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AECOM

Biodiversity Offset Delivery Plan Implementation Report 2023/2024

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Western Sydney International (Nancy-Bird Walton) Airport

Biodiversity Offset Delivery Plan Implementation Report 2023/2024

Client: Department of Infrastructure, Transport, Regional Development, Communications and the Arts

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Executive Summary

The Western Sydney International Airport Plan (Airport Plan) provides the authorisation for Stage 1 of the airport under the *Airports Act 1996* (Cth) and includes a number of environmental conditions the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Infrastructure) must comply with. Under condition 30 of the Airport Plan, Infrastructure was required to prepare and submit a Biodiversity Offset Delivery Plan (BODP) for approval to compensate for residual significant impacts associated with Stage 1 of the development. The purpose of this report is to provide details on the implementation activities associated with the BODP that have been undertaken in the 2023-24 reporting period (25 August 2023 to 24 August 2024).

During this reporting period Infrastructure undertook implementation activities including:

- Securing offset credits purchased through the NSW Biodiversity Offset Scheme (BOS), including:
 - River Flat Eucalypt Forest (HN526/PCT 835): 160 BioBanking Assessment Methodology (BBAM) credits
 - Freshwater wetland (HN630/PCT 1071): 74 Biodiversity Assessment Method (BAM) credits
- Specialist offset management contractor activities at the Defence Establishment Orchard Hills (DEOH) Offset Area, including ongoing development of traineeship programs, installation and restoration in the area to promote habitat growth, waste removal, weed and pest management, as well as ongoing monitoring and research programs.
- An independent audit covering an 18 month period from August 2022 through to February 2024. The audit determined that all requirements of the audit criteria were either complied with or not triggered during the audit period, including the close-out of recommendations from the previous BODP audit.
- Preparation of the BODP 5 Year Review, which determined that the BODP continues to meet the approval criteria and is 'otherwise appropriate'.

At the conclusion of the 2024 reporting period, outstanding credits obligations to be considered in the following reporting period are shown in **Table ES-1**.

Table ES-1 Outstanding biodiversity credit requirements following the 2023-24 reporting period

Credit type	Credits required (BBAM)	Equivalent BAM credits	Credits Secured in 2023-24	Outstanding credit (BBAM)	Outstanding credit (BAM)
Ecosystem credits					
River Flat Eucalypt Forest (HN526/PCT 835)	2,661	n/a	160 BBAM	133	133
Freshwater wetlands (HN630/PCT 1071)	926	545	74 BAM	-	437
Species credits					
Spike Rice flower <i>Pimelea spicata</i>	107,068	53	-	107,068	53

Actions in the 2025 reporting period are anticipated to include ongoing biodiversity credit availability investigation activities, determining options for securing remaining required biodiversity offset credits, quantifying other compensatory measures, and a variation of the BODP to confirm the quantum of offset being secured at DEOH following detailed survey work by the specialist offset management

contractor and including additional plant community types meeting NSW BAM like-for-like offset options for Freshwater Wetlands.

Details on these investigations and subsequent purchases of offsets based on these options will be detailed in the 2025 BODP Implementation Report.

1.0 Introduction

The Western Sydney International (Nancy-Bird Walton) Airport (WSI) is currently under construction at Badgerys Creek, NSW, with the Stage 1 development including a 3.7-kilometre runway, an integrated domestic and international terminal, and initial capacity for 10 million passengers annually.

The WSI Airport Plan (Airport Plan) provides the authorisation for Stage 1 of the airport under the *Airports Act 1996* (Cth) and includes a number of environmental conditions to mitigate the biodiversity impacts caused by Stage 1 development. Under condition 30 of the Airport Plan, Infrastructure was required to prepare and submit a Biodiversity Offset Delivery Plan (BODP) for approval to compensate for residual significant impacts associated with Stage 1 of the development, specifically to offset impacts on threatened species and communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and threatened plants, animals and their habitat listed under the New South Wales (NSW) *Biodiversity Conservation Act 2017* (BC Act).

Under Condition 47(3)¹ of the Airport Plan, Infrastructure is required to report to the Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) annually on the implementation of the BODP until all biodiversity offsets (including other compensatory measures) have been secured or implemented. The purpose of this report is to provide detail on the implementation activities associated with the BODP that have been undertaken in the 2023-2024 reporting period (25 August 2023 to 24 August 2024). This includes:

- A description of activities undertaken to identify, secure and quantify direct offsets.
- A description of the other compensatory measures that have been delivered and steps taken to identify additional measures.

Figure 1 shows locations where offsets have been investigated or secured, including direct offsets and other compensatory measures, to the end of this reporting period.

1.1 Reference documentation

Given the volume of previous reporting and publicly available information, this report does not provide extensive background information. Further information on the development and approval of the BODP, offset requirement, and implementation activities in previous periods can be sourced in relevant documentation, available on the WSI web page. Available reports at the point of publishing include:

- Western Sydney Airport Environmental Impact Statement (EIS) 2016, Appendix K2 – Offset Strategy²
- Western Sydney Airport Plan, as approved in 2016 (Commonwealth of Australia 2016) and varied in 2020 and 2021³
- BODP (DIRD 2018), as approved 24 August 2018⁴
- BODP Implementation Reports⁵
 - 2019: Reporting period 25 August 2018 to 25 August 2019 (GHD 2020)
 - 2020: Reporting period 25 August 2019 to 25 August 2020 (GHD 2021)
 - 2021: Reporting period 25 August 2020 to 24 August 2021 (AECOM 2023a)
 - 2022: Reporting period 25 August 2021 to 24 August 2022 (AECOM 2023b)
 - 2023: Reporting period 25 August 2022 to 24 August 2023 (AECOM 2024a)

¹ This was previously condition 39(3) under the 2016 and 2020 Airport Plans, varied to condition 47(3) in September 2021

² <https://www.westernsydneyairport.gov.au/sites/default/files/WSA-EIS-Volume-4-Appendix-K2-Offset-strategy.pdf>

