a condition of approval of the EIS and will also include measurable performance criteria for assessing the success of the offsets. This criteria will be related to the scores used in the EPBC Act Offset Assessment Guide calculator for *Site Condition, Site Context* and *Species Stocking Rate.* The species habitat attributes and vegetation condition scores measured using the Queensland *Guide to determining terrestrial habitat quality* will also be compared to assess improvements in the condition of the offset sites.

Once initiated, the effectiveness of these management plans will be monitored, and where necessary corrective actions taken. As such, the work will include an adaptive management approach.

9.1 Offset Area Management Plans

For all land-based offset proposals at the Project site and LMRE Reserve, SCA will prepare a detailed Offset Area Management Plan (OAMP) specifying how the SCA would deliver the offset for agreement of the Coordinator-General and the DOE. The OAMP will:

- be consistent with this Biodiversity Offsets Strategy;
- be signed by the project proponent and the landowners of the land[3] provided for the offsets;
- describe the environmental matters to which the offset relates;
- outline further details as to how the offset will be undertaken and timing for delivery of the offsets (e.g. how each site will be treated, restored and managed) to achieve the required conservation outcomes;
- include particulars of the land on which the offset will be undertaken;
- identify, and contain details of, any person with an interest in the land on which the offset will be undertaken;
- describe the existing land uses on which the offset will be undertaken and any impact that land use may have on the delivery of the offset;
- state the specific measures SCA will take to secure the offset and the period over which it will take the measures;

[3] For this project the proponent and the landowner of the offset site are the same

- includes the contingency measures contained in this Strategy and measures to account for and address risks of the offset not achieving the conservation outcome; and
- includes the governance arrangements and procedures for monitoring and auditing the offset.

The requirements of each OAMP will be specific to the required tasks to achieve the desired environmental and conservation outcomes.

The OAMPs will also include detailed monitoring works for the Mount Emu She-oak, fauna habitats and species within the SCA (i.e., acid frog and Ground Parrot population and habitat monitoring), and vegetation/habitats within the LMRER (including acid frog population and habitat monitoring). Plans will include key performance indicators, success criteria, responsibilities, timeframes, and mechanisms to allow corrective actions (adaptive management).

The OAMPs must be implemented by the Proponent. It is intended that each OAMP will relate to properties where offset works will be delivered. At a minimum, separate OAMPs will be required to detail the Mount Emu She-oak translocation, habitat creation and management for Wallum Sedgefrog and Ground Parrot at the SCA and restoration works at the LMRER.As a guide, each plan will consider the elements summarised below in Section 9.1.1 to 9.1.3.

9.1.1 Mount Emu She-oak

- Pre-clearing population surveys;
- Seed collection and storage;
- Preparation of a heath-tile translocation plan;
- Fire management and weed management plans;
- Maintenance and monitoring plans; initially biannual for the first 5 years and annually for another 5 years.

9.1.2 Wallum Sedgefrog and other acid frog species

- Soil and groundwater investigations informing the placement/construction of breeding ponds;
- Design and construction of breeding ponds;
- Suitable slashing regimes of woody vegetation;
- Development of habitat management/monitoring plans outlining key performance indicators. Performance indicators will be finalised in the monitoring plan, but could include:
  - Presence of acidic (pH < 5.5), tannin-stained water within ponds after heavy rain,
  - Persistence of surface water 6-8 weeks over summer (or 8-12 weeks during spring, autumn and winter) after heavy rain, and
  - Evidence of successful breeding/recruitment (i.e., presence of recently metamorphosing or transforming frogs and/or late stage tadpoles) after heavy rain.

- Three years biannual survey for acid frogs followed by three years annual survey with option for extension should any corrective actions be required.

9.1.3 Ground Parrot (within the SCA)

- Plant species to be included in and around created acid frog ponds to increase Ground Parrot foraging resources,
- Suitable slashing regimes of woody vegetation,
- Development of habitat management/monitoring plans outlining key performance indicators. Performance indicators will be finalised in the monitoring plan, but could include:
  - Suitable vegetation composition (i.e, % of granivorous sedge cover),
  - Suitable vegetation structure (i.e., vegetation density across selected vegetation heights),
  - Ground Parrot activity within modified areas,
  - Persistence of the existing population,
  - Utilization of existing habitats consistent with current activity (as monitored for the EIS), and
  - Predator absence.
- Monitoring regime as defined by the recovery team.

9.1.4 LMRE Reserve restoration works

- Prepare detailed ecological restoration plans using a combination of assisted regeneration and habitat creation;
- Design and location of acid frog breeding ponds; and
- Maintenance and monitoring of vegetation condition; biannual for initial 3 years, annual for remaining 7 years; and
- Monitoring acid frog populations and habitats; initial three years biannual monitoring followed by three years annual monitoring with option for extension for any corrective actions.

9.2 Implementation, staging and timing

SCA will implement this Biodiversity Offsets Strategy by:

- preparing OAMPs for each offset site consistent with this Biodiversity Offsets Strategy (see Section 7.1 above);
- lodging each OAMP with the Coordinator-General for the Coordinator-General's agreement prior to commencement of construction activities; and
- implementing each OAMP.

Any revisions of the OAMP or this strategy are to be agreed with the Coordinator-General.

The OAMPs once agreed by the Coordinator-General are intended to apply to the exclusion of any offset conditions under the Environmental Offsets Act.

An indicative program for the planning, delivery, implementation and management of the offset tasks is provided in **Table 7**. This staging proposes that the delivery of the offsets will commence prior to clearing and construction works for the Project.

PHASE AND OFFET DELIVERY	2015				2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Construction period														
OAMP preparation (All sites)														
Secure conservation tenure														
Establish Ground Parrot Recovery Team/develop recovery plan														
Mount Emu She-oak														
Pre-clearing surveys of clearing and receiving sites														
Seed collection and storage														
Heath-tile translocation														
Maintenance and monitoring														
Wallum Sedgefrog and Ground Parrot habitat management (SCA land)														
Soil/groundwater investigations and pond design														
Preparation of Ground Parrot habitats north of northern perimeter drain (selective clearing area)														
Pond creation (commence on, or shortly after, approval)														
Maintenance and Monitoring (acid frogs)														
Maintenance and Monitoring (Ground Parrot)														
Lower Mooloolah Environmental Reserve														
Prepare detailed ecological restoration plans														
Soil/groundwater investigations and habitat (pond/wet heath) design														
Stage restoration works (assisted regeneration and habitat creation)														
Maintenance and monitoring (vegetation)														
Maintenance and monitoring (acid frogs)														

10 Offset package costing

A preliminary cost estimate has been compiled for delivering the direct, land-based offsets and the priority indirect actions for the Project (**Table 11**). The total cost of the priority actions, which also includes actions relating to Ground Parrot recovery team is **$11,170,720**. This also includes 10 years of management and monitoring of the offset sites.

Table 11: Preliminary costing of priority actions to deliver the offset package.

Priority actions outlined in EIS		
Matter	**Action summary**	**Estimate**
Loss of 1.67 ha of Wallum Sedgefrog habitat during construction	Design and construction of vegetated ponds *on site* (across 2.28 ha area in the far north of the WHMA and a 5.8 ha strip along north-eastern boundary of proposed runway [total = 8.08 ha]); Includes 5 years monitoring and maintenance	$161,600.00
Loss of 60.63ha of Wallum Froglet, Rocketfrog, Broad-leaved Paperbark, sedgeland and heathland communities	Revegetation works across 63ha at Palmview providing a mixture of wet heath, sedgeland Melaleuca wetland (includes 10 years monitoring and maintenance)	$5,800,000.00
Loss of 7.79 ha of ground parrot habitat	Slashing of woody vegetation to create 5.84 ha linear stretch of habitat alongside northern perimeter drain through the slashing of woody growth > 1.5 m in height	$32,120.00
	Establishment of recovery team and funding commitments to implement recommendations of recovery team.	$220,000.00
Loss of connectivity between southern and northern sections of Mt Coolum National Park	48 ha revegetation works with 10 years maintenance and monitoring	$3,500,000.00
	Installation of culverts along vegetated corridor over northern and western perimeter drains	$25,000.00
Direct impact to 4.41ha (*N* = 550 plants) of Mount Emu She-oak habitat and population	Heath-tile translocation to receiving site to the north, adjacent to existing Mount Emu She-oak population	$1,532,000.00
TOTAL		**$11,270,720.00**

APPENDIX B

Biodiversity Offsets Strategy (continued)

The total, costed package proposed by SCA to offset for the residual impacts is the preferred option to achieve a positive conservation outcome, rather than an option to pay a pure financial offset under the current Offset Act. The financial commitments that SCA has made in this BOS far exceed the financial contribution obtained using the State financial offset calculator

As the proposed offset commitments in this package are all being implemented on land owned in freehold by the proponent (SCA), there is greater control over the management of these parcels in the long-term. SCA has committed the funding, time and effort into implementing the land-based offsets in this package. The actions have been designed and planned by suitability qualified ecologists and have been designed for the specific matters impacted as a result of the Project.

The estimate for SCA works exceeds the amount calculated for a pure financial offset, as calculated using the DEHP Financial Offsets Calculator. For a Distinct Matter Area of 60.63ha containing habitat for threatened plants and animals on the Sunshine Coast, the financial offset calculated is $9,097,881.49 (**Appendix C2**).

11 Conclusion

This Biodiversity Offsets Strategy provides a summary of the commitments SCA proposes to manage the residual impacts to MNES and MSES predicted from the SCAEP. The commitments include a package of actions that are predominantly land-based, but also include a range of contingency measures that are proposed to manage the potential risk of success criteria not being met.

For MNES, calculations using the EPBC Act Offsets Assessment Guide indicate that well over 100% of the offset commitments have been met for Wallum Sedgefrog and Mount Emu She-oak. Field based and desktop analysis using the Department of Environment and Heritage Protection (DEHP) offset calculators, indicates that for MSES over 100% of the offset commitments have been met for Wallum Sedgefrog, Wallum Rocket Frog and Ground Parrot, however there is a small amount of residual impact not offset for the Mount Emu She-oak and the Wallum Froglet. It is recognised however the total biodiversity offset package provides an overall positive environmental outcome for these species at both the Project site and off-site at the Lower Mooloolah River Environmental Reserve (LMRER).

The total, costed package proposed by SCA to offset for the residual impacts is the preferred option to achieve a positive conservation outcome, rather than an option to pay a pure financial offset as is available under the current Queensland Offset Act. The financial commitments that SCA has made in this BOS far exceed the financial contribution obtained using the State financial offset calculator

The Strategy has been prepared to meet the requirements of the EIS Terms of Reference and is consistent with the principles set out in the EPBC Act Offsets Policy and the Queensland Offsets Policy (**Table 12**).

Table 12: Summary of offset principles and how they have been addressed in this Strategy

Principle	Addressed in the SCAEP Biodiversity Offset Policy
EPBC Act Offset Policy (Mount Emu She-oak)	
Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action	The proposed heath-tile translocation and the required weed and fire management are anticipated to increase the density of Mount Emu She-oak plants within the receiving site to the extent that the local population is likely to increase, which will improve the viability of the species in the local area.
Be built around direct offsets but may include other compensatory measures	The primary offset delivery mechanism is a direct, land-based offset for the establishment of a new population of Mount Emu She-oak through translocation. Other compensatory measures to manage risk include seed collection and fire management of the balance of the population south of Finland Road.

APPENDIX B

Biodiversity Offsets Strategy (continued)

Principle	Addressed in the SCAEP Biodiversity Offset Policy
Be in proportion to the level of statutory protection that applies to the protected matter	Mount Emu She-oak is listed as endangered under the EPBC Act. The proposed offset is likely to result in an increased population size. The EPBC Act Offsets Assessment Guide has also been applied and 100% of the offset commitments for Mount Emu She-oak have been met.
Be of a size and scale proportionate to the residual impacts on the protected matter	The proposed offset will relocate the impacted habitat to a protected area to the north of the runway. There will be no net loss in area and through management a likely increase in population size.
Effectively account for and manage the risks of the offset not succeeding	Heath-tile translocation has been chosen due to previous success on the Sunshine Coast when translocating this habitat type. Seed collection and storage prior to the clearing works will also be carried out to account for the risk of unsuccessful establishment.
Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs	There is currently no requirement for the establishment of a Mount Emu She-oak population in the proposed offset area. The receiving site is also zoned as Community Facilities for the airport under the local planning scheme, not a conservation zone. Any protection will be additional to what is currently provided.
Be efficient, effective, timely, transparent, scientifically robust and reasonable	The detailed planning for the offset will commence prior to clearing commencing in the relevant area and be carried out at the start of the construction and clearing works. All works will be planned by a suitably qualified specialist in ecology, botany or bushland restoration. All reporting and monitoring will also include scientifically robust methodologies.
Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	Governance arrangements will be included in the mechanism for securing the offsets sites, including the inclusion of conditions or clauses for maintaining the offset site in accordance with the OAMPs and this Strategy.
EPBC Act Offset Policy (Wallum Sedgefrog)	
Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action	The proposed habitat creation areas are located within close proximity to lost habitat. 12.23ha will be used for offsets at the SCA site and LMRER site, which will be the creation and augmentation of breeding ponds. The proposed offset area and actions has been assessed by the EPBC Act Offset Assessment Guide to meet over 100% of the required offset commitment. The creation of acid frog habitats at the LMRER will further increase habitat for this species within the broader region. Successful implementation of these actions will significantly contribute to Wallum Sedgefrog values.
Be built around direct offsets but may include other compensatory measures	The primary mechanism for offset provided in this package is land-based. The location of the selected offset areas are within close proximity to existing habitats, will be guided by detailed habitat investigations and monitored for success. As such, there remains a good to high likelihood of success.

