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MACKA'S SAND PTY LTD

BIODIVERSITY OFFSET STRATEGY

Mackas Sand Pty Ltd

FINAL

September 2023

BIODIVERSITY OFFSET STRATEGY

Mackas Sand Pty Ltd

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mackas Sand Pty Ltd

Project Director: Luke Bettridge
Project Manager: Chris Bonomini
Report No. 1646/R110
Date: September 2023

75 York Street
Teralba NSW 2284

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Mackas Sand and Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
Draft V1	Dominic Brown	August 2021	Luke Bettridge	August 2021
Draft V2	Rebecca Vere	15 May 2023	Luke Bettridge	20 June 2023
Final	Chris Bonomini	21 September 2023	Luke Bettridge	21 September 2023

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1.0 Introduction

Mackas Sand Pty Ltd (Mackas Sand) operates the Mackas Sand Project (the Project), a sand quarry on Lot 218/DP1044608 (Lot 218) and Lot 220/DP1049608. The Project is located approximately 25 kilometres (km) north-east of Newcastle near Salt Ash in the Port Stephens local government area (LGA) of New South Wales (NSW) (refer to **Figure 1.1**). Lots 218 and 220 are owned by the Worimi Local Aboriginal Lands Council and the Project is operated under contract by Mackas Sand.

Mackas Sand was granted Project Approval No. 08_0142 (PA 08_0142) on 20 September 2009 by the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to operate sand extraction operations at Lots 220 and 218 (referred to hereafter as the Project).

It is estimated that in excess of 21 million tonnes of sand resource will be extracted from Lots 218 and 220, with Lot 218 having an indefinite extraction life due to the ongoing movement of sand from the adjoining mobile dunes. Mackas Sand is permitted to extract up to 2 Million tonnes per annum (Mtpa) of sand resource from Lots 218 and 220 (1 Mtpa from each site, respectively).

1.1 Purpose and Scope

This Biodiversity Offset Strategy (BOS) has been prepared to satisfy Condition 28A of Schedule 3 of PA 08_142 (as modified), following the approval of Modification 1 (MOD 1).

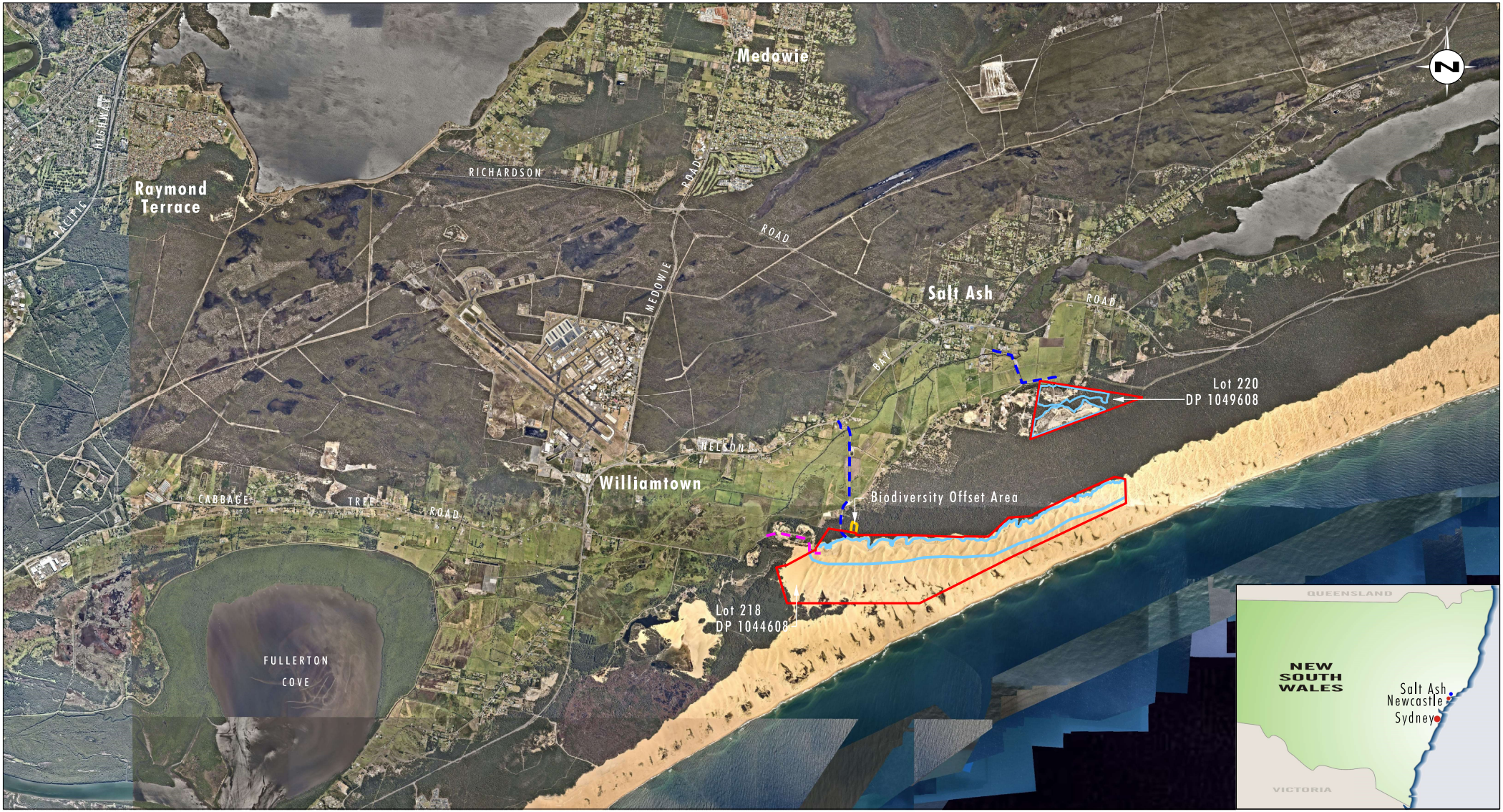
MOD 1 was approved on 30 September 2013 by the NSW Planning Assessment Commission (PAC) under delegation of the Minister for Planning and Infrastructure (now Secretary for the Department of Planning and Environment- DPE), formerly the Department of Planning, Industry and Environment – DPIE.