³ <https://www.westernsydneyairport.gov.au/about/airport-plan>

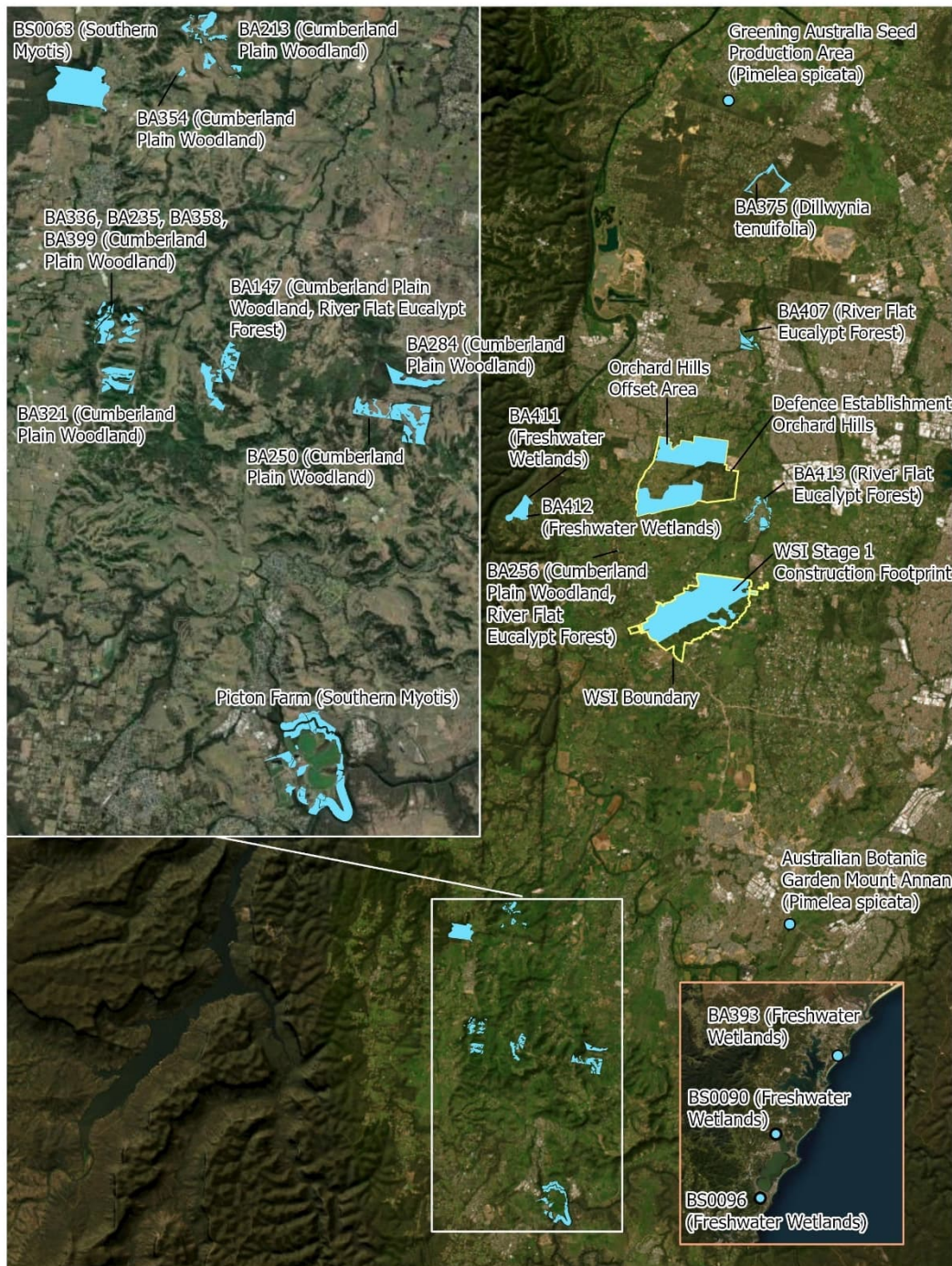
⁴ <https://www.westernsydneyairport.gov.au/environment-heritage/environment/biodiversity-offset-delivery-plan>

⁵ <https://www.westernsydneyairport.gov.au/environment-heritage/environment/biodiversity-offset-delivery-plan>

- Department of Defence Orchard Hills Offset Area Offset Plan, June 2022⁶ (GHD 2022).

This report (2024) is required to be published on the website under Condition 47(3) of the Airport Plan.

Figure 1 BODP Implementation offset sites



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 Source: Earthstar Geographics



⁶ <https://www.westernsydneyairport.gov.au/sites/default/files/documents/defence-orchard-hills-offset-area-offset-plan.pdf>

1.2 Overview of offset requirements

Biodiversity values identified in the BODP as requiring offsetting as a result of Stage 1 of the Development are summarised in **Table 1**.

Table 1 Biodiversity offset obligations of Stage 1 of the Project

Threatened species and communities	
EPBC Act	
<ul style="list-style-type: none"> Habitat for Grey-headed Flying fox (<i>Pteropus poliocephalus</i>) (187.8 hectares (ha)) Potential winter foraging habitat for the critically endangered Swift Parrot (<i>Lathamus discolor</i>) (187.8 ha) Habitat for the endangered Spiked Rice-flower (<i>Pimelea spicata</i>) (4,118 clumps over 2.94 ha) Cumberland Plain Woodland (141 ha). 	
BC Act	
Ecosystem-specific offsets: <ul style="list-style-type: none"> Grey Box – Forest Red Gum Grassy Woodland on flats in varying condition (224.1 ha) Grey Box – Forest Red Gum Grassy Woodland on shale in varying condition (48.7 ha) Forest Red Gum – Rough-barked Apple Grassy Woodland in varying condition (47.6 ha) Broad-leaved Ironbark – Grey Box – (<i>Melaleuca decora</i>) grassy open forest in varying condition (5.9 ha) Good condition artificial freshwater wetland on floodplain (32.7 ha). 	Species-specific offsets: <ul style="list-style-type: none"> Cumberland Land Snail (<i>Meridolum corneovirens</i>) 183.2 ha of habitat) <i>Dillwynia tenuifolia</i> (30 individuals) <i>Marsdenia viridiflora</i> subsp. <i>Viridiflora</i> (145 individual stems) <i>Pultenaea parviflora</i> (4 individuals) Southern Myotis (<i>Myotis macropus</i>) roosting habitat (71.7 ha of habitat) Spiked Rice-flower (<i>Pimelea spicata</i>) (4,118 clumps over 2.94 ha of habitat).