Principle	Addressed in the SCAEP Biodiversity Offset Policy
Be in proportion to the level of statutory protection that applies to the protected matter	The Wallum Sedgefrog is Vulnerable under the EPBC Act. Successful implementation of the proposed offset actions is directed to enabling a significant increase in local and regional Wallum Sedgefrog values. As such, the proposed actions exceed a level proportionate to the protected matter. The EPBC Act Offsets Assessment Guide has also been applied and 100% of the offset commitments for Wallum Sedgefrog have been met.
Be of a size and scale proportionate to the residual impacts on the protected matter	Successful implementation of the proposed offset actions is directed to enabling a significant increase in local and regional Wallum Sedgefrog values. As such, the proposed actions exceed a level proportionate to project-related impacts.
Effectively account for and manage the risks of the offset not succeeding	The selected offset areas are within close proximity to existing habitats, and therefore edaphic conditions are likely to be suitable. Detailed investigations will be carried out to ensure breeding habitat design accounts for any local variability. Further, the amount of offset provided will significantly exceed lost habitat, allowing redundancy for failure.
Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs	The proposed actions are not prescribed under other schemes or programs, but have been formulated specifically to address residual impacts associated with the SCAEP.
Be efficient, effective, timely, transparent, scientifically robust and reasonable	Detailed planning (including site investigation informing breeding pond design) will be completed prior to clearing in the relevant area. Construction of habitats will commence at the start of the construction and clearing works. All works will be planned and monitored by a recognised qualified specialist in acid frog ecology. All reporting and monitoring will include scientifically robust methodologies.
Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	Governance arrangements will be included in the mechanism for securing the offsets sites, including the inclusion of conditions or clauses for maintaining the offset site in accordance with plans and strategies.
Queensland Environmental Offset Policy	
Offsets will not replace or undermine existing environmental standards or regulatory requirements, or be used to allow development in areas otherwise prohibited through legislation or policy.	The Project has been designated a coordinated project under the SDPWO Act and has been assessed through the EIS process. The proposed offset package has not been proposed to facilitate this development, but to address the risk of significant residual impacts only after all reasonably and practicable avoidance and mitigation measures have been implemented. Offsets are not being used to allow development that would otherwise be prohibited.
Environmental impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact.	Impacts to MNES and MSES have been avoided where possible in the Project design and a range of mitigation measures will be applied during and after construction. These avoidance and mitigation measures are described in the Project's EIS.

APPENDIX B

Biodiversity Offsets Strategy (continued)

Principle	Addressed in the SCAEP Biodiversity Offset Policy
Offsets must achieve a conservation outcome that achieves an equivalent environmental outcome.	This offset strategy will achieve a conservation outcome by maintaining the long term viability of the MNES and MSES impacted. There will be no net loss of habitat supporting these features, though it is recognised that habitat creation for the Ground Parrot is untested. For this species in particular, a range of additional measures have been included in the offset package to manage these risks. These measures are described in Section 7.4.
Offsets must provide environmental values as similar as possible to those being lost.	The proposed land-based offsets are proposed within the same bioregion and on areas that are highly likely to support the vegetation communities and habitat features
Offset provision must minimise the time-lag between the impact and delivery of the offset.	The staging of the delivery of the offsets is proposed to commence prior to the impacts, with site assessments and detailed plans completed before construction and clearing commences. Land-based actions are proposed to commence no later than the same year that clearing begins.
Offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values.	The proposed offset site at the SCA site and the LMRE Reserve are located on areas that are currently degraded or in a regrowth state. The actions proposed will improve the environmental values in these areas.
Where legal security is required, offsets must be legally secured for the duration of the impact on the prescribed environmental matter	All offset sites will be secured with an appropriate land tenure mechanism or conservation agreement.

Appendix A

EPBC Act Offset Calculator outputs

APPENDIX B

Biodiversity Offsets Strategy (continued)

A1 Mount Emu She-oak assessment

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

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

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	No		Area			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	Yes		550		Count	Population survey

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset									
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0								
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)									
Threatened species habitat																				
Area of habitat	No				Time over which loss is averted (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset									
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0								
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)									
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	Yes	550	Count	Translocation of 4.41ha of heath with A. ermuina	10		550		0		1420		1420	50%	710.00	630.16	114.58%	Yes	$1,532,000.00	

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	550	630.16	114.58%	**Yes**	$1,532,000.00	N/A	$1,532,000.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0				$0.00		$0.00
Area of community	0				$0.00		$0.00
					$1,532,000.00	**$0.00**	**$1,532,000.00**

A2 Wallum Sedgefrog assessment

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Litoria olongaburensis
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	No		Area	1.67		
			Quality	7		
			Total quantum of impact	1.17		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset Future area without offset (adjusted hectares)	 0.0	Risk of loss (%) with offset Future area with offset (adjusted hectares)	 0.0								
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)									
Threatened species habitat																				
Area of habitat	Yes	1.17	Adjusted hectares	12.23	Time over which loss is averted (max. 20 years)	10	Start area (hectares)	12.23	Risk of loss (%) without offset Future area without offset (adjusted hectares)	2% 12.0	Risk of loss (%) with offset Future area with offset (adjusted hectares)	0% 12.2	0.24	78%	0.19	0.19	2.02	172.75%	Yes	
					Time until ecological benefit	5	Start quality (scale of 0-10)	7	Future quality without offset (scale of 0-10)	7	Future quality with offset (scale of 0-10)	9	2.00	78%	1.56	1.54				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	1.169	2.02	172.75%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Appendix B

Queensland offset calculator tools

B1 Habitat quality scoring template

Habitat Quality Site Assessment Template.....

For all environmental offset applications you must:

- Complete form (Environmental Offsets Delivery Form 1– Notice of Election and Advanced Offsets Details)
- Complete any other forms relevant to your application
- Provide the mandatory supporting information identified on the forms as being required to accompany your application

This form is useful for undertaking a **habitat quality analysis** of an impact and/or offset/advanced offset site.
Please note that this form should be completed individually for each assessment unit under consideration.

Is this Assessment for:	An Impact Site	☐	An Offset Site	☑	an Advanced Offset Site	☐

Habitat Quality Assessment Unit Score Sheet

Part C - Site Data

Property	Palmview	Date	15

Assessment Unit:	Assessment Unit Area (ha)	RE	Bioregion Number
1	24.05	12.3.5	Southeast Queensland

Landscape Photo- Please attach or insert north, south, east and west photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.

Datum		0m Mark	Zone	Easting	Northing
WGS 84	☐		56	153.09271	-26.73232
GDA 94	☑	50m Mark	Zone	Easting	Northing
			56	153.09323	-26.73251
Plot bearing		90	Recorders	MJD / FSR	

Site description and Location (including details of discrete polygons within the assessment unit)

Palmview grazing property (Lot 1 RP27759 and Lot 2 RP27760), currently owned in freehold by Sunshine Coast Council. Extensive grazing once covered the property, now used by small number of cattle.

Assessment unit can be described as a contiguous areas of Broad-leaved Paperbark *Melaleuca quinquenervia* regrowth, with a canopy height of 3-4m. Ground layer dominated by exotic grasses, with some native and exotic sedges in lower areas where pooling surface water is common. Isolated retained eucalypt trees and Cabbage Palms throughout, spaced very sparcely.

Part D - Native Species Richness: (*list species below)

Tree species richness:			
Total number of species	1		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Shrub species richness:			
Total number of species	3		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Eucalypt spp.*	Common Name	Eucalypt sapling
Scientific Name	*Melastoma malabathricum* subsp. *malabathricum*	Common Name	Native Blue Tongue
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Grass species richness:			
Total number of species	1		
Scientific Name	*Themeda triandra*	Common Name	Kangaroo Grass
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Forbs and others (non grass ground) species richness:			
Total number of species	9		
Scientific Name	*Gahnia sieberiana*	Common Name	Red-fruited Saw-sedge
Scientific Name	*Cyperus sp.*	Common Name	Sedge
Scientific Name	*Cyperus sp.*	Common Name	Sedge
Scientific Name	*Drosera spathulata*	Common Name	Sundew
Scientific Name	*Baumea teretifolia*	Common Name	
Scientific Name	*Schoenoplectus mucronatus*	Common Name	
Scientific Name	*Velleia spathulata*	Common Name	
Scientific Name	*Lomandra longifolia*	Common Name	Mat Rush
Scientific Name	*Fimbristylis nutans*	Common Name	

Part E - Non-Native Plant Cover: (*list species below)

Total percentage cover within plot	90.00%		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters)

Total Length of Course Woody Debris (Meters):			
1		26	
2		27	
3		28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)

Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	5.00%	10.00%	5.00%	0.00%	10.00%	6.00%

Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	0.00%	0.00%	0.00%	0.00%	

Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:

Eucalypt Large tree DBH benchmark used :	0	Non- Eucalypt Large tree DBH benchmark used:	33
Number of large eucalypt trees:	0	Number of large non eucalypt trees:	0
Total Number Large Trees:			

Median Tree Canopy Height Measurements	Canopy:	4.00	Sub-canopy:		Emergent:	18.00

Number of ecologically dominant layer species regenerating:	1

Part I - Tree canopy cover, Shrub canopy cover

Tree canopy cover %	Canopy:	18.40%	Sub-canopy:		Emergent:	
Shrub canopy cover %	15.00%					

Note: Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corridors
DESCRIPTION	3 - 26 - 100ha	3 - 50%-75% connection	1 - <10% remnant	1 - 0-500m	2 - Sharing a common boundary
SCORE	5	4	0	0	4

DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.

YES ☑ PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED

NO ☐ PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED

Part K - Species Habitat Attributes

Species Habitat Attributes

No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location to overall population
1	*Crinia tinnula*	wallum froglet	V	Description	*3 - Low threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	10	10	10	1
2	*Litoria freycineti*	wallum rocketfrog	V	Description	*3 - Low threat level*	*2 - Moderate*	*2 - Moderate*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	5	5	10	1
3	*Litoria olongburensis*	wallum sedgefrog	V	Description	*3 - Low threat level*	*1 - Poor*	*1 - Poor*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	1	1	10	1
4				Description					
				Score					
5				Description					
				Score					
6				Description					
				Score					
7				Description					
				Score					
8				Description					
				Score					
9				Description					
				Score					
10				Description					
				Score					
				Maximum Score	15.00	10.00	10.00	10.00	1.00

APPENDIX B

Biodiversity Offsets Strategy (continued)

Attach Landscape Photos Here

North

South

East

West

(FORM COMPLETE) Please save and forward completed form/s together with Offsets Delivery Form 5 that can be accessed here: QLD Environmental Offsets

Habitat Quality Site Assessment Template.....

For all environmental offset applications you must:

- Complete form (Environmental Offsets Delivery Form 1– Notice of Election and Advanced Offsets Details)
- Complete any other forms relevant to your application
- Provide the mandatory supporting information identified on the forms as being required to accompany your application

This form is useful for undertaking a **habitat quality analysis** of an impact and/or offset/advanced offset site.
Please note that this form should be completed individually for each assessment unit under consideration.

Is this Assessment for:	An Impact Site	☐	An Offset Site	☑	an Advanced Offset Site	☐

Habitat Quality Assessment Unit Score Sheet

Part C - Site Data

Property	Palmview	Date	

Assessment Unit:	Assessment Unit Area (ha)	RE	Bioregion Number
2	3.82	12.3.5	Southeast Queensland

Landscape Photo- Please attach or insert north, south, east and west photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.

