



Department of Infrastructure, Transport, Regional Development and Communications

Western Sydney International (Nancy-Bird Walton) Airport 2019 BODP Implementation Report

July 2020

Executive summary

This *Western Sydney International (Nancy-Bird Walton) Airport 2019 BODP Implementation Report* has been prepared to demonstrate to an auditor that the Department of Infrastructure, Transport, Regional Development and Communications (Infrastructure) has delivered the offset proposal presented in the Biodiversity Offset Delivery Plan (BODP) in accordance with the Airport Plan conditions, including:

- 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.
- Calculation of the quantum of direct biodiversity offsets secured for the airport based on information presented in the BODP and detailed biodiversity assessments for offset sites.

Badgerys Creek will be the site for the new Western Sydney International (Nancy-Bird Walton) Airport (WSI). The construction and operation of WSI was assessed in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). Approval for the construction and operation of WSI is controlled by the *Airports Act 1996* (Cth) (Airports Act) which provides for the preparation of an Airport Plan identifying a staged development of the airport. The Airport Plan contains a number of biodiversity conditions, which require mitigation and management measures to be implemented to reduce the potential impacts on biodiversity values and to offset unavoidable residual impacts.

The Airport Plan conditions required Infrastructure to prepare for approval a BODP to compensate for significant residual impacts associated with the construction and development of the WSI (DIRD 2018). The BODP was prepared in accordance with the requirements set out in condition 30 of the Airport Plan, including that the BODP takes into account the *EPBC Act 1999 Environmental Offsets Policy October 2012* (EPBC Act Offsets Policy) (DSEWPaC 2012).

Biodiversity offsets are required for significant residual impacts of WSI on:

- The threatened species and communities listed under the EPBC Act (affected threatened biota):
 - Cumberland Shale Plains Woodland and Shale-Gravel Transition Forest (Cumberland Plain Woodland)
 - Grey-headed Flying-fox (*Pteropus poliocephalus*)
 - Swift Parrot (*Lathamus discolor*) foraging habitat
 - Spiked Rice-flower (*Pimelea spicata*)
- Other plants, animals and their habitat on Commonwealth Land, including threatened biota listed under the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act).

The EPBC Act Offsets Policy requires biodiversity offset sites to be secured under a legally binding conservation covenant (or other appropriate mechanisms) and the calculation of offsets for impacts on the affected threatened biota using the 'offsets assessment guide' spreadsheet. The guide calculates the percentage of the total offset requirement for the individual protected matter that would be delivered by an offset proposal. Further to this, offsets for significant residual impacts on plants, animals and their habitat have been calculated with reference to the NSW Framework for Biodiversity Assessment (FBA) methodology (OEH 2014a). The FBA is based on the NSW Biodiversity Banking and Offsets Scheme (BioBanking) credit calculator and assessment methodology (OEH 2014b), which was the methodology used to calculate offsets for major projects in NSW at the time that the airport EIS was prepared.

The BODP was approved by the former Department of the Environment and Energy (Environment) on 24 August 2018 prior to substantial physical works being undertaken at the airport site. This commenced the BODP implementation phase which includes the following main steps:

- Additional field surveys, assessment, consultation, confirmation of legal arrangements and payment of compensation as required to secure the known offsets presented in the BODP.
- Synthesis of information and consultation as required to identify additional offsets, followed by the steps outlined above to secure those offsets.
- Preparation and audit of BODP Implementation reports to ensure independent verification of the effective implementation of the BODP.

This 2019 BODP Implementation Report presents BODP implementation activities undertaken by Infrastructure during the first year following the approval of the BODP. This report has been independently audited by a suitably qualified biodiversity expert in accordance with Condition 30 (11) of the Airport Plan.

The BODP implementation activities that have been implemented during the 2019 period comprise:

- Synthesis of existing information and consultation with various offset vendors to identify and secure direct offsets.
- Establishment of the Offset Area at Defence Establishment Orchard Hills, including execution of a Memorandum of Understanding to secure at least 900 hectares of land as an offset, completion of an Initial Ecological Survey and consultation with Defence on the preparation of the Offset Plan for management of the site.
- Purchase of biodiversity credits to secure direct offsets for Cumberland Plain Woodland, the Grey-headed Flying-fox and Swift Parrot foraging habitat and for various plants, animals and their habitat.
- Finalisation of the threatened flora propagation program required by Condition 33 of the Airport Plan, delivery of a *Pimelea spicata* genetic research program and initial stages in the establishment of an *ex situ* *Pimelea spicata* population to support conservation of the species.
- Continued implementation of the Greening Australia seed collection and production program required by Condition 32 of the Airport Plan.
- Consideration of potential research, restoration and rewilding programs.
- Other activities include discussions with key stakeholders from governments, private industry, and communities.

The quantum of offset for the affected threatened biota secured through these activities has been calculated using the offsets assessment guide in accordance with the EPBC Act offsets policy. Biodiversity credits were purchased in 2019 to secure direct offsets for WSI and BioBanking credit calculations have been performed to estimate the quantum of offset for plants, animals and their habitats secured at the Orchard Hills Offset Area. The total quantum of offset secured in the 2019 BODP implementation period is summarised in the tables below.

Based on the review of available documentation and observations made during the audit, Infrastructure are meeting compliance criteria for the Implementation of the BODP in accordance with the Airport Plan conditions.

ES-1 Quantum of offset for the affected threatened biota secured in the 2019 implementation period

Protected matter	Impact area (ha) ¹	Area of habitat at Orchard Hills Offset Area (ha)	Percentage offset provided by Orchard Hills Offset Area ²	Offset area associated with biodiversity credits purchased in 2019 (ha)	Total 2019 BODP implementation period area (ha)	Percentage direct offset provided by 2019 Offset Proposal	Other compensatory measures
EPBC Act Cumberland Plain Woodland	141.0	373.3	60.98%	120.9	494.2	76%	
Poorer quality Cumberland Plain Woodland	n/a	307.7	49.22%	123.2	430.8	58%	
Total EPBC Act Cumberland Plain Woodland	141.0	678.2	110.12%	244.1	925.0	135%	TFPP, Greening Australia SPA up to 10%
Grey-headed Flying-fox habitat	187.8	517.9	78.26%	139.3	657.2	105%	
Swift Parrot foraging habitat	188.0	517.9	51.57%	139.3	657.2	61%	
Spiked Rice-flower (<i>Pimelea spicata</i>)	2.9	0.0	0.00%	0.0	0.0	0%	TFPP, Greening Australia SPA up to 10%

Notes: 1) based on EPBC Act offset assessment guide calculations in the approved BODP (DIRD 2018).

2) based on calculations in the draft Initial Ecological Survey report (GHD in prep a).

ES-2 Quantum of offset for plants, animals and their habitat secured in the 2019 implementation period

Credit type	Credits required ¹	Estimated credits provided by Orchard Hills Offset Area ²	% provided by Orchard Hills offset area	Biodiversity credits purchased in 2019	Total 2019 BODP implementation period	Total 2019 BODP implementation period % of total requirement	Outstanding credit requirement
Ecosystem credits							
Total Cumberland Plain Woodland (HN528 high, medium, poor and low and HN529 high and poor)	12,742	11,414	90%	3,805	15,219	119%	0
Total River Flat Eucalypt Forest (HN526 high, poor and low)	2,661	2,416	91%	254	2,670	100%	0
Total Shale-gravel Transition Forest (HN512 high and poor and HN513 high)	359	917	255%	0	917	255%	0
Freshwater wetland (HN630)	926	53	6%	0	53	6%	873
Species credits							
<i>Pimelea spicata</i>	n/a	0	0	0	0	0	0
Cumberland Plain Land Snail	2,441	3,677	151%	0	3,677	151%	0
<i>Dillwynia tenuifolia</i>	540	511	95%	0	511	95%	29
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> endangered population	5,800	17,949	309%	0	17,949	309%	0
<i>Pultenaea parviflora</i>	60	9,358	15,597%	0	9,358	15,597%	0
Southern Myotis	1,617	1,198	74%	0	1,198	74%	419

Notes: 1) based on Framework for Biodiversity Assessment credit calculations in the approved BODP (DIRD 2018).

2) based on calculations in the draft Initial Ecological Survey report (GHD in prep a).

Glossary of terms and acronyms

Term	Definition
Affected threatened biota	Threatened species or communities listed under the EPBC Act, which are likely to suffer a significant impact as a result of a proposal and which require biodiversity offsets having regard to the EPBC Act Offset Policy. In this report it is as defined in the BODP and comprises: <ul style="list-style-type: none"> • Cumberland Plain Woodland • Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>) • Swift Parrot (<i>Lathamus discolor</i>) foraging habitat • Spiked Rice-flower (<i>Pimelea spicata</i>)
BAM	Biodiversity Assessment Methodology
BAR	BioBanking Assessment Report
BBAM	The NSW BioBanking Assessment Methodology (OEH 2014).
BC Act	<i>Biodiversity Conservation Act 2017 (NSW)</i>
BCD	Biodiversity Conservation Division of NSW Department of Planning, Industry and Environment, formerly NSW Office of Environment and Heritage (OEH). Note that data maintained by the current BCD appears on the internet as published by OEH and is referenced as such in this report.
BCT	NSW Biodiversity Conservation Trust (BCT, formerly Nature Conservation Trust)
Biobank site	Land that is designated by a biobanking agreement under Part 7A of the former TSC Act to be a biobank site (see Biodiversity Stewardship Site – BSS).
Biobanking agreement	An agreement entered into between the landowner and the NSW Environment Minister under Part 7A of the former TSC Act for establishing a biobank site (see Biodiversity Stewardship Agreement – BSA).
Biodiversity credit	A unit of biodiversity value to measure specific development impacts or conservation gains in accordance with the FBA, the BBAM or the BAM. Includes ecosystem credits or species credits.
Biodiversity credit report	Specifies the number and type of biodiversity credits required to offset the impacts of a Major Project in accordance with the FBA or that would be generated through conservation and management of an offset site under a BioBanking agreement or a BSA.
Biodiversity offset delivery plan (BODP)	The plan prepared to compensate for residual significant impacts associated with Western Sydney International development. The BODP was prepared in accordance with condition 30 of the Airport Plan and approved by the Environment Minister on 25 August 2018.
Biodiversity offset package	See GHD (2016a). Appendix K2 to the airport EIS, which outlines the approach to the delivery of biodiversity offsets for the airport, including an estimate of the quantum of offsets required, options to deliver these offsets, an estimate of the costs involved and the additional steps required to finalise their delivery.
Biodiversity offsets	Specific measures that are put in place to compensate for impacts on biodiversity values.
Biodiversity Stewardship Agreement (BSA)	An agreement entered into between the landowner and the Minister under Part 5 of the Biodiversity Conservation Act 2016 (BC Act) for establishing a Biodiversity Stewardship Site.
Biodiversity Stewardship Site (BSS)	Land that is designated by a Biodiversity Stewardship Agreement to be a Biodiversity Stewardship Site. Equivalent to the former ‘biobank site’.
Biodiversity values	The composition, structure and function of ecosystems, including native species, populations and ecological communities, and their habitats.
BOS	NSW Biodiversity Offset Scheme
CEEC	Critically endangered ecological community.

Term	Definition
Confidence in result	Means the assessor's estimated percentage confidence in the data entered in the offsets assessment guide that supports the Environmental Offsets Policy.
Defence	The Australian Government Department of Defence
DoEE	The former Australian Government Department of the Environment and Energy (now Department of Agriculture, Water and the Environment, abbreviated to 'Environment').
DPI	The NSW Department of Primary Industries.
DSEWPac	The former Department of Sustainability, Environment, Water, Populations and Communities, now the Australian Government Department of the Environment and Energy.
Ecosystem credit	The class of biodiversity credits created or required for the impact on EECs, 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.
EEC	Endangered ecological community
EIS	Environmental Impact Statement
Environment	The Australian Government Department of Agriculture, Water and the Environment, formerly the Department of the Environment and Energy.
EPBC Act	The Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
EPBC Act-listed biota	Threatened species and communities and migratory species listed under the EPBC Act.
FBA	The Framework for Biodiversity Assessment (OEH 2014a). The methodology to assess impacts on biodiversity that is used to assess all biodiversity values on the development site for a Major Project under the NSW <i>Environmental Planning and Assessment Act 1979</i> (EPA Act) and in accordance with The NSW Biodiversity Offsets Policy for Major Projects (OEH 2014a).
Food tree	A tree species that is recognised as being of value as a foraging resource for a given fauna species.
GIS	Geographic information systems
Habitat tree	A tree that is recognised as being of value as a shelter, roosting and/or nesting resource for fauna species. Includes hollow-bearing trees, snags (standing dead trees) and trees with nests or other signs of fauna occupancy.
Infrastructure	Department of Infrastructure, Transport, Regional Development and Communications, responsible for preparing this report and for preparing and implementing the BODP.
Main Construction Works	Substantial physical works on a particular part of the WSI site (including large-scale vegetation clearance, bulk earthworks and the carrying out of other physical works, and the erection of buildings and structures) described in Part 3 of the Airport Plan, other than TransGrid Relocation Works or Preparatory Activities.
Migratory species	Species that are listed as migratory under the EPBC Act.
NPW Act	<i>The National Parks and Wildlife Act 1974</i> (NSW)
NPWS	The NSW National Parks and Wildlife Service
NSW-listed biota	Threatened species, populations and communities listed under the NSW BC Act or FM Act.
OEH	Former NSW Office of Environment and Heritage now Biodiversity Conservation Division of NSW Department of Planning, Industry and Environment. Note that data maintained by the current BCD appears on the internet as published by OEH and is referenced as such in this report.
Offset Area	The area of land of no less than 900 hectares at Orchard Hills that is the subject of the MOU between Defence and Infrastructure that functions as a biodiversity offset for WSI and that is the subject of this report.

Term	Definition
Offset Improvement Period	means the period commencing when the Offset Plan is approved and ending when the improvements provided for in the plan have been completed and all related monitoring, reporting and auditing requirements have been finalised.
Orchard Hills, DEOH	Defence Establishment Orchard Hills
PCT	Plant community type
Quality Score, site quality	means the site quality score of habitat within an impact area or offset area measured under the offsets assessment guide that supports the Environmental Offsets Policy.
Retired (credits)	Means biodiversity credits that have been used to offset the impacts of a particular development or to facilitate private land conservation and that are not available to offset the impacts of a development.
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.
Species-credit type threatened species	Threatened species that are linked to species credits according to the BBAM (rather than ecosystem credits) because they cannot be reliably predicted to use an area of land based on habitat surrogates according to the BBAM.
Stage 1 Construction Impact Zone (CIZ)	The disturbance footprint for construction of the Stage 1 development of WSI, including the anticipated extent of vegetation clearing and grubbing, earthworks, drainage works and the permanent infrastructure that would be constructed for Stage 1 of the airport.
Stage 1 development	The initial stage in the development of WSI, including a single runway and facilities for 10 million annual passengers.
TEC	Threatened ecological community listed under the EPBC Act and/or the BC Act.
The EPBC Act Offsets Policy	The <i>Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy October 2012</i> (DSEWPac 2012)
The locality	Land within a 10km radius of the Offset Area.
The MOU	The Memorandum of Understanding (MOU) that was entered into between Defence and Infrastructure that <i>inter alia</i> provides for the definition of an Offset Area of no less than 900 hectares at Orchard Hills and its conservation and management to function as a biodiversity offset for WSI.
The offsets assessment guide	The spreadsheet offset calculator that accompanies the EPBC Act Offsets Policy (DSEWPac 2012).
The region	A bioregion defined in a national system of bio-regionalisation. For this study this is the Sydney Basin Bioregion as defined in the Interim Biogeographic Regionalisation for Australia (Thackway and Cresswell 1995).
Threatened biota	Threatened species, populations or communities listed under the EPBC Act, BC Act or FM Act.
TSC Act	The <i>Threatened Species Conservation Act 1995</i> (NSW), which was repealed and replaced by the BC Act in August 2017.
Western Sydney International (Nancy-Bird Walton) Airport (WSI).	The airport project that is the subject of the BODP. The airport is referred to as Sydney West Airport under the Airports Act.
WSI site	The site for Sydney West Airport as defined in the Airports Act, now known as Western Sydney International (Nancy-Bird Walton) Airport (WSI).

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Appendices

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1. Introduction

1.1 Background

This 2019 Biodiversity Offset Delivery Plan (BODP) implementation report has been prepared to demonstrate to an auditor that the Department of Infrastructure, Transport, Regional Development and Communications (Infrastructure) has delivered the offset proposal presented in the BODP in accordance with the Airport Plan conditions, including:

- 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;
- Calculation of the quantum of direct biodiversity offsets secured for the airport based on information presented in the BODP and detailed biodiversity assessments for offset sites.

Badgerys Creek will be the site for the new Western Sydney International (Nancy-Bird Walton) Airport (WSI). The construction and operation of WSI was assessed in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). Approval for the construction and operation of the airport is controlled by the *Airports Act 1996* (Cth) (Airports Act). The Airports Act provides for the preparation of an Airport Plan, which serves as the authorisation for the development of the airport. An Airport Plan was developed identifying a staged development of the airport. The Airport Plan contains a number of biodiversity conditions, which require mitigation and management measures to be implemented to reduce the potential impacts on biodiversity and to offset unavoidable residual impacts.

The Airport Plan conditions required Infrastructure to prepare for approval a BODP to compensate for significant residual impacts associated with the construction and development of the WSI (DIRD 2018). The BODP was prepared in accordance with the requirements set out in condition 30 of the Airport Plan, including that the BODP takes into account the *EPBC Act 1999 Environmental Offsets Policy October 2012* (EPBC Act Offsets Policy) (DSEWPaC 2012).

Biodiversity offsets are required for significant residual impacts of WSI on:

- Threatened species and communities listed under the EPBC Act (affected threatened biota).
- Plants, animals and their habitat on Commonwealth Land, including threatened biota listed under the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act).

The EPBC Act Offsets Policy recognises options available for delivery of direct offsets, including market-based tools such as BioBanking – now the NSW Biodiversity Offset Strategy (BOS) and Biodiversity Assessment Methodology (BAM) (OEI 2017). The EPBC Act Offsets Policy requires biodiversity offset sites to be secured under a legally binding conservation covenant (or other appropriate mechanisms) and actively managed.

The BODP was approved by the former Department of the Environment and Energy (Environment) on 24 August 2018 prior to substantial physical works being undertaken at the airport site. This commenced the BODP implementation phase with Infrastructure identifying and securing biodiversity offsets in accordance with the BODP and the Airport Plan conditions. The BODP accounts for the Infrastructure's delivery of offsets to compensate for the impacts on biodiversity resulting from the construction of Stage 1 of the airport.

Implementation of the BODP, includes the following main steps:

- Additional field surveys, assessment, consultation, confirmation of legal arrangements and payment of compensation as required to secure the known offsets presented in the BODP.
- Synthesis of information and consultation as required to identify additional offsets, followed by the steps outlined above to secure those offsets.
- Preparation and audit of BODP Implementation reports to ensure independent verification of the effective implementation of the BODP.

This *Western Sydney International (Nancy-Bird Walton) Airport 2019 BODP Implementation Report* presents BODP implementation activities undertaken by Infrastructure during the first year following the approval of the BODP. This report has been independently audited by a suitably qualified biodiversity expert in accordance with Condition 30 (11) of the Airport Plan.

1.2 Overview of the offset requirement

Biodiversity offsets are required for significant residual impacts of the WSI on the following affected threatened biota listed under the EPBC Act:

- Cumberland Shale Plains Woodland and Shale-Gravel Transition Forest (Cumberland Plain Woodland), which is listed as a critically endangered ecological community (CEEC) under the EPBC Act and occurs at the WSI site. Construction of WSI would require the permanent removal of 141 hectares of vegetation within the local occurrence of Cumberland Plain Woodland.
- The Grey-headed Flying-fox (*Pteropus poliocephalus*), which is listed as a vulnerable species under the EPBC Act and has been observed at the airport site. Construction of WSI would remove 187.8 hectares of potential foraging habitat for the Grey-headed Flying-fox, including foraging resources for local roost camps when resources are scarce and at critical lifecycle stages.
- Swift Parrot foraging habitat, as the Swift Parrot (*Lathamus discolor*) may occur at the WSI site on occasion during its winter migration, although it was not detected during targeted surveys. This species is listed as a critically endangered species under the EPBC Act. Construction of WSI would remove 187.8 hectares of potential winter foraging habitat for the Swift Parrot.
- The Spiked Rice-flower (*Pimelea spicata*), which is listed as an endangered species under the EPBC Act. A total of 4118 clumps of *Pimelea spicata* were recorded at the WSI site in March–April 2017, including many flowering plants. Construction of WSI is likely to have a significant impact on *Pimelea spicata* through the complete removal of this population and 2.94 hectares of occupied habitat.

Biodiversity offsets are also required for significant impacts on plants, animals and their habitats on Commonwealth Land.

The EPBC Act Offsets Policy requires the calculation of offsets for impacts on affected threatened biota using the 'offsets assessment guide' spreadsheet. The guide calculates the percentage of the total requirement for the individual protected matter that would be delivered by an offset proposal. Further to this, offsets for significant residual impacts on plants, animals and their habitat have been calculated with reference to the NSW Framework for Biodiversity Assessment (FBA) methodology (OEH 2014a). The FBA is based on the NSW Biodiversity Banking and Offsets Scheme (BioBanking) credit calculator and assessment methodology (OEH 2014b), which was the methodology used to calculate offsets for major projects in NSW at the time that the airport EIS was prepared.

The ecosystem credits that would be required to offset the impacts of the airport on plants, animals and their habitat are shown in Table 1, along with potential offset options (that is the Plant Community Types (PCTs) that can be used to offset these impacts according to the FBA/BioBanking credit trading rules).

Table 1 Ecosystem credits required to offset impacts of the airport

Plant community type name	PCT ID	EPBC Act status	BC Act status	Management zone area (ha)	Ecosystem credit requirement	Offset options – credit types
Good condition Grey Box – Forest Red Gum grassy woodland on flats (HN528)	849	CEEC (part) ¹	CEEC	104.8	6545	HN528
Poor condition Grey Box – Forest Red Gum grassy woodland on flats (HN528)	849	-	CEEC	113.2	3829	HN528
Medium condition Grey Box – Forest Red Gum grassy woodland on flats (HN528)	849	-	CEEC	6.1	210	HN528
Good condition Grey Box – Forest Red Gum grassy woodland on shale (HN529)	850	CEEC (part) ¹	CEEC	35.5	1651	HN529, HN528
Poor condition Grey Box – Forest Red Gum grassy woodland on shale (HN529)	850	-	CEEC	13.2	511	HN529, HN528
Good condition Forest Red Gum – Rough-barked Apple grassy woodland (HN526)	835	-	EEC	35.9	2146	HN526
Poor condition Forest Red Gum – Rough-barked Apple grassy woodland (HN526)	835	-	EEC	11.7	515	HN526
Good condition Broad-leaved Ironbark – Grey Box – <i>Melaleuca decora</i> grassy open forest (HN512)	724	CEEC (part) ¹	EEC	5.5	338	HN512, HN513, HN604, HN556
Poor condition Broad-leaved Ironbark – Grey Box – <i>Melaleuca decora</i> grassy open forest (HN512)	724	-	EEC	0.4	21	HN512, HN513, HN604, HN556
Good condition artificial freshwater wetland on floodplain (HN630)	1071	-		32.7	926	HN630, HN520

Notes: CEEC – critically endangered ecological community. EEC – endangered ecological community.

1) Dependent upon patch size and condition thresholds as stated in the listing advice for the community (TSSC 2008).

The species credits that would be required to offset the impacts of the Stage 1 development on plants, animals and their habitat are shown in Table 2. Species credits will be traded on a 'like for like' basis. Consultation with Environment has confirmed that, as a protected matter, offsets for *Pimelea spicata* should be calculated using the EPBC Act offset assessment guide. Therefore species credits calculations are not required to confirm the quantum of offset for impacts to *Pimelea spicata*. See section 1.6 for further detail regarding offset calculations.

Table 2 Species credits required to offset impacts of the airport

Common name	Scientific name	EPBC Act status	BC Act status	Quantum of impact	Threatened species multiplier	Species credits required
Cumberland Plain Land Snail	<i>Meridolum corneovirens</i>	-	E	183.2 ha of habitat	1.3	2,441
<i>Dillwynia tenuifolia</i>	<i>Dillwynia tenuifolia</i>	-	V	30 individuals	1.8	540
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> endangered population	-	EP	145 stems	4.0	5,800
<i>Pultenaea parviflora</i>	<i>Pultenaea parviflora</i>	V	E	4 individuals	1.5	60
Southern Myotis	<i>Myotis macropus</i>	-	V	71.7 ha of habitat	2.2	1,617
Spiked Rice-flower	<i>Pimelea spicata</i>	E	E	4118 clumps, 2.94 ha of habitat	2.6	n/a

Notes: E – endangered species. V – vulnerable species. EP – endangered population.

1.3 Overview of the offset proposal

The approved BODP sets out the proposed approach for Infrastructure to identify and secure biodiversity offsets in accordance with the Airport Plan conditions. The BODP development and implementation process is shown in Figure 1.

At this stage of the implementation of the BODP, the intent is to deliver the majority of biodiversity offsets through conservation of suitable offset sites.

It was considered that a large component of the direct offsets to be implemented under the BODP would be associated with an offset site at the Defence Establishment Orchard Hills (DEOH). The Orchard Hills Offset Area is owned by the Commonwealth and entered on the Commonwealth Heritage List. It is subject to the comprehensive environmental protection framework set out in the EPBC Act under the control of the Environment Minister or approved delegate. A Memorandum of Understanding (MOU) was entered into between the Department of Defence (Defence) and Infrastructure in September 2018 with provisions that are additional to any Commonwealth Heritage Listing requirements. The MOU will provide for:

- A defined Orchard Hills Offset Area of no less than 900 hectares.
- An Offset Plan to be developed, funded and implemented to provide measurable ecological improvements to the quality of habitat for the affected threatened biota and plants, animals and their habitat.

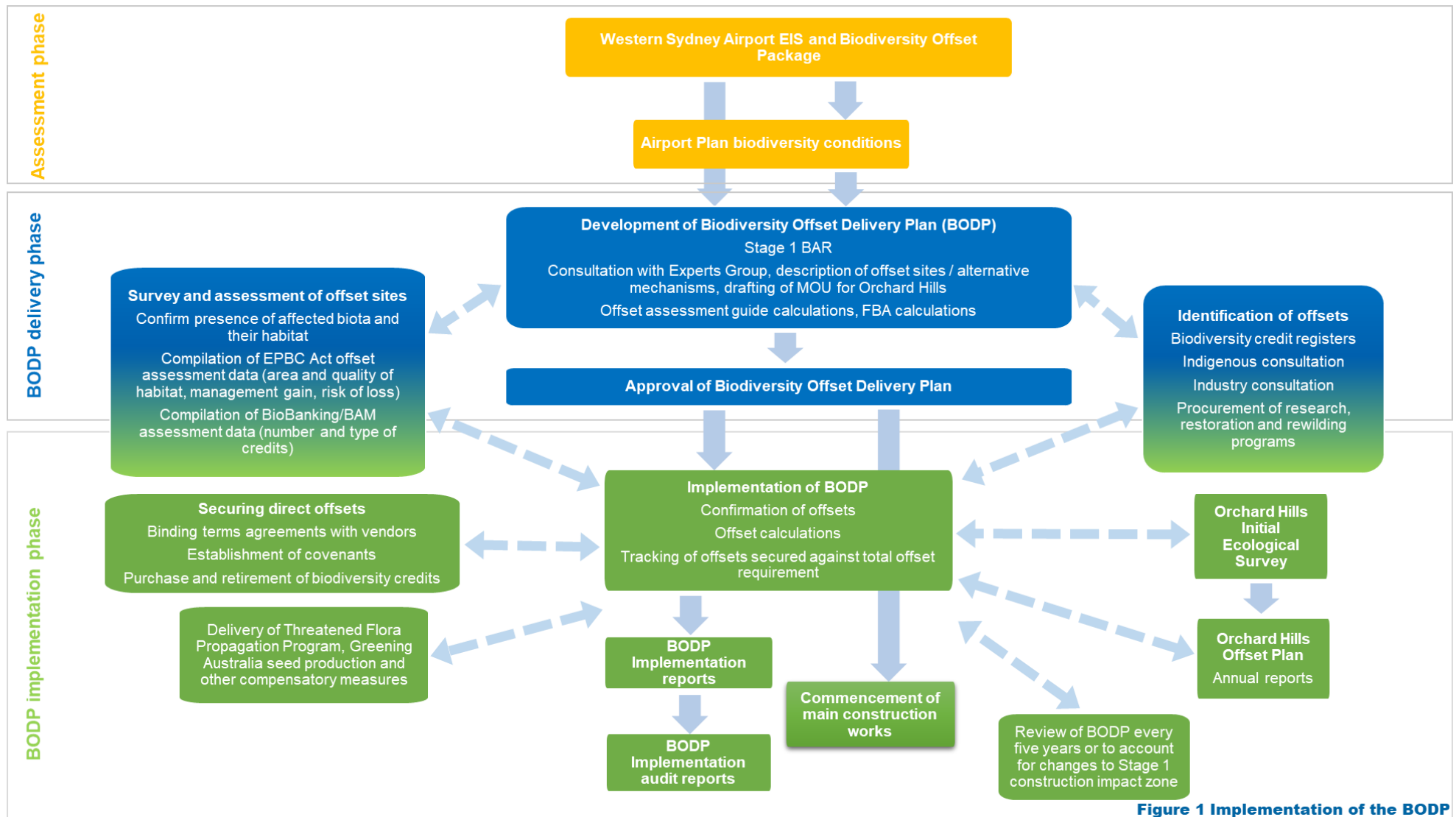
- Various monitoring, record keeping, reporting and auditing arrangements to be put in place, consistent with the BODP and the Airport Plan.
- The Orchard Hills Offset Area to be maintained following completion of the improvements, so as to retain long-term benefits of the quality improvements following implementation of the Offset Plan.

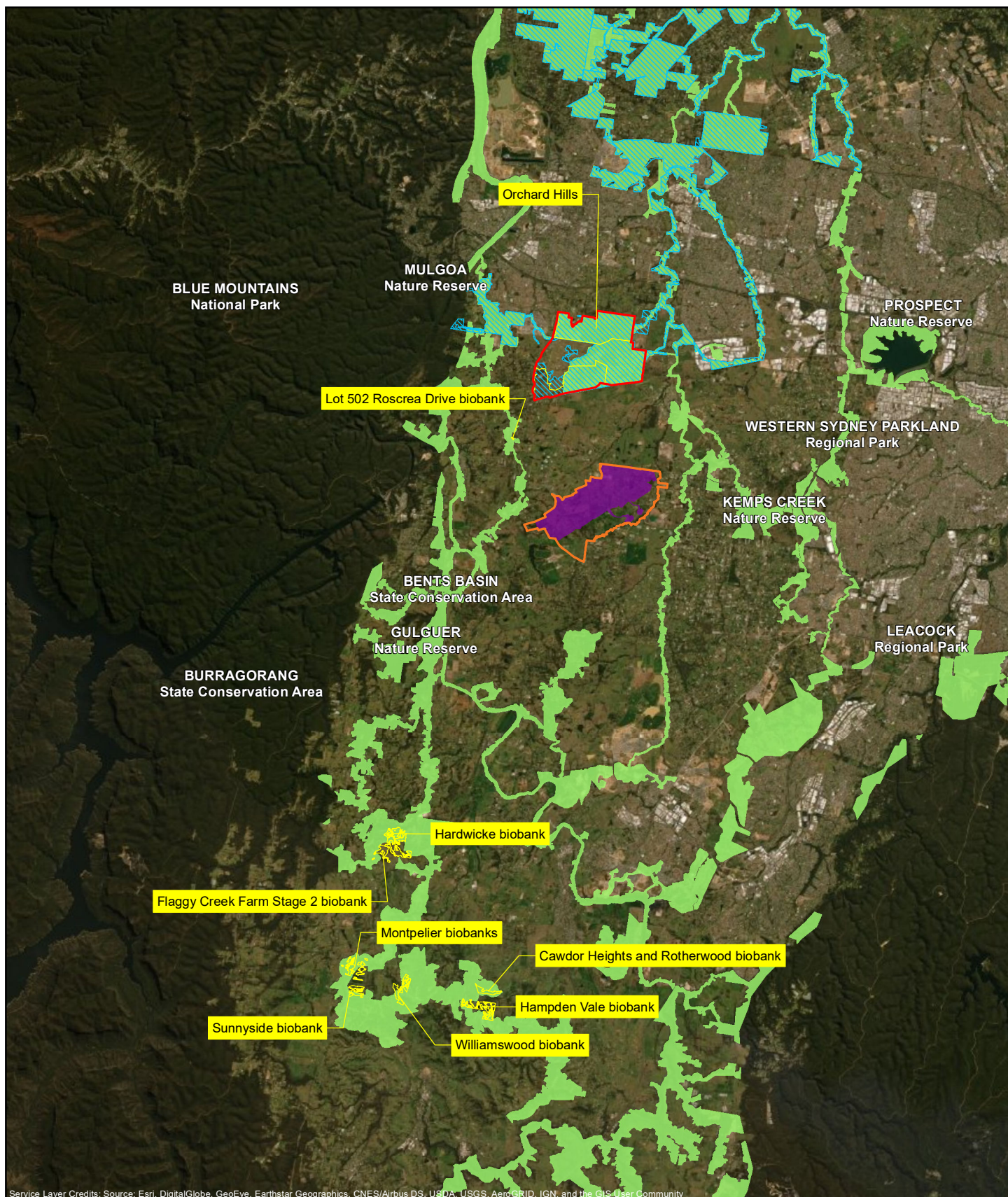
A proportion of the direct offsets for the airport would be secured by purchasing and retiring biodiversity credits from Biodiversity Stewardship Agreement (BSA) sites, secured under the NSW BOS (formerly BioBanking) and BC Act. To confirm the quantum of offset for affected threatened biota, requires an assessment of the area and quality of habitat for the affected threatened biota within the land associated with purchased biodiversity credits and offset calculations in accordance with the EPBC Act Offsets Policy to be undertaken. These biodiversity credits would also directly contribute to the offset requirement for impacts on plants, animals and their habitats. For instance 2.5 hectares of Grey Box - Forest Red Gum grassy woodland on shale, contributing to the offset requirement for EPBC Act Cumberland Plain Woodland was secured through the purchase of 25 HN529 ecosystem credits which contributes 25 credits towards the impact on this ecosystem type as part of the offset requirement for plants, animals and their habitats. A map of the direct offset sites secured in the 2018/2019 financial year is shown on Figure 2.

In addition to these direct offsets, a Threatened Flora Propagation Program and a native seed production program are being implemented as other compensatory measures in accordance with the Airport Plan conditions and the EPBC Act Offsets Policy.

As part of the development of the BODP a variety of options for biodiversity 'research, restoration and rewilding' programs have been identified. Infrastructure have commenced a process of further developing these options. Each of these programs would deliver substantial conservation outcomes but it is unlikely that all would be permanently secured offset site. The EPBC Act Offsets Policy acknowledges that "in some circumstances there may be difficulties in permanently securing a site for conservation purposes due to the existing tenure of the land' and that 'such situations will be considered by the Department of Environment and Energy (now the Department of Agriculture, Water and the Environment, 'Environment') on a case by case basis" (DSEWPaC 2012, p19). Where the security of the offset is diminished, the level of direct offset that would be delivered would be discounted accordingly (DSEWPaC 2012). This requirement would be addressed using the offsets assessment guide, which accounts for the level of security of an offset proposal.

The offset proposal presented in the BODP includes the direct offsets, other compensatory measures and longer term options outlined above and summarised in Table 3. The offset proposal was developed based on Infrastructure's *assessment criteria for biodiversity offsets* developed with reference to the EPBC Act Offsets Policy and Airport Plan conditions and refined in consultation with a Biodiversity Experts Group.



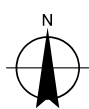


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- | | |
|---------------------------------------|--|
| Airport site | Defence Establishment Orchard Hills |
| Stage 1 construction impact zone | 2019 BODP implementation period offset sites |
| Cumberland Conservation Corridor | |
| Priority conservation lands (BIO Map) | |

Paper Size A4
0 2 4 8
Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



Department of Infrastructure, Transport,
Regional Development and Communications
2019 BODP Implementation Report

Job Number	21-26204-11
Revision	A
Date	30 Jan 2020

2019 BODP implementation period offset areas

Figure 2

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydney@ghd.com.au W www.ghd.com.au

© 2020. Whilst every care has been taken to prepare this map, GHD (and WSU, OEH, NSW Department of Lands, ESRI) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Data source: Aerial Imagery - ESRI 2020, Offset sites - GHD 2017, Cumberland Plain Conservation - OEH 2016, Airport layout data - WSU 2016. Created by:jprprice Created by:jprprice

Table 3 The Western Sydney International Airport offset proposal

Measure	Summary	Characteristics	Quantum of offset	Timing
Direct offsets			At least 90%	
Orchard Hills Offset Area	Secure the ongoing conservation and enhance the biodiversity value of a large site with strategic value and a significant amount of like-for-like native vegetation in close proximity to the airport site.	<p>Secures and strengthens the conservation outcomes of a large site with strategic value and strong connectivity benefits, in addition to existing environmental obligations. Conservation of a significant amount of Cumberland Plain Woodland and other like-for-like native vegetation and habitats in close proximity to the airport site.</p> <p>Strong potential for complementary outcomes.</p> <p>Under the MOU, there would be requirements for active management, monitoring, reporting and auditing to improve biodiversity values with a commitment to achieve an increase in site quality and provision for ongoing management.</p> <p>Moderate averted risk of loss through exclusion of future development or harmful activities.</p> <p>Management described in the Offset Plan, prepared in accordance with the MOU, to be fully funded for the improvement period, anticipated to be up to 20 years with a high certainty of success and ongoing conservation and management obligations.</p>	<p>Infrastructure has entered into a MOU with Defence and the Initial Ecological Survey of the Orchard Hills Offset Area has been completed. Based on preliminary Offsets assessment guide calculations conservation and management of the Orchard Hills Offset Area could meet around:</p> <ul style="list-style-type: none"> – 90 % of the offset for Cumberland Plain Woodland, including – 61 % through conservation of EPBC Act Cumberland Plain Woodland – 30 % through improvement of poorer quality Cumberland Plain Woodland – 71% of the offset requirement for the Grey-headed flying-fox – 47% of the offset requirement for Swift Parrot foraging habitat <p>The Orchard Hills Offset Area could also meet a substantial proportion of the offset requirement for impacts on plants, animals and their habitats as a direct offset when translated into the equivalent biodiversity credits.</p>	<p>Implementation commenced in the 2018/19 Financial Year.</p> <p>A Final Draft Offset Plan will be completed within 18 months of the approval of the BODP. The core offset site and any other agreed areas will be actively managed as an offset for the airport for the period required to achieve the offset objectives, expected to be up to 20 years, with ongoing maintenance thereafter.</p>

Measure	Summary	Characteristics	Quantum of offset	Timing
Purchase of credits through the NSW Biodiversity Offsets Scheme	Secure areas for conservation in perpetuity through the purchase of biodiversity credits.	The NSW Biodiversity Offsets Scheme provides for a secure conservation covenant, detailed management plan, secure funding, monitoring, and auditing and enforcement by the BCT. Sites chosen will have relevant ecological communities and species to meet offset requirements. Sites will be strategically located with good connectivity outcomes.	<p>The quantum of offset that would be delivered is subject to the identification of suitable suites of credits sourced from appropriate offset sites, information presented in Biodiversity Stewardship Site Assessment Reports in accordance with the BAM and EPBC Act offset calculations. This measure is likely to deliver:</p> <ul style="list-style-type: none"> – at least 10% of the offset requirement for Cumberland Plain Woodland – around 15 to 25% of the offset requirement for the Grey-headed Flying-fox – up to 35% of the offset requirement for Swift Parrot foraging habitat – up to 60% of the offset requirement for Pimelea spicata when linked to an area of occupied habitat <p>This measure would meet a substantial proportion of the offset requirement for impacts on plants, animals and their habitats with a particular focus on securing offsets for threatened biota not delivered by other measures.</p>	Purchase of credits will be staged, with the initial tranche of credits purchased in the 2018/19 Financial Year, and the total quantum of required credits expected to be purchased and secured within three years of BODP approval.

Measure	Summary	Characteristics	Quantum of offset	Timing
Acquisition of land	Acquisition of strategic parcels of land that promote connectivity for the Cumberland Plain Corridor to be managed in perpetuity by a third party.	<p>Sites chosen will have relevant ecological communities and species to meet offsetting requirements.</p> <p>Sites will be strategically located and enhance connectivity outcomes for the Cumberland Plain Corridor.</p> <p>An appropriate mechanism will be applied to ensure security of tenure in perpetuity.</p> <p>Time and flexibility will be built into the process to ensure the best land parcels can be acquired.</p> <p>Acquisition processes will make use of the expertise of appropriate local experts in site selection and governance. Active management plans will include provisions for monitoring and evaluation, and will be funded to deliver specific biodiversity outcomes.</p>	<p>The quantum of offset that would be delivered is subject to the identification of suitable sites, biodiversity survey and assessment with reference to the BAM, preparation of a biodiversity management plan (or equivalent) and EPBC Act offset calculations.</p> <p>This measure would also help meet the offset requirement for impacts on plants, animals and their habitats.</p>	An advisory group may be established in the 2019/20 Financial Year, and it is expected that suitable parcels of land will be identified and secured within 3 years of the establishment of the advisory group.

Measure	Summary	Characteristics	Quantum of offset	Timing
Restoration and rewilding programs	Improve the extent, connectivity and condition of native vegetation and habitat in the Cumberland Plain on non-biodiversity stewardship sites.	<p>Measures will be selected that have strategic or complementary benefits that help ensure conservation gains at least equivalent to other options for direct offsets.</p> <p>Sites chosen will have relevant ecological communities and species to meet offsetting requirements.</p> <p>Land tenure of sites will be closely considered to ensure long-term viability of restoration and revegetation.</p> <p>Sites of work will be strategically chosen to improve connectivity and conservation corridors.</p> <p>Long-term management objectives and funding sources must be built into any programs, along with ongoing monitoring and evaluation.</p> <p>Restoration and rewilding must be additional to the status quo.</p> <p>There will be a preference for programs that link with other measures such as Aboriginal land management, research and other on-ground conservation work.</p>	<p>The quantum of offset that would be delivered is subject to the identification of suitable sites and programs, biodiversity survey and assessment with reference to the BAM, preparation of a biodiversity management plan (or equivalent) and EPBC Act offset calculations. This measure may deliver:</p> <ul style="list-style-type: none"> – around 5 to 10% of the offset requirement for Cumberland Plain Woodland – around 5 to 15% of the offset requirement for the Grey-headed Flying-fox – up to 15% of the offset requirement for Swift Parrot foraging habitat – up to 40% of the offset requirement for <i>Pimelea spicata</i> <p>This measure would also help meet the offset requirement for impacts on plants, animals and their habitats with a particular focus on securing targeted offsets for threatened biota not delivered by other measures.</p>	Scoping and identifying restoration and rewilding programs commenced in the 2018/19 Financial Year, with programs expected to be delivered for up to 10 years.

Measure	Summary	Characteristics	Quantum of offset	Timing
Other compensatory measures			Up to 10%	
Threatened Flora Propagation Program (TFPP)	Propagation, research program and <i>in situ</i> collection of threatened plant species found at the airport site.	TFPP implemented in accordance with Condition 33 of the Airport Plan. Additional genetic research program targeting regional populations of <i>Pimelea spicata</i> and helping to address knowledge gaps identified in the recovery plan for the species (DEC 2005a). Maintenance of an <i>ex situ</i> potted collection of <i>Pimelea spicata</i> to support translocation of the airport site population and restoration programs.	The quantum of offset delivered will be calculated as a percentage offset contribution to the total requirement for <i>Pimelea spicata</i> using the 'Other compensatory (\$)' section of the EPBC Act offsets assessment guide. Would also deliver biodiversity offsets for individual threatened plants, estimated by taking the percentage offset calculated using the offsets assessment guide and equating it to an equivalent percentage of the total species-credit requirement (calculated using the FBA) for <i>Pimelea spicata</i> , <i>Pultenaea parviflora</i> , and <i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> .	TFPP commenced in the 2016/17 Financial Year and was completed by July 1 2019. Genetic research program and maintenance of an <i>ex situ</i> population commenced in April 2019 with the research completed in October 2019. The <i>ex situ</i> population will be established in 2019/2020 and will be maintained for a period of at least 5 years.
Greening Australia seed collection and production program	Secure ongoing collection of native seeds for the region	Native seed production implemented in accordance with Condition 32 of the Airport Plan. The Department has entered into an agreement with Greening Australia to contribute funds to the organisation's Cumberland Seed Hub program in Western Sydney. Delivers a reliable, species-rich and local provenance source of native seed for use in restoration activities. Research outcomes should inform future on-ground activities.	The quantum of offset delivered will be calculated as a percentage offset contribution to the total requirement for Cumberland Plain Woodland and <i>Pimelea spicata</i> using the 'Other compensatory (\$)' section of the EPBC Act offsets assessment guide. Would also deliver biodiversity offsets for individual plants, animals and their habitats, estimated by taking the percentage offset calculated using the offsets assessment guide and equating it to an equivalent percentage of the total biodiversity credit requirement (calculated using the FBA) for the affected biota.	Program commenced in the 2017/18 Financial Year and will run for 5 years and be completed in 2021/22.

Measure	Summary	Characteristics	Quantum of offset	Timing
Longer term research and capacity building, including training	Undertake research into effective restoration techniques for threatened ecological communities and species on the Cumberland Plain. Provide capacity building and training, including Aboriginal land management, in on-ground conservation and ecological restoration activities.	Research should align with the Research Priorities in the Commonwealth Conservation Advice and Appendix 4 of the Cumberland Plain Recovery Plan (DECCW 2010). Research to have strong engagement with local projects and organisations and contribute to capacity building. Be complementary to on-ground works undertaken as part of the offsets package and contribute to ongoing monitoring, evaluation and adaptive management practices. Funding for training would not extend to those with existing obligations under BSAs.	The quantum of offset delivered will be calculated as a percentage offset contribution to the total requirement for affected threatened biota using the 'Other compensatory (\$)' section of the EPBC Act offsets assessment guide. Also likely to deliver biodiversity offsets for plants, animals and their habitats, which would be estimated by taking the percentage offset calculated using the offsets assessment guide and equating it to an equivalent percentage of the total biodiversity credit requirement (calculated using the FBA) for the affected biota.	Scoping and identification of programs commenced in the 2018/19 Financial Year, with programs expected to be delivered for up to 10 years.
Complementary outcomes				
Aboriginal land management	Secure long-term training and employment opportunities in land management and restoration for Aboriginal peoples in Western Sydney.	To be based on partnerships and consultative co-design processes with leadership from local Aboriginal groups. Preference for approaches that make strong links to other offset measures included in the offset proposal. As a complementary outcome can be applied to any land-based offset measures.	As a complementary outcome, would not contribute to the biodiversity offset requirement.	Timing would be the same as for the relevant land-based proposed offset measures Aboriginal land management is complementary to.