MOD 1 permitted the construction the alternate haul route as depicted within **Figure 1.1**. Construction of the MOD 1 alternate route commenced on 9 December 2013.

As part of approval conditions for MOD 1, Mackas Sand agreed to enter into a Long Term Security of Biodiversity Offset to manage residual impacts associated with the clearing of vegetation associated with the construction of the alternate haul route to access Lot 218. The Biodiversity Offset is secured under a Conservation Agreement as detailed in **Section 2.0** below.

The scope of the BOS exclusively covers a dedicated Biodiversity Offset Area (BOA) located within Lot 122 DP 753192 (Lot 122) and provides a framework for the implementation of:

- Short and long term ecological management actions within the Lot 122 BOA.
- Monitoring and land management requirements specified under the Conservation Agreement.
- Controls and monitoring actions within the Lot 122 BOA.



Source: Nearmap (May 2023)

0 1 2 4km

1:85 000

Legend

- Lot Boundaries
- Approval Areas
- Biodiversity Offset Area
- Approved Site Access
- Alternate Access

FIGURE 1.1

Locality Plan

File Name (A4): V1/1646_546.dgn

1.2 Regulatory Requirements

1.2.1 Project Approval

A detailed list of the applicable PA 08_142 (as modified) conditions to this BOS and where they are addressed in this document is included in **Table 1.1**.

Table 1.1 Relevant PA 08_0142 (as modified) conditions

Conditions		Addressed in Section
Schedule 3 – Environmental Performance Conditions Biodiversity Offset Strategy		
28A	The Proponent shall prepare and implement a Biodiversity Offset Strategy for the Biodiversity offset Area, in consultation with OEH and to the satisfaction of the Secretary. The strategy must include:	This whole document
	a) performance criteria for the offset area;	**Section 5.0**
	b) a description of the proposed short-term and long-term management measures for the offset area, including to: • protect, conserve and enhance the vegetation within the offset area; • control access to the offset area; and • control weeds and feral pests.	**Section 3.0** and **5.0**
	c) a program to measure and monitor the effectiveness of the strategy against the performance criteria. The Proponent shall implement the approved strategy as approved from time to time by the Secretary.	**Section 4.0**
Schedule 3 – Environmental Performance Conditions Long Term Security of Biodiversity Offset		
28B	Prior to the end of December 2014, or as otherwise agreed by the Secretary, the Proponent shall make suitable arrangements to provide appropriate long-term security for the Biodiversity Offset Area to the satisfaction of the Secretary. *Note: Mechanisms to provide appropriate long-term security to the land within the Biodiversity Offset Strategy include a Biobanking Agreement under Part 7A Division 2 of the Threatened Species Conservation Act 1995, a Voluntary Conservation Agreement under Section 69B of the National Parks and Wildlife Act 1974, or any alternative mechanism that results in similar conservation outcomes. Any mechanism used to secure the land must remain in force in perpetuity.*	**Section 2.0**
Schedule 5 – Environmental Management and Monitoring Conditions Incident Reporting		
2	Within 24 hours of detecting an exceedance of the limits/performance criteria in this approval or the occurrence of an incident that causes (or may cause) material harm to the environment, the Proponent shall notify the Department and other relevant agencies of the exceedance/incident.	**Section 6.0**

Conditions		Addressed in Section
3	Within 6 days of notifying the Department and other relevant agencies of an exceedance/incident, the Proponent shall provide the Department and these agencies with a written report that must: • describe the date, time, and nature of the exceedance/incident; • identify the cause (or likely cause) of the exceedance/incident; • describe what action has been taken to date; and • describe the proposed measures to address the exceedance/incident.	**Section 6.0**
Schedule 5 – Environmental Management and Monitoring Conditions **Revision of Strategies, Plans and Programs**		
4A	Within 3 months of: • The submission of an incident report under Conditions 2 or 3 (Schedule 5) • The submission of an annual review under Condition 4 (Schedule 5) • The submission of an audit report under Condition 6 (Schedule 5) • Any modification to the conditions of this approval, (unless the conditions require otherwise), the Proponent shall review and if necessary revise, the strategies, plans and programs required under the this consent to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted for the approval of the Secretary.	**Section 6.0**

1.2.2 Stakeholder Consultation

A copy of the revised BOS has been submitted to DPE for review. This document has also been submitted for consultation with BCD in accordance with Schedule 3 Condition 28A of PA 08_0142 (as modified).

Consultation records for this revision of the BOS are provided in **Appendix 1** of this document. The revision history of this document is included in **Section 7.2**.

2.0 Biodiversity Offset Area

The BOA is located on Lot 122 which is located due east of the Mackas Sand alternate haul road and adjacent to the Worimi Conservation Lands (WCL) (refer to **Figure 2.1**). The BOA is approximately 1.3 ha in size and encapsulates a suite of biodiversity values including known habitat for Newcastle doubletail (*Diuris praecox*) and sand doubletail (*Diuris arenaria*) located on land owned by Mackas Sand.

A Conservation Agreement (CA) (VC 0532) was agreed as the mechanism for the Long-Term Security of Lot 122 by Office Environment and Heritage (now Biodiversity Conservation Trust – (BCT)) and landholders of Lot 122 on 30 June 2020 under section 69B of the NPW Act and clause 17 (2) of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017.* The CA is a legally binding document and is registered on the land title for both current and future landholders. The CA outlines the conservation values present within the BOA, as well as management and monitoring arrangements.

2.1 Climatic Information

The BOA is influenced by a temperate weather system and experiences warm summer and mild winter temperatures. Mean maximum temperatures typically range between 30-33 degrees celsius (°C) during summer months and 19.5-22.0 °C during winter months. Mean minimum temperatures typically range between 18.8 – 21.0 °C during summer months and 9.0-12.2 °C during winter months. The average rainfall is 1,124 millimetres per year with higher rainfall typically experienced between February-June (BoM, 2021).