In accordance with the EPBC Act Environmental Offsets Policy October 2012 (DSEWPaC 2012), a minimum of 90% of required offsets are required to be 'direct offsets' providing a measurable conservation gain for an impacted protected matter. This includes securing management and conservation of equivalent sites, securing of biodiversity credits from existing sites and acquisition of suitable land. Up to 10% of the offsets can be delivered through 'other compensatory measures' which are actions that lead to benefits for the impacted protected matter such as the funding of research or educational programs.

1.3 Biodiversity credit terminology

The NSW Biodiversity Offsets Scheme (BOS) relies on the Biodiversity Assessment Method (BAM) under the BC Act to consistently assess impacts on biodiversity values from a proposed development, as well as improvements in biodiversity values from management actions undertaken at a stewardship site. Prior to the BC Act commencing in August 2017, the NSW BioBanking Scheme similarly relied on the BioBanking Assessment Methodology (BBAM), under the now repealed *Threatened Species Conservation Act 1995* (TSC Act), to consistently assess impacts and improvements on biodiversity values.

'Biodiversity credits' is the standard unit of measure used under both the former BioBanking scheme and the current BOS. Due to changes in the assessment process supporting NSW offsetting schemes between BioBanking and the BOS, the same offset requirement can be expressed as a different number of credits depending on the scheme being referenced. A conversion of an offset requirement between schemes is termed an Assessment of Reasonable Equivalence and is undertaken by NSW Department of Planning and Environment (DPE) (now NSW DCCEEW).

As outlined in the 2020 BODP Implementation Report (GHD 2021), Commonwealth DCCEEW has provided endorsement of the project's offset requirement to be expressed in terms of 'biodiversity credits'. The offset requirement for the project was calculated in accordance with the former Framework for Biodiversity Assessment (FBA) (the assessment methodology previously adopted to quantify offsets for major NSW projects), under the BioBanking Scheme. An Assessment of Reasonable Equivalence was undertaken for certain components of the project's offset requirements in February 2020 to convert

these credits to the current BOS scheme. A request for a revised Statement of assessment of reasonable equivalence was submitted to DPE on 24 August 2022, and replaced the previous statement dated 9 April 2020. As such, the project's residual offset requirement, in biodiversity credits, is expressed herein as both:

- BioBanking (BBAM) credits for biodiversity values established under the TSC Act
- Biodiversity Assessment Method (BAM) for biodiversity values established under the BC Act, determined through an Assessment of Reasonable Equivalence.

Furthermore, both BBAM and BAM biodiversity credits can be expressed as either ecosystem or species credits:

- Ecosystem credit: The class of biodiversity credits created or required for the impact on Endangered ecological communities (EECs), Critically Endangered ecological communities (CEECs) and threatened species habitat for species that can be reliably predicted to occur within a vegetation type according to the BBAM, FBA and BAM.
- Species credit: The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates according to the BBAM, FBA and BAM. The number of species credits is calculated based on targeted surveys.

1.4 Summary of the quantum of secured offsets prior to reporting period

BODP implementation reports were published for the 2018-19, 2019-20, 2020-21, 2021-22 and 2022-23 reporting periods (**Section 1.1**). The following section provides a brief summary of the status of offsets secured prior to the current reporting period and forms the baseline of residual offset obligations discussed in this report.

A substantial portion of the direct offsets required for the Development have been secured through the development of a conservation area at Defence Establishment Orchard Hills (DEOH). The DEOH Offset Area is proposed for conservation management through a Memorandum of Understanding (MoU) between Defence and Infrastructure and the implementation of the DEOH Offset Plan.

Direct offsets have also been secured through purchasing of biodiversity credits at Biodiversity Stewardship Agreement (BSA) sites. Once purchased, the biodiversity credits generated through BSA sites are being transferred to Infrastructure. Upon securing the full offset requirement, biodiversity credits will be retired, securing the offset in perpetuity.

The quantum of direct offsets secured to-date through DEOH and BSA sites is provided in **Table 2**. By the end of the 2023 reporting period, the full offset obligation for eight of the eleven credit types had been satisfied. Outstanding credit types are discussed in **Section 1.5**.

Ongoing indirect offsets (other compensatory measures) have not been quantified to-date. These measures, including the Australian Botanic Garden Mount Annan (ABGMA) TFPP and GA seed collection and production program, are discussed in **Section 2.5**. These programs have been funded by Infrastructure and details on their progress and operations provided in this report.

Table 2 Quantum of biodiversity offsets secured over previous reporting periods (as of August 2023, the start of this reporting period) (BBAM credits)

Credit type	Credits required	Biodiversity credits generated at DEOH Offset Area ¹	Biodiversity credits previously secured at BSA sites					Secured credits available for retirement for the Development		
			2018-19	2019-20	2020-21	2021-22	2022-23	Total credits	% of offset requirements	Offset obligation met?
Ecosystem credits										
Cumberland Plain Woodland (HN528 high, medium, poor and low condition and HN529 high and poor condition)	12,746	9,351	3,805	0	0	0		13,156	103%	Yes
River Flat Eucalypt Forest (HN526 high, poor and low condition)	2,661	1,979	254	0	0	0	135	2,368	89%	No
Shale-gravel Transition Forest (HN512 high and poor condition and HN513 high condition)	359	709	0	0	0	0		709	197%	Yes
Equivalent ecosystem credits for Grey-headed Flying-fox habitat and Swift Parrot foraging habitat	15,766	12,039	0	4,059	0	0		16,098	102%	Yes
Freshwater wetland (HN630)	926	41	0	4	0	0	12	57	6%	No
Species credits										
Spiked Rice-flower (<i>Pimelea spicata</i>)	107,068	0	0	0	0			107,068	0%	No
Cumberland Plain Land Snail (<i>Meridolum corneovirens</i>)	2,441	2,799	0	0	0	0		2,799	115%	Yes
<i>Dillwynia tenuifolia</i>	540	409	0	29	0	0	102	540	100%	Yes
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>	5,800	14,512	0	0	0	0		14,512	250%	Yes
<i>Pultenaea parviflora</i>	60	7,486	0	0	0	0		7,486	12,477%	Yes
Southern Myotis (<i>Myotis macropus</i>)	1,617	759	0	0	0	458	400	1,617	100%	Yes

(1) DEOH credits consistent with 2021 update, as updated to reflect addition of land to the Offset Area and discounting of credit generation rates for existing management obligations

1.5 Overview of current outstanding offsets

Progress towards securing the required offsets under the BODP has been made in the previous reporting periods for most direct offset requirements. Outstanding offsets are calculated using the total generated and secured biodiversity credit amount following the 2023 period. The offsets are then compared with the direct offset requirement identified in the BODP and are shown in **Table 3**.