1.4 Purpose and structure of this report

Condition 30(10) of the Airport Plan requires that Infrastructure must implement the approved BODP on behalf of the Commonwealth. Condition 39(3) states that following approval of the BODP, Infrastructure must report to Environment every 12 months on its implementation until all biodiversity offsets and other compensatory measures under the BODP have been secured or implemented.

Condition 30(11) of the Airport Plan requires that Infrastructure must:

- (a) ensure that an independent audit of its compliance with condition 30(10) is conducted in respect of:
 - (i) the 12-month period commencing with the approval of the BODP
 - (ii) each subsequent 18-month period until all biodiversity offsets required by the BODP have been secured or implemented
- (b) submit a report of each audit that is carried out to Environment within six months of the end of the period in respect of which the audit was conducted.

This 2019 BODP implementation report:

- Is for the 12-month period commencing with the approval of the BODP, specifically 25 August 2018 to 25 August 2019.
- Has been audited and submitted to Environment prior to 25 February 2020 (that is within six months of the end of the period in respect of which the audit was conducted).

The purpose of this 2019 BODP implementation report is to demonstrate to an auditor how Infrastructure has delivered the offset proposal presented in the BODP in accordance with the Airport Plan conditions, including:

- 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.
- Calculation of the quantum of direct biodiversity offsets secured for the airport based on information presented in the BODP and detailed biodiversity assessments for offset sites.

The BODP implementation activities that have been implemented during the 2019 period comprise:

- Synthesis of existing information and consultation with various offset vendors to identify and secure direct offsets.
- Establishment of the Offset Area at Defence Establishment Orchard Hills, including execution of a Memorandum of Understanding to secure at least 900 hectares of land as an offset, completion of an Initial Ecological Survey and consultation with Defence on the preparation of the Offset Plan for management of the site (section 2.1).
- Purchase of biodiversity credits to secure direct offsets for Cumberland Plain Woodland, the Grey-headed Flying-fox and Swift Parrot foraging habitat and for various plants, animals and their habitat (section 2.2).
- Finalisation of the threatened flora propagation program required by Condition 33 of the Airport Plan, delivery of a *Pimelea spicata* genetic research program and initial stages in the establishment of an *ex situ Pimelea spicata* population to support conservation of the species (section 2.3).

- Continued implementation of the Greening Australia seed collection and production program required by Condition 32 of the Airport Plan (section 2.4).
- Consideration of potential research, restoration and rewilding programs (section 2.5).
- Other activities include discussions with key stakeholders from governments, private industry, and communities.

1.5 Relationship with other reports

This 2019 BODP implementation report should be read in conjunction with the *Western Sydney Airport Biodiversity Offset Delivery Plan* (BODP) (DIRD 2018). This 2019 BODP implementation report references impact assessments and preliminary offset calculations presented in the BODP. The BODP was prepared in accordance with condition 30 of the Airport Plan, including requirements to take into account:

- The biodiversity assessment and offset package in the airport EIS (GHD 2016a, 2016b).
- The updated biodiversity survey of the WSI site and impact calculations presented in the *Western Sydney Airport Stage 1 Biodiversity Assessment Report Addendum* (the Stage 1 BAR addendum, GHD 2018b).
- The EPBC Act Offsets Policy (dsewpac 2012).

The BODP outlines the:

- Impact area and quality of habitat for the affected threatened biota in the Stage 1 construction impact zone.
- The number and type of biodiversity credits required to offset impacts of the Stage 1 development of WSI on plants, animals and their habitats.
- Consultation activities and advice of the Biodiversity Experts Group that helped identify potential biodiversity offsets.
- The direct offsets that would be delivered, including preliminary assessment of the Orchard Hills Offset Area and the process for identifying and securing other offset sites.
- Other compensatory measures that would be delivered.
- The approach and indicative timing for implementation of the BODP.

The quantum of impact of the Stage 1 development of WSI that has been used to calculate the offset delivered in this report was approved by Environment in the BODP. Similarly the approach to calculating the quantum of offset from direct offset sites using the EPBC Act offset assessment guide and policy (DSEWPac 2012b) is based on the approach presented in the approved BODP, including: the weighting of site characteristics that may contribute to habitat quality; habitat quality relative to the impact area; the relative averted risk associated with certain land uses and conservation covenants; and the confidence in results.

The *Orchard Hills Offset Area Initial Ecological Survey Report* (GHD in prep a) presents the results of detailed biodiversity surveys and offset calculations for the Orchard Hills offset area. It presents the baseline site quality scores for affected threatened biota and start and future site value scores for plants, animals and their habitats as inputs to offset calculations. The MOU between Defence and Infrastructure provides for an Offset Plan to be developed, funded and implemented over a period of 20 years to provide measurable ecological improvements to the quality of habitat for the affected threatened biota and plants, animals and their habitat at the Orchard Hills Offset Area, consistent with the EPBC Act Offsets Policy and through the implementation of biodiversity management actions. The *Defence Establishment Orchard Hills Offset Plan* (GHD in prep b) presents specific targets and management objectives to achieve the future site value scores with management that support the offset calculations.

At the time of auditing of this BODP implementation report, the Orchard Hills Initial Ecological Survey report and Offset Plan (GHD in prep a, b) have not been finalised and independently verified. As such the ecological survey results, management actions and quantum of offset associated with the Orchard Hills Offset Area have not been fully confirmed. Preliminary versions of these reports are relied upon to summarise activities completed at Orchard Hills in the 2019 BODP implementation period. The confirmed quantum of offset secured will be presented in the 2021 BODP implementation report based on the final, independently verified Orchard Hills Initial Ecological Survey Report and Offset Plan.

The quantum of offset for plants, animals and their habitat associated with the purchase of biodiversity credits from direct offset sites is based on various BioBanking assessment reports prepared by accredited assessors and referenced throughout this report.

The summary of activities related to the WSI threatened flora propagation program is based on the:

- *Western Sydney International Airport Threatened Flora Propagation Program Delivery Report* (ABGMA 2019).
- *Conservation genomics of Pimelea spicata* (Spiked Rice-flower) *in support of management and translocation activities* (RBGDT 2019).

The summary of activities related to the Greening Australia seed production program is based on program delivery and progress update reports provided by Greening Australia.

1.6 Methodology for calculating and securing offset

1.6.1 Quantum of direct offset for affected threatened biota

The EPBC Act policy requires a formal assessment of impacts and offset contributions for EPBC Act-listed species and communities using the 'offsets assessment guide'. The offsets assessment guide uses a balance sheet approach to measure impacts and offsets. According to the EPBC Act Offsets Policy, controlled actions requiring offsets must achieve a minimum 90% direct offset except in limited circumstances specified in the policy. Direct offsets are defined as those actions that provide a measurable conservation gain for an impacted protected matter.

The majority of the direct offsets for the airport would comprise the conservation and management of the affected threatened biota and their habitat in offset sites. These measures would achieve improvement in the condition of habitat, creation of new habitat resources, mitigation of threats and averted risk of loss through development or agricultural activities. A single offset area can compensate for impacts on multiple threatened biota if they have common habitat requirements (DSEWPac 2012a). Therefore, some offset areas at potential offset sites would contribute to meeting EPBC Act Cumberland Plain Woodland, Grey-headed Flying-fox and Swift Parrot foraging habitat offset requirements.

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented Chapter 2 of the BODP (DIRD 2018) and the conservation and management of the Orchard Hills Offset area and offset sites secured through the purchase of biodiversity credits. The quality of habitat for the affected threatened biota at offset sites has been calculated through synthesis of data from approved BioBanking assessment reports and supplementary surveys designed to confirm the extent and quality of habitat for the affected threatened biota in accordance with the EPBC Act offset policy and relevant listing and conservation advice (EPBC Act surveys).

The approach to calculating the quantum of offset from direct offset sites using the EPBC Act offset assessment guide and policy (DSEWPac 2012a) is based on the approach presented in the approved BODP, including: the weighting of site characteristics that may contribute to habitat quality; habitat quality relative to the impact area; the relative averted risk associated with certain land uses and conservation covenants; and the confidence in results.

It is important to note that the assessment of quality for threatened species habitat and ecological communities is not simply a scoring of vegetation 'intactness'. Rather, Environment's instructions for the offsets assessment guide identify three site characteristics that may contribute to the calculation of quality:

- Site condition - comprising the condition of a site in relation to the ecological requirements of a threatened species or ecological community. This includes considerations such as vegetation condition and structure, the diversity of habitat species present, and the extent and quality of habitat resources.
- Site context – comprising the relative importance of a site in terms of its position in the landscape, taking into account the connectivity needs of a threatened species or ecological community. This includes considerations such as the extent of habitat, connectivity with other areas of suitable habitat, and the role of the site in relation to the overall population or extent of a species or community.
- Species stocking rate - comprising the usage and/or density of a species at a particular site. The principle acknowledges that a particular site may have a high value for a particular threatened species, despite appearing to have poor condition and/or context. It also includes consideration of the role of the site population in regards to the overall species population viability or community extent (DSEWPac 2012b).

These three attributes must be weighted according to their relative importance to the offset calculations based on the ecology of the relevant species or community (DSEWPac 2012b) (ie their relative contribution to the total score out of 10). The weighting of these three attributes for the affected threatened biota was defined in the approved BODP as follows:

- Cumberland Plain Woodland:
 - site condition – 50 per cent comprising an assessment of the condition of the site in relation to the ecological requirements of the community and based on vegetation structure, native plant cover, species richness and presence of habitat resources.
 - site context – 50 per cent comprising an assessment of the relative importance of the site in terms of its position in the landscape based on patch size, connectivity and proximity to threats.
 - species stocking rate – 0 per cent because this attribute is not directly relevant to threatened communities.

- Grey-headed Flying-fox:
 - Site condition – 60 per cent comprising an assessment of the condition of the site in relation to the ecological requirements of the species and based on vegetation condition and presence of food trees and other habitat resources.
 - Site context – 20 per cent comprising an assessment of the relative importance of the site in terms of its position in the landscape based on patch size, connectivity, presence of roost camps and/or proximity to off-site roost camps and proximity to threats. This factor was given less weighting because the species is highly mobile and is known to forage in small or isolated patches of vegetation.
 - Species stocking rate – 20 per cent comprising an assessment of the usage or density of the species at the site. This factor was given less weighting because the species is highly mobile and all individuals in NSW are considered part of one regional population that undertakes nomadic movements to exploit seasonal resources (DECCW 2009). The Grey-headed Flying-fox regularly travels up to 50 km in a night to forage, and has been shown to make migratory movements of almost 1000 km within a year (Churchill 2008; Webb and Tidemann 1996). Given this mobility and population fluctuations in any given area, the local species stocking rate is a relatively minor component of habitat quality.
- Swift Parrot foraging habitat:
 - Site condition – 40 per cent comprising an assessment of the condition of the site in relation to the ecological requirements of the species and based on vegetation condition and presence of food trees and other habitat resources.
 - Site context – 20 per cent comprising an assessment of the relative importance of the site in terms of its position in the landscape based on patch size, connectivity and proximity to threats. This factor was given less weighting because the species is highly mobile and movement pathways used by Swift Parrots throughout their range are not well understood (Saunders and Tzaros 2011).
 - Species stocking rate – 40 per cent comprising an assessment of the usage or density of the species at the site. The Swift Parrot is a highly mobile species, which regularly travels between Tasmania and mainland Australia during its annual migrations. However the recovery plan for the species emphasises the importance of habitat that is used by large proportions of the Swift Parrot population or repeatedly between seasons (ie site fidelity) (Saunders and Tzaros 2011).
- *Pimelea spicata*:
 - Site condition – 20 per cent comprising an assessment of the condition of the habitat at the site in relation to the ecological requirements of the species and based on vegetation condition and degree of disturbance.
 - Site context – 20 per cent comprising an assessment of the relative importance of habitat at the site in terms of its position in the landscape based on patch size, connectivity and proximity to threats. This factor was given minor weighting because important elements in the life history of the species such as pollination, seed fall and recruitment typically happen over short distances and within populations (DEC 2005a).
 - Species stocking rate – 60 per cent comprising an assessment of the usage or density of the species at the site. This factor was given greater weighting because the size and abundance of individuals within a population are recognised as being critical to the maintenance of populations of the species as well as being the best indicator of the quality of habitat given uncertainty about the key microhabitat, pollinator and disturbance regime requirements for the species (DEC 2005a).

Each characteristic was then scored out of 10 based on the results of field surveys conducted in accordance with BBAM and supplementary EPBC Act surveys and used to calculate an aggregate site quality score.

The link between the qualitative assessment provided above and the quantitative site quality scores is summarised in the approved BODP for the impact area at the WSI site and preliminary 'current', 'future with offset' and 'future without offset' quality scores for offset areas. These various inputs to the offsets assessment guide calculations are tabulated along with a description of the attributes that define the given values at the WSI site or offset area and references to source documents. Descriptions of the relevant attribute values for the range of site quality scores are provided for context (DIRD 2018). The benchmark site quality scores for Orchard Hills have since been updated with reference to the Initial Ecological Survey report (GHD in prep). This approach to scoring habitat quality values has been used in offsets assessment guide calculations included in this BODP implementation report and will be used to confirm the quantum of offset provided by longer term offsets. This ensures a consistent approach to scoring site quality between the impact and offset areas.

EPBC Act offset assessment guide spreadsheets for each of the direct offset sites secured to date have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

1.6.2 Quantum of direct offset for plants, animals and their habitat

The quantum of offset required for significant impacts on plants, animals and their habitats affected by WSI was calculated with reference to the NSW Framework for Biodiversity Assessment (FBA) methodology. The FBA is based on the NSW Biodiversity Banking and Offsets Scheme (BioBanking) credit calculator and assessment methodology, which was the methodology used to calculate offsets for major projects in NSW at the time that the airport EIS was prepared.

The EPBC Act Offsets Policy recognises that there are various options available for delivery of direct offsets, including market-based tools such as BioBanking – now the NSW Biodiversity Offset Strategy (BOS) – and Biodiversity Assessment Methodology (BAM). The EPBC Act Offsets Policy requires biodiversity offset sites to be securely titled under a legally binding conservation covenant (or other appropriate mechanisms) and actively managed. At this stage of the implementation of the BODP, the intent is to deliver a large majority of biodiversity offsets through conservation of suitable offset sites. The purchase and retirement of biodiversity credits from offset sites secures the associated area of habitat in accordance with the EPBC Act offset policy as well as providing direct offsets for impacts to plants, animals and their habitat.

Offset requirements for impacts to plants, animals and their habitat are expressed in terms of biodiversity credits which are split into:

- Ecosystem credits, for impacts to native vegetation types and associated habitat for native fauna including threatened species that can be reliably predicted to occur based on habitat surrogates.
- Species credits for individual threatened plant species, endangered populations and threatened fauna species or habitat features that cannot be confirmed without targeted survey.

The suite of ecosystem credits and species credits required to offset impacts of WSI are presented in the BODP.

Ecosystem credits are linked to plant community type (PCT) codes under the BAM, which are equivalent to NSW vegetation types under BioBanking but do not include a code indicating the catchment management authority region in which the credits were generated. The former BioBanking ecosystem credit code is presented in the BODP and throughout this implementation report to allow direct comparison with the impact calculations (e.g. HN528, HN526 etc).

Species credits calculations are not required to confirm the quantum of offset for impacts to *Pimelea spicata* because, as a protected matter, offsets for this species are calculated with the EPBC Act offset assessment guide. When Infrastructure enters into an offset arrangement with a landowner, Infrastructure would purchase *Pimelea spicata* species credits and any ecosystem credits associated with the area of occupied habitat. Purchase of both species and ecosystem credits would secure the direct offset and ensure that the area of habitat could not be used to offset another development. However the quantum of offset delivered would be as calculated with the Offset assessment guide based on the area and quality of habitat for *Pimelea spicata* as described in section 1.6.1 above.

The direct offsets that were secured through the purchase of biodiversity credits during the 2019 BODP implementation period are each associated with sites conserved under existing Biodiversity Stewardship Agreements (BSAs) and that were assessed by accredited assessors in accordance with the BioBanking Assessment Methodology (BBAM). BioBanking Assessment Reports were prepared and independently verified for each BSA prior to credits being generated for sale. The review, approval and governance arrangements of the BOS provide certainty that the credit calculations and descriptions of biodiversity values presented in the approved BioBanking Assessment Reports are reliable. Therefore the quantum of offset for plants, animals and their habitats comprises a direct comparison between the credit requirement presented in the BODP and the matching credits purchased by Infrastructure.

The *Orchard Hills Offset Area Initial Ecological Survey Report* (GHD in prep a) presents the results of detailed biodiversity surveys and credit calculations for the site with reference to the BBAM. At the time of auditing of this BODP implementation report, the Orchard Hills Initial Ecological Survey report and Offset Plan (GHD in prep a, b) have not been finalised and independently verified. As such the ecological survey results, management actions and quantum of biodiversity credits associated with the Orchard Hills Offset Area have been estimated in this 2019 implementation period based on drafts of these reports. The confirmed quantum of offset secured will be presented in the 2021 BODP implementation report based on the final, independently verified Orchard Hills Initial Ecological Survey report and Offset Plan.

1.6.3 Other compensatory measures

Quantum of offset for affected threatened biota

The WSI threatened flora propagation program (TFPP), Greening Australia seed production program and potentially other research, rewilding and restoration programs, would be presented as other compensatory measures in accordance with the EPBC Act offsets policy.

The approved BODP confirmed that the TFPP will be presented as a compensatory measure for *Pimelea spicata*. The offset delivered by the TFPP will be calculated as a percentage offset contribution to the total requirement for *Pimelea spicata* using the 'Other compensatory (\$)' section of the EPBC Act offsets assessment guide. The EPBC Act offsets assessment guide will confirm the total cost of the offset contribution that must be met by funding other compensatory measures, once the cost of delivering the minimum 90 per cent direct offsets is known. This will then allow back-calculation of the percentage of the total offset requirement for *Pimelea spicata* that would be met by dedicated funding for the TFPP.

The approved BODP confirmed that the Cumberland Seed Hub will be presented as a compensatory measure for Cumberland Plain Woodland and for *Pimelea spicata*. As described for the TFPP above, the offset delivered will be calculated using the 'Other compensatory (\$)' section of the EPBC Act offsets assessment guide as a back-calculation of the percentage of the total offset requirement for Cumberland Plain Woodland that would be met by the \$10 million of dedicated funding for the Cumberland Seed Hub.

These other compensatory measures have been substantially delivered in the 2018-2019 BODP implementation period as documented in section 2.3 and 2.4 of this report. However since greater than 90 per cent of all direct offsets for WSI have not yet been secured and costed it is not possible to calculate the value of other compensatory measures using the 'Other compensatory (\$)' section of the EPBC Act offsets assessment guide. The offset contribution from the TFPP, and any other compensatory measures, would be confirmed at the conclusion of the implementation of this BODP and documented in the final BODP implementation audit report.

Quantum of offset for plants, animals and their habitat

The TFPP, Greening Australia seed production program and potentially other research, rewilding and restoration programs, would deliver biodiversity offsets as part of the offset requirement for plants, animals and their habitat. The offset requirement for plants, animals and their habitat has been calculated with reference to the NSW FBA methodology and is expressed in terms of ecosystem credits or species credits that must be purchased and retired. The EPBC Act offsets assessment guide calculations will be used to estimate the credit equivalent provided by the proposal outcomes. These estimates will be derived by taking the percentage offset calculated using the offsets assessment guide and equating it to an equivalent percentage of the total credit requirement (calculated using the FBA) for other biota. The offset contribution from the TFPP, and any other compensatory measures, would be confirmed at the conclusion of the implementation of this BODP and documented in the final BODP implementation audit report.

1.7 Qualifications

1.7.1 Suitably Qualified Biodiversity Expert (GHD)

Ben Harrington (GHD) is the Suitably Qualified Expert who was responsible for the preparation of the BODP in accordance with Airport Plan Condition 30(5). Ben is the technical lead of GHD's biodiversity offset group and an accredited assessor under the NSW BC Act. He has extensive experience preparing biodiversity offset assessments for major projects in accordance with the EPBC Act Offsets Policy, FBA and NSW Environmental Offsets Policy. Ben is a recognised industry specialist in the application of the former BioBanking assessment methodology and in developing offset strategies.

Ben has over 17 years of experience conducting ecological surveys and assessments in NSW, including over 15 years of experience in environmental consulting. He has extensive field survey and project experience on the Cumberland Plain, including at the airport site and at ~20 approved BSA sites.

Qualifications of GHD staff that provided input to this BODP implementation report or undertook recent field surveys and provided inputs to the BODP are provided in Table 4. Flora and fauna surveys were conducted under a Section 132C scientific licence (SL100146) issued under the NSW *National Parks and Wildlife Act 1974* and complied with GHD's animal ethics Research Authority requirements.

Table 4 Qualifications of GHD staff

Name	Position/Role	Qualifications	Years' experience
Ben Harrington	Technical Director – Biodiversity / technical lead for offset assessments, site surveys, credit calculations and reporting	BSc, MSc (Physical Geography) NSW BAM Assessor Accreditation (number 0073)	17+ years
Jayne Tipping	Technical Director – Biodiversity / direction and technical review	BSc, MEnvLaw	25+ years
Malith Weerakoon	Ecologist / desktop assessment, site surveys, data processing.	BSc, MPhil. (Zoology)	6+ years
Dan Williams	Technical Director –biodiversity offsetting / offset vendor consultation and technical review	B. App. Sc. NSW BAM Assessor Accreditation	19+ years
Hannah Urwin	Graduate Environmental Scientist / site surveys	BSc (Plant science)	2+ years
Isabel Lyons	Graduate Ecologist / site surveys	BSc (Environmental Biology)	2+ years

1.7.2 Independent auditor

Alex Cockerill (WSP) has been subcontracted by GHD on behalf of Infrastructure as the Suitably Qualified Expert responsible for auditing this 2019 BODP implementation report. Environment approved Alex Cockerill as the independent auditor prior to the commencement of the audit in accordance with Condition 30 (12) of the Airport Plan.

Alex has more than 19 years' experience in botanical and terrestrial ecological research, ecological impact assessment and conservation landscape management. He is responsible for managing large scale environmental impact assessment projects, including the coordination of field staff, preparation of reports, agency negotiations and ongoing facilitation of projects towards positive outcomes.

He is an Accredited BAM Assessor and recognised expert in the application of the BAM in NSW, regularly providing support to the NSW Government as a third-party reviewer. He has acted as an independent ecological expert participating in compliance audits on behalf of State and Commonwealth governments and as an Expert Witness on flora and vegetation matters in the NSW Supreme Court, NSW Land and Environment Court and the Victorian Court of Arbitration and Tribunal.

Alex previously completed the independent verification of the Biodiversity Assessment Reports (BARs) for WSI in accordance with the Airport Plan conditions.

Table 5 Qualifications of independent auditor

Name	Position/Role	Qualifications	Years' experience
Alex Cockerill (WSP)	Ecology National Team Executive / Independent verifier	BSc (Hons) NSW BAM Assessor Accreditation	19+ years

2. Offset Implementation Activities

2.1 Orchard Hills Offset Area

2.1.1 Overview of proposal

Infrastructure has made arrangements with Defence for establishing an offset site at the Defence Establishment Orchard Hills (DEOH). DEOH is an explosive ordnance depot located approximately 50 kilometres west of central Sydney that is owned, used and managed by Defence. DEOH is managed for Defence capability purposes, Defence training activities and the use and safe storage of explosives. Approximately 1370 hectares of DEOH is recorded on the Commonwealth Heritage List as a Commonwealth Heritage Place for its natural heritage values. The Heritage Place is subject to the comprehensive environmental protection framework set out in the EPBC Act under the control of the Environment Minister.

A Memorandum of Understanding (MOU) was entered into between Defence and Infrastructure that includes provisions that are additional to any Commonwealth Heritage Listing requirements relating to the Offset Area. The MOU provides for:

- The area and boundaries of the Offset Area to be formalised, with a core area of no less than 900 hectares and any other additional areas agreed between Defence and Infrastructure.
- The preparation of an 'Initial Ecological Survey' report (GHD in prep a) to describe the biodiversity values of the offset area and the quantum of direct offset associated with its conservation and management.
- An Offset Plan (GHD in prep b) to be developed, funded and implemented over a period of 20 years to provide measurable ecological improvements to the quality of habitat for the affected threatened biota and plants, animals and their habitat at the Offset Area, consistent with the EPBC Act Offsets Policy and through the implementation of biodiversity management actions.
- Various monitoring, record keeping, reporting and auditing arrangements to be put in place, consistent with the BODP and the Airport Plan.
- The Orchard Hills Offset Area to be maintained following completion of the improvements, so as to retain long-term benefits of the quality improvements following implementation of the Offset Plan.

The objectives of the Offset Plan are to improve the quality of habitat for the affected threatened biota and plants, animals and their habitat in the Offset Area in order to help meet the requirements of the BODP. Specifically, the Offset Plan management actions will be designed to achieve the following objectives:

- a. 'Future quality with offset' score that is two greater than the 'Start quality' score that is defined in the Initial Ecological Survey for the area of Cumberland Plain Woodland.
- b. 'Future quality with offset' score that is one greater than the 'Start quality' score that is defined in the Initial Ecological Survey for the area of habitat for the Swift Parrot and Grey-headed Flying-fox in the Offset Area.
- c. 'Future quality with offset' score for the area of poorer quality Cumberland Plain Woodland in the Offset Area that is at least:
 - i) as high as the quality score for the Cumberland Plain Woodland in the Stage 1 Construction Impact Zone (6 out of 10)

- ii) two greater than the 'Start quality' score that is defined in the Initial Ecological Survey for the area of poorer quality Cumberland Plain Woodland in the Offset Area
- d. Site value scores with active restoration and management at least equal to the scores defined in the Initial Ecological Survey to confirm the quantum of offset for plants, animals and their habitat as calculated with the BBAM.
- e. Averted risk, management of threats and site context score improvements in areas that do not comprise habitat but that would contribute to achieving the core offset objectives a-d listed above.

The baseline site quality scores for affected threatened biota and start and future site value scores for plants, animals and their habitat are defined in the Initial Ecological Survey report. (GHD in prep a). The biodiversity credit value of the species and habitats at the Orchard Hills Offset Area has been confirmed using the BBAM as the preferred means of quantifying offset contributions. This approach allows direct comparison with the NSW FBA methodology credit calculations included in the BODP. The Orchard Hills Offset Area Initial Ecological Survey report, including the assessment of the quantum of direct offset delivered by the Orchard Hills Offset Area, will be independently verified.

The Offset Area and any other agreed areas will be actively managed as an offset for WSI for the period required to achieve the Offset Objectives outlined above, which is expected to be up to 20 years from the date that delivery of the offset commenced in September 2018. Defence would implement the plan, including completion of all monitoring, reporting and auditing requirements. Once the quality improvements have been achieved, Defence would continue to manage the Offset Area so as to maintain the long-term benefits of the quality improvements.

2.1.2 Summary of 2019 implementation activities

The BODP activities that were implemented for the Orchard Hills Offset Area during the 2019 period include:

- Establishment of an Offset Area at Defence Establishment Orchard Hills that is at least 900 hectares in area through the execution of the MOU between Defence and Infrastructure.
- Participation in the Orchard Hills Biodiversity Working Group and consultation with Defence on the implementation of the Offset Plan.
- Initial site inspection by the independent verifier and confirmation of the approach to the survey and audit criteria.
- Completion of the Initial Ecological Survey by GHD ecologists, including:
 - Desktop assessment of databases, management plans, ecological assessments and research papers relating to the biodiversity values at the site
 - Ecosystem credit and species credit surveys, including habitat assessments, vegetation zone mapping, BBAM and BAM plot/transects, diurnal fauna surveys, Anabat recording, call playback and spotlighting
 - Systematic traverses for threatened flora
 - Management unit definition and mapping
 - Landscape assessment and GIS analysis according to the BBAM.
 - Compilation of baseline EPBC Act site quality and offset calculation data, including sampling of rapid EPBC Act site quality plots and synthesis of the other biodiversity survey data

- Drafting of the Initial Ecological Survey report, including initial EPBC Act offset assessment guide calculations and BBAM credit calculations.
- Arrangements for the review and independent verification of the Offset Plan, prepared by Defence.

Additional detail regarding the activities that were implemented for the Orchard Hills Offset Area are presented in the Initial Ecological Survey report (GHD in prep a) and the Offset Plan (GHD in prep b).

Biodiversity Working Group

On 21 September 2018, representatives from the Department of Defence (Defence) and Infrastructure signed the Orchard Hills Memorandum of Understanding (MOU) and a Biodiversity Working Group was formed. The Biodiversity Working Group's role includes reviewing the progress of the site and associated documentation, specifically the Offset Plan. The MOU contains the following clauses in relation to the Working Group:

- Defence and Infrastructure will form a Working Group that will meet at least quarterly or more frequently as required until the Offset Plan is in place and will continue to meet at least annually after the Offset Plan is in place to review annual reporting on progress against the Offset Plan.
- Defence and Infrastructure will invite Environment to participate in such meetings as part of consultation for the Offset Plan if Environment wishes to do so.
- Defence and Infrastructure will work together to identify complementary outcomes that can be achieved through development and implementation of the Offset Plan including Indigenous and local employment and potential collaboration with other complementary measures being pursued through the BODP.

The working group met on a number of occasions during the reporting period and a summary of those meetings are below.

Meeting 1 (11 February 2019)

Representatives from Defence and Infrastructure attended this meeting. This initial meeting involved a discussion of expectations for both the working group meetings and the progress of work at Orchard Hills. Specifically, Defence representatives advised of the proposed works that needed to be undertaken at Orchard Hills in the short-term in order to allow the best possible offset outcomes to proceed. These works included weed management and procurement of a number of contractors involved in preparatory works on the site. The Initial Ecological Survey scope was also discussed and both parties sought clarity on the scope.

Meeting 2 (21 May 2019)

Representatives from Defence and Infrastructure attended this meeting and discussion points included:

- Developing the Terms of Reference (TOR) for the Working Group.
- Drafting the table of contents for the Offset Plan.
- Financial administrative matters.
- Complementary outcomes potential at Orchard Hills (in relation to other flora requiring offsetting by Infrastructure) and various community organisations working on some of the biodiversity rehabilitation activities at Orchard Hills.
- Broader benefits for the community.

Meeting 3 (26 July 2019)

Representatives from Defence and Infrastructure attended this meeting and the main discussion points included:

- Update on biodiversity offsets acquired to date, including maps of successful biobank properties.
- Agreed to the Terms of Reference for the Biodiversity Working Group.
- Update on Australian Botanic Gardens Mt Annan genetic diversity flora research and *Pimelea spicata* propagation.
- Progressing the draft table of contents for the Offset Plan.
- Complementary outcomes potential (Indigenous participation in ecological restoration).
- Discussions about encouraging Indigenous participation.
- Consideration of risk management and scheduling.

This meeting included a site visit to the Defence Establishment Orchard Hills offset site. The tour and of the site included inspection and discussion of Cumberland Plain Woodland, River Flat Eucalypt Forest, Shale-gravel Transition Forest, habitat condition, streamlines, feral animal management, unexploded ordinance management, bushfire and drought management.

Meeting 4 (25 September 2019)

Representatives from Defence and Infrastructure attended this meeting and the main discussion points included:

- Process map of BODP and the NSW Strategic Impact Assessment.
- Timelines for delivery of major Orchard Hills reports, announceables and activities.
- Agreement to the Statement of Requirement at Orchard Hills.
- Details of the Statement of Requirements for procuring lead contractor for biodiversity restoration.
- Agreement to prepare a joint brief to include biodiversity improvements, opportunities, jobs, Indigenous participation, local impacts and other relevant Cities Deals linkages.
- Discussion on the potential to translocate *Pimelea spicata* plants collected from the WSI site (see section 2.3) to Orchard Hills.
- Update on the status of the quantum of biodiversity offsets acquired to date.
- Discussion about consultation with Environment and their satisfaction with the biodiversity offsetting to date.

This meeting included a site visit to the Western Sydney International (Nancy-Bird Walton) Airport. The tour and discussion of the airport included Construction Impact Zone, the Environmental Conservation Zone, streamlines, surface water management, environmental management and areas of cultural significance and artefacts.

2.2 Purchase of biodiversity credits

2.2.1 Overview of proposal

The NSW Biodiversity Offset Scheme (BOS) – and Biodiversity Assessment Methodology (BAM), formerly known as BioBanking, provides a mechanism for biodiversity offset sites to be securely titled under a legally binding conservation covenant known as a Biodiversity Stewardship Agreement (BSA), formerly known as a BioBanking agreement. This system expresses the conservation gain delivered through conservation and management of the offset site in terms of biodiversity credits and provides rules for the like-for-like trading of credits to offset the impacts of a development. A developer can purchase and retire biodiversity credits from a BSA site to secure an offset.

A BSA is the strongest conservation covenant available on private land in NSW and, along with the BAM, provides for sound calculation of offset contributions, a management plan, secure and performance-based funding, monitoring and oversight by the NSW Biodiversity Conservation Trust (BCT, formerly Nature Conservation Trust). This combination of attributes makes the BOS an effective means of delivering direct offsets and the purchase of appropriate biodiversity credits through the scheme will make a substantial contribution to the implementation of the BODP. Members of the Biodiversity Experts Group were generally supportive of this approach.

The biodiversity credits that are purchased and retired will provide direct offsets for impacts on plants, animals and their habitat. Direct offsets for the affected EPBC Act-listed biota have been calculated using the offsets assessment guide in accordance with the EPBC Act Offsets Policy based on the area of habitat for the affected threatened biota at offset sites. The area of habitat associated with the biodiversity credits purchased by Infrastructure was calculated based on the rate of generation of credits per hectare in the appropriate vegetation zone(s) (ie the offset area). Offset areas were then surveyed to confirm the extent and quality of habitat for the affected threatened biota as described below.

The EPBC Act Offsets Policy and the FBA and BAM include different rules that govern the biodiversity offsets that can be delivered for a development's impacts. The EPBC Act Offsets Policy requires like-for-like biodiversity offsets and that the offset site must be able to reach the same site quality score as the development site. Therefore, only habitat that has similar ecological attributes and that has an equal or greater site quality score than the habitat at the airport site (or which could be improved to that score through management) has been presented as offsets for the affected threatened biota.

The FBA methodology includes greater flexibility with respect to some criteria. This flexibility allows trading of ecosystem credits for closely related vegetation types if they are in the same vegetation class and are at least as extensively cleared (ie have the same or greater conservation significance). The FBA also allows trading of ecosystem credits associated with poorer condition vegetation at an offset site, including vegetation that could not meet the standard of EPBC Act Cumberland Plain Woodland. Credits associated with vegetation that could not meet the standard of EPBC Act Cumberland Plain Woodland will only be presented as an offset for similar poorer condition vegetation at the WSI site.

Infrastructure purchased credits in the first tranche secured in March and July 2019 from approved BSA sites.

2.2.2 Summary of 2019 implementation activities

Identification of offsets

A broad desktop assessment and consultation program was performed throughout the preparation of the BODP to identify potential direct offsets for WSI. This desktop assessment process will continue through the implementation phase of the BODP up until the full quantum of biodiversity offsets are implemented in accordance with the plan.

The inputs to the desktop assessment include:

- The 'Biodiversity credits register' (OEH 2019a), which identifies existing BSA sites with biodiversity credits that could offset impacts on the affected threatened biota and that are available for sale.
- The 'Expression of interest register' (OEH 2019b), which identifies potential offset sites that could generate suitable biodiversity credits in the future.
- Available biodiversity assessment reports for existing and potential offset sites, which describe the biodiversity values of the sites and confirm the extent and quality of habitat for the affected threatened biota.
- Consultation with private landowners, ecological consultants, the Biodiversity Conservation Trust (BCT) and other stakeholders to identify or to describe potential offset sites.

While retaining a focus on value for money for any credits purchased, the following biodiversity criteria were used to confirm direct offset sites:

- Presence of Cumberland Plain Woodland, linked to the credit types HN528, HN529 and HN512:
 - that meets the condition criteria required to comprise the community as defined under the EPBC Act and associated policy (DEWHA 2010), or
 - is poorer quality Cumberland Plain Woodland that could be managed to achieve that condition and is connected to EPBC Act Cumberland Plain Woodland.
- Presence of occupied *Pimelea spicata* habitat or habitat for other species-credit species.
- Presence of habitat for the Grey-headed Flying-fox and Swift Parrot, based on the presence of known food tree species and critical habitat criteria listed in recovery plans for the species.
- Presence of other biodiversity values appropriate to offset the airport's impacts on plants, animals and their habitats (for example *Myotis macropus* habitat or freshwater wetlands (HN630)).
- Land that is relatively close to the airport site, in order to more directly benefit the populations and communities affected by the airport, and which as a minimum is located in the Cumberland Interim Biogeographic Regionalisation for Australia (IBRA) sub-region).
- Land that is within the Cumberland Conservation Corridor or other identified priority conservation lands or wildlife corridors or that could connect fragmented patches of habitat.
- Land that is already set aside as a BSA site and that has suitable biodiversity credits for sale; that is likely to be set aside as a BSA site or otherwise protected under a conservation covenant; or that may be available for sale and would be suitable for the purposes of establishing a new offset site.

GHD have maintained a 'register of offsets' throughout the implementation phase of the BODP including location, ownership, biodiversity values and available credits data for candidate offset sites.

Purchase of credits

As foreshadowed in section 6.2.1 of the BODP, Infrastructure purchased a tranche of biodiversity credits in 2019 as a way of securing a large proportion of its offset obligation. The method of purchase utilised by Infrastructure was via a tender process rather than direct approaches to landholders. The aim of this approach was to gain access to a wider market through the NSW Biodiversity Offsets Scheme (BOS) and provide the Commonwealth with value for money propositions.

Infrastructure initiated this procurement in September 2018 through the release of an Expression of Interest (EOI) advertisement seeking biodiversity credits. The advertisement was published on Infrastructure's website and in nine local and national newspapers across three weeks in September and October 2018. Infrastructure requested submissions from vendors for the following biodiversity credits.

- Up to 3600 credits of HN528 and HN529
- Up to 1300 credits of HN526
- Up to 700 credits of HN630 and HN520
- *Marsdenia viridiflora* subspecies *viridiflora* credits
- Southern Myotis (*Myotis macropus*) credits
- Spiked Rice-flower (*Pimelea spicata*) credits

A limited request for tender was then released following the EOI. From this limited tender, 21 individual offers were received from 13 Vendors, with some Vendors offering credits from multiple biobanks. Of the offers received, 14 were for HN528/HN529 credits, 5 for HN526 credits and 1 for HN520/HN630. No submissions were received for any of the species credits (*Marsdenia viridiflora* subsp. *viridiflora*, *Pimelea spicata* or *Myotis macropus*).

Successful vendors needed to satisfy both the price and location requirements. That is, the offers needed to be under the agreed capped price and the credits offered be derived from land within the Cumberland Conservation Corridor, other Cumberland Plain Priority Conservation Lands (as mapped by NSW Government) or which Infrastructure considers could connect fragmented patches of habitat). In addition they must meet the Value for Money criteria. Other considerations included:

- Infrastructure's 'targets' for number of credits to be purchased (as noted above), which took account of the offset obligations under the Biodiversity Offset Delivery Plan (BODP) which reflect requirements to offset for Commonwealth-listed biota (under the *Environment Protection and Biodiversity Conservation Act 1999*) and NSW-listed biota (under the *Biodiversity Conservation Act 2017* (BC Act) and other sources of offsets such as the Orchard Hills offset site.
- the consideration of package offers, whereby Infrastructure was offered the opportunity to purchase the credits at a substantially lower 'per credit' price subject to all credits being purchased in a single transaction.

The outcome of the tender process was that Infrastructure purchased 3,806 BioBanking Assessment Methodology (BBAM) credits of HN528 and HN529 and 254 BBAM credits of HN526. The total cost was \$69.273 m (GST inc) across two purchase dates: one in March 2019 and one in July 2019.

Infrastructure has had the BBAM credits transferred from vendors to Infrastructure but has not yet retired the credits that is, the credits can still be transferred to another party by Infrastructure. The appropriate number of credits will be retired when Infrastructure has secured a number of other biodiversity offsets and has greater clarity regarding the precise quantum of offsets.

Once credits were secured through an agreement between Infrastructure and vendors, biodiversity surveys and assessments were conducted to confirm the quantum of biodiversity offset associated with these credits noting the requirements of the BODP and EPBC Act offsets policy.

The direct offset sites associated with the tranche of biodiversity credits purchased in the 2018/2019 financial year are shown on Figure 2. A detailed description of each offset site is presented in Appendix A.

Assessment of offset sites

Each of the BSA sites associated with the tranche of biodiversity credits purchased in the 2018/2019 financial year were biobank sites assessed under the former BioBanking assessment methodology 2014 (BBAM). BioBanking assessment reports were reviewed and associated data was compiled to support the description of the existing environment of offset sites and biodiversity offset calculations. GIS shape files were obtained from the landowners or accredited assessors for the sites and used to produce the 'EPBC Act offset area', 'Vegetation zones' and 'Threatened biota and habitat' figures for each site included in Appendix A.

Supplementary 'EPBC Act surveys' were conducted to collect data that is not part of the BAM or BBAM with a particular focus on verifying the extent and quality of habitat for the affected threatened biota, likely change in site quality with and without management and averted risk of loss. EPBC Act data was collected in accordance with the Offsets assessment guide site quality score values tables 2.1 to 2.4 in the approved BODP and included sampling of 'Rapid site quality assessment plots' and recording of:

- Fine scale, 'patch by patch' data related to the key diagnostic characteristics and condition thresholds for EPBC Act Cumberland Plain Woodland in order to map the extent and condition of EPBC Act quality and poorer quality forms of the community.
- Cover, abundance and health of food trees for the Grey-headed Flying-fox and Swift Parrot.
- Presence and quality of occupied *Pimelea spicata* habitat (if present).
- Sampling of rapid EPBC Act offset assessment guide site quality plots, including:
 - Type and cover of native over storey species
 - Cover and health of dominant native mid storey species
 - Cover and health of dominant native groundcover species
 - Cover and health of dominant exotic species
 - General field observations of the patch
- Opportunistic fauna observations.
- Targeted fauna surveys as permitted by timing and available access during field surveys, including spotlighting, with a particular focus on the presence and any foraging behaviour of Grey-headed Flying-foxes.

Targeted field surveys of offset sites were conducted by teams of two ecologists between October 2019 and January 2020 as summarised in Table 6.

Table 6 Survey effort at tranche 1 credits offset sites

Site	Survey dates	Survey effort
Lot 502 Roscrea Drive biobank	Site access not obtained.	
Montpelier biobanks	10 January 2020	9 Rapid site quality plots
Sunnyside biobank	4 October 2019	11 Rapid site quality plots
Williamstown biobank	3 October 2019	11 Rapid site quality plots Spotlighting
Cawdor Heights biobank	9 January 2020	4 Rapid site quality plots
Hardwicke Stage 2 biobank	15-16 January 2020	16 Rapid site quality plots
Flaggy Creek Farm	15 January 2020	6 Rapid site quality plots
Hampden Vale biobank	9 January 2020	13 Rapid site quality plots

The extent and quality of habitat for the affected threatened biota was assessed and mapped with reference to the desktop assessment and site survey data using the standardised approach to scoring described in section 1.6.1. Field survey results, including EPBC Act site quality plot data sheets and photos are included in Appendix A.

Access to the Lot 502 Roscrea Drive biobank could not be obtained and so EPBC Act site quality scores were derived from a desktop assessment of biodiversity values. This has not limited the accuracy of the assessment for this offset site noting that it contains only a single vegetation zone, the availability of approved BioBanking assessment data and that field surveys and technical review of the original BioBanking assessment were conducted by members of the GHD team for this BODP implementation report and as such that they are familiar with the site (GHD 2017b).

2.3 Threatened flora propagation program

2.3.1 Overview of proposal

As part of the work required to meet the Airport Plan biodiversity conditions, the Australian Botanic Gardens, Mount Annan (ABGMA) and Royal Botanic Gardens and Domain Trust (RBGDT) have been engaged by GHD as a sub-consultant to deliver a Threatened Flora Propagation Program (TFPP).

Located in Western Sydney, ABGMA is the native plant garden of the Royal Botanic Garden, Sydney, and specialises in the conservation and seed storage of NSW threatened species. The RBGDT Evolutionary Ecology section is responsible for genomic studies across native species and application of genomic technology to ecosystems, including threatened species. They are currently expanding a new flagship project, Restore & Renew, and using technical and analytical approaches developed to support the management and conservation of threatened species.

Condition 33 of the Airport Plan requires the delivery of a TFPP, developed in consultation with Environment, OEHL (now the BCD), and ABGMA. The offset package, as presented in the finalised 2016 airport EIS, had previously recommended that the BODP include consideration of the salvage and propagation of the known local populations of *Pultenaea parviflora* and *Marsdenia viridiflora* subsp. *viridiflora* and any other threatened plants detected at the airport site (GHD 2016b). Consultation with Environment during the preparation of the offset package for the 2016 airport EIS confirmed that the TFPP may be considered as a proportion of the other compensatory measures component of the BODP. To qualify for this approach, the program must be undertaken as part of a sound scientific framework, with adequate monitoring and reporting that genuinely increases the knowledge and understanding of the species (DSEWPac 2012).

The TFPP meets the requirements for other compensatory measures presented in Appendix A of the EPBC Act Offsets Policy with respect to *Pimelea spicata* because it:

- Will improve the viability of *Pimelea spicata*, by:
 - improving the effectiveness and knowledge of propagation techniques for the species; and
 - maintaining an *ex situ* population of the species and providing cuttings and seed to help establish or expand populations of the species across Western Sydney.
- Is transparent (through monitoring and reporting requirements included in the contract between ABGMA and GHD and reporting in the Department's BODP reports), scientifically robust (through best-practice collection, production and genetic analysis techniques) and timely (in that stage 1 of the TFPP commenced in mid-2017, over one year prior to the expected commencement of main construction works for the airport).
- Is being undertaken by a suitably qualified organisation, in ABGMA and RBGDT.
- Targets actions identified in the *Pimelea spicata* R. Br. Recovery Plan (DEC 2005b). Specifically the genetic research will help address limits to current knowledge and research questions identified in the recovery plan that will assist in the effective conservation of *Pimelea spicata* (DEC 2005b).

The approved BODP presents the TFPP as a compensatory measure for the affected threatened species *Pimelea spicata* based on the above criteria and by extension for populations of *Marsdenia viridiflora* subsp. *viridiflora* and *Pultenaea parviflora* on Commonwealth Land.

The Stage 1 TFPP included collection of threatened plant material from the WSI site and seed germination and cutting trials with the aim of producing up to 500 plants of *Pultenaea parviflora*, 500 plants of *Marsdenia viridiflora* subsp. *viridiflora* and 1000 plants of *Pimelea spicata* in 50 mm forestry tube size pots. The TFPP included testing of a number of seed and cutting treatments to help identify the optimal approach to propagation of the species. The program would also directly contribute to translocation and ecosystem restoration activities by providing source populations of these threatened plants.

