Biodiversity Offsets Strategy

Issue

Sunshine Coast Airport Expansion Project

Biodiversity Offsets Strategy

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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,

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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.

Biodiversity Offsets Strategy (continued)

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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).

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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.

Biodiversity Offsets Strategy (continued)

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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.

Biodiversity Offsets Strategy (continued)

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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 Sheoak 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;

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- 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.

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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	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 <i>Litoria</i> 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.

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.

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

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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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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)*				
Species	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.

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

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^{**} 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.

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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 nonremnant 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.

Biodiversity Offsets Strategy (continued)



Biodiversity Offsets Strategy (continued)



Biodiversity Offsets Strategy (continued)



Biodiversity Offsets Strategy (continued)

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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.

	Total extent of available habitat (ha)	Extent lost (ha)				
Habitat		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.

Biodiversity Offsets Strategy (continued)



Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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 coverdependent, 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.

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Offset Delivery 5

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. Landbased 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 Sheoak	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

^{* 2.25}ha 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.

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).

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^{**} 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.

Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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 (≤ 10 ha) 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 air	port 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

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Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

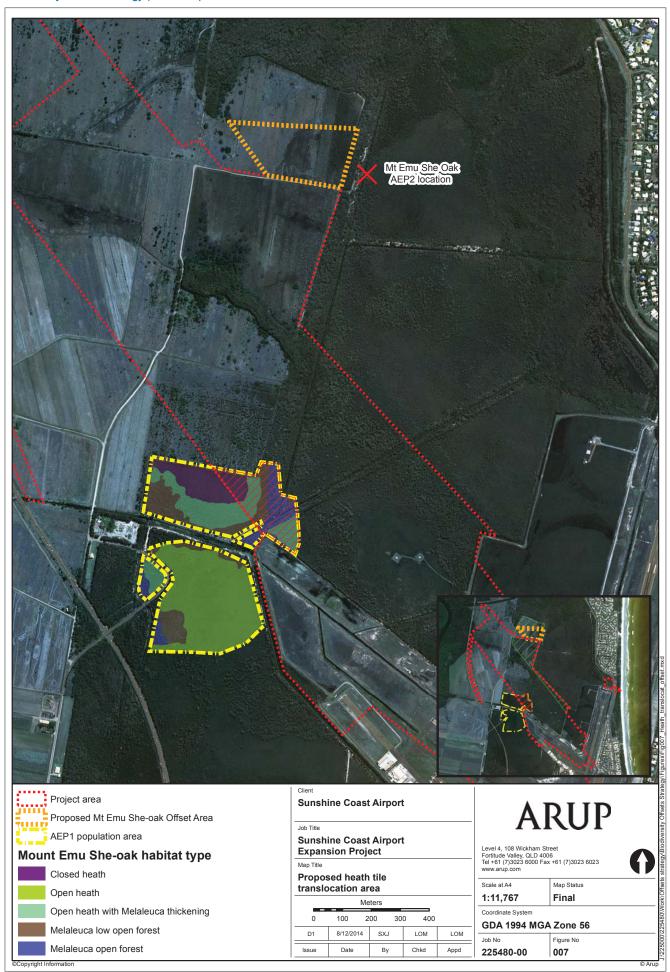
Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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).



Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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.).

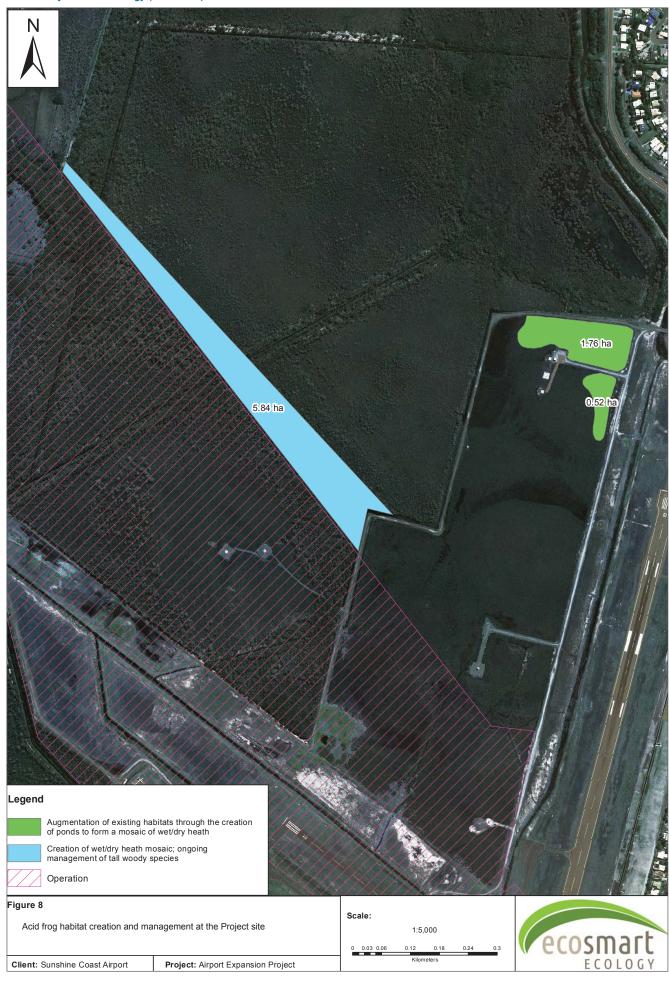
Soil and groundwater conditions in the north of the WHMA appear highly suitable for the creation of Wallum Sedgefrog breeding habitat, as evidenced by successful recruitment of Wallum Sedgefrogs in wet furrows beside vehicular access tracks in this area. Within areas of the WHMA that do not have priority 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.

Biodiversity Offsets Strategy (continued)



Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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.

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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.

Biodiversity Offsets Strategy (continued)



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.

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Biodiversity Offsets Strategy (continued)

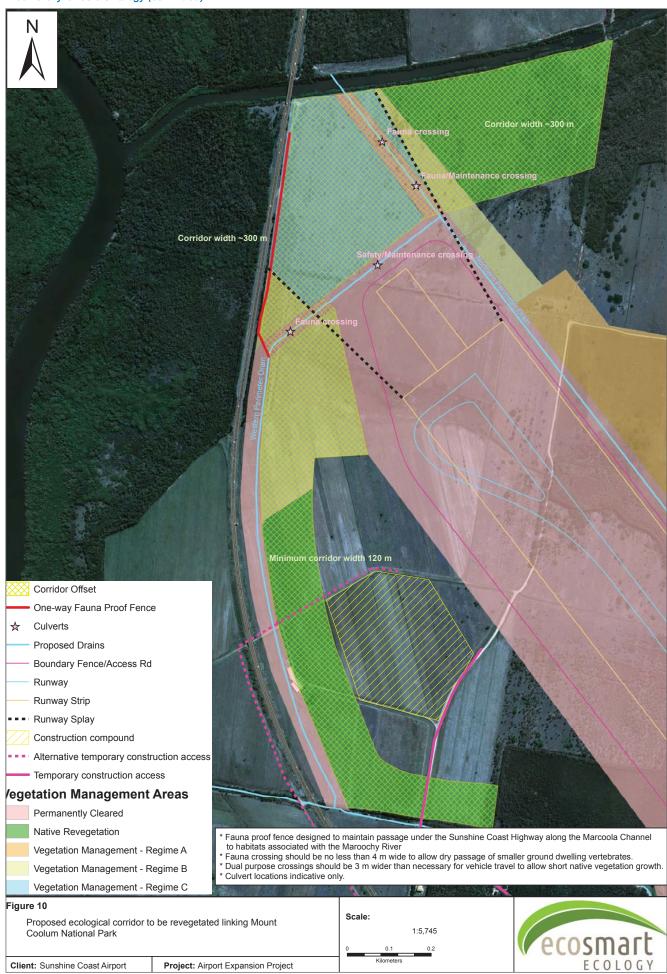
Sunshine Coast Airport

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- 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 Marcoochy 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.

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Biodiversity Offsets Strategy (continued)



Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

5.1.2 Lower Mooloolah River Environmental Reserve (LMRER)

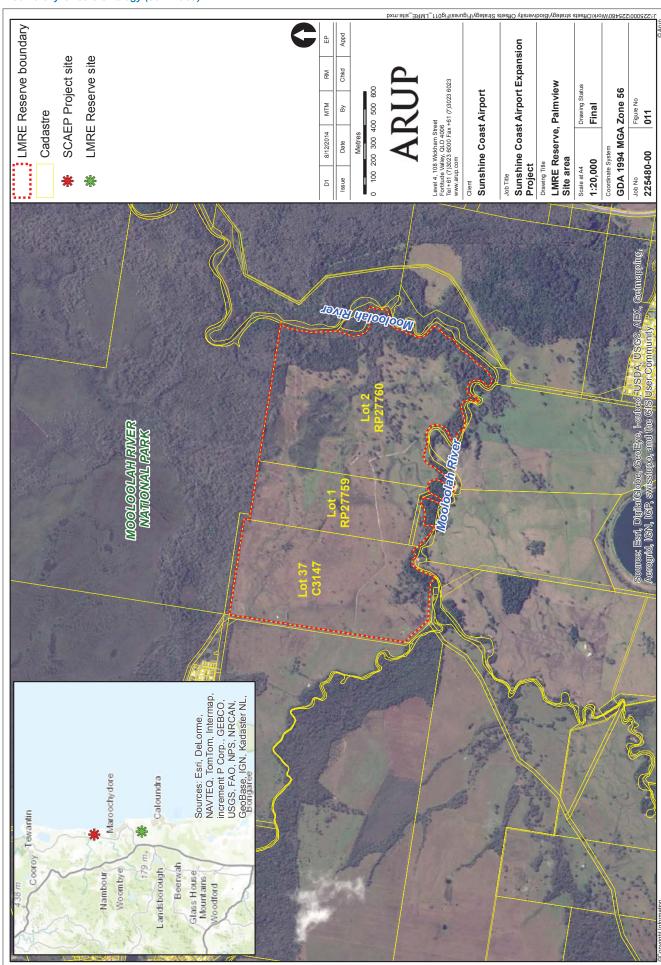
Due to a lack of suitable receiving sites within and adjacent to the SCA to compensate for the loss of ecological values, and in particular habitat for the Wallum Froglet and Wallum Rocketfrog, off-site works are proposed to offset the loss of habitat for these species.

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.



Biodiversity Offsets Strategy (continued)

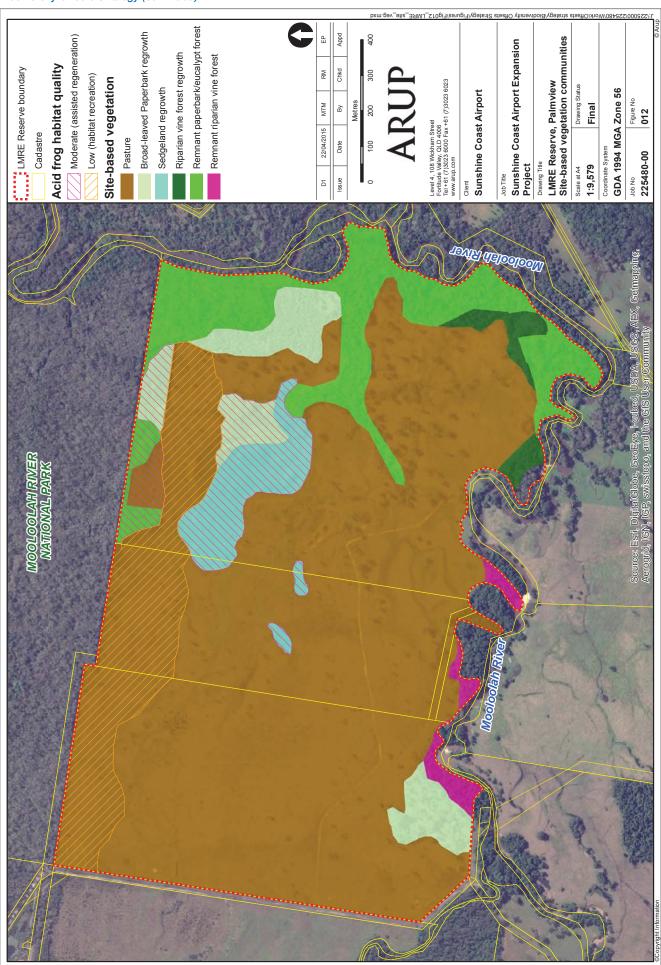
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Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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 <i>Melaleuca quinquenervia</i> , Forest Red Gum <i>Eucalyptus tereticornis</i> , Pink Bloodwood <i>Corymbia intermedia</i> , Swamp Box <i>Lophostemon suaveolens</i> and Cabbagetree Palm <i>Livistona australis</i> .	145.8
	The north-east corner of the site contains a higher density of Broad-leaved Paperbark regrowth.	
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 <i>Lepironia articulata</i> , Jointed Twigrush <i>Baumea articulata</i> , Bungwall <i>Blechnum indicum</i>	8.1
Non-native or non-remna	ant 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



Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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.