As described in **Section 1.3**, the project's residual offset requirement is expressed as both BBAM credits and BAM credits).

The requirements for credits will be expressed as both BBAM and BAM in this implementation report.

Table 3 Outstanding biodiversity credit requirements following the 2022-23 reporting period

Credit type	Credits required (BBAM)	Equivalent BAM credits	Outstanding credit (BBAM)	Outstanding credit (BAM)
Ecosystem credits				
River Flat Eucalypt Forest (HN526/PCT 835)	2,661	n/a ⁽¹⁾	293	293
Freshwater wetland (HN630/ PCT 1071)	926	545	869	511
Species credits				
Spiked Rice-flower <i>Pimelea spicata</i>	107,068	53	107,068	53

2.0 Implementation activities undertaken in the 2024 reporting period

2.1 Report scope

This report covers activities in the 2024 reporting period, between 25 August 2023 and 24 August 2024, including:

- Independent audit of the implementation of the BODP (**Section 2.2**)
- Five year review of BODP (**Section 2.3**)
- A description of activities undertaken to identify, secure and quantify direct offsets (**Section 2.4**)
- A description of the other compensatory measures that have been delivered and steps taken to identify additional measures (**Section 2.5**).

2.2 Independent audit

Infrastructure is required to ensure that independent audits of BODP implementation are conducted every 18 months until all offset requirements by the BODP have been implemented, under Condition 30(11) of the Airport Plan for WSI.

During this reporting period an independent auditor was engaged by Infrastructure to undertake an independent audit of the implementation of the BODP. The audit covered an 18-month period from August 2022 through to February 2024.

The audit concluded that all audit criteria were either complied with or not applicable during the audit period, including the resolution of recommendations from the previous BODP audit. No instances of activities being conducted in a manner deemed 'non-compliant' with the BODP objectives or audit criteria were identified. Additionally, the audit confirmed that the two recommendations from the previous BODP audit report have been fully addressed. The next independent audit will be carried out for the February 2024 to August 2025 period.

2.3 Five-year review of BODP

Condition 30(14) of the Airport Plan requires Infrastructure to conduct periodic reviews of the BODP. These reviews are to be conducted every five years until all biodiversity offsets, including other compensatory measures, mandated by the BODP have been secured or implemented. The purpose of these reviews is to ensure that the BODP continues to meet the approval criteria set for the plan.

The first five-year review report, covering the period 24 August 2018 to 24 August 2023, was prepared during the reporting period (AECOM 2024b).

The review determined that the BODP continues to meet the approval criteria, specifically that the BODP takes into account the Western Sydney Airport EIS and the EPBC Act Environmental Offsets Policy (DSEWPaC 2012), and is 'otherwise appropriate'.

The EPBC Act Environmental Offsets Policy notes that offsets implemented either before, or at the same time as the impact have a greater likelihood of delivering a conservation gain for the protected matter. Where offset obligations have not been achieved to date (**Section 1.5**), the Five-year review considered this to potentially be inconsistent with the EPBC Act Environmental Offsets Policy principle of timeliness. Accordingly, recommendations relevant to securing remaining offsets in as timely a manner as possible were provided in the report, including:

- Providing an option to secure Freshwater Wetland offsets from sites located in regions further from the Airport site, beyond the Cumberland Interim Biogeographic Regionalisation for Australia (IBRA) subregions, to include the entire IBRA subregions that intersect with the 100km buffer zone from the development site (i.e., meeting the criteria for NSW BAM like-for-like offsets).
- Including additional plant community types (PCTs) comprising NSW BAM like-for-like offset options for Freshwater Wetlands.

- Seeking endorsement from the Commonwealth DCCEEW to include Spiked Rice-flower offsets within the established Orchard Hills Offset Area, in the event that Infrastructure pursues this option to secure *Pimelea spicata* offsets.

The report also provided the following recommendations in relation to the BODP:

- Updating the BODP to reflect the revised Statement of Assessment of Reasonable Equivalence (8 November 2022) and clarify the offset obligation, so it is expressed in BAM credits, where relevant.
- Inserting an updated table into the BODP to reflect the quantum of offsets generated at the Orchard Hills Offset Area.
- Confirming that Infrastructure's reporting requirements under the Airport Plan cease at the point at which all biodiversity offsets, as set out in the BODP, are secured and implemented.

A variation to the BODP will be prepared in the next reporting period to address the recommendations of the Five year review. Amendments to the BODP are not intended to replace existing considerations for securing offsets, and would provide additional, expanded options to secure outstanding offsets in order to deliver a timely conservation gain for the protected matters significantly impacted by the development of the airport.

Under the conditions of the Airport Plan, Infrastructure must review the BODP every five years to ensure that the BODP continues to meet the approval criteria for that plan. The next five year BODP will be undertaken during the 2029 reporting period, and a report will be provided to the Environment Minister.

2.4 Direct biodiversity offset actions

The *Western Sydney Airport Biodiversity offset options report* (Biosis, 2022) was prepared to identify available biodiversity credits that may be suitable as direct offsets for the project. This report has been used to support the ongoing investigations and activities to secure remaining offsets for the project. The report focused on the two types of ecosystem credits and three types of species credits for which there remained an offset obligation at the commencement of the 2022 reporting period. The report considered the suitability of each option, referencing like-for-like matches in accordance with the BOS/FBA, and direct offsets in accordance with the EPBC Act Offsets Policy. The report also provided an assessment of options against the BODP offset criteria.

The following is a summary of direct offset actions undertaken by Infrastructure involving identification and securing of biodiversity credits, including through the NSW BOS, and conservation and restoration activities at DEOH.

Biodiversity credits are categorised below as ecosystem credits and species credits as identified in **Table 2**.