At the conclusion of the Stage 1 TFPP the plants were transferred to ABGMA as custodians to determine the most effective use of the plants in the implementation of the BODP and broader conservation activities. The majority of the plants are likely to be used to support a threatened flora translocation plan for WSI. A subset of the tube stock plants could be used to establish a longer term potted *ex situ* collection at the Mount Annan nursery as described below.

In addition to the requirements of Condition 33 of the Airport Plan, Infrastructure funded the delivery of a broader *Pimelea spicata* research and conservation works program as a compensatory measure for the airport as an extension of the TFPP. The RBGDT Evolutionary Ecology section delivered a regional-scale genetic research project to help understand the ecology of *Pimelea spicata* and assist with its conservation. The objectives of the project were to assess genetic diversity and genetic structure across the remaining distribution of *Pimelea spicata*, and investigate possible association between genetic and geographic / environmental diversity.

Infrastructure have also arranged for ABGMA to expand the TFPP to help establish a longer term potted *ex situ* *Pimelea spicata* collection at the Mount Annan nursery (the Stage 2 TFPP). This potted collection would provide a source of cutting material to support any future translocation or amenity planting of the *Pimelea spicata* population from the WSI site once the plants are removed. The Stage 2 TFPP will draw upon the results of the genetic study and experience in propagation techniques gained throughout the Stage 1 TFPP. The proposal is for a potted collection of around 100 plants, comprising 30 genetic individuals, informed by the results of the genetic study and selected to minimise kinship and maximise genetic diversity.

2.3.2 Summary of 2019 implementation activities

Stage 1 TFPP

In accordance with Condition 33 of the Airport Plan, ABGMA has been contracted, through Infrastructure's consultant GHD, to undertake a TFPP, collecting seeds and completing propagation trials of threatened flora species at the airport site. Under this arrangement, the ABGMA prepared a Threatened Flora Propagation Plan, outlining objectives, timeframes and outputs. The TFPP was delivered between April 2017 and July 2019 and the TFPP delivery report finalised in December 2019.

The executive summary of the Western Sydney International Airport Threatened Flora Propagation Program Delivery Report (ABGMA 2019) is as follows:

"The TFPP has been delivered by the ABGMA with the support of GHD ecologists between April 2017 and July 2019. The key objective of the TFPP was to develop the most effective approaches to the propagation and translocation of threatened native plant populations affected by the development of WSI, and to support the conservation of these species.

The program focused on the threatened plant species *Pultenaea parviflora*, *Marsdenia viridiflora* subsp. *viridiflora* and *Pimelea spicata* which are not commonly cultivated and have contrasting growth habits, ecological requirements and seed biology. Resulting from this program of seed/cutting collections, nursery propagation and ecological observations at the WSI site the key results of the TFPP are:

- *Pultenaea parviflora* is a straightforward plant to propagate from seed and grow under nursery conditions. Cuttings had a low success rate and produced plants with low vigour. Seed can be collected easily using mesh bags, and the hard coated seed has a very long storage life under good storage conditions.
- *Marsdenia viridiflora* subsp. *viridiflora* produces small amounts of fruit/seed, making good quantity seed collections difficult. Germination and storage of seed is straightforward. Cuttings is the preferred method to produce plants, although they are slow to establish.
- *Pimelea spicata* is a difficult species to propagate and to collect seed from in quantity, particularly during drought conditions. Seed germination rates are low due to physiological dormancy, although treatment with Gibberellic acid and smoke water improved germination. Cuttings are slow to establish, and even with well struck cuttings losses at the potting stage can be significant.

At the conclusion of Stage 1 of the TFPP, the following plant materials were held at the ABGMA, and provide a valuable resource for future conservation work at the WSI site:

- *Pimelea spicata* (190 plants in the nursery, 6,100 seeds held in PlantBank).
- *Marsdenia viridiflora* subsp. *viridiflora* (560 plants, 108 seeds).
- *Pultenaea parviflora* (500 plants, 50 seeds).

The combination of seed collections, germination/propagation experiments, nursery stock and documented propagation techniques generated by the TFPP are a significant advance on the existing propagation and conservation knowledge of these poorly known threatened species. As such, the TFPP comprises an 'other compensatory measure' component implemented through the BODP and will help offset impacts to these threatened flora species" (ABGMA 2019).

Genetic research

The *Pimelea spicata* genetic research program was delivered by RBGDT between April 2019 and September 2019. A program delivery report was provided to Infrastructure in October 2019 presenting the scope and methodology for the genetic study, results and key research findings.

The outcomes of the *Conservation genomics of Pimelea spicata* (Spiked Rice-flower) *in support of management and translocation activities* delivery report (RBGDT 2019) is summarised below.

The genetic diversity of populations across the known distribution of *Pimelea spicata* was measured using high quality genome scans. Surprisingly, the most northern and the most southern sites of *Pimelea spicata* are genetically most similar, and are differentiated from the rest of *Pimelea spicata* populations that exist on the Cumberland Plain. There is little between-population genetic connectivity and as a result, individuals within populations tend to be similar to each other but different from those at other sites (RBGDT 2019).

The WSI site is the largest population and displays the highest genetic diversity of *Pimelea spicata* among all tested sites. Two genetically distinguishable groups are present within the WSI site at separate locations. The existing *ex situ* WSI collection at ABGMA partially represents the diversity of one of these two groups (RBGDT 2019).

Genomic data was used to identify the propagules required to assemble a nursery population to be used in future translocation work. Assuring maximum levels of genetic diversity in a translocated population increases fitness by reducing the risk of inbreeding and increasing the adaptive potential to environmental change and other pressures. RBGDT estimated the necessary combinations of propagules to ensure the establishment of suitably evolutionary resilient translocated populations of various sizes (RBGDT 2019).

RBGDT's Environmental Niche Models suggest *Pimelea spicata* has very little environmental suitability beyond its currently known distribution, and under future climatic projections suitable environments might be further constrained to the southern Cumberland Plain (RBGDT 2019).

The research would be presented for publishing on Infrastructure's website, in a peer-reviewed conservation based scientific journal, and through sharing of information with the NSW Saving Our Species program with the publication approach to be confirmed with RBGDT and Infrastructure. The research outcomes would also directly contribute to the sampling strategy for the Stage 2 TFPP as described below.

Stage 2 TFPP

Establishment and maintenance of an *ex situ* potted *Pimelea spicata* population commenced in the 2018/19 Financial Year along with the delivery of the genetic research program but is subject to the suitability of seasonal conditions for cutting collection.

ABGMA botanists coordinated with RBGDT researchers in April 2020 to identify, sample and tag *Pimelea spicata* at the WSI site and the existing *ex situ* potted WSI collection at Mount Annan. Genomic data drawn from the RBGDT research was used to identify the number of propagules and the genotypes that would be targeted to assemble a nursery population based on maximising genetic diversity and fitness.

Severe summer 2019-2020 drought conditions across western Sydney continue to be a major impediment to the harvest of suitable cutting propagation material for the project. As a drought response, the WSI *Pimelea spicata* population has limited above ground vegetative material and individual plants are reduced to the underground lignotuber.

The ABGMA nursery conducted a site inspection on 8 November 2019 to locate and tag target genotypes as determined by genetic study. Only small amounts of above ground foliage were observed and plant material was water stressed and unsuitable for cutting propagation. Propagation of target genotypes has been postponed until a substantial rain event has occurred and plants resprout.

Once the *ex situ* population has been collected and established, funding would be provided to maintain the collection for a period of five years.

2.4 Greening Australia seed collection and production program

2.4.1 Overview of proposal

In accordance with Condition 32 of the Airport Plan, Infrastructure has entered into an agreement with Greening Australia to contribute funds to the organisation's Cumberland Seed Hub program in Western Sydney. The objective of the program is to deliver a reliable source of native seed for ecological restoration work, with the primary focus on species associated with Cumberland Plain Woodland. Native seed collection includes harvest from Cumberland Plain Woodland and other native plant communities at the WSI site.

The Cumberland Seed Hub project is based around the Richmond High Diversity Production Area and Processing Facility supported by wild collection and other production areas throughout Western Sydney. The hub utilises traditional agricultural techniques to maximise seed yields from around 120 native plant species and is the only high-diversity native seed production facility in the region (Greening Australia 2016). The Cumberland Seed Hub facilitated by the agreement with Infrastructure will enhance conservation actions at offset sites and restoration programs that would directly benefit the species and plant communities affected by the airport. The seed supply program was presented in the BODP as a compensatory measure that contributes to the offset requirement for Cumberland Plain Woodland, *Pimelea spicata* and for plants, animals and their habitats by facilitating ecological restoration of these species and their habitats at offset sites and other lands across Western Sydney.

The agreement with Infrastructure will help Greening Australia increase the output of their seed production areas and the volume of wild collection to facilitate restoration of up to 100 hectares a year by the end of the five-year agreement period. The Cumberland Seed Hub will continue to operate and to help maintain Cumberland Plain Woodland through the provision of native species-rich seed for many years after the conclusion of the agreement with Infrastructure. The hub infrastructure and stock plants will be maintained by Greening Australia using alternative funding sources on an ongoing basis.

The Richmond High Diversity Production Area and Processing Facility includes a population of *Pimelea spicata* that has been used to harvest cuttings for use in restoration projects. The *Pimelea spicata* production population consists of approximately 50 plants collected from two wild populations at Prospect Reservoir and Narellan. To date, these cuttings have been successfully used to enhance a Greening Australia complex grassy woodland restoration site at Parrot Farm, Narellan. The number and diversity of source populations of *Pimelea spicata* production plants will increase through the implementation of the program, including source plants from the WSI site produced by the TFPP and held by ABGMA (see section 2.3). The Cumberland Seed Hub will continue to operate and to help maintain the viability of *Pimelea spicata* through provision of plants for revegetation projects for many years after the conclusion of the agreement with Infrastructure.

2.4.2 Summary of 2019 implementation activities

With regard to the Greening Australia seed collection and production program, Infrastructure has entered into a contract with Greening Australia for these services, as required under Condition 32(1) of the Airport Plan. The contract details a scheme of annual reports, project plan updates and contractual milestones over the five years of the agreement. A first annual report was provided in October 2017, and an update to the Project Plan was provided in April 2018. The final report will be provided by August 2021.

As per condition 32 of the Airport Plan Infrastructure entered into an agreement with Greening Australia in 2017 to contribute funds to the organisation's Native Seed Production Area (SPA) program in Western Sydney. The program focussed on the collection and production of native seed from threatened vegetation communities found on the Cumberland Plain, including native plant communities found at the airport site.

A key focus of the SPA program was to relocate facilities from the existing 4.5 hectare seed production paddock to a leased 15 hectare site nearby on the Western Sydney University campus. For the 12 months from August 2018 to August 2019 a number of key milestones centered on this relocation were completed, namely:

- Development application approved
- Final lease executed with Western Sydney University
- Site fencing complete
- Major zone 1 site preparations and drainage complete

In addition, a number of other activities were completed at the SPA, including:

- Upgrading of 15 new wildflower cells, including the development of raised trough planters for threatened and difficult species under cultivation, notably including *Pimelea spicata*.
- Installation of over 120,000 grass seedlings (comprising 5 species) to double the productive grass footprint of the existing production facility.
- Installation of further sub dominant grasses into another 0.3ha, significantly increasing the size of the production area for these species.
- A further 30,000 grasslands plants have been propagated and delivered for installation into the new paddock facilities during 2019/20.
- Ongoing maintenance of the existing 4.5-hectare restoration paddock, cropping zones and herb and forbs production areas.
- Development and implementation of field trials for improved weed control techniques, soil and water profile applications and further innovation around alternate restoration techniques.
- Continuation and expansion of wild seed harvest program.



Photo: Existing 4.5 hectare seed production area July 2019

2.5 Research, restoration and rewilding programs

2.5.1 Overview of proposal

Infrastructure may also deliver biodiversity offsets for the airport through other forms of direct offsets that deliver a clear conservation outcome but are not linked to a parcel of land that could be secured under an appropriate conservation covenant. Consultation with the Experts Group and other investigations conducted in the preparation of the BODP have identified a number of such options that could deliver direct offsets collectively referred to as research, restoration and rewilding programs.

Research that contributes to the knowledge and conservation of the affected threatened biota could be presented as an ‘other compensatory measure’ in accordance with Appendix A of the EPBC Act Offsets Policy. To qualify for this approach, a research program must be undertaken as part of a sound scientific framework, with adequate monitoring and reporting that genuinely increases the knowledge and understanding of the species (DSEWPaC 2012).

The EPBC Act Offsets Policy acknowledges that, in some situations, there may be difficulties in permanently securing a site for conservation purposes due to the existing tenure of the land, but that there is still the potential to treat such proposals as direct offsets. The Offsets Policy states that such situations will be considered by Environment on a case-by-case basis and, where the security of an offset is diminished, the risk to any protected matters, and subsequently the magnitude of offsets required, will increase (DSEWPaC 2012). Restoration and rewilding programs of this kind could deliver a substantial ‘management gain’ but a reduced ‘averted risk of loss’.

Research, restoration and rewilding programs would be selected, defined and funded during the longer term implementation of the BODP. Programs would be selected based on consideration of Infrastructure's criteria for evaluation of potential biodiversity offsets as well as the criteria in the EPBC Act Offsets Policy. These would include a focus on restoring species, communities and their habitats that are equivalent to the affected protected matters relevant to the airport development. At this stage of the implementation of the BODP, it is anticipated that research, restoration or rewilding projects could deliver up to 10 per cent of the total quantum of offset required for WSI. An appropriate portion of the funds likely to be available to secure offsets has been linked to this approach. This is likely to include up to 10 per cent of the offset requirement for impacts on plants, animals and their habitats. A contribution toward the offset requirement for impacts on *Pimelea spicata* or for other species credits within the offset requirement for plants, animals and their habitats may also be achieved, depending on the programs that are implemented.

2.5.2 Summary of 2019 implementation activities

As identified in consultation with the Biodiversity Experts Group (BEG) and other investigations conducted in the preparation of the BODP Infrastructure is considering a range of options including implementing restoration and rewilding programs. Programs would be selected based on consideration of Infrastructure's criteria for evaluation of potential biodiversity offsets as well as the criteria in the EPBC Act Offsets Policy. Feedback and advice will be sought on the criteria. These would include a focus on restoring species habitat including flora and fauna communities, populations and habitat condition. Other projects may include engineering solutions for establishing wetlands, fencing and the removal of pests (eg feral species and invasive plants). These improvements will be equivalent to the affected protected matters relevant to the airport development.

Infrastructure may fund one or more restoration and rewilding programs in 2020 through an agreed arrangement or procurement. Programs would include allowance for ongoing management and monitoring for the life of the offset period. They would also be located on a site that would not be at substantial risk of future development (through consultation with NSW planning agencies) if a conservation covenant was not secured. In addition, through consultation with the BEG, Infrastructure identified the following characteristics as relevant to any restoration and rewilding proposals:

- Sites chosen will have relevant ecological communities and species to meet offsetting requirements.
- Land tenure of sites will be closely considered to ensure long-term viability of restoration and revegetation.
- Sites of work will be strategically chosen to improve connectivity and conservation corridors.
- Long-term management objectives and funding sources must be built into any programs, along with ongoing monitoring and evaluation.
- Restoration and rewilding must be additional to the status quo.
- Preference for programs that take a strategic partnership or consortium approach to achieving the best restoration outcomes for the Cumberland plain.
- Preference for programs that link with other measures such as aboriginal land management, research and other on-ground conservation work.

To inform the approach to market Niche Environment and Heritage were engaged by the Department in early 2019 to produce a restoration and rewilding options analysis. The options analysis provides the Infrastructure with information on cost, duration and offset outcomes from similar programs conducted previously. The next stage of the process involves scoping the program and appropriate documentation.

The following options for restoration or rewilding programs have been identified and assessed as potentially suitable as offsets for the airport to date:

- Planting or restoration of vegetation in areas of previously cleared or degraded land rather than the conservation of intact ecological communities. Such an option recognises that because it is not economically possible to retain all of the remnant ecological communities of the Cumberland Plain in conservation reserves, the long-term viability of these remnants is dependent on the restoration of some areas of currently cleared land and the provision of linkages that enable the remnants to be managed as a bushland network across the landscape (DEC 2005b).
- Rewilding of patches of remnant vegetation on the Cumberland Plain. The objective of rewilding is to restore as far as possible a fully functional ecosystem of the Cumberland Plain through the permanent eradication of feral species and the reintroduction of native fauna species. Reintroduced species would include fauna that are locally or regionally extinct and that perform ecosystem services such as bioturbation of soils, inoculation of soils with mycorrhizae, fertilisation of plants or transmission of seeds. A rewilding project would involve construction and maintenance of a feral-predator-proof fence around the perimeter of a site, intensive management of pest fauna within the site and translocation of selected native fauna species.
- Regional-scale management programs such as permanent eradication of target weeds, and coordinated cross-tenure control of feral animals.
- Cross-tenure measures to improve the effectiveness of vegetated corridors so wildlife can move freely and safely. This would involve permanent removal of key barriers to wildlife in existing corridors in easements or other open space that would be conserved but which based on their current tenure could not be set aside as BSA sites (or equivalent).
- Direct restoration of Cumberland Plain Woodland and other native vegetation at sites that will be conserved but which based on current tenure could not be set aside as BSA sites (or equivalent).

3. Direct Offsets Secured

3.1 Overview of direct offsets secured

The following direct offset sites were secured during the 2019 BODP implementation period:

- The Offset Area at Defence Establishment Orchard Hills, including at least 900 hectares of habitat secured through the MOU with Defence in September 2018.
- A 0.6 hectare EPBC Act offset area at the 'Lot 502 Roscrea Drive biobank' secured through the purchase of six biodiversity credits by Infrastructure in March 2019 from this established Biodiversity Stewardship Agreement (BSA) site (Agreement ID 256).
- A 37.3 hectare EPBC Act offset area at the 'Montpelier biobanks' (Agreement IDs 399, 358, 235 and 336) secured through the purchase of 528 biodiversity credits by Infrastructure in March 2019.
- A 26.9 hectare EPBC Act offset area at the 'Sunnyside biobank' (Agreement ID 321) secured through the purchase of 295 biodiversity credits by Infrastructure in March 2019.
- A 41.0 hectare EPBC Act offset area at the 'Williamstown biobank' offset site (Agreement ID 147) secured through the purchase of 411 biodiversity credits by Infrastructure in March 2019.
- A 22.8 hectare EPBC Act offset area at the 'Cawdor Heights biobank' (Agreement ID 284) secured through the purchase of 409 biodiversity credits by Infrastructure in March 2019.
- A 85.2 hectare EPBC Act offset area at the 'Hardwicke Stage 2 biobank' (Agreement ID 213) secured through the purchase of 1277 biodiversity credits by Infrastructure in March 2019.
- A 24 hectare EPBC Act offset area at the 'Flaggy Creek Farm Stage 2 biobank' (Agreement ID 354) secured through the purchase of 339 biodiversity credits by Infrastructure in July 2019.
- A 59.0 hectare EPBC Act offset area at the 'Hampden Vale biobank' (Agreement ID 250) secured through the purchase of 794 biodiversity credits by Infrastructure in July 2019.

The airport site, Orchard Hills Offset Area and the direct offset sites associated with biodiversity credits purchased in the 2019 BODP implementation period are shown on Figure 2.

3.2 Quantum of offset for affected threatened biota

The quantum of offset for the affected threatened biota has been calculated using the offsets assessment guide in accordance with the EPBC Act offsets policy as summarised in section 1.6.1. Preliminary EPBC Act offset calculations for the Orchard Hills Offset Area and confirmed calculations for offset sites secured through the purchase of biodiversity credits are included in Appendix A. The quantum of offset from Orchard Hills will be confirmed once the Initial Ecological Survey report has been independently verified. EPBC Act offset assessment guide spreadsheets for each of the other direct offset sites secured to date have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

The total quantum of offset for the affected threatened biota secured in the 2019 BODP implementation period is summarised in Table 7.

3.3 Quantum of offset for plants, animals and their habitat

Biodiversity credits were purchased in 2019 to secure direct offsets for WSI. A detailed description of the direct offset sites secured by the purchase of biodiversity credits including a description of the existing environment, 'EPBC Act offset area', 'Vegetation zones' and 'Threatened biota and habitat' figures for each site are included in Appendix A. Preliminary credit calculations for Orchard Hills and a detailed summary of biodiversity values linked to credits purchased from other sites are included in Appendix A.

Biodiversity credits generated from Orchard Hills will be confirmed once the Initial Ecological Survey report has been independently verified. The other direct offset sites are secured under BSAs, supported by approved BioBanking assessments and agreement applications. The quantum of offset for plants, animals and their habitats secured at these offset sites comprises a direct comparison between the credit requirement presented in the BODP and the matching credits purchased by Infrastructure.

The total quantum of offset for plants, animals and their habitat secured in the 2019 BODP implementation period is summarised in Table 8.

3.4 Contribution to regional conservation priorities

Condition 30.(7) of the Airport Plan states that the BODP should capitalise wherever possible on opportunities to improve connectivity or contribute to Commonwealth, state or local government initiatives to secure offsets with strategic value.

Land within the Orchard Hills Offset Area is recorded on the Commonwealth Heritage List as a Commonwealth Heritage Place for its natural heritage values. Implementation of the Offset Plan (GHD in prep b) over a period of 20 years will provide measurable ecological improvements to the quality of habitat for the affected threatened biota and plants, animals and their habitat at the Offset Area, consistent with the EPBC Act Offsets Policy and building on the Commonwealth Heritage Place listing.

The Orchard Hills Offset Area is located within the Cumberland Conservation Corridor, which is a community-developed proposal that recognises the biodiversity value of conservation and especially connectivity of habitat on the Cumberland Plain. The majority of the Orchard Hills offset site is also recognised as a conservation priority in the *Biodiversity Investment Opportunities Map, Mapping Priority Investment Areas for the Cumberland Subregion* (BIO Map) (OEH 2015). As such, the Orchard Hills Offset Area represents the conservation of habitat with strategic value.

The EPBC Act offset areas secured in the 2019 BODP implementation period include 974 hectares of land recognised as a conservation priority in BIO Map (OEH 2015). Implementation of the BODP has ensured the:

- Conservation and improvement of 657 hectares of 'core habitat' comprising EPBC Act Cumberland Plain Woodland and other better condition vegetation with a near-natural structure within regional biodiversity corridors.
- Restoration of 553 hectares of poorer quality Cumberland Plain Woodland and other derived grassland or scrub and associated increase in the extent and connectivity of habitat within and adjoining these priority lands.

The locations of the offset areas in the context of the WSI site and strategic conservation corridors in the Cumberland Plain region are shown on Figure 3. Collectively the direct offsets secured in the 2019 BODP implementation period will help conserve habitat with strategic value through the conservation of 1244 hectares of habitat in '2019 BODP implementation period offset areas'.

Table 7 Quantum of offset secured for the affected threatened biota

Protected matter	Impact area (ha) ¹	Area of habitat at Orchard Hills Offset Area (ha)	Percentage offset provided by Orchard Hills Offset Area ²	Offset area associated with biodiversity credits purchased in 2019 (ha)	Total 2019 BODP implementation period area (ha)	Percentage direct offset provided by 2019 Offset Proposal	Other compensatory measures
EPBC Act Cumberland Plain Woodland	141.0	373.3	60.98%	120.9	494.2	76%	
Poorer quality Cumberland Plain Woodland	n/a	307.7	49.22%	123.2	430.8	58%	
Total EPBC Act Cumberland Plain Woodland	141.0	678.2	110.12%	244.1	925.0	135%	TFPP, Greening Australia SPA up to 10%
Grey-headed Flying-fox habitat	187.8	517.9	78.26%	139.3	657.2	105%	
Swift Parrot foraging habitat	188.0	517.9	51.57%	139.3	657.2	61%	
Spiked Rice-flower (<i>Pimelea spicata</i>)	2.9	0.0	0.00%	0.0	0.0	0%	TFPP, Greening Australia SPA up to 10%

Notes: 1) based on EPBC Act offset assessment guide calculations in the approved BODP (DIRD 2018).

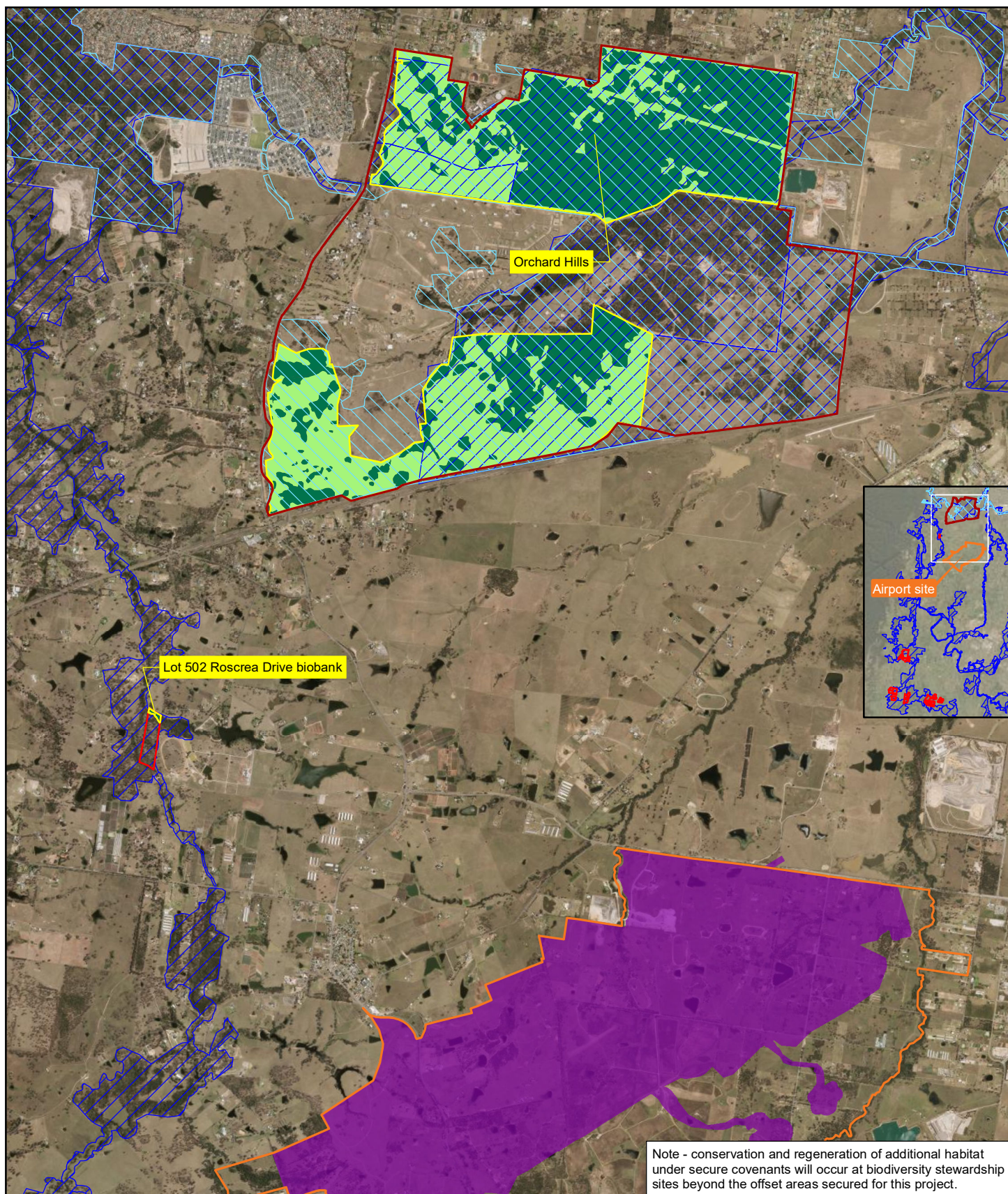
2) based on calculations in the draft Initial Ecological Survey report (GHD in prep a).

Table 8 Quantum of offset for plants, animals and their habitat

Credit type	Credits required ¹	Estimated credits provided by Orchard Hills Offset Area ²	% provided by Orchard Hills offset area	Biodiversity credits purchased in 2019	Total 2019 BODP implementation period	Total 2019 BODP implementation period % of total requirement	Outstanding credit requirement
Ecosystem credits							
Total Cumberland Plain Woodland (HN528 high, medium, poor and low and HN529 high and poor)	12,742	11,414	90%	3,805	15,219	119%	0
Total River Flat Eucalypt Forest (HN526 high, poor and low)	2,661	2,416	91%	254	2,670	100%	0
Total Shale-gravel Transition Forest (HN512 high and poor and HN513 high)	359	917	255%	0	917	255%	0
Freshwater wetland (HN630)	926	53	6%	0	53	6%	873
Species credits							
<i>Pimelea spicata</i>	n/a	0	0	0	0	0	0
Cumberland Plain Land Snail	2,441	3,677	151%	0	3,677	151%	0
<i>Dillwynia tenuifolia</i>	540	511	95%	0	511	95%	29
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> endangered population	5,800	17,949	309%	0	17,949	309%	0
<i>Pultenaea parviflora</i>	60	9,358	15,597%	0	9,358	15,597%	0
Southern Myotis	1,617	1,198	74%	0	1,198	74%	419

Notes: 1) based on Framework for Biodiversity Assessment credit calculations in the approved BODP (DIRD 2018).

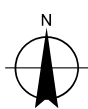
2) based on calculations in the draft Initial Ecological Survey report (GHD in prep a).



LEGEND

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|---------------------------------------|--|--|
| Airport site | Defence Establishment Orchard Hills | Regeneration and improvement of habitat connectivity |
| Stage 1 construction impact zone | Biodiversity stewardship site boundary | |
| Cumberland Conservation Corridor | 2019 BODP implementation period offset areas | |
| Priority conservation lands (BIO Map) | Conservation of core habitat | |

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Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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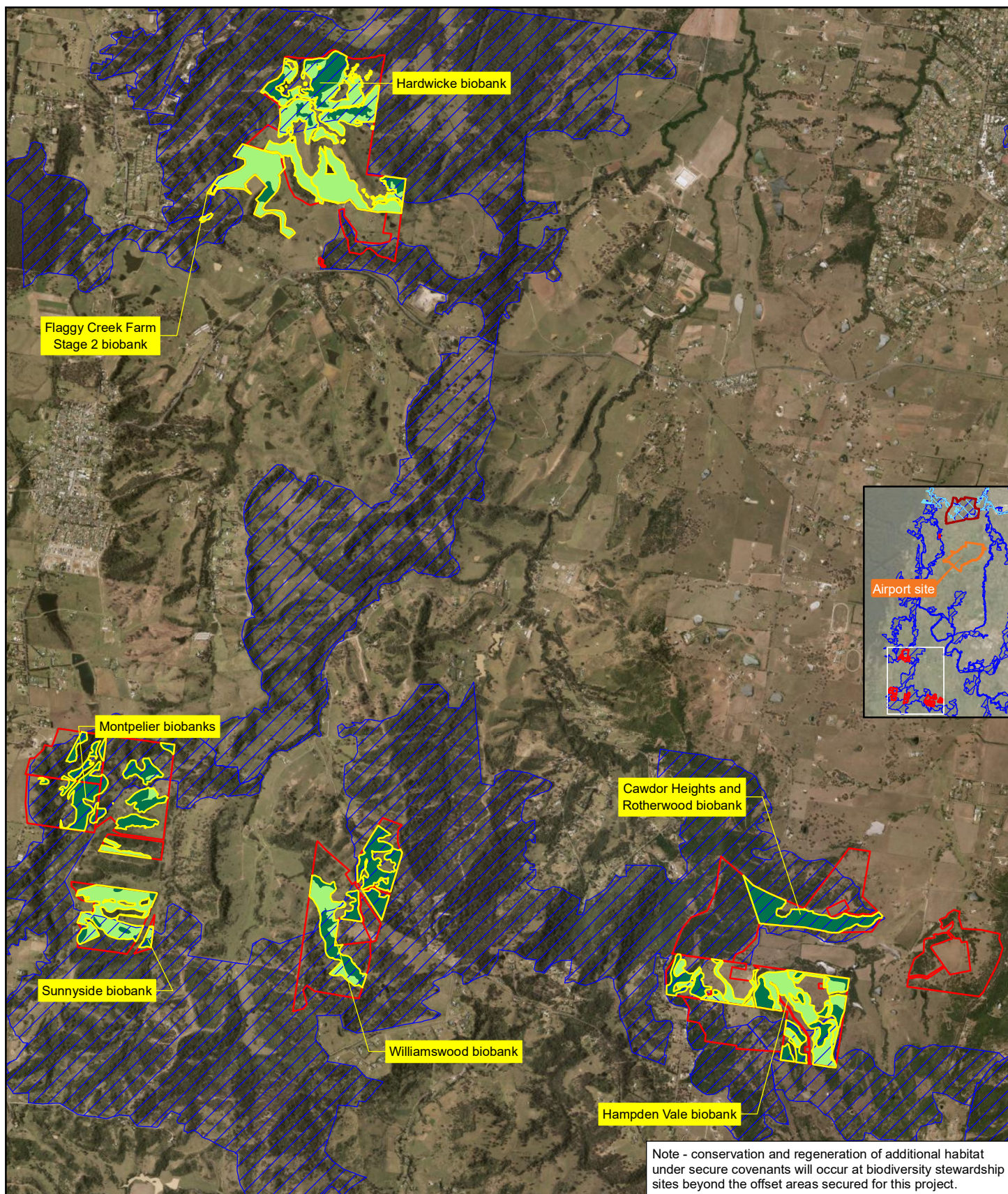
Job Number 21-26204-11
Revision A
Date 31 Jan 2020

Contribution to regional conservation

Figure 3a

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

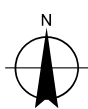
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Data source: Aerial Imagery - Sixmaps 2020 (Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community), Offset sites - GHD 2017, Cumberland Plain Conservation - OEH 2016, Airport layout data - WSU 2016. Created by: jrprice Created by: jrprice



LEGEND

- | | | |
|---------------------------------------|--|--|
| Airport site | Defence Establishment Orchard Hills | Regeneration and improvement of habitat connectivity |
| Stage 1 construction impact zone | Biodiversity stewardship site boundary | |
| Cumberland Conservation Corridor | 2019 BODP implementation period offset areas | |
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Contribution to regional conservation

Figure 3b

4. Independent Audit

4.1 Overview

Infrastructure must implement the approved BODP and ensure that an independent audit of the BODP implementation is conducted in respect of:

- The 12-month period commencing with the approval of the BODP.
- Each subsequent 18-month period until all biodiversity offsets required by the BODP have been secured or implemented.
- Submit a report of each audit that is carried out to Environment within six months of the end of the period in respect of which the audit was conducted.

This 2019 BODP implementation report is for the 12-month period commencing with the approval of the BODP, specifically 25 August 2018 to 25 August 2019. The purpose of this 2019 BODP implementation report is to demonstrate to an auditor how Infrastructure has delivered the offset proposal presented in the BODP in accordance with the Airport Plan conditions.

Alex Cockerill (WSP) has been subcontracted by GHD on behalf of Infrastructure as the Suitably Qualified Expert responsible for auditing this 2019 BODP implementation report. Environment approved Alex Cockerill as the independent auditor prior to the audit.

Audit criteria were provided to Environment in December 2019, which was prior to the formal commencement of the audit when the final draft of this 2019 BODP implementation report was submitted to the auditor on 31 January 2020. Environment have approved the auditor and audit criteria.

This 2019 BODP implementation report has been audited and submitted to Environment prior to 25 February 2020 (that is within six months of the end of the period in respect of which the audit was conducted). The independent audit report is provided as Appendix B, including confirmation that the actions implemented by Infrastructure during the period and the offset assessments presented in this report are in accordance with the BODP and the Airport Plan conditions.

Audit criteria, a summary of the outcome of the independent audit and compliance with the Airport Plan conditions are presented below.

4.2 Compliance with audit criteria

There were no non-compliances identified as part of the audit. A summary of compliance with audit criteria is provided in Table 9. A full checklist of compliance and auditor comments against each requirement is provided in Appendix B.

Table 9 Summary of compliance with audit criteria

Compliance Indicator	Compliance Finding
Condition 30(10) The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth	
The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth	Compliant (Y)
Condition 30(6) The Biodiversity Offset Delivery Plan must:	
(a) be consistent with the EPBC Act Environmental Offsets Policy (2012) to the satisfaction of the Approver, including in particular:	Compliant (Y)
(i) offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter;	Compliant (Y)
(ii) offsets must be built around Direct Offsets but may include Other Compensatory Measures (including that the offsets must be 'like-for-like');	Compliant (Y)
(iii) offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs; and	Compliant (Y)
(iv) the identification of offsets must be informed by scientifically robust information and incorporate the precautionary principle in the absence of scientific certainty	Compliant (Y)
(b) include measures to offset impacts on foraging habitat for the Swift Parrot (<i>Lathamus discolor</i>) in addition to those species and ecological communities listed in the Biodiversity Offset Strategy provided as part of the EIS;	Compliant (Y)
(c) identify biodiversity credits (or other measure as appropriate) required to offset the total impacts of the Stage 1 Development on biodiversity, determined in accordance with the relevant policies;	Compliant (Y)
(d) provide evidence that the required biodiversity credits (or other measure as appropriate) can be secured in accordance with the relevant policies;	Compliant (Y)
(e) provide evidence that the arrangements for managing the Direct Offsets will be provided through mechanisms that are enduring, enforceable and auditable; and	Compliant (Y)
(f) if any Other Compensatory Measures are proposed, provide details of those measures along with a justification of why they should be considered acceptable.	Compliant (Y)
Condition 30 (11) The Infrastructure Department must	
(a) ensure that an independent audit of its compliance with condition 30(10) is conducted in respect of;	Compliant (Y)
(i) the 12-month period commencing with the approval of the Biodiversity Offset Delivery Plan; and	Compliant (Y)
(ii) each subsequent 18-month period until all biodiversity offsets required by the Biodiversity Offset Delivery Plan have been secured or implemented; and	Not applicable (NA)
(b) submit a report of each audit that is carried out to the Environment Department within six months of the end of the period in respect of which the audit was conducted.	Compliant (Y)

Table 10 Compliance finding ratings

Compliance finding rating	Description
Compliant (Y)	The Department has been found to comply with the specific requirement of a plan or condition of approval.
Observation (O)	The Department has been found to be compliant with the specific requirement of an approval condition or plan, although issues relevant to that requirement were noted.
Not compliant (N)	The Department has been found to have not met the specific requirement of a plan or condition of approval.
Not applicable (NA)	A specific requirement of a condition of approval or plan relevant to the site falls outside the scope of the audit, is addressed or duplicated by another audit condition or has not been triggered.
Undetermined (U)	A rating of 'undetermined' is given when the condition or element of a condition falls inside the scope of the audit but there is insufficient evidence to make a judgment on compliance or non-compliance.

A number of observations were made during the audit when reviewing the Final Draft 2019 BODP Implementation Report and biodiversity offset and area calculations. These observations were determined to not affect compliance against the agreed audit requirements protocol (Appendix B), however observations and recommendations have been provided. Audit observations on the Final Draft report, GHD responses and cross references to where these observations have been addressed in this Final Report are summarised in Table 11 below.

The auditor noted the assessment and offset calculations presented in this report are preliminary and subject to further review following completion of the Initial Ecological Survey report for the Orchard Hills Offset Area. These findings will be required for the audit of 2020 BODP implementation report.

It is also recommended that in future compliance reporting, evidence (i.e. documented dates) that the credits transferred are now retired, should be provided.

Based on the review of available documentation and observations made during the audit, Infrastructure are meeting compliance criteria for the Implementation of the BODP in accordance with the Airport Plan conditions.

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Table 11 Summary of audit observations

Compliance Indicator	Audit observations	GHD response
Condition 30(10) The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth		
The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth	Observations cited within the 2019 BODP Implementation report include; Montpelier Agreements IDs listed in text are 339, 358, 235 and 336. The agreement ID number is 399 (not 339).	Noted and corrected.
	Table 7 (same table as in the Executive Summary) – Grey headed flying-fox ‘percentage direct offset provided by 2019 offset proposal’ is 105%, but the table fill is red (indicating it does not meet requirements), the table fill should be green here. This table formatting error occurs again for River Flat Eucalypt Forest for ‘Total 2019 BODP implementation period % of total requirement’, here table fill is red, however it should be green.	Noted and corrected.
	No footnotes are provided for Table 1, Appendix A.	No footnotes required. Superscripts deleted from table accordingly.

Compliance Indicator	Audit observations	GHD response
Condition 30(6)The Biodiversity Offset Delivery Plan must:		
(c) identify biodiversity credits (or other measure as appropriate) required to offset the total impacts of the Stage 1 Development on biodiversity, determined in accordance with the relevant policies;	Assumption that project impacts and criteria are same for impact, as they are for offset. This approach has previously been reviewed and approved by DoEE for the EIS, including preliminary calculation of Orchard hills within the BODP. Site inspections found that only one (RA4) of the 18 rapid assessments showed inconsistencies, the independent audit assessed the area Cumberland Plain Woodland (HN 528) rather than Shale Gravel Transitional Forest (HN 512) which it is currently mapped. However, this is inconsequential to the assessment as both mapped communities form part of the threatened ecological community.	Noted. No immediate action, noting that vegetation mapping at the Orchard Hills Offset Area will be considered in the review of the Initial Ecological Survey Report.
(d) provide evidence that the required biodiversity credits (or other measure as appropriate) can be secured in accordance with the relevant policies;	Vegetation surveys, assessment and management for Orchard Hills are substantially advanced and generally consistent with accepted methodology and adequacy. However, in the absence of Orchard Hills Survey report, findings within this audit are limited to the information available to date.	Noted.
	Credit retirement was unable to be proven. It is recommended that in future compliance reporting that evidence (documented dates) that the credits are now retired should be provided.	Noted.
	Minor area calculation disparities between BODP Implementation report, geospatial file review and EPBC calculator: Page 62; Appendix A Table 1 - the area of poor quality CPW for Orchard Hill Site is 304.9 ha in table however stated as 307.7 ha in the calculator. Geospatial review found that poor quality CPW was 307.7 ha	Noted. Error was in the zone 2 row in Appendix A Table 1. Appendix A updated accordingly.

Compliance Indicator	Audit observations	GHD response
	Page 74 Appendix A; Section 1.1.2 -the sum of derived grassland and scrub that would be regenerated is stated as 346.9 ha in text, however geospatial verification only calculated 342.85 ha	Noted. Appendix A updated accordingly.
	Page 135; Appendix A Table 14 –The area of CPW for Hardwicke Biobank offset in the calculator is 21.72 ha, however is stated as 22.2 ha in the table in the report. The area of low quality CPW in the calculator is 42.9 ha, however is stated as 43.9 ha in the table in the report. The Geospatial review returned the following calculations; 22.1 ha for CPW, and 43.9 for poor quality CPW.	Noted. Offset guide and calculation results in section 3.2 and Appendix A updated accordingly.
	Page 86, Appendix A Table 8 - Geospatial verification of calculations found small discrepancies for CPW calculations for Montpelier biobank site. Geospatial review of CPW found 33.7 ha (instead 33.6 ha as stated in Table 6 in report) and CPW poor quality 3.7 (instead of 3.6 ha as stated in Table 6 in report). And therefore, GHFF and Swift Parrot habitat was found to be 33.7 ha rather than 33.6 ha as stated in the report.	Apparent discrepancy due to different approaches to rounding of multiple vegetation zone areas in summary table and does not materially affect offset calculations. No updates made.

Compliance Indicator	Audit observations	GHD response
	Page 156; Appendix A Table 18-. Area of CPW in report is 23.8 ha, however in calculator it is 19.4 ha. The Geospatial review returned the same calculations as stated in the report.	Noted. Offset guide and calculation results in section 3.2 and Appendix A updated accordingly.

4.3 Compliance with Airport Plan Conditions

Section 3.10 of the Airport Plan sets out the conditions to be complied with in relation to the Stage 1 development of WSI, including the conditions specified in the notice given by the Environment Minister in response to a draft Airport Plan. Conditions that relate to the requirements for the preparation and implementation of the BODP are detailed in Table 12 along with reference to where each condition is addressed in this report and related reports.

Table 12 Airport Plan conditions related to BODP implementation

No.	Environmental Condition	Where addressed in this 2019 BODP implementation report and related reports
30.(1)	The Infrastructure Department must: (a) prepare; and (b) submit to an Approver for approval; a Biodiversity Offset Delivery Plan in relation to the carrying out of the developments described in Part 3 of the Airport Plan.	The approved BODP (DIRD 2018).
30.(2)	The criteria for approval of the Biodiversity Offset Delivery Plan are that an Approver is satisfied that the Biodiversity Offset Delivery Plan: (a) takes into account: (i) sections 28.5.3.3 to 28.5.3.5 in Chapter 28 of the EIS; and (ii) the Biodiversity Offset Package in volume 4 of the EIS; and (iii) the EPBC Act Environmental Offsets Policy issued by the Environment Department in October 2012; and (b) is otherwise appropriate.	These requirements are referenced throughout the approved BODP.
30.(3)	The Site Occupier must not commence Main Construction Works until the Biodiversity Offset Delivery Plan has been approved in accordance with this condition.	The approved BODP.
30.(6)	The Biodiversity Offset Delivery Plan must: (a) be consistent with the EPBC Act Environmental Offsets Policy (2012) to the satisfaction of the Approver.	This requirement is considered in the description of offset proposals throughout the approved BODP. Consistency with specific criteria is demonstrated in Chapter 9 of the approved BODP.

No.	Environmental Condition	Where addressed in this 2019 BODP implementation report and related reports
30.(7)	The Biodiversity Offset Delivery Plan should capitalise wherever possible on opportunities to improve connectivity or contribute to Commonwealth, state or local government initiatives to secure offsets with strategic value.	This requirement was considered in the process for procuring biodiversity credits documented in sections 2.1 2.2 and 3.1. The contribution of direct offset sites to connectivity and/or government initiatives is described in section 3.4. This requirement was also considered at all stages of the process of planning the offset proposal described in the approved BODP and was a particular focus for the Experts Group as documented in section 4.1 and Chapter 5 (DIRD 2018).
30.(8)	In preparing the Biodiversity Offset Delivery Plan, the Infrastructure Department must consult with local Aboriginal Land Councils and Aboriginal groups in Western Sydney, to identify complementary outcomes for biodiversity conservation and Aboriginal cultural heritage on the Cumberland Plain.	This requirement was considered at all stages of the process of identifying and assessing the offset proposals described throughout the approved BODP as well as the Aboriginal stakeholder consultation program documented in Section 4.2 (DIRD 2018).
30.(9)	The Infrastructure Department must provide the Environment Department with Shapefiles identifying the location and boundaries of each direct offset site within three months of legally securing and establishing management arrangements for the site, unless otherwise approved by an Approver.	Maps identifying the location and boundaries of 'EPBC Act offset areas' at each direct offset site are included in Appendix A. Shape files for each EPBC Act offset area were provided to Environment within three months of legally securing and establishing management arrangements for each site.
30.(10)	The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth.	This 2019 BODP implementation report.