Datum			Zone	Easting	Northing
WGS 84 ☐		0m Mark	56	153.10098	-26.73591
GDA 94 ☑		50m Mark	Zone	Easting	Northing
			56	153.10104	-26.73544
Plot bearing			0	Recorders	MJD / FSR

Site description and Location (including details of discrete polygons within the assessment unit)
Palmview grazing property (Lot 2 RP27760), currently owned in freehold by Sunshine Coast Council. Extensive grazing once covered the property, now used by small number of cattle. Very dense groundcover with exotic grasses indicates that grazing has been largely excluded from this AU. Higher abundance of retained paddock trees of the genus *Eucalyptus* and *Angophora* within this AU. Mapped and floristically remnant RE 12.3.5 located to the north, east and south of this AU. Also shares a boundary with floristically remnant sedgeland/fernland/paperbark complex in the centre of the offet area. AU described as regrowth Broad-leaved Paperbark forest, with scattered *Acacia spp.* and eucalypt saplings. EDL approximately 3m in height, composed almost completely of Broad-leaved Paperbark trees. Emergent layer of eucalypts up to 22m in height. No defined shrub layer, this strata dominated largely by paperbark saplings. Very dense ground cover dominated by exotic grasses, with some native grasses. Exotic and native sedges common in drainage depressions and low lying areas. Topography is generally flat, with a very gradual fall towards the central sedgeland/fernland/paperbark complex and the southern drainage line.

Part D - Native Species Richness: (*list species below)

Tree species richness:			
Total number of species	4		
Scientific Name	*Eucalyptus tereticornis*	Common Name	Forest Red Gum
Scientific Name	*Corymbia intermedia*	Common Name	Pink Bloodwood
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Angophora subvelutina*	Common Name	Rough-barked Apple
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Shrub species richness:			
Total number of species	2		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Pultenea robusta*	Common Name	Tall Swamp Pea
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Grass species richness:			
Total number of species	3		
Scientific Name	*Imperata cylindrica*	Common Name	Blady Grass
Scientific Name	*Themeda triandra*	Common Name	Kangaroo Grass
Scientific Name	*Cymbopogon refractus*	Common Name	Barbwire Grass
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Forbs and others (non grass ground) species richness:			
Total number of species	5		
Scientific Name	*Dianella caerulea*	Common Name	Blue Flax-lilly
Scientific Name	*Lomandra longifolia*	Common Name	Mat Rush
Scientific Name	*Cyperus sp*	Common Name	A sedge
Scientific Name	*Centella asiatica*	Common Name	Pennywort
Scientific Name	*Patersonia sericea*	Common Name	Native Iris
Scientific Name		Common Name	
Scientific Name		Common Name	

Part E - Non-Native Plant Cover: (*list species below)

Total percentage cover within plot	80.00%		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters)

Total Length of Course Woody Debris (Meters):			
1		26	
2		27	
3		28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)

Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	40.00%	25.00%	10.00%	10.00%	5.00%	18.00%

Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	0.00%	0.00%	0.00%	0.00%	

Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:

Eucalypt Large tree DBH benchmark used :	0	Non- Eucalypt Large tree DBH benchmark used:	33
Number of large eucalypt trees:	0	Number of large non eucalypt trees:	3
Total Number Large Trees:	3		

Median Tree Canopy Height Measurements	Canopy:	3.00	Sub-canopy:		Emergent:	22.00

Number of ecologically dominant layer species regenerating:	1

Part I - Tree canopy cover, Shrub canopy cover

Tree canopy cover %	Canopy:	20.40%	Sub-canopy:		Emergent:	4.90%
Shrub canopy cover %	8.50%					

Note: Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corridors
DESCRIPTION	1 - <5ha	3 - 50%-75% connection	1 - <10% remnant	1 - 0-500m	2 - Sharing a common boundary
SCORE	0	4	0	0	4

DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.

YES ☑ PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED

NO ☐ PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED

Part K - Species Habitat Attributes

Species Habitat Attributes

No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location to overall population
1	*Crinia tinnula*	wallum froglet	V	Description	*3 - Low threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	10	10	10	1
2	*Litoria freycineti*	wallum rocketfrog	V	Description	*3 - Low threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	10	10	10	1
3	*Litoria olongburensis*	wallum sedgefrog	V	Description	*3 - Low threat level*	*2 - Moderate*	*2 - Moderate*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	5	5	10	1
4				Description					
				Score					
5				Description					
				Score					
6				Description					
				Score					
7				Description					
				Score					
8				Description					
				Score					
9				Description					
				Score					
10				Description					
				Score					
				Maximum Score	15.00	10.00	10.00	10.00	1.00

Attach Landscape Photos Here

North

South

East

West

(FORM COMPLETE) Please save and forward completed form/s together with Offsets Delivery Form 5 that can be accessed here: QLD Environmental Offsets

Habitat Quality Site Assessment Template.....

For all environmental offset applications you must:

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- Complete any other forms relevant to your application
- Provide the mandatory supporting information identified on the forms as being required to accompany your application

This form is useful for undertaking a **habitat quality analysis** of an impact and/or offset/advanced offset site.
Please note that this form should be completed individually for each assessment unit under consideration.

Is this Assessment for:	An Impact Site	☐	An Offset Site	☑	an Advanced Offset Site	☐

Habitat Quality Assessment Unit Score Sheet

Part C - Site Data

Property	Palmview	Date	

Assessment Unit:	Assessment Unit Area (ha)	RE	Bioregion Number
3	25.48	12.3.5	Southeast Queensland

Landscape Photo- Please attach or insert north, south, east and west photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.

Datum		Zone	Easting	Northing
WGS 84 ☐	0m Mark	56	153.09683	-26.73614
GDA 94 ☑	50m Mark	Zone	Easting	Northing
		56	153.09629	-26.73597
Plot bearing		285	Recorders	MJD / FSR

Site description and Location (including details of discrete polygons within the assessment unit)
Palmview grazing property (Lot 2 RP27760), currently owned in freehold by Sunshine Coast Council. Highly degraded exotic pasture, with very low levels of native shrub and tree regrowth. Very low strutural complexity and high levels of exotic ground cover. Ecologically dominant layer can be described as the ground cover of exotic grasses. Areas of native vegetation groundcover are concentrated in depressions where pooling surface water has allowed the growth of native sedges.

Part D - Native Species Richness: (*list species below)

Tree species richness:			
Total number of species	1		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Shrub species richness:			
Total number of species	2		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Melastoma malabathricum* subsp. *malabathricum*	Common Name	Native Blue Tongue
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Grass species richness:			
Total number of species	1		
Scientific Name	*Themeda triandra*	Common Name	Kangaroo Grass
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Forbs and others (non grass ground) species richness:			
Total number of species	7		
Scientific Name	*Cyperus sp*	Common Name	A sedge
Scientific Name	*Philydrum lanuginosum*	Common Name	Wooly Frogsmouth
Scientific Name	*Gahnia sieberiana*	Common Name	Red-fruited Saw-sedge
Scientific Name	*Commelina diffusa*	Common Name	Native Wandering Jew
Scientific Name	*Centella asiatica*	Common Name	Pennywort
Scientific Name	*Xyris complanata*	Common Name	
Scientific Name	*Persicaria sp.*	Common Name	A smartweed

Part E - Non-Native Plant Cover: (*list species below)

Total percentage cover within plot	90.00%		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters)

Total Length of Course Woody Debris (Meters):			
1		26	
2		27	
3		28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)

Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	0.00%	0.00%	0.00%	0.00%	

Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	0.00%	0.00%	0.00%	0.00%	

Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:

Eucalypt Large tree DBH benchmark used :	0	Non- Eucalypt Large tree DBH benchmark used:	33
Number of large eucalypt trees:	0	Number of large non eucalypt trees:	0
Total Number Large Trees:			

Median Tree Canopy Height Measurements	Canopy:	3.00	Sub-canopy:		Emergent:	

Number of ecologically dominant layer species regenerating:	1

Part I - Tree canopy cover, Shrub canopy cover

Tree canopy cover %	Canopy:	2.40%	Sub-canopy:		Emergent:	
Shrub canopy cover %	4.90%					

Note: Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corridors
DESCRIPTION	3 - 26 - 100ha	1 - 0% - 10% connection	1 - <10% remnant	1 - 0-500m	1- Not within
SCORE	5	0	0	0	0

DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.

YES ☐ **PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED**

NO ☐ **PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED**

Part K - Species Habitat Attributes

Species Habitat Attributes

No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location to overall population
1	*Crinia tinnula*	wallum froglet	V	Description	*2 - Moderate threat level*	*2 - Moderate*	*2 - Moderate*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	5	5	10	1
2	*Litoria freycineti*	wallum rocketfrog	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	10	1
3	*Litoria olongburensis*	wallum sedgefrog	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	10	1
4				Description					
				Score					
5				Description					
				Score					
6				Description					
				Score					
7				Description					
				Score					
8				Description					
				Score					
9				Description					
				Score					
10				Description					
				Score					
				Maximum Score	7.00	5.00	5.00	10.00	1.00

APPENDIX B

Biodiversity Offsets Strategy (continued)

Attach Landscape Photos Here

North

South

East

West

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Habitat Quality Site Assessment Template.....

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- Provide the mandatory supporting information identified on the forms as being required to accompany your application

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Please note that this form should be completed individually for each assessment unit under consideration.

Is this Assessment for:	An Impact Site	☐	An Offset Site	☑	an Advanced Offset Site	☐

Habitat Quality Assessment Unit Score Sheet

Part C - Site Data

Property	Palmview	Date	

Assessment Unit:	Assessment Unit Area (ha)	RE	Bioregion Number
4	2.3	12.3.5	Southeast Queensland

Landscape Photo- Please attach or insert north, south, east and west photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.

Datum					
WGS 84 ☐	0m Mark	Zone	Easting	Northing	
GDA 94 ☐		56	153.1	-26.736	
	50m Mark	Zone	Easting	Northing	
		56	153.099	-26.7358	
Plot bearing		315	Recorders	MJD / FSR	

Site description and Location (including details of discrete polygons within the assessment unit)
Palmview grazing property (Lot 2 RP27760), currently owned in freehold by Sunshine Coast Council. Assessment Unit is located in an area that has had grazing excluded for some time and native regrowth is in a moderate to excellent condition. Some areas appear to have retained Broad-leaved Paperbark trees . Grazing likley excluded due to hydrology. Very high quality regrowth and floristically remnant Broad-leaved Paperbark forest. Some areas have good canopy cover of Broad-leaved Paperbark trees. In centre of patch, no weed/exotic cover, however some exotic grass cover on edge.

Part D - Native Species Richness: (*list species below)

Tree species richness:			
Total number of species	1		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Shrub species richness:			
Total number of species	1		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Grass species richness:			
Total number of species	2		
Scientific Name	*Leersia hexandra*	Common Name	Swamp Rice Grass
Scientific Name	*Imperata cylindrica*	Common Name	Blady Grass
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Forbs and others (non grass ground) species richness:			
Total number of species	7		
Scientific Name	*Blechnum indicum*	Common Name	Bungwall
Scientific Name	*Baumea rubiginosa*	Common Name	Twigrush
Scientific Name	*Baumea articulata*	Common Name	Jointed Twigrush
Scientific Name	*Persicaria sp.*	Common Name	Smartweed
Scientific Name	*Lygodium microphyllum*	Common Name	Climbing Maidenhair Fern
Scientific Name	*Pteridium esculentum*	Common Name	Bracken Fern
Scientific Name	*Schoenus brevifolius*	Common Name	Spiky Sedge
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part E - Non-Native Plant Cover: (*list species below)

Total percentage cover within plot			
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters)

Total Length of Course Woody Debris (Meters):	385.50		
1	7.30	26	
2	8.60	27	
3	0.65	28	
4	6.50	29	
5	1.20	30	
6	3.50	31	
7	5.60	32	
8	2.10	33	
9	0.80	34	
10	0.60	35	
11	1.20	36	
12	0.50	37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)

Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	0.00%	0.00%	0.00%	0.00%	

Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	0.00%	0.00%	0.00%	0.00%	

Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:

Eucalypt Large tree DBH benchmark used :	0	Non- Eucalypt Large tree DBH benchmark used:	33
Number of large eucalypt trees:	0	Number of large non eucalypt trees:	13
Total Number Large Trees:	13		

Median Tree Canopy Height Measurements	Canopy:	18.00	Sub-canopy:	5.50	Emergent:	

Number of ecologically dominant layer species regenerating:	1

Part I - Tree canopy cover, Shrub canopy cover

Tree canopy cover %	Canopy:	68.20%	Sub-canopy:	12.50%	Emergent:	
Shrub canopy cover %	0.54%					

Note: Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corridors
DESCRIPTION	1 - <5ha	1 - 0% - 10% connection	2 - >10% to 30% remnan	1 - 0-500m	2 - Sharing a common boundary
SCORE	0	0	2	0	4

DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.

YES ☑ **PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED**

NO ☐ **PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED**

Part K - Species Habitat Attributes

Species Habitat Attributes

No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location to overall population
1	*Crinia tinnula*	wallum froglet	V	Description	*3 - Low threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	10	10	10	1
2	*Litoria freycineti*	wallum rocketfrog	V	Description	*3 - Low threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	10	10	10	1
3	*Litoria olongburensis*	wallum sedgefrog	V	Description	*3 - Low threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	10	10	10	1
4				Description					
				Score					
5				Description					
				Score					
6				Description					
				Score					
7				Description					
				Score					
8				Description					
				Score					
9				Description					
				Score					
10				Description					
				Score					
				Maximum Score	15.00	10.00	10.00	10.00	1.00

North

Habitat Quality Site Assessment Template……

PLEASE NOTE - YELLOW INDICATES AN AUTO POPULATED FIELD

For all environmental offset applications you must:

- Complete form (Environmental Offsets Delivery Form 1– Notice of Election and Advanced Offsets Details)
- Complete any other forms relevant to your application
- Provide the mandatory supporting information identified on the forms as being required to accompany your application

This form is useful for undertaking a **habitat quality analysis** of an impact and/or offset/advanced offset site.
Please note that this form should be completed individually for each assessment unit under consideration.