2.2 Ecological Context

The BOA was selected for its ability to adequately compensate for likely and potential impacts on the key offset drivers and connectivity with adjoining conservation land parcels. The key vegetation community of the BOA is Coastal Sand Apple – Blackbutt Forest (Plant Community Type (PCT) 1646 Smooth-barked Apple – Blackbutt – Old Man Banksia Woodland on Coastal Sands of the Central and Lower North Coast).

This broader area is known to provide favourable conditions for both Newcastle doubletail (*Diuris praecox*) (Vulnerable under the BC Act and EPBC Act) and sand doubletail (*Diuris arenaria*) (Endangered under the BC Act). Stem locations identified during baseline monitoring in 2014 are shown in **Figure 2.1**. Revised Habitat Assessment and Baseline conditions of the BOA, as listed in the CA are provided in **Table 2.1**.

2.3 Aboriginal and Non-Indigenous Heritage Context

The BOA does not contain any known Aboriginal or non-indigenous heritage sites or items however, in the unlikely event that unexpected or significant archaeological remains or as yet unidentified heritage items are discovered, any potential impacts will be minimised through the implementation of management measures listed in Mackas Sand Aboriginal Cultural Heritage Management Plan and Non-Indigenous Heritage Management Plan, respectively.

A copy of the most up to date version of each management plan is available on the Mackas Sand website.

Table 2.1 Biodiversity Offset Area Baseline Monitoring (September 2018)

Attribute	Result
Disturbances	
Weeds (density/species)	Low/Whiskey Grass (*Andropogon virginicus*)
Pests	Nil identified
Fire	Evidence of previous
Grazing	Cattle
Erosion	Minor (Aeolian)
Logging	Historic (cut stumps)
Features (Relative Abundance)	
Fallen timber/logs	Moderate
Stags	Nil
Ground cover (litter)	Common
Mistletoe	Nil
Dieback	Nil
Loose bark on trees	Moderate
Tree Hollows	
Number of tree hollows present	12
Size classes present	Very Small – Very Large
Canopy Cover* (%)	
Native Over-Storey	12
Native Mid-Storey	2.1
Ground Cover* (%)	
Native Grass	11
Native Shrubs	5
Native (other)	9
Exotic	5
Bare Earth	71

* average result between transects

Source: Aerial: Google Earth (2014), Cadastral: Department of Lands (2009)
Note: Co-ordinates are in MGA56

0 50 00 125m
1:2500

Legend

- Lot Boundary
- Approved Operational Area
- Worimi Conservation
- Biodiversity Offset Area
- Alternate Haul Route
- Photo Location
- *Diuris arenaria*
- *Diuris praecox*

FIGURE 2.1

Proposed Biodiversity Offset Area and Targeted Orchid Survey Locations

File Name (A4): R61_V1/1646_446.dgn
20160517 13.45

3.0 Management of Biodiversity Offset Area

Effective and site specific management practices are pertinent to the success of any biodiversity offset area. The following sections outline the management practices that apply to the BOA. Management practices include both short and long term measures to promote the ecological value of the BOA.

3.1 Short Term Management Measures

Short term management measures are aligned to measures undertaken during a ten year time period, commencing in 2020. Management measures and actions are undertaken as informed by the monitoring program outlined in **Section 4.0**.

3.1.1 Weed Management

A weed management program has been implemented within the BOA as part of the offset management and monitoring program. Whiskey grass (*Andropogon virginicus*), African love grass (*Eragrostis curvula*), bitou bush (*Chrysanthemoides monilifera* subsp. *Rotundata*) and fireweed (*Senecio madagascariensis*) within the offset area are targeted for management as part of the weed management program. Additional weed species which may need to be managed will be identified as part of the annual offset area monitoring, which is provided to BCD, refer to **Section 4.0**.

Weed incursions inside the BOA and within approximately 20-50 m surrounding the BOA where access is available[1] (i.e. the weed management area) will be targeted as part of the annual weed management program. The aim of extending the weed management program beyond the BOA is to reduce potential weed source populations. The annual weed management program will target both noxious and environmental weed species, previously or recently identified, within the weed management area to prevent further spread.

Weed management / control works will only be undertaken during the period between and including December to April to avoid when the orchids (*Diuris arenaria* and *Diuris praecox*) are either actively growing, flowering, fruiting or setting seed. Weed management activities primarily include the manual removal of weeds however spot spraying using appropriate herbicides or biological controls may also be implemented, should it be required. Herbicide treatment of all weeds will be undertaken by suitably qualified and experienced personnel abiding to the applicable chemical safety data sheet (SDS) for application, handling, storage and disposal.

Consideration will be given as to the most effective method of removing each of the weed species from the offset area, and measures may include employing land management specialists.

3.1.2 Pest Control

Appropriate pest control activities will be implemented at the BOA for target pest species, on an as needed basis as determined through the BOA monitoring program. Control programs or activities may include baiting and trapping activities or other activities in consultation with Local Land Services and National Parks and Wildlife Services.

[1] Any weed management activities proposed outside of the BOA in the Worimi Conservation Lands, will be undertaken in consultation with the Local Worimi Traditional Owners.

Evidence of pest species identified and associated management actions, if required, will be outlined in the Annual Review document each year (refer to **Section 6.4**).

3.1.3 Grazing Management

All domestic stock is currently excluded from Lot 122 to promote the ecological and conservation values of the BOA. If monitoring indicates that biodiversity values may be enhanced through the use of temporary grazing, approval will be sought from the BCT in accordance with the terms of the CA.

3.1.4 Fencing, Signage and Access Control

The BOA is located on private property, is enclosed with stock-proof fencing along the perimeter and access is restricted to approved personnel only. The perimeter fencing will be inspected on a regular basis by the landowner to ensure that it remains stock-proof and in good condition. Any repairs required will be undertaken as soon as practicable. Fence condition will also be assessed during the BOA monitoring program as outlined in **Section 4.0**.