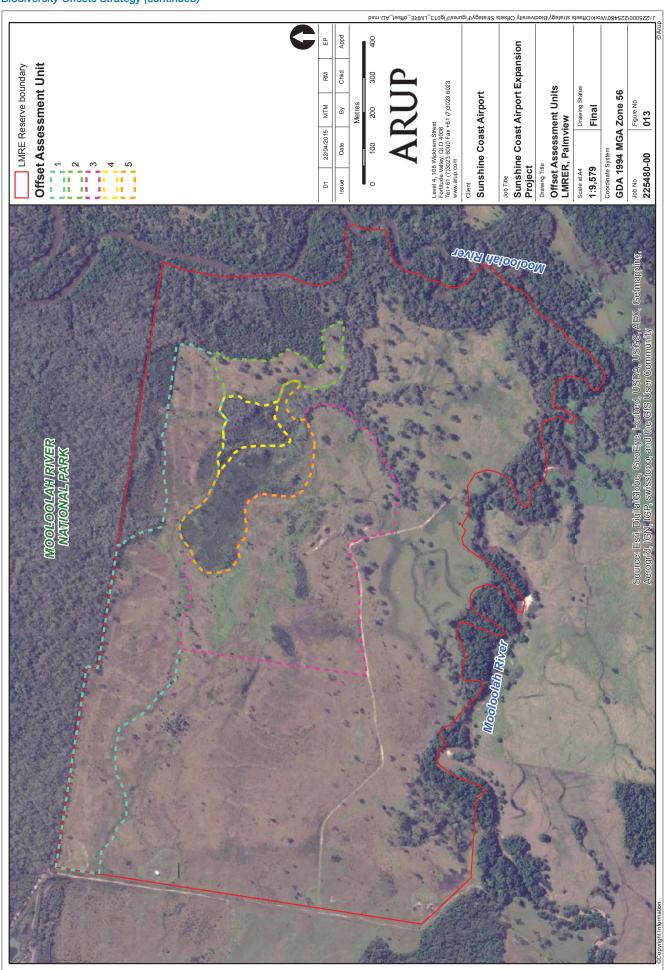
There may be suitable areas to establish closed heathland vegetation community along the northern property boundary; however this would require more intensive revegetation works to create a new vegetation community. This would require a more 'traditional' revegetation program, with site preparation and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



Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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 Sheoak 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.

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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.

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Table 9: EPBC Act Offset Assessment Guide inputs and justification

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
Impact site				
Residual	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.	EIS Section 7.2.2.3 and 7.6.2 BOS Section 4.2 EIS Section 8.16.2 BOS Section
			Wallum Sedgefrog	4.3
			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).	
Quality of	-	7	Mount Emu She-oak	
impacted			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.	EIS Section
			Wallum Sedgefrog	8.7
			The quality of impacted habitat score is 7, which is an average of the scores for <i>Site Condition, Site Context</i> and <i>Species Stocking Rate.</i> Summary of the rationale for these scores is provided below.	BOS Section 4.3
			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	

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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 <i>Site Context</i> 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	ı			
Proposed offset area	4.41 ha	12.23ha	Mount Emu She-oak	EIS Section 7.7.1.2
Silber died			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	BOS Section 5.1.1.1
			location to the north.	8.17.1
			Wallum Sedgefrog A total of 12.23ha of offset area is proposed for Wallum Sedgefrog.	BOS Section 5.1.1.2 and 5.1.2
			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	

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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	
Start	550 plants	7	acid frog breeding ponds. Mount Emu She-oak	EIS Section
quality			The start value for Mount Emu Sheoak 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.	7.7.1.2 BOS Section 5.1.1.1
			Wallum Sedgefrog	BOS Section 6.1.2
			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.	0.1.2
			The Site Condition of the areas of offset within the SCA site can be	

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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 <i>Site Context</i> for Wallum Sedgefrog is slightly higher and can be given a score of 5 due to some connection to existing habitat in the WHMA. <i>Species Stocking Rate</i> 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.	NA
			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.	

Biodiversity Offsets Strategy (continued)

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Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
Time until	-	5	Mount Emu She-oak	
ecological benefit			Time until ecological benefit is not a required input in the EPBC Act offset assessment calculator when using number of plants.	
			Wallum Sedgefrog	BOS Section
			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.	9.1.2
			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.	
Risk of	-	2%	Mount Emu She-oak	
loss without offset			Risk of loss with offset is not considered in the EPBC Act offset assessment guide when using a number of plants.	
			Wallum Sedgefrog	BOS 5.1.2
			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.	

Calculator variable	Input		Explanation	Reference
	Mt Emu She-oak	Wallum Sedgefrog		
Future value / quality without offset	0	7	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

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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 <i>Site Condition, Site Context</i> and <i>Species Stocking Rate</i> 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	

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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	EIS Section 7.7.1.2
			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 Broadleaved Paperbark by limiting root development. The boreholes in the	BOS Section 6.1.1

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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.	BOS Section 6.1.2
			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.	

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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 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.

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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

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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	24.05	3.82	2.55	2.30	7.50	25.46	16.8	4.41	5.84	92.73
Froglet	(100%)	(100%)	(10%)	(100%)	(100%)	(100%)	(35%)	(100%)	(100%	
Wallum	9.62	1.53	2.55	2.30	7.50	25.46	16.8	4.41	5.84	76.01
Rocket Frog	(40%)	(40%)	(10%)	(100%)	(100%)	(100%)	(35%)	(100%)	(100%	
Wallum	2.41	0.38	1.27	2.30	7.50	25.46	16.8	4.41	5.84	66.37
Sedgefrog ²	(10%)	(10%)	(5%)	(100%)	(100%)	(100%)	(35%)	(100%)	(100%	
Ground	0.00	0.00	0.00	0.00	0.00	25.46	0.00	4.41	5.84	35.71
Parrot	(0%)	(0%)	(0%)	(0%)	(0%)	(100%)	(0%)	(100%)	(100%	
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.

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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.

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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).

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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 outcomeoriented, 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 onground 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 land³ 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;

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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 Sheoak, 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.

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Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

 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.

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Biodiversity Offsets Strategy (continued) Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy Sunshine Coast Airport 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.

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Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

Sunshine Coast

PHASE AND OFFET DELIVERY 2015	2016 2017	7 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)									

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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 $(N = 550 \text{ plants})$ 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		

Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

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.

Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

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. 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.
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.
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.
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.
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.
gefrog)
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. 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 Pol	icy
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.

Biodiversity Offsets Strategy (continued)

Sunshine Coast Airport

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.

Biodiversity Offsets Strategy (continued)	
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	EPBC Act Offset Calculator
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A1 Mount Emu She-oak assessment	

Biodiversity Offsets Strategy (continued)

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APPENDIX B Biodiversity Offsets Strategy (continued) **Appendix B** Queensland offset calculator tools

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

B1 Habitat quality scoring template

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Plot bearing [Lot 1 RP27759 and Lot 2 RP27760], currently owned cribed as a contiguous areas of Broad-leaved Paperbs nmon. Isolated retained eucalypt trees and Cabbage		
Site description and Location (including details of description and Location (including details of description and Location (including details of described sort Council. Extensive grant unit can be described as a contiguous areas of Broad-leaved Paperbark Melaleuca quinquenervia regrowth, with a canourface water is common. Isolated retained eucalypt trees and Cabbage Palms throughout, spaced very sparcely.	necolners	-26./3251 MID / ESB
Site description and Location (including details of description and Location (including details of described as a contiguous areas of Broad-leaved Paperbark Melaleuca quinquenervia regrowth, with a cano urface water is common. Isolated retained eucalypt trees and Cabbage Palms throughout, spaced very sparcely.		101/004
igrazing property (Lot 1 RP27759 and Lot 2 RP27760), currently owned in freehold by Sunshine Coast Council. Extensive gr int unit can be described as a contiguous areas of Broad-leaved Paperbark <i>Meloleuca quinquenervia reg</i> rowth, with a cano urface water is common. Isolated retained eucalypt trees and Cabbage Palms throughout, spaced very sparcely.	liscrete polygons within the assessment unit)	
	azing once covered the property, now used by small r py height of 3-4m. Ground layer dominated by exotic	mber of cattle. grasses, with some native and exotic sedges in lower areas whi

	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	
	Forks and others (non grass ground) sneries richness	richness:	
Total number of species		6	
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	