Is this Assessment for:	An Impact Site	☐	An Offset Site	☑	an Advanced Offset Site	☐

Habitat Quality Assessment Unit Score Sheet

Part C - Site Data

Property	Sunshine Coast Airport - corridor offset	Date	

Assessment Unit:	Assessment Unit Area (ha)	RE	Bioregion Number
5	7.5	12.3.5	Southeast Queensland

Landscape Photo- Please attach or insert north, south, east and west photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.

Datum		0m Mark	Zone	Easting	Northing
WGS 84	☐		56	153.096	-26.735
GDA 94	☐	50m Mark	Zone	Easting	Northing
			56	153.097	-26.7348
Plot bearing			135	Recorders	MJD / FSR

Site description and Location (including details of discrete polygons within the assessment unit)
Palmview grazing property (Lot 2 RP27760), currently owned in freehold by Sunshine Coast Council. Assessment Unit is located in an area that has had grazing excluded for some time and native regrowth is in a moderate to excellent condition. Grazing likley excluded due to hydrology Regrowth Broad-leaved Paperbark forest, sedgeland and fernland complex. Some areas lack a canopy/shrub layer. Very low weed and exotic plant coverage. Pooling surface water present during site investigations on 10th April. Low turbidity and pH < 5

Part D - Native Species Richness: (*list species below)

Tree species richness:			
Total number of species	2		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Lophostemon suaveolens*	Common Name	Swamp Box
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Shrub species richness:			
Total number of species	4		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Glochidion sumatranum*	Common Name	Cheese Tree
Scientific Name	*Melastoma malabathricum* subsp. *malabathricum*	Common Name	Native Blue Tongue
Scientific Name	*Meleleuca pachyphylla*	Common Name	Swamp Bottlebrush
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Grass species richness:			
Total number of species	1		
Scientific Name	*Imperata cylindrica*	Common Name	Blady Grass
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Forbs and others (non grass ground) species richness:			
Total number of species	6		
Scientific Name	*Blechnum indicum*	Common Name	Bungwall
Scientific Name	*Baumea rubinosa*	Common Name	Twigrush
Scientific Name	*Baumea articulata*	Common Name	Jointed Twigrush
Scientific Name	*Schoenus brevifolius*	Common Name	Spiky Sedge
Scientific Name	*Gahnia sieberiana*	Common Name	Red-fruited Saw Sedge
Scientific Name	*Lygodium microphyllum*	Common Name	Climbing Maidenhair Fern
Scientific Name		Common Name	

Part E - Non-Native Plant Cover: (*list species below)

Total percentage cover within plot	0.00%		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters)

Total Length of Course Woody Debris (Meters):	86.10		
1	2.80	26	
2	3.40	27	
3	1.20	28	
4	0.55	29	
5	0.66	30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)

Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	0.00%	0.00%	0.00%	0.00%	

Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	25.00%	15.00%	5.00%	18.00%	25.00%	17.60%

Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:

Eucalypt Large tree DBH benchmark used :		Non- Eucalypt Large tree DBH benchmark used:	30
Number of large eucalypt trees:		Number of large non eucalypt trees:	
Total Number Large Trees:			

Median Tree Canopy Height Measurements	Canopy:	12.00	Sub-canopy:	3.00	Emergent:	

Number of ecologically dominant layer species regenerating:	1

Part I - Tree canopy cover, Shrub canopy cover

Tree canopy cover %	Canopy:	46.50%	Sub-canopy:	7.20%	Emergent:	
Shrub canopy cover %	2.30%					

Note: Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corridors
DESCRIPTION	2 - 5 - 25ha	1 - 0% - 10% connection	1 - <10% remnant	1 - 0-500m	2 - Sharing a common boundary
SCORE	2	0	0	0	4

DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.

YES ☑ PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED

NO ☐ PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED

Part K - Species Habitat Attributes

Species Habitat Attributes

No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location to overall population
1	Crinia tinnula	wallum froglet	V	Description	*3 - Low threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	10	10	10	1
2	Litoria freycineti	wallum rocketfrog	V	Description	*3 - Low threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	10	10	10	1
3	Litoria olongburensis	wallum sedgefrog	V	Description	*3 - Low threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	10	10	10	1
4				Description					
				Score					
5				Description					
				Score					
6				Description					
				Score					
7				Description					
				Score					
8				Description					
				Score					
9				Description					
				Score					
10				Description					
				Score					
				Maximum Score	15.00	10.00	10.00	10.00	1.00

APPENDIX B

Biodiversity Offsets Strategy (continued)

Attach Landscape Photos Here

North

South

East

Habitat Quality Site Assessment Template.....

For all environmental offset applications you must:

- Complete form (Environmental Offsets Delivery Form 1– Notice of Election and Advanced Offsets Details)
- Complete any other forms relevant to your application
- Provide the mandatory supporting information identified on the forms as being required to accompany your application

This form is useful for undertaking a **habitat quality analysis** of an impact and/or offset/advanced offset site.
Please note that this form should be completed individually for each assessment unit under consideration.

Is this Assessment for:	An Impact Site	☐	An Offset Site	☑	an Advanced Offset Site	☐

Habitat Quality Assessment Unit Score Sheet

Part C - Site Data

Property	Sunshine Coast Airport - Wallum Heath Management Area	Date	

Assessment Unit:	Assessment Unit Area (ha)	RE	Bioregion Number
6	25.46	12.2.12	Southeast Queensland

Landscape Photo- Please attach or insert north, south, east and west photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.

Datum					
WGS 84 ☐	0m Mark	Zone	Easting	Northing	
GDA 94 ☐		56	153.09188	-26.59393	
	50m Mark	Zone	Easting	Northing	
		56	153.09234	-26.59393	
Plot bearing		0	Recorders	MJD / FSR	

Site description and Location (including details of discrete polygons within the assessment unit)
Wallum Heath Management Area within airside sections of the Sunshine Coast Airport. Area undergoes periodic slashing and management to maintain a low vegetation cover to meet airport safety and operational requirements. This section of the airport contains radar and meteorological equipment. Regrowth wallum heathland, with patches of wetter sedgeland/fernland. Very sparse Broad-leaved Paperbark regrowth within sampling sites, but density of regrowth varies across AU. Area is subject to inundation during rainfall events. Known habitat for acid frogs and Ground Parrot.

Part D - Native Species Richness: (*list species below)

Tree species richness:			
Total number of species	1		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Shrub species richness:			
Total number of species	11		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Philotheca queenslandica*	Common Name	Queensland Wax Flower
Scientific Name	*Woollsia pungens*	Common Name	
Scientific Name	*Banksia robur*	Common Name	Wallum Banksia
Scientific Name	*Pultenea paleacea*	Common Name	Chaffy Swamp Pea
Scientific Name	*Leptospermum liversidgei*	Common Name	Swamp May
Scientific Name	*Baeckea frutescens*	Common Name	Weeping Baeckea
Scientific Name	*Leucopogon leptospermoides*	Common Name	Bushy Whitebeard
Scientific Name	*Hibbertia vestita*	Common Name	Guinea Flower
Scientific Name	*Boronia falcifolia*	Common Name	Wallum Boronia
Scientific Name	*Epacris pulchella*	Common Name	Coral Heath

Grass species richness:			
Total number of species	0		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Forbs and others (non grass ground) species richness:			
Total number of species	12		
Scientific Name	*Schoenoplectus mucronatus*	Common Name	
Scientific Name	*Empodisma minus*	Common Name	Spreading Rope Rush
Scientific Name	*Balloskion pallens*	Common Name	Pale Cordrush
Scientific Name	*Xyris complanata*	Common Name	Hatpins
Scientific Name	*Baumea teretifolia*	Common Name	
Scientific Name	*Baumea articulata*	Common Name	Jointed Twigrush
Scientific Name	*Cassytha pubescens*	Common Name	Dodder Laurel
Scientific Name	*Xanthorrhoea fulva*	Common Name	Wallum Grasstree
Scientific Name	*Gleichenia dicarpa*	Common Name	Pouched Coral Fern
Scientific Name	*Persicaria sp.*	Common Name	Smartweed
Scientific Name	*Blechnum indicum*	Common Name	Bungwall
Scientific Name	*Gonocarpus micranthus*	Common Name	Creeping Raspwort

Part E - Non-Native Plant Cover: (*list species below)

Total percentage cover within plot			
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters)

Total Length of Course Woody Debris (Meters):			
1		26	
2		27	
3		28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)

Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	0.00%	0.00%	0.00%	0.00%	

Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average

Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:

Eucalypt Large tree DBH benchmark used :		Non- Eucalypt Large tree DBH benchmark used:	
Number of large eucalypt trees:		Number of large non eucalypt trees:	
Total Number Large Trees:			

Median Tree Canopy Height Measurements	Canopy:	2.50	Sub-canopy:		Emergent:	

Number of ecologically dominant layer species regenerating:	5

Part I - Tree canopy cover, Shrub canopy cover

Tree canopy cover %	Canopy:	3.90%	Sub-canopy:		Emergent:	
Shrub canopy cover %	35.30%					

Note: Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corridors
DESCRIPTION	2 - 5 - 25ha	2 - >10% - <50%	1 - <10% remnant	1 - 0-500m	2 - Sharing a common boundary
SCORE	2	2	0	0	4

DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.

YES ☐ PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED

NO ☐ PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED

Part K - Species Habitat Attributes

Species Habitat Attributes

No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location to overall population
1	*Crinia tinnula*	wallum froglet	V	Description	*3 - Low threat level*	*2 - Moderate*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	5	10	10	1
2	*Litoria freycineti*	wallum rocketfrog	V	Description	*3 - Low threat level*	*2 - Moderate*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	15	5	10	10	1
3	*Litoria olongburensis*	wallum sedgefrog	V	Description	*2 - Moderate threat level*	*2 - Moderate*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	5	10	10	1
4	Pezoporus wallicus wallicus	ground parrot	V	Description	*2 - Moderate threat level*	*3 - High*	*3 - High*	*4 - Minor restriction (0 – 25% reduction)*	2 - Likely to be critical to species' survival
				Score	7	10	10	10	4
5				Description					
				Score					
6				Description					
				Score					
7				Description					
				Score					
8				Description					
				Score					
9				Description					
				Score					
10				Description					
				Score					
				Maximum Score	15.00	10.00	10.00	10.00	4.00

Attach Landscape Photos Here

North

South

East

West

(FORM COMPLETE) Please save and forward completed form/s together with Offsets Delivery Form 5 that can be accessed here: QLD Environmental Offsets

Habitat Quality Site Assessment Template.....

PLEASE NOTE - YELLOW INDICATES AN AUTO POPULATED FIELD

For all environmental offset applications you must:

- Complete form (Environmental Offsets Delivery Form 1– Notice of Election and Advanced Offsets Details)
- Complete any other forms relevant to your application
- Provide the mandatory supporting information identified on the forms as being required to accompany your application

This form is useful for undertaking a **habitat quality analysis** of an impact and/or offset/advanced offset site.
Please note that this form should be completed individually for each assessment unit under consideration.

Is this Assessment for:	An Impact Site	☐	An Offset Site	☑	an Advanced Offset Site	☐

Habitat Quality Assessment Unit Score Sheet

Part C - Site Data

Property	Sunshine Coast Airport - corridor offset	Date	

Assessment Unit:	Assessment Unit Area (ha)	RE	Bioregion Number
7	38.22	12.2.7	Southeast Queensland

Landscape Photo- Please attach or insert north, south, east and west photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.

Datum					
WGS 84 ☐	0m Mark	Zone	Easting	Northing	
GDA 94 ☐		56	153.078	-26.579	
	50m Mark	Zone	Easting	Northing	
		56	153.078	-26.5783	
Plot bearing		0	Recorders	MJD / FSR	

Site description and Location (including details of discrete polygons within the assessment unit)
North-east corner of the proposed corridor offset located on Sunshine Coast Airport land (Lot 1106 on SP206556). The vegetation composition of the Assessment Unit is predominantly degraded grassland, due to the historic and current use as cane lands. The northern section has been removed from cultivation earlier and has some native regrowth elements. Further to the south, there are still areas under cane cultivation which contain no native canopy cover. Much of the Assessment Unit has exotic grasses, forbs and sedges as the dominant group of species. Declared pest plants, particularly Groundsel Bush *Baccharis halimifolia,* are common across the AU. The sampling site is located within an area of the most advanced native regrowth, dominated by Wattle *Acacia spp.* and Broad-leaved Paperbark *Melaleuca quinquenervia.* AU also includes the 4.41ha of land reserved for the Mount Emu She-oak offset, as the current floristic condition of the AU is similar.