No.	Environmental Condition	Where addressed in this 2019 BODP implementation report and related reports
30.(11)	The Infrastructure Department must: (a) ensure that an independent audit of its compliance with condition 30(10) is conducted in respect of; (i) the 12-month period commencing with the approval of the Biodiversity Offset Delivery Plan; and (ii) each subsequent 18-month period until all biodiversity offsets required by the Biodiversity Offset Delivery Plan have been secured or implemented; and (b) submit a report of each audit that is carried out to the Environment Department within six months of the end of the period in respect of which the audit was conducted.	The independent audit report included as Appendix B to this 2019 BODP implementation report.
30.(12)	For each audit, the independent auditor must be approved by an Approver prior to the commencement of the audit. Audit criteria must be agreed to by an Approver and the audit report must address the criteria to the satisfaction of an Approver.	The independent auditor has been approved by Environment. The audit criteria included in the independent audit report at Appendix B to this 2019 BODP implementation report. These audit criteria were provided to Environment in December 2019, prior to the commencement of the audit upon submission of the final draft of this 2019 BODP implementation report to the auditor on 31 January 2020.
30.(13)	If there is a change to the Construction Impact Zone after the Biodiversity Offset Delivery Plan is approved, a variation of the Biodiversity Offset Delivery Plan in relation to that change must be prepared by the Infrastructure Department and submitted for approval in accordance with condition 41 (Variation of Approved Plans), unless an Approver decides that the change is not material to biodiversity offset requirements.	No changes to the Construction Impact Zone have occurred since the BODP was approved.
30.(14)	The Infrastructure Department must review the Biodiversity Offset Delivery Plan every five years to ensure that the Biodiversity Offset Delivery Plan continues to meet the approval criteria for that plan. The Infrastructure Department must provide a report on the review to the Environment Minister. If the plan does not continue to meet the approval criteria, within three months of the provision of the report, the Infrastructure Department must prepare and submit for approval under condition 41(1), a variation to the Approved Plan to ensure it continues to meet the approval criteria.	Not applicable until 25 August 2023.

No.	Environmental Condition	Where addressed in this 2019 BODP implementation report and related reports
30.(15)	The Environment Minister may: (a) vary an approved Biodiversity Offset Delivery Plan; or (b) request in writing that the Infrastructure Department prepare and seek approval for a specified variation of an approved Biodiversity Offset Delivery Plan in accordance with condition 41(1), if the Environment Minister believes on reasonable grounds that: (c) this condition 30 has been contravened; and (d) the variation or the request for a specified variation (as the case may be) will address the contravention.	No variations to the approved BODP have been requested or are anticipated at present.
39. (3)	Following approval of the Biodiversity Offset Delivery Plan, the Infrastructure Department must report to the Environment Department every 12 months on its implementation until all biodiversity offsets and other compensatory measures under the Biodiversity Offset Delivery Plan have been secured or implemented. The Infrastructure Department must publish the report on its website.	This 2019 BODP implementation report which is for the 12 month period from 25 August 2018 to 25 August 2019.

5. Next Steps

5.1 Identification of additional offsets

The offsets secured in the 2019 implementation period described in Table 7 and Table 8 above. Greater than 60 per cent of the offsets have been secured and therefore more offsets are required to meet the obligations for the biodiversity impacts of WSI. Additional direct offsets and other compensatory measures will be identified and implemented to address the remaining biodiversity offset obligations.

Investigations of additional offset proposals would focus on shortfalls in the quantum of offset secured for particular species and communities, which at this stage of the implementation of the BODP include *Pimelea spicata*, Swift Parrot and Grey-headed Flying-fox foraging habitat, Forest Red Gum – Rough-barked Apple grassy woodland (HN526) and freshwater wetlands on floodplains (HN630).

A number of additional potential offset sites or direct restoration programs have already been considered but were not secured in this period because insufficient information was available about biodiversity values and future ownership. An overview of these longer term options for direct offsets is provided in Section 6.2 of the BODP (DIRDC 2018). Environment and the Biodiversity Experts Group were also provided with a register detailing potential offset sites, though this information was not included in the published BODP because of confidentiality and commercial considerations. Infrastructure will continue to consult with Environment as the process for implementing these additional offsets is developed. Further identification of offsets and consultation will take place up until the full quantum of biodiversity offsets are implemented in accordance with the BODP.

Throughout the preparation and implementation of the BODP, a broad desktop assessment and consultation program was performed and the register of potential offset sites has been maintained. Infrastructure has held initial discussions with some vendors of offset sites with relevant credits currently available as well as proposed BSA sites where survey and assessment have not yet been completed and biodiversity credits have not yet been generated. Where credits have not yet been generated, Infrastructure may enter into a terms agreement with the vendor, whereby credits can be purchased and sold at a future date once they are available.

Proposed or existing BSA sites containing potential direct biodiversity offsets would be located, and:

- Each relevant site would be assessed to confirm the extent and quality of habitat matching the WSI offset requirement (that is the offset area). Where appropriate, this assessment would rely upon the results of BioBanking/BAM assessments or other ecological surveys already conducted at the site;
- If a site is already subject to a BSA, then the biodiversity credits linked to the offset area would be purchased and retired; and
- If a site is not yet subject to a BSA, the site would be assessed using the BAM, the site owner would enter into a BSA, and the biodiversity credits linked to the offset area would be purchased and retired.

Infrastructure would also consider the acquisition of land proposal presented in the BODP. This would involve an advisory group that would identify potential conservation land and undertake preliminary investigations to determine suitability for the offset requirements of WSI.

Infrastructure may provide the required funding for acquisition of the land and a conservation covenant would be placed over the land. A third party, potentially a local non-Government organisation, would be required to manage the land in perpetuity, consistent with the covenant, to achieve conservation outcomes. A binding agreement would include management actions to conserve and improve habitat and alleviate threats.

Restoration and rewilding programs would be selected, defined and funded during the longer term implementation of the BODP. Programs would be selected based on consideration of Infrastructure's criteria for evaluation of potential biodiversity offsets as well as the criteria in the EPBC Act Offsets Policy.

Longer term options for other compensatory measures are discussed in section 7.4 of the BODP. These may include options for conservation, research, educational and training programs, including Aboriginal land management, to help meet offset requirements. Biodiversity offsets using these alternative mechanisms may be delivered through a range of existing and future programmes, projects and policies. Key considerations will include that any other compensatory measures must directly benefit the protected matter to be affected, must be based on sound ecological survey and assessment, and must be additional to any existing funding for conservation programmes.

The Biodiversity Experts Group identified a number of potential research, capacity building and training options that meet these criteria. The Department will continue to consult with government agencies and other relevant parties about suitable options. In accordance with Appendix A of the EPBC Act Offsets Policy, suitable research or education programs must be selected through an open tender process. Any research and education programs that form part of the offsets for WSI will be implemented in accordance with the Policy. This includes the requirements for periodic reporting to Infrastructure and Environment on progress and key findings, and that the research institution may publish findings in an internationally recognised peer-reviewed scientific journal or be of a standard that would be acceptable for publication in such a journal.

Anticipated BODP implementation activities linked to the offset proposals identified to date, and the process for identifying additional offsets outlined above, are presented below for the next two annual implementation periods.

5.2 Anticipated 2020 BODP implementation activities

The 2020 BODP implementation period will be the second 12-month period following approval of the BODP, specifically 25 August 2019 to 24 August 2020. The BODP activities that are anticipated to be implemented during the 2020 period include:

- Confirmation of offset arrangements for an Offset Area of at least 900 hectares at Defence Establishment Orchard Hills, including:
 - Finalisation and independent verification of the Initial Ecological Survey report (GHD in prep a)
 - Review and independent verification of the Offset Plan (GHD in prep b)
 - Confirmation of the total quantum of offset for the affected threatened biota and plants, animals and their habitat delivered by the Orchard Hills Offset Area based on these finalised reports
 - Participation in the Orchard Hills Biodiversity Working Group and consultation with Defence on the implementation of the Offset Plan.

- Continued synthesis of existing information and consultation with various offset vendors to identify and secure direct offsets, including continuing consultation with:
 - Owners of a proposed BSA site at Douglas Park that contains ~5.44 hectares of occupied *Pimelea spicata* habitat as well as Cumberland Plain Woodland, Grey-headed Flying-fox habitat and Swift Parrot foraging habitat within a 5.44 hectare offset area that is the subject of a draft terms of agreement with Infrastructure.
 - Site occupiers of Commonwealth Land at Camden that contains ~50 hectares of Grey-headed Flying-fox habitat and Swift Parrot foraging habitat as well as Forest Red Gum – Rough-barked Apple grassy woodland (HN526) ecosystem credits and probable Southern Myotis species credits.
- Continued implementation of Stage 2 of the threatened flora propagation program, including the establishment of an *ex situ Pimelea spicata* population to support conservation of the species.
- Continued implementation of the Greening Australia seed collection and production program required by Condition 32 of the Airport Plan. Significant progress on the new SPA is expected over the 2019/20 reporting period, including:
 - Infrastructure construction
 - Scaling up nursery stock for planting out in new SPA
 - Development of community and school education programs
 - Development of community and school education programs
- Consideration of potential research, restoration and rewilding programs.
- Preparation of a '2020 BODP implementation report' and submission to Environment in accordance with Condition 39 of the Airport Plan.

5.3 Anticipated 2021 BODP implementation activities

The 2021 BODP implementation period will be the third 12-month period following approval of the BODP, specifically 25 August 2020 to 25 August 2021. The BODP activities that are anticipated to be implemented during the 2021 period include:

- Continued management of an Offset Area of no less than 900 hectares at Defence Establishment Orchard Hills including:
 - Implementation of the Offset Plan by Defence
 - Participation in the Orchard Hills Biodiversity Working Group and consultation with Defence on the implementation of the Offset Plan
- Continued synthesis of existing information and consultation with various offset vendors to identify and secure direct offsets, as required.
- Continued implementation of Stage 2 of the threatened flora propagation program, including maintenance of the *ex situ Pimelea spicata* population to support conservation of the species.
- Continued implementation of the Greening Australia seed collection and production program required by Condition 32 of the Airport Plan.
- Implementation of suitable research, restoration and rewilding programs as appropriate.
- Preparation of a '2021 BODP implementation report' and submission to Environment in accordance with Condition 39 of the Airport Plan.
- Arrangements for submission of a '2021 BODP implementation audit report' to Environment in accordance with Condition 30 (11) of the Airport Plan.

The '2021 BODP implementation audit report' would be for the 18-month period following the initial 12-month period that commenced with the approval of the BODP, specifically 25 August 2019 to 25 February 2021. The audit report would need to be submitted to Environment prior to 25 August 2021 (that is within six months of the end of the period in respect of which the audit was conducted). The timing and content of the audit report and any future BODP implementation reports would depend on the quantum of offset secured through the 2021 BODP implementation period and whether there were any remaining offsets required at 25 February 2021.

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Appendices

Appendix A – Direct Offsets

Direct offset sites

Orchard Hills Offset Area

Overview of the proposal

A large component of the direct offsets to be implemented under the BODP are associated with an offset site at the Defence Establishment Orchard Hills (DEOH). DEOH is an explosive ordnance depot located approximately 50 kilometres west of central Sydney that is owned, used and managed by Defence. DEOH is managed for Defence capability purposes, Defence training activities and the use and safe storage of explosives. Approximately 1370 hectares of Orchard Hills is recorded on the Commonwealth Heritage List as a Commonwealth Heritage Place for its natural heritage values. It is subject to the comprehensive environmental protection framework set out in the EPBC Act under the control of the Environment Minister.

A Memorandum of Understanding (MOU) entered into between Defence and Infrastructure includes provisions intended to be additional to any Commonwealth Heritage Listing requirements. The MOU provides for:

- The area and boundaries of the Orchard Hills Offset Area to be formalised, with a core area of no less than 900 hectares and any other additional areas agreed between Defence and Infrastructure.
- An Offset Plan to be developed, funded and implemented over a period of 20 years, to provide measurable ecological improvements to the quality of habitat for the affected threatened biota and plants, animals and their habitat at the Offset Area, consistent with the EPBC Act Offsets Policy and through the management actions outlined in the BODP.
- Various monitoring, record keeping, reporting and auditing arrangements to be put in place, consistent with the BODP and the Airport Plan.
- The Orchard Hills Offset Area to be maintained following completion of the improvements, so as to retain long-term benefits of the quality improvements following implementation of the Offset Plan.

The objectives of the Offset Plan will be to improve the quality of habitat for the affected threatened biota and plants, animals and their habitat in the Offset Area in order to help meet the requirements of the BODP. Specifically, the Offset Plan management actions will be designed to achieve the following objectives:

- a. 'Future quality with offset' score that is two greater than the 'Start quality' score that is defined in the Initial Ecological Survey for the area of Cumberland Plain Woodland
- b. 'Future quality with offset' score that is one greater than the 'Start quality' score that is defined in the Initial Ecological Survey for the area of habitat for the Swift Parrot and Grey-headed Flying-fox in the Offset Area
- c. 'Future quality with offset' score for the area of poorer quality Cumberland Plain Woodland in the Offset Area that is at least:
 - as high as the quality score for the Cumberland Plain Woodland in the Stage 1 Construction Impact Zone (6 out of 10), and
 - two greater than the 'Start quality' score that is defined in the Initial Ecological Survey for the area of poorer quality Cumberland Plain Woodland in the Offset Area.

An 'Initial Ecological Survey' report (GHD in prep a) is being prepared in accordance with the MOU in order to support development of the Offset Plan and quantify the value of the Offset Area for the implementation of the BODP. The purpose of the Initial Ecological Survey report is to:

- Describe the existing environment of the Offset Area, including the extent and condition of native plant communities and fauna habitats.
- Confirm the extent and quality of habitat for the affected threatened biota with regard to the EPBC Act Environmental Offset Policy and specifically the key diagnostic characteristics and condition thresholds specified in the Commonwealth Listing Advice on Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (TSSC 2009).
- Calculate the quantum of offset for impacts on affected threatened biota using the 'offsets assessment guide' spreadsheet.
- Calculate the biodiversity credits that would be generated at the Offset Area to help to offset the impacts of WSI on plants, animals and their habitats, including threatened biota listed under the BC Act, as determined in accordance with the NSW Biodiversity Banking and Offsets Scheme (biobanking) credit calculator and assessment methodology (the BBAM).
- Demonstrate that the Offset Area would help deliver an overall conservation outcome that improves or maintains the viability of the EPBC Act protected matters consistent with the Environmental Offsets Policy as required by the BODP.

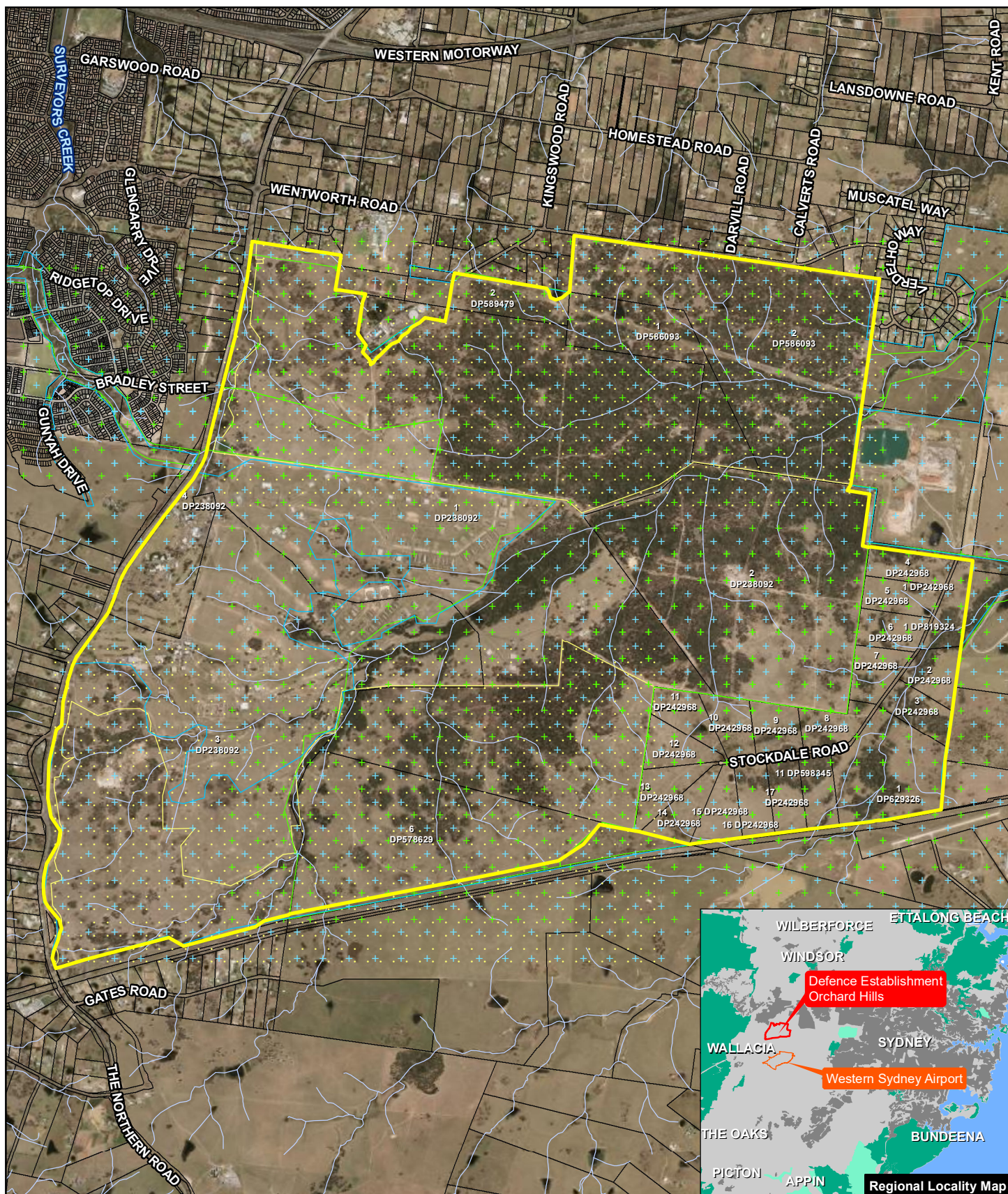
The baseline site quality scores for affected threatened biota and start and future site value scores for plants, animals and their habitat are defined in the Initial Ecological Survey report (GHD in prep a). The Orchard Hills Offset Area Initial Ecological Survey report, including the assessment of the quantum of direct offset delivered by the Orchard Hills Offset Area, will be independently verified.

The Offset Area and any other agreed areas will be actively managed as a direct offset for WSI for the period required to achieve the Offset Objectives outlined above, which is expected to be 20 years from when the offset commenced in August 2018. Defence would implement the plan, including completion of all monitoring, reporting and auditing requirements. Once the quality improvements have been achieved, Defence would continue to manage the Offset Area so as to maintain the long-term benefits of the quality improvements.

The Offset Area has been defined based on biodiversity values and current and proposed land uses and includes a core area of no less than 900 hectares (see Figure 4). The Offset Area lies within the Commonwealth Heritage List area within the northern buffer area and southern buffer area at DEOH, also known as Sector B and Sector H in the Defence site plan. In the ~20 years prior to the signing of the MOU the Offset Area was maintained as vegetated open space. Defence contractors periodically completed land management activities such as bushfire hazard reduction and pest fauna control to protect infrastructure and to help maintain the values of the Commonwealth Heritage List area. The northern buffer area and southern buffer area, including the Offset Area, were periodically used for Defence personnel training.

Formalisation of the final area and boundaries of the offset site, confirmation of the characteristics to be protected through further ecological survey and assessment, and agreement on suitable management measures to be implemented, will determine the ultimate quantum of offset that will be delivered by the Orchard Hills site. The following sections describe the existing environment of the Offset Area and estimated quantum of offset that would be delivered based on the draft Initial Ecological Survey report (GHD in prep a) and Offset Plan (GHD in prep b). Any changes to the quantum of offset as a result of review and finalisation of these reports or the addition of land to the Offset Area will be documented in future BODP implementation reports.

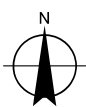
As shown on Figure 4, the Offset Area is located within the Cumberland Conservation Corridor (CCC), which is a community-developed, government-recognised proposal to help address the conservation of biodiversity values and especially connectivity of habitat on the Cumberland Plain. The CCC aims to secure and connect approximately 7000 hectares of land under conservation management in Western Sydney. The majority of the Offset Area is also mapped as priority conservation lands in the *Biodiversity Investment Opportunities Map, Mapping Priority Investment Areas for the Cumberland Subregion* (BIO Map) (OEH 2015). As such the conservation of the Offset Area would realise an opportunity to improve connectivity and contribute to Australian Government and state government initiatives to secure offsets with strategic value in accordance with Airport Plan Condition 30 (7).



LEGEND

- Defence Establishment Orchard Hills
- EPBC Act offset area (946.8 ha)
- Cumberland Conservation Corridor
- Priority conservation lands (BIO Map)
- Cadastre
- Waterways

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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



Department of Infrastructure, Transport,
Regional Development and Communications
2019 BODP Implementation Report

Orchard Hills
Offset Area

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Figure 4

Existing environment of the offset area

Field surveys completed for the Initial Ecological Survey confirmed the presence and distribution of five Plant Community Types (PCTs). Stands of these PCTs include near-intact vegetation in 'moderate/good - high' condition, partially cleared or regrowth vegetation in 'moderate/good - poor' condition and highly modified areas in 'low' condition (according to the BBAM). Vegetation zones are shown on Figure 5. The condition of these PCTs varies across the site as a result of previous land uses. Areas that have been historically cleared and/or heavily grazed now contain regrowth vegetation in poorer condition. The Offset Area has never been extensively ploughed or sown with exotic pasture and contains predominantly native vegetation. There is slight to moderate weed infestation throughout the site, with linear remnants along roads being the most severely affected. There are occasional patches of more severe weed infestation associated with areas of dumped fill or previous more intensive land uses such as firing ranges.

Vegetation zones at the Orchard Hills offset area are presented in Figure 5 and habitat for the affected threatened biota in Figure 6. At the time of preparation of this report the Offset Area included a total of 947 hectares of land comprising:

- 517.9 hectares of woodland and forest that would be maintained and approved as Cumberland Plain Woodland and/or Grey-headed Flying-fox and Swift Parrot foraging habitat.
- 342.9 hectares of derived grassland and scrub that would be regenerated, including areas of poorer quality Cumberland Plain Woodland that could be regenerated into functional occurrences of the EPBC Act listed form of the community.
- 54.5 hectares of exotic grassland and other Low condition vegetation that would be regenerated as offsets for plants, animals and their habitat and to improve habitat connectivity.
- 27.7 hectares of land that has not been mapped as vegetation zones because it is set aside for electricity easements or other purposes but that would be managed to control weeds, pest fauna and other threats to biodiversity values.

Grey Box – Forest Red Gum grassy woodland on flats (PCT 849 / HN528) is associated with mid and lower slopes, on shale-derived soils across Orchard Hills and is the most extensive native PCT. It comprises an open forest or woodland of Forest Red Gum (*Eucalyptus tereticornis*) and Grey Box (*E. moluccana*) with a grassy understorey and extensive dense patches of the shrub species Native Blackthorn (*Bursaria spinosa* subsp. *spinosa*). Vegetation zone 2, 'Poor condition Grey Box – Forest Red Gum grassy woodland on flats', comprises a derived Swamp Oak (*Casuarina glauca*) scrub, Native Blackthorn shrubland or grassland form of this PCT.

There is an isolated patch of tertiary clay and gravel influenced soils in the southern buffer area that supports 'Broad-leaved Ironbark – Grey Box – *Melaleuca decora* forest on clay' (PCT 725 / HN513) with a canopy of Broad-leaved Ironbark (*Eucalyptus fibrosa*) and occasional Woollybutt (*E. longifolia*) along with a characteristic mid storey of Honey Myrtle (*Melaleuca decora*) and Bracelet Honey Myrtle (*M. nodosa*) and an open shrubby understorey. This community grades into 'Broad-leaved Ironbark – Grey Box – *Melaleuca decora* grassy open forest on clay/gravel soils' (PCT 724 / HN512) with a similar canopy of Broad-leaved Ironbark along with Grey Box, a mid storey of Honey Myrtle and a denser shrub and grass understorey. Vegetation zone 8, 'Poor condition Broad-leaved Ironbark – *Melaleuca decora* grassy open forest', comprises a derived scrub or shrubland form of this plant community type.

Forest Red Gum – Rough-barked Apple grassy woodland occurs along the riparian corridors of Blaxland Creek and other drainage lines through the site. This community is a closed woodland or forest of Forest Red Gum, Grey Box and Cabbage Gum (*Eucalyptus amplifolia*) along with Swamp Oak, Broad-leaved Apple (*Angophora subvelutina*) and paperbarks (*Melaleuca* spp.). Understorey vegetation is similar to Grey Box – Forest Red Gum grassy woodland on flats along with additional moisture loving species such as rushes and sedges. Vegetation zone 6, 'Poor condition Forest Red Gum – Rough-barked Apple grassy woodland', comprises a derived Swamp Oak scrub, sedgeland or grassland form of this plant community type.

There are a large number of dams and flooded depressions throughout the site formed by the construction of barriers across small drainage lines. These water bodies contain a moderate diversity and abundance of native wetland plants. They are not natural features; however they contain native wetland and aquatic plant species, and the PCT '*Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin' is the best fit for this vegetation zone. These areas support a well-established wetland community and would provide foraging habitat and a water source for many native fauna species notably including the threatened Southern Myotis (*Myotis macropus*). In this context it would not be appropriate to attempt to restore these areas to their original dryland vegetation structure and so the baseline description and management described in the Initial Ecological Survey report (GHD in prep a) and the Offset Plan (GHD in prep b) is based on maintaining the current PCT.

The Offset Area contains 373.4 hectares of vegetation that comprises an occurrence of the EPBC Act listed form of Cumberland Plain Woodland. Larger and better condition patches of Grey Box – Forest Red Gum grassy woodland on flats and Broad-leaved Ironbark – Grey Box – *Melaleuca decora* grassy open forest at the site comprise occurrences of 'Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest' (Cumberland Plain Woodland). Cumberland Plain Woodland is listed as a CEEC under the EPBC Act. EPBC Act Cumberland Plain Woodland was identified according to the criteria in the listing advice for the community (TSSC 2009), specifically:

- Characteristic dominant tree species Grey Box, Forest Red Gum and Broad-leaved Ironbark are present with a foliage projective cover of greater than 10%;
- Part of a patch greater than 0.5 ha in area; and
- Greater than 50% of the groundcover vegetation present comprising perennial native species, or greater than 30% of the groundcover vegetation present comprising perennial native species and part of a patch greater than five hectares in area or containing at least one tree per hectare that is hollow-bearing.

Patches of woodland at the site that comprise an occurrence of EPBC Act Cumberland Plain Woodland are shown on Figure 6. A patch is defined as a discrete and continuous area that comprises the ecological community. A patch may include small-scale disturbances such as tracks or breaks or other small-scale variations in native vegetation that do not significantly alter the overall functionality of the ecological community – for instance the easy movement of wildlife or dispersal of plant spores and seeds (DEWHA 2010).

Derived native grassland and other moderate/good to poor condition vegetation at the site does not meet the condition criteria for a local occurrence of EPBC Act Cumberland Plain Woodland as defined in the listing advice for the community (TSSC 2009) and associated guidelines (DEWHA 2010). These areas of derived native scrub or grassland feature predominantly native vegetation with intact soil profiles, high native species richness, high resilience and by virtue of these attributes, high conservation significance. These patches of 'poorer quality Cumberland Plain Woodland' do not currently meet the condition criteria for the EPBC Act-listed form of the community because the native over storey cover is less than 10%, however they meet the other condition attributes for the community, including greater than 50% perennial native groundcover and connectivity to a patch of at least 0.5 hectares of EPBC Act Cumberland Plain Woodland or contiguous with a native vegetation remnant at least one hectare in area (see DEWHA 2010). There are also small, isolated patches of woodland vegetation that do not meet the condition criterion related to a minimum patch size of 0.5 hectares (DEWHA 2010). When purposefully managed for conservation, suitable recovery and management actions may improve these patches of poorer quality Cumberland Plain Woodland to the point that they can be regarded as part of the ecological community listed under the EPBC Act (TSSC 2009) and reach at least the same site quality score as the impact area, in accordance with the EPBC Act Offsets Policy (DSEWPac 2012a, 2012b).

The 307.7 hectares of poorer quality Cumberland Plain Woodland at the Offset Area could be managed and improved to at least the same condition as the community at the WSI site in the medium to long term, through the intensive treatment of weed infestations and control of overabundant herbivores to permit regeneration of over storey vegetation and supplementary planting where appropriate. The aims of this management would be to achieve restoration of vegetation that comprises EPBC Act Cumberland Plain Woodland, specifically vegetation that is part of woodland patches greater than 0.5 ha in area, with greater than 10% canopy cover and greater than 50% native groundcover in accordance with the condition criteria specified in the conservation and listing advice for the community (TSSC 2009, DEWHA 2010). The 'time until ecological benefit' in the offsets assessment guide calculations (ie the time period required to achieve the probable increase in site quality score and/or decline in site quality without management) has been set at 20 years (compared to 10 years for EPBC Act Cumberland Plain Woodland). Twenty years is the expected time it takes to implement the Offset Plan, including to complete primary weed control and other management activities, complete supplementary planting where appropriate, achieve natural regeneration and for regenerating *Eucalyptus* to mature into over storey vegetation.

The offset area contains 517.9 hectares of Grey-headed Flying-fox and Swift Parrot foraging habitat associated with woodland and forest.

Dominant canopy species include Forest Red Gum, Grey Box and Broad-leaved Ironbark. Forest Red Gum and Grey Box are recognised as significant species in the blossom diet of the Grey-headed Flying-fox (Eby and Law 2008). Forest Red Gum scores in the upper quartile of all diet plants for the region for productivity and reliability of flowering. This species flowers in late winter and spring, partly during the food bottleneck for the Grey-headed Flying-fox. Grey Box has low productivity and reliability. It flowers in late summer and early autumn. Broad-leaved Ironbark has high productivity but is an unreliable flowerer. This species flowers in summer and early autumn, providing foraging habitat during the breeding period for the Grey-headed Flying-fox (Eby and Law 2008). Habitat at the Offset Area is thus somewhat productive during food bottlenecks, and qualifies as habitat critical to the survival of the species, as defined in the draft recovery plan (DECCW 2009). There are no Grey-headed Flying-fox camps located at the Offset Area, although there are at least seven known camps within 20 kilometres (DoE 2014).

There are no confirmed records of the Swift Parrot at the Offset Area. The species has been observed foraging in similar habitat in the near vicinity of the site, including: a 2014 record at Glenmore Park, around 500 metres to the west of the site; and two 2013 observations at Mulgoa Nature Reserve around two kilometres to the west of the site (OEH 2019a).

The single, migratory population of the Swift Parrot may use foraging habitat at the Offset Area on an occasional basis as part of its occupation of winter foraging habitat. Of the canopy species present at the offset site, Forest Red Gum is identified as a key food tree in the Sydney Metro and Hawkesbury-Nepean areas within the non-breeding range of the species (Saunders and Tzaros 2011), and Grey Box and other eucalypts would provide a source of lerps. Each of the vegetation zones at the Offset Area with a forest or woodland structure contains Forest Red Gum and/or Grey Box as dominant canopy species and is potential Swift Parrot foraging habitat. The offset area comprises an area of potentially productive foraging habitat within the broad range of this highly mobile species but with no confirmed records on site or evidence of use by large numbers of individuals or of site fidelity.

Habitat for these species in the offset area is part of an extensive patch of native vegetation that encompasses the majority of the Northern and Southern buffer areas at DEOH and vegetation in the riparian corridor surrounding Blaxlands Creek and the demolitions range (see Figure 4). This patch of habitat is interrupted by frequent 10-50 metre wide gaps associated with clearing for access tracks, electricity easements, Defence infrastructure and former agricultural landuses. The Swift Parrot and Grey-headed Flying-fox are highly mobile species, so this would not limit opportunities for dispersal or recruitment or substantially increase the risk or energy cost of travelling to exploit foraging resources. The management of the offset area would realise a gain in the landscape score for this patch of habitat through revegetation of cleared land at the Offset Area and treatment of weed infestations to reduce threats to remnant vegetation.

The link between the qualitative assessment provided above and the quantitative site quality scores is described and scored in the 'Site quality score inputs' sheet of the Offset assessment guide spreadsheet provided to the auditor. The sheet includes site quality scores for the impact area at the WSI site and the 'current', 'future with offset' and 'future without offset' quality scores for the Offset Area. Values in the 'Site quality score inputs' sheet that relate to these various inputs to the offsets assessment guide calculations for the project are indicated in bold, along with a description of the attributes that define the given values at the WSI site or offset area.

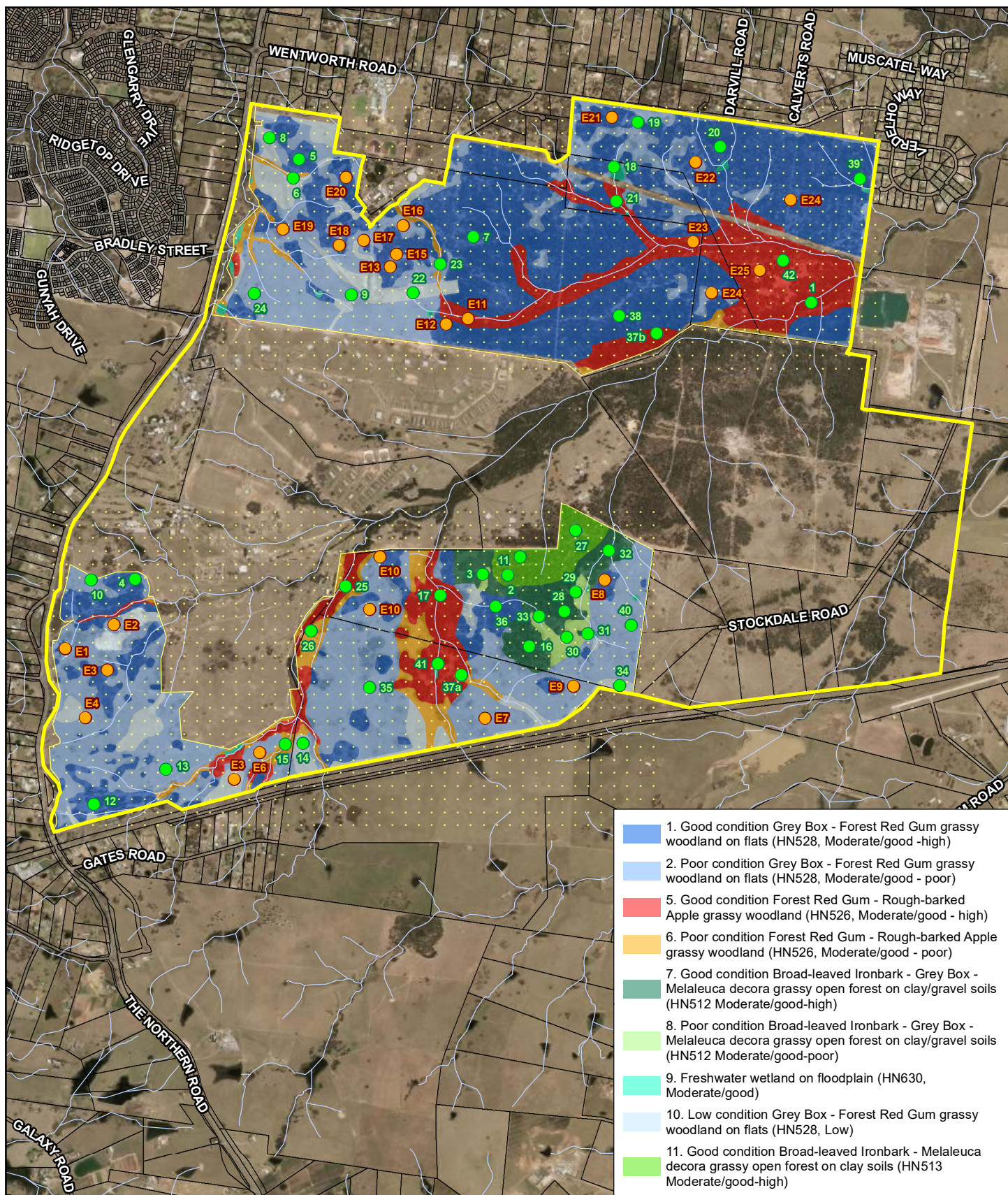
There are 54.5 hectares of Low condition vegetation at the Offset Area that does not comprise habitat for the affected threatened biota. These areas currently contain exotic grassland that would undergo full structural revegetation under the Offset Plan and would help improve habitat connectivity and the landscape context component of the site quality scores for the affected threatened biota. However this vegetation would not be expected to mature into a functioning occurrence of Cumberland Plain Woodland or productive Grey-headed Flying-fox and Swift Parrot foraging habitat in 20 years.

Matching biodiversity credits from all vegetation zones, including Low condition vegetation, comprise direct offsets for impacts on plants, animals and their habitat.

Vegetation zones and habitat for the affected threatened biota in the Orchard Hills Offset Area are summarised in Appendix Table 1. There is a further 27.7 hectares of land in the 947 hectare Offset Area that has not been mapped as vegetation zones because it is set aside for electricity easements or other purposes. This area would not be regenerated but would be managed to control weeds, pest fauna and other threats to biodiversity values.

Appendix Table 1 Vegetation zones, biodiversity credits and habitat for the affected threatened biota at the Orchard Hills Offset Area

Zone ID	Vegetation Zone	Veg type ID	Condition	EPBC Act offset area (ha)	Secured biodiversity credits	Area of EPBC Act Cumberland Plain Woodland (ha)	Area of poorer quality Cumberland Plain Woodland (ha)	Area of Habitat for Grey-headed Flying fox (ha)	Area of habitat for Swift Parrot (ha)	Area of habitat for <i>Pimelea spicata</i> (ha)
1	Good condition Grey Box - Forest Red Gum grassy woodland on flats (HN528, Moderate/good -high)	HN528	Moderate/good - high	345.1	5,164	342.1	2.9	345.1	345.1	0
2	Poor condition Grey Box - Forest Red Gum grassy woodland on flats (HN528, Moderate/good - poor)	HN528	Moderate/good - poor	296.3	5,373		296.4	0	0	0
10	Low condition Grey Box - Forest Red Gum grassy woodland on flats (HN528, Moderate/good - poor)	HN528	Low	54.5	877			0	0	0
5	Good condition Forest Red Gum - Rough-barked Apple grassy woodland (HN526, Moderate/good - high)	HN526	Moderate/good - high	123.1	1,862			123.1	123.1	0
6	Poor condition Forest Red Gum - Rough-barked Apple grassy woodland (HN526, Moderate/good - poor)	HN526	Moderate/good - poor	38.1	554			0	0	0
7	Poor condition Broad-leaved Ironbark - Grey Box - <i>Melaleuca decora</i> grassy open forest on clay/gravel soils (HN512 Moderate/good-high)	HN512	Moderate/good - high	31.2	477	31.2		31.2	31.2	0
8	Poor condition Broad-leaved Ironbark - Grey Box - <i>Melaleuca decora</i> grassy open forest on clay/gravel soils (HN512 Moderate/good-poor)	HN512	Moderate/good - poor	8.4	155		8.4	8.4	0	0
11	Good condition Broad-leaved Ironbark - <i>Melaleuca decora</i> grassy open forest on clay soils (HN513 Moderate/good-high)	HN513	Moderate/good - high	18.5	285			18.5	18.5	0
9	Freshwater wetland on floodplain (HN630, Moderate/good)	HN630	Moderate/good	4	53			0	0	0
	Total			919.2	14,800	373.3	307.7	517.9	517.9	0.0

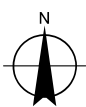


LEGEND

- Defence Establishment Orchard Hills
- EPBC Act offset area (946.8 ha)
- Cadastre
- Waterways
- Plot/transect
- Rapid site quality plot

EPBC Act Offset Area	7 - 31.2 ha
Veg Zone ID - Area	8 - 8.4 ha
1 - 345.1 ha	9 - 4.0 ha
2 - 296.3 ha	10 - 54.5 ha
5 - 123.1 ha	11 - 18.5 ha
6 - 38.1 ha	

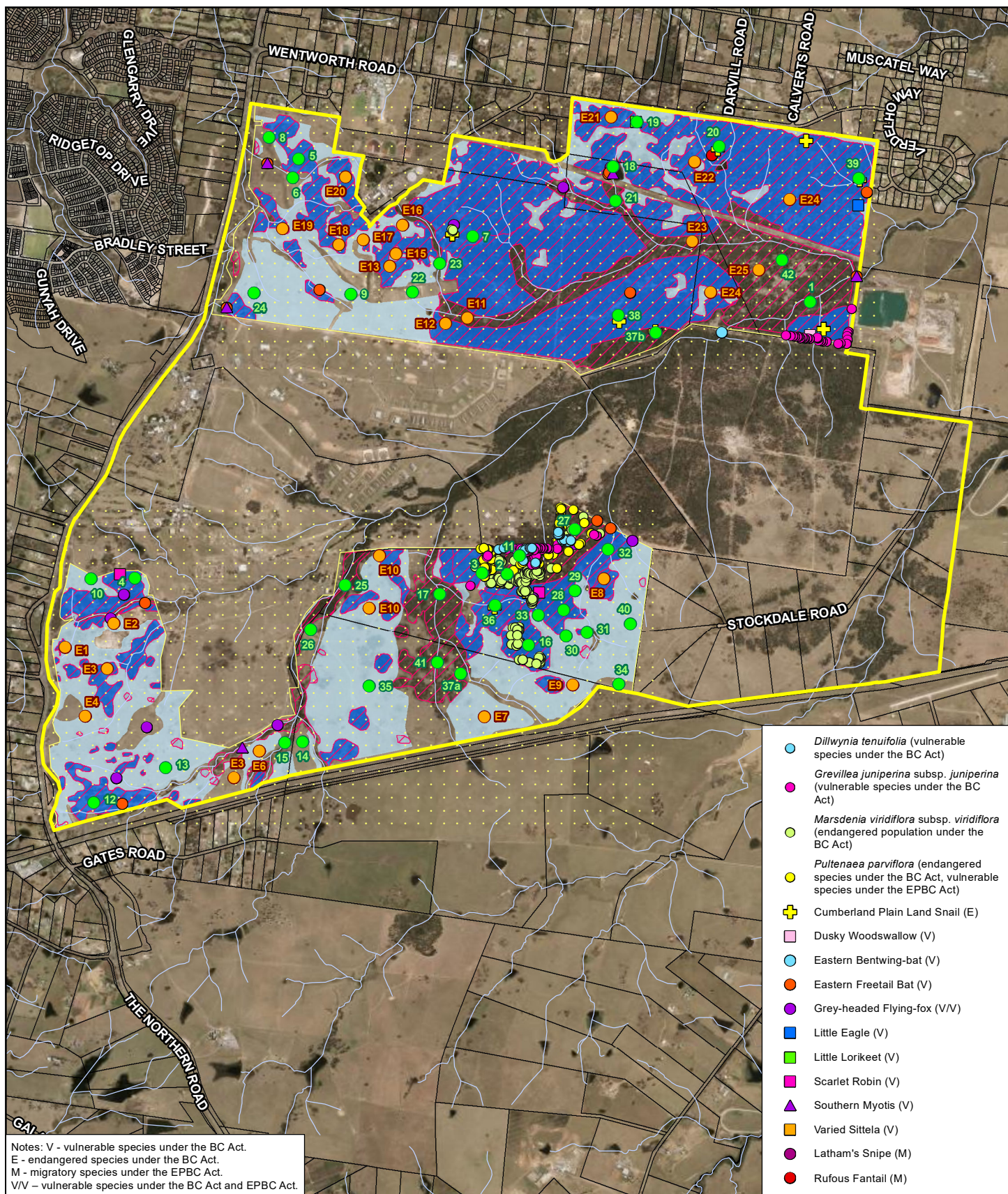
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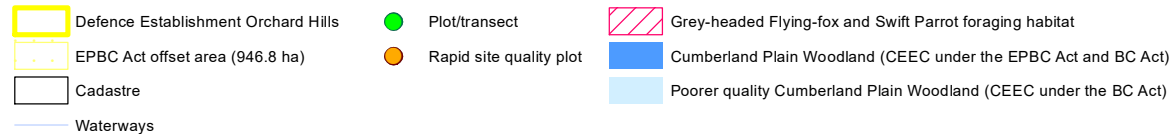
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**Orchard Hills
Vegetation**

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Date 28 Jan 2020

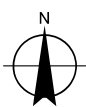
Figure 5



LEGEND



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Department of Infrastructure, Transport,
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2019 BODP Implementation Report

Orchard Hills
Threatened Biota and Habitat

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Figure 6

Quantum of offset for affected threatened biota

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented in Chapter 2 of the BODP (DIRD 2018), synthesis of data from the draft Initial Ecological Survey Report (GHD in prep a) and EPBC Act survey of the offset area according to the approach presented in the approved BODP, as described above. Draft EPBC Act offset assessment guide spreadsheets have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs. The final EPBC Act offset assessment guide spreadsheets will be submitted for independent verification along with the final draft Initial Ecological Survey Report.

The MOU between Defence and Infrastructure has secured a 947 hectare EPBC Act offset area at DEOH that contains the following quantum of direct offset for affected threatened biota:

- 373.35 hectares of Cumberland Plain Woodland with a start site quality score of 7 and a future site quality score with offset of 9 that would contribute 60.98 per cent of the offset requirement for the community.
- 307.66 hectares of poorer quality Cumberland Plain Woodland with a start site quality score of 4 and a future site quality score with offset of 6 that would contribute 49.22 per cent of the offset requirement for the community.
- 517.90 hectares of Grey-headed Flying-fox habitat with a start site quality score of 7 and a future site quality score with offset of 8 that would contribute 78.26 per cent of the offset requirement for the species.
- 517.90 hectares of Swift Parrot foraging habitat with a start site quality score of 5 and a future site quality score with offset of 6 that would contribute 51.57 per cent of the offset requirement for the species.

Quantum of offset for plants, animals and their habitat

The Initial Ecological Survey has been completed to support an assessment of the biodiversity values of the Offset Area and BBAM credit calculations as the means of quantifying offset contributions for plants, animals and their habitat. This approach allows direct comparison with the FBA and credit calculations included in the BODP.

The BioBanking credit calculations were completed by Ben Harrington (assessor accreditation number 0073) using the BBAM 2014 and credit calculator Version 4.0. The calculator case has been shared with the independent verifier along with the Initial Ecological Survey report.

Ecosystem credits generated at the Orchard Hills offset area are summarised in Appendix Table 2. Species credits generated at the Orchard Hills offset area are summarised in Appendix Table 3. All of these credits are secured as direct offsets for WSI under the MOU between Defence and Infrastructure.