2.4.1 NSW Biodiversity Offset Scheme

2.4.1.1 Ecosystem credits

Potential ecosystem credits available in the NSW BOS were identified during the reporting period, with the following ecosystem credits secured:

- River Flat Eucalypt Forest: 160 BBAM credits purchased (BioBanking Agreement – BA407)
- Freshwater Wetland: 74 BAM credits purchased– Biodiversity Stewardship Agreements BS0090 (12 credits) and BS0096 (62 credits)

During the reporting period, Infrastructure continued to actively seek options to secure the outstanding Freshwater Wetland credit obligation for the Development, including engaging with the NSW BCT Credits Supply Taskforce and Commonwealth DCCEEW.

2.4.1.2 Species credits

Infrastructure continues to actively identify potential opportunities to meet the offset obligation for Spiked Rice-flower. This has included the investigation of credits available through the BOS for procurement, as well as the potential for the Orchard Hills Offset Area to provide a suitable offset.

Separate to the implementation of the BODP, efforts have been made to minimise impacts to Spiked Rice-flower at the airport site through translocation of 534 individuals and topsoil containing a seed bank for the species into a suitable recipient site within the airport Environmental Conservation Zone. The survivorship, recruitment, and growth of Spiked Rice-flower at the recipient site continues to be actively monitored.

2.4.2 Defence Establishment Orchard Hills

A substantial portion of the direct offsets required for the airport development have been secured through undertaking conservation and restoration activities at DEOH. Defence has set aside 978.83 hectares of land at DEOH to provide biodiversity offsets for the development of WSI. These arrangements have been formalised through a MoU between Defence and Infrastructure and will be managed under the DEOH Offset Plan to improve the quality of habitat for affected threatened biota and plants over a period of 20 years until 2038, with ongoing maintenance thereafter.

GS LLS have been engaged by Defence as the specialist offset management contractor for the DEOH Offset Area since July 2022. During the reporting period, GS LLS has undertaken a Five Year review of the DEOH Offset Plan (**Section 2.4.2.1**), as well as management actions set out in the DEOH Offset Plan, and continued monitoring and research programs.

2.4.2.1 Five Year review of DEOH Offset Plan

The MoU between Defence and Infrastructure requires a review and update of the DEOH Offset Plan every five years to ensure that it remains appropriate for the protection and improvement of the relevant biodiversity values of the Offset Area. GS LLS submitted a draft addendum to the DEOH Offset Plan ('Offset Plan Validation and Five-Year Review (2023)' (GS LLS 2024)) to Defence and Infrastructure to meet this requirement.

In undertaking the review and an associated validation process, GS LLS refined mapping of property boundaries, roads, trails, existing easements, and accommodated new easements and development areas not previously identified in the DEOH Offset Plan. The addendum was then developed to better align the DEOH Offset Plan with the results of the validation process which would allow GS LLS to implement management activities which can provide the greatest conservation gain for identified ecosystems and species habitat on the site.

Infrastructure's review of the addendum was ongoing at the completion of this reporting period.

2.4.2.2 Management activities

The DEOH Offset Plan requires that management actions be performed across the Offset Area to achieve the Offset Plan objectives, with a particular focus on the required increase in the site quality score of habitat for threatened biota affected by development of Stage 1 of WSI. Management actions include those that are specific to certain habitat types (e.g. installation of habitat resources in woodland; revegetation of derived grasslands) and those that can be applied to alleviate broader threats or achieve restoration opportunities (e.g. management of fire for conservation, control of pest fauna).

These management actions include the development of strategies and mapping which provide the framework to meet the offset objectives for the site. **Table 4** provides a summary of documents completed by GS LLS during the reporting period, and the corresponding DEOH Offset Plan Management Action ID. The fauna reintroduction strategy (DEOH Offset Plan management action ID 7.1) is progressing in partnership with Australian Wildlife Conservancy and is anticipated to be completed in the next reporting period.

Table 4 Completed management action documentation

DEOH Offset Plan Management Action ID	Completed Management Action	Management Action Outcomes
1.2	Woodland and forest stand health mapping	High resolution fine scale mapping of stand health, including tree species richness, dieback and diversity of stem size classes and definition of specific targets and management actions appropriate to each stand.

In addition to the preparation of documentation, GS LLS have completed on ground activities aimed at achieving offset objectives at the site with early observations of improved native groundcover. A summary of these activities, and their alignment with DEOH Offset Plan management actions, during the reporting period is provided in **Table 5**.

Climactic conditions have been conducive for most offset metric improvements during the reporting period with consistent wet weather. However, these conditions were not optimal for some woodland fauna species and saw declines in Bearded Dragon and Scarlet Robin activity (except where burning or Bursaria thinning opened up areas of groundcover).

The wet conditions, however, resulted in significant deterioration of trails during the reporting period. While trail repairs were pending, large areas of the site became inaccessible for much of the reporting period. Reliable access presents a risk for delivery of the Offset Plan outcomes.

Table 5 Summary of GS LLS management actions

ID	Management Action	Summary of GS LLS activities
1	Woodland and forest management	
1.3	<i>Develop and implement techniques to improve stand quality:</i> Identification and implementation of dieback treatments, stand thinning, other silvicultural techniques or other ecological restoration techniques to help meet performance targets.	<ul style="list-style-type: none"> Approximately 34 ha in the northern buffer area has been subject to stand quality improvements. This represents completion of approximately 12% of final offset target Dendrometers have been installed to monitor changes to tree growth Forest dynamic management (FDM) plots have been established and surveyed to track tree health and hollow development Significant increases in woody debris have been observed.
1.5	<i>Management of overabundant Native Blackthorn scrub:</i> Definition of management areas and Native Blackthorn cover targets as informed by a research-based trial.	<ul style="list-style-type: none"> Approximately 34 ha in the northern buffer area has been subject to native blackthorn management. This represents completion of approximately 15% of final offset target Visible improvements in groundcover extent and diversity have been observed.
2	Regeneration and revegetation	
2.3	<i>Broad area over-storey/mid-storey planting:</i> Definition of areas, appropriate species and cover targets to increase over-storey and mid-storey cover.	<ul style="list-style-type: none"> Seed collection has been undertaken seasonally across the site. These seeds will provide the basis for revegetation activities aimed at improving species diversity, and structural complexity Propagation of shrubs is on schedule Consistently mild conditions have limited Eucalyptus seed production (i.e. flowering) needed for revegetation works, and the seed collection and propagation of trees is behind schedule. GS LLS are investigating alternative options First planting is proposed Autumn 2026 (weather dependent).
2.4	<i>Full structural revegetation:</i> Definition of areas, appropriate species and cover targets to achieve full structural revegetation resembling ecological	<ul style="list-style-type: none"> Six sites of high-quality native grasslands have been prepared as Seed Production Areas (SPA) (total SPA area is 41.32 ha), including ongoing weed management