Part D - Native Species Richness: (*list species below)

Tree species richness:			
Total number of species	5		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Acacia cincinnata*	Common Name	Coil-pod Wattle
Scientific Name	*Acacia disparrima* subsp. *disparrima*	Common Name	Hickory Wattle
Scientific Name	*Commersonia bartramia*	Common Name	Brown Kurrajong
Scientific Name	*Glochidion sumatranum*	Common Name	Cheese Tree
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Shrub species richness:			
Total number of species	1		
Scientific Name	*Acacia cincinnata*	Common Name	Coil-pod Wattle
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Grass species richness:			
Total number of species	1		
Scientific Name	*Imperata cylindrica*	Common Name	Blady Grass
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Forbs and others (non grass ground) species richness:			
Total number of species	0		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part E - Non-Native Plant Cover: (*list species below)

Total percentage cover within plot	90.00%		
Scientific Name	*Setaria sp.*	Common Name	Setaria
Scientific Name	*Baccharis halimifolia*	Common Name	Groundsel Bush
Scientific Name		Common Name	Exotic Grasses
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters)

Total Length of Course Woody Debris (Meters):			
1		26	
2		27	
3		28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)

Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	3.00%	4.00%	0.00%	15.00%	4.40%

Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	90.00%	94.00%	95.00%	20.00%	3.00%	60.40%

Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:

Eucalypt Large tree DBH benchmark used :	50	Non- Eucalypt Large tree DBH benchmark used:	30
Number of large eucalypt trees:	0	Number of large non eucalypt trees:	0
Total Number Large Trees:			

Median Tree Canopy Height Measurements	Canopy:	7.00	Sub-canopy:	4.00	Emergent:	

Number of ecologically dominant layer species regenerating:	3

Part I - Tree canopy cover, Shrub canopy cover

Tree canopy cover %	Canopy:	51.10%	Sub-canopy:	22.90%	Emergent:	
Shrub canopy cover %	1.00%					

Note: Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corridors
DESCRIPTION	3 - 26 - 100ha	1 - 0% - 10% connection	1 - <10% remnant	1 - 0-500m	2 - Sharing a common boundary
SCORE	5	0	0	0	4

DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.

YES ☑ **PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED**

NO ☐ **PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED**

Part K - Species Habitat Attributes

Species Habitat Attributes

No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location to overall population
1	Crinia tinnula	wallum froglet	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*2 - Highly restricted (51% - 75% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	4	1
2	Litoria freycineti	wallum rocketfrog	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*2 - Highly restricted (51% - 75% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	4	1
3	Litoria olongburensis	wallum sedgefrog	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*2 - Highly restricted (51% - 75% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	4	1
4				Description					
				Score					
5				Description					
				Score					
6				Description					
				Score					
7				Description					
				Score					
8				Description					
				Score					
9				Description					
				Score					
10				Description					
				Score					
				Maximum Score	7.00	1.00	1.00	4.00	1.00

APPENDIX B

Biodiversity Offsets Strategy (continued)

Attach Landscape Photos Here

North

South

East

West

(FORM COMPLETE) Please save and forward completed form/s together with Offsets Delivery Form 5 that can be accessed here: QLD Environmental Offsets

Habitat Quality Site Assessment Template.....

PLEASE NOTE - YELLOW INDICATES AN AUTO POPULATED FIELD

For all environmental offset applications you must:

- Complete form (Environmental Offsets Delivery Form 1– Notice of Election and Advanced Offsets Details)
- Complete any other forms relevant to your application
- Provide the mandatory supporting information identified on the forms as being required to accompany your application

This form is useful for undertaking a **habitat quality analysis** of an impact and/or offset/advanced offset site.
Please note that this form should be completed individually for each assessment unit under consideration.

Is this Assessment for:	An Impact Site	☐	An Offset Site	☑	an Advanced Offset Site	☐

Habitat Quality Assessment Unit Score Sheet

Part C - Site Data

Property	Sunshine Coast Airport	Date	

Assessment Unit:	Assessment Unit Area (ha)	RE	Bioregion Number
8	4.41	12.2.12	Southeast Queensland

Landscape Photo- Please attach or insert north, south, east and west photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.

Datum			Zone	Easting	Northing
WGS 84 ☐		0m Mark			
GDA 94 ☐		50m Mark	Zone	Easting	Northing
Plot bearing				Recorders	

Site description and Location (including details of discrete polygons within the assessment unit)
Proposed Mount Emu She-oak offset area. No formal Bioconditon transect was completed within this AU, however the current vegetation characteristics are functionally similar to AU7. The information in this form has been collated from AU7.

Part D - Native Species Richness: (*list species below)

Tree species richness:			
Total number of species	5		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Acacia cincinnata*	Common Name	Coil-pod Wattle
Scientific Name	*Acacia disparrima* subsp. *disparrima*	Common Name	Hickory Wattle
Scientific Name	*Commersonia bartramia*	Common Name	Brown Kurrajong
Scientific Name	*Glochidion sumatranum*	Common Name	Cheese Tree
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Shrub species richness:			
Total number of species	1		
Scientific Name	*Acacia cincinnata*	Common Name	Coil-pod Wattle
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Grass species richness:			
Total number of species	1		
Scientific Name	*Imperata cylindrica*	Common Name	Blady Grass
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Forbs and others (non grass ground) species richness:			
Total number of species	0		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part E - Non-Native Plant Cover: (*list species below)

Total percentage cover within plot	90.00%		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters)

Total Length of Course Woody Debris (Meters):			
1		26	
2		27	
3		28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)

Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	3.00%	4.00%	0.00%	15.00%	4.40%

Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	90.00%	94.00%	95.00%	20.00%	3.00%	60.40%

Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:

Eucalypt Large tree DBH benchmark used :	50	Non- Eucalypt Large tree DBH benchmark used:	30
Number of large eucalypt trees:	0	Number of large non eucalypt trees:	0
Total Number Large Trees:			

Median Tree Canopy Height Measurements	Canopy:	7.00	Sub-canopy:	4.00	Emergent:	

Number of ecologically dominant layer species regenerating:	3

Part I - Tree canopy cover, Shrub canopy cover

Tree canopy cover %	Canopy:	51.10%	Sub-canopy:	22.90%	Emergent:	
Shrub canopy cover %	1.00%					

Note: Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corridors
DESCRIPTION	1 - <5ha	3 - 50%-75% connection	1 - <10% remnant	1 - 0-500m	2 - Sharing a common boundary
SCORE	0	4	0	0	4

DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.

YES ☑ PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED

NO ☐ PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED

Part K - Species Habitat Attributes

Species Habitat Attributes

No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location to overall population
1	Crinia tinnula	wallum froglet	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*2 - Highly restricted (51% - 75% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	4	1
2	Litoria freycineti	wallum rocketfrog	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*2 - Highly restricted (51% - 75% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	4	1
3	Litoria olongburensis	wallum sedgefrog	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*2 - Highly restricted (51% - 75% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	4	1
4				Description					
				Score					
5				Description					
				Score					
6				Description					
				Score					
7				Description					
				Score					
8				Description					
				Score					
9				Description					
				Score					
10				Description					
				Score					
				Maximum Score	7.00	1.00	1.00	4.00	1.00

Habitat Quality Site Assessment Template.....

PLEASE NOTE - YELLOW INDICATES AN AUTO POPULATED FIELD

For all environmental offset applications you must:

- Complete form (Environmental Offsets Delivery Form 1– Notice of Election and Advanced Offsets Details)
- Complete any other forms relevant to your application
- Provide the mandatory supporting information identified on the forms as being required to accompany your application

This form is useful for undertaking a **habitat quality analysis** of an impact and/or offset/advanced offset site.
Please note that this form should be completed individually for each assessment unit under consideration.

Is this Assessment for:	An Impact Site	☐	An Offset Site	☑	an Advanced Offset Site	☐

Habitat Quality Assessment Unit Score Sheet

Part C - Site Data

Property	Sunshine Coast Airport - 5.84ha northern sliver	Date	

Assessment Unit:	Assessment Unit Area (ha)	RE	Bioregion Number
9	5.84	12.2.12	Southeast Queensland

Landscape Photo- Please attach or insert north, south, east and west photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.

Datum		Zone	Easting	Northing
WGS 84 ☐	0m Mark			
GDA 94 ☐	50m Mark	Zone	Easting	Northing
Plot bearing			Recorders	

Site description and Location (including details of discrete polygons within the assessment unit)
Area proposed for clearing of Broad-leaved Paperbark and establishment of low, wallum heath vegetation community. As the vegetation community on this site does not currently reflect the conditions for when the offsets will be delivered, the site-based assessment values were taken from AU7. AU7 has the characteristics of a largely cleared Broad-leaved Paperbark forest.

Part D - Native Species Richness: (*list species below)

Tree species richness:			
Total number of species	5		
Scientific Name	*Melaleuca quinquenervia*	Common Name	Broad-leaved Paperbark
Scientific Name	*Acacia cincinnata*	Common Name	Coil-pod Wattle
Scientific Name	*Acacia disparrima subsp. disparrima*	Common Name	Hickory Wattle
Scientific Name	*Commersonia bartramia*	Common Name	Brown Kurrajong
Scientific Name	*Glochidion sumatranum*	Common Name	Cheese Tree
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Shrub species richness:			
Total number of species	1		
Scientific Name	*Acacia cincinnata*	Common Name	Coil-pod Wattle
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Grass species richness:			
Total number of species	1		
Scientific Name	*Imperata cylindrica*	Common Name	Coil-pod Wattle
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Forbs and others (non grass ground) species richness:			
Total number of species	0		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part E - Non-Native Plant Cover: (*list species below)

Total percentage cover within plot	90.00%		
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	
Scientific Name		Common Name	

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters)

Total Length of Course Woody Debris (Meters):			
1		26	
2		27	
3		28	
4		29	
5		30	
6		31	
7		32	
8		33	
9		34	
10		35	
11		36	
12		37	
13		38	
14		39	
15		40	
16		41	
17		42	
18		43	
19		44	
20		45	
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)

Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	0.00%	3.00%	4.00%	0.00%	15.00%	4.40%

Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
	90.00%	94.00%	95.00%	20.00%	3.00%	60.40%

Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:

Eucalypt Large tree DBH benchmark used :	50	Non- Eucalypt Large tree DBH benchmark used:	30
Number of large eucalypt trees:	0	Number of large non eucalypt trees:	0
Total Number Large Trees:			

Median Tree Canopy Height Measurements	Canopy:	7.00	Sub-canopy:	4.00	Emergent:	

Number of ecologically dominant layer species regenerating:	3

Part I - Tree canopy cover, Shrub canopy cover

Tree canopy cover %	Canopy:	51.10%	Sub-canopy:	22.90%	Emergent:	
Shrub canopy cover %	1.00%					

Note: Only assess Emergent (E) or Subcanopy (S) layers if the benchmark document stipulates that layers are present *If trees are in the same layer and continuous along the transect you can group them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corridors
DESCRIPTION	2 - 5 - 25ha	3 - 50%-75% connection	1 - <10% remnant	1 - 0-500m	2 - Sharing a common boundary
SCORE	2	4	0	0	4

DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.