Appendix Table 2 Ecosystem credits generated at the Orchard Hills Offset Area

Veg code	Management zone	Zone ID	Zone area (ha)	Landscape Value score	Current site value	Future site value	Gain in site value	Averted loss in site value	Number of ecosystem credits created	Notes
HN528	Maintain and enhance Good condition Grey Box - Forest Red Gum grassy woodland on flats (HN528, Moderate/good -high)	MZ1	345.1	32.5	67.63	89.37	21.74	5.62	5,164	
HN528	Targeted supplementary planting in Poor condition Grey Box - Forest Red Gum grassy woodland on flats (HN528, Moderate/good - poor)	MZ2	296.3	32.5	35.51	72.46	36.95	3.08	5,373	Inclusive of active restoration gain associated with supplementary planting of overstorey and mid storey.
HN528	Revegetation in Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	MZ10	54.5	32.5	23.91	55.07	31.16	0.72	877	Inclusive of active restoration gain associated with supplementary planting of overstorey and mid storey.
HN528	Total		695.9						11,414	
HN526	Maintain and enhance Good condition Forest Red Gum - Rough-barked Apple grassy woodland (HN526, Moderate/good - high)	MZ5	123.1	32.5	58.85	82.29	23.44	4.56	1,862	
HN526	Targeted supplementary planting in Poor condition Forest Red Gum - Rough-barked Apple grassy woodland (HN526, Moderate/good - poor)	MZ6	38.1	32.5	32.81	56.25	23.44	2.21	554	Inclusive of active restoration gain associated with supplementary planting of overstorey and mid storey.
HN526	Total		161.2						2,416	
HN512	Maintain and enhance Broad-leaved Ironbark - Grey Box - <i>Melaleuca decora</i> grassy open forest on clay/gravel soils (HN512, Moderate/good – high)	MZ7	31.2	32.5	74.4	95.65	21.25	7.43	477	
HN512	Targeted supplementary planting in Broad-leaved Ironbark - Grey Box - <i>Melaleuca decora</i> grassy open forest on clay/gravel soils (HN512, Moderate/good – poor)	MZ8	8.4	32.5	37.68	75.36	37.68	3.44	155	Inclusive of active restoration gain associated with supplementary planting of overstorey and mid storey.
HN513	Maintain and enhance Broad-leaved Ironbark - <i>Melaleuca decora</i> shrubby open forest on clay soils (HN513, Moderate/good – high)	MZ11	18.5	32.5	76.09	97.83	21.74	7.43	285	
HN512/ HN513	Total		58.1						917	
HN630	Maintain and enhance <i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands (HN630 Moderate/good)	MZ9	4	32.5	71.01	85.51	14.5	6.16	53	

Appendix Table 3 Species credits generated at the Orchard Hills Offset Area

Common name	Scientific name	Threatened species multiplier	Individuals / area available at offset site	Species credits
Cumberland Plain Land Snail	<i>Meridolum corneovirens</i>	1.3	517.9	3,677
<i>Dillwynia tenuifolia</i>	<i>Dillwynia tenuifolia</i>	1.8	72	511
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> – endangered population	4.0	2,528	17,949
<i>Pultenaea parviflora</i>	<i>Pultenaea parviflora</i>	1.5	1,318	9,358
Southern Myotis	<i>Myotis macropus</i>	2.2	168.7	1,198
<i>Grevillea juniperina</i>	<i>Grevillea juniperina</i>	1.5	188	1,335

Lot 502 Roscrea Drive biobank

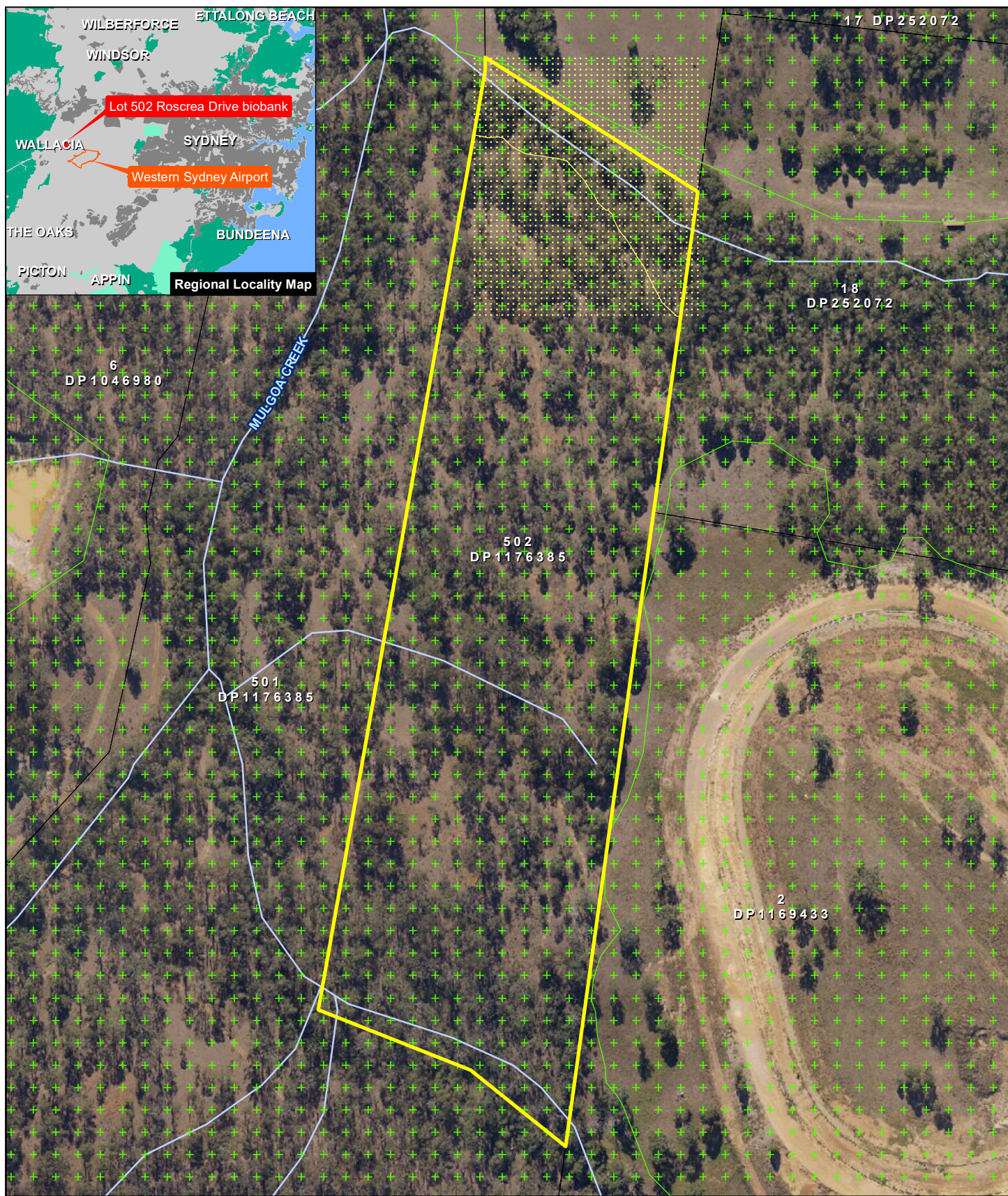
Overview of the proposal

The 'Lot 502 Roscrea Drive biobank' offset site is biodiversity stewardship site (BSS, biobank at the time the site was assessed and named) that has been subject to a detailed field survey and BioBanking assessment by accredited assessors and has been set aside for conservation under a Biodiversity Stewardship Agreement (BSA) (Agreement ID 256). The description of the site presented below is based on the information presented in the BioBanking assessment report for the site (GHD 2017b).

A portion of the site has been secured as a direct offset for WSI through the purchase of six biodiversity credits by Infrastructure in March 2019. The equivalent EPBC Act offset area for WSI was calculated based on credit generation rates per hectare as summarised in Appendix Table 4. The six biodiversity credits that have been purchased have secured a 0.6 hectare EPBC Act offset area as shown on Figure 7. Shape files delimiting this offset area were provided to Environment within three months of securing the offset in accordance with the Airport Plan conditions. Environment have confirmed that there are no other EPBC Act offset areas registered over this parcel of land.

The Lot 502 Roscrea Drive biobank includes a total of 7.7 hectares of land and is located at Mulgoa within the Penrith City Council Local Government Area (LGA). It falls within the Hawkesbury Nepean Catchment Management Authority (CMA), and within the Sydney Basin Bioregion. The offset area is currently zoned RU2 Rural Landscape under the *Wollondilly Local Environment Plan 2011* and was previously used for grazing cattle.

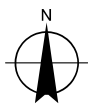
The Lot 502 Roscrea Drive biobank includes areas of woodland and forest that are mapped within a regional wildlife corridor (OEH 2015a). Conservation of the Lot 502 Roscrea Drive biobank site has ensured the protection and management of core areas of habitat within a recognised regional wildlife corridor as well as increasing the extent and connectivity of habitat through the regeneration of poorer condition vegetation.



LEGEND

- Lot 502 Roscrea Drive biobank (agreement ID 256)
- EPBC Act offset area (0.6ha)
- Priority conservation lands (BIO Map)
- Cadastre
- Waterways

Paper Size A4
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Metres
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Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Lot 502 Roscrea Drive Biobank Offset Area

Figure 7

Existing environment of the offset area

Field surveys completed for the approved BioBanking assessment confirmed the presence and distribution of two plant community types (PCTs, equivalent to NSW vegetation types under BioBanking) at the site. The stands of these PCTs are in moderate/good condition (according to the BBAM).

The distribution of the vegetation zones in the site is mainly tied to geomorphic position. There are areas of Grey Box – Forest Red Gum grassy woodland on shale (HN528) on lower undulating slopes and flatter areas of the site. Forest Red Gum – Rough-barked Apple grassy woodland (HN526) occurs on sheltered alluvial flats and in narrow gullies. Both vegetation types have been cleared, grazed and subject to weed infestation to varying degrees. There is only one vegetation zone in the Lot 502 Roscrea Drive EPBC Act offset area: Moderate/good-medium condition Forest Red Gum – Rough-barked Apple grassy woodland (HN526), as shown on Figure 8.

The moderate/good- medium condition Forest Red Gum – Rough-barked Apple grassy woodland (HN526) features a canopy dominated by Forest Red Gum (*Eucalyptus tereticornis*). Forest Red Gum is a highly productive species in the blossom diet of the Grey-headed Flying-fox (Eby and Law 2008). Forest Red Gum scores in the upper quartile of all diet plants for the region for productivity and reliability of flowering. This species flowers in late winter and spring, partly during the food bottleneck for the Grey-headed Flying-fox. Habitat at the offset area would be productive during food bottlenecks and as such qualifies as habitat critical to the survival of the species, as defined in the draft recovery plan (DECCW 2009).

Forest Red Gum is also identified as a key Swift Parrot food tree in the Sydney Metro and Hawkesbury-Nepean areas within the non-breeding range of the species (Saunders and Tzaros 2011). The offset area comprises an area of potentially productive foraging habitat within the broad range of this highly mobile species but with no confirmed records on site or evidence of use by large numbers of individuals or of site fidelity. There are scattered records of the species across the Cumberland Plain, but limited evidence of any concentration of records at any locations and very few records of the species in south-western Sydney (OEH 2018a). A broad-scale habitat map prepared for the Greater Southern Sydney Region identifies the largest area of habitat for the Swift Parrot within the Burragorang Valley with smaller patches around Glenmore, west of Liverpool, and around Wedderburn (DECC 2007).

All of the 0.6 hectare offset area contains an over storey of Forest Red Gum and other food trees and comprises foraging habitat for the Grey-headed Flying-fox and Swift Parrot (see Figure 9). Habitat for these species in the offset area is part of a fragmented, rural landscape. The Swift Parrot and Grey-headed Flying-fox are highly mobile species, so this would not limit opportunities for dispersal or recruitment or substantially increase the risk or energy cost of travelling to exploit foraging resources. However, adjoining areas are dominated by exotic vegetation, including many noxious and environmental weeds that pose a threat to remnant patches of native vegetation and the productivity of food species.

The link between the qualitative assessment provided above and the quantitative site quality scores is described and scored in the 'Site quality score inputs' sheet of the Offset assessment guide spreadsheet provided to the auditor. The sheet includes site quality scores for the impact area at the WSI site and the 'current', 'future with offset' and 'future without offset' quality scores for the offset area. Values in the table that relate to these various inputs to the offsets assessment guide calculations for the project are indicated in bold, along with a description of the attributes that define the given values at the WSI site or offset area.

There is no Cumberland plain Woodland or occupied *Pimelea spicata* habitat at the offset area.

High threat exotic weeds occur in low numbers across the offset area and include African Olive (*Olea europea* subsp. *cuspidata*), Lantana (*Lantana camara*). Fireweed (*Senecio madagascariensis*) is scattered throughout the offset area.

Much of the offset area has been grazed and canopy vegetation has been extensively cleared or thinned historically. Mature canopy and mid-storey vegetation has re-established across Forest Red Gum – Rough-barked Apple grassy woodland (HN526) in the offset area.

A summary of the ecosystem credits that have been purchased for WSI and the associated type and extent of habitat for the affected threatened biota in the 0.6 hectare Lot 502 Roscrea Drive biobank offset area is summarised in Appendix Table 4.

Plot/transect data within the EPBC Act offset area that was collected for the Roscrea Drive Biobanking Assessment is shown in Appendix Table 5 below.

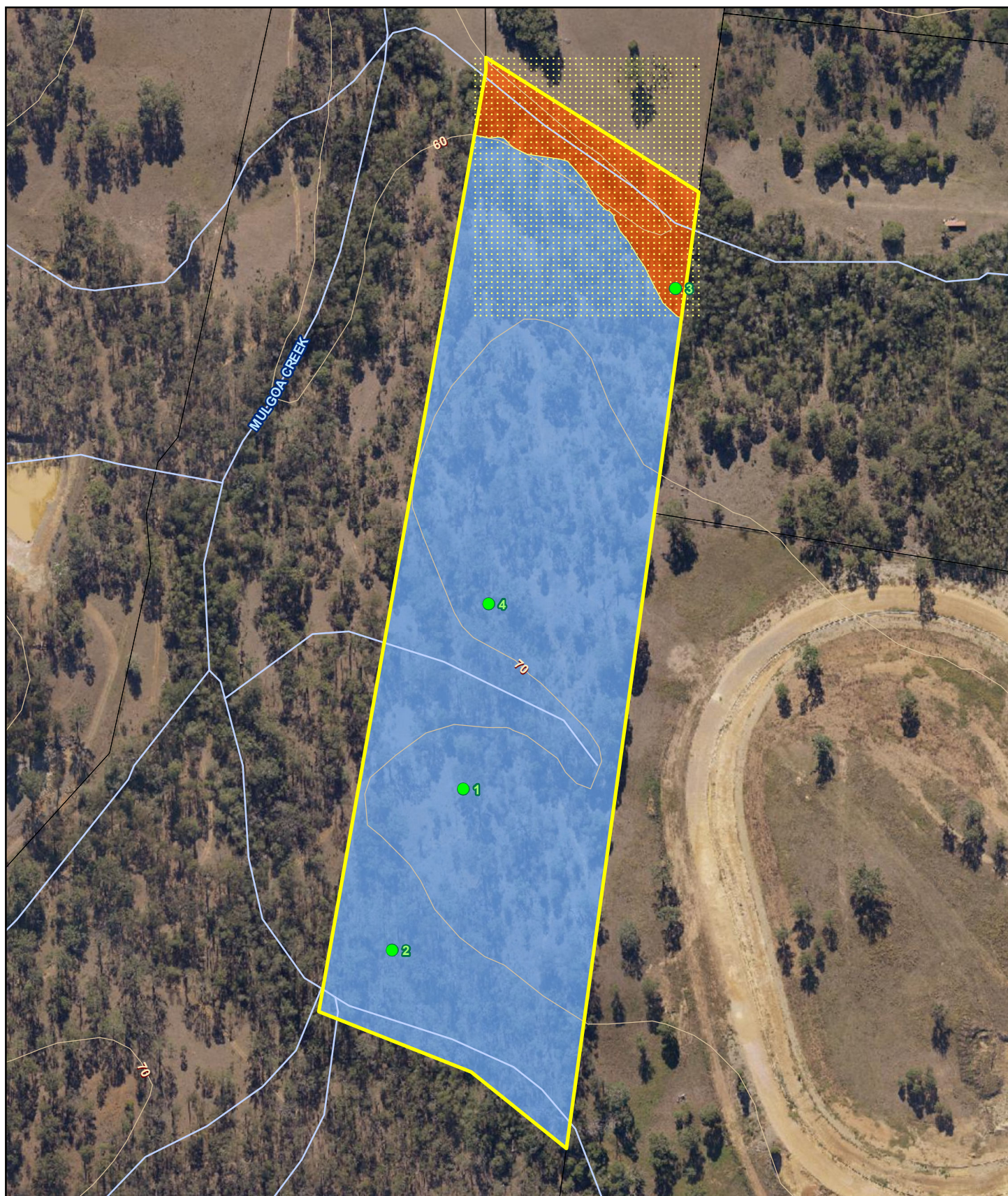
Appendix Table 4 Vegetation zones, biodiversity credits and habitat for the affected threatened biota at the Lot 502 Roscrea Drive biobank offset area

Vegetation Zone	Veg Type ID	Condition	EPBC Act Status	BC Act Status	Total Area (ha)	Total credits	Credits per hectare	Secured credits	EPBC Act offset area (ha)	Area of EPBC Act Cumberland Plain Woodland ¹ (ha)	Area of poorer quality Cumberland Plain Woodland (ha)	Area of habitat for Grey-headed Flying fox ² (ha)	Area of habitat for Swift Parrot (ha)	Area of habitat for <i>Pimelea spicata</i> (ha)
Forest Red Gum – Rough-barked Apple grassy woodland	HN526	Moderate/good		EEC	0.6	6	10.0	6	0.6	0	0	0.6	0.6	0
Grey Box - Forest Red Gum grassy woodland on flats	HN528	Moderate/good	CEEC	EEC	7.1	103	14.5	0	0	0	0	0	0	0
		Total			7.7	109		6	0.6	0	0	0.6	0.6	0

Appendix Table 5 Plot/transects within the EPBC offset area at the Lot 502 Roscrea Drive Biobank

Veg Zone ID	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Native groundcover ¹	Exotic ground cover	Exotic plant cover	Number of trees with hollows	Over storey regeneration	Total length of fallen logs
Swift Parrot and Grey-headed Flying-fox habitat														
1	HN526	Benchmark	24	27.5-32.5	21-31	24.45-30.45	0-10	24.45-30.45	-		0	> = 1	1	> = 50
		3	28	27	16	68	4	36	90	12	12	0	1	15

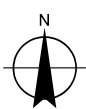
Notes: 1. The percentage proportion of native groundcover relative to total groundcover including exotic vegetation. 2. Exotic plant cover comprises the highest exotic cover within a single strata



LEGEND

- | | | |
|-------------------------------|----------------|---|
| Lot 502 Roscrea Drive biobank | Contours (10m) | 1 - Forest Red Gum – Rough-barked Apple grassy woodland (HN526_Moderate/good) |
| EPBC Act offset area (0.6ha) | Plot/transect | 2 - Grey Box - Forest Red Gum grassy woodland on flats (HN528_Moderate/good) |
| Cadastre | | |
| Waterways | | |

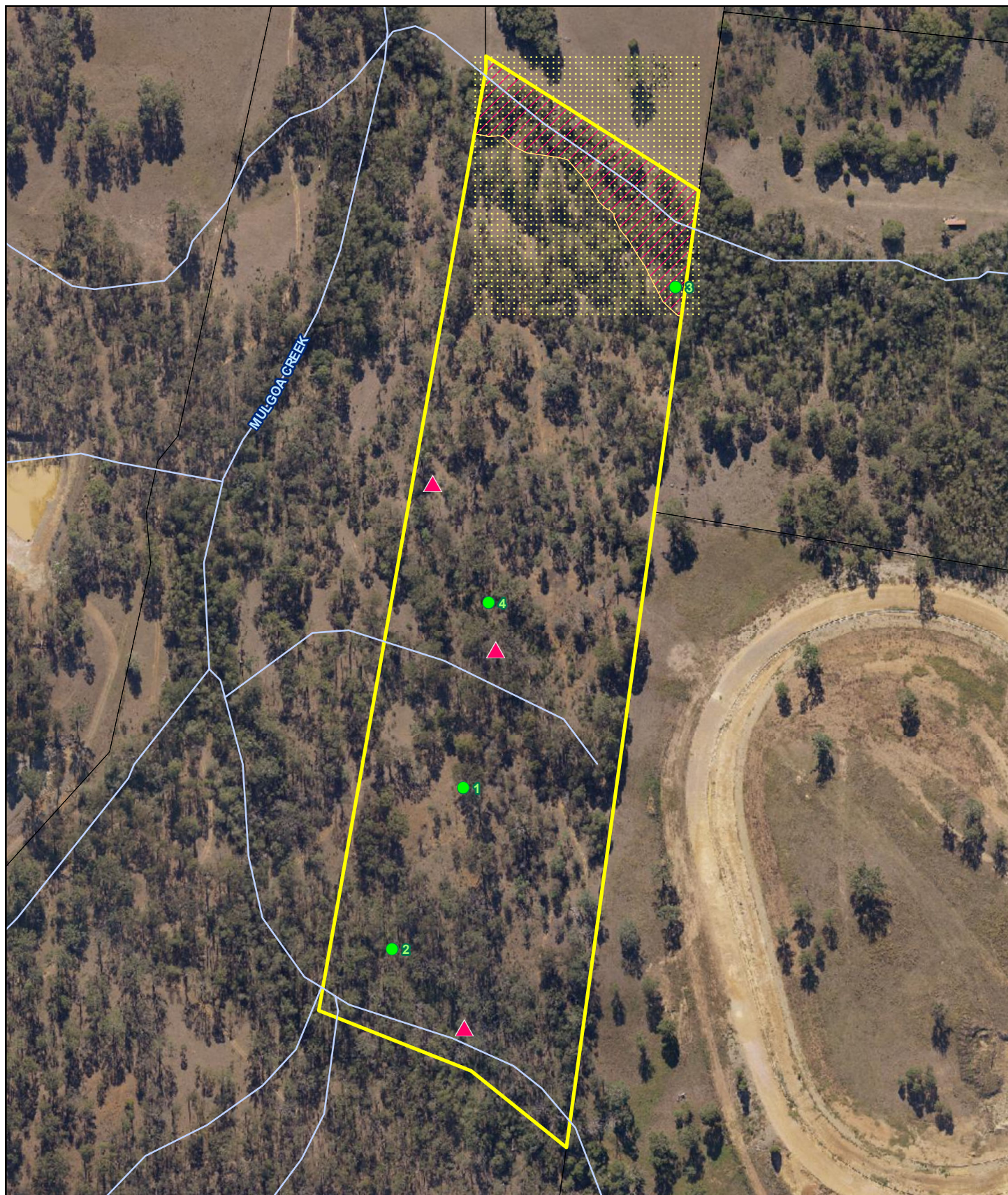
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Grid: GDA 1994 MGA Zone 56



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**Lot 502 Roscrea Drive Biobank
Vegetation Zones**

Job Number	21-26204-11
Revision	A
Date	30 Jan 2020

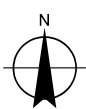
Figure 8



LEGEND

- Lot 502 Roscrea Drive biobank
- EPBC Act offset area (0.6ha)
- Cadastre
- Waterways
- Plot/transect
- ▲ Cumberland Plain Land Snail
- Grey-headed Flying-fox and Swift Parrot foraging habitat

Paper Size A4
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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



Department of Infrastructure, Transport,
Regional Development and Communications
2019 BODP Implementation Report
Lot 502 Roscrea Drive Biobank
Threatened Biota and Habitat

Job Number 21-26204-11
Revision A
Date 30 Jan 2020

Figure 9

Quantum of offset

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented in Chapter 2 of the BODP (DIRD 2018) and synthesis of data from the previous BioBanking assessment (GHD 2017b) according to the approach presented in the approved BODP, as described in section 1.6.1. EPBC Act offset assessment guide spreadsheets have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

The six biodiversity credits that have been purchased have secured a 0.6 hectare EPBC Act offset area at the Lot 702 Roscrea biobank that contains the following quantum of direct offset for WSI:

- 0.6 hectares of Grey-headed Flying-fox habitat with a start site quality score of 6 and a future site quality score with offset of 7 that would contribute 0.07 % of the offset requirement for the species.
- 0.6 hectares of Swift Parrot foraging habitat with a start site quality score of 5 and a future site quality score with offset of 6 that would contribute 0.04% of the offset requirement for the species.
- The biodiversity credits summarised in Appendix Table 4 as direct offsets for impacts on plants, animals and their habitat.

Montpelier biobanks

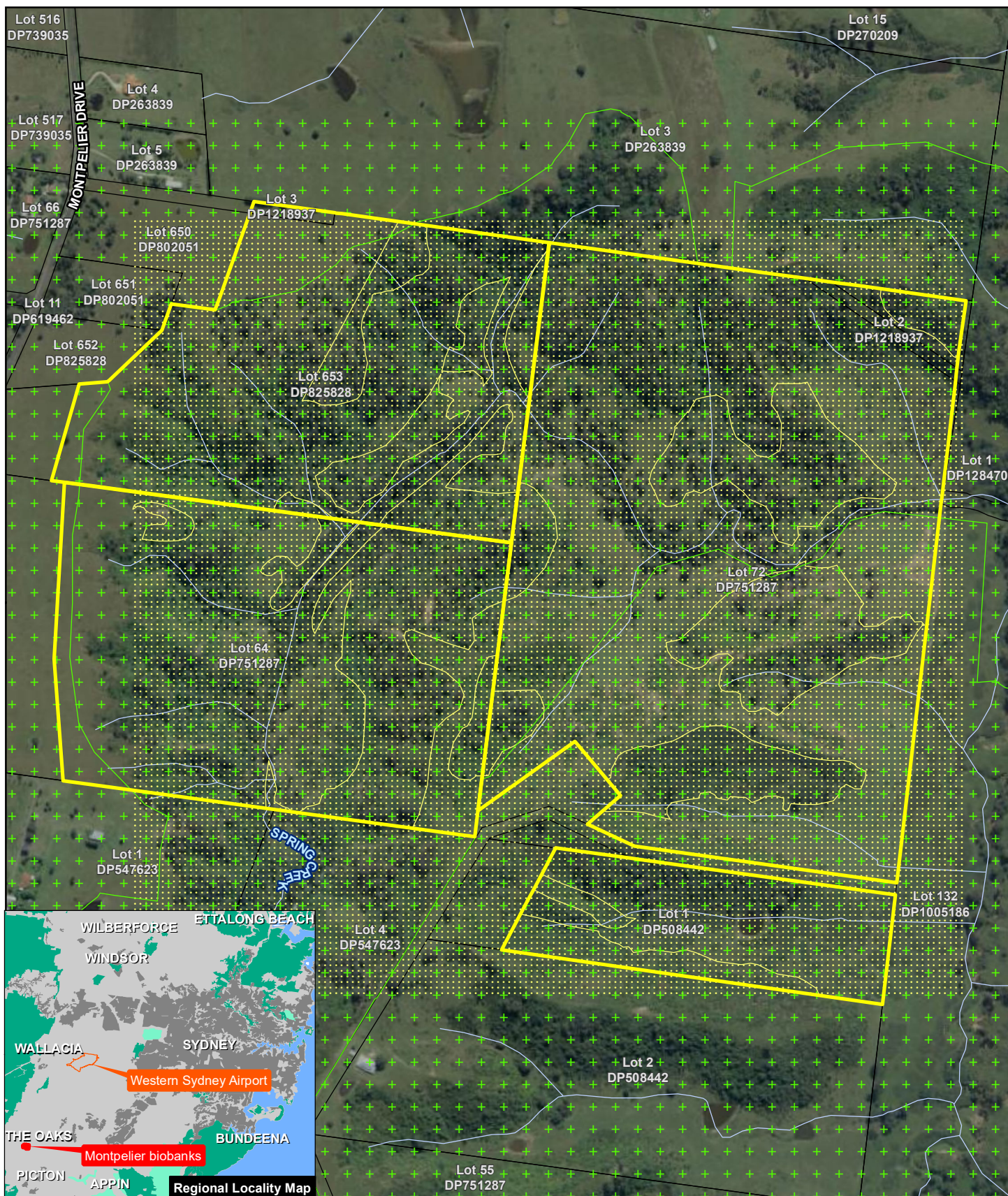
Overview of the proposal

The 'Montpelier biobanks' offset site comprises four biobanks that have been subject to detailed field survey and BioBanking assessments and have been set aside for conservation under BSAs (Agreement IDs 399,358,235 and 336). The Montpelier biobanks offset area has been secured as a direct offset for WSI through the purchase of 528 biodiversity credits by Infrastructure in March 2019.

The equivalent EPBC Act offset area for WSI was calculated based on credit generation rates per hectare as summarised in Appendix Table 6. The 528 biodiversity credits that have been purchased have secured a 37.3 hectare EPBC Act offset area as shown on Figure 10. Shape files delimiting this offset area were provided to Environment within three months of securing the offset in accordance with the Airport Plan conditions. Environment have confirmed that there are no other EPBC Act offset areas registered over this parcel of land. The description of the site presented below is based on the information presented in the BioBanking assessment reports for the Montpelier Biobanks (GHD 2015a; 2018a) and supplementary EPBC Act surveys by GHD ecologists in January 2020.

The Montpelier Biobank offset area is located around five kilometres south of the village of The Oaks within the Wollondilly LGA. It falls within the Hawkesbury Nepean Catchment Management Authority CMA region, and within the Sydney Basin Bioregion. The offset area is currently zoned RU2 Rural Landscape under the *Wollondilly Local Environment Plan 2011*.

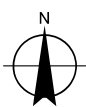
The Montpelier biobanks include areas of woodland and forest that are mapped as Cumberland Plain Priority Conservation Lands in the recovery plan for Cumberland Plain Woodland (DECCW 2010, 2011) and forms part of a regional wildlife corridor (OEH 2015a). Conservation of the Montpelier Biobank offset area has ensured the protection and management of core areas of habitat within a recognised regional wildlife corridor as well as increasing the extent and connectivity of habitat through the regeneration of poorer condition vegetation.



LEGEND

- Montpellier biobanks (agreement IDs 399, 358, 235, 336)
- EPBC Act offset area (37.4 ha)
- Priority conservation lands (BIO Map)
- Cadastre
- Waterways

Paper Size A4
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Grid: GDA 1994 MGA Zone 56



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Montpelier Biobanks Offset Area

Figure 10

Existing environment of the offset area

Field surveys completed for the approved BioBanking assessment confirmed the presence and distribution of four PCTs at the biobanks. The stands of these PCTs are in varying condition (according to the BBAM) and were split into broad condition classes yielding seven vegetation zones. Vegetation zones at the Montpelier offset area are presented in Figure 11 and habitat for the affected threatened biota in Figure 12.

The distribution of vegetation zones at the site is mainly tied to geomorphic position. More exposed slopes and ridges support Grey Box – Forest Red Gum grassy woodland on shale (HN529). Moderate/good- medium condition patches of this PCT comprise an occurrence of the EPBC Act form of Cumberland Plain Woodland. This PCT grades into Forest Red Gum – Grey Box shrubby woodland (HN524) in steeper or more sheltered areas, which is distinguished from adjoining grassy woodlands on shale by the presence of a denser shrub layer and mesic understorey species. These PCTs give way to Grey Myrtle dry rainforest (HN538) in narrow gullies. Each of these PCTs have been cleared, grazed and subject to weed infestation to varying degrees with areas of Moderate/good- medium, Moderate/good – poor and Low condition vegetation.

Much of the site has been grazed and canopy vegetation has been extensively cleared or thinned historically. Mid-storey vegetation has since re-established across the majority of the site though there are very few over storey species in areas of poor or low condition vegetation. There are mature hollow-bearing trees in low to moderate densities throughout areas of Moderate/good – medium condition vegetation at the site. There are no hollow-bearing trees within areas of poor or low condition vegetation. There is considerable scope to improve the biodiversity values of the site through treatment of weed infestations and development of vegetation structure and habitat resources.

There are moderate to severe infestations of noxious weeds, such as Lantana (*Lantana camara*), Blackberry (*Rubus* species) and especially African Olive (*Olea europaea* subsp. *cuspidata*), which form a dense mid storey in many parts of the site. Other high threat exotic weeds present on site in lower numbers include Small-leaved Privet (*Ligustrum sinense*), Fireweed (*Senecio madagascariensis*), African Boxthorn (*Lycium ferocissimum*), Bridal Creeper (*Asparagus asparagoides*), Green Cestrum (*Cestrum parqui*), Moth Vine (*Araujia sericifera*) and Prickly Pear (*Opuntia stricta*). At the time of the 2020 field survey primary weed control had been completed across around 50 % of the offset area as part of its management under BSAs. Lantana and African Olive had been slashed and mulched and some follow up treatment completed. Regeneration and total ground cover of both native and exotic species was low and/or senescent reflecting drought conditions at the time of the survey.

Vegetation zones and habitat for the affected threatened biota in the 37.3 ha Montpelier biobanks offset area are summarised in Appendix Table 6.

Plot/transect data within the EPBC Act offset area that was collected for the Montpelier Biobanking Assessments is shown in Appendix Table 7 below.

Supplementary surveys were conducted at the Montpelier biobanks and other offset areas in October 2019 and January 2020 to confirm the extent and quality of habitat for the affected threatened biota in accordance with the EPBC Act offset policy and relevant listing and conservation advice (EPBC Act surveys).

The EPBC Act survey confirmed that the Montpelier biobanks offset area contains 33.6 hectares of vegetation that comprises an occurrence of the EPBC Act listed form of Cumberland Plain Woodland; specifically, woodland that is part of a patch greater than five hectares in area, with >10% over storey cover of Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), shale-derived soils and >30% of the total ground cover composed of perennial native plants as defined in the listing advice for the community (TSSC 2008). There are portions of the mapped area with less than 10 % over storey cover, including patches sampled by plot/transects as shown in Appendix Table 7. These areas represent fine scale variation in over storey cover as a result of historical clearing and regeneration. The EPBC Act survey, including mapping of habitat for the affected threatened biota and sampling of rapid assessment plots, confirmed that there was at least 10 % over storey cover of characteristic canopy species when averaged across the mapped area of Cumberland Plain Woodland shown on Figure 12.

There was at least 70% native groundcover and less than 28% total exotic cover sampled in plot/transects at the time of the BioBanking assessments as shown in Appendix Table 4. The EPBC Act survey revealed highly variable but generally low groundcover reflecting the prevailing severe drought conditions at the time of the survey as well as the effects of primary weed control in recent months. Overall the survey data for the site suggested that at least >30% of the total ground cover present was perennial native plants, meeting the criteria for a patch of the community greater than five hectares in area and containing important trees as defined in the listing advice for the community (TSSC 2008).

The Montpelier biobanks offset area, and the other offset areas described below, contain areas of derived native scrub or grassland that feature predominantly native vegetation with intact soil profiles, high native species richness, high resilience and by virtue of these attributes, high conservation significance. These patches of Cumberland Plain Woodland do not currently meet the condition criteria for the EPBC Act-listed form of the community because the native over storey cover is less than 10%, however they meet the other condition attributes for the community, including greater than 30% perennial native groundcover and connectivity to a patch of at least 0.5 hectares of EPBC Act Cumberland Plain Woodland or contiguous with a native vegetation remnant at least five hectares in area (see DEWHA 2010). When purposefully managed for conservation, suitable recovery and management actions may improve these patches of poorer quality Cumberland Plain Woodland to the point that they can be regarded as part of the ecological community listed under the EPBC Act (TSSC 2008) and reach at least the same site quality score as the impact area, in accordance with the EPBC Act Offsets Policy (DSEWPaC 2012). These areas have mapped as 'poorer quality Cumberland Plain Woodland' and presented as a direct offset for the community based on the justification provided below.

The guide to identifying and protecting EPBC Act Cumberland Plain Woodland notes that appropriate management of patches that do not meet the condition thresholds may still play an important ecological role, especially where they are linking native vegetation remnants in the landscape and contributing to the future viability of listed patches of the ecological community (DEWHA 2010). Both patches that meet the condition thresholds and those that do not should be considered in recovery and other management actions (DEWHA 2010). This approach is consistent with the Commonwealth listing advice for Cumberland Plain Woodland, which notes that if a patch does not meet the condition criteria, suitable recovery and management actions may improve it to the point that it can be regarded as part of the ecological community listed under the EPBC Act (TSSC 2008). The listing advice also notes that 'derived grasslands and shrublands can be quite easily recovered to meet the Description and Condition Thresholds for the listed ecological community through planting of key canopy tree species and ongoing management actions' (TSSC 2008, p.5). In line with the listing advice, only derived native grassland and scrub with predominantly native groundcover, high resilience and the capacity for assisted natural regeneration have been included as poorer quality Cumberland Plain Woodland in offset calculations.

The poorer quality Cumberland Plain Woodland at the offset areas could be managed and improved to at least the same condition as the community at the airport site in the medium to long term, through the intensive treatment of weed infestations and exclusion of grazing to permit regeneration of over storey vegetation and supplementary planting where appropriate. The aims of this management would be to achieve restoration of vegetation that comprises EPBC Act Cumberland Plain Woodland, specifically vegetation with greater than 10% canopy cover and predominantly native groundcover in accordance with the condition criteria specified in the conservation and listing advice for the community (TSSC 2008, DEWHA 2010).

Monitoring of regeneration of poorer condition Cumberland Plain Woodland without a canopy in the Royal Botanic Gardens at Mount Annan revealed:

- Recovery of mid-storey plants (mainly Native Blackthorn) after five to seven years in areas where they had been suppressed by grazing.
- Significant declines in exotic groundcover after 15 years.
- Regeneration of canopy species and growth up to eight metres after 17 years in areas of adequate water supply (Royal Botanic Gardens & Domain Trust undated). The Commonwealth listing advice notes that the canopy in regrowth stands of EPBC Act Cumberland Plain Woodland may be shorter than 10 metres tall (TSSC 2008). Based on the results at Mount Annan, twenty years is likely to be sufficient to achieve natural regeneration over broad areas and for regenerating *Eucalyptus* to mature into over-storey vegetation.

The 'time until ecological benefit' in the final offsets assessment guide calculations (that is the time period required to achieve the probable increase in site quality score and/or decline in site quality without management) will be set at 20 years (compared to 10 years for EPBC Act Cumberland Plain Woodland). Twenty years is the expected time it takes to establish an offset site under a Biodiversity Management Plan, complete primary weed control and other management activities, complete supplementary planting where appropriate, achieve natural regeneration and for regenerating *Eucalyptus* to mature into over storey vegetation.

There are 3.6 hectares of poorer quality Cumberland Plain Woodland at the Montpelier biobanks that comprises derived grassland or scrub which could be managed to improve in quality and become EPBC Act Cumberland Plain Woodland. These areas have minimal canopy cover at present and do not contain minimal foraging resources for the Grey-headed Flying Fox and Swift Parrot. They contained predominantly native ground cover at the time of the BioBanking assessment and the EPBC Act survey in 2020. There are patches of high total exotic plant cover across the site but this mainly comprises Lantana or African Olive in the mid storey, above leaf litter and a patchy but predominantly native ground layer. The poorer quality Cumberland Plain Woodland at the Montpelier biobanks is adjacent to patches of the community and similar vegetation with a woodland or forest structure that provides a source of seed for natural regeneration of over storey vegetation (see Figure 11 and Figure 12). Supplementary planting of over storey species is proposed and funded under the BSAs for these areas (GHD 2015a; 2018a).

The offset area contains 33.6 hectares of Grey-headed Flying-fox and Swift Parrot foraging habitat associated with the area of Cumberland Plain Woodland. This area contains a canopy of the important food tree Forest Red Gum and other *Eucalyptus* species in the blossom diet of the Grey-headed Flying-fox (Eby and Law 2008) and comprise critical habitat for the species (DEWHA 2010). Forest Red Gum is also identified as a key Swift Parrot food tree in the Sydney Metro and Hawkesbury-Nepean areas within the non-breeding range of the species (Saunders and Tzaros 2011). The offset area comprises an area of potentially productive foraging habitat within the broad range of this highly mobile species but with no confirmed records on site or evidence of use by large numbers of individuals or of site fidelity.

All of the 33.6 hectares of woodland at the offset area contains an over storey of Forest Red Gum and other food trees and comprises foraging habitat for the Grey-headed Flying-fox and Swift Parrot (see Figure 12). Up to 25% cover of Forest Red Gum was confirmed in EPBC Act site quality plots sampled across patches of habitat for these species and the species is broadly distributed as a co-dominant canopy species across the offset area.

Habitat for these species in the offset area is part of fragmented, rural landscape. Within this matrix the offset area is part of a large, near continuous patch of habitat including vegetation within the four biobanks that contribute to the offset area and connected native vegetation in the riparian corridor of Spring Creek. This patch of habitat is interrupted by frequent 10-50 metre wide gaps associated with clearing for agriculture. The Swift Parrot and Grey-headed Flying-fox are highly mobile species, so this would not limit opportunities for dispersal or recruitment or substantially increase the risk or energy cost of travelling to exploit foraging resources. However, adjoining areas are dominated by exotic vegetation, including many noxious and environmental weeds that pose a threat to remnant patches of native vegetation and the productivity of food species. The management of the offset area would realise a gain in the landscape score for this patch of habitat through revegetation of cleared land at the sites and treatment of weed infestations to reduce threats to remnant vegetation.

The link between the qualitative assessment provided above and the quantitative site quality scores is described and scored in the 'Site quality score inputs' sheet of the Offset assessment guide spreadsheet provided to the auditor. The sheet includes site quality scores for the impact area at the WSI site and the 'current', 'future with offset' and 'future without offset' quality scores for the offset area. Values in the table that relate to these various inputs to the offsets assessment guide calculations for the project are indicated in bold, along with a description of the attributes that define the given values at the WSI site or offset area.

Matching biodiversity credits from all vegetation zones, including Low condition vegetation, comprise direct offsets for impacts on plants, animals and their habitat.

Appendix Table 6 Vegetation zones, biodiversity credits and habitat for the affected threatened biota at the Montpelier biobanks offset area

Site	Vegetation Zone	Veg Type ID	Condition	EPBC Act Status	BC Act Status	Total Area (ha)	Total credits	Credits per hectare	Secured biodiversity credits	EPBC Act offset Area (ha)	Area of EPBC Act Cumberland Plain Woodland ¹ (ha)	Area of poorer quality Cumberland Plain Woodland (ha)	Area of Habitat for Grey-headed Flying fox ² (ha)	Area of habitat for Swift Parrot (ha)	Area of habitat for <i>Pimelea spicata</i> (ha)
Lot 1	Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good - poor		CEEC	2.49	25	10.0	25	2.5	0	2.5	0	0	0
Lot 72	Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good - poor		CEEC	9.88	128	13.0	15	1.2	0	1.2	0	0	0
Lot 72	Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good - medium	CEEC	CEEC	15.79	238	15.1	238	15.8	15.8	0	15.8	15.8	0
Lot 64	Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good - medium	CEEC	CEEC	13.59	195	14.3	153	10.7	10.7	0	10.7	10.7	0
Lot 653	Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good - medium	CEEC	CEEC	11.84	160	13.5	97	7.2	7.2	0	7.2	7.2	0
			Total			141.8 ¹	1715 ¹		528	37.3	33.6	3.6	33.6	33.6	0.0

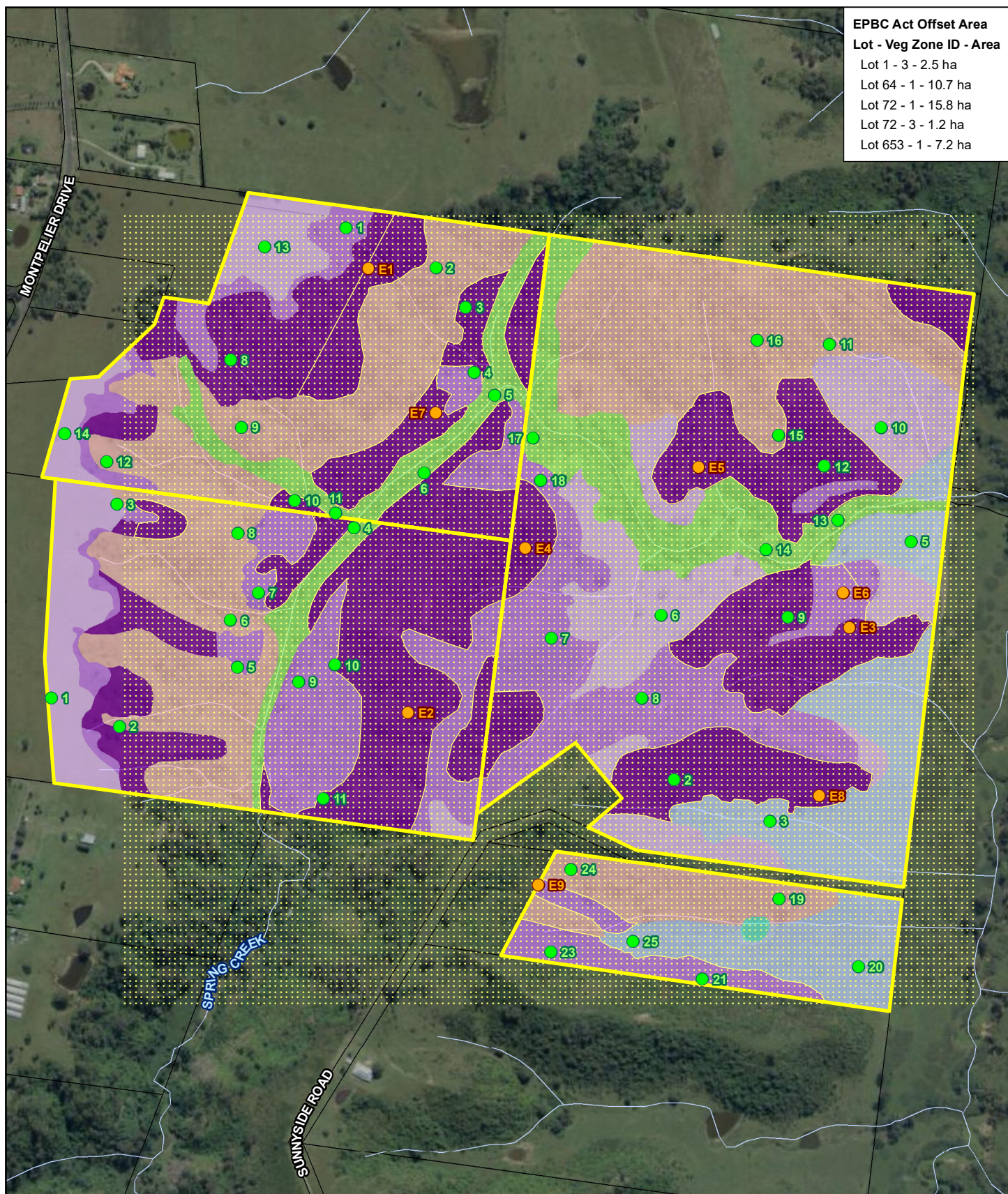
Notes: 1. The total for the site, including land outside the offset area and vegetation zones in addition to those listed above.