ID	Management Action	Summary of GS LLS activities
	communities in DEOH Offset Area.	<ul style="list-style-type: none"> • Portions of SPA (3.2 ha) have been burnt off in July/August 2024 to maximise vigour and early seed production • Harvesting is scheduled for Summer 2024/25. • 34 ha of tumbledown regrowth (dense forest) restored to grassy woodland structure by thinning of overabundant <i>Bursaria</i> scrub and sapling trees, improving native groundcover, generating terrestrial logs and creating new tree hollows (Plate 1).
3	Habitat enhancement	
3.2	<p><i>Installation of supplementary habitat resources:</i> Installation of supplementary habitat resources, including hollows, nesting boxes, woody debris and other resources.</p>	<ul style="list-style-type: none"> • Approximately 15,000 metres of terrestrial logs have been installed as supplementary habitat. Logs have been sourced through a combination of donated logs (southern buffer area) and forest conservation thinning (northern buffer area). This represents completion of approximately 12% of final offset target for woody debris in woodland areas, and approximately 3% of final offset target for grassland areas. • GS LLS are using various methodologies (e.g. single logs and piles of three logs) to balance desired habitat outcomes, geographic spread of habitat resources, and habitat enhancement progress across the site (particularly in grassland areas) • Experimental nest box trials with Hollow Hogs and multiple nest box designs (total 32) (Plate 2) were extensively surveyed by Forest Science Centre in 2023-24 and confirmed no roosting by threatened species. This finding supports GS LLS approach to prioritise silvicultural techniques (tree staggings) to form 'natural' hollows for habitat, in line with Offset Objectives. • Over 1,000 stags have been created across 34 ha and these will begin to develop hollows over subsequent years.
3.4	<p><i>Implement measures to improve aquatic habitat:</i> Identification of effective and ecologically appropriate actions to maximise aquatic habitat value.</p>	<ul style="list-style-type: none"> • A total of 112 logs have been installed across aquatic habitats for wildlife habitat • Aerial installation of logs (e.g. by helicopter) has been effective in avoiding damage to sensitive aquatic flora and disturbance to fauna • Immediate response by native waterbirds has been observed • GS LLS experimented with differing densities of woody debris in aquatic habitat, with higher volumes (500 logs/ha) corresponding to the greatest observed wildlife use.
3.5	<p><i>Identify significant sources of light pollution and management actions to minimise their impact:</i></p>	<ul style="list-style-type: none"> • Long-term light pollution monitoring metres were installed in July 2024 and are collecting data

ID	Management Action	Summary of GS LLS activities
	Undertake night-time inspections to determine significant sources of light pollution and their impact on habitat quality for nocturnal fauna.	<ul style="list-style-type: none"> Ongoing discussions are continuing with external parties regarding potential mitigation actions.
4	Weed control	
4.2	<p><i>Primary weed control followed by weed control rounds as required to achieve maintenance level:</i> Primary weed control of mapped weed infestations followed by control rounds as required to achieve <5% weed cover.</p>	<ul style="list-style-type: none"> Approximately 22,000 hours of primary weed control completed during the reporting period, with bush regeneration occurring across all zones of site. Fine-scale weed mapping has been further refined during the reporting period. Bush regeneration works have been highly successful in targeting mature woody weeds throughout the Offset Area, significantly reducing the size and extent of infestations. <i>Lantana camara</i> is the most persistent woody weed on site. This is due to its vigorous growth and germination during wet periods, however works to date have been highly successful. (Plate 3). Monitoring, reporting and control of vines has been successful in identifying known locations and infestations to prevent further spread throughout the site.
4.3	Maintenance weed control	<ul style="list-style-type: none"> Maintenance weed control occurred in areas subject to weed control in previous reporting period, primarily woody weeds and vines. Biosecurity threats are under active management with no new incursions reported. A rural-residential property adjoining the north-east corner of the site diverted their overland water egress onto the Offset Area in late 2023, resulting in a new weed plume over approximately 0.5 hectares of Offset Area. GS LLS is preparing to install a swale to concentrate and redirect these flows and reduce the impacts on offset objectives.
4.4	<p><i>Suppress weeds:</i> Reduced cover and extent of infestations.</p>	<ul style="list-style-type: none"> Reduction in African Love Grass and recovery of native species, especially <i>Themeda triandra</i>. Management practices have been negotiated within the Transgrid power easement to allow for spray of woody-selective herbicide to control tree and shrub growth, rather than slashing. GS LLS contractors are managing groundcover weeds within the easement.
5	Ecological fire management	
5.2	<p><i>Support the implementation of the DEOH Bushfire Risk Management Plan:</i> Facilitate the objectives of the DEOH BRMP including maintenance of access, fire breaks and signage.</p>	<ul style="list-style-type: none"> Conservation thinning has resulted in significant reductions in fuel loads. This allows for the return of high-frequency cool fire, which is necessary to maintain the improved woodland structure in the restoration areas. Strategic Fire Advantage Zones (SFAZ) have been inspected throughout the reporting period