YES ☑ **PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED**

NO ☐ **PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED**

Part K - Species Habitat Attributes

Species Habitat Attributes

No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location to overall population
1	Crinia tinnula	wallum froglet	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*2 - Highly restricted (51% - 75% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	4	1
2	Litoria freycineti	wallum rocketfrog	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*2 - Highly restricted (51% - 75% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	4	1
3	Litoria olongburensis	wallum sedgefrog	V	Description	*2 - Moderate threat level*	*1 - Poor*	*1 - Poor*	*2 - Highly restricted (51% - 75% reduction)*	1 - Not or unlikely to be critical to species' survival"
				Score	7	1	1	4	1
4				Description					
				Score					
5				Description					
				Score					
6				Description					
				Score					
7				Description					
				Score					
8				Description					
				Score					
9				Description					
				Score					
10				Description					
				Score					
				Maximum Score	7.00	1.00	1.00	4.00	1.00

APPENDIX B

Biodiversity Offsets Strategy (continued)

Habitat Quality Final Summary

For all environmental offset applications you must:
- Complete form (Environmental Offsets Delivery Form 1–Notice of Election and Advanced Offsets Details)
- Complete any other forms relevant to your application
- Provide the mandatory supporting information identified on the forms as being required to accompany your application

Note: This document/tool may be used in relation to undertaking a habitat quality analysis of an impact site/offset site and/or advanced offset site and is designed to be attached to Envrionmental Offsets Delivery Form 5 - Habitat Quality Details as

Habitat Quality Final Summary Template

Case Reference	
Project Name	
Total Area	137.08

PART		Habitat Quality Attributes	Requirement	Assessment Unit Number									
				1	2	3	4	5	6	7	8	9	10
		Assessment Unit Area (ha)	Area (ha)	24.05	3.82	25.48	2.3	7.5	25.46	38.22	4.41	5.84	0
		Regional Ecosystems	RE	12.3.5	12.3.5	12.3.5	12.3.5	12.3.5	12.2.12	12.2.7	12.2.12	12.2.12	
		Bioregion	Bioregion	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	
1	Site Condition Attributes	1. Recruitment of woody perennial species	Score	5	5	5	5	5	3	3	3	3	
		2. Native plant species richness											
		- Trees	Score	3	5	3	3	3	3	5	5	5	
		- Shrubs	Score	5	5	5	5	5	3	3	2.5	2.5	
		- Grasses	Score	3	3	3	3	3	2.5	3	3	3	
		- Forbs	Score	3	3	3	3	3	3	2.5	2.5	2.5	
		3. Tree canopy height											
		- Canopy layer	Score	3	0	0	5	5	3	3	5	5	
		- Sub-Canopy Layer	Score					3		3			
		- Emergent Layer	Score										
		Average Score	Average Score	3	0	0	5	4	3	3	5	5	
		4. Tree canopy cover											
		- Canopy layer	Score	2	2	0	5	2	2	5	3	3	
		- Sub-Canopy Layer	Score							5			
		- Emergent Layer	Score										
		Average Score	Average Score	2	2	0	5	2	2	5	3	3	
		5. Shrub canopy cover	Score	3	3	3	5	3	3	0	0	0	
		6. Native perennial grass cover	Score	5	5					1	5	5	
		7. Organic litter	Score					5		3	3	3	
		8. Large trees	Score		5		5						
		9. Coarse woody debris	Score				2	0					
		10. Weed cover	Score	5	5	5		10		5	5	5	
2	Site Context Attributes	11. Size of patch (fragmented)	Score	5	0	5	0	2	2	5	0	2	
		12. Connectedness (fragmented)	Score	4	4	0	0	0	2	0	4	4	
		13. Context (fragmented)	Score	0	0	0	2	0	0	0	0	0	
		14. Distance from water (intact)	Score	0	0	0	0	0	0	0	0	0	
		15. Ecological corridors	Score	4	4	0	4	4	4	4	4	4	
3	Species Habitat Index	16. Threats to species	Score	15	15	7	15	15	15	7	7	7	
		17. Quality and availability of food and foraging habitat	Score	10	10	5	10	10	10	1	1	1	
		18, Quality and availability of shelter	Score	10	10	5	10	10	10	1	1	1	
		19. Species mobility capacity	Score	10	10	10	10	10	10	4	4	4	
		20. Role of site location to overall population in the State.	Score	1	1	1	1	1	4	1	1	1	

Habitat Quality Score (measured)	96.00	95.00	60.00	93.00	95.00	79.50	56.50	59.00	61.00	
Habitat Quality Score (max)	151.00	166.00	146.00	156.00	156.00	136.00	156.00	156.00	156.00	
Assessment Unit Area (ha)	24.05	3.82	25.48	2.30	7.50	25.46	38.22	4.41	5.84	0.00
Assessment Unit Habitat Quality Score	6.36	5.72	4.11	5.96	6.09	5.85	3.62	3.78	3.91	
Size weighting	0.18	0.03	0.19	0.02	0.05	0.19	0.28	0.03	0.04	
Weighted Assessment Unit Habitat Quality Score	1.12	0.16	0.76	0.10	0.33	1.09	1.01	0.12	0.17	
FINAL TOTAL HABITAT QUALITY SCORE	**4.86**									

Administrative Information

Name of Assessment Officer	Matt Davis	Date	
Organisation/Company Name	Arup		
Project Name	Sunshine Coast Airport Expansion Project		
Phone Number	3023 6027	Email	matt.davis@arup.com

Case Reference	
Project Name	
Total Area	137.08

SITE ASSESSMENT TEMPLATE SUMMARY SHEET

Part	Habitat Quality Attributes	Assessment Unit Number									
		1	2	3	4	5	6	7	8	9	10
	Assessment Unit Area (ha)	24.05	3.82	25.48	2.3	7.5	25.46	38.22	4.41	5.84	0
	Regional Ecosystems	12.3.5	12.3.5	12.3.5	12.3.5	12.3.5	12.2.12	12.2.7	12.2.12	12.2.12	
	Bioregion	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	
1	Site Condition Attributes										
	1. Recruitment of woody perennial species (Number of ecologically dominant layers regenerating)	1.00	1.00	1.00	1.00	1.00	5.00	3.00	3.00	3.00	
	2. Native plant species richness										
	- Trees	1.00	4.00	1.00	1.00	2.00	1.00	5.00	5.00	5.00	
	- Shrubs	3.00	2.00	2.00	1.00	4.00	11.00	1.00	1.00	1.00	
	- Grasses	1.00	3.00	1.00	2.00	1.00	0.00	1.00	1.00	1.00	
	- Forbs	9.00	5.00	7.00	7.00	6.00	12.00	0.00	0.00	0.00	
	3. Tree canopy height										
	- Canopy Layer	4.00	3.00	3.00	18.00	12.00	2.50	7.00	7.00	7.00	
	- Sub-Canopy Layer				5.50	3.00		4.00	4.00	4.00	
	- Emergent Layer	18.00	22.00								
	4. Tree canopy cover										
	- Canopy Layer	18.40%	20.40%	2.40%	68.20%	46.50%	3.90%	51.10%	51.10%	51.10%	
	- Sub-Canopy Layer				12.50%	7.20%		22.90%	22.90%	22.90%	
	- Emergent Layer		4.90%								
	5. Shrub canopy cover	15.00%	8.50%	4.90%	0.54%	2.30%	35.30%	1.00%	1.00%	1.00%	
	6. Native perennial grass cover	6.00%	18.00%					4.40%	4.40%	4.40%	
	7. Organic litter					17.60%		60.40%	60.40%	60.40%	
	8. Large trees		3.00		13.00						
	9. Coarse woody debris (Meters)				385.50	86.10					
	10. Weed cover	90.00%	80.00%	90.00%		0.00%		90.00%	90.00%	90.00%	
2	Site Context Attributes										
	11. Size of patch (fragmented)	5.00	0.00	5.00	0.00	2.00	2.00	5.00	0.00	2.00	
	12. Connectedness (fragmented)	4.00	4.00	0.00	0.00	0.00	2.00	0.00	4.00	4.00	
	13. Context (fragmented)	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	
	14. Distance from water (intact)	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
	15. Ecological corridors	*4.00*	*4.00*	*0.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	
3	Species Habitat Index										
	16. Threats to species	15.00	15.00	7.00	15.00	15.00	15.00	7.00	7.00	7.00	
	17. Quality and availability of food and foraging habitat	10.00	10.00	5.00	10.00	10.00	10.00	1.00	1.00	1.00	
	18. Quality and availability of shelter	10.00	10.00	5.00	10.00	10.00	10.00	1.00	1.00	1.00	
	19. Species mobility capacity	10.00	10.00	10.00	10.00	10.00	10.00	4.00	4.00	4.00	
	20. Role of site location to overall population in the State.	1.00	1.00	1.00	1.00	1.00	4.00	1.00	1.00	1.00	

APPENDIX B

Biodiversity Offsets Strategy (continued)

PLEASE COMPLETE THE BENCHMARK OR BEST ON OFFER SITE DETAILS BELOW AS DIRECTED FOR EACH ASSESSMENT UNIT AND REGIONAL ECOSYSTEM LISTED BELOW

Case Reference	
Project Name	
Total Area	137.08

SITE ASSESSMENT TEMPLATE - BENCHMARK OR BEST ON OFFER SITE DETAILS - ENTER DETAILS IN CELLS BELOW

INFORMATION ON BENCHMARKS IS AVAILABLE ON THE QUEENSLAND GOVERNMENT WEBSITE THAT CAN BE ACCESSED HERE: BENCHMARKS

(NOTE: WHERE THERE IS NO BENCHMARK AVAILABLE FOR THE REGIONAL ECOSYSTEM IN QUESTION A BEST ON OFFER SITE MAY BE USED AS A SURROGATE.)

Part	Habitat Quality Attributes	BenchMark or Best on Offer Site Data									
		1	2	3	4	5	6	7	8	9	10
	Assessment Unit Area (ha)	24.05	3.82	25.48	2.3	7.5	25.46	38.22	4.41	5.84	0
	Regional Ecosystems	12.3.5	12.3.5	12.3.5	12.3.5	12.3.5	12.2.12	12.2.7	12.2.12	12.2.12	
	Bioregion	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	
1	Site Condition Attributes										
	1. Recruitment of woody perennial species (Number of ecologically dominant layers regenerating)	1.00	1.00	1.00	1.00	1.00	12.00	5.00	12.00	12.00	
	2. Native plant species richness										
	- Trees	2.00	2.00	2.00	2.00	3.00	2.00	3.00	2.00	2.00	
	- Shrubs	1.00	1.00	1.00	1.00	4.00	15.00	4.00	15.00	15.00	
	- Grasses	4.00	4.00	4.00	4.00	3.00	2.00	3.00	2.00	2.00	
	- Forbs	15.00	15.00	15.00	15.00	15.00	18.00	12.00	18.00	18.00	
	3. Tree canopy height										
	- Canopy Layer	14.00	14.00	14.00	14.00	14.00	7.00	14.00	7.00	7.00	
	- Sub-Canopy Layer					8.00		8.00			
	- Emergent Layer										
	4. Tree canopy cover										
	- Canopy Layer	96.00%	96.00%	96.00%	96.00%	96.00%	12.00%	60.00%	12.00%	12.00%	
	- Sub-Canopy Layer							20.00%			
	- Emergent Layer										
	5. Shrub canopy cover	1.00%	1.00%	1.00%	1.00%	1.00%	86.00%	15.00%	86.00%	86.00%	
	6. Native perennial grass cover	2.00%	2.00%	2.00%	2.00%	2.00%	1.00%	15.00%	1.00%	1.00%	
	7. Organic litter	20.00%	20.00%	20.00%	20.00%	20.00%	10.00%	30.00%	10.00%	10.00%	
	8. Large trees	168	168	168	168	168		150			
	9. Coarse woody debris (Meters)	898.00	898.00	898.00	898.00	898.00	370.00	900.00	370.00	370.00	
	10. Weed cover	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	

Case Reference	
Project Name	
Total Area	137.08

SITE ASSESSMENT BENCHMARK COMPARISON RESULTS

Part		Habitat Quality Attributes	Assessment Unit Number									
			1	2	3	4	5	6	7	8	9	10
		Assessment Unit Area (ha)	24.05	3.82	25.48	2.3	7.5	25.46	38.22	4.41	5.84	0
		Regional Ecosystems	12.3.5	12.3.5	12.3.5	12.3.5	12.3.5	12.2.12	12.2.7	12.2.12	12.2.12	
		Bioregion	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	Southeast Queensland	
1	Site Condition Attributes	1. Recruitment of woody perennial species (Number of ecologically dominant layers regenerating)	100.00%	100.00%	100.00%	100.00%	100.00%	41.67%	60.00%	25.00%	25.00%	
		2. Native plant species richness										
		- Trees	50.00%	200.00%	50.00%	50.00%	66.67%	50.00%	166.67%	250.00%	250.00%	
		- Shrubs	300.00%	200.00%	200.00%	100.00%	100.00%	73.33%	25.00%	6.67%	6.67%	
		- Grasses	25.00%	75.00%	25.00%	50.00%	33.33%	0.00%	33.33%	50.00%	50.00%	
		- Forbs	60.00%	33.33%	46.67%	46.67%	40.00%	66.67%	0.00%	0.00%	0.00%	
		3. Tree canopy height										
		- Canopy Layer	28.57%	21.43%	21.43%	128.57%	85.71%	35.71%	50.00%	100.00%	100.00%	
		- Sub-Canopy Layer					37.50%		50.00%			
		- Emergent Layer										
		4. Tree canopy cover										
		- Canopy Layer	19.17%	21.25%	2.50%	71.04%	48.44%	32.50%	85.17%	425.83%	425.83%	
		- Sub-Canopy Layer							114.50%			
		- Emergent Layer										
		5. Shrub canopy cover	1500.00%	850.00%	490.00%	54.00%	230.00%	41.05%	6.67%	1.16%	1.16%	
		6. Native perennial grass cover	300.00%	900.00%					29.33%	440.00%	440.00%	
		7. Organic litter					88.00%		201.33%	604.00%	604.00%	
		8. Large trees		1.79%		7.74%						
		9. Coarse woody debris (Meters)				42.93%	9.59%					
		10. Weed cover	90.00%	80.00%	90.00%		0.00%		90.00%	90.00%	90.00%	
2	Site Context Attributes	11. Size of patch (fragmented)	5.00	0.00	5.00	0.00	2.00	2.00	5.00	0.00	2.00	
		12. Connectedness (fragmented)	4.00	4.00	0.00	0.00	0.00	2.00	0.00	4.00	4.00	
		13. Context (fragmented)	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	
		14. Distance from water (intact)	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	
		15. Ecological corridors	4.00	4.00	0.00	4.00	4.00	4.00	4.00	4.00	4.00	
3	Species Habitat Index	16. Threats to species	15.00	15.00	7.00	15.00	15.00	15.00	7.00	7.00	7.00	
		17. Quality and availability of food and foraging habitat	10.00	10.00	5.00	10.00	10.00	10.00	1.00	1.00	1.00	
		18, Quality and availability of shelter	10.00	10.00	5.00	10.00	10.00	10.00	1.00	1.00	1.00	
		19. Species mobility capacity	10.00	10.00	10.00	10.00	10.00	10.00	4.00	4.00	4.00	
		20. Role of site location to overall population in the State.	1.00	1.00	1.00	1.00	1.00	4.00	1.00	1.00	1.00	