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Common large Comm	Scientific Name				Common Name		
Common target Common targe	Scientific Name				Common Name		
Common Name	Scientific Name				Common Name		
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Common Name	Sciencine				COMMISSION		
Common Name	Scientific Name				Common Name		
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Scientific Ranne Common Table	Scientific Name				Common Name		
2	Scientific Name				Common Name		
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2	art F - Coarse Woody Debris: (*list lengths of individual	logs in meters)					
2	Total Length of Course Woody Debris (Meters):						
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23 26 26 26 26 26 26 26	33				40		
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Inial grass cover, organic litter: (* provide percentage cover within each quadrat's and provide average cover) Quadrat 2 Quadrat 3 Quadrat 4 Quadrat 5 0.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% 10.00% <th< td=""><td>25</td><td></td><td></td><td></td><td>20</td><td></td><td></td></th<>	25				20		
Diage Eucaypt trees: Provide percenting acover within Earn quadrat 2 Quadrat 3 Quadrat 5 Quadrat 5							
Organic Litter Quadrat 1 Quadrat 2 Quadrat 3 Quadrat 3 Quadrat 5 Quadrat 5 Quadrat 3 Quadrat 4 Quadrat 5 Quadrat 5 Quadrat 3 Quadrat 4 Quadrat 5	art G - Native perennial grass cover, organic litter: ("pro	vide percentage cover within	n each quadrat, and provide	average cover)			
Organic Litter Clouds 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% 10,00% <th< td=""><td>Native perennial grass cover</td><td>Quadrat 1</td><td>Quadrat 2</td><td>Quadrat 3</td><td>Quadrat 4</td><td>Quadrat 5</td><td>Average</td></th<>	Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
Organic Litter Quadrat 1 Quadrat 2 Quadrat 3 Quadrat 4 Quadrat 5		2.00%	10.00%	2.00%	0.00%	10.00%	8:00.9
Organic Litter Quadrat 1 Quadrat 2 Quadrat 3 Quadrat 5							
State Compared C	Organic Litter	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
large trees, tree canopy height, recruitment of woody perennial species: of large eucalypt trees: of large eucalypt trees: egs: Number of large no eucalypt trees: of large eucalypt trees: Number of large no eucalypt trees: Number of large no eucalypt trees: Number of large no eucalypt trees: 1 I theregent:		0.00%	0.00%	%00.0	0.00%	0.00%	
ref farge euca lypt trees: or flarge euca lypt trees: Number of eaclogically dominant layer species regenerating: Number of eaclogically dominant layer species regenerating: Number of ecologically dominant layer species regenerating: Number of ecologically dominant layer species regenerating: Number of ecologically trees: 1	2004 Hydray of speed speed to any holythe real	leinnesses shoots to treating	:000				
rof large eucalypt trees: 0 Non-Eucalypt Large Tree 33 rof large eucalypt trees: 0 DBH benchmark used: 0 ees: 0 eucalypt trees: 0 eight Measurements Canopy: 4.00 Sub-canopy: Emergent: Number of ecologically dominant layer species regenerating: 1 1	rait na namber of farge trees, tree camppy fiergift, feet	ditilient of woody perchinal	species.				
ees: Number of large eucalypt trees: eght Measurements Number of eucalypt trees: O eucalypt trees: O eucalypt trees: O eucalypt trees: I Mumber of ecologically dominant layer species regenerating: Number of ecologically dominant layer species regenerating: I Sub-canopy: I Sub-canopy: I Emergent: I Sub-canopy: I Emergent: I Emer	Eucalypt Large tree DBH benchmark used:		0		Non- Eucalypt Large tree DBH benchmark used:		33
cof large eucal/ppt trees: 0 Number of large non eucal/ppt trees: 0 Number of large non eucal/ppt trees: 0 eeght Measurements Canopy: 4.00 Sub-canopy: Emergent: In Number of ecologically dominant layer species regenerating: 1 1 August Annual canopy cover. 1 cover, Shrub canopy cover Canopy: 18.40% Sub-canopy: Emergent: Emergent:							
cees: A.00 Sub-canopy: Emergent: Number of ecologically dominant layer species regenerating: 1 over, Shrub canopy cover Canopy: 18.40% Sub-canopy: Emergent:	Number of large eucalypt trees:		0		Number of large non		0
ees: eight Measurements Canopy: 4.00 Sub-canopy: Emergent: 1 Number of ecologically dominant layer species regenerating: 1 over, Shrub canopy cover Canopy: 18.40% Sub-canopy: Emergent:					eucalypt trees.		
eight Measurements Number of ecologically dominant layer species regenerating: Number of ecologically dominant layer species regenerating: 1 Over, Shrub canopy cover Canopy: 18.40% Sub-canopy: Emergent: Emergent:	otal Number Large Trees:						
eight Measurements Canopy: 4.00 Sub-canopy: Emergent: 1 Number of ecologically dominant layer species regenerating: 1 Over, Shrub canopy cover Canopy: 18.40% Sub-canopy: Emergent:							
Number of ecologically dominant layer species regenerating: over, Shrub canopy cover Canopy: 18.40% Sub-canopy:	edian Tree Canopy Height Measurements	Canopy:	4.00	Sub-canopy:		Emergent:	18.00
Number of ecologically dominant layer species regenerating: over, Shrub canopy cover Canopy: 18.40% Sub-canopy:							
over, Shrub canopy cover Canopy: 18.40% Sub-canopy:	Number of ecologically domin	ant layer species regenerating:				1	
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SCORE SEASESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT. PLEASE COMPLETE SPECIES HABITAT REQUIREMENT. PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED Species Name CommonName NACA Status Artiflutes 3-1cm fincation place 3-1cm fincation 3-1cm fincation place 3-1cm fincation	2 - Sharing a common boundary
Species Name Species Name CommonName Co	4
PLEASE COMPLETE SPECIES HABITAT REQUIREMENT. Species Habitate Attributes Species Hamiltonia of binging fraction of bingi	
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Species Name CommonName NCA Status Attributes Threats to species Quality and availability of coord and foraging habitant or capeding that it coil of the coording but many and and foraging habitant or capeding wallum rocketfrog V Description 3 - Low threat level 3 - High 10 Litroria olong burensis wallum rocketfrog V Description 3 - Low threat level 2 - Moderate Litroria olong burensis wallum sedgefrog V Description 3 - Low threat level 1 - Poor Litroria olong burensis wallum sedgefrog V Description 3 - Low threat level 1 - Poor Score Score 15 1 - Poor Score Score Score Score Score Score Score Score Score Score Score Score Sc	
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Species Name CommonName NACA Status Attributes Threats to species Attributes Threats to species Attributes Threats to species Additional condamn froaging habitat Crinia tinnula wallum rocketfrog V Description 3 - Low threat level 3 - High Litorio freycineti wallum rocketfrog V Description 3 - Low threat level 2 - Moderate Litorio freycineti wallum sedgefrog V Description 3 - Low threat level 1 - Poor Litorio olongburensis wallum sedgefrog V Description 3 - Low threat level 1 - Poor Score Score 15 1 - Poor Score Score Score Score Score Score Score Score Score Score Score Score Score Score	
Species Name CommonName NCA Status Attributes Titreats to species Good and foraging habitaty of the control of the	
Crinic tinnula Wallum Foderto V Description 3-Low threat level 3-High	lability of Species mobility
Crinia tinula wallum fraget V Description 3 - Low threat level 3 - High 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 <	shelter capacity to overall population
Litoria freyzineti wallum rocketfrog V Description Score 3 - Low threat level 1 - Poor 2 - Moderate 10 10 Litoria olongburensis wallum sedgefrog V Description Score 3 - Low threat level 1 - Foor 1 - Foor 1 - Foor Score Score 15 1 - Foor 1 - Foor 1 - Foor Score Score Score 1 - Foor 1 - Foor 1 - Foor Score Score Score 1 - Foor 1 - Foor 1 - Foor Score Score Score 1 - Foor 1 - Foor 1 - Foor Score Score Score 1 - Foor 1 - Foor 1 - Foor Score Score Score 1 - Foor 1 - Foor 1 - Foor Score Score Score 1 - Foor 1 - Foor 1 - Foor Score Score Score 1 - Foor 1 - Foor 1 - Foor Score Score Score 1 - Foor 1 - Foor 1 - Foor Score	3 - High 4 - Minor restriction $\frac{1}{1}$ - No. or unimary to $(0-25\%$ reduction) erritical to species $(0-25\%$ reduction)
Litoria freycinetis Wallum rocketfrog Notation Score 15 Score	10 10 1
A	2 - Moderate 4 - Minor restriction be critical to species' (0 – 25% reduction) survival"
Itionia olong burensis Wallum sedgefrog Ascore 15 1 - Poor 1 - Po	5 10 1
	$\begin{array}{ccc} 4 - \textit{Minor restriction} & 1 - \textit{Poor} & \\ \hline & (0 - 25\% \ reduction) & \text{be critical to species}' \\ & \text{survival"} & \\ & \text{survival"} & \\ \end{array}$
	1 10 1
Description	
Score Score	
	4000



					à	lac.	in the following row.	Northing	-26.73591	Northing	-26.73544	MJD / FSR	th exotic grasses indicates that grazing has d south of this AU. Also shares a boundary gent layer of eucalypts up to 22m in height. Islons and low lying areas.
	an Advanced Offset Site			Date	and and Mines	ladiin Nulligaiola	st photos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.	Easting	153.10098	Easting	153.10104	Recorders	for and Location (including details of discrete polygons within the assessment unit) Council. Extensive grazing once covered the property, now used by small number of cattle. Very dense groundcover with exotic grasses indicates that grazing has use Eucolyptus and Angophora within this AU. Mapped and floristically remnant RE 12.35 located to the north, east and south of this AU. Also shares a boundary area. ucalyptus appinoximately 3m in height, composed almost completely of Broad-leaved Paperbark trees, Emergent layer of eucalypts up to 22m in height, bund cover dominated by exotic grasses, with some native grasses. Exotic and native sedges common in drainage depressions and low lying areas.
Details)	An Offset Site	Habitat Quality Assessment Unit Score Sheet				12.2 E	vided from row 231-355 below and include	Zone	99	Zone	56	0 Rec	Site description and Location (including details of discrete polygons within the assessment unit) stable Coast Council. Extensive grazing once covered the property, now used by small number of crases of the genus Eucolyptus and Angophora within this AU. Mapped and floristically remnant RE11 e of the offer area. To spp. and eucalypt saplings. EDL approximately 3m in height, composed almost completely of Bro lery dense ground cover dominated by exotic grasses, with some native grasses. Exotic and native staland/fernland/paperbark complex and the southern drainage line.
orm 1– Notice of Election and Advanced Offsets Details) ration lentified on the forms as being required to accompany your application s of an impact and/or offset/advanced offset site. for each assessment unit under consideration.	An Impact Site	Habitat Quality		Palmview	Accompany of all the company	Assessment Only Alea (na)	north, south, east and west photos in the spaces prov	1	Om ivlark	50m Mark	2		Site description and Location (including eehold by Sunsthine Coast Council. Extensive grazing or jaeddock trees of the genus Eucolyptus and Angophatin the centre of the offet area. In the centre of the offet area. Respirings. Very dense ground cover dominated by extentral sedgeland/fernland/paperbark complex and the
Habitat Quality Site Assessment Template	Is this Assessment for:		Part C - Site Data	Property	45-114	Assessment Onit:	Landscape Photo-Please attach or insert north, south, east and we	Datum	WGS 84	GDA 94		Plot bearing	Site description and Location (Including details of discrete polygons within the assessment unity Palmwiew 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 exotit grasses indicates that grazing has been largely excluded from this AU. Higher abundance of retained paddock trees of the genus Eucotypitus 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 Acacio spp. and eucalypt saplings. EDL approximately 3m in height, composed almost completely of Broad-leaved Paperbark trees. Emergent 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.

otal number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name		Total number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name		Total number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name Scientific Name	Scientific Name	Scientific Name	Scientific Name		Total number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	Total percentage cover; (*11st species below)	Scientific Name	Scientific Ivallie	Scientific Name						
F. constraint description of the	Eucalyptus tereticornis Corvmhia intermedia	Molalonaminanamina	Andophora subvelutina							Shruh snacias richness	201101101101010 pp 110	Melaleuca quinquenervia	Pultenea robusta									Grass species richness:		Imperata cylindrica	Themeda triandra	Cymbopogon refractus							(Management and) and the base when ?	Forbs and otners (non grass ground) species richness:	Dianella caetalea	Lomandra lonaifolia	Cyperus sp	Centella asiatica	Patersonia sericea													
4	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	соштоп мате		2	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name		m	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name		pecies richness:	Common	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name		%00 08	Common Name	Collinon Valle	Common Name	Common value	Common Name	Common Name	Common Name	Common Name	
	Pink Bloodwood	Broad-leaved	Rough-barked Apple									Broad-leaved Paperbark	Tall Swamp Pea											Blady Grass	Kangaroo Grass	Barbwire Grass									Blue Flax-lilly	Mat Bush	A sedge	Pennywort	Native Iris													

2						
2				26		
				27		
8				28		
4				29		
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18				43		
19				44		
20				45		
21				46		
22				47		
23				48		
24				49		
25				20		
Part G - Native perennial grass cover, organic litter: (*pro	rovide percentage cover within each quadrat, and provide average cover)	n each quadrat, and provid	de average cover)			
100	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
Native perennial grass cover	40.00%	25.00%	10.00%	10.00%	2.00%	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:	ruitment 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:		8
Total Number Large Trees:				3		
Median Tree Canopy Height Measurements	Canopy:	3.00	Sub-canopy:		Emergent:	22.00
					,	
	The condition of the co				•	

In a ssess Emergent (E) or Subcanoov (S) lavers if the benchmark document stibulates that lavers are present "If trees are in the same laver and continuous along the transect you can proup them