As noted in **Section 2.0**, the BOA adjoins the boundary of the WCL to the east. A fire management trail is located along the outer perimeter fence of the BOA in the WCL. As noted in the WCL Plan of Management (NPWS, 2015), access to the management trail is restricted to authorised personnel only and is not accessible to the public.

Signposts will be erected in the four corners of the biodiversity offset area requiring that human activities are kept to a minimum within the area however this is more of a precautionary measure in the event that members of the public accidentally trespass.

3.1.5 Other Management Works and Disturbance Regime

The threatened orchids recorded within the BOA have been observed along a slashed track adjacent to the existing fence line. Both the Newcastle doubletail (*Diuris praecox*) and the sand doubletail (*Diuris arenaria*) are known to occur in, and prefer, areas of disturbance with other known populations occurring in regularly slashed locations such as powerline easements (Bell and Driscoll 2010).

Various types of disturbance may be trialled in consultation with BCT to help manage the orchids and may include slashing or the use of fire management practices. Mackas Sand will gain written approval from BCT prior to undertaking any works considered under the BOA disturbance regime.

All works considered under the BOA disturbance regime would only be undertaken between December through to April to avoid when the orchids (*Diuris arenaria* and *Diuris praecox*) are either actively growing, flowering, fruiting or setting seed.

3.2 Long term Management

Approval of the CA as the long-term security mechanism (refer **Section 2.0**) ensures the management of the BOA on Lot 122 in perpetuity and provisions outlined in the event of sale of transfer of title to another landholder.

Management measures will be undertaken as required by the CA following the initial annual 10 year monitoring and management program. Long term management measures may include undertaking similar management measures identified in **Section 3.1**, including measures which require permission being granted by BCT to undertake associated actions.

4.0 Monitoring Program

The biodiversity monitoring program is an integral part of managing the BOA as it allows the Quarry Manager to determine the effectiveness of the management practices being implemented.

The BOA monitoring program will assess the performance of biodiversity offset monitoring location against the performance/completion criteria as noted in **Section 5.0**. The BOA monitoring program utilises a combination of qualitative observations and quantitative data methodologies (**Sections 4.1** to **4.4**).

The BOA monitoring program will be undertaken by a suitably qualified and experienced person annually for a period of 10 years commencing in 2019, in conjunction with the peak flowering periods for *D. praecox* and *D. arenaria.* Following the completion of the 10-year annual BOA monitoring program, a reduced BOA monitoring program will continue triennially as required by the CA.

4.1 Photo Monitoring

4.1.1 Annual Monitoring

Photo monitoring will be undertaken on an annual basis from dedicated photo monitoring points in the BOA to visually track and identify changes across the term of the monitoring program. Photo monitoring locations are shown on **Figure 2.1**.

4.1.2 Triennial Monitoring

Following the completion of the annual BOA monitoring program for 10 years, a triennial photo monitoring program will continue to visually track and identify changes across the BOA. Photo monitoring locations are shown on **Figure 2.1**.

4.2 Walkthrough Assessments

A walkthrough assessment will be undertaken annually for 10 years to record opportunistic sightings within the BOA. The walkthrough assessments will include identification of:

- Fire events or impacts of fire management.
- Weeds (including compiling a list of exotic species and recording new weed infestations including location and extent.
- Pest animals (species and location must be recorded, including evidence of pest animals such as burrows, scats or disturbance).
- Unauthorised grazing or stock presence.
- Visitor impact and vehicle access (including evidence of any recent usage, and the presence of any new access tracks.
- Rubbish dumping.
- Natural regeneration of previously disturbed areas.
- Sightings of threatened species.

A summary of the walkthrough assessments will be included in the Mackas Sand Annual Review (refer to **Section 6.4**).

4.3 Vegetation Structure Assessment

Monitoring of vegetation structure is completed according to the methods defined in the CA. Two dedicated 50m transects are installed and marked with a star picket within the BOA.

Transects are to monitor for any change in vegetation assemblage (e.g. encroachment of exotic species) and the habitat of areas populated by and/or adjacent to sand doubletail (*Diuris arenaria*) and Newcastle doubletail (*Diuris praecox*).

Native and exotic species point intercept will be recorded at one metre intervals along the 50 m transect while canopy and mid-story percentage cover will be recorded at five metre intervals. Two 10 x 10 m rapid floristic quadrats will be conducted in conjunction with the two transects.

Vegetation structure and dominant species (composition and cover abundance) will be recorded for each quadrat as well as a targeted habitat assessment (limited to include vegetation community, quadrat aspect, soil properties, disturbance, ground cover properties, and the age of the vegetation structure).

A summary of the vegetation structure assessment will be included in the Mackas Sand Annual Review, refer to **Section 6.4**.

4.4 Targeted Orchid Survey

Surveys targeting Newcastle doubletail (*Diuris praecox*) and the sand doubletail (*Diuris arenaria*) will be undertaken by an ecologist walking in parallel transects across the BOA. The surveys will extend across the whole BOA however particular focus will be made in previously identified locations.

The targeted orchid surveys will be undertaken in accordance with the methodology as detailed in the CA, which is generally in accordance with DPIE's *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method – April 2020* and any specific survey requirements (such as use of reference populations outside of the BOA) in the Threatened Biodiversity Profile Data Collection (TBDC) database. Future monitoring reports will include a map of the parallel field traverse survey locations.

A summary of the targeted orchid survey results will be included in the Mackas Sand Annual Review, refer to **Section 6.4**.

4.5 Monthly Monitoring

A monthly visual inspection of the BOA will be undertaken to identify:

- Any signs of clearing within the BOA by either natural processes such as fire or unauthorised clearing.
- Damage to the BOA perimeter fence.
- Any signs of unauthorised entry of livestock or people into the BOA.

Management action triggers will be implemented if either of the above is identified (refer to **Section 5.1**).

5.0 Performance Criteria for the Biodiversity Offset Area

Short term action triggers will be developed for a period of 10 years to track against the annual monitoring program and long-term triggers to track against the CA (perpetuity).