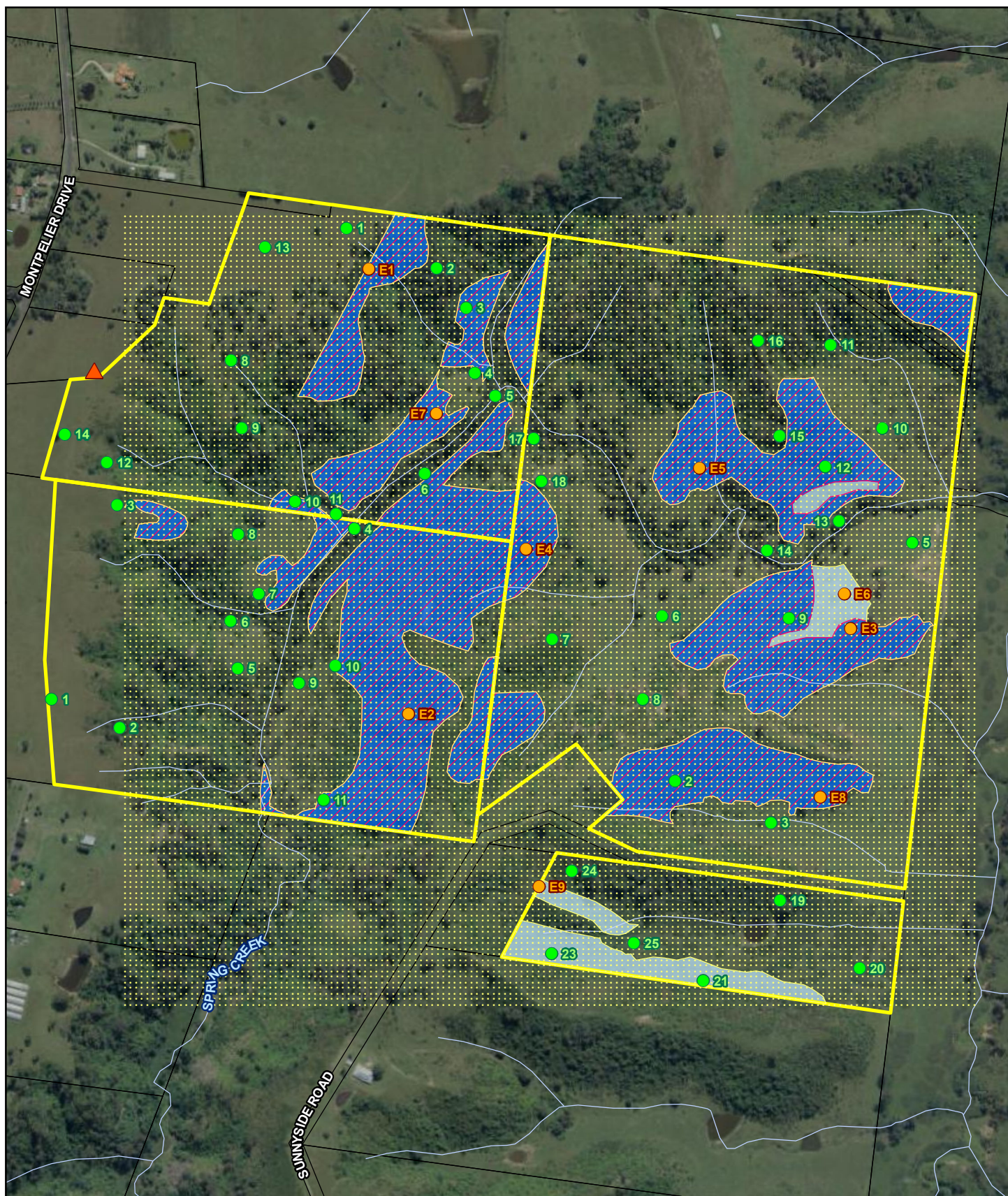
Appendix Table 7 Plot/transects within EPBC offset area at Montpelier Biobanks

Vegetation Zone	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Percentage native ground cover ¹	Exotic ground cover	Exotic plant cover ²	Number of trees with hollows	Over storey regeneration	Total length of fallen logs
Swift Parrot and Grey-headed Flying-fox habitat/EPBC Act Cumberland Plain Woodland														
1	HN529	Benchmark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75			0	> = 0	1	> = 0
	Mod-good medium	Lot 72 - 2	27	9	13.5	46	4	18	70.8	28	28	1	1	9
		Lot 72 - 9	30	3.5	17	44	6	32	77.4	24	24	2	1	18
		Lot 72 - 12	29	34	4	18	0	60	71.6	14	31	1	1	16
		Lot 64 - 10	18	22.5	57.5	64	8	34	84.5	16	19.5	0	1	5
		Lot 64 - 11	17	15	62.5	52	4	54	87.0	14	16.5	0	1	2
		Lot 653 - 3	26	3.5	9.5	28	4	62	71.2	14	38	0	1	0
		Lot 653 -10	32	1	20	34	0	54	78.6	24	24	0	1	0
Poorer quality Cumberland Plain Woodland														
3	HN529	Benchmark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75			0	> = 0	1	> = 0
	Mod-good poor	Lot 10 - 21	17	0	39.5	38	0	14	52.0	48	48	0	0	0
		Lot 10 - 23	26	0	6.5	32	2	24	48.9	26	60.5	0	0	0

Notes: 1. The percentage of native groundcover as a proportion of the total groundcover (including exotic groundcover) recorded within plots.

2. Exotic plant cover comprises the highest exotic cover within a single strata.

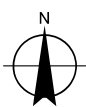




LEGEND

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|--------------------------------|--|--|
| Montpelier biobanks | Plot/transect | Grey-headed Flying-fox and Swift Parrot foraging habitat |
| EPBC Act offset area (37.4 ha) | Rapid site quality plot | Cumberland Plain Woodland (CEEC under the EPBC Act and BC Act) |
| Cadastre | Little Eagle (<i>Hieraaetus morphnoides</i>) | Poorer quality Cumberland Plain Woodland (CEEC under the BC Act) |
| Waterways | | |

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Metres
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Grid: GDA 1994 MGA Zone 56



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Montpelier Biobanks Threatened Biota and Habitat

Figure 12

Quantum of offset

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented in Chapter 2 of the BODP (DIRD 2018) synthesis of data from the previous BioBanking assessment (GHD 2015a; 2018a) and EPBC Act survey of the offset area according to the approach presented in the approved BODP, as described in section 1.6.1. EPBC Act offset assessment guide spreadsheets have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

The 528 biodiversity credits that have been purchased have secured a 37.3 hectare EPBC Act offset area at the Montpelier biobanks that contains the following quantum of direct offset for WSI:

- 33.6 hectares of Cumberland Plain Woodland with a start site quality score of 6 and a future site quality score with offset of 8 that would contribute 4.26 per cent of the offset requirement for the community.
- 3.6 hectares of poorer quality Cumberland Plain Woodland with a start site quality score of 4 and a future site quality score with offset of 6 that would contribute 0.26 per cent of the offset requirement for the community.
- 33.6 hectares of Grey-headed Flying-fox habitat with a start site quality score of 7 and a future site quality score with offset of 8 that would contribute 6.42 per cent of the offset requirement for the species.
- 33.6 hectares of Swift Parrot foraging habitat with a start site quality score of 5 and a future site quality score with offset of 6 that would contribute 2.17 per cent of the offset requirement for the species.
- The biodiversity credits summarised in Appendix Table 6 as direct offsets for impacts on plants, animals and their habitat.

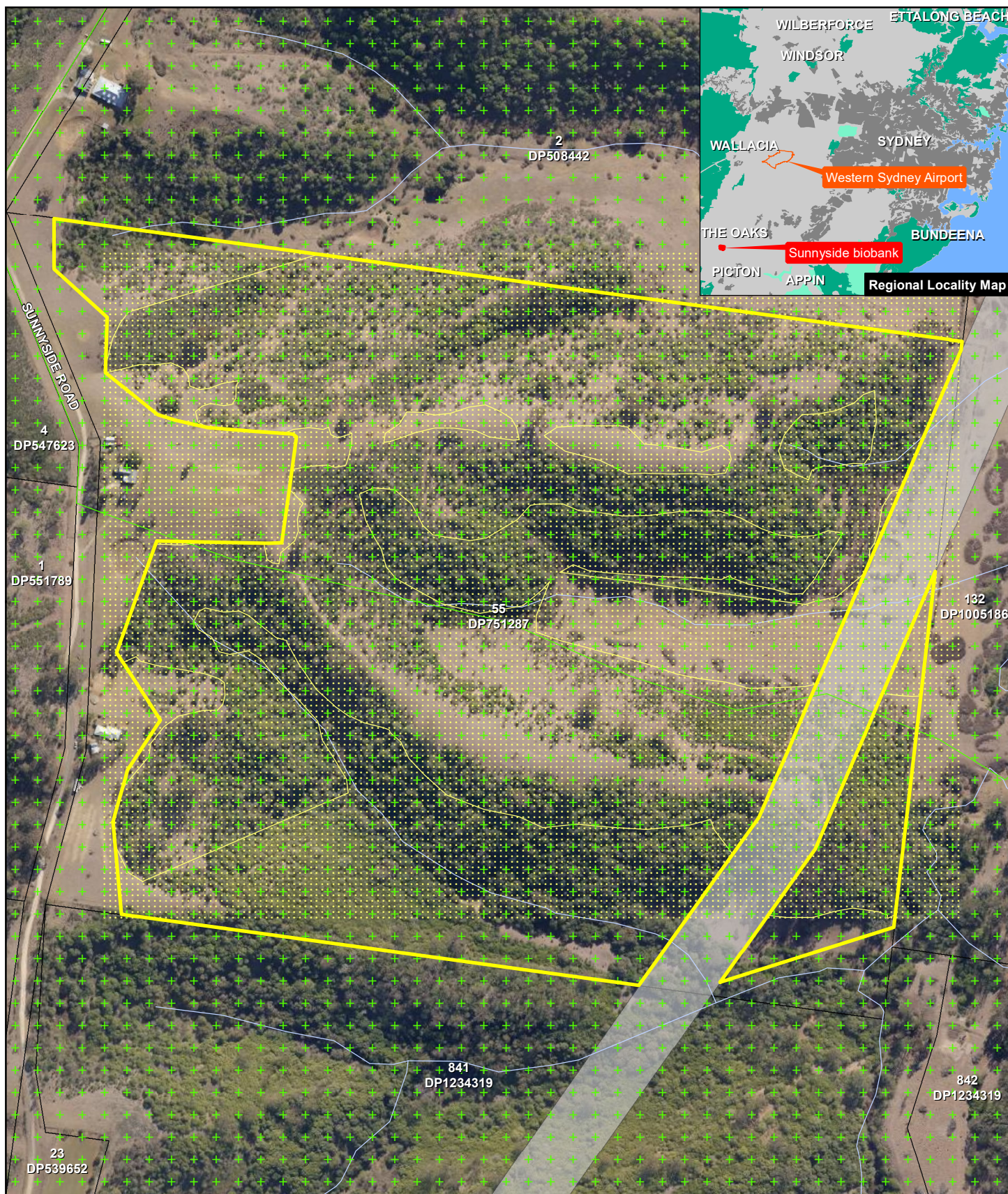
Sunnyside biobank

Overview of the proposal

The Sunnyside biobank has been subject to a detailed field survey and BioBanking assessment by accredited assessors and has been set aside for conservation under a BSA (Agreement ID 321). The Sunnyside biobank offset area has been secured as a direct offset for WSI through the purchase of 295 biodiversity credits by Infrastructure in March 2019. The 295 biodiversity credits that have been purchased have secured a 26.9 hectare EPBC Act offset area as shown on Figure 13. Shape files delimiting this offset area were provided to Environment within three months of securing the offset in accordance with the Airport Plan conditions. Environment have confirmed that there are no other EPBC Act offset areas registered over this parcel of land. The description of the site presented below is based on the information presented in the BioBanking assessment report for the Sunnyside biobank (GHD 2018c) and supplementary EPBC Act surveys by GHD ecologists in October 2019.

The Sunnyside biobank is 43.7 hectares in area and is located around five kilometres south of the village of The Oaks within the Wollondilly LGA. It falls within the Hawkesbury Nepean Catchment Management Authority CMA region, and within the Sydney Basin Bioregion. The offset area is currently zoned RU2 Rural Landscape under the *Wollondilly Local Environment Plan 2011*.

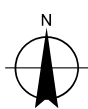
The Sunnyside biobank includes areas of woodland and forest that are mapped as Cumberland Plain Priority Conservation Lands in the recovery plan for Cumberland Plain Woodland (DECCW 2010, 2011) and is in a regional wildlife corridor (OEH 2015a). Conservation of the Sunnyside biobank offset area has ensured the protection and management of core areas of habitat within a recognised regional wildlife corridor as well as increasing the extent and connectivity of habitat through the regeneration of poorer condition vegetation.



LEGEND

- Sunnyside biobank (agreement ID 321)
- Cadastre
- EPBC Act offset area (26.9 ha)
- Waterways
- Priority conservation lands (BIO Map)
- Easement

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Grid: GDA 1994 MGA Zone 56



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Sunnyside Biobank Offset Area

Figure 13

Existing environment of the offset area

Field surveys completed for the approved BioBanking assessment confirmed the presence and distribution of four PCTs at the site. The stands of these PCTs are in varying condition (according to the BBAM) and were split into broad condition classes yielding six vegetation zones. Vegetation zones at the Sunnyside offset area are presented in Figure 14 and habitat for the affected threatened biota in Figure 15. The Sunnyside EPBC Act offset area comprises a large portion of the moderate/good-poor condition and all of the moderate/good-medium condition Grey Box – Forest Red Gum grassy woodland (HN529) at the site.

The distribution of vegetation zones in the site is mainly tied to geomorphic position. More exposed slopes and ridges support Grey Box – Forest Red Gum grassy woodland (HN529). This PCT grades into Forest Red Gum – Grey Box shrubby woodland (HN524) in steeper or more sheltered areas, which is distinguished from adjoining grassy woodlands on shale by the presence of a denser shrub layer and mesic understorey species. Sheltered slopes with substantial rock outcrop support Grey Myrtle dry rainforest (HN538). There is an occurrence of Grey Box – Forest Red Gum grassy woodland on shale (HN528) on the lower undulating slopes and flatter area of the site.

There are moderate to severe infestations of high threat exotic weeds, such as African Olive (*Olea europaea* subsp. *cuspidata*) across much of the site. This species forms a dense midstorey in many parts of the site. Other high threat exotic weeds present on site in lower numbers include Lantana (*Lantana camara*), Blackberry (*Rubus fruticosus* spp. agg.) and Bridal Creeper (*Asparagus asparagoides*).

Much of the site has been grazed and canopy vegetation has been extensively cleared or thinned historically. Mid-storey vegetation has since re-established across portions of the site though there are very few over storey species in areas of poor or low condition vegetation. There are sparsely scattered hollow-bearing trees throughout the site.

Vegetation zones and habitat for the affected threatened biota in the 26.9 ha Sunnyside biobank offset area are summarised Appendix Table 8.

Plot/transect data within the EPBC Act offset area that was collected for the Sunnyside Biobanking Assessment is shown in Appendix Table 9 below.

The offset area does not contain any EPBC Act Cumberland Plain Woodland that could be counted as a direct offset for impacts to this community at WSI. There are localised patches with >10 per cent over storey cover of characteristic canopy species, shale-derived soils and >50 per cent perennial native plants in the groundcover as defined in the listing advice for the community (TSSC 2008). As shown in Appendix Table 9, plot/transects 1 and 6 featured 18 per cent and 10 per cent over storey cover respectively but plot/transect 8 contained just 2 per cent cover (GHD). These data are indicative of occasional patches of mature over storey vegetation in a matrix of derived scrub. The EPBC Act survey, including habitat mapping and sampling of rapid site quality plots confirmed that each patch of treed vegetation was less than 0.5 hectares in area, or are associated with isolated trees such that when over storey cover is averaged across the total area of equivalent vegetation the cover is less than 10 per cent.

In addition to the patchy woodland remnants described above, the Sunnyside biobank offset area contains areas of derived native scrub or grassland that do not currently meet the condition criteria for the EPBC Act-listed form of the community because the native over storey cover is less than 10%, however they meet the other condition attributes for the community, including greater than 30% perennial native groundcover and connectivity to a native vegetation remnant at least five hectares in area (see DEWHA 2010). There is 26.9 hectares of 'poorer quality Cumberland Plain Woodland' at the offset area (see Figure 15) including 5 hectares comprising small patches of woodland and 21.9 hectares of derived grassland and scrub as summarised in Appendix Table 9.

Poorer quality Cumberland Plain Woodland will be managed for conservation and improve in condition to comprise an occurrence of the ecological community listed under the EPBC Act (TSSC 2008) and reach at least the same site quality score as the impact area, in accordance with the EPBC Act Offsets Policy (DSEWPaC 2012). The poorer quality Cumberland Plain Woodland at the offset areas could be managed and improved to at least the same condition as the community at the WSI site in the medium to long term, through the intensive treatment of weed infestations and exclusion of grazing to permit regeneration of over storey vegetation and supplementary planting where appropriate. The aims of this management would be to achieve restoration of vegetation that comprises EPBC Act Cumberland Plain Woodland, specifically vegetation with greater than 10% canopy cover and predominantly native groundcover in accordance with the condition criteria specified in the conservation and listing advice for the community (TSSC 2008, DEWHA 2010).

Around 3.6 hectares of the total area of Moderate/good- medium condition Grey Box – Forest Red Gum grassy woodland (HN529) within the Sunnyside EPBC Act offset area contains a canopy of the important seasonally productive food tree Forest Red Gum and other species in the blossom diet of the Grey-headed Flying-fox (Eby and Law 2008). Forest Red Gum is also identified as a key Swift Parrot food tree in the Sydney Metro and Hawkesbury-Nepean areas within the non-breeding range of the species (Saunders and Tzaros 2011). The offset area comprises an area of potentially productive foraging habitat within the broad range of this highly mobile species but with no confirmed records on site or evidence of use by large numbers of individuals or of site fidelity.

All of the 3.6 hectares of treed vegetation at the offset area contains an over storey of Forest Red Gum and other food trees and comprises foraging habitat for the Grey-headed Flying-fox and Swift Parrot (see Figure 15). Up to 30 per cent cover of Forest Red Gum was confirmed in EPBC Act site quality plots sampled across the total area of 3.6 hectares of habitat for these fauna and it is broadly distributed as patches of remnant trees across the offset area.

Grey-headed Flying-fox and Swift Parrot foraging habitat in the offset area is part of a fragmented, rural landscape. Within this matrix the offset area is part of a large, near continuous patch of native vegetation including the remainder of the Sunnyside biobank, connected native vegetation in the riparian corridor of Spring Creek and the four Montpelier biobanks to the north. Treed habitat containing foraging resources frequently occurs as smaller patches within a matrix of derived grassland or scrub. Patches of habitat are interrupted by frequent 10-50 metre wide gaps associated with clearing for agriculture and transmission line easements. The Swift Parrot and Grey-headed Flying-fox are highly mobile species, so this would not limit opportunities for dispersal or recruitment or substantially increase the risk or energy cost of travelling to exploit foraging resources. However, adjoining areas are dominated by exotic vegetation, including many noxious and environmental weeds that pose a threat to remnant patches of native vegetation and the productivity of food species. The management of the offset area would realise a gain in the landscape score for this patch of habitat through revegetation of cleared land at the site and treatment of weed infestations to reduce threats to remnant vegetation.

The link between the qualitative assessment provided above and the quantitative site quality scores is described and scored in the 'Site quality score inputs' sheet of the Offset assessment guide spreadsheet provided to the auditor. The sheet includes site quality scores for the impact area at the WSI site and the 'current', 'future with offset' and 'future without offset' quality scores for the offset area. Values in the table that relate to these various inputs to the offsets assessment guide calculations for the project are indicated in bold, along with a description of the attributes that define the given values at the WSI site or offset area.

Matching biodiversity credits from all vegetation zones, including Low condition vegetation, comprise direct offsets for impacts on plants, animals and their habitat.

Appendix Table 8 Vegetation zones, biodiversity credits and habitat for the affected threatened biota at the Sunnyside biobank offset area

Vegetation Zone	Veg Type ID	Condition	EPBC Act Status	BC Act Status	Total Area (ha)	Total credits	Credits per hectare	Secured biodiversity credits	EPBC Act offset area (ha)	Area of EPBC Act Cumberland Plain Woodland ¹ (ha)	Area of poorer quality Cumberland Plain Woodland (ha)	Area of Habitat for Grey-headed Flying fox ² (ha)	Area of habitat for Swift Parrot (ha)	Area of habitat for <i>Pimelea spicata</i> (ha)
Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good - medium		CEEC	5	67	13.4	67	5.0	0	5	3.6	3.6	0
Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good - poor		CEEC	26.44	275	10.4	228	21.9	0	21.9	0	0	0
		Total			43.67¹	470¹		295	26.9	0	26.9	3.6	3.6	0

Notes: 1. The total for the site, including land outside the offset area and vegetation zones in addition to those listed above.

Appendix Table 9 Plot/transects within EPBC offset area at Sunnyside Biobank (GHD)

Veg Zone ID	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Native groundcover 1	Exotic groundcover	Exotic plant cover 2	Number of trees with hollows	Over storey regeneration	Total length of fallen logs
Swift Parrot and Grey-headed Flying-fox habitat/ Poorer quality Cumberland Plain Woodland														
1	HN529	Benchmark	29	18.5-23.5	20-30	23-31	0-5	11.8-19.8			0	> = 0	1	> = 0
	Mod/good-medium	1	13	10	0	4	0	8	27	26	82	0	0.5	11
		6	17	18	16	58	2	42	63	62	62	1	0.5	40
		8	20	2	17	70	0	50	47	46	46	1	0.5	15
Poorer quality Cumberland Plain Woodland														
2	HN529	Benchmark	29	18.5-23.5	20-30	23-31	0-5	11.8-19.8			0	> = 0	1	> = 0
	Mod/good-poor	5	28	2	24.5	26	0	40	37	36	56	1	0.25	10
		9	21	0	33.5	56	0	58	47	46	46	0	0.25	0
		10	18	0	36	38	6	30	33	32	68	0	0.25	0
		13	11	0	15.5	40	0	62	69	68	68	0	0.25	0

Notes: 1. The percentage of native groundcover as a proportion of the total groundcover (including exotic groundcover) recorded within plots.

2. Exotic plant cover comprises the highest exotic cover within a single strata.



LEGEND

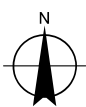
- Sunnyside biobank
- EPBC Act offset area (26.9 ha)
- Easement
- Cadastre
- Waterways
- Plot/transect
- Rapid site quality plot

EPBC Act Offset Area

Veg Zone ID - Area

- 1 - 5.0 ha
- 2 - 21.9 ha

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Metres
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Sunnyside Biobank Vegetation Zones

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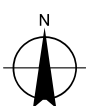
Figure 14



LEGEND

- | | | |
|---|--|---|
| Sunnyside biobank | — Waterways | Grey-headed Flying-fox and Swift Parrot foraging habitat |
| EPBC Act offset area (26.9 ha) | ● Plot/transect | Poorer quality Cumberland Plain Woodland (CEEC under the BC Act) |
| Easement | ● Rapid site quality plot | |
| Cadastre | ▲ Cumberland Plain Land Snail | |

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Sunnyside Biobank Threatened Biota and Habitat

Figure 15

Quantum of offset

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented Chapter 2 of the BODP (DIRD 2018) and the approach presented in the approved BODP, as described above. EPBC Act offset assessment guide spreadsheets have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

The 295 biodiversity credits that have been purchased have secured a 26.9 hectare EPBC Act offset area at the Sunnyside biobank that contains the following quantum of direct offset for WSI:

- 26.9 hectares of poorer quality Cumberland Plain Woodland with a start site quality score of 4 and a future site quality score with offset of 6 that would contribute 1.98 per cent of the offset requirement for the community.
- 3.56 hectares of Grey-headed Flying-fox habitat with a start site quality score of 7 and a future site quality score with offset of 7 that would contribute 0.45 per cent of the offset requirement for the species.
- 3.56 hectares of Swift Parrot foraging habitat with a start site quality score of 5 and a future site quality score with offset of 6 that would contribute 0.23 per cent of the offset requirement for the species.
- The biodiversity credits summarised in Appendix Table 8 as direct offsets for impacts on plants, animals and their habitat.

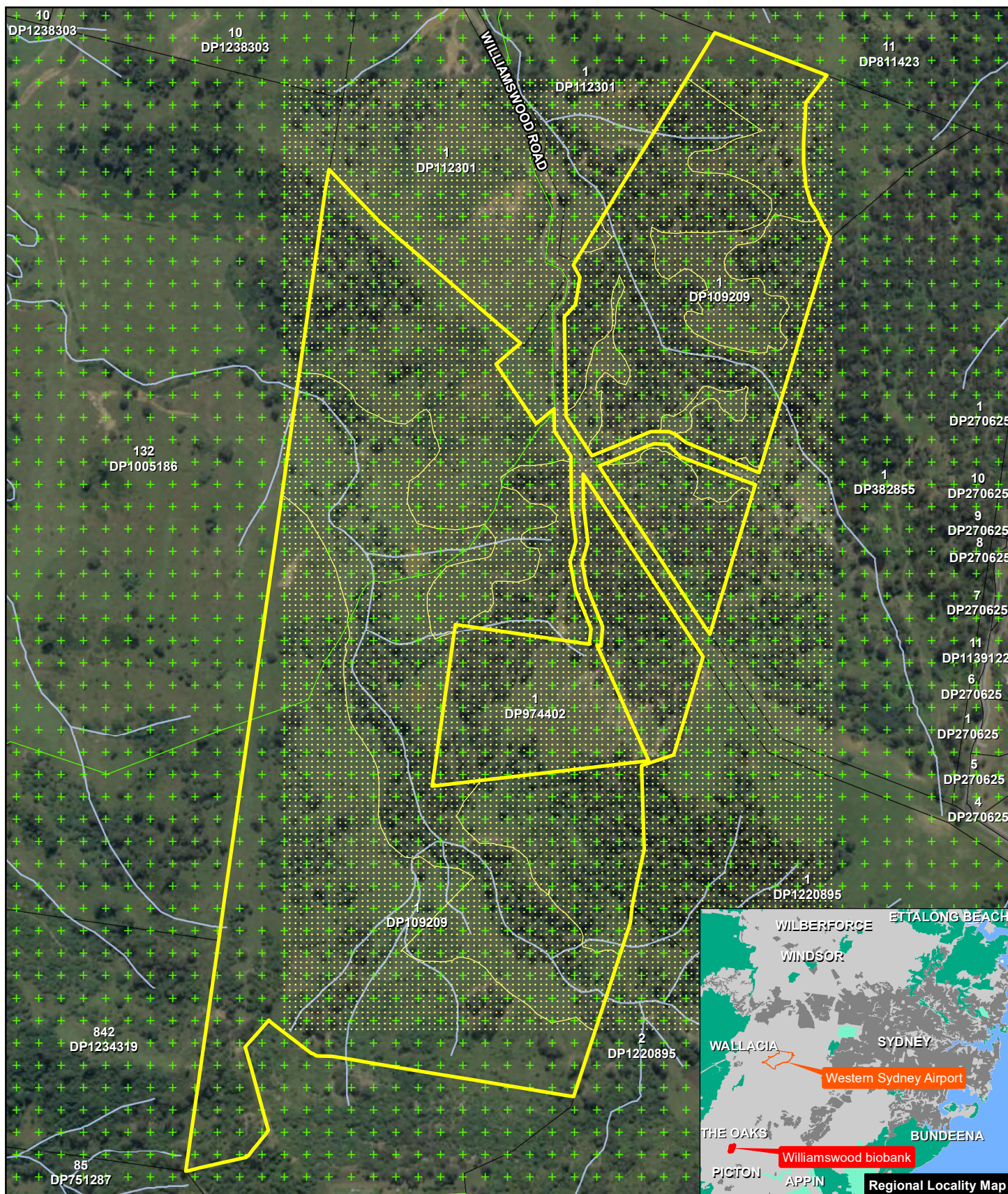
Williamswood biobank

Overview of the proposal

The 'Williamswood biobank' offset site is a biobank that has been subject to a detailed field survey and BioBanking assessment by accredited assessors and has already been set aside for conservation under a BSA (Agreement ID 147). The Williamswood biobank offset area has been secured as a direct offset for WSI through the purchase of 411 biodiversity credits by Infrastructure in March 2019. The 411 biodiversity credits that have been purchased have secured a 41.0 hectare EPBC Act offset area as shown on Figure 16. Shape files delimiting this offset area were provided to Environment within three months of securing the offset in accordance with the Airport Plan conditions. Environment have confirmed that there are no other EPBC Act offset areas registered over this parcel of land. The description of the site presented below is based on the information presented in the BioBanking assessment report for the site (GHD 2015b) and supplementary EPBC Act surveys by GHD ecologists in October 2019.

The Williamswood biobank includes 104.4 hectares of land and is located at Mount Hunter within the Wollondilly LGA. It falls within the Cumberland subregion of the Sydney Basin Bioregion. The biobank is currently zoned RU2 Rural Landscape under the *Wollondilly Local Environment Plan 2011* and was grazed by cattle prior to being set aside as a biobank.

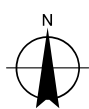
The Williamswood biobank includes forest and woodland that is mapped as Cumberland Plain Priority Conservation Lands in the recovery plan for Cumberland Plain Woodland (DECCW 2010, 2011) and is in a regional wildlife corridor (OEH 2015a). Conservation of the Williamswood biobank site would ensure the protection and management of core areas of habitat within a recognised regional wildlife corridor as well as increasing the extent and connectivity of habitat through the regeneration of poorer condition vegetation.



LEGEND

- Williamswood biobank (agreement ID 147)
- EPBC Act offset area (41.0 ha)
- Priority conservation lands (BIO Map)
- Cadastre
- Waterways

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Metres
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Horizontal Datum: GDA 1994
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Williamswood Biobank Offset Area

Figure 16

Existing environment of the offset area

Field surveys completed for the approved BioBanking assessment confirmed the presence and distribution of three PCTs at the site. Each of these PCTs have been cleared, grazed and subject to weed infestation to varying degrees with areas of Moderate/good- medium, Moderate/good – poor and Low condition vegetation. PCTs were split into broad condition classes yielding six vegetation zones. Vegetation zones at the Williamswood offset area are presented in Figure 17 and habitat for the affected threatened biota in Appendix Table 10. The Williamswood offset area comprises all of the Forest Red Gum – Rough-barked Apple grassy woodland (HN526) within the site. It also contains a portion of low condition Forest Red Gum – Rough-barked Apple grassy woodland and moderate/good-medium condition Grey Box – Forest Red Gum grassy woodland (HN529).

The distribution of vegetation zones at the site is closely tied to soil type, underlying geology and geomorphic position. More exposed slopes and ridges on shale support Grey Box – Forest Red Gum grassy woodland (HN529). This vegetation zone comprises an occurrence of the EPBC Act listed form of Cumberland Plain Woodland. Grey Box – Forest Red Gum grassy woodland grades into Moderate/good condition Forest Red Gum – Grey Box shrubby woodland (HN524) on sheltered slopes with a fine grained volcanic substrate, which is distinguished from adjoining grassy woodlands on shale by the presence of mesic small trees, a denser shrub layer and mesic understorey species. These PCTs give way to Forest Red Gum – Rough-barked Apple grassy woodland (HN526) in riparian areas and adjoining alluvial flats.

Much of the site has been grazed and canopy vegetation has been extensively cleared or thinned historically. Mid storey vegetation has since re-established across the majority of the site though there are very few over storey species in areas of poor or low condition vegetation. There are mature hollow-bearing trees in moderate densities throughout areas of Moderate/good condition vegetation at the site.

There are moderate to severe infestations of high threat exotic weeds, such as Lantana (*Lantana camara*), Blackberry (*Rubus fruticosus* spp. agg.) and especially African Olive (*Olea europeae* subsp. *cuspidata*) at the site. These weeds are most prevalent on the cleared low lying areas and on more sheltered slopes.

Vegetation zones and habitat for the affected threatened biota in the 41.0 hectare Williamswood biobank offset area are summarised in Appendix Table 10.

Plot/transect data within the EPBC Act offset area that was collected for the Williamswood BioBanking Assessment is shown in Appendix Table 11 below.

The EPBC Act survey confirmed that the Williamswood biobank offset area contains 16.4 hectares of vegetation that comprises an occurrence of the EPBC Act listed form of Cumberland Plain Woodland; specifically, woodland that is part of a patch greater than five hectares in area, with >10% over storey cover of Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), shale-derived soils and >50% of the total ground cover composed of perennial native plants as defined in the listing advice for the community (TSSC 2008). EPBC Act Cumberland Plain Woodland at the site includes 'Larger patches (>5 ha) which are inherently valuable due to their rarity' and 'Patches that have large mature trees or trees with hollows (habitat) that are very scarce on the Cumberland Plain' as defined in the listing advice for the community (TSSC 2008). The EPBC Act survey, including mapping of habitat for the affected threatened biota and sampling of rapid assessment plots, confirmed that there was at least 10 per cent over storey cover of characteristic canopy species across the mapped area of 16.4 hectares of Cumberland Plain Woodland shown on Figure 18.

The offset area contains 30.7 hectares of Grey-headed Flying-fox and Swift Parrot foraging habitat associated with the area of Cumberland Plain Woodland and additional areas of Forest Red Gum - Rough-barked Apple grassy woodland. This area contains a canopy of the important food tree Forest Red Gum and other *Eucalyptus* species in the blossom diet of the Grey-headed Flying-fox (Eby and Law 2008) and comprise critical habitat for the species (DEWHA 2010). Forest Red Gum is also identified as a key Swift Parrot food tree in the Sydney Metro and Hawkesbury-Nepean areas within the non-breeding range of the species (Saunders and Tzaros 2011). The offset area comprises an area of potentially productive foraging habitat within the broad range of this highly mobile species but with no confirmed records on site or evidence of use by large numbers of individuals or of site fidelity.

All of the 30.7 hectares of woodland at the offset area contains an over storey of Forest Red Gum and other food trees and comprises foraging habitat for the Grey-headed Flying-fox and Swift Parrot (see Figure 12). Up to 25% cover of mature Forest Red Gum was confirmed in EPBC Act site quality plots sampled across patches of habitat for these species and the species is broadly distributed as a co-dominant canopy species across the offset area.

Grey-headed Flying-fox and Swift Parrot foraging habitat in the offset area adjoins a fragmented, rural landscape but is in itself part of a >500 hectare, near continuous patch of habitat, including vegetation within the site and other native vegetation on steeply undulating terrain of the Razorback range. This patch of habitat is interrupted by occasional 10-50 metre wide gaps associated with clearing for agriculture, roads and transmission line easements. The Swift Parrot and Grey-headed Flying-fox are highly mobile species, so these small scale gaps would not limit opportunities for dispersal or recruitment or substantially increase the risk or energy cost of travelling to exploit foraging resources. Some adjoining areas are dominated by exotic vegetation, including many noxious and environmental weeds that pose a threat to remnant patches of native vegetation and the productivity of food species. The management of the offset area would realise a gain in the landscape score for this patch of habitat through revegetation of cleared land at the site and treatment of weed infestations to reduce threats to remnant vegetation.

The link between the qualitative assessment provided above and the quantitative site quality scores is described and scored in the 'Site quality score inputs' sheet of the Offset assessment guide spreadsheet provided to the auditor. The sheet includes site quality scores for the impact area at the WSI site and the 'current', 'future with offset' and 'future without offset' quality scores for the offset area. Values in the table that relate to these various inputs to the offsets assessment guide calculations for the project are indicated in bold, along with a description of the attributes that define the given values at the WSI site or offset area.

The threatened plant Spiked Rice-flower (*Pimelea spicata*) has been recorded at the site. No *Pimelea spicata* species credits have been calculated or secured within the Williamswood EPBC Act Offset Area and the precise extent and quality of habitat for the species has not been confirmed through targeted survey. Therefore no *Pimelea spicata* offset calculations have been included in this report.

There are 10.3 hectares of Low condition vegetation at the offset area that does not comprise habitat for the affected threatened biota. These areas currently contain exotic grassland that would undergo full structural revegetation under the BSA and would help improve habitat connectivity and the landscape context component of the site quality scores for the affected threatened biota. However this vegetation would not be expected to mature into a functioning occurrence of Cumberland Plain Woodland or productive Grey-headed Flying-fox and Swift Parrot foraging habitat in 20 years.

Matching biodiversity credits from all vegetation zones, including Low condition vegetation, comprise direct offsets for impacts on plants, animals and their habitat.

Appendix Table 10 Vegetation zones, biodiversity credits and habitat for the affected threatened biota at the Williamswood biobank offset area

Vegetation Zone	Veg Type ID	Condition	EPBC Act Status	BC Act Status	Total Area (ha)	Total credits	Credits per hectare	Secured biodiversity credits	EPBC Act offset area (ha)	Area of EPBC Act Cumberland Plain Woodland ¹ (ha)	Area of poorer quality Cumberland Plain Woodland (ha)	Area of Habitat for Grey-headed Flying fox ² (ha)	Area of habitat for Swift Parrot (ha)	Area of habitat for <i>Pimelea spicata</i> (ha)
1 -Grey Box - Forest Red Gum grassy woodland on hills (Moderate/good - medium)	HN529	Moderate/ good - medium	CEEC	CEEC	31.9	317	9.9	163	16.4	16.4	0	16.4	16.4	0
2 -Grey Box - Forest Red Gum grassy woodland on hills (Moderate/good - poor)	HN529	Moderate/ good - poor		CEEC	28	372	13.3	0	0.0	0.0	0	0	0	0
3 -Grey Box - Forest Red Gum grassy woodland on hills (Low)	HN529	Low			12.6	163	12.9	0	0.0	0.0	0	0	0	0
4 -Forest Red Gum - Rough-barked Apple grassy woodland (Moderate/good - medium)	HN526	Moderate/ good - medium		EEC	14.3	144	10.1	144	14.3	0.0	0	14.3	14.3	0
5 -Forest Red Gum - Rough-barked Apple grassy woodland (Low)	HN526	Low			13.5	136	10.1	104	10.3	0.0	0	0	0	0
6 - Forest Red Gum - Grey Box shrubby woodland (Moderate/good - high)	HN524	Moderate/ good - high	CEEC	EEC	4.2	38	9.0	0	0.0	0.0	0	0	0	0
		Total			104.5¹			411	41.0	16.4	0	30.7	30.7	0

Notes: 1. The total for the site, including land outside the offset area and vegetation zones in addition to those listed above.

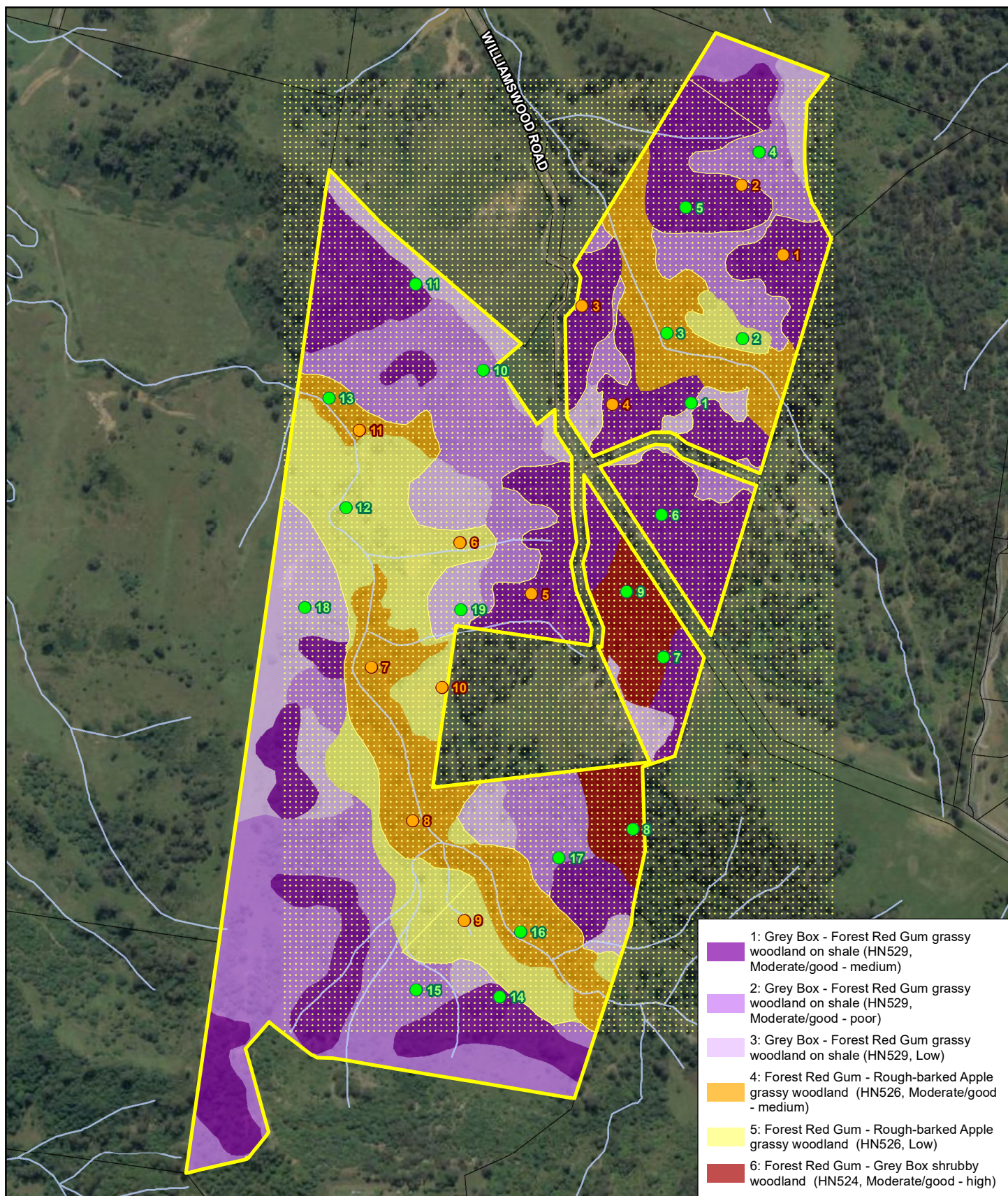
Appendix Table 11 Plot/transects within EPBC offset area at Williamswood Biobank

Veg. Zone	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Native ground cover1	Exotic groundcover	Exotic plant cover2	Number of trees with hollows	Over storey regen.	Total length of fallen logs
Swift Parrot and Grey-headed Flying-fox habitat/ EPBC Act Cumberland Plain Woodland														
1	HN529	Bench mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75			0	> = 0	1	> = 0
		5	36	9.7	47	66	0	20	93.5	6	8.9	0	1	1
		6	26	32.5	6.5	28	0	10	79.2	10	17.7	2	1	14
Swift Parrot and Grey-headed Flying-fox habitat														
4	HN526	Bench mark	24	27.5-32.5	21-31	24.45-30.45	0-10	24.45-30.45			0	> = 1	1	> = 50
		3	35	14.5	20.2	16	0	16	100.0	0	38.5	0	1	15
		13	42	26.5	12	52	10	38	90.9	10	34.5	1	1	14
		16	33	19	7.5	38	0	42	95.2	4	33	2	1	42
5	HN526	Bench mark	24	27.5-32.5	21-31	24.45-30.45	0-10	24.45-30.45			0	> = 1	1	> = 50
		123	36	0	1.1	18	0	6	30.0	56	56	0	0.25	5

Notes:1. The percentage of native groundcover as a proportion of the total groundcover (including exotic groundcover) recorded within plots.

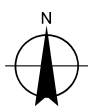
2. Exotic plant cover comprises the highest exotic cover within a single strata.

3. Biodiversity credits secured within vegetation zone 5 do not contribute to the quantum of offset for affected threatened biota.



EPBC Act Offset Area	
Veg Zone ID - Area	
1	16.4 ha
4	14.3 ha
5	10.3 ha

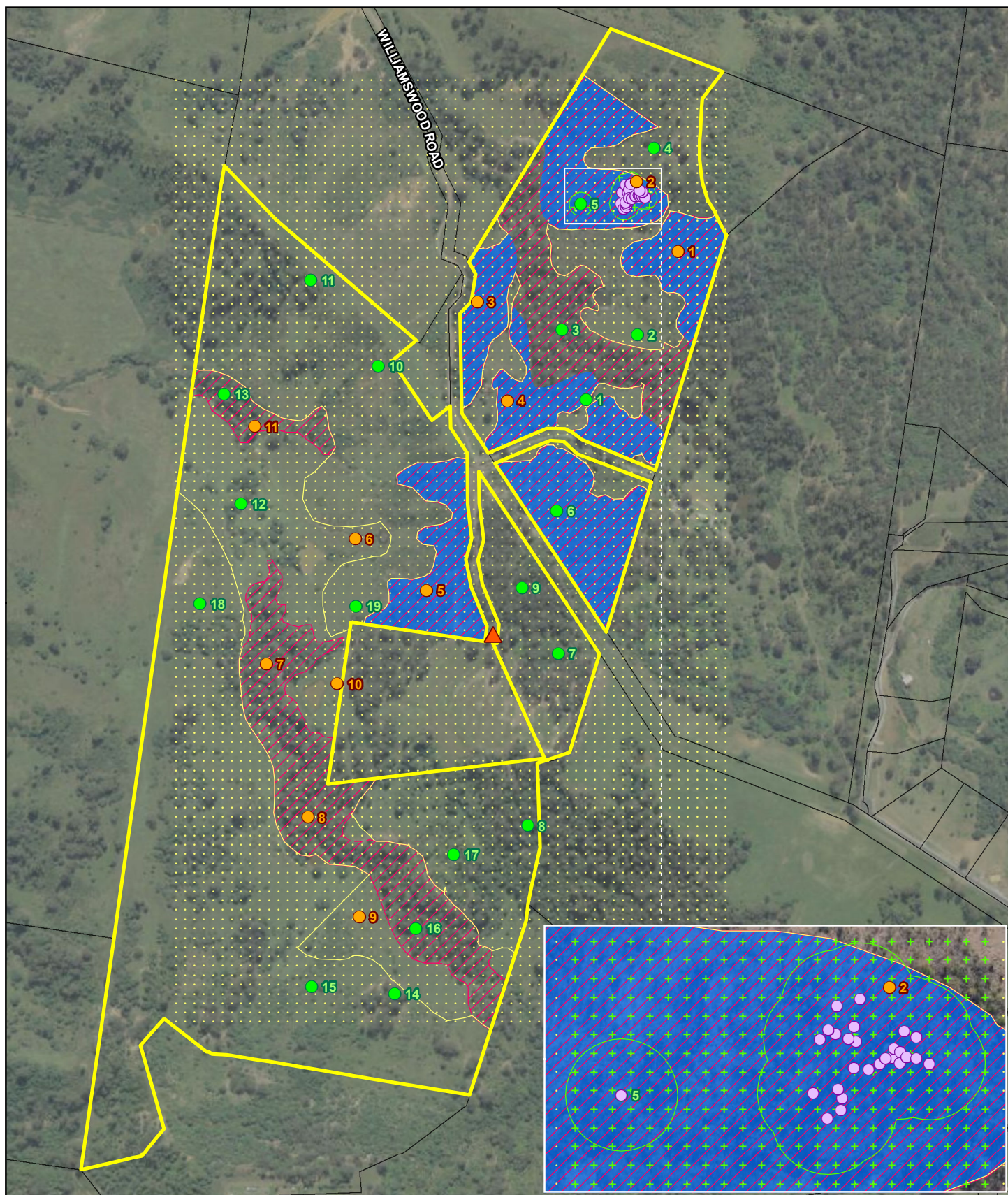
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Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Vegetation Zones**

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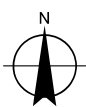
Figure 17



LEGEND

- | | | |
|--------------------------------|--|--|
| Williamswood biobank | Plot/transect | Grey-headed Flying-fox and Swift Parrot foraging habitat |
| EPBC Act offset area (41.0 ha) | Rapid site quality plot | Cumberland Plain Woodland (CEEC under the EPBC Act and BC Act) |
| Cadastre | Little Eagle (<i>Hieraaetus morphnoides</i>) | Occupied <i>Pimelea spicata</i> habitat |
| Waterways | <i>Pimelea spicata</i> | |

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Metres
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Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Figure 18

Quantum of offset

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented Chapter 2 of the BODP (DIRD 2018) synthesis of data from the previous BioBanking assessment (GHD 2015b) and EPBC Act survey of the offset area according to the approach presented in the approved BODP, as described above. EPBC Act offset assessment guide spreadsheets have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

The 411 biodiversity credits that have been purchased have secured a 41.0 hectare EPBC Act offset area at the Williamswood biobank that contains the following quantum of direct offset for WSI:

- 16.4 hectares of Cumberland Plain Woodland with a start site quality score of 7 and a future site quality score with offset of 8 that would contribute 2.08 per cent of the offset requirement for the community.
- 30.7 hectares of Grey-headed Flying-fox habitat with a start site quality score of 6 and a future site quality score with offset of 7 that would contribute 5.87 per cent of the offset requirement for the species.
- 30.7 hectares of Swift Parrot foraging habitat with a start site quality score of 5 and a future site quality score with offset of 6 that would contribute 1.99 per cent of the offset requirement for the species.
- The biodiversity credits summarised in Appendix Table 10 as direct offsets for impacts on plants, animals and their habitat.