SCORE SCORE SCORE SASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIRING THEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT Species Name Crinia tinnula Litoria olongburensis Litoria olongburensis wallum sedgefrog wallum sedgefrog	## Species Habitat Attributes 3 - 50%-75% connection 1 - C10% remnant 1	BMIT AS DIRECTED	DIRECTED Outlity and availability of Quality and availability of	2 - Sharing a common boundary 4 Quality and availability of Species m	Species mobility	Role of site location
SASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIR PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT Crinia tinnula Species Name Crinia tinnula Litoria freycine ti Litoria olongburensis wallum sedgefrog	NNDSCAPE PHOTOS AND SUB Habitat Attributes Attributes Description		Quality and availability of	Quality and availability of		Role of site local
POES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIR YES PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW NO PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT. Species Name Crinia tinnula Litoria freycine ti Litoria olongburensis wallum rocketfrog wallum rocketfrog	NNDSCAPE PHOTOS AND SUB Habitat Attributes Attributes Description	BMIT AS DIRECTED	One jiliga o a sile jiliga o	Quality and availability of		Role of site loca
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Species Name CommonName Crinia tinnula Litoria freycineti Litoria olongburensis wallum sedgefrog	Habitat Attributes Attributes	Threats to species	Quality and availability of	Quality and availability of		Role of site log
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Species Name CommonName Nu wallum froglet Litoria freycineti wallum sedgefrog Litoria olongburensis wallum sedgefrog	Habitat Attributes Attributes Oescription	Threats to species	Quality and availability of	Quality and availability of		Role of site loca
Species Name CommonName Nu Cania timula Litoria freycine ti Litoria olongburensis wallum sedgefrog	Habitat Attributes Attributes Description	Threats to species	Quality and availability of	Quality and availability of		Role of site loca
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Species Name CommonName Nu Crinia timula Litoria freycine ti wallum rocketfrog Wallum sedgefrog Wallum sedgefrog	Habitat Attributes Attributes Description	Threats to species	Quality and availability of	Quality and availability of		Role of site loca
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Crinia timula wallum fraglet Litoria freycine ti wallum rocketfrag Litoria olongburensis wallum sedgefrag	Describation	loud through the C	delli c	4277	4 - Minor restriction	1 - Not or unlikely to
Litoria freycine ti wallum rocketfrog Litoria olongburensis wallum sedgelfrog		פ-רחת וווובמו ובתבו	ligin - c	IIBITI - C	(0-25% reduction)	
Litoria freycine ti wallum rocketfrog Litoria olongburensis wallum sedgefrog	Score	15	10	10	10	1
Litoria diagaurensis wallum sedgefrag						
Litorio alongburensis wallum sedgeffog	Description	3 - Low threat level	3 - High	3 - High	(0-25% reduction)	be cri
Litoria olongburensis wallum sedgefrag		-	4,		/	survival"
Litoria alongburensis wallum sedgeff og	Score	15	10	10	10	1
Litoria alongburensis wallum sedgeff og	Description	3 - I ow threat level	2 - Moderate	2 - Moderate	4 - Minor restriction	 Not or unlikely to he critical to species'
4 10 0 10 0 0				4	(0-25% reduction)	
5 5 6 6 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Score	15	5	5	10	1
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o 6	Description					
6	Score					
	Description					
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	Score					
	Maximum Score	15.00	10.00	10.00	10.00	1.00
	Maximum score	15.00	10.00	10.00	10.00	1.00



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				1.	put	in the following row.	Northing	-26.73614	Northing	-28.73397 MJD / FSR		und cover of exotic grasses. Areas o
	an Advanced Offset Site			Bioregion Number	Southeast Queensland	as Time and Mapping Coordinates	Easting	3.09683	Easting	5.09029	0	nt layer can be described as the gro
	<u>></u>		Date			nd include details such	ä	153	3 1.	Recorders	in the assessment unit	ver. Ecologically domina
ils) yyour application	An Offset Site	Habitat Quality Assessment Unit Score Sheet		RE	12.3.5	from row 231-355 below a	Zone	9	Zone	285	Ste description and Location (including details of discrete polygons within the assessment unit) inshine Coast Council.	gh levels of exotic ground co e sedges.
on and Advanced Offsets Details) s being required to accompany your application fset/advanced offset site.		Habitat Quality Ass	Palmview	nt Unit Area (ha)		otos in the spaces providec	70	26	Zo	28	nd Location (including deta	strutural complexity and hi
ry Form 1— Notice of Election ar pplication in identified on the forms as bei lysis of an impact and/or offset,	An Impact Site			Assessment Uni	25.48	r north, south, east and west ph	Om Mark		50m Mark		Site description ar in freehold by Sunshine Coast Coun	shrub and tree regrowth. Very low is where pooling surface water has
 Habitat Quality Site Assessment Template	Is this Assessment for:	Data	Property	Assessment Unit:	3	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.			Ŋ	Plot bearing	Site description and I 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.
Habitat Q For all envirc C C C C This form is v		Part C - Site Data					Datum	WGS 84	GDA 94		Palmview graz	native vegetra

	Broad-leaved Paperbark												Broad-leaved Paperbark	Native Blue Tongue	,										Kangaroo Grass												A sedge	Wooly Frogsmouth	Red-fruited Saw-sedge	Native Wandering Jew	remywor	Asmartweed											
1	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name		2	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name		1	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	s richness:	7	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	7600 00	30.008	Common Name								
	Melaleuca quinquenervia										see and the section of small 2	oning species richness:	Melaleuca auinauenervia	Melastoma malabathricum subsp. malabathricum									Grass species richness:		Themeda triandra										Forbs and others (non grass ground) species richness:		Cyperus sp	Fnilydrum Idnuginosum	Gahnia sleberiana	Commeina aigusa	Xuris complanata	Persicaria sp.											
Total number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name		Total number of energe	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name		Total number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name		Total number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Part E - Non-Native Plant Cover: (*list species below)	lotal percentage cover within plot	Scientific Name	Concession Name							

Biodiversity Offsets Strategy (continued)

Part F - Coarse Woody Debris: (*list lengths of individual logs in meters) Total length of Course Woody Debris (Meters): 1 1 2 3 3 6 6 7 8 8 8 9 9 10 11 13 14 15 13 13 14 13 13 14 13 15 23 23 24 24 24 25 24 27 24 28 24 29 24 20 0.00% Part G- Native perennial grass cover 23 24 24 0.00% Part H- Number of large trees , tree canopy height, recruitment of woody perennial grass cover Number of large tree DBH benchmark used : Number of large eucalypt trees: Part Number of large tree DBH benchmark used : Nu	in meters)	26	27	2.8	23	30	31	32	33	34	35	98	37	38	39	40	41	42	43	77	45	46	47	48	49	05		Quadrat 1 Quadrat 2 Quadrat 4 Quadrat 5 Average	0.00% 0.00% 0.00% 0.00% 0.00%		Quadrat 2 Quadrat 3 Quadrat 4 C	0.00% 0.00% 0.00%	Part H- Number of large trees , tree canopy height, recruitment of woody perennial species:	0	DBH benchmark used:	0 Number of large non 0 eucalvot trees:			Canopy: Sub-canopy: Emergent:
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Part I - Tree canopy cover, Shrub canopy cover

Particular 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1	IS AS	9 - 26 - 100ha 14BITAT REQUIREME DETAILS BELOW AN W AND SUBMIT AS D ommonName	NT. Species Habi	CAPE PHOTOS AND SL Tat Attributes Attributes Description Score		500m	1- Not wit	<u>hin</u>	
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wallum fragiet V Description score 2 - Moderate threat invest 3 - Moderate threat investigation investi	Species Name	vallum frog let		Description Score		Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site locat to overall popular
wallum froglet V Description score 2 - Moderate proof plee in a score 2 - Moderate proof plee in a score 2 - Moderate proof plee in a score 4 - Minor restriction plee in a score 5 - Moderate plee in a plee in a score 5 - Moderate plee in a pl		wallum froglet		Description Score		0			1 - Not or unlikely
Mailum rocketfog V Description Score 2 Moderate threat Level 1 - Poor Level 1 - Poor Level 4 - Minor restriction of Level 1 - Poor Level 4 - Minor restriction of Level 1 - Poor Level 4 - Minor restriction of Level			>	Score	2 - Moderate threat Ievel	2 - Moderate	2 - Moderate	4 - Minor restriction (0 – 25% reduction)	be critical to species' survival"
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7 1 1 10 10 10 10 10 10 10 1		allum sedgefrog	>	Description	2 - Moderate threat level	1 - Poor	1 - Poor	4 - Minor restriction (0 – 25% reduction)	1 - Not or unlikely to be critical to species'
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An Offset Site Habitat Quality Assessment Unit Score Sheet Habitat Quality Assessment Unit Score Sheet Palmview Palmview 12.3.5 tos in the spaces provided from row 231-355 below and include details such as 56 56 153 56 163 17 Assessment Unit is located in an area she in the basessment unit is located in an area she in the basessment unit is located in an area she in the base area unit is located in an area she in the base area unit)	
Site Data Property Assessment Unit: Assessment Unit: Assessment Unit: Assessment Unit: Plot bearing Plot bearing Son	
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uiaw araina aranastu (i nr ? BD77761) runraattu numad in fraakhild fuu Sunekina Arat Prummii Accessmant liiti in Dratad in ara araa that hag araina avolulad for soma tim	unit)
promitive grants properly that are an active of promise in a moderate to consider a property that are also and leaved Paperbak trees. Grazing likey excluded due to hydrology.	unit) ome time and native regrowth is in a moderate to excellent condition. Some area

	Broad-leaved Paperbark													Broad-leaved Paperbark													Swamp Rice Grass	Blady Grass											Bungwall	Twigrush	Jointed Twigrush	Smartweed	Cimping Maidenair Fem	Spilor Sadra	2000 A															
iness:	Common Name	Common Name	Common Name	Common Name	O TOTAL NOTICE OF THE PARTY OF	Common Name	Common Name	omeo gomeo	Common Name	Common Name	and the second	mess.	T	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	hness:	2	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	und) species richness:	7	Common Name	Common Name	Common Name	Common Name	Common Name	Someth norman	Common Name	Common Name	Common Name	Common Name	Common Name		:	Common Name								
וופה אליביונים ויכווופאי	Melale uca quinque nervia										stonday actions divide	an sapade ciniiic		Melaleuca quinque nervia											Grass species richness:		Leersia hexandra	Imperata cylindrica	parameter and the same and the								Forbs and others (non grass ground) species richness:		Blechnum indicum	Baumea rubiginosa	Baumea articulata	Persicand sp.	Lygodium microphyllum	Chamic Scalentain	complete company															
Total number of species	. Scientific Name	Scientific Name	Scientific Name	Scientific Name	Section 19 and 1	Scientific Name			lotal number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name		Total number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name		Total number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Part E - Non-Native Plant Cover: (*list species below)	Total percentage cover within plot	Scientific Name												

385.50	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	US
	7.30	8.60	0.65	6.50	1.20	3.50	2.60	2.10	0.80	09:0	1.20	0.50													
Total Length of Course Woody Debris (Meters):	1	2	3	4	S	9	2	8	6	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	26

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

Ouadrat 1

Ouadrat 2

Ouadrat 3

Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
Olgaint Little	%00'0	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:	ant layer species regenerating:				1	

Mate (Tale accest Francest El ox Galvanous (C) lauges (# the barchmapt downment crinilates that James an morest # if trees are in the came buser and rontin unus alone the transert unus norm in them

Part J - Site Context Score

ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Permanent Water	Ecological Corrido
DESCRIPTION	1 - <5ha	1 - 0% - 10% connection	2 - > 10% to 30% remnan	1 - 0-500m	2 - Sharing a common b
STORE	U	U	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

	Species mobility capacity	4 - Minor restriction be critical to species' (0 – 25% reduction) survival"	10 1	4 - Minor restriction 1 - Not or unlikely to (0 – 25% reduction) survival"	10 1	4 - Minor restriction be critical to species' (0 – 25% reduction)	10 1													
	Quality and availability of shelter	чбін - E	10	чвін - E	10	чбін - E	10													
	Quality and availability of food and foraging habitat	3 - High	10	3 - High	10	3 - High	10													
	Threats to species	3 - Low threat level	15	3 - Low threat level	15	3 - Low threat level	15													
Species Habitat Attributes	Attributes	Description	Score	Description	Score	Description	Score	Description	Score	Description	Score	Score	Description	Score	Description	Score	Description	Score	Description	Score
Species Hab	NCA Status	>		>		>														
	CommonName	wallum froglet		wallum rocketfrog		wallum sedgefrog														
	Species Name	Crinia tinnula		Litoria freycineti		Litoria olongburensis														
	S	9		ī, tie		Litori														
									-		+		Т							