5.1 Management Action Triggers

Management action triggers associated with BOA performance are to be assessed by the landholder to determine whether enaction of a management action trigger is likely to be a result of natural fluctuation in the biological system, management actions or other anthropogenic sources. Management action triggers and potential associated actions are listed in **Table 5.1**. Management actions are assessed as part of the monitoring program.

Table 5.1 Management Action Triggers

Trigger	Potential Action
• any area of Coastal Sands Apple – Blackbutt Forest, Newcastle doubletail (*Diuris praecox*) or sand doubletail (*Diuris arenaria*) habitat, identified during the revised baseline (2018) survey, is cleared either by natural processes such as fire or anthropogenic processes such as clearing.	Identify access points and repair fences appropriately. Review, modify or adapt management strategies accordingly.
• unauthorised entry of the livestock or other feral fauna that has the potential to impact the Newcastle doubletail (*Diuris praecox*) or sand doubletail (*Diuris arenaria*) populations.	Identify access points and repair fences appropriately. Review, modify or adapt pest management strategies accordingly.
• the diversity or density of weed species is higher than the revised baseline (2018) results for more than 2 consecutive years.	Review, modify or adapt weed management strategies accordingly.
• the Newcastle doubletail (*Diuris praecox*) or sand doubletail (*Diuris arenaria*) stem count is less than 25% of the revised baseline count for three consecutive years.	Review, modify or adapt offset areas management strategies accordingly.

5.2 Performance Criteria

The performance criteria seek to ensure the maintenance or improvement of habitat within the BOA for Coastal Sands Apple – Blackbutt Forest, Newcastle doubletail (*Diuris praecox*), sand doubletail (*Diuris arenaria*) and various fauna species. The BOA, through the effective use of the management strategies and short term action triggers discussed above will:

- Maintain the same area of Coastal Sands Apple – Blackbutt Forest as identified in the baseline surveys.
- Maintain the same area of Newcastle doubletail (*Diuris praecox*) and sand doubletail (*Diuris arenaria*) habitat as identified in baseline surveys.
- Reduce the diversity and density of weed species to 10% or less, as a percentage of the total ground cover within the BOA.

Review of the long term performance criteria will take place on a triennial basis and in line with the long term management and monitoring commitments outlined in this strategy.

6.0 Review and Reporting

6.1 Incident Reporting and Notification

In the event of any exceedances or incidents which cause or may cause material harm to the environment, Mackas Sand will report in accordance with the requirements of Conditions 2 and 3 of Schedule 5 of PA 08_0142. The Quarry Manager will be responsible for ensuring these reporting requirements are complied with.

6.2 Review and Revision of Strategy

Revisions of the BOS will be undertaken in accordance with Schedule 5, Condition 4A of PA 08_0142. While independent reviews of the BOS will be undertaken in accordance with Schedule 5, Condition 7 of PA 08_0142.

The BOS may be updated from time to time following the provision of findings and recommendations from the monitoring program.

6.3 Offset Monitoring Report

An Offset Monitoring Report will be prepared and submitted to the Quarry Manager on an annual basis. The Quarry Manager will submit the offset monitoring report to BCT in accordance with requirements of the CA. The monitoring report will detail the monitoring methodology and outcomes of the monitoring program (refer **Section 4.0**), measurements against performance criteria and provide a list of any recommendations to improve or promote conservation values within the BOA.

6.4 Annual Review

A summary of the BOS monitoring activities and results will be reported annually to the Secretary of the DPE and other relevant government agencies as part of the Annual Review that is required by Schedule 5, Condition 4 of the PA 08_0142. The Annual Review is available on the Mackas Sands website at: http://www.mackassand.com.au/compliance/.

The BOA annual monitoring report will be produced by 31 December each year and Mackas will provide the monitoring report to BCT within 21 days of receiving the finalised report. Mackas will provide a copy of the annual monitoring report to BCD at the same time that it is provided to BCT.

6.5 Deterioration of Conservation Values

As per the CA, the Chief-Executive of BCT (or delegate) will be notified in writing as soon as possible after Mackas Sand becomes aware of the deterioration of any Conservation Values or threat to Conservation Values within the BOA.

6.6 Roles and Responsibilities

The Quarry Manager will be responsible for ensuring that the management of the BOA is undertaken in accordance with the requirements of PA 08_0142 (as modified). Responsibilities in relation to the BOS are outlined in **Table 6.1**.

Table 6.1 Roles and Responsibilities

Role	Responsibilities
Quarry Manager	• Provide that sufficient resources are allocated for the implementation of this BOS. • Ensure that the requirements of this BOS are effectively implemented. • Schedule short-term and long-term management measures for the offset area as per this strategy. • Authorise internal and external reporting requirements as well as subsequent revisions of this strategy. • Ensure that the strategy is relevant to current operations. • Ensure that all personnel are aware of BOS management obligations. • Periodically measure and monitor the effectiveness of the strategy against the performance criteria. • Authorising internal and external reporting requirements as well as subsequent revisions of this strategy.
All employees and contractors	• Undertake all activities in accordance with this BOS.

7.0 Document Information

7.1 Reference Information

Information referenced in this document is listed in **Table 7.1**.