CLICK HERE TO GO TO THE FINAL SUMMARY SHEET

APPENDIX B

Biodiversity Offsets Strategy (continued)

B2 Offset multiplier calculator

Land-based Offsets Multiplier Calculator (for standard proponent driven offset assessments involving a comparison of an impact site and a proposed offset site)

1 - Remnant Offsets

SELECT BIOREGION	SELECT BVG	Description	Enter Impact Habitat Quality	Enter Offset Habitat Quality	Maximum Possible Gain	Enter Predicted Gain over 20yrs	Required Multiplier
Southeast Queensland	SEQ_08_22	Melaleuca spp. on seasonally inundated open-forests and woodlands of lowland coastal swamps and fringing lines. (palustine wetlands)	7	4	6	3	4.00

2 - Regrowth Offsets

SELECT BIOREGION	SELECT BVG	Description	Enter Impact Habitat Quality	Enter Offset Habitat Quality	Maximum Possible Gain	Enter Predicted Gain over 20yrs	Required Multiplier
Southeast Queensland	SEQ_08_22	Melaleuca spp. on seasonally inundated open-forests and woodlands of lowland coastal swamps and fringing lines. (palustine wetlands)	7	5	5	2	3.30

Note: For further information on Habitat quality please consult the Guide to determining terrestrial habitat quality located on the Queensland Government website that can be accessed via the link below.

Queensland Environmental Offsets Website

Version 1.0 - December - 2014 © - State of Queensland, Department of Environment and Heritage Protection

Click Here to Update Multipliers

Instructions for Use

1 - Choose the type of community you are offseting in.

2 - For remnant communities use the remnant calculator and for regrowth communities use the regrowth calculator

3 - Select the applicable bioregion from the drop-down list provided

4 - Select the applicable Broad Vegetation Group (BVG) from the drop-down list provided

5 - Select your impact area habitat quality score from the drop-down list provided

6 - Select your offset area habitat quality score from the drop-down list provided

7 - Enter predicted gain over 20yrs from the drop-down list provided. Note predicted gain cannot exceed maximum possible gain.
(Please Note: Any predicted gain greater than 2 points will need to be justified in your application and demonstrated via additional management actions)

8 - Click the button provided to update the required multiplier field.

APPENDIX B

Biodiversity Offsets Strategy (continued)

B3 Combined offset delivery calculator

COMBINED OFFSET DELIVERY CALCULATOR

For instructions on using this calculator please refer to Row 61

This calculator is designed to assist proponents in determining their total offset obligation for a part land-based and part financial settlement offset proposal. The calculator functions by determining what proportion of a proposed offset site meets the necessary offset requirements for each impacted matter and also what proportion of the remaining impact area needs to be subsequently met through the financial calculator.

Note: Please ensure that all matters that have a significant residual impact are accounted for by entering the total hectares for each matter concerned as directed below on an individual basis.

PLEASE ENTER DATA ASDIRECTED IN THE FIELDS BELOW						RESULTS (NOTE: THESE FIELDS ARE AUTOPOPULATED)			
Matter Number	Select Matter Type	Enter Matter Description	Enter Significant Residual Impact Area per Matter (ha)	Enter Matter Multiplier	Enter the Total Extent of Area on Proposed Offset Site That Meets Requirements For Impacted Matter	Total Offset Obligation per Impacted Matter (ha)	Total % of Offset Obligation met on Proposed Offset Site	Total proportion of Significant Residual Impact Area per Matter Acquitted via Offset Site (ha)	Total Remaining Significant Residual Impact Area to be Offset through the Financial Calculator per Impacted Matter (ha)
1	Threatened animals	Wallum Froglet Crinia tinnula	60.63	3.3	92.73	200.079	46.35%	28.10	32.53
2	Threatened animals	Wallum Rocketfrog Litoria freycineti	21.85	3.3	76.01	72.105	105.42%	23.03	-1.18
3	Threatened animals	Wallum Sedgefrog Litoria olongburensis	1.67	3.3	66.37	5.511	1204.32%	20.11	-18.44
4	Threatened animals	Ground Parrot Pezoporus wallicus wallicus	7.88	3.3	35.71	26.004	137.33%	10.82	-2.94
5	Threatened plants	Mount Emu She-oak	4.41	3.3	10.42	14.553	71.60%	3.16	1.25
6									
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49									
50									
						TOTAL	85.22	11.22	
							Total Hectares of Impact Area Offset via Offset Site	Total Hectares of Impact Area Still Required to be Offset via a Financial Payment	

INSTRUCTIONS

1. Select the matter type for each matter you are impacting (E6).

2. Enter the description for each matter type selected (F/G6).

3. Enter the significant residual impact area for each matter type selected (H6).

4. Enter the multiplier for the matter type selected. (I6)

Appendix C

Financial payment calculator outputs

C1 Financial payment for residual impact area

Matt Davis

From: Matt Davis <davis.james.matt@gmail.com>
Sent: Friday, 8 May 2015 8:51 AM
To: Matt Davis
Subject: Fwd: Environmental offsets calculator results - Financial settlement offset calculator [Filed 08 May 2015 08:54]
Attachments: data.csv

---------- Forwarded message ----------
From: <no-reply@ehp.qld.gov.au>
Date: Fri, May 8, 2015 at 8:49 AM
Subject: Environmental offsets calculator results - Financial settlement offset calculator
To: davis.james.matt@gmail.com

Environmental offsets calculator results - Financial settlement offset calculator

Payment details

Non-protected area cost	
On ground cost	$897,600.00
Landholder incentive payment	$859,048.08
Administrative cost	$224,400.00
Total non-protected area cost	$1,981,048.08
Protected area cost	
Total protected area cost	$0.00
Total cost	
Grand total	$1,981,048.08

Total offset area: 44.88 ha

Section 1

LGA
Sunshine Coast Regional Council
Bioregion
Southeast Queensland
Subregion
Sunshine Coast - Gold Coast Lowlands
Impact area
11.22 ha
Notional offset area
44.88 ha
Distinct matter area 1.1

Impact area: 11.22 ha
Notional offset area: 44.88 ha

Matter groups:

- 1.1.1: Threatened plants - Allocasuarina emuina (Mt. Emu she-oak)
- 1.1.2: Threatened animals - Crinia tinnula (wallum froglet)
- 1.1.3: Threatened animals - Litoria olongburensis (wallum sedgefrog)
- 1.1.4: Threatened animals - Litoria freycineti (wallum rocketfrog)
- 1.1.5: Threatened animals - Pezoporus wallicus wallicus (ground parrot)

Sections, areas and matter groups used in calculations

Section	Bioregion / Marine (and waterways) zone	Subregion / Marine bioregion	Local government area (LGA)	Distinct matter area (DMA)	DMA impact area (ha)	DMA notional offset area (ha)	Matter group
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	11.22	44.88	1.1.1 Threatened plants - Allocasuarina emuina (Mt. Emu she-oak)
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	11.22	44.88	1.1.2 Threatened animals - Crinia tinnula (wallum froglet)
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	11.22	44.88	1.1.3 Threatened animals - Litoria olongburensis (wallum sedgefrog)
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	11.22	44.88	1.1.4 Threatened animals - Litoria freycineti (wallum rocketfrog)
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	11.22	44.88	1.1.5 Threatened animals - Pezoporus wallicus wallicus (ground parrot)

C2 Financial payment for total impact area

Matt Davis

From: Matt Davis <davis.james.matt@gmail.com>
Sent: Wednesday, 22 April 2015 9:06 AM
To: Matt Davis
Subject: Fwd: Environmental offsets calculator results - Financial settlement offset calculator
Attachments: data.csv

Environmental offsets calculator results - Financial settlement offset calculator

Payment details

Non-protected area cost	
On ground cost	$4,137,800.00
Landholder incentive payment	$3,960,081.49
Administrative cost	$1,000,000.00
Total non-protected area cost	$9,097,881.49
Protected area cost	
Total protected area cost	$0.00
Total cost	
Grand total	$9,097,881.49

Total offset area: 242.52 ha

Section 1

LGA
Sunshine Coast Regional Council
Bioregion
Southeast Queensland
Subregion
Sunshine Coast - Gold Coast Lowlands
Impact area
60.63 ha
Notional offset area
242.52 ha
Distinct matter area 1.1

Impact area: 60.63 ha
Notional offset area: 242.52 ha

Matter groups:

APPENDIX B

- 1.1.1: Threatened plants - Allocasuarina emuina (Mt. Emu she-oak)
- 1.1.2: Threatened animals - Crinia tinnula (wallum froglet)
- 1.1.3: Threatened animals - Litoria freycineti (wallum rocketfrog)
- 1.1.4: Threatened animals - Litoria olongburensis (wallum sedgefrog)
- 1.1.5: Threatened animals - Pezoporus wallicus wallicus (ground parrot)

Sections, areas and matter groups used in calculations

Section	Bioregion / Marine (and waterways) zone	Subregion / Marine bioregion	Local government area (LGA)	Distinct matter area (DMA)	DMA impact area (ha)	DMA notional offset area (ha)	Matter group
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	60.63	242.52	1.1.1 Threatened plants - Allocasuarina emuina (Mt. Emu she-oak)
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	60.63	242.52	1.1.2 Threatened animals - Crinia tinnula (wallum froglet)
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	60.63	242.52	1.1.3 Threatened animals - Litoria freycineti (wallum rocketfrog)
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	60.63	242.52	1.1.4 Threatened animals - Litoria olongburensis (wallum sedgefrog)
1	Southeast Queensland	Sunshine Coast - Gold Coast Lowlands	Sunshine Coast Regional Council	1.1	60.63	242.52	1.1.5 Threatened animals - Pezoporus wallicus wallicus (ground parrot)

Appendix D

Geology, soils and groundwater investigation in the Mount Emu She-oak

APPENDIX B

Biodiversity Offsets Strategy (continued)

Golder Associates

TECHNICAL MEMORANDUM

DATE 10 October 2013 **PROJECT No.** 127683017-010-TM-Rev0

TO Cathy Crawley
The Long View Group

CC Walter Mastenbroek, Detlef Bringemeier

FROM Elizabeth Major **EMAIL** elmajor@golder.com.au

SUNSHINE COAST AIRPORT EXPANSION PROJECT; PRELIMINARY GROUNDWATER IMPACT ASSESSMENT RESULTS RELEVANT TO SPECIFIED FLORA AND ENVIRONMENTAL VALUES CONSIDERATIONS

Introduction

Golder Associates Pty Ltd (Golder) is currently undertaking the groundwater baseline study and groundwater modelling for the Environmental Impact Study of the Sunshine Coast Airport (SCA) upgrade project, as provided in our proposal: Geology, Soils and Groundwater Consultancy Schedule 6, dated 25 June 2012.

A request to include flora considerations was provided to Golder in response to a review of the Geology, Soils and Groundwater component of the baseline studies. The intent of the request was to provide recommendations for potential further site investigations and modelling to assist in the preparation of the terrestrial flora baseline and impact assessment component (to be conducted by others). The request for flora considerations was provided in the following documents:

- GW Modelling, ECOSMART, dated 21 November 2012; and
- Sunshine Coast Airport Expansion Project – Geology, Soils and Groundwater, ARUP, dated 27 November 2012.

The above documents were reviewed by Golder to assess the requirements therein. These are discussed in the following section.

Additional Flora and Environmental Values Considerations

Flora and environmental values considerations relating to construction and operation of the SCA expansion project from the above documents were summarised as follows:

1) Groundwater depth and fluctuations at specific locations containing groundwater dependant ecosystems;
2) Groundwater depth and fluctuations in areas identified as potential flora offset areas for selected species;
3) Groundwater quality changes (i.e. salinity and pH should be determined in certain areas to assess any potential indirect changes); and
4) More detailed mapping of the depth and occurrence of the Coffee Rock and its influence on groundwater levels in areas identified as potential flora offset areas for selected species.