ID	Management Action	Summary of GS LLS activities
		and remain within required fuel limits (no burns required). This monitoring will be ongoing.
5.3	<i>Implement the ecological fire management actions:</i> Maintenance of ecologically appropriate fire regimes in accordance with the BRMP and strategy developed.	<ul style="list-style-type: none"> GS LLS continue to work with local Rural Fire Service (RFS) and Fire & Rescue brigades to co-deliver cultural burns on site Eight days of cultural and ecological burns have occurred with a total burnt area of 81 ha.
6	Pest fauna and overabundant native fauna control	
6.2	<i>Maintain exclusion fencing around Offset Area:</i> Appropriate monitoring and maintenance regime developed and implemented for fencing around the Offset Area.	<ul style="list-style-type: none"> GS LLS is working with Defence to consider improvements to fencing around the Offset Area for the management of general biosecurity risks and pest fauna.
6.3	<i>Implement pest fauna controls:</i> Implementation to achieve planned targets with the overarching aim to eradicate pest fauna within the Offset Area in the first 10 years of the Offset Improvement Period.	<ul style="list-style-type: none"> Initial priority has been on Macropod control, with removal of fallow deer and foxes ongoing. 114 exotic pest animals were controlled during the reporting period, including 4 deer, 22 fox, 20 hares, 50 rabbits, plus 18 fox baits taken.
6.4	<i>Review and implement overabundant macropod controls:</i> Review existing kangaroo management plan and implement supplementary strategies and works plans as required to manage macropod populations such that Offset Objectives are not threatened.	<ul style="list-style-type: none"> No overabundant native herbivore control was necessary within the reporting period due to previous operations and seasonal conditions Native groundcovers and native fauna continue to improve as a result of population management.
8	Contamination and human activities	
8.1	<i>Identify and report significant sources of contamination:</i> Report evidence of contamination to Defence with GPS coordinates.	<ul style="list-style-type: none"> This is an ongoing activity, with GS LLS reporting evidence of contamination to Defence.
8.2	<i>Facilitate contamination remediation by Defence in Offset Area and adjoining areas:</i> All proposed ground-disturbing activities to be reported to Defence to allow appropriate clearance and remediation (if required) prior to the activity commencing.	<ul style="list-style-type: none"> GS LLS has removed known asbestos on the Offset Area GS LLS is continuing discussions with Defence regarding lead stockpiles in the northern buffer area impacting approximately 1 ha of Offset Area
8.3	<i>Ensure appropriate quality of revegetation in remediation areas:</i> All remediation areas must be treated as management unit E – full structural revegetation.	<ul style="list-style-type: none"> GS LLS has committed to revegetation in remediation areas to Offset standard.
8.4	<i>Remove non-hazardous waste and dumped materials:</i>	<ul style="list-style-type: none"> Approximately 90% of general waste has been removed from site including:

ID	Management Action	Summary of GS LLS activities
	Remove obsolete fences, sources of asbestos, rubbish or other dumped materials from the Offset Area.	<ul style="list-style-type: none"> • 13 km of fencing (recycled offsite) (approximately 90% of fence removal complete) • 15 copper chrome arsenic telegraph poles and fittings (recycled offsite) (two poles retained as wildlife habitat) • Dumped vehicles and caravans • Assorted metal (e.g. steel tanks, refer Plate 4).
9	<ul style="list-style-type: none"> • Soil and water management 	
9.3	<i>Implement soil and water quality management system:</i> Minimise erosion and sediment transport through appropriate management techniques and maintenance/ monitoring schedule. Minimise other impacts to water quality.	<ul style="list-style-type: none"> • A twice-yearly water quality testing regime is in place
9.4	<i>Mitigate and/or remediate erosion:</i> Implement erosion management controls and/or remediation for observed areas of erosion.	<ul style="list-style-type: none"> • GS LLS is working with Soil Conservation Service to deliver priority water quality improvements identified through field survey and monitoring



Plate 1 Bursaria before (left) and after (after) thinning operations (Ridgeway 2024a)



Plate 2 Microbat Nest Box designs from DEOH trial © Peter Ridgeway (Ridgeway 2024a)



Plate 3 Before (left) and after (right) removal of *Lantana camara* amongst areas of good native diversity (Visintin & Ridgeway 2024b)



Plate 4 Before (left) and after (right) removal of a steel tank in the southern buffer (Visintin & Ridgeway 2024a)



Plate 5 Habitat logs installed by helicopter, Northern Buffer Area 2024 (left) and installed aquatic habitat logs, Dotterel Dam, Northern Buffer Area 2024 (right) © Peter Ridgeway (Ridgeway 2024a)

2.4.2.3 Monitoring program

The following provides a summary of monitoring activities undertaken by GS LLS during the reporting period:

- **Threatened flora surveys:** Seasonal threatened flora surveys were undertaken resulting in substantial additions to the threatened species and populations in the Offset Area. Additional significant threatened flora extent was recorded, including:
 - *Pimelea spicata* (additional 21 stems)
 - *Grevillea juniperina* (additional 76 plants in 18 locations)
- **Native Fauna monitoring:** GS LLS deploys a network of 41 fauna monitoring cameras to monitor native and exotic fauna on the site in Autumn and Spring each year (and as required). No significant outcomes were recorded during reporting period.
- **Groundcover transects (Fire management):** 24 fire monitoring transects have been established, and pre-fire recording has been completed during the reporting period. First post-fire survey is scheduled for Spring 2024.
- **Groundcover transects (thinning):** 18 thinning monitoring transects have been established, with pre-thinning recording completed during the reporting period. First post-thinning survey is scheduled Spring 2024.
- **Kangaroo & Pest Animal monitoring:** Extensive quantitative surveys of pest and overabundant species are undertaken through a collection of monitoring programs. This includes:
 - 14 macropod abundance transects
 - 12 vegetation condition (grazing) transects
 - 6 pairs of grazing enclosure transect surveys.
- **Avifauna surveys:** Quantitative surveys are undertaken monthly for all species at 13 sites, with additional seasonal surveys for Scarlet Robin and Speckled Warbler. These surveys observed the presence of a single Turquoise Parrot on site (listed as Vulnerable in NSW), rarely observed on the Cumberland Plain. Monitoring confirming five additional threatened fauna species on site:
 - Glossy Black Cockatoo (Vulnerable Commonwealth)
 - Powerful Owl (Vulnerable, NSW)
 - Latham's Snipe (Protected Commonwealth, Vulnerable NSW)
 - Square-tailed Kite (Vulnerable NSW – Nesting in Offset Area)
 - Turquoise Parrot (Vulnerable NSW) (**Plate 6**).