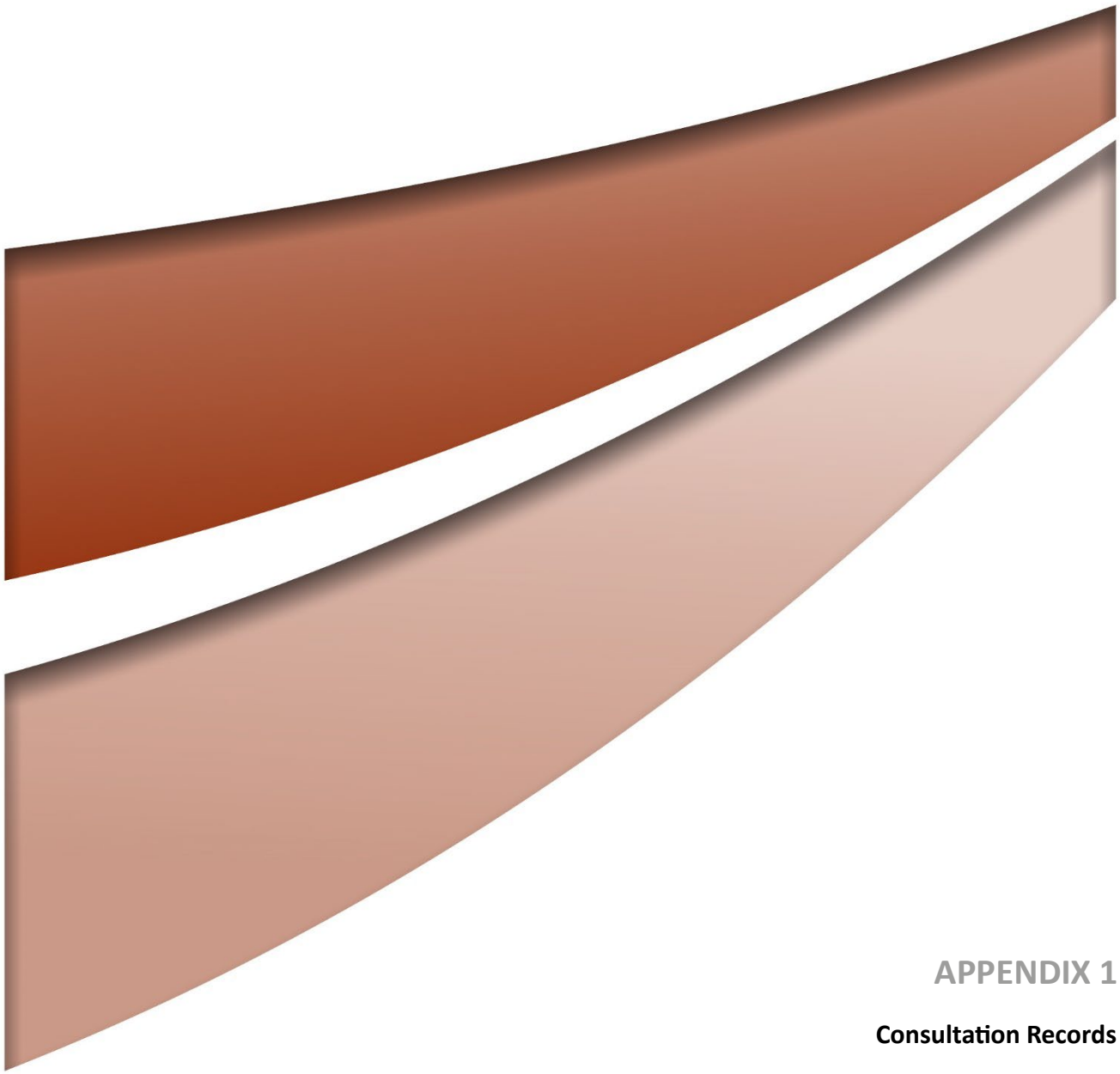
Table 7.1 Reference Information

Reference	Title
Bell, S & Driscoll, C. 2010	Vegetation of the Worimi Conservation Lands Port Stephens, NSW. Report prepared for Dept. of Environment, Climate Change & Water, November 2010.
Bureau of Meteorology (BOM) 2021	Climate Data Online. Accessed from http://www.bom.gov.au/climate/data/ August 2021.
NSW Office of Environment and Heritage (OEH) 2015	Worimi Conservation Lands Plan of Management.
Umwelt (Australia) Pty Limited (Umwelt) 2012	*Environmental Assessment Modification to Sand Extraction Operations on Lot 218 and Lot 220, Salt Ash, NSW*.

7.2 Version History

Table 7.2 Change Information

Version No.	Date	Change Summary
1	18 August 2021	New standalone Biodiversity Offset Strategy document developed at request of DPE. Document submitted to DPE and BCT for consultation.
2	31 May 2022	Revised Biodiversity Offset Strategy developed to address comments from BCD review.