Cawdor Heights biobank

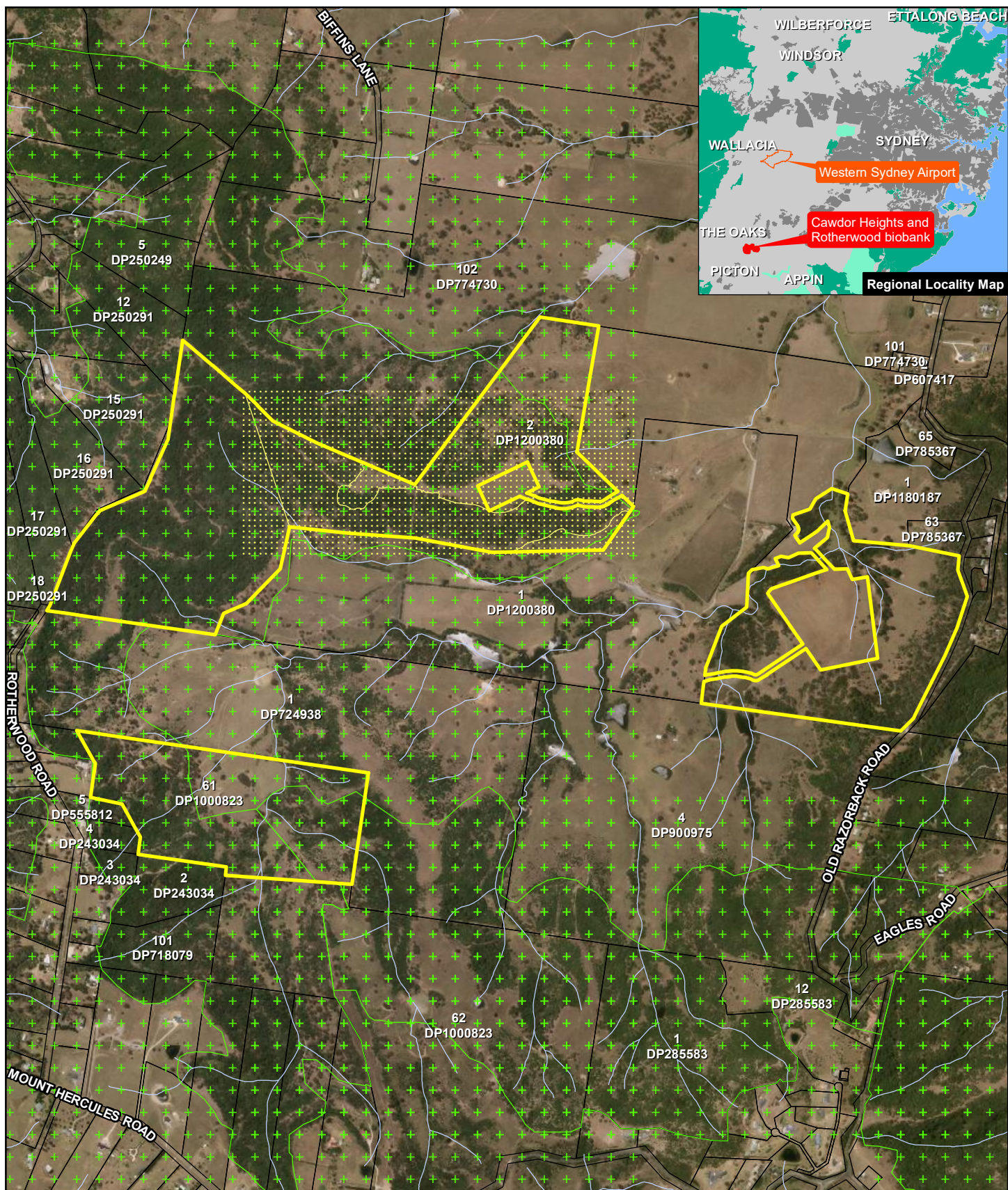
Overview of the proposal

The Cawdor Heights biobank has been subject to a detailed field survey and BioBanking assessment by accredited assessors and has been set aside for conservation under a BSA (Agreement ID 284). The Cawdor Heights biobank has been secured as a direct offset for WSI through the purchase of 409 biodiversity credits by Infrastructure in March 2019.

The 409 biodiversity credits that have been purchased have secured a 22.8 hectare EPBC Act offset area as shown on Figure 19. Shape files delimiting this offset area were provided to Environment within three months of securing the offset in accordance with the Airport Plan conditions. Environment have confirmed that there are no other EPBC Act offset areas registered over this parcel of land. The description of the site presented below is based on the information presented in the BioBanking assessment report for the Cawdor Heights biobank (EcoLogical Australia 2017) and supplementary EPBC Act surveys by GHD ecologists in January 2020.

The Cawdor Heights biobank, along with a parcel of land called 'Rotherwood' conserved under the same BSA, includes ~180 hectares of land. The site is located ~4.5 km south west of the Camden town centre within the Wollondilly Local Government Area (LGA). It falls within the Cumberland subregion within the Sydney Basin Bioregion. The biobank is currently zoned a mix of RU1 Primary Production and RU2 Rural Landscape under the *Wollondilly Local Environment Plan 2011* and was grazed by cattle and selectively logging prior to being set aside as a biobank. The offset area is zoned RU1 which provides for high intensity agricultural land uses. As such there is a notable averted risk of loss associated with its conservation as an offset area under a BSA.

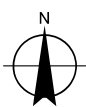
The Cawdor Heights biobank includes areas of woodland and forest that are mapped as Cumberland Plain Priority Conservation Lands in the recovery plan for Cumberland Plain Woodland (DECCW 2010, 2011). Conservation of the Cawdor Heights biobank site would ensure the protection and management of core areas of habitat within a recognised regional conservation corridor as well as increasing the extent and connectivity of habitat through the regeneration of poorer condition vegetation.



LEGEND

- Cawdor Heights and Rotherwood biobank (agreement ID 284)
- EPBC Act offset area (22.8 ha)
- Priority conservation lands (BIO Map)
- Cadastre
- Waterways

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0 100 200 400
Metres
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Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Cawdor Heights Biobank Offset Area

Figure 19

Existing environment of the offset area

Field surveys completed for the approved BioBanking assessment confirmed the presence and distribution of four PCTs at the site. The stands of these PCTs are in varying condition (according to the BBAM) and were split into broad condition classes yielding eleven vegetation zones. Vegetation zones at the Cawdor Heights offset area are presented in Figure 20 and habitat for the affected threatened biota in Figure 21. The Cawdor Heights EPBC offset area comprises only one vegetation zone; Moderate/good- intact/weedy condition Grey Box – Forest Red Gum grassy woodland (HN529).

The distribution of vegetation zones at the site is mainly tied to geomorphic position. Moderate/good-intact/weedy condition Grey Box – Forest Red Gum grassy woodland (HN529) generally occurs on steep sloping hills and ridges while the Derived native grassland and shrubby form of this community occurs on the footslopes. There are patches of Grey Box – Forest Red Gum grassy woodland on flats (HN528) on lower undulating slopes and flatter areas of the site. Grey Myrtle Dry Rainforest (HN524) is present on steep rocky slopes and narrow gullies with sheltered aspects and topographic fire protection. Each of these PCTs have been cleared, grazed and subject to weed infestation to varying degrees. There are moderate to severe infestations of high threat exotic weeds, especially African Olive which form a dense mid storey in many parts of the site. At the time of the 2020 field survey primary weed control had been completed across around 20 per cent of the offset area as part of its management under BSAs. Lantana and African Olive had been slashed and mulched and some follow up treatment completed. Regeneration and total ground cover of both native and exotic species was low and/or senescent reflecting drought conditions at the time of the survey.

The extent of habitat for the affected threatened biota in the 22.8 hectare Cawdor Heights EPBC Act offset area is summarised in Appendix Table 12.

Plot/transect data within the EPBC Act offset area that was collected for the Cawdor Heights BioBanking Assessment is shown in Appendix Table 13 below.

The EPBC Act survey confirmed that the single vegetation zone in the Cawdor offset area comprises an occurrence of the EPBC Act listed form of Cumberland Plain Woodland; specifically, woodland that is part of a patch greater than five hectares in area, with >10% over storey cover of Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), shale-derived soils and >50% of the total ground cover composed of perennial native plants as defined in the listing advice for the community (TSSC 2008). EPBC Act Cumberland Plain Woodland at the site includes 'Larger patches (>5 ha) which are inherently valuable due to their rarity' and 'Patches that have large mature trees or trees with hollows (habitat) that are very scarce on the Cumberland Plain' as defined in the listing advice for the community (TSSC 2008). The EPBC Act survey, including mapping of habitat for the affected threatened biota and sampling of rapid assessment plots, confirmed that there was at least 10 per cent over storey cover of characteristic canopy species across the mapped area of 22.8 hectares of Cumberland Plain Woodland shown on Figure 21.

The EPBC Act survey revealed highly variable but generally low groundcover reflecting the prevailing severe drought conditions at the time of the survey as well as the effects of primary weed control in recent months. There are patches of high total exotic plant cover across the site but this mainly comprises Lantana or African Olive in the mid storey, above leaf litter and a patchy but predominantly native ground layer. Overall the survey data for the site suggested that at least >30% of the total ground cover present was perennial native plants, meeting the criteria for a patch of the community greater than five hectares in area and containing important trees as defined in the listing advice for the community (TSSC 2008).

All of the 22.8 hectares of woodland at the offset area contain Narrow-leaved Ironbark (*Eucalyptus crebra*), Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*Eucalyptus tereticornis*) and other species in the blossom diet of the Grey-headed Flying-fox (Eby and Law 2008) and comprises critical habitat for the species (DEWHA 2010). Forest Red Gum is also identified as a key Swift Parrot food tree in the Sydney Metro and Hawkesbury-Nepean areas within the non-breeding range of the species (Saunders and Tzaros 2011). The offset area comprises an area of potentially productive foraging habitat within the broad range of this highly mobile species but with no confirmed records on site or evidence of use by large numbers of individuals or of site fidelity.

Grey-headed Flying-fox and Swift Parrot foraging habitat in the offset area adjoins a fragmented, rural landscape but is in itself part of a >500 hectare, near continuous patch of habitat, including vegetation within the Cawdor Heights and Rutherwood biobank and adjoining Hampden Vale biobank and other native vegetation on steeply undulating terrain of the Razorback range. This patch of habitat is interrupted by occasional 10-50 metre wide gaps associated with clearing for agriculture, roads and transmission line easements. The Swift Parrot and Grey-headed Flying-fox are highly mobile species, so these small scale gaps would not limit opportunities for dispersal or recruitment or substantially increase the risk or energy cost of travelling to exploit foraging resources. Some adjoining areas are dominated by exotic vegetation, including many noxious and environmental weeds that pose a threat to remnant patches of native vegetation and the productivity of food species. The management of the offset area would realise a gain in the landscape score for this patch of habitat through revegetation of cleared land at the site and treatment of weed infestations to reduce threats to remnant vegetation.

The link between the qualitative assessment provided above and the quantitative site quality scores is described and scored in the 'Site quality score inputs' sheet of the Offset assessment guide spreadsheet provided to the auditor. The sheet includes site quality scores for the impact area at the WSI site and the 'current', 'future with offset' and 'future without offset' quality scores for the offset area. Values in the table that relate to these various inputs to the offsets assessment guide calculations for the project are indicated in bold, along with a description of the attributes that define the given values at the WSI site or offset area.

Matching biodiversity credits from all vegetation zones, including Low condition vegetation, comprise direct offsets for impacts on plants, animals and their habitat.

Appendix Table 12 Vegetation zones, biodiversity credits and habitat for the affected threatened biota at the Cawdor Heights offset area

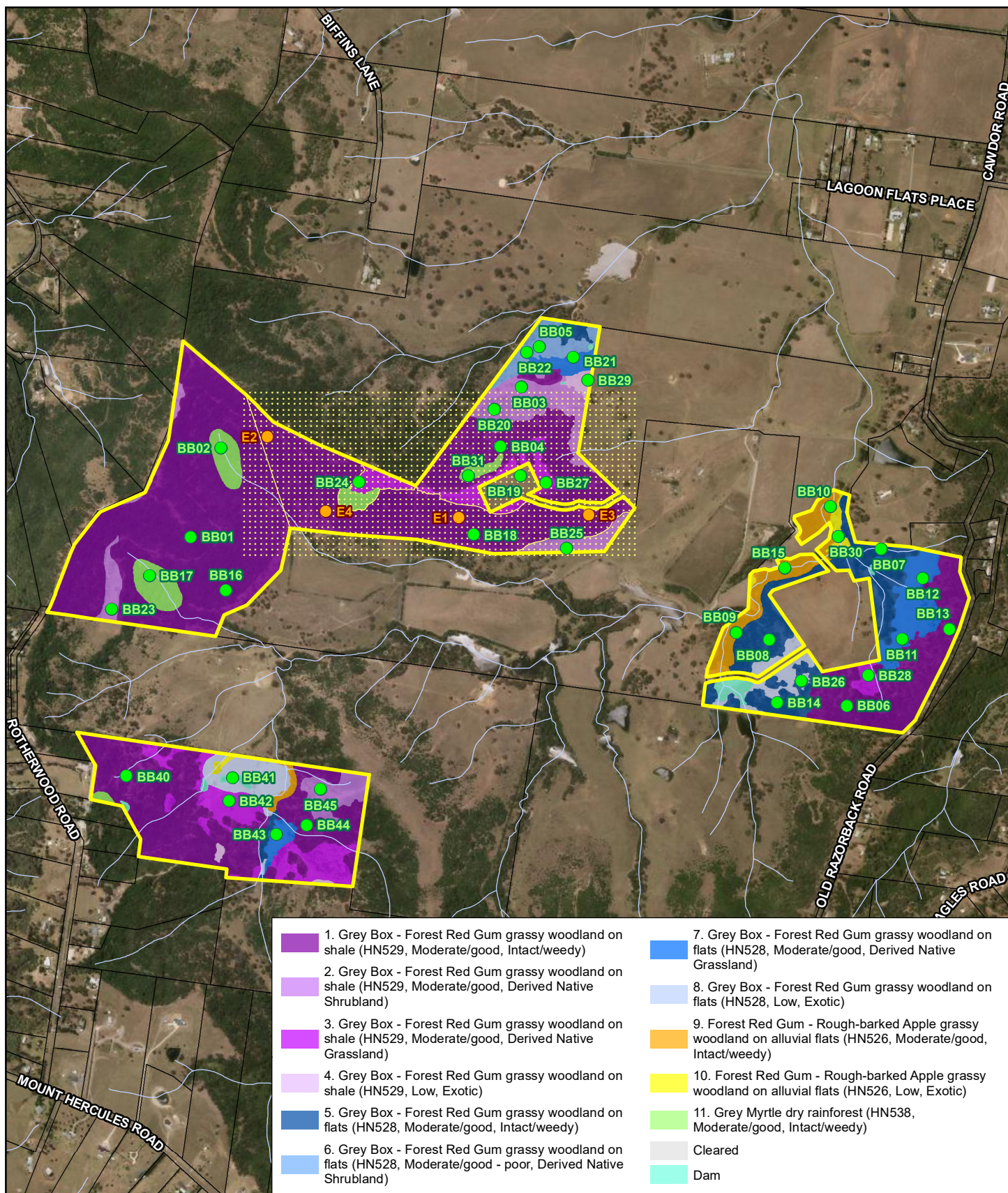
7	Veg Type ID	Condition	EPBC Act Status	BC Act Status	Total Area (ha)	Total credits	Credits per hectare	Secured biodiversity credits	EPBC Act offset area (ha)	Area of EPBC Act Cumberland Plain Woodland ¹ (ha)	Area of poorer quality Cumberland Plain Woodland (ha)	Area of Habitat for Grey-headed Flying fox ² (ha)	Area of habitat for Swift Parrot (ha)	Area of habitat for <i>Pimelea spicata</i> (ha)
Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good-intact/weedy			111.64	2004	18.0	409	22.8	22.8	0	22.8	22.8	0
		Total			179.49¹	3192¹		409	22.8	22.8	0	22.8	22.8	0

Notes: 1. The total for the site, including land outside the offset area and vegetation zones in addition to those listed above.

Appendix Table 13 Plot/transects within EPBC offset area at Cawdor Heights Biobank

Veg Zone ID	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover ¹	Number of trees with hollows	Over storey regen	Total length of fallen logs
Swift Parrot and Grey-headed Flying Fox habitat/ EPBC Act Cumberland Plain Woodland												
1	HN529	Bench- mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75	0	> = 0	1	> = 0
		18	32	23.5	1.3	16	12	2	50	0	1	0

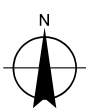
- 1) exotic plant cover comprises the highest exotic cover within a single strata. Percentage native groundcover was not able to be interpreted from plot/transect data because exotic ground cover was not reported separately.



LEGEND

- | | |
|---------------------------------------|-------------------------|
| Cawdor Heights and Rotherwood biobank | Plot/transect |
| EPBC Act offset area (22.8 ha) | Rapid site quality plot |
| Cadastral | |
| Waterways | |

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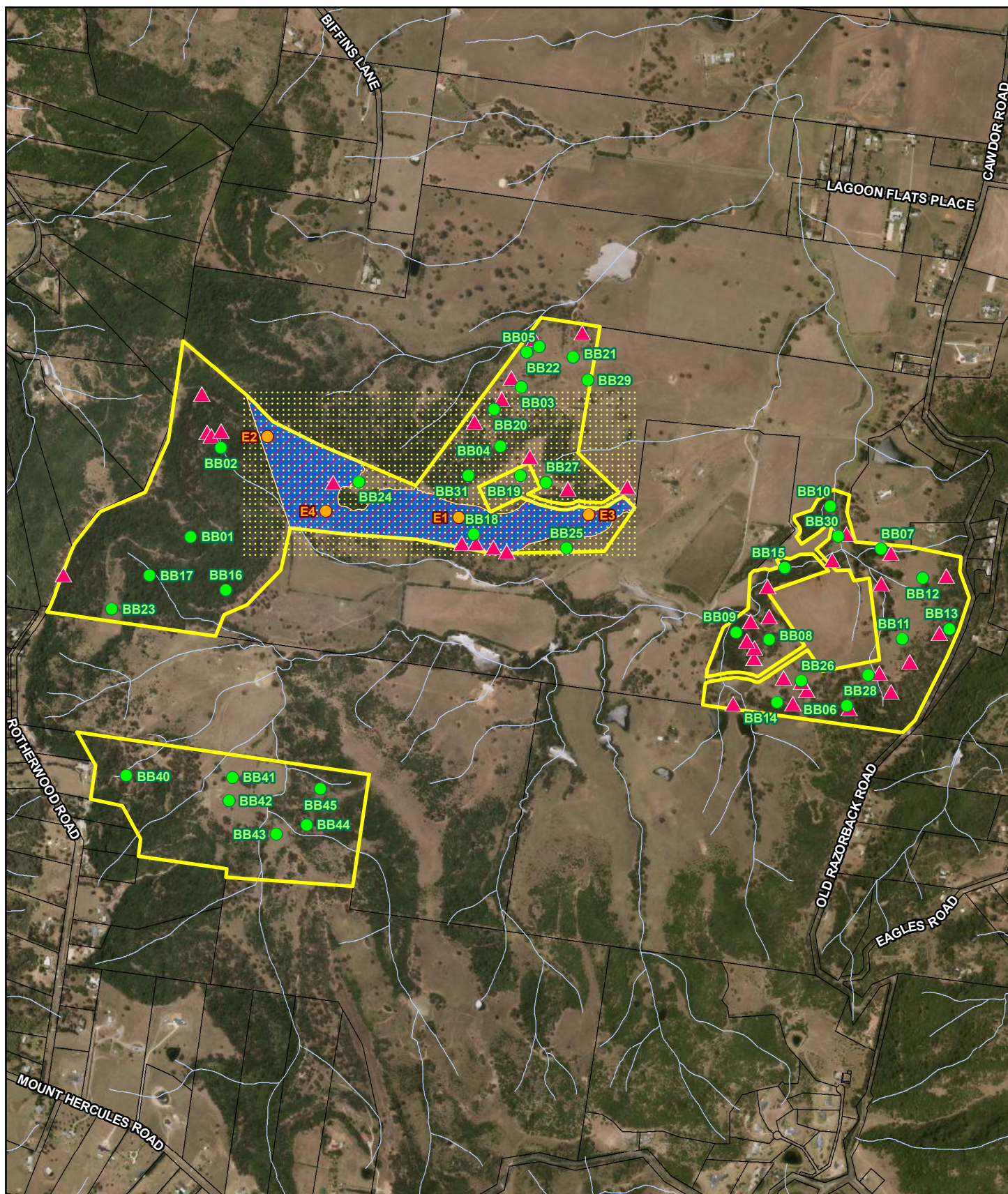


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Cawdor Heights Biobank Vegetation Zones

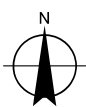
Figure 20



LEGEND

- | | | |
|---------------------------------------|-----------------------------|--|
| Cawdor Heights and Rotherwood biobank | Plot/transect | Grey-headed Flying-fox and Swift Parrot foraging habitat |
| EPBC Act offset area (22.8 ha) | Rapid site quality plot | Cumberland Plain Woodland (CEEC under the EPBC Act and BC Act) |
| Cadastre | Cumberland Plain Land Snail | |
| Waterways | | |

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Cawdor Heights Biobank Threatened Biota and Habitat

Figure 21

Quantum of offset

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented in Chapter 2 of the BODP (DIRD 2018) synthesis of data from the previous BioBanking assessment (EcoLogical Australia 2017) and EPBC Act survey of the offset area according to the approach presented in the approved BODP, as described above. EPBC Act offset assessment guide spreadsheets have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

The 409 biodiversity credits that have been purchased have secured a 22.8 hectare EPBC Act offset area at the Cawdor Heights biobank that contains the following quantum of direct offset for WSI:

- 22.8 hectares of Cumberland Plain Woodland with a start site quality score of 7 and a future site quality score with offset of 8 that would contribute 3.18 per cent of the offset requirement for the community.
- 22.8 hectares of Grey-headed Flying-fox habitat with a start site quality score of 7 and a future site quality score with offset of 8 that would contribute 4.66 per cent of the offset requirement for the species.
- 22.8 hectares of Swift Parrot foraging habitat with a start site quality score of 5 and a future site quality score with offset of 6 that would contribute 1.73 per cent of the offset requirement for the species.
- The biodiversity credits summarised in Appendix Table 12 as direct offsets for impacts on plants, animals and their habitat.

Hardwicke Stage 2 biobank

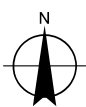
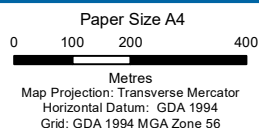
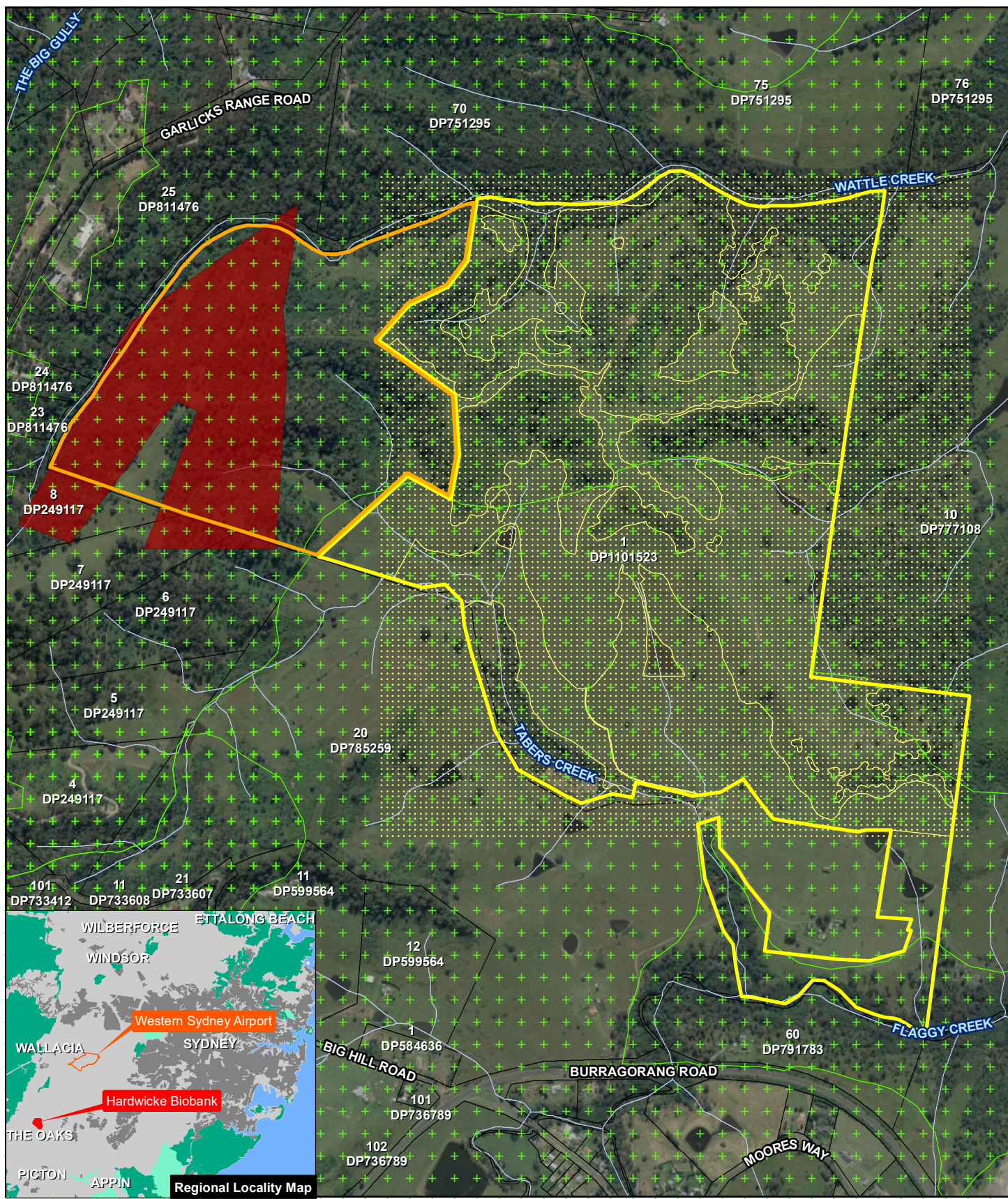
Overview of the proposal

The Hardwicke Stage 2 biobank has been subject to a detailed field survey and BioBanking assessment by accredited assessors and has been set aside for conservation under a BSA (Agreement ID 213). A portion of the Hardwicke biobank has been secured as a direct offset for WSI through the purchase of 1277 biodiversity credits by Infrastructure in March 2019. The 1277 biodiversity credits that have been purchased have secured an 85.2 hectare EPBC Act offset area as shown Figure 22.

Shape files delimiting this offset area were provided to Environment within three months of securing the offset in accordance with the Airport Plan conditions. Environment have confirmed that there are no other EPBC Act offset areas registered over this parcel of land. There is a previously registered EPBC Act offset area within the Hardwicke Stage 1 biobank, to the west of the offset area for WSI (see Figure 22). The description of the site presented below is based on the information presented in the BioBanking assessment report for the Hardwicke Stage 2 biobank (EcoLogical Australia 2018) and supplementary EPBC Act surveys by GHD ecologists in January 2020.

The Hardwicke Stage 2 biobank includes 169.2 hectares of land and is located ~3.5 km north of the township of The Oaks within the Wollondilly Local Government Area (LGA). It falls within the Cumberland subregion within the Sydney Basin Bioregion. The biobank is currently zoned RU2 Rural Landscape under the *Wollondilly Local Environment Plan 2011* and was grazed by cattle and selectively logged prior to being set aside as a biobank.

The Hardwicke Stage 2 biobank includes areas of woodland and forest that are mapped as Cumberland Plain Priority Conservation Lands in the recovery plan for Cumberland Plain Woodland (DECCW 2010, 2011). Conservation of the Hardwicke Stage 2 biobank site would ensure the protection and management of core areas of habitat within a recognised regional conservation corridor as well as increasing the extent and connectivity of habitat through the regeneration of poorer condition vegetation.



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Hardwicke Biobank Offset Area

Figure 22

Existing environment of the offset area

Field surveys completed for the approved BioBanking assessment confirmed the presence and distribution of four PCTs at the site. The stands of these PCTs are in varying condition (according to the BBAM) and were split into broad condition classes yielding 17 vegetation zones. Vegetation zones at the Hardwicke offset area are presented in Figure 23 and habitat for the affected threatened biota in Figure 24.

The distribution of vegetation zones at the site is mainly tied to geomorphic position. More exposed slopes and ridges support Grey Box – Forest Red Gum grassy woodland (HN529). This PCT grades into Forest Red Gum – Grey Box shrubby woodland (HN524) in steeper or more sheltered areas, which is distinguished from adjoining grassy woodlands on shale by the presence of a denser shrub layer and mesic understorey species. These PCTs give way to Grey Myrtle Dry Rainforest (HN538) within and adjacent to Flaggy Creek and Tabers Creek and associated deep incised gullies. Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest (HN556) is associated with lighter textured soils and sandstone outcrop. Each of these PCTs have been cleared, grazed and subject to weed infestation to varying degrees within areas of Moderate/good and Low condition vegetation.

There are moderate to severe infestations of high threat exotic weeds, such as Lantana, Blackberry and especially African Olive which form a dense mid storey in many parts of the site. At the time of the 2020 field survey primary weed control had been completed across around 20 per cent of the offset area as part of its management under BSAs. Lantana and African Olive had been slashed and mulched and some follow up treatment completed. Regeneration and total ground cover of both native and exotic species was low and/or senescent reflecting drought conditions at the time of the survey.

Much of the site has been grazed and canopy vegetation has been extensively cleared or thinned historically. There is considerable scope to improve the biodiversity values of the site through treatment of weed infestations and development of vegetation structure and habitat resources.

Vegetation zones and habitat for the affected threatened biota in the 85.2 hectare Hardwicke Stage 2 biobank offset area is summarised in Appendix Table 14.

Plot/transect data within the EPBC Act offset area that was collected for the Hardwicke Stage 2 Biobanking Assessment is shown in Appendix Table 15 below.

The EPBC Act survey confirmed that the Hardwicke Stage 2 biobank offset area contains 22.2 hectares of vegetation that comprises an occurrence of the EPBC Act listed form of Cumberland Plain Woodland; specifically, woodland that is part of a patch greater than five hectares in area, with >10% over storey cover of Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), shale-derived soils and >30% of the total ground cover composed of perennial native plants as defined in the listing advice for the community (TSSC 2008). EPBC Act Cumberland Plain Woodland at the site includes 'Larger patches (>5 ha) which are inherently valuable due to their rarity' and 'Patches that have large mature trees or trees with hollows (habitat) that are very scarce on the Cumberland Plain' as defined in the listing advice for the community (TSSC 2008). The EPBC Act survey, including mapping of habitat for the affected threatened biota and sampling of rapid assessment plots, confirmed that there was at least 10 per cent over storey cover of characteristic canopy species across the mapped area of 22.2 hectares of Cumberland Plain Woodland shown on Figure 24. The EPBC Act survey revealed highly variable but generally low groundcover reflecting the prevailing severe drought conditions at the time of the survey as well as the effects of primary weed control in recent months. There are patches of high total exotic plant cover across the site but this mainly comprises Lantana or African Olive in the mid storey, above leaf litter and a patchy but predominantly native ground layer. Overall the survey data for the site suggested that at least >30% of the total ground cover present was perennial native plants, meeting the criteria for a patch of the community greater than five hectares in area and containing important trees as defined in the listing advice for the community (TSSC 2008).

The Hardwicke Stage 2 biobank offset area contains areas of derived native scrub or grassland that do not currently meet the condition criteria for the EPBC Act-listed form of the community because the native over storey cover is less than 10%, however they meet the other condition attributes for the community, including greater than 30% perennial native groundcover and connectivity to a native vegetation remnant at least five hectares in area (see DEWHA 2010). There are 43.9 hectares of 'poorer quality Cumberland Plain Woodland' at the offset area (see Figure 24).

Poorer quality Cumberland Plain Woodland will be managed for conservation and improve in condition to comprise an occurrence of the ecological community listed under the EPBC Act (TSSC 2008) and reach at least the same site quality score as the impact area, in accordance with the EPBC Act Offsets Policy (DSEWPaC 2012). There are patches of high total exotic plant cover across the site but this mainly comprises Lantana or African Olive in the mid storey, above leaf litter and a patchy but predominantly native ground layer. The poorer quality Cumberland Plain Woodland at the offset area is adjacent to patches of the community and similar vegetation with a woodland or forest structure that provides a source of seed for natural regeneration of over storey vegetation (see Figure 23 and Figure 24). Supplementary planting of over storey species is proposed and funded under the BSAs for these areas (EcoLogical Australia 2018).

The poorer quality Cumberland Plain Woodland at the offset area could be managed and improved to at least the same condition as the community at the WSI site in the medium to long term, through the intensive treatment of weed infestations and exclusion of grazing to permit regeneration of over storey vegetation and supplementary planting where appropriate. The aims of this management would be to achieve restoration of vegetation that comprises EPBC Act Cumberland Plain Woodland, specifically vegetation with greater than 10% canopy cover and predominantly native groundcover in accordance with the condition criteria specified in the conservation and listing advice for the community (TSSC 2008, DEWHA 2010).

The offset area contains 22.9 hectares of Grey-headed Flying-fox and Swift Parrot foraging habitat associated with the area of Cumberland Plain Woodland. This area contains a canopy of the important food tree Forest Red Gum and other *Eucalyptus* species in the blossom diet of the Grey-headed Flying-fox (Eby and Law 2008) and comprise critical habitat for the species (DEWHA 2010). Forest Red Gum and Spotted Gum (*Corymbia maculata*) are identified as key Swift Parrot food trees in the Sydney Metro and Hawkesbury-Nepean areas within the non-breeding range of the species (Saunders and Tzaros 2011). The offset area comprises an area of potentially productive foraging habitat within the broad range of this highly mobile species but with no confirmed records on site or evidence of use by large numbers of individuals or of site fidelity.

All of the 22.2 hectares of woodland at the offset area contains an over storey of Forest Red Gum, Spotted Gum and other food trees and comprises foraging habitat for the Grey-headed Flying-fox and Swift Parrot (see and Figure 24). Up to 20 per cent cover of Forest Red Gum and 20 per cent cover of Spotted Gum was confirmed in EPBC Act site quality plots sampled across patches of habitat for these species and the species is broadly distributed as a co-dominant canopy species across the offset area.

Habitat for these species in the offset area is part of fragmented, rural landscape. Within this matrix the offset area is part of a large, near continuous patch of habitat including vegetation within Hardwicke Stage 1 and 2 biobanks, adjoining Flaggy Creek biobank and connected native vegetation in the riparian corridor of Spring Creek. This patch of habitat is interrupted by frequent 10-50 metre wide gaps associated with clearing for agriculture. The Swift Parrot and Grey-headed Flying-fox are highly mobile species, so this would not limit opportunities for dispersal or recruitment or substantially increase the risk or energy cost of travelling to exploit foraging resources. However, adjoining areas are dominated by exotic vegetation, including many noxious and environmental weeds that pose a threat to remnant patches of native vegetation and the productivity of food species. The management of the offset area would realise a gain in the landscape score for this patch of habitat through revegetation of cleared land at the sites and treatment of weed infestations to reduce threats to remnant vegetation.

The link between the qualitative assessment provided above and the quantitative site quality scores is described and scored in the 'Site quality score inputs' sheet of the Offset assessment guide spreadsheet provided to the auditor. The sheet includes site quality scores for the impact area at the WSI site and the 'current', 'future with offset' and 'future without offset' quality scores for the offset area. Values in the table that relate to these various inputs to the offsets assessment guide calculations for the project are indicated in bold, along with a description of the attributes that define the given values at the WSI site or offset area.

The threatened plant Spiked Rice-flower (*Pimelea spicata*) has been recorded at the site. No *Pimelea spicata* species credits have been calculated or secured within the Hardwicke EPBC Act Offset Area and the precise extent and quality of habitat for the species has not been confirmed through targeted survey. Therefore no *Pimelea spicata* offset calculations have been included in this report.

There are 19.2 hectares of Low condition vegetation at the offset area that does not comprise habitat for the affected threatened biota. These areas currently contain exotic grassland that would undergo full structural revegetation under the BSA and would help improve habitat connectivity and the landscape context component of the site quality scores for the affected threatened biota. However this vegetation would not be expected to mature into a functioning occurrence of Cumberland Plain Woodland or productive Grey-headed Flying-fox and Swift Parrot foraging habitat in 20 years.

Matching biodiversity credits from all vegetation zones, including Low condition vegetation, comprise direct offsets for impacts on plants, animals and their habitat.

Appendix Table 14 Vegetation zones, biodiversity credits and habitat for the affected threatened biota at the Hardwicke Stage 2 biobank offset area

Vegetation Zone	Veg Type ID	Condition	Total Area (ha)	Total credits	Credits per hectare	Secured biodiversity credits	EPBC Act offset area (ha)	Area of EPBC Act Cumberland Plain Woodland ¹ (ha)	Area of poorer quality Cumberland Plain Woodland (ha)	Area of Habitat for Grey-headed Flying fox ² (ha)	Area of habitat for Swift Parrot (ha)
1 - Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good (Disturbed / shrubby)	14.92	222	14.9	222	14.9	14.9	0	14.9	14.9
3 - Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate to Good (Derived native shrubland)	25.05	353	14.1	353	25.1	4.3	20.8	4.3	4.3
4 - Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate to Good (Derived native grassland)	40.77	628	15.4	171	11.1	1.2	9.9	1.2	1.2
5 - Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate to Good (Olive)	6.79	99	14.6	99	6.8	1.7	5	1.8	1.8
7 - Grey Box - Forest Red Gum grassy woodland on flats	HN528	Moderate to Good (Derived native grassland)	6.65	108	16.2	108	6.7	0	6.7	0	0
8 - Grey Box - Forest Red Gum grassy woodland on flats	HN528	Low (Cleared/exotic to be regenerated)	24.64	385	15.6	324	20.7	0	1.5	0	0
		Total	166.18 ¹			1277 ¹	85.2	22.1	43.9	22.2	22.2

Notes: 1. The total for the site, including land outside the offset area and vegetation zones in addition to those listed above.

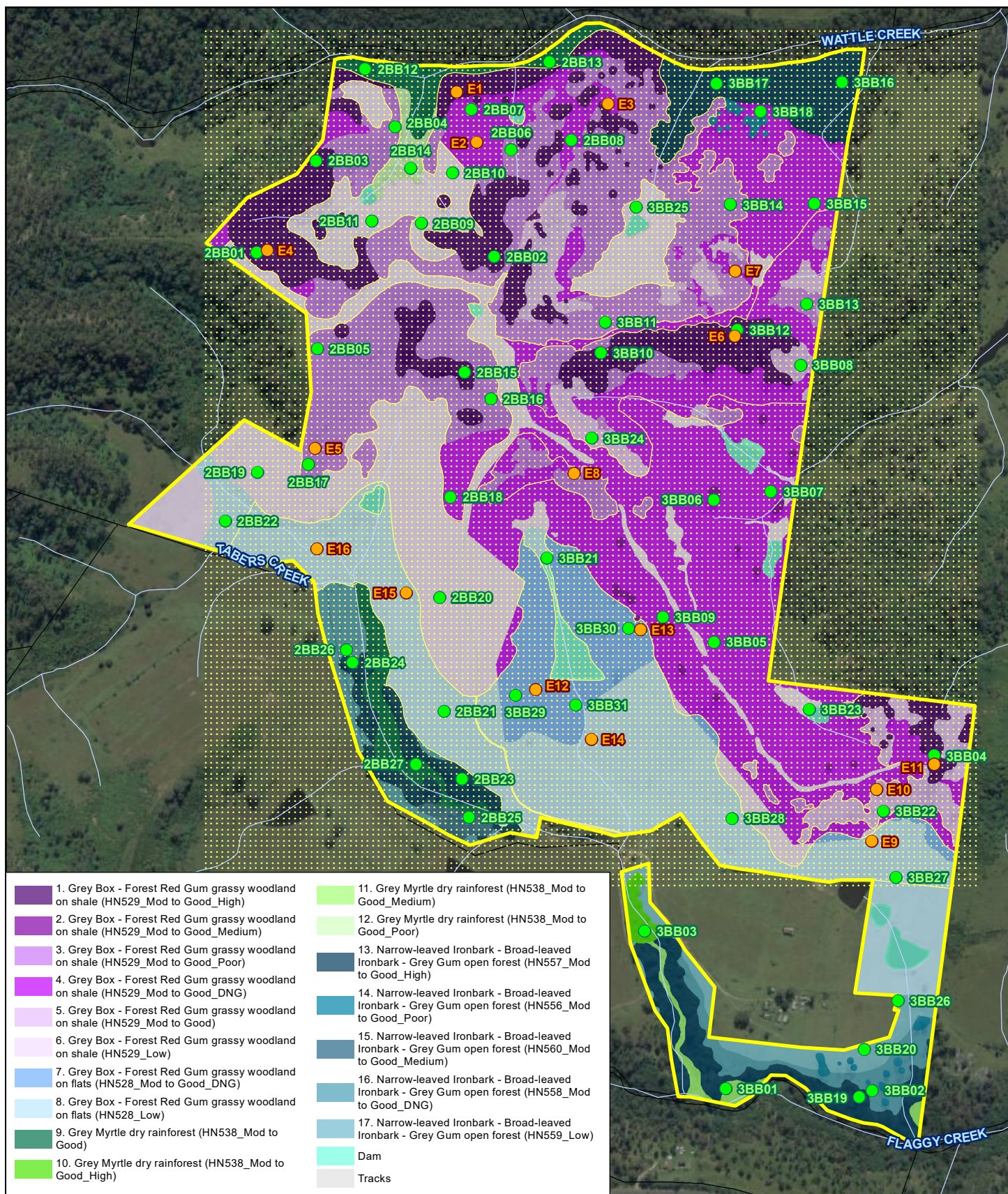
Appendix Table 15 Plot/transects within EPBC offset area at Hardwicke Stage 2 Biobank

Veg Zone ID	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover ¹	Number of trees with hollows	Over storey regen	Total length of fallen logs
Swift Parrot and Grey-headed Flying Fox habitat/ EPBC Act Cumberland Plain Woodland												
1	HN529	Bench-mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75	0	> = 0	1	> = 0
		2BB01	32	14.9	3.6	46	2	18	42.1	3	0.75	6
		2BB02	30	10	4.2	12	2	14	118	2	0.75	31
		2BB03	43	21.2	0.4	0	0	22	74.7	0	0.75	14
		2BB15	43	9	0	4	0	8	61	0	0.75	10
		3BB04	27	21.5	0	0	0	34	18	1	0.75	41
		3BB10	43	15	3.5	6	2	24	64	7	0.75	46
		3BB12	37	23.54	2.6	42	0	32	38.5	3	0.75	16
Poorer quality Cumberland Plain Woodland												
3	HN529	Bench-mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75	0	> = 0	1	> = 0
		2BB04	28	0	10.2	56	2	24	50.5	0	0	0
		2BB05	31	0	29	54	4	36	34.7	0	0	0
		2BB06	32	0	12	42	0	44	87	0	0	0
		2BB16	25	2	3.2	64	0	12	14.7	0	0	10
		2BB17	27	0	5.1	32	0	34	31	0	0	0
		3BB11	26	0	15.5	78	0	24	14.5	0	0	0
		3BB13	25	0	0	88	0	18	31	0	0	0
		3BB14	32	0	22	84	0	16	15.6	0	0	0
4	HN529	Bench-mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75	0	> = 0	1	> = 0
		2BB07	22	0	0	70	0	22	36	0	0.5	11
		2BB08	16	0	0	94	0	10	20	0	0.5	0

Veg Zone ID	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover ¹	Number of trees with hollows	Over storey regen	Total length of fallen logs
		2BB18	21	0	0.5	94	0	6	45	0	0.5	0
5	HN529	Bench-mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75	0	> = 0	1	> = 0
		3BB08	29	0	1	48	0	56	53	0	0	22
		3BB22	25	0	0.1	34	2	64	54.9	0	0	0
		3BB24	25	0	0.6	72	0	8	24	0	0	0
7	HN528	Bench-mark	29	20.5-25.5	25.5-30.5	26.8-30.8	0-5	14.8-18.8	0	> = 0	1	> = 0
		3BB29	10	0	0	50	0	8	42	0	0	0
		3BB30	12	0	0	52	0	8	44	0	0	0
		3BB31	4	0	0	22	0	14	74	0	0	0
Plants, animals and their habitat only ²												
8	HN528	Bench-mark	29	20.5-25.5	25.5-30.5	26.8-30.8	0-5	14.8-18.8	0	> = 0	1	> = 0
		2BB21	7	0	0	28	0	2	88.1	0	0	0
		3BB27	13	0	0	16	0	0	88	0	0	0
		3BB28	3	0	0	0	0	2	79	0	0	0

Notes: 1. Exotic plant cover comprises the highest exotic cover within a single strata. Percentage native groundcover was not able to be interpreted from plot/transect data because exotic ground cover was not reported separately.

2. Biodiversity credits secured within vegetation zone 8 of the EPBC Act offset area do not contribute to the quantum of offset for affected threatened biota.

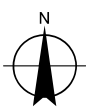


LEGEND

- Hardwicke biobank
 EPBC Act offset area (85.2 ha)
 Cadastre
— Waterways
- Plot/transect
● Rapid site quality plot

EPBC Act Offset Area	4 - 11.1 ha
Veg Zone ID - Area	5 - 6.8 ha
1 - 14.9 ha	7 - 6.7 ha
3 - 25.1 ha	8 - 20.7 ha

Paper Size A4
 0 50 100 200
 Metres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 56

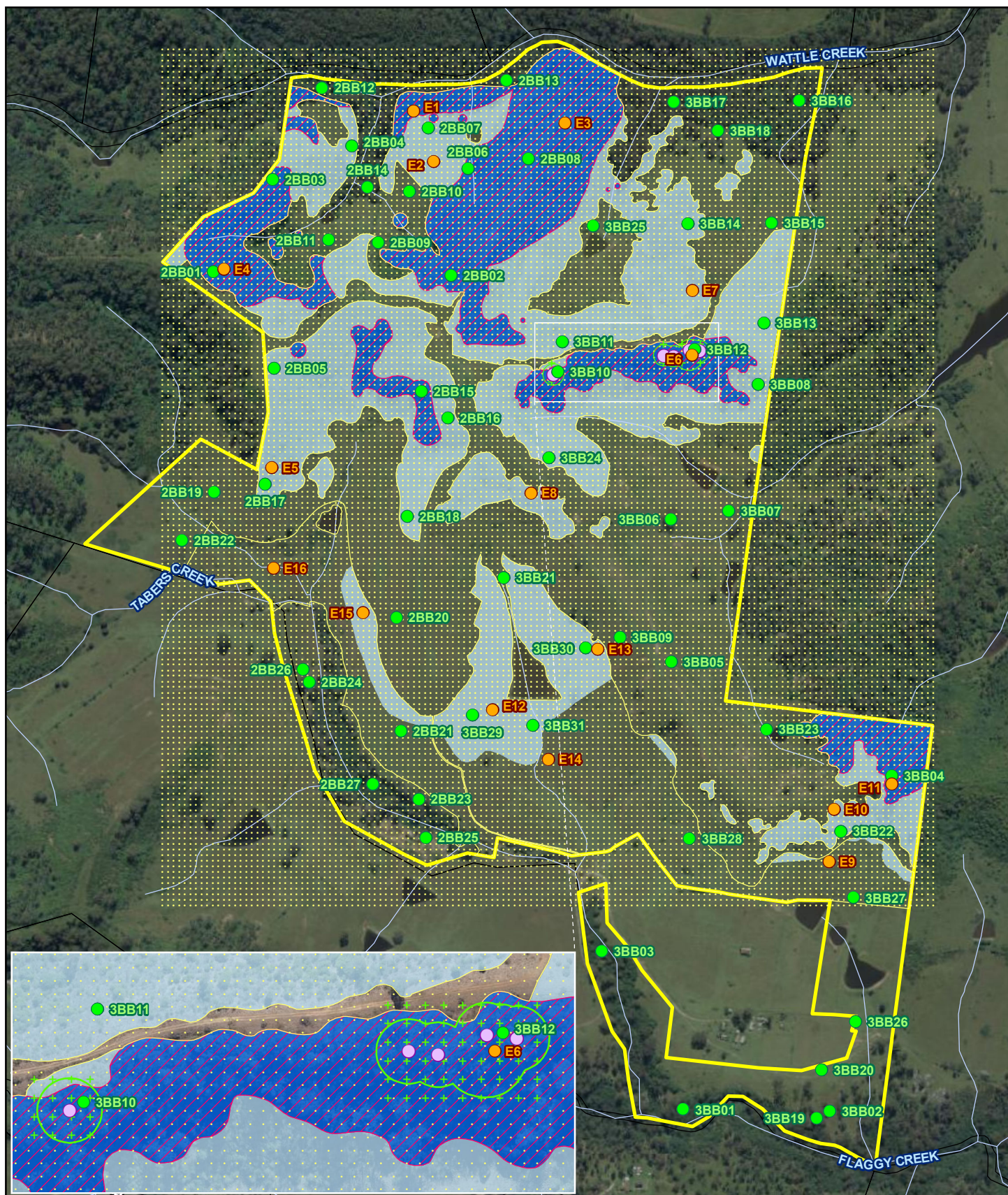


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Hardwicke Biobank Vegetation Zones

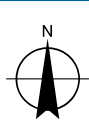
Figure 23



LEGEND

- | | | |
|--|--|--|
| Hardwicke biobank | ● Rapid site quality plot | Cumberland Plain Woodland (CEEC under the EPBC Act and BC Act) |
| EPBC Act offset area (85.2 ha) | ● <i>Pimelea spicata</i> | Poorer quality Cumberland Plain Woodland (CEEC under the BC Act) |
| Cadastre | Occupied <i>Pimelea spicata</i> habitat | |
| — Waterways | Grey-headed Flying-fox and Swift Parrot foraging habitat | |
| ● Plot/transect | | |

Paper Size A4
0 50 100 200
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



Department of Infrastructure, Transport,
Regional Development and Communications
2019 BODP Implementation Report

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Revision A
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Hardwicke Biobank Threatened Biota and Habitat

Figure 24

Quantum of offset

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented in Chapter 2 of the BODP (DIRD 2018) synthesis of data from the previous BioBanking assessment (EcoLogical Australia 2018) and EPBC Act survey of the offset area according to the approach presented in the approved BODP, as described above. EPBC Act offset assessment guide spreadsheets have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

The 1277 biodiversity credits that have been purchased have secured an 85.2 hectare EPBC Act offset area at the Hardwicke Stage 2 biobank that contains the following quantum of direct offset for WSI:

- 22.1 hectares of Cumberland Plain Woodland with a start site quality score of 6 and a future site quality score with offset of 8 that would contribute 2.80 per cent of the offset requirement for the community.
- 43.9 hectares of poorer quality Cumberland Plain Woodland with a start site quality score of 4 and a future site quality score with offset of 6 that would contribute 3.23 per cent of the offset requirement for the community.
- 22.2 hectares of Grey-headed Flying-fox habitat with a start site quality score of 7 and a future site quality score with offset of 8 that would contribute 4.24 per cent of the offset requirement for the species.
- 22.2 hectares of Swift Parrot foraging habitat with a start site quality score of 5 and a future site quality score with offset of 6 that would contribute 1.44 per cent of the offset requirement for the species.
- The biodiversity credits summarised in Appendix Table 14 as direct offsets for impacts on plants, animals and their habitat.

Flaggy Creek Farm Stage 2 biobank

Overview of the proposal

The Flaggy Creek Farm Stage 2 biobank has been subject to a detailed field survey and BioBanking assessment by accredited assessors and has been set aside for conservation under a BSA (Agreement ID 354). The Flaggy Creek Farm Stage 2 Biobank has been secured as a direct offset for WSI through the purchase of 339 biodiversity credits by Infrastructure in July 2019. The 339 biodiversity credits that have been purchased have secured a 24 hectare EPBC Act offset area as shown on Figure 25. Shape files delimiting this offset area were provided to Environment within three months of securing the offset in accordance with the Airport Plan conditions. Environment have confirmed that there are no other EPBC Act offset areas registered over this parcel of land. The description of the site presented below is based on the information presented in the BioBanking assessment report for the Flaggy Creek Farm Stage 2 biobank (Biosis 2017) and supplementary EPBC Act surveys by GHD ecologists in January 2020.

The Flaggy Creek Farm Stage 2 biobank includes ~50 hectares of land and is located at Glenmore within the Wollondilly Local Government Area (LGA). It falls within the Cumberland subregion within the Sydney Basin Bioregion. The biobank was grazed by cattle prior to being set aside as a biobank.

The EPBC Act offset area includes small areas of woodland that are mapped as Cumberland Plain Priority Conservation Lands in the recovery plan for Cumberland Plain Woodland. The broader Flaggy Creek Farm Stage 2 biobank includes more extensive areas of woodland and forest within the corridor (DECCW 2010, 2011). Conservation of the offset area would ensure the protection and management of core areas of habitat within a recognised regional conservation corridor as well as achieving a ~20 hectare increase in the extent of connected habitat through the regeneration of poorer condition vegetation (see Figure 25).

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© 2020. Whilst every care has been taken to prepare this map, GHD (and NSW Department of Lands, sixmaps 2020, WSU, Geoscience Australia, Biosis, NSW Department of Planning and Environment) make no representations or warranties about its accuracy, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any third party in reliance on the map, or any way derived from it.
Data source: Aerial Imagery – sixmaps 2020 (i), General topol – NSW LPI DTDB 2015 & 2012, Cadastral data – NSW LPI DCDB 2018; WSA boundary – WSU; Inset map – Geoscience Australia; Biobank data – Biosis; Existing offset area – DPE 2019.
Created by: jrice

Existing environment of the offset area

Field surveys completed for the approved BioBanking assessment confirmed the presence and distribution of two PCTs at the site. The stands of these PCTs are in varying condition (according to the BBAM) and were split into broad condition classes yielding four vegetation zones. Vegetation zones at the Flaggy Creek Farm Stage 2 biobank offset area are presented in Figure 26 and habitat for the affected threatened biota in Figure 27.

The distribution of vegetation zones at the site is mainly tied to geomorphic position. Hill slopes and low ridges supported Moderate/good- medium condition patches of Grey Box – Forest Red Gum grassy woodland (HN529). Lower condition and derived grassland patches of Grey Box – Forest Red Gum grassy woodland (HN529) was found on flats and mildly undulating terrain. Narrow-leaved Ironbark – Broad-leaved Ironbark Grey Gum open forest was recorded in an isolated patch above a sandstone gully.

Exotic species are present throughout many of the vegetation zones across the site, especially African Olive (*Olea europea* subsp. *cuspidata*) which forms a dense mid storey in many parts of the site. Other high threat exotic weeds present on site in lower numbers include Lantana (*Lantana camara*), Blackberry (*Rubus* species) and Fireweed (*Senecio madagascariensis*). At the time of the 2020 field survey primary weed control had been completed across around 20 per cent of the offset area as part of its management under BSAs. Lantana and African Olive had been drilled or sprayed and some follow up treatment completed. Regeneration and total ground cover of both native and exotic species was low and/or senescent reflecting drought conditions at the time of the survey.

Much of the site has been grazed and canopy vegetation has been extensively cleared or thinned historically. Existing native vegetation is actively regenerating and disturbed by understorey weed invasion. The majority of native vegetation is considered to be in moderate to good condition and of moderate conservation value.

There is considerable scope to improve the biodiversity values of the site through treatment of weed infestations and development of vegetation structure and habitat resources. Vegetation zones and habitat for the affected threatened biota in the 24.0 ha Flaggy Creek Farm Stage 2 biobank offset area are summarised in Appendix Table 16.

Plot/transect data within the EPBC Act offset area that was collected for the Flaggy Creek Farm Stage 2 Biobanking Assessment is shown in Appendix Table 17 below.

The EPBC Act survey confirmed that the Hardwicke Stage 2 biobank offset area contains 2.0 hectares of vegetation that comprises an occurrence of the EPBC Act listed form of Cumberland Plain Woodland; specifically, woodland that is part of a patch greater than five hectares in area, with >10% over storey cover of Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), shale-derived soils and >30% of the total ground cover composed of perennial native plants as defined in the listing advice for the community (TSSC 2008). 30 % overstorey cover of characteristic species was recorded in the single plot/transect sampled in Cumberland Plain Woodland the offset area. The EPBC Act survey, including mapping of habitat for the affected threatened biota and sampling of rapid assessment plots, confirmed that there was at least 10 per cent over storey cover of characteristic canopy species across the mapped area of Cumberland Plain Woodland shown on Figure 26. The EPBC Act survey revealed highly variable but generally low groundcover reflecting the prevailing severe drought conditions at the time of the survey as well as the effects of primary weed control in recent months. Overall the survey data for the site suggested that at least >30% of the total ground cover present was perennial native plants, meeting the criteria for a patch of the community greater than five hectares in area and containing important trees as defined in the listing advice for the community (TSSC 2008).

The Flaggy Creek Farm Stage 2 biobank offset area contains areas of derived native scrub or grassland that do not currently meet the condition criteria for the EPBC Act-listed form of the community because the native over storey cover is less than 10%, however they meet the other condition attributes for the community, including greater than 30% perennial native groundcover and connectivity to a native vegetation remnant at least five hectares in area (see DEWHA 2010). There are 20.3 hectares of 'poorer quality Cumberland Plain Woodland' at the offset area (see Figure 26).

Poorer quality Cumberland Plain Woodland will be managed for conservation and improve in condition to comprise an occurrence of the ecological community listed under the EPBC Act (TSSC 2008) and reach at least the same site quality score as the impact area, in accordance with the EPBC Act Offsets Policy (DSEWPaC 2012). There are patches of high total exotic plant cover across the site but this mainly comprises Lantana or African Olive in the mid storey, above leaf litter and a patchy but predominantly native ground layer. The poorer quality Cumberland Plain Woodland at the offset area is adjacent to patches of the community and similar vegetation with a woodland or forest structure that provides a source of seed for natural regeneration of over storey vegetation (see in Figure 26 and Figure 27). Supplementary planting of over storey species is proposed and funded under the BSAs for these areas (Biosis 2017).

The poorer quality Cumberland Plain Woodland at the offset area could be managed and improved to at least the same condition as the community at the WSI site in the medium to long term, through the intensive treatment of weed infestations and exclusion of grazing to permit regeneration of over storey vegetation and supplementary planting where appropriate. The aims of this management would be to achieve restoration of vegetation that comprises EPBC Act Cumberland Plain Woodland, specifically vegetation with greater than 10% canopy cover and predominantly native groundcover in accordance with the condition criteria specified in the conservation and listing advice for the community (TSSC 2008, DEWHA 2010).

The offset area contains 2.0 hectares of Grey-headed Flying-fox and Swift Parrot foraging habitat associated with the area of Cumberland Plain Woodland. Moderate/good- medium condition patches of Grey Box – Forest Red Gum grassy woodland (HN529) within the Flaggy Creek Farm Stage 2 biobank offset area include a canopy dominated by Spotted Gum (*Corymbia maculata*) which is recognised as a 'significant species' in the blossom diet of the Grey-headed Flying-fox (Eby and Law 2008). This species flowers in late winter and spring, partly during the 'food bottleneck' for the Grey-headed Flying-fox. Habitat at the Flaggy Creek Farm Stage 2 biobank is thus productive during food bottlenecks, and qualifies as habitat critical to the survival of the species, as defined in the draft recovery plan (DECCW 2009). Better condition patches of Grey Box – Forest Red Gum grassy woodland (HN529) containing Spotted Gum which is a favoured food tree, would also provide winter foraging resources for the Swift Parrot. The offset area comprises an area of potentially productive foraging habitat within the broad range of this highly mobile species but with no confirmed records on site or evidence of use by large numbers of individuals or of site fidelity.

All of the woodland at the offset area contains an over storey of Forest Red Gum, Spotted Gum and other food trees and comprises foraging habitat for the Grey-headed Flying-fox and Swift Parrot (see Figure 26). 15 per cent cover of Spotted Gum was confirmed in the EPBC Act site quality plot sampled in habitat for these fauna species and this tree species is broadly distributed across the offset area.

Habitat for these species in the offset area is part of a fragmented, rural landscape. Within this matrix the offset area is part of a large, near continuous patch of habitat, including vegetation within the Hardwicke Stage 1 and 2 biobanks and Flaggy Creek Stage 1 biobank and connected native vegetation in the riparian corridor of Spring Creek. This patch of habitat is interrupted by frequent 10-50 metre wide gaps associated with clearing for agriculture. The Swift Parrot and Grey-headed Flying-fox are highly mobile species, so this would not limit opportunities for dispersal or recruitment or substantially increase the risk or energy cost of travelling to exploit foraging resources. However, adjoining areas are dominated by exotic vegetation, including many noxious and environmental weeds that pose a threat to remnant patches of native vegetation and the productivity of food species. The management of the offset area would realise a gain in the landscape score for this patch of habitat through revegetation of cleared land at the sites and treatment of weed infestations to reduce threats to remnant vegetation.

The link between the qualitative assessment provided above and the quantitative site quality scores is described and scored in the 'Site quality score inputs' sheet of the Offset assessment guide spreadsheet provided to the auditor. The sheet includes site quality scores for the impact area at the WSI site and the 'current', 'future with offset' and 'future without offset' quality scores for the offset area. Values in the table that relate to these various inputs to the offsets assessment guide calculations for the project are indicated in bold, along with a description of the attributes that define the given values at the WSI site or offset area.

There are 1.72 hectares of vegetation at the offset area that does not comprise habitat for the affected threatened biota. These areas currently contain exotic grassland that would undergo full structural revegetation under the BSA and would help improve habitat connectivity and the landscape context component of the site quality scores for the affected threatened biota. However this vegetation would not be expected to mature into a functioning occurrence of Cumberland Plain Woodland or productive Grey-headed Flying-fox and Swift Parrot foraging habitat in 20 years.

Matching biodiversity credits from all vegetation zones, including Low condition vegetation, comprise direct offsets for impacts on plants, animals and their habitat.

Appendix Table 16 Vegetation zones, biodiversity credits and habitat for the affected threatened biota at the Flaggy Creek Farm Stage 2 biobank offset area

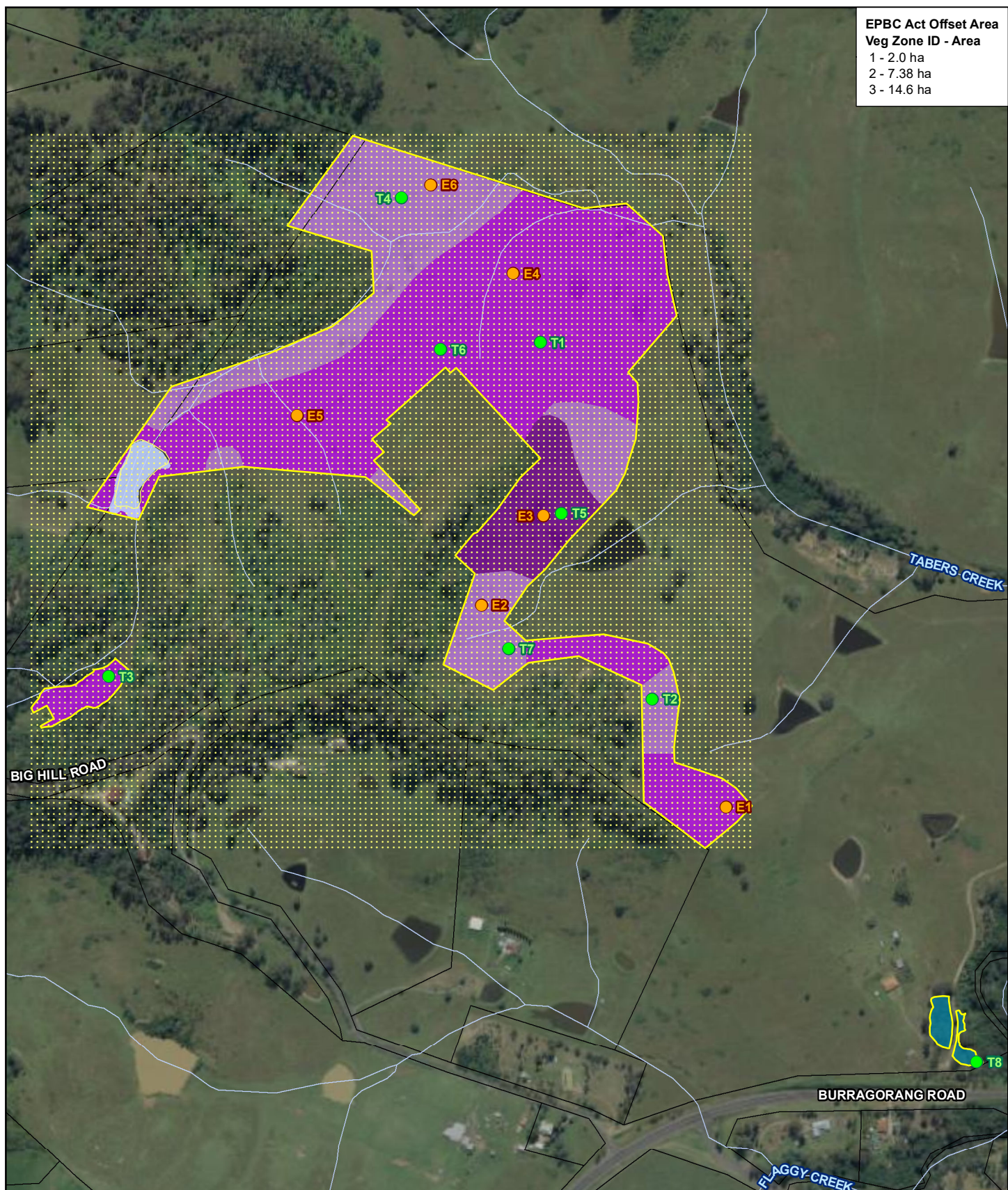
Vegetation Zone	Veg Type ID	Condition	EPBC Act Status	BC Act Status	Total Area (ha)	Total credits	Credits per hectare	Secured biodiversity credits	EPBC Act offset Area (ha)	Area of EPBC Act Cumberland Plain Woodland ¹ (ha)	Area of poorer quality Cumberland Plain Woodland (ha)	Area of Habitat for Grey-headed Flying fox ² (ha)	Area of habitat for Swift Parrot (ha)	Area of occupied habitat for <i>Pimelea spicata</i> (ha)
Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate-Good_Medium	CEEC	CEEC	2	30	15.0	30	2	2	0	2	2	0
Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate-Good_Poor		CEEC	7.38	103	14.0	103	7.38	0	7.38	0	0	0
Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate-Good_Derived Grassland		CEEC	14.62	206	14.1	206	14.62	0	12.9	0	0	0
		Total			50.32¹	676¹		339	24	2.0	20.3	2.0	2.0	0.0

Notes: 1. The total for the site, including land outside the offset area and vegetation zones in addition to those listed above.

Appendix Table 17 Plot/transects within EPBC offset area at Flaggy Creek Farm Stage 2 Biobank

Veg Zone ID	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover ¹	Number of trees with hollows	Over storey regen	Total length of fallen logs
Swift Parrot and Grey-headed Flying Fox habitat/ EPBC Act Cumberland Plain Woodland												
1	HN529	Bench- mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75	0	> = 0	1	> = 0
		5	27	30	14	70	26	42	86	1	1	8
Poorer quality Cumberland Plain Woodland												
2	HN529	Bench- mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75	0	> = 0	1	> = 0
		4	20	0	0	88	0	30	72	0	0	0
		7	15	0	11	66	0	60	68	0	0	2
3	HN529	Bench- mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75	0	> = 0	1	> = 0
		3	31	0	0	56	0	68	24	0	0	0
		6	15	0	0	60	0	10	96	0	0	3

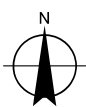
Notes: 1. Exotic plant cover comprises the highest exotic cover within a single strata. Percentage native groundcover was not able to be interpreted from plot/transect data because exotic ground cover was not reported separately.



LEGEND

Flaggy Creek Farm Stage 2 biobank	1. Grey Box - Forest Red Gum grassy woodland on shale (HN529, Moderate-Good_Medium)	Plot/transect
EPBC Act offset area (24.0 ha)	2. Grey Box - Forest Red Gum grassy woodland on shale (HN529, Moderate-Good_Poor)	Rapid site quality plot
Cadastre	3. Grey Box - Forest Red Gum grassy woodland on shale (HN529, Moderate-Good_Derived Grassland)	
Waterbody	4. Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest (HN556, Moderate-Good)	
Waterways		

Paper Size A4
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 Metres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 56



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Flaggy Creek Farm Biobank Vegetation Zones

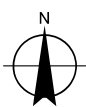
Figure 26



LEGEND

- | | |
|-----------------------------------|--|
| Flaggy Creek Farm Stage 2 biobank | Rapid site quality plot |
| EPBC Act offset area (24.0 ha) | Grey-headed Flying-fox and Swift Parrot foraging habitat |
| Cadastre | Cumberland Plain Woodland (CEEC under the EPBC Act and BC Act) |
| Waterways | Poorer quality Cumberland Plain Woodland (CEEC under the BC Act) |
| Plot/transect | |

Paper Size A4
0 50 100 200
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Flaggy Creek Farm Biobank Threatened Biota and Habitat

Figure 27

Quantum of offset

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented in Chapter 2 of the BODP (DIRD 2018), synthesis of data from the previous BioBanking assessment (Biosis 2017) and EPBC Act survey of the offset area according to the approach presented in the approved BODP, as described above. EPBC Act offset assessment guide spreadsheets have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

The 339 biodiversity credits that have been purchased have secured a 24 hectare EPBC Act offset area at the Flaggy Creek biobank that contains the following quantum of direct offset for WSI:

- 2.0 hectares of Cumberland Plain Woodland with a start site quality score of 7 and a future site quality score with offset of 8 that would contribute 0.25 per cent of the offset requirement for the community.
- 20.3 hectares of poorer quality Cumberland Plain Woodland with a start site quality score of 4 and a future site quality score with offset of 6 that would contribute 1.49 per cent of the offset requirement for the community.
- 2.0 hectares of Grey-headed Flying-fox habitat with a start site quality score of 7 and a future site quality score with offset of 8 that would contribute 0.38 per cent of the offset requirement for the species.
- 2.0 hectares of Swift Parrot foraging habitat with a start site quality score of 5 and a future site quality score with offset of 6 that would contribute 0.13 per cent of the offset requirement for the species.
- The biodiversity credits summarised in Appendix Table 16 as direct offsets for impacts on plants, animals and their habitat.

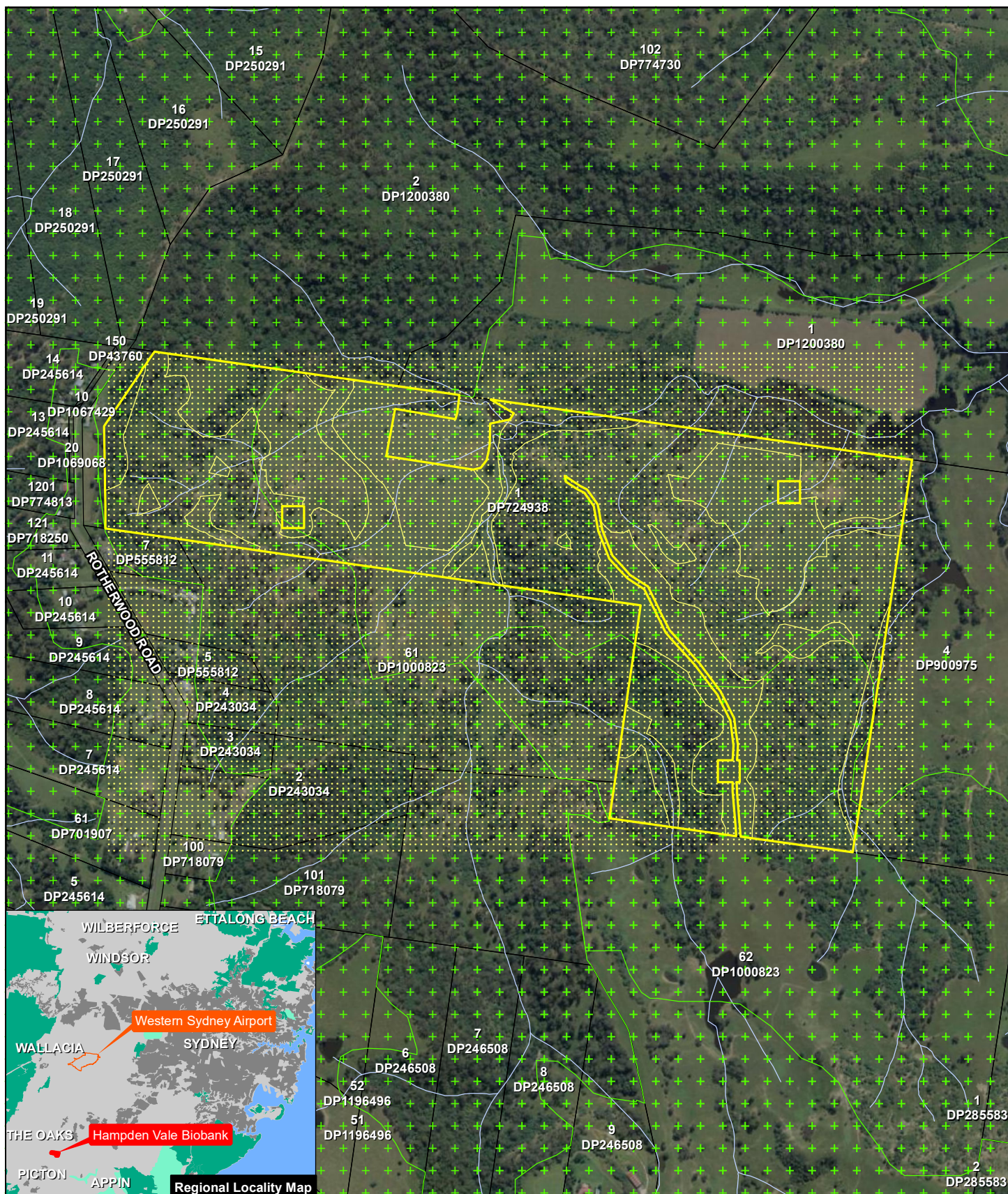
Hampden Vale biobank

Overview of the proposal

The 'Hampden Vale biobank' offset site is a biobank that has been subject to a detailed field survey and BioBanking assessment by accredited assessors and has been set aside for conservation under a BSA (Agreement ID 250). The Hampden Vale Biobank has been secured as a direct offset for WSI through the purchase of 794 biodiversity credits by Infrastructure in July 2019. The 794 biodiversity credits that have been purchased have secured a 59.0 hectare EPBC Act offset area as shown on Figure 10. Shape files delimiting this offset area were provided to Environment within three months of securing the offset in accordance with the Airport Plan conditions. Environment have confirmed that there are no other EPBC Act offset areas registered over this parcel of land. The description of the site presented below is based on the information presented in the BioBanking assessment report for the site (GHD 2017c) and supplementary EPBC Act surveys by GHD ecologists in January 2020.

The Hampden Vale biobank includes 101 hectares of land and is located at Razorback within the Wollondilly Local Government Area (LGA). It falls within the Cumberland subregion of the Hawkesbury Nepean Catchment Management Authority (CMA), and within the Sydney Basin Bioregion. The biobank is currently zoned RU2 Rural Landscape under the *Wollondilly Local Environment Plan 2011* and was previously used for grazing cattle.

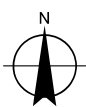
The EPBC Act offset area includes forest and woodland mapped as Cumberland Plain Priority Conservation Lands in the recovery plan for Cumberland Plain Woodland (DECCW 2010, 2011) and is in a regional wildlife corridor (OEH 2015d). Conservation of the Hampden Vale biobank site has ensured the protection and management of core areas of habitat within a recognised regional wildlife corridor as well as increasing the extent and connectivity of habitat through the regeneration of poorer condition vegetation.



LEGEND

- Hampden Vale biobank (agreement ID 250)
- EPBC Act offset area (59.0 ha)
- Priority conservation lands (BIO Map)
- Cadastre
- Waterways

Paper Size A4
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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Hampden Vale Biobank Offset Area

Figure 28

Existing environment of the offset area

There are four PCTs at the site. Each of these PCTs have been cleared, grazed and subject to weed infestation to varying degrees within areas of Moderate/good- medium, Moderate/good – poor and Low condition vegetation. PCTs were split into broad condition classes yielding eight vegetation zones. The distribution of vegetation zones at the site is closely tied to soil type, underlying geology and geomorphic position. Vegetation zones at the Hampden Vale biobank offset area are presented in Figure 29 and habitat for the affected threatened biota in Figure 30.

More exposed slopes and ridges on shale support Grey Box – Forest Red Gum grassy woodland on shale (HN529). This vegetation zone comprises an occurrence of the EPBC Act listed form of Cumberland Plain Woodland. Grey Box – Forest Red Gum grassy woodland grades into Moderate/good condition Forest Red Gum – Grey Box shrubby woodland (HN524) on sheltered slopes, which is distinguished from adjoining grassy woodlands on shale by the presence of mesic small trees, a denser shrub layer and mesic understorey species. The steepest, most sheltered slopes and those with substantial rock outcrop that affords fire protection contain Grey Myrtle Dry Rainforest, which features Kurrajong (*Brachychyton populneus*) as a dominant canopy species and a dense mid storey of mesic small trees, abundant climbers and mesic understorey species. Gentle lower slopes and broad flats contain Grey Box – Forest Red Gum grassy woodland on flats (HN528). These PCTs give way to Forest Red Gum – Rough-barked Apple grassy woodland (HN526) in riparian areas and adjoining alluvial flats.

There are moderate to severe infestations of high threat exotic weeds, such as Lantana (*Lantana camara*), Blackberry (*Rubus fruticosus* spp. agg.) and especially African Olive (*Olea europea* subsp. *cuspidata*) at the site. These weeds are most prevalent on the cleared low lying areas and on more sheltered slopes.

Much of the site has been grazed and canopy vegetation has been extensively cleared or thinned historically. Mid storey vegetation has since re-established across the majority of the site though there are very few over storey species in areas of poor or low condition vegetation. There are mature hollow-bearing trees in moderate densities throughout areas of Moderate/good – medium condition vegetation at the site.

Vegetation zones and habitat for the affected threatened biota in the 59.0 hectare Hampden Vale biobank offset area is summarised in Appendix Table 15.

Plot/transect data within the EPBC Act offset area that was collected for the Hampden Vale Biobanking Assessment is shown in Appendix Table 16 below.

The EPBC Act survey confirmed that the Hampden Vale biobank offset area contains 23.8 hectares of vegetation that comprises an occurrence of the EPBC Act listed form of Cumberland Plain Woodland; specifically, woodland that is part of a patch greater than five hectares in area, with >10% over storey cover of Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), shale-derived soils and >30% of the total ground cover composed of perennial native plants as defined in the listing advice for the community (TSSC 2008). EPBC Act Cumberland Plain Woodland at the site includes 'Larger patches (>5 ha) which are inherently valuable due to their rarity' and 'Patches that have large mature trees or trees with hollows (habitat) that are very scarce on the Cumberland Plain' as defined in the listing advice for the community (TSSC 2008). The EPBC Act survey, including mapping of habitat for the affected threatened biota and sampling of rapid assessment plots, confirmed that there was at least 10 per cent over storey cover of characteristic canopy species across the mapped area of 23.8 hectares of Cumberland Plain Woodland shown on Figure 30. The EPBC Act survey revealed highly variable but generally low groundcover reflecting the prevailing severe drought conditions at the time of the survey as well as the effects of primary weed control in recent months. There are patches of high total exotic plant cover across the site but this mainly comprises Lantana or African Olive in the mid storey, above leaf litter and a patchy but predominantly native ground layer. Overall the survey data for the site suggested that at least >30% of the total ground cover present was perennial native plants, meeting the criteria for a patch of the community greater than five hectares in area and containing important trees as defined in the listing advice for the community (TSSC 2008).

The Hampden Vale biobank offset area contains areas of derived native scrub or grassland that do not currently meet the condition criteria for the EPBC Act-listed form of the community because the native over storey cover is less than 10%, however they meet the other condition attributes for the community, including greater than 30% perennial native groundcover and connectivity to a native vegetation remnant at least five hectares in area (see DEWHA 2010). There are 28.5 hectares of 'poorer quality Cumberland Plain Woodland' at the offset area (see Figure 30).

Poorer quality Cumberland Plain Woodland will be managed for conservation and improve in condition to comprise an occurrence of the ecological community listed under the EPBC Act (TSSC 2008) and reach at least the same site quality score as the impact area, in accordance with the EPBC Act Offsets Policy (DSEWPaC 2012). There are patches of high total exotic plant cover across the site but this mainly comprises Lantana or African Olive in the mid storey, above leaf litter and a patchy but predominantly native ground layer. Areas with lower olive cover feature healthy and species rich native grassland with apparently high ecological resilience. The poorer quality Cumberland Plain Woodland at the offset area is adjacent to patches of the community and similar vegetation with a woodland or forest structure that provides a source of seed for natural regeneration of over storey vegetation (see Figure 29 and Figure 30). Supplementary planting of over storey species is proposed and funded under the BSAs for these areas (GHD 2017c).

The poorer quality Cumberland Plain Woodland at the offset area could be managed and improved to at least the same condition as the community at the WSI site in the medium to long term, through the intensive treatment of weed infestations and exclusion of grazing to permit regeneration of over storey vegetation and supplementary planting where appropriate. The aims of this management would be to achieve restoration of vegetation that comprises EPBC Act Cumberland Plain Woodland, specifically vegetation with greater than 10% canopy cover and predominantly native groundcover in accordance with the condition criteria specified in the conservation and listing advice for the community (TSSC 2008, DEWHA 2010).

The site contains 23.8 hectares of Grey-headed Flying-fox habitat, comprising woodland and forest dominated by Forest Red Gum and Grey Box, which are recognised as 'significant species' in the blossom diet of the Grey-headed Flying-fox (Eby and Law 2008). Forest Red Gum scores in the upper quartile of all diet plants for the region for productivity and reliability of flowering. This species flowers in late winter and spring, partly during the 'food bottleneck' for the Grey-headed Flying-fox. Habitat at the Hampden Vale biobank is thus productive during food bottlenecks, and qualifies as habitat critical to the survival of the species, as defined in the draft recovery plan (DECCW 2009). Better condition patches of Grey Box – Forest Red Gum grassy woodland (HN529) containing Forest Red Gum which is a favoured food tree, would also provide winter foraging resources for the Swift Parrot.

There are 6.7 hectares of Low condition vegetation at the offset area that does not comprise habitat for the affected threatened biota. These areas currently contain exotic grassland that would undergo full structural revegetation under the BSA and would help improve habitat connectivity and the landscape context component of the site quality scores for the affected threatened biota. However this vegetation would not be expected to mature into a functioning occurrence of Cumberland Plain Woodland or productive Grey-headed Flying-fox and Swift Parrot foraging habitat in 20 years.

Matching biodiversity credits from all vegetation zones, including Low condition vegetation, comprise direct offsets for impacts on plants, animals and their habitat.

Appendix Table 18 Vegetation zones, biodiversity credits and habitat for the affected threatened biota at the Hampden Vale biobank offset area

Vegetation Zone	Veg Type ID	Condition	EPBC Act Status	BC Act Status	Total Area (ha)	Total credits	Credits per hectare	Secured biodiversity credits	EPBC Act offset area (ha)	Area of EPBC Act Cumberland Plain Woodland ¹ (ha)	Area of poorer quality Cumberland Plain Woodland (ha)	Area of Habitat for Grey-headed Flying fox ² (ha)	Area of habitat for Swift Parrot (ha)	Area of habitat for <i>Pimelea spicata</i> (ha)
1. Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good - medium	CEEC	CEEC	19.4	250	12.9	250.0	19.4	19.4	0.0	19.4	19.4	0.0
2. Grey Box - Forest Red Gum grassy woodland on shale	HN529	Moderate/good - poor		CEEC	40.7	575	14.1	339.0	24.0	0.0	24.0	0.0	0.0	0.0
6. Grey Box - Forest Red Gum grassy woodland on flats	HN528	Moderate/good		CEEC	8.9	124	13.9	124	8.9	4.4	4.5	4.4	4.4	0.0
7. Grey Box - Forest Red Gum grassy woodland on flats	HN528	Low		EEC	17.5	213	12.2	81.0	6.7	0.0	0.0	0.0	0.0	0.0
		Total			97.4 ¹	1289 ¹		794	59.0	23.8	28.5	23.8	23.8	0.0

Notes: 1. The total for the site, including land outside the offset area and vegetation zones in addition to those listed above.

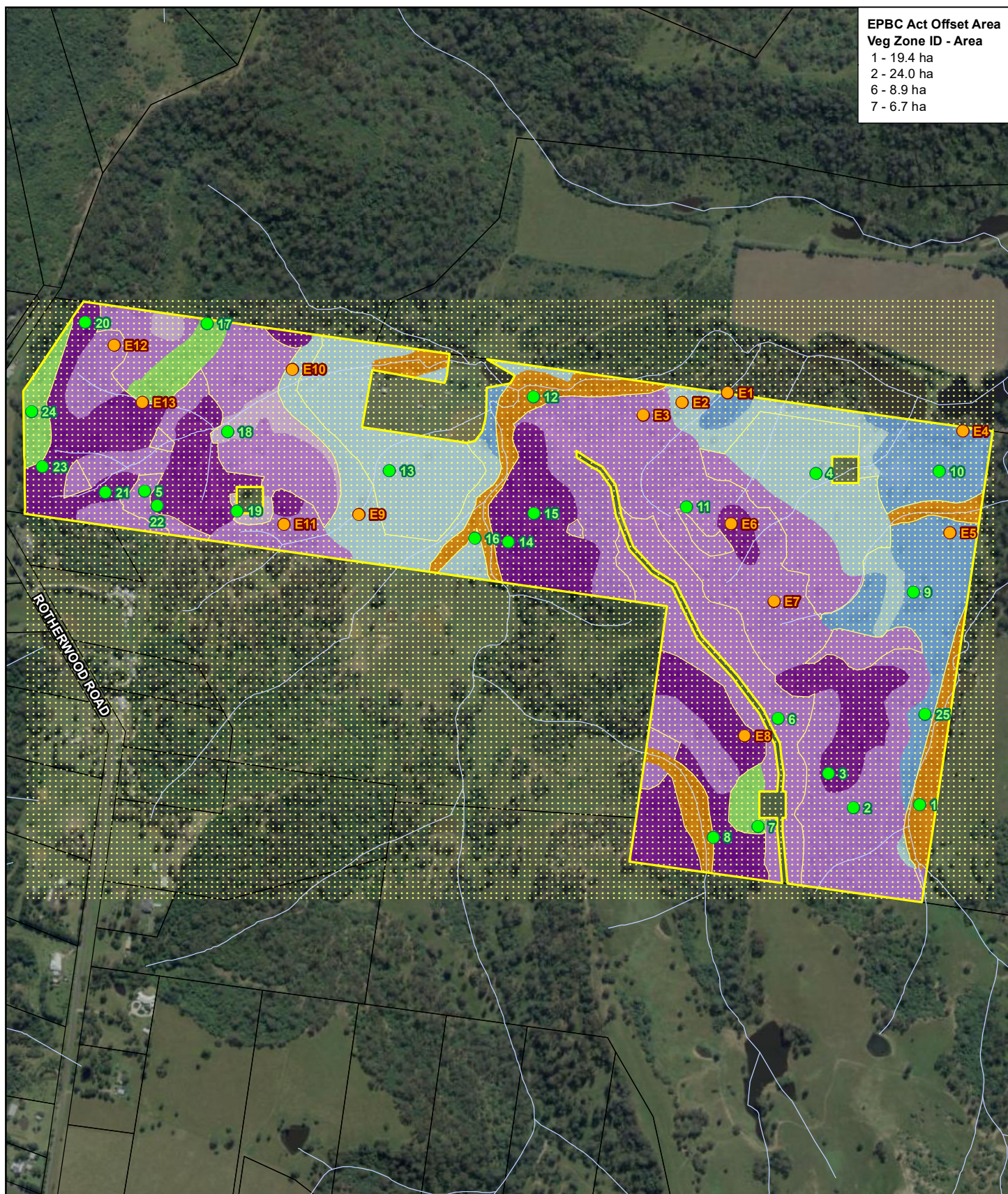
Appendix Table 19 Plot/transects within EPBC offset area at Hampden Vale Biobank

Veg Zone ID	Veg Type ID	Plot ID	Native plant species richness	Native over-storey cover	Native mid-storey cover	Native ground cover (grasses)	Native ground cover (shrubs)	Native ground cover (other)	Percentage native groundcover ¹	Exotic groundcover	Exotic plant cover ²	Number of trees with hollows	Over storey regen	Total length of fallen logs
Swift Parrot and Grey-headed Flying Fox habitat/ EPBC Act Cumberland Plain Woodland														
1	HN529	Bench-mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75			0	> = 0	1	> = 0
		3	30	16	2	28	0	22	83.3	10	34	0	1	0
		14	40	20	0	88	0	38	94.0	8	8	0	1	6
		15	35	20.5	0	68	0	18	93.5	6	32	0	1	10
		21	47	11.5	21.5	72	6	46	91.2	12	25.5	0	1	15
		22	27	22	4	64	2	20	81.1	20	42	0	1	25
		20	50	19.5	11	64	0	28	88.5	12	23.5	1	1	38
		23	46	9	14.5	82	14	40	86.1	22	25.5	0	1	5
Poorer quality Cumberland Plain Woodland														
2	HN529	Bench-mark	29	18.5-23.5	20-30	23-31	0-5	11.75-19.75			0	> = 0	1	> = 0
		2	28	0	1	32	0	20	54.2	44	62	0	0.75	0
		11	26	0	0	72	0	38	88.7	14	23	0	0.75	0
6	HN528	Bench-mark	29	20.5-25.5	25.5-30.5	26.8-30.8	0-5	14.8-18.8			0	> = 0	1	> = 0
		9	26	11	8	54	0	50	83.9	20	20	0	0.75	40
		10	23	0	0	70	0	20	65.2	48	48	0	0.75	0
		25	42	0	14	88	0	40	82.1	28	28	1	0.75	0

Notes: 1. The percentage of native groundcover as a proportion of the total groundcover (including exotic groundcover) recorded within plots.

2. Exotic plant cover comprises the highest exotic cover within a single strata.

3. Biodiversity credits secured within vegetation zone 5 do not contribute to the quantum of offset for affected threatened biota.

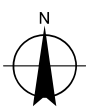


EPBC Act Offset Area
Veg Zone ID - Area
 1 - 19.4 ha
 2 - 24.0 ha
 6 - 8.9 ha
 7 - 6.7 ha

LEGEND

- | | | |
|--------------------------------|--|---|
| Hampden Vale biobank | Rapid site quality plot | 5. Forest Red Gum - Rough-barked Apple grassy woodland (HN526, Moderate/good) |
| EPBC Act offset area (59.0 ha) | 1. Grey Box - Forest Red Gum grassy woodland (HN529, Moderate/good-medium) | 6. Grey Box - Forest Red Gum grassy woodland on flats (HN528, Moderate/good) |
| Cadastre | 2. Grey Box - Forest Red Gum grassy woodland (HN529, Moderate/good-poor) | 7. Grey Box - Forest Red Gum grassy woodland on flats (HN528, Low) |
| Waterways | 3. Grey Box - Forest Red Gum grassy woodland (HN529, Low) | 8. Grey Myrtle dry rainforest (HN538, Moderate/good) |
| Plot/transect | | |

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