Plate 6 Turquoise Parrot feeding on grass seeds in Northern Buffer Area Aug 2024 © Brad Sargent (Ridgeway 2024a)

- **Grey-headed Flying Fox and Swift Parrot surveys:** The Offset Plan prioritises these species for habitat improvements. GS LLS have a Site-Scale Acoustic Survey of 40 grid points to monitor these species’ responses over time.
- **Bird Surveys:** 13 BirdDATA methodology quantitative survey sites are monitored monthly.
- **Reptile Surveys:** 31 sites are surveyed at set intervals, with the next survey scheduled in 2026.
- **Invertebrate Surveys:** 39 sites were surveyed for various target invertebrate groups, including four major sites with quantitative invertebrate abundance data collected using Malaise traps.
- **Long-term (‘photo-point’) monitoring:** GS LLS have a network of nine fixed (permanent) monitoring cameras to improve long-term monitoring and reporting of Offset Improvements.
- **Aquatic monitoring:** GS LLS undertake twice-yearly aquatic monitoring of eight sites to inform delivery of Soil/Erosion and Aquatic habitat offset objectives. This includes water chemistry monitoring, and aquatic biota monitoring (aquatic macrophytes, weeds, macroinvertebrate metrics and diatom metrics).
- **Soil condition monitoring:** Soil health is critical to revegetation and groundcover weed Offset Objectives. Without addressing the issues underlying poor groundcover health, Offset Activities will not succeed. GS LLS engaged the NSW DCCEEW Soil Science team to provide baseline health data for soils across the site.

2.4.2.4 Research programs

The purpose of research outcomes is to increase the effectiveness of the listed DEOH Offset Plan Management Actions and the likely benefits. Seven strategic research programs are underway to improve offset outcomes, through GS LLS engagement with a diverse range of academic partners (Table 6).

Table 6 Research activities during the reporting period

Research project name	Partners	Description
<i>Improving soil management for Cumberland Plain Woodland groundcover revegetation</i>	Western Sydney University	Research on soil health and soil remediation in optimising Cumberland Plain Woodland groundcover revegetation.

Research project name	Partners	Description
<i>Improving habitat management for Pimelea spicata</i>	University of Wollongong	Research on tree and Bursaria management and their benefits to <i>Pimelea spicata</i> .
<i>Improving habitat management for threatened Cumberland Plain fauna</i>	Department of Primary Industries Forest Science Unit	Research on tree and Bursaria management and their benefits to threatened bird and bat habitat offset objectives.
<i>Understanding woodland tree structural development to improve the management of Cumberland Plain Woodland and its habitat</i>	Melbourne University	Research into silviculture techniques and their benefit to Canopy Health offset objectives.
<i>Understanding vegetation structure and Invertebrates Maximising the recovery of endangered Cumberland Plain Land Snail</i>	Independent researcher (Dr Stephanie Clark)	Research on tree and Bursaria management and their benefits to Cumberland Plain Land Snail offset objectives.
<i>Understanding structural dynamics in Cumberland Plain Woodland - impacts on reptiles</i>	Charles Sturt University	Research on tree and Bursaria management and their benefits to threatened fauna offset objectives.
<i>Using artificial habitat for conservation of insectivorous bats</i>	Macquarie University	Nest box designs for threatened microbats in the Cumberland Plain

2.5 Other compensatory measures

Ongoing indirect offsets (other compensatory measures) have not been quantified to-date. These measures include the ABGMA TFPP and GA seed collection and production program.

The GA program has been delivered, with activities described in previous implementation reports (**Section 1.1**). and is not discussed further in this report.

2.5.1 Threatened Flora Propagation Program (TFPP)

Infrastructure has arranged for ABGMA to help establish a longer term potted ex situ *Pimelea spicata* collection at the Mount Annan PlantBank (the Stage 2 TFPP), including 100 individuals from the WSI site for a genetic study. The collection of cuttings from the WSI site was a result of many visits to site over multiple years, based on rain and temperature. The potted collection provides a source of cutting material to support any future translocation or amenity planting of the *Pimelea spicata* population from the WSI site.

The Stage 2 TFPP draws upon the results of the genetic study and experience in propagation techniques gained throughout the Stage 1 TFPP. Funding to maintain the collection has been committed for a period of five years until 2025.

In addition to the 100 *Pimelea spicata* individuals for the TFPP Stage 2 genetic study, ABGMA maintains a collection of *Pimelea spicata* (approximately 727 individuals) and *Marsdenia viridiflora* (approximately 120 individuals) from TFPP Stage 1 for future use. *Pultinaea parviflora* individuals from Stage 1 were collected from ABGMA in July 2020 for use by WSA Co.

3.0 Conclusion

3.1 Outstanding offsets

During the 2023-2024 reporting period (25 August 2023 to 24 August 2024), 160 River Flat Eucalypt Forest credits and 74 Freshwater Wetlands credits were identified and secured.

Outstanding biodiversity offsets are required in relation to two ecosystem credits and one species credit.

Table 7 Outstanding biodiversity credit requirements following the 2023-24 reporting period

Credit type	Credits required (BBAM)	Equivalent BAM credits	Credits Secured in 2023-24 (BBAM)	Outstanding credit (BBAM)	Outstanding credit (BAM)
Ecosystem credits					
River Flat Eucalypt Forest (HN526/PCT 835)	2,661	n/a	160	133	133
Freshwater wetland (HN630/PCT 1071)	926	545	74	-	437
Species credits					
Spike Rice flower <i>Pimelea spicata</i>	107,068	53	-	107,068	53

3.2 Anticipated 2024-25 BODP reporting period activities

Actions in the 2025 reporting period will continue progress towards securing the biodiversity offset obligation for Stage 1 development of WSI, and is anticipated to include identifying options for securing remaining biodiversity offsets including the availability of biodiversity credits. As appropriate direct offsets are secured, other compensatory measures will also be quantified. Details on any offsets secured over the upcoming reporting period will be detailed in the 2025 BODP Implementation Report.

A variation to the BODP will be prepared in the next reporting period to address the recommendations of the Five-year review.

4.0 References

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10. GHD (2021) Western Sydney International (Nancy-Bird Walton) Airport 2020 BODP Implementation Report. Report to Department of Infrastructure, Transport, Regional Development and Communications.
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12. GS LLS (2024) Offset Plan Validation & Five-Year Review (2023), DEOH Offset Plan Annex B - Validation
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