APPENDIX 1

Consultation Records

Appendix 1 – Regulatory Consultation

Stakeholder	Consultation activity	Matters subject to consultation	Actions arising from consultation
NSW DPIE – Biodiversity Conservation Division (BCD)	Submission of electronic copy of this BOS (dated August 2021) to NSW DPIE-BCD via email for consultation	The development of this BOS in accordance with the requirements of Condition 28A of, Schedule 3 of Project Approval 08_0142.	Correspondence received from BCD on **26 August 2021** with the following recommendations. It is noted that the feedback provided by BCD on 26 August 2021 is consistent with feedback provided by BCD on 5 September 2022. 1. Figure 1.1 of the Biodiversity Offset Strategy (BOS) should be amended to include the location of the BOS area subject to the Biodiversity Offset Strategy. For scale purposes this can be shown as a single point reference, such as 'X' marks the spot. ***(Response: Figure 1.1 amended)*** 2. Any other 'Environmental Weeds' of concern that need to be managed / controlled, aside from the three listed should be included in the BOS and have appropriate control strategies developed. Furthermore, the spelling of '*Eragrostis*' in the BOS should be corrected. (Response: Section 3.1.1 has been revised to note: "***A weed management program has been implemented within the BOA as part of the offset management and monitoring program. Whiskey grass (Andropogon virginicus), African love grass (Eragrostis curvula), bitou bush (Chrysanthemoides monilifera subsp. Rotundata) and fireweed (Senecio madagascariensis) within the offset area are targeted for management as part of the weed management program. Additional weed species which may need to be managed will be identified as part of the annual offset area monitoring. The spelling of 'Eragrostis' has been corrected".*** 3. Infestations of whiskey grass (*Andropogon virginicus*), African love grass (*Eragrostis curvula*), bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*) and any other Environmental Weeds within 200 metres of the BOS site should be managed / controlled. ***(Response: Section 3.1.1 states that the weed management area will be extended up to 50m from the offset boundary, where land access is available.)*** 4. Weed management / control works should be only undertaken between and including December to April to avoid when the orchids (*Diuris arenaria* and *Diuris praecox*) are actively growing, flowering, fruiting, or setting seed. ***(Response: Section 3.1.1 amended in accordance with BCD recommendation)*** 5. Achievable and measurable performance criteria need to be developed for the control of weeds in the BOS, which BCD recommends would be between 'zero' and 'less than 10% cover'. ***(Response: Section 5.2 amended in accordance with BCD recommendation)*** 6. BCD recommends that vegetation monitoring is done using the Biodiversity Assessment Method, to be consistent with current best practice. ***(Response: No change to monitoring has been proposed in this revision. The current monitoring methodology is to continue in accordance with approved methods in the existing Conservation Agreement (CA))*** 7. Targeted orchid surveys should be undertaken in accordance with DPIE 'Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method' (DPIE 2020) and the Threatened Biodiversity Data Collection across all suitable habitat and at their appropriate seasonal survey times. Flowering at nearby reference populations (within a 5km radius) should be used to greater refine the survey. Furthermore, BCD recommends that the targeted orchid surveys also record the number of flowers open, in bud, finished, and which of those finished flowers are in fruit, and if there is any evidence of herbivory of each plant, and that the survey results are discussed in relation to temperature and rainfall of the preceding three months. ***(Response: The current monitoring methodology is consistent with the requirements of the CA. Additional information on the location of parallel field traverse survey locations will be provided in monitoring reports.)*** 8. Monthly checks of the offset site should be undertaken to determine if management actions have been triggered and if so, appropriate management strategies should be applied promptly. ***(Response: Confirmed by Mackas Sand.)*** 9. BCD requests that it is provided with a copy of the full version of the monitoring reports by the end of December each year for the 10-year period of monitoring. ***(Response: Added to section 6.4)***
NSW DPIE – Biodiversity Conservation Division (BCD)	Review of BOS by BCD (message received from the Major Projects Portal dated 5 September 2022)	The development of this BOS in accordance with the requirements of Condition 28A of, Schedule 3 of Project Approval 08_0142.	Correspondence received from NSW DPIE-BCD on 4 October 2022 noting the BOS report was the same version BCD reviewed previously (BCD letter dated 26 August 2021). BCD's advice is very similar to previous advice and makes nine recommendations, of which key recommendations include: 1. Any other 'Environmental Weeds' of concern that need to be managed / controlled, aside from the three listed must be included in the BOS and have appropriate control strategies developed. ***(Response: Section 3.1.1 states A weed management program has been implemented within the BOA as part of the offset management and monitoring program. Whiskey grass (Andropogon virginicus), African love grass (Eragrostis curvula), bitou bush (Chrysanthemoides monilifera subsp. Rotundata) and fireweed (Senecio madagascariensis) within the offset area are targeted for management as part of the weed management program. Additional weed species which may need to be managed will be identified as part of the annual offset area monitoring. The spelling of 'Eragrostis' has been corrected.*** 2. Weed management / control works should be only undertaken between and including December to April to avoid when the orchids (Diuris arenaria and Diuris Praecox) are actively growing, flowering, fruiting, or setting seed. ***(Response: Section 3.1.1 amended in accordance with BCD recommendation)***

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NSW DPIE – Biodiversity Conservation Division (BCD)	Submission of electronic copy of this BOS (dated August 2021) to NSW DPIE-BCD via email for consultation	The development of this BOS in accordance with the requirements of Condition 28A of, Schedule 3 of Project Approval 08_0142.	Correspondence received from BCD in **August 2023** with the following recommendation sand requests following review of the second draft BOS document (*1646_R110_Mackas_BOS_Draft_V2*). It is noted that the feedback provided by BCD in August 2023 is consistent with feedback provided by BCD on 5 September 2022. 1. Figure 1.1 of the Biodiversity Offset Strategy (BOS) should be amended to include the location of the BOS area subject to the Biodiversity Offset Strategy. For scale purposes this can be shown as a single point reference, such as 'X' marks the spot. **BCD Comments/Requested Action:** - **No further action required.** 2. Any other 'Environmental Weeds' of concern that need to be managed / controlled, aside from the three listed should be included in the BOS and have appropriate control strategies developed. Furthermore, the spelling of '*Eragrostis*' in the BOS should be corrected. **BCD Comments/Requested Action:** - **BCD does not have sufficient information to verify what effort has been taken to reduce environmental weeds. Hence, BCD has requested a copy of the most recent Annual Report.** - **Provide BCD with a copy of the most recent annual BOA monitoring report.** ***(Response: Copy of latest BOA monitoring report provided to huntercentralcoast@environment.nsw.gov.au , cc james.mcdonough@dpie.nsw.gov.au)*** 3. Infestations of whiskey grass (*Andropogon virginicus*), African love grass (*Eragrostis curvula*), bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*) and any other Environmental Weeds within 200 metres of the BOS site should be managed / controlled. **BCD Comments/Requested Action:** - **Weed control has been limited to a 50m buffer area from the site rather than the 200m that BCD previously recommended.** - **Justify why weed management/control within a 50m buffer is adequate.** ***(Response: The BOA is just over 1 ha in area (~140m x 74m). Management weeds within a 200m buffer around the BOA boundary would require management of 24.5 ha (i.e. ~540m x 74m - less the 1ha BOA) of land. It is considered an unreasonable expectation to manage such a large area and is also considered that minimal additional benefit, in terms of limiting weed ingress into the BOA, would be realised when compared to management of a 50m buffer (i.e. an area of approximately 3.1 ha).*** 4. Weed management / control works should be only undertaken between and including December to April to avoid when the orchids (*Diuris arenaria* and *Diuris praecox*) are actively growing, flowering, fruiting, or setting seed. **BCD Comments/Requested Action:** - **No further action required.** 5. Achievable and measurable performance criteria need to be developed for the control of weeds in the BOS, which BCD recommends would be between 'zero' and 'less than 10% cover'. **BCD Comments/Requested Action:** - **No further action required.** 6. BCD recommends that vegetation monitoring is done using the Biodiversity Assessment Method, to be consistent with current best practice. 7. Targeted orchid surveys should be undertaken in accordance with DPIE 'Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method' (DPIE 2020) and the Threatened Biodiversity Data Collection across all suitable habitat and at their appropriate seasonal survey times. Flowering at nearby reference populations (within a 5km