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Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America
A.B.N. 64 006 107 857

The specifically identified areas of interest for the flora and environmental values assessments were identified as being:

- to the north of the proposed drain at the northern end of the site (for flora offset areas),
- to the east of the proposed runway,
- groundwater dependant ecosystems at the south-western edge of the proposed development, and
- potential groundwater changes at the boundary between proposed development and existing groundwater dependant ecosystems.

Current Results Relevant to Additional Flora and Environmental Values Considerations

To assist the flora and environmental values assessment processes discussed above, it is considered that the existing groundwater monitoring, baseline data and groundwater modelling undertaken to date should be augmented. Because of the need for further investigation as related to the specific areas of interest defined in ARUP (2012) and ECOSMART (2012), a portion of the requested information are not yet available. These gaps are discussed below for each individual area.

To assist in the discussion of groundwater results, the following areas of interest (AOI) have been identified as AOI 1 to AOI 6 as shown on Figure 1 and Figure 2. Modelling is carried out to complete the impacts assessment and is documented in the Stage 3 report[1]. Site-wide groundwater results, including relevant results obtained in geotechnical and environmental investigations, generally consist of the following:

- Groundwater depth ranges from 0.2 m to 3.4 m below ground level (bgl), with a geometric mean of 0.9 m bgl;
- Average salinity of groundwater is 450 ppm;
- Average pH of groundwater is 4.6;
- Depth to Coffee Rock ranges from 0.4 to 7.8 m bgl with an average of 1.7 m bgl;
- Depth to Coffee Rock is generally at about 1 m to 2 m bgl and becomes deeper in the western part of the site;
- Thickness of the Coffee Rock is between 0.3 m and 5.0 m and averages 2.7 m;
- All piezometers screened below the Coffee Rock indicate semi-confined to confined groundwater conditions;
- No distinct groundwater flow direction exists in the semi-confined unit below the Coffee Rock;
- The soils above the Coffee Rock contain localised perched water tables that are recharged via ground surface infiltration;
- Perched groundwater above the Coffee Rock generally dissipates radially with minimal downward leakage through the Coffee Rock, and with very slight regional-scale discharge to the west;
- Advection (groundwater velocity), diffusion, and density variation all significantly contribute to the transport of salts on this site; and
- The combination of the relatively flat topography and the inconsistency of the Coffee Rock occurrence and depth results in:

[1] Golder document 127683017-012-R-Rev0-6000.

- Significant interaction between groundwater and surface water with significant potential for surface water ponding;
- variability in confining nature of the Coffee Rock (i.e, pockets of confined, semi-confined, and unconfined groundwater); and
- localised hydrogeologic connectivity (i.e., groundwater flow and solute transport) between soils above and below the Coffee Rock.

- Groundwater levels generally decrease as a result of the dry season (low rainfall rates); however, no piezometers have yet been monitored for an entire 12 month period. This leaves gaps in data required for the assessment of annual and seasonal groundwater fluctuations and rainfall responses.

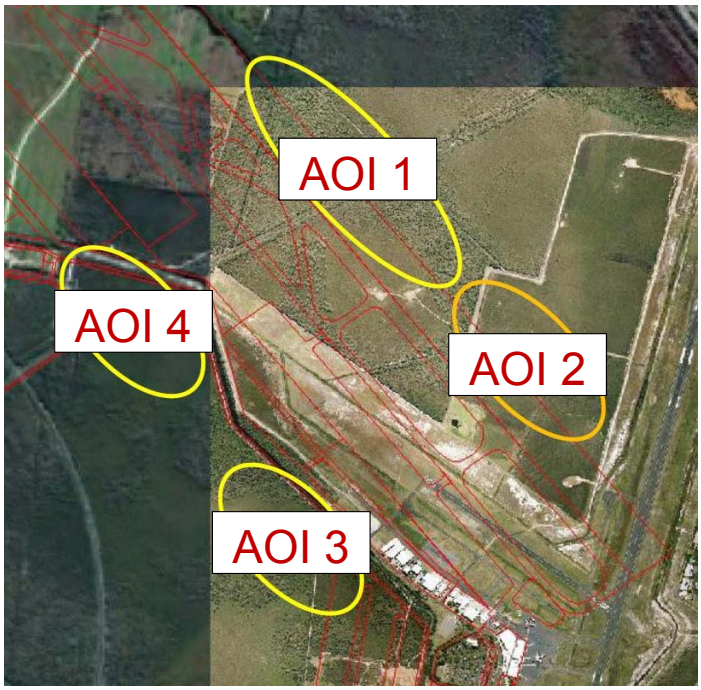

Figure 1: Environmental Values. Excerpt from ECOSMART (2012).

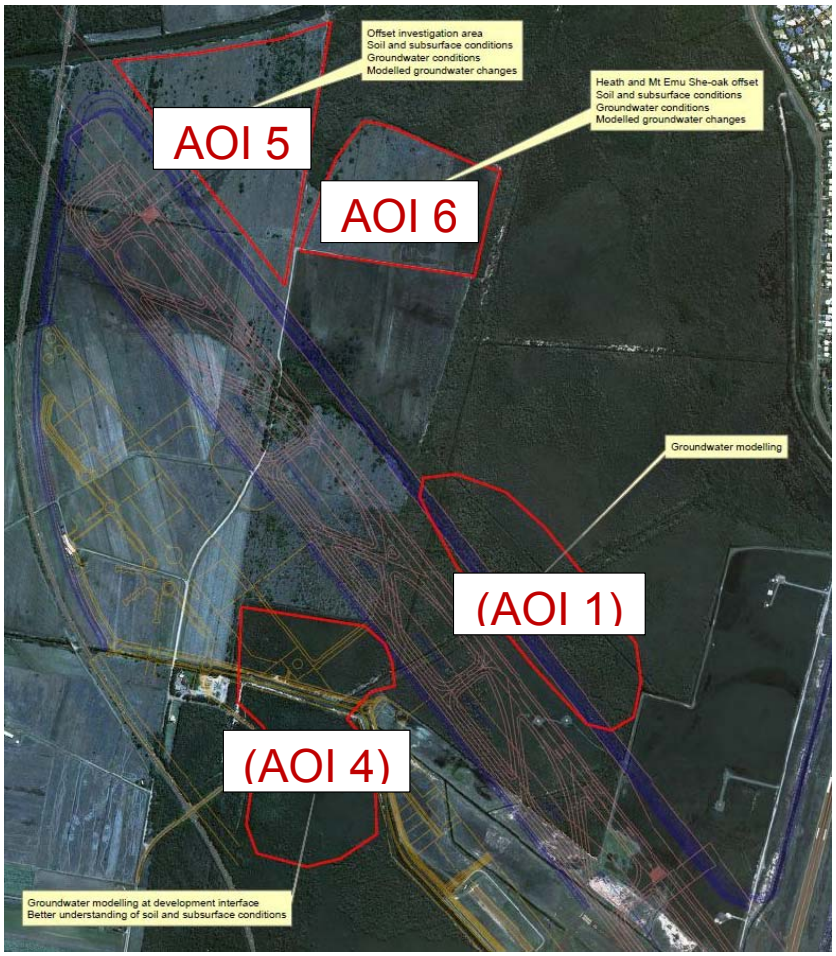

Figure 2: Flora Considerations; AOI 1 and AOI 4 overlap with ecology areas. Excerpt from ARUP (2012).

Specific to each area of interest (AOI) is the following information, which also includes relevant results obtained from geotechnical and environmental investigations:

1) **AOI 1** (Northeast of central part of proposed runway):

- Groundwater levels – observations range from 0.5 m to 1.48 m depth bgl with an average of 0.86 m depth bgl in this area. There appears to be a slight northwest groundwater gradient across the area.
- Groundwater quality – in October 2012 the pH was observed to be 4.98, and the salinity 540 ppm.
- Coffee Rock occurrence – depth to the Coffee Rock ranges from 0.55 m to 1.0 m bgl across this area with an average of 0.81 m bgl. There are parts where the surface of the Coffee Rock may either be at a depth greater than 3 m bgl or non-existent. The thickness is observed to range between 1.7 m and 2.2 m; however, not enough detail exists for identifying trends in thickness of the formation in this area.
- Gaps include seasonal fluctuations in groundwater level and quality.

2) **AOI 2** (Northeast of southern part of proposed runway):

- Groundwater levels – water depth range from 0.1 m to 3.4 m bgl and have an average of 0.81 m bgl, with no clear spatial trends.
- Groundwater quality – in October 2012 the pH was on average 4.48 and the salinity was on average 230 ppm towards the north western boundary of this area.
- Coffee Rock occurrence – depth to the Coffee Rock ranges from 0.4 m to 1.1 m bgl and has an average of 1.05 m bgl. The thickness of the Coffee Rock ranges from 2.5 m to at least 3.9 m. There is no clear trend in the depth or thickness of this formation.
- Gaps include seasonal fluctuations in groundwater level and quality.

3) **AOI 3** (Southwest of southern part of proposed runway):

- Groundwater levels – no information exists within this area; however, one test-pit to the northeast of the area observed water at 1.0 m depth bgl in August 2012.
- Groundwater quality – no information exists within or near this area.
- Coffee Rock occurrence – no information exists within this area; however, along the southern side of the existing runway the depth to the Coffee Rock is between 1.1 m and at least 1.2 m bgl, and has a thickness from 1.3 m to 5 m (no clear spatial trends).
- Gaps include groundwater quality, seasonal fluctuations in groundwater level and quality, and subsurface hydrogeological (stratigraphy, and water level and quality) data for assessing groundwater impacts to the area, particularly the central to southern parts.

4) **AOI 4** (Southwest of central part of proposed runway):

- Groundwater levels – very few water level observations exist in this area; the depths to groundwater range from 0.97 m to 2.1 m bgl and have an average of 1.70 m bgl. Areas outside of the boundary and along the runway have an average depth to groundwater of 1.06 m bgl (range from 0.4 m to 1.55 m bgl).
- Groundwater quality – in October 2012 the pH was 4.64 on average and the salinity 580 ppm on average at a site in the north western corner of this area.
- Coffee Rock occurrence – the depth to the Coffee Rock is from 0.8 m to at least 1.2 m bgl within the area, and 0.5 m to 1.5 m bgl in the areas just outside the boundaries and along the runway. The

Coffee Rock has been observed to have a thickness of 3.5 m within the area, and between 1.1 m and 3.3 m (with potential discontinuities) just outside of the boundary for this area of interest.

- Gaps include data on seasonal fluctuations in groundwater level and quality, and subsurface hydrogeological (stratigraphy, and water level and quality) data for assessing groundwater impacts to the southern part of the area, specifically as relevant to the area identified for the flora considerations.

5) **AOI 5** (Offset northeast of runway):

- Groundwater levels – existing nearby data indicates water depth between 0.2 m and 1.33 m bgl (average of 0.91 m bgl) in this area; however, the majority of these observations are along the proposed runway with only a few at one location midway along the eastern border of this area.
- Groundwater quality – only two observations have been made for pH and salinity, one along the proposed runway, and the other midway along the eastern boundary. The pH readings were 6.4 and 4.9, respectively, and the salinity readings were 4410 ppm and 470 ppm respectively.
- Coffee Rock occurrence – Borehole and test-pit reports indicate an average depth to the Coffee Rock of 2.94 m bgl, and a thickness of the formation from 2.9 m to 3.2 m in this area. The depth to the Coffee Rock appears to decrease (closer to ground surface) with increasing distance to the northeast, away from the runway. The majority of the observations are along the proposed runway with only two shallow pits in the middle of this area, and one midway along the eastern boundary.
- Gaps include data on seasonal fluctuations in groundwater level and quality, water levels and quality in the central to northern part of this area, and subsurface hydrogeological (stratigraphy, and water level and quality) data for assessing groundwater impacts to the area, particularly the central to northern parts.

6) **AOI 6** (Heath and Mt Emu She-oak Offset):

- Groundwater levels – a standpipe piezometer located just outside the southwest corner of this area indicates groundwater levels between 0.80 m and 1.33 m bgl (1.12 m bgl average).
- Groundwater quality – the average pH just outside the southwest corner of this area is 4.9 and the average salinity is 470 ppm.
- Coffee Rock occurrence – the Coffee Rock depth is 1.5 m bgl at the single observation point relatively near this area, and the formation has a thickness of 2.9 m at the observation. The occurrence of the Coffee Rock is expected to vary in this area as it varies in the other AOI's.
- Gaps include data on seasonal fluctuations in groundwater level and quality, water levels and quality in the central to northern and eastern parts of this area, and subsurface hydrogeological (stratigraphy, and water level and quality) data for assessing groundwater impacts to the area.

Closure

We trust that the information provided in this memorandum meets your requirements. Further information will be communicated as they are obtained from groundwater modelling results. Delivery of the results relevant to the continued investigation will occur following their completion.

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Dr Detlef Bringemeier
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EM/DB/

References

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