North



The bit of quality analysis of an impact and/or offset/advanced offset site. Is this Assessment for: An impact Site An impact Site An impact Site An impact Site Assessment Unit consideration. Indicate Property Assessment Unit axes (the Date Site Date Date Site Date Si	Froperty Sundhine Coart Allord coffeet Site An Impact Site Bacterial Duality Assessment Unit Locar Site Bacterial Duality Assessment Unit Locar Site Bacterial Covernity Oversion An Impact Site Bacterial Covernity Oversion Bacterial Covernity Oversion An Impact Site Bacterial Covernity Coversion Bacterial Site Impact S		 Provide the mandatory supporting information identified on the forms as be 	Compace any other points receasing to span application. I provide the mandatory supporting information identified on the forms as being required to accompany your application.	cation		
15 this Assessment for: An Impact Site Habitat Quality Assessment Unit Score Site An Offset Site An Advanced Offset Site Sushine Coast Airport - conflor offset Dave Assessment Unit Score Site Assessment Unit: Assessment Unit: Bicated property (Lot 2 PR27750), currently owned in freehold by Sunshine Coast Council: Assessment Unit: Bicated in an area that its shad grazing excluded for some time and native regrowth is in a moderate to excellent condition. Grazing excluded due to hydrology	14 this Assessment for: An Impact Site Fig. 12.35 Assessment for: Asse	is form is useful for undertaking a habitat quality anal y ease note that this form should be completed individua	ysis of an impact and/or offset ally for each assessment unit u	/advanced offset site. nder consideration.			
Habitat Quality Assessment Unit Score Sheet Property Sunshine Coast Airport - corridor offset Date Date Bioregion Number Bioregion Number South-seast 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. 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. 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. San Mark Son Mark	1 C - Site Data Assessment Unit Assessment Unit Assessment Unit Assessment Unit Assessment Unit Buttering Butterin	Is this Assessment for:	An Impact Site			an Advancec	
Property Sunshine Coast Airport - corridor offset Date Da	Assessment Unit			Habitat Quality Assessment Un	nit Score Sheet		
Assessment Units Assessment Unit Area (ta) RE Bioregion Number Bioregion Number	Assessment Unit. Assessment Unit. Landscape Photo-Please attach or insert morth, south, east and west photos in the spaces provided from row 231-335 below and include details such as Time and Marping Coordinates in the following row. Landscape Photo-Please attach or insert morth, south, east and west photos in the spaces provided from row 231-335 below and include details such as Time and Marping Coordinates in the following row. Statement Louis Statemen	Part C - Site Data					
Assessment Units: Assessment Unit Area (ha) RE Bloregion Number Bloregion Number	Sour least Current Units: Sour least and west photos in the space provided from row 231-335 below and include details such as Time and Mapping Coordinates in the following row 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1-23.5 1		Sunshin	e Coast Airport - corridor offset		Date	
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. A	Landscape Photo- Please attach or insert morth, south, east and west photos in the spaces provided from row 231355 below, and include details such as Time and Mapping Coordinates in the following row. 15.54 25.64 25.64 25.67 25.73 25.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.73 26.	Assessment Unit:	Assessment Un		BE		Bioregion Number
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. 2 De Easting Northing 133 Bat 133.096 153.097 153.097 156.7348 Plot bearing Plot bearing Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit)	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. SS4 A 94 To Cone Som Mark Som	5	7.5		2.3.5		Southeast Queensland
84 Om Mark Son Mark 56 153.096 26.735 94 Son Mark Son Mark Son Mark Son Mark Son Mark Northing 123.097 153.097 153.097 AUD/FSR 124.7348 AVID/FSR -26.7348 125 Recorders AVID/FSR 126 AVID/FSR 126 AVID/FSR 127 AVID/FSR 128 AVID/FSR 129 AVID/FSR 120 Avid of or	Som Mark	Landscape Photo- Please attach or inser	rt north, south, east and west pl	hotos in the spaces provided from row 2:	31-355 below and include	details such as Time and Ma	pping Coordinates in the following row.
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94 Easting Northing Plot bearing 56 153.097 .26.7348 rich grazing property (Lot 2 RP27750), 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 excluded due to hydrology	Som Mark Som Strategies Som Mark Som Strategies Som Mark Som Strategies Som Mark Som Strategies Som		0m Mark	95		153.096	-26.735
Plot bearing 56 153.097 -26.7348 -26.7348 Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit)	Plot bearing Site description and Location (Including details of discrete polygons within the assessment unit)		1	Zone		Easting	Northing
Plot bearing 135 Recorders MJD / FSR Wild Steed escription and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Site description and Location (including details of discrete polygons within the assessment unit) Second discrete polygons within the 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 excluded due to hydrology	Site description and Location (Including details of discrete polygons within the assessment unit) Site description and Location (Including details of discrete polygons within the assessment unit) With 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 rytowth Broad-leaved Paperbark forest, sedgeland and fernland complex. Some areas lack a canopy/shrub layer. Very low weed and exotic plant coverage. Site description and Location (Including details of discrete polygons within the assessment unit) April		SUM Mark	95		153.097	-26.7348
Site description and Location (including details of discrete polygons within the assessment unit) iew 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 excluded due to hydrology	Site description and Location (including details of discrete polygons within the assessment unit) www 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 excluded due to hydrology growth Broad-leaved Paperbark forest, sedgeland and ferniand complex. Some areas lack a canopy/shrub layer. Very low weed and exotic plant coverage. Jing surface water present during site investigations on 10th April. Low turbidity and pH < 5	Plot bearing		135	Re	corders	MJD / FSR
iew 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 excluded due to hydrology	mview 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 sy excluded due to hydrology recount Broad-leaved Paperbark forest, sedgeland and fernland complex. Some areas lack a canopy/shrub layer. Very low weed and exotic plant coverage. July surface water present during site investigations on 10th April. Low turbidity and pH < 5.		Site description	and Location (including details of discrete	e polygons within the ass	essment unit)	
	frowth Broad-leaved Paperbark forest, sedgeland and fernland complex. Some areas lack a canopy/shrub layer. Very low weed and exotic plant coverage. Jing surface water present during site investigations on 10th April. Low turbidity and pH < 5	Palmview grazing property (Lot 2 RP27760), currently owned is likley excluded due to hydrology	site description in freehold by Sunshine Coast Cou	and Location (including details of discrete incil. Assessment Unit is located in an are:	e polygons within the ass a that has had grazing excl	essment unit) uded for some time and nativ	e regrowth is in a moderate to excellent condition. Gra

Scientific Name	Shrub species richness: Shrub species richness: Melaleuca quinquenevia Glochidion sumotranum Melastoma malabathricum subsp. malabathricum Meleleuca pachyphylla Grass species richness:	Common Name	Swamp Box Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
Scientific Name	Melateuca quinquent Glochidion sumatrar malaba thricum subst Meleteuca pachyph imperata cylindric	Common Name	Broad-leaved Paperbark Chees Tree Native Blue Tongue Swamp Bottlebrush
Scientific Name	Melaleuca quinquene Glochidion sumatrar malobathicum subsy Meleleuca pachyph imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
Scientific Name	Melaleuca quinquenc Glochidion sumatrar malabathicum subsy Meleleuca pachyphi imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
Scientific Name	Meialeuca quinquen Glochidion sumatrar malabathricum subsy Meieleuca pachyph imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
Scientific Name	Melaleuca quinquent Glochidion sumatrar malaba thricum subst Meleleuca pachyph imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
Scientific Name	Melaleuca quinquena Glochidion sumatran malaba thricum subsp Meleleuca pachyph imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
Scientific Name	Meloteuca quinquent Glochidion sumatrat malobathicum subs; Meleteuca pochyph imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
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scientific Name	Nelaleuca quinquene Glochidion sumatrar malabathicum subs _i Meleleuca pachyphi imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
Scientific Name	Melaleuca quinquene Glochidion sumatrar malabathicum subs _i Meleleuca pachyph imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
nber of species Scientific Name	Melaleuca quinquene Glochidion sumatran malabathricum subsp Meleleuca pachyphy imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Tree Native Blue Tongue Swamp Bottlebrush
Scientific Name	Melaleuca quinquene Golobidios sumatran Golobidicum subsp Meleleuca pachyphy Imperata cylindric	Common Name	Broad-leaved Paperbark Cheese Treee Native Blut Tongue Swamp Bottlebrush
Scientific Name	malabermion subsp malabermicum subsp Meleleuca pochyphi imperata cylindric	Common Name	Native Blue Tree Swamp Bottlebrush
Scientific Name	matadamcam suss	Common Name	Native blue to ligue Swamp Bottlebrush
Scientific Name	Grass species richness;	Common Name	
Scientific Name	Grass species richness:	Common Name	
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		Common Name	Blady Grass
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	one (knii om seem non) sandab har shac	oe vichnoee.	
	Forbs and others (non grass ground) species richness:	es richness:	
Total number of species		9	
Scientific Name	December 2 this see	Common Name	Dungwall
Scientific Name	bauman rational and	Common Name	IWIGHT INTERPRETATION
Scientific Name	Schoons braifeling	Common Name	Spilited I Wigitasii
Scientific Name	Scholas previonas Gabaia sieberiana	Common Name	Spirky seuge Red-fruited Saw Sedge
Scientific Name	Lyaodium microphyllum	Common Name	Climbing Maidenhair Fern
Scientific Name	, Barrer 1	Common Name	0
Part F - Non-Native Plant Cover: (*list snecies below)			
Total percentage cover within plot		00:00	
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	
Colombific Namo		Common Name	
Scientific Name		Common Name	

Biodiversity Offsets Strategy (continued)

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

source parama lei magazon cui de M	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
Native perennial grass cover	%00:0	0.00%	0.00%	0.00%	0.00%	
a chiling O	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
Olganic Litter	25.00%	15.00%	2.00%	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:	
	·				1	
Number of ecologically domin	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

SCORE SASSESSMENT UNIT ALSO CONTAIN A SPECIES HA PLEASE COMPLETE SPECIES HABITAT INDEX C PLEASE ATTACH LANDSCAPE PHOTOS BELOW		Connectedness	Context	Distance to Per	rmanent Water	Ecological Corridors	rridors	
S AS	-5-25na	1 - 0% - 10% connection	1 - <10% remnant	1-0-	1 - 0-500m	2 - Sharing a common boundary	ion boundary	
IS AS	2	0	0)	0	4		
IS AS								
S AS								
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N D								
S [100000							
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	-							
	AND SUBMIT AS D	DIRECTED						
Part K - Species Habitat Attributes								
		Species Hab	Species Habitat Attributes					
					Quality and availability of	Quality and availability of	Species mobility	Role of site location
No Species Name Com	CommonName	NCA Status	Attributes	Threats to species	food and foraging habitat	shelter		to overall population
							A - Minor restriction	1 - Not or unlikely to
Crinia tinnula wall	wallum froglet	>	Description	3 - Low threat level	3 - High	3 - High		be critical to species'
			Score	15	10	UL	10	Survival
			2000	CT	61	OT CO		1 Not or unlikely
			Docorintion	2 - I our throat lovel	deitt c	deiti c		1 - NOL OF UNITREIY LO ho critical to chaciac'
Litoria freycineti wallun	wallum rocketfrog	>	Describcion	פ- דמא וווובמו ובאבו	ligin - c	IIBIH - C		pe critical to speci
			Score	15	10	10	10	3 ai vivai
								1 - Not or unlikely to
			40000	2 Lour throat lough	4000	457		bo critical to cooci
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Biodiversity Offsets Strategy (continued)

Attach Landscape Photos Here

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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	
				oregion Number	theast Queensland	
an Advanced Of				Bi	Sou	
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An Offset Site	sment Unit Score Sheet		ment Area	RE	12.2.12	
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		SOIL MAIN	56	153.0923	34	-26.59393
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ontains radar and meteorological equipment.

Vallum 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

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.

	Broad-leaved Paperbark													Broad-leaved Paperbark	Queensland Wax Flower		To the second second	Wallum Banksia	Charry Swamp Pea	Swamp May	Weeping Baeckea	Bushy Whitebeard	Guinea Flower	Wallum Boronia	Coral Heath																	Spreading Rope Rush	Pale Cordrush	Hatpins	And the second s	Jointed I Wighter	Dodder Laurel	Pourhed Coral Fern	Smartweed	Bungwall	Creeping Baspwort	0												
1	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	omeN nommo)		Common Name		11	Common Name	Common Name	Common Namo	COMMISSION	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name		c	0	Common Name		1.2	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name	Common Name				Common Name	Collingation	Common Name	Common Name	Common Name	Common Name													
	Melaleuca quinquenervia											Shrub species richness:		Melaleuca quinquenervia	Philotheca aueenslandica	Moodle is a second	and brown	Banksia robur	Pultenea paleacea	Leptospermum Iiversidgei	Baeckea frutescens	Leucopogon leptospermoides	Hibbertia vestita	Boronia falcifolia	Epacris pulchella	in a constant of the constant	Grass species nomess:												Forbs and others (non grass ground) species richness	-	Schoenoplectus mucronatus	8 1	Balloskion pallens	Xyris complanata		Baumea articulara	Cassyria proescens	Gleichenia dirama	Persignia sp.	Blechnum indicum	Gonocamus micranthus													
Total number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Complete Name	2000 N 2000 200 2	Scientific Name		otal number of species	Scientific Name	Scientific Name	Colombific Nama		Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name			Total number of species	Scientific Name		otal number of species	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name	Scienting Name	Scientific Name	Scientific Name	Scientific Name	Scientific Name		Part E - Non-Native Plant Cover: (*list species below)	Total percentage cover within plot	Scientific Name																		

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25				20		
Part G - Native perennial grass cover, organic litter: (*provide percentage cover within each quadrat, and provide average cover)	ercentage cover within each q	quadrat, and provide	average cover)			
	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
Native perennial grass cover	%00.0	%00'0	0.00%	0.00%	%00.0	
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:	nt of woody perennial species:					
Firehord large free DBI hearthwark used				Non-Eucalypt Large tree		
				DBH benchmark used:		
Number of large eucalypt trees:				Number of large non		
Total Number I area Trace.				encaly pr (rees:		
000000000000000000000000000000000000000						
Median Tree Canopy Height Measurements	Canopy:	2.50	Sub-canopy:		Emergent:	
Number of ecologically dominant layer species regenerati	r species regenerating:				2	
Part I - Tree canopy cover, Shrub canopy cover						
Tree canopy cover %	Canopy:	3.90%	Sub-canopy:		Emergent:	
Shrub canopy cover %				35,30%		

CONTAIN A SPECIES HABITAT REQUIREMENT. ECIES HABITAT INDEX DETAILS BELOW AND THEN AT SCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED CommonName NCA wallum froglet wallum rockerfrog wallum sedgefrog		Quality and availability of Quality and availability of food and foraging habitat 2 - Moderate 3 - High 5 - Moderate 3 - High	Species mobility capacity 4 - Minor restriction 7 - 25% reduction 7 - Minor restriction 7 - Minor restriction 7 - Minor restriction 8 - Minor restriction 9 - 25% reduction 10 - 25% reduction
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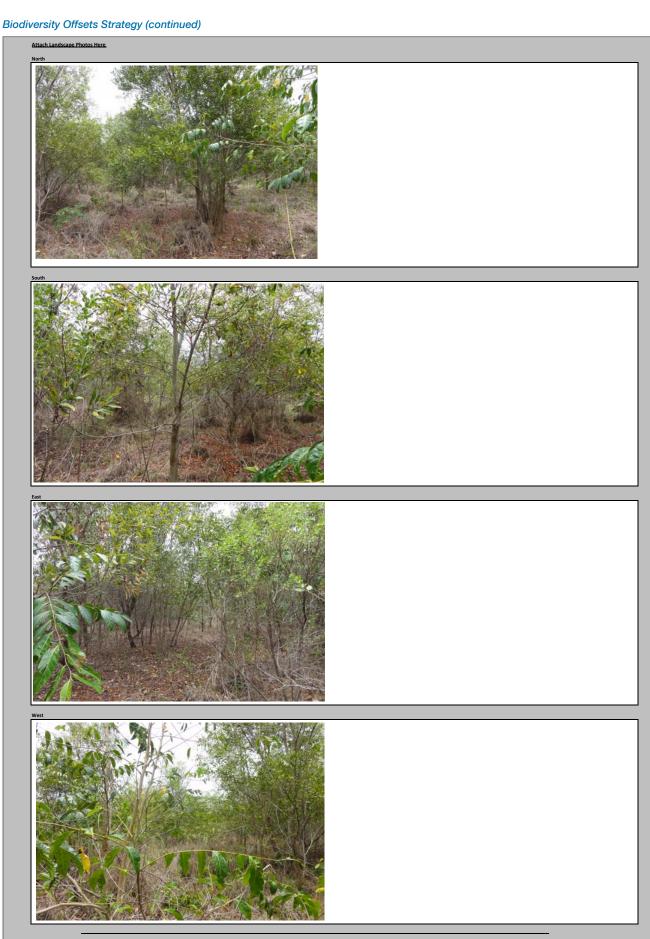
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Leading Quality Assessment Units: Assessment Units: Assessment Units: Assessment Units: Assessment Units: Assessment Units as and west photos in the spaces provided from row 231-335 below and include details such as Time and Mapping Coordinates in the following row. Lundscape Photo-Please statish or insert north, south, east and west photos in the spaces provided from row 231-335 below and include details such as Time and Mapping Coordinates in the following row. Lundscape Photo-Please statish or insert north, south, east and west photos in the spaces provided from row 231-335 below and include details such as Time and Mapping Coordinates in the following row. Both bearing: State description and Location (Including details of discrete polygons within 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 enlier and has some native rangowth elements. Further states are controlled by species. Declared peat plants, particularly Grounded Bush norther cardow cover. Much of the Assessment Unit has earlier grounded sections as the duminant groun of species. Declared peat plants, particularly Grounded Bush and shall no native canopy cover. Much of the Assessment Unit has earlier and cultivation which contain no native canopy cover. Much of the Assessment Unit has earlier and ease and has some native rangowth elements. Further and current use as cane lands. The northern section has been removed from cultivation ender and has some native rangowth elements. Further and current uses as cane lands. The northern section has been removed from cultivation ender and has some native rangowth elements. Further and current uses as cane lands. The northern section has been removed from cultivation ender and has some native rangowth elements. Further and current uses as cane lands. The northern section has been removed from cultivation ender and has some native rangewith elements. Further and particular defection cult	Strick Assessment for: An impact Site Habitat Quality Assessment Unit Score Sheet An Advanced Offset Site Habitat Quality Assessment Unit Score Sheet Date Southeast Offset Site Southeast Supplement Unit Score Sheet Southeast Supplement Supplement Unit Score Sheet Southeast Supplement Supp	rrowner ure manaawy supporting mormator form is useful for undertaking a habitat quality ana sse note that this form should be completed individu	on identified on the forms as be I lysis of an impact and/or offset ially for each assessment unit u	ing required to accompany yo /advanced offset site. nder consideration.	ou application			
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	Scientific Name	Acacia disparrima subsp. disparrima	Common Name	Hickory Wattle
STOCKED STOC	Scientific Name	Commersonia bartramia	Common Name	Brown Kurrajong
Common Name	Scientific Name	Glochidion sumatranum	Common Name	Cheese Tree
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Biodiversity Offsets Strategy (continued)

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Fucility Large trees, tree canopy height, recruitment of woody perennial species: Eucalypt Large trees of large trees, tree canopy height, recruitment of woody perennial species: Eucalypt Large tree DBH benchmark used: Number of large trees, tree canopy height trees: So DBH benchmark used: Number of large trees or any pt trees: I I - Tree canopy Height Measurements Number of acologically dominant layer species regenerating: Reanopy cover, % Thrub canopy cover % Canopy: Sub-canopy: Sub-canopy: A 00 A 00 A 100% A 100	15.00%	4.40%
Organic Litter Quadrat 1 Quadrat 2 Quadrat 3 Quadrat 4		
### Houmber of large trees, tree canopy height, recruitment of woody perennial species: Fucalypt Large tree	Quadrat 5	Average
Eucalypt Large trees of large trees: Non-Eucalypt Large tree	3.00%	60.40%
Eucalypt Large Trees: Non-Eucalypt Large Trees: Number of large eucalypt Large Trees: Number of large eucalypt Large Trees: Number of large undipply trees: O		
Eucalypt Large tree DBH benchmark used: Number of large eucalypt trees: Number of large nor large tree DBH benchmark used: Number of large nor large tree canopy Height Measurements Number of ecologically dominant layer species regenerating: 1.00% 1.00% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1.10% 1		
Number of large eucalypt trees: al Number of large eucalypt trees: 0 Number of large non eucalypt trees:	30 d:	
dian Tree Canopy Height Measurements Canopy: 7.00 Sub-canopy: 4.00 Number of ecologically dominant layer species regenerating: 5.1.10% Sub-canopy: 22.90% L1 - Tree canopy cover % Canopy: 5.1.10% Sub-canopy: 22.90% 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 note with the same l	C	
dian Tree Canopy Height Measurements Canopy: 7.00 Sub-canopy: 4.00		
dian Tree Canopy Height Measurements Number of ecologically dominant layer species regenerating: 1.00% 1.00% Ub canopy cover % Lanopy cover % Note: Only assess Emergent [E] or Subcanopy (S) layers if the benchmark document stipulates that layers are present "liftness are in the same layer and continuous process." 1.00%		
t 1 - Site Context Score	4.000	
Shrub c	Emergent:	
Shrub c	a	
Shrub G	,	
	Emergent:	
i.		
nonter CoCoat	ntinuous along the transect you can group them	
City of Designation of the Contest o		:
Size of Patch Connectedness Connext	nt Water	Ecological Corridors
3 - 26 - 100ha 1 - 0% - 10% connection 1 - <10% remnant	1 - 0-500m	2 - Sharing a common boundary
SCORE S	0	4

Biod	iversi	ty Oi	ffsets			gy (co																			
								 Not or unlikely to be critical to species' survival" 		1 - Not or unlikely to be critical to species' survival"	1													1.00	
						2 - Highly restricted (51% - 75% reduction)	4	2 - Highly restricted (51% - 75% reduction)	4	2 - Highly restricted (51% - 75% reduction)	4													4.00	
					Quality and availability of shelter	1 - Poor	1	1 - Poor	1	1 - Poor	1													1.00	
					Quality and availability of food and foraging habitat	1 - Poor	1	1 - Poor	1	1 - Poor	1													1.00	
	BMIT AS DIRECTED				Threats to species	2 - Moderate threat Ievel	7	2 - Moderate threat Ievel	7	2 - Moderate threat Ievel	7													7.00	
	APE PHOTOS AND SUI			Species Habitat Attributes	Attributes	Description	Score	Description	Score	Description	Score	Description	Description	Score	Description	Score	Description	Score	Score	Description	Score	Description	Score	Maximum Score	
NT.	THEN ATTACH LANDSC	RECTED		Species Habi	NCA Status	^		^		>				•					_			_			
	NDEX DETAILS BELOW AND	BELOW AND SUBMIT AS DI			CommonName	wallum froglet		wallum rocketfrog		wallum sedgefrog															
JINII ALSO CONTAIN A SPEC	PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDSCAPE PHOTOS AND SUBMIT AS DIRECTED	PLEASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DIRECTED			lame	nula		/cinet i		burensis															
DOES THIS ASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT.	YES 🔽 PLEASE CON	NO 🗆 PLEASE ATT	Attributes		Species Name	Crinia tinnula		Litoria freycineti		Litoria olongburensis															
			Part K - Species Habitat Attributes		No	τ		2		m		4		ın	y	o	7		œ	6		10			



(FORM COMPLETE)

	an Advanced Offset Site				Disconias Nimakas	Southeast Ouensland	ohotos in the spaces provided from row 231-355 below and include details such as Time and Mapping Coordinates in the following row.	Easting Northing	Easting Northing	rs	nt unit)	gion Number ast Queensland coordinates in the followi
	Σ	heet		Date			ow and include details			Recorders	within the assessmen	Ow and include details: Recorders Rec
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.	☐ An Offset Site	Habitat Quality Assessment Unit Score Sheet		Sunshine Coast Airport				Zone	Zone		and Location (including details of discrete polygons	
very Form 1– Notice of Election application ion identified on the forms as b labys of an impact and/or offse dually for each assessment unit to	An Impact Site				**************************************	Assessment U		0m Mark	And Mark		Site description	Sunshine G Assessment Unit Area (ha) 4.41 60m Mark 50m Mark 50m Mark Site description and Location Site description and Location
 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:		Part C - Site Data	Property		Assessment Unit:	Landscape Photo- Please attach or insert north, south, east and west		Wuss 84 GDA 94	Plot bearing		Assessment Unit: Batum WGS 84 GDA 94 Plot bearing Proposed Mount Emu She-oak offset area. No formal Bioconditon transect was completed within this A

Biodiversity Offsets Strategy (continued)

| 5 | Melaleuca quinquenervia | Acacia cincinnata | disparrima subsp. disparrima | | Common Name | Common Name | Common Name | Common Name Common Name | Shrub species richness: | Acacia cincinnata Common Name | Common Name Common Name | Common Name | Common Name | Common Name | Common Name | Common Name | Common Name | Common Name | Grass species richness: | Imperata cylindrica | Common Name | Fortis and others (non grass ground) species richness: | rotus and others (notigiass ground) species richness. | Common Name | Common Name | Common Name | Common Name | Common Name | Common Name | Common Name | | %00'06 | Common Name | Common Name | Common Name | Common Name | Common Name | Common Name | Common Name | Common Name | Common Name |
|---|-------------------------|-------------------|------------------------------|--|-----------------|-----------------|-----------------|------------------------------------|-------------------------|-------------------------------|------------------------------------|-----------------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------------|---------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------------------------------------------|-------------------------------------------------------|-----------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------------------------------------------|------------------------------------|-----------------|-----------------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | Scientific Name Me | | Acaci | | Scientific Name | Scientific Name | Scientific Name | Scientific Name
Scientific Name | | Scientific Name | Scientific Name
Scientific Name | Scientific Name | Name | Scientific Name | Scientific Name | Scientific Name | Scientific Name | Scientific Name | | | Scientific Name | | | es
Scientific Name | Scientific Name | Part E - Non-Native Plant Cover: (*list species below) | Total percentage cover within plot | Scientific Name | Scientific Name | Name | Scientific Name | Scientific Name | Scientific Name | Scientific Name | Scientific Name | Scientific Name |

Biodiversity Offsets Strategy (continued)

Part F - Coarse Woody Debris: (*list lengths of individual	logs in meters)		
Total Length of Course Woody Debris (Meters):	logs in 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	<u> </u>
21		46	
22		47	
23		48	
24		49	
25		50	

Part G - Native perennial grass cover, organic litter: (*pr	ovide percentage cover withir	each quadrat, and provid	e average cover)			
Native perennial grass cover	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
Native perennial grass cover	0.00%	3.00%	4.00%	0.00%	15.00%	4.40%

Part H- Number of large trees , tree canopy height, rec	ruitment 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:							
Modian Tree Canony Height Measurements	Canony	7.00	Sub canony	4.00	Emorgont		

	, , ,					
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

			Species Hab	itat Attributes					
No	Species Name	CommonName	NCA Status	Attributes	Threats to species	Quality and availability of food and foraging habitat		capacity	Role of site locatio 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 t be critical to specie 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 specie 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 t be critical to specie survival"
				Score	7	1	1	4	1
4				Description					
•				Score					
5				Description					
				Score					
6				Description					
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7				Description Score					
				Description					
8				Score					
				Description					
9				Score					
10				Description					
10				Score					
	<u> </u>								
				Maximum Score	7.00	1.00	1.00	4.00	1.00

nd Add ng rec advar cc der cc	pany your application An Offset Site Assessment Unit Score Sheet	an Advanced Offset Site	an Advanced Offset Site
orm is useful for undertaking a habitat quality analysis of an impact and/or offset/advanced ofference that this form should be completed individually for each assessment unit under considera Is this Assessment for: An Impact Site Habitat Habitat Assessment Unit Area (ha)	J offset site. Ideration. An Offset Site bitat Quality Assessment Unit Score Sheet	D	
s this Assessment for: An Impact Site Property Property Sunshine Coast Air Assessment Unit: Assessment Unit:	An Offset Site bitat Quality Assessment Unit Score Sheet	D	
Property Sunshine Coast Air Assessment Unit: Assessment Unit Area	bitat Quality Assessment Unit Score Sheet		
Property Assessment Unit: As			
Property Assessment Unit: As			
	t - 5.84ha northern sliver	Date	
		1	Bioregion Number
5.84	12.2.12	os	Southeast Queensland
		- 197	
WGS 84	2016	Surge	8
GDA 94	Zone	Easting	Northing
Plotbearing		Recorders	

Metabarana purione state disperent puntua enersia Acce di disperent autoritaria Commerciale bioritaria Giochidion sumatranum Giochidion sumatranum Acce cincinnata Fortic and others (non grass ground) species richness: Imperior Cylinding	lentific Name hertific Name and a fertific Name activities Nam		Broad-leaved Paperbark Coll-pod Wattle Hickory Wattle Brown Kurrajong Cheese Tree Coll-pod Wattle Coll-pod Wattle
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	n-Native Plant Cover: (* list species below) Total percentage cover within plot Scientific Name	Common Name	
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Biodiversity Offsets Strategy (continued)

	9										9														
	56	27	28	59	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	05
Total Length of Course Woody Debris (Meters):	1	2	3	4	2	9	7	8	6	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

i i i i i i i i i i i i i i i i i i i	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
ivative pereiiiia grass cover	0.00%	3.00%	4.00%	%00'0	15.00%	4.40%
O complete in the control of	Quadrat 1	Quadrat 2	Quadrat 3	Quadrat 4	Quadrat 5	Average
Organic Litter	%00.06	94.00%	%00'56	20.00%	3.00%	60.40%

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

Number of large eucalypt trees: 0 Number of large non eucalypt trees: 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0<					DBH benchmark used:		
Canopy: 7.00 Sub-canopy: 4.00 logically dominant layer species regenerating:	Number of large eucalypt trees:		0		Number of large non eucalypt trees:		0
Canopy: 7.00 Sub-canopy: 4.00 logically dominant layer species regenerating:	Total Number Large Trees:						
Canopy: 7.00 Sub-canopy: 4.00 logically dominant layer species regenerating:							
Number of ecologically dominant layer species regenerating:	Median Tree Canopy Height Measurements	Canopy:	7.00	Sub-canopy:	4.00	Emergent:	
Number of ecologically dominant layer species regenerating:		o .					
	Number of ecologically dominant layer sp	pecies regenerating:				3	

Note: Only assess Emergent (E) or Subcranopy (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

Sub-canopy:

51.10%

Part I - Tree canopy cover, Shrub canopy cover

SASSESSMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT. PLEASE COMPLETE SPECIES HABITAT INDEX DETAILS BELOW AND THEN ATTACH LANDS Species Hab Species Name Crima tinnula Crima tinnula Litoria diongburensis wallum sedgefrog Wallum sedgefrog V Uttoria dongburensis	Species Name	SASSESAMENT UNIT ALSO CONTAIN A SPECIES HABITAT REQUIREMENT. PLEASE COMPLIET SPECIES HABITAT REQUIREMENT.	SASSESSANDENT UNIT ALLO CONTAIN A SPICIUS MARTIN REQUIREMENT. PLASE COMPLETE SPECIES MARTIN INDEX DETAILS RECOM AND SIGNIT AS DIRECTED PLASE ATTACH LANDSCAPE PHOTOS RECOM AND SIGNIT AS DIRECTED PLASE ATTACH LANDSCAPE PHOTOS RECOM AND SIGNIT AS DIRECTED PLASE ATTACH LANDSCAPE PHOTOS RECOM AND SIGNIT AS DIRECTED PROSPER CONTRIBUTE SPECIES MARTIN AS DIRECTED CONTRIBUTE SPECIES MARTIN AS DIRECTED PROSPER CONTRIBUTE SPECIES MARTIN AS DIRECTED CONTRIBUTE SPECIES MARTIN AS DIRECTED CONTRIBUTE SPECIES MARTIN AS DIRECTED CONTRIBUTION AS DIRECTED CONTRIBU		ATTRIBUTE	Size of Patch	Connectedness	Context	Distance to Pe	Distance to Permanent Water	Ecological Corridors	rridors	
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Species Mane Species Mane Species Habitat Attributes Species Habitat Attributes Species Mane Specie	PREASE ATTACH LANDSCADE PHOTOS BELOW AND SUBWIT AS DRECTED Species Hobbits Attributes Threats to species Countrol Manue NAS states Attributes Threats to species Countrol Manue Threats to species	PREASE ATTACH LANDSCAPE PHOTOS BELOW AND SUBMIT AS DRECTED Species Habitat Attributes Species Habitat Attributes Threats to species for an antibuting of continuous months and benefiting Species Habitat Attributes Threats to species for an antibuting of continuous months and benefiting Species months and benefit Species months and benefit	Species Name		>	AT INDEX DETAILS BELOW	AND THEN ATTACH LANDS	CAPE PHOTOS AND SUF	SMIT AS DIRECTED				
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Crinatinula Wallum rogieta V Description 2 - Moderate threat 1 - Poor 1 -	Crimia timula Wallum froglet Auto-fined from threat Auto-fined	Crimatimula Wallum fregist	Corini time in the continue of the continue	ON	Species Name	CommonName	NCA Status	Attributes Attributes	Threats to species	Quality and availability of food and foraging habitat	Quality and availability of shelter	Species mobility capacity	Role of site location
Score Townstrated and plant rockeffrog V Description bescription bescription 2 - Modernor threat proof produce threat proof produce threat produced proof produced proof produced proof produced proof produced proof produced proof proof produced proof p	Electric Electric	Literia freychedi Wallum nockefrog Wallum nockefrog Wallum nockefrog Wallum nockefrog Wallum sedjefrog Wallum sed	Ultrain functional	1	Crinia tinnula	wallum froglet	>	Description	2 - Moderate threat Ievel	1 - Poor		2 - Highly restricted (51%- 75% reduction)	 Not or unlikely to be critical to species' survival"
Litria fleychetic bring	Literia freycineti	Libraria fleycinetia Wallum rockletfrog Wallum rockletfrog Wallum rockletfrog Score 2 - Mondering threat 1 - Poor 2 - Mondering threat 2	Littoria Freychetti Autiliant Colorification					Score	7	1	1	4	1
Sort Pescription Sort Pescription Sort Pescription Pescrip	Litria olongburensis Wallum seegefrog V Description C - Moderate threat 1- Poor C 1-High Presistrated C - High Presistated C - High Presistrated C - High Presistrated C - High	Literia clongburensis Wallum sedgefrog V Description 2 - Monderte Innoc 1 - Poor 1 -	Librio dong/burnisis	2	Litoria freycineti	wallum rocketfrog	>	Description	2 - Moderate threat Ievel	1 - Poor		2 - Highly restricted (51% - 75% reduction)	 Not or unlikely to be critical to species' survival"
Litoria olongburensis Aurilian sedgefrog Auri	Littoria olong burenisis Parity Perciption Paccription Paccrip	Litoria clongburensis Augusta	Libral adrightereds					Score	7	1	1	4	1
				æ	Litoria olongburensis	wallum sedgefrog	>	Description	2 - Moderate threat Ievel	1 - Poor		2 - Highly restricted (51% - 75% reduction)	 Not or unlikely to be critical to species' survival"
								Score	7	1	1	4	1
				4				Description					
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								Maximum Score	7.00	1.00	1.00	4.00	1.00

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 Environmental Offsets Delivery Form 5 - Habitat Quality Details as

Case Re					Habita	at Quality	Final Sum	mary Ien	<u>iplate</u>				
Project Total		137.08											
		Habitat Quality Attributes	Requirement					Assessment	Unit Number				
		Assessment Unit Area (ha)	Area (ha)	1 24.05	3.82	3 25.48	2.3	5 7.5	6 25.46	7 38.22	8 4.41	9 5.84	10
PA	RT	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									
		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	
	8	- Sub-Canopy Layer	Score					3		3			
	ribut	- Emergent Layer	Score										
1	Site Condition Attributes	Average Score	Average Score	3	0	0	5	4	3	3	5	5	
1	ditio	4. Tree canopy cover											
	e Cor	- Canopy layer	Score	2	2	0	5	2	2	5	3	3	
	Sit	- 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	
	ontes	11. Size of patch (fragmented)	Score	5	0	5	0	2	2	5	0	2	
	Context Attributes	12. Connectedness (fragmented)	Score	4	4	0	0	0	2	0	4	4	
2	text	13. Context (fragmented)	Score	0	0	0	2	0	0	0	0	0	
	Con	14. Distance from water (intact)	Score	0	0	0	0	0	0	0	0	0	
	Site	15. Ecological corridors	Score	4	4	0	4	4	4	4	4	4	
	Index	16. Threats to species	Score	15	15	7	15	15	15	7	7	7	
	itat li	17. Quality and availability of food and foraging habitat	Score	10	10	5	10	10	10	1	1	1	
3	Species Habitat	18, Quality and availability of shelter	Score	10	10	5	10	10	10	1	1	1	
	ecies	19. Species mobility capacity	Score	10	10	10	10	10	10	4	4	4	
	S	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) Habitat Quality Score (max)	96.00 151.00	95.00 166.00	60.00 146.00	93.00 156.00	95.00 156.00	79.50 136.00	56.50 156.00	59.00 156.00	61.00 156.00	
Assessment Unit Area (ha)	24.05	3.82	25.48	2.30	7.50	25.46	38.22	4.41	5.84	0.00
										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					Ar	up				
Project Name				Sui	nshine Coast Airpo	ort Expansion Proj	ect			
Phone Number			3023 6027			Em	nail	m	att.davis@arup.co	om

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	eference ct Name		1		SITE	ASSESSM	ENT TEM	PLATE SU	MMARY S	HEET		
	l Area	137.08	1									
		Habitat Quality Attributes						Unit Number				
		Assessment Unit Area (ha)	24.05	3.82	3 25.48	2.3	5 7.5	6 25.46	7 38.22	8 4.41	9 5.84	10
Pi	art	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									
		Recruitment of woody perennial species (Number of	-									
		ecologically dominant layers regenerating) 2. Native plant species richness	1.00	1.00	1.00	1.00	1.00	5.00	3.00	3.00	3.00	
		- 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		•	•	•			•	•	•	
	se	- Canopy Layer	4.00	3.00	3.00	18.00	12.00	2.50	7.00	7.00	7.00	
	Attributes	- Sub-Canopy Layer				5.50	3.00		4.00	4.00	4.00	
1	n Att	- Emergent Layer	18.00	22.00								
-	Condition	4. Tree canopy cover										
	Con	- Canopy Layer	18.40%	20.40%	2.40%	68.20%	46.50%	3.90%	51.10%	51.10%	51.10%	
	Site	- 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%	
	es	11. Size of patch (fragmented)	5.00	0.00	5.00	0.00	2.00	2.00	5.00	0.00	2.00	
	ributes	12. Connectedness (fragmented)	4.00	4.00	0.00	0.00	0.00	2.00	0.00	4.00	4.00	
2	t Attr	13. Context (fragmented)	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	
-	Context											
	o o	14. Distance from water (intact)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Sit	15. Ecological corridors	4.00	4.00	0.00	4.00	4.00	4.00	4.00	4.00	4.00	
	ex	16. Threats to species	15.00	15.00	7.00	15.00	15.00	15.00	7.00	7.00	7.00	
	at Ind	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	
3	Habitat	18, Quality and availability of shelter	10.00	10.00	5.00	10.00	10.00	10.00	1.00	1.00	1.00	
	ies H	19. Species mobility capacity	10.00	10.00	10.00	10.00	10.00	10.00	4.00	4.00	4.00	
	8	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	

Biodiversity Offsets Strategy (continued)

PLEASE COMPLETE THE RENCHMARK OR REST ON OFFER SITE DETAILS RELOW AS DIRECTED FOR EACH ASSESSMENT LINIT AND REGIONAL ECOSYSTEM LISTED RELOW

Case Re	eference		SITE ASS	ESSMENT T	EMPLATE - E	BENCHMARE	OR BEST O	N OFFER SIT	E DETAILS -	ENTER DETA	AILS IN CELLS	BELOW
	t Name											
Total	l Area	137.08				AILABLE ON THE						BENCHMA
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,									
		Habitat Quality Attributes	1	2	3	Be 4	nchMark or Bes	t on Offer Site D	ata 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
Pa	art	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	
		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	-									
	es	- Canopy Layer	14.00	14.00	14.00	14.00	14.00	7.00	14.00	7.00	7.00	
	Condition Attributes	- Sub-Canopy Layer					8.00		8.00			
	n Att	- Emergent Layer										
1	di ii	4. Tree canopy cover					•			-		
		- Canopy Layer	96.00%	96.00%	96.00%	96.00%	96.00%	12.00%	60.00%	12.00%	12.00%	
	Site	- 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%	

Projec	eference ct Name Il Area	137.08			SITE ASS	ESSMENT	BENCHM	ARK COM	PARISON	RESULTS		
			-				Assessment	Unit Number				
		Habitat Quality Attributes	1	2	3	4	5	6	7	8	9	10
Р	art	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									
		Recruitment of woody perennial species (Number of ecologically dominant layers regenerating) Native plant species richness	100.00%	100.00%	100.00%	100.00%	100.00%	41.67%	60.00%	25.00%	25.00%	
		- 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										
	tes	- Canopy Layer	28.57%	21.43%	21.43%	128.57%	85.71%	35.71%	50.00%	100.00%	100.00%	
	Attributes	- Sub-Canopy Layer					37.50%		50.00%			
	n Att	- Emergent Layer										
1	Condition	4. Tree canopy cover										
		- Canopy Layer	19.17%	21.25%	2.50%	71.04%	48.44%	32.50%	85.17%	425.83%	425.83%	
	Site	- 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%	
	outes	11. Size of patch (fragmented)	5.00	0.00	5.00	0.00	2.00	2.00	5.00	0.00	2.00	
2	Attributes	12. Connectedness (fragmented)	4.00	4.00	0.00	0.00	0.00	2.00	0.00	4.00	4.00	
	Context /	13. Context (fragmented)	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	
	Con	14. Distance from water (intact)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	Site	15. Ecological corridors	4.00	4.00	0.00	4.00	4.00	4.00	4.00	4.00	4.00	
	Index	16. Threats to species	15.00	15.00	7.00	15.00	15.00	15.00	7.00	7.00	7.00	
	tat Ir	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	
3	Habitat	18, Quality and availability of shelter	10.00	10.00	5.00	10.00	10.00	10.00	1.00	1.00	1.00	
	cies	19. Species mobility capacity	10.00	10.00	10.00	10.00	10.00	10.00	4.00	4.00	4.00	
	Spe	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

Biodiversity Offsets Strategy (continued) Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy Sunshine Coast Airport Offset multiplier calculator **B2**

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	Enter Impact Habitat Quality	Enter Offset Habitat Quality	Maximum Possible Gain	Enter Predicted Gain over 20yrs	Required
Melaleuca spp. on seasonally inundated open-forests and woodlands of lowland coastal swamps and fringing lines. (palustine wetlands)	7	4	9	8	4.00
	Enter Impact Habitat	Enter Offset Habitat Ouality	Maximum Possible Gain	Enter Predicted	Required
Melaleuca spp. on seasonally inundated open-forests and woodlands of lowland coastal swamps and fringing lines. (palustine wetlands)	7	5	5	2	3.30
ps an	d fringing lines. (palustine wetlands)		Enter Impact Habitat Quality 7	Enter Offset Quality Habitat Quality P 7	Enter impact Habitat Enter Offset Maximum Quality Habitat Quality Possible Gain 7 5 5

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.

Biodiversity Offsets Strategy (continued) Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy Sunshine Coast Airport **Combined offset delivery calculator B3**

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Control Cont	Trace Date Date A SOME CTION N THE FILLISK BLOWN The Content Date of A SOME CTION N THE FILLISK BLOWN The Content Date of A SOME CTION N THE FILLISK BLOWN The Content Date of A SOME CTION N THE FILLISK BLOWN The Content Date of A SOME CTION N THE CONT	This calculator is designed to assist proponents in determining their total offset obligation for a part land-based and part financial estitlement offset proposal. The calculator functions by determining what proportion of a proposed offset site meets the necessary offset of the remaining impact area needs to be subsequently meet through the financial calculator. Note: Please ensure that all matters that have a significant residual impact are accounted for by entering the total nectares for each matter concerned as directed below on an individual basis.	oart financial settleme on of the remaining in occounted for by enter	ent offset proposal. npact area needs to ring the total hecta	For instructions on using this calculator please refer to flow 61 and-based and part financial settlement of text prosposal. The calculator functio and taxt proportion of the emaining impart area needs to be subsequently me load impact are accounted for by entering the total hectares for each matter or	ons by determining the finant through the finant oncerned as directed	what proportion of a cial calculator. I below on an indivie	a proposed offset site dual basis.	e meets the necessary offse
Chart the Young	Control Description	ASE ENTER DATA ASDIRECTED IN THE FIELDS BELC	WC			RESU	LTS (NOTE: THES	E FIELDS ARE AUTO	OPOPULATED)
1187 33 7601 720079 66358 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200 7200	Water (Control Decision Control Cont	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 Financia Calculator per Impacted Matter (ha)
1.67 3.3 16.57 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.510 2.5	Complete C	Wallum Froglet Crinia tinnula	60.63		92.73	200.079	46.35%	28.10	32.53
TOTAL 8:22 TOTAL 6:22	Vertical 1.0 - Decreber - 2014. © - State of Operentised, Department of foreknownest and lestings Protection	wanton nocketing tunia neyaneu Wallum Sedgefrog Litoria diongburensis Ground Parror Pezoporus wallicus wallicus Mount Emu She-oak	7.88	3.3	66.37 35.71 10.42	5.511 26.004 14.553	1204.32% 1204.32% 137.33% 71.60%	20.11 10.82 3.16	-18.44 -2.94 1.25
85.22 T dal Hectors of Impact Area Officer via Offices Site via Offices Site	100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100								
85.22 Total Hestree of Impact Area Offers Site via Offers Site	1								
8.5.2 Total Hestere of Impact Area Offers of Impact and Offers Site	(a) (A								
85.22 T dal Hectore of T map Hectore of Impact Area Officer via Offices Site	(3)) (State of Discentiser, 2014 D. State of Discentiser, Dispatrment of Invisorated and Metalge Protection (State of Discentiser, 2014 D. State of Queeniser, Dispatrment of Invisorated and Metalge Protection (State of Discentiser, 2014 D. State of Queeniser, Dispatrment of Invisorated and Metalge Protection								
85.22 Total Hesture of Impact Area Office site via Office Site	3.9. We seed code (1902) We seed to (1902) We se								
8.2.2 T dal Hetero of T mps Hetero of Impact Area Office to a office Site	(3)) (1) (2) (3) (4) (4) (5) (5) (6) (6) (7) (7) (7) (7) (7) (8) (9) (9) (9) (9) (9) (9) (9) (9) (9) (9								
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Biodiversity Offsets Strategy (continued) **Appendix C** Financial payment calculator outputs

Sunshine Coast Airport

Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy

C1 Financial payment for residual impact area

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Page C1

Biodiversity Offsets Strategy (continued)

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: <<u>no-reply@ehp.qld.gov.au</u>> 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

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)

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Biodiversity Offsets Strategy (continued) Sunshine Coast Airport Expansion Project Biodiversity Offsets Strategy Sunshine Coast Airport Financial payment for total impact area

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Page C2

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:

1

- 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)

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Biodiversity Offsets Strategy (continued)



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:

- Groundwater depth and fluctuations at specific locations containing groundwater dependant ecosystems;
- Groundwater depth and fluctuations in areas identified as potential flora offset areas for selected 2)
- Groundwater quality changes (i.e. salinity and pH should be determined in certain areas to assess any potential indirect changes); and
- 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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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 report¹. 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

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- 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.

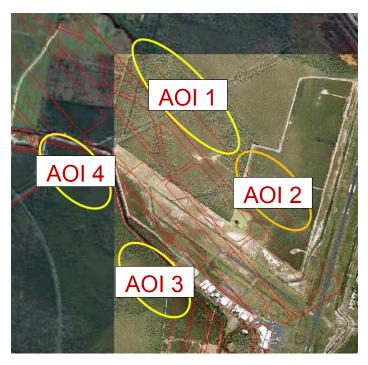


Figure 1: Environmental Values. Excerpt from ECOSMART (2012).



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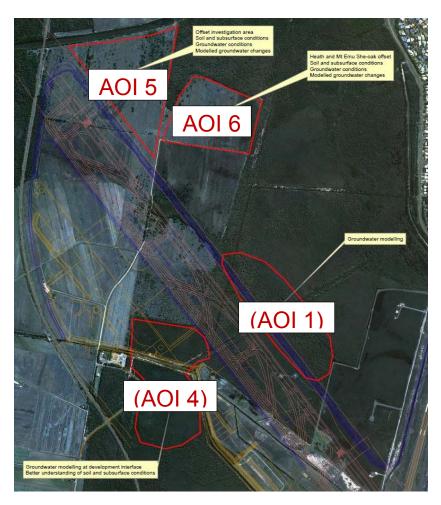


Figure 2: Flora Considerations; AOI 1 and AOI 4 overlap with ecology areas. Excerpt from ARUP (2012).



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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
 - 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



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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.

Elizabeth Major Hydrogeologist

EM/DB/

Dr Detlef Bringemeier Principal Hydrogeologist



Biodiversity Offsets Strategy (continued)

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