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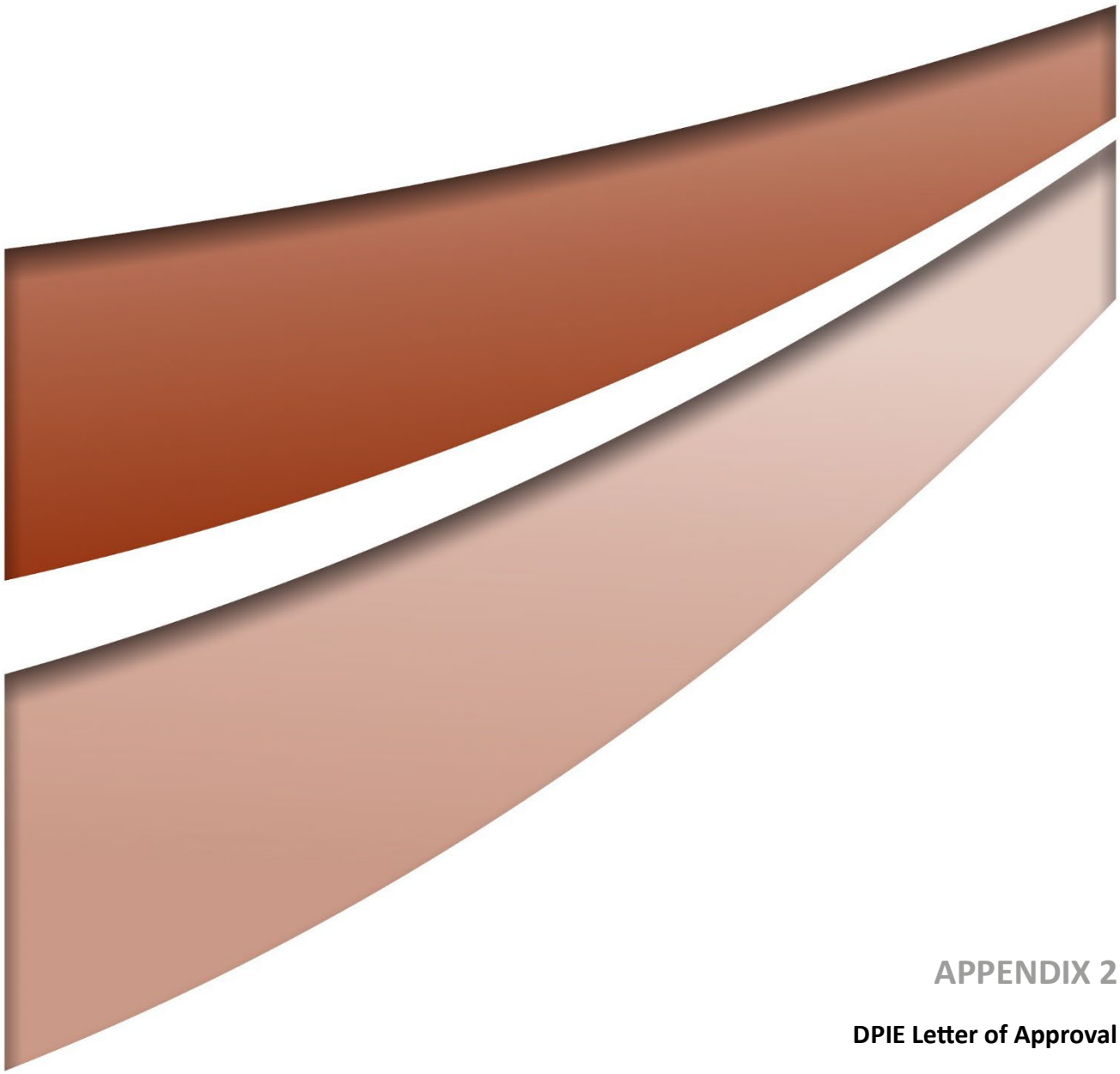
			radius) should be used to greater refine the survey. Furthermore, BCD recommends that the targeted orchid surveys also record the number of flowers open, in bud, finished, and which of those finished flowers are in fruit, and if there is any evidence of herbivory of each plant, and that the survey results are discussed in relation to temperature and rainfall of the preceding three months. **BCD Comments/Requested Action:** - **BCD does not have sufficient information to determine if these recommendations have been addressed. Hence, BCD has requested that the Conservation Agreement is made available on the Mackas Sand website. Alternatively, the agreement could be provided to BCD for review.** - **Provide BCD with a copy of the Conservation Agreement and undertake engagement during subsequent update to the BOS to ensure survey and monitoring requires are addressed adequately.** ***(Response: Copy of latest BOA monitoring report emailed to huntercentralcoast@environment.nsw.gov.au , cc james.mcdonough@dpie.nsw.gov.au)*** 8. Monthly checks of the offset site should be undertaken to determine if management actions have been triggered and if so, appropriate management strategies should be applied promptly. **BCD Comments/Requested Action:** - **BCD does not have sufficient information to determine if this recommendation has been addressed and requests that Mackas Sand clarify its actions relating to this.** - **Update BOS to include a commitment to undertake monthly checks of the offset site, as per BCD's recommendations.** ***(Response: Section 4.5 has been included to address monthly inspection requirements)*** 9. BCD requests that it is provided with a copy of the full version of the monitoring reports by the end of December each year for the 10-year period of monitoring. **BCD Comments/Requested Action:** **BCD has not been provided with Annual Reports and has therefore recommended that the most recent Annual Report is provided.** - **Update section 6.4 to include a commitment to provide BCD (in addition to BCT) with a copy of the annual BOA monitoring reports** ***(Response: Section 6.4 has been updated to reflect the reporting requirements specified in the Conservation Agreement and to indicate that the annual BOA monitoring report will be provided to BCD at the same time as it is provided to BCT)***



APPENDIX 2

DPIE Letter of Approval

DPIE Letter of Approval is to be received after final BCT review of this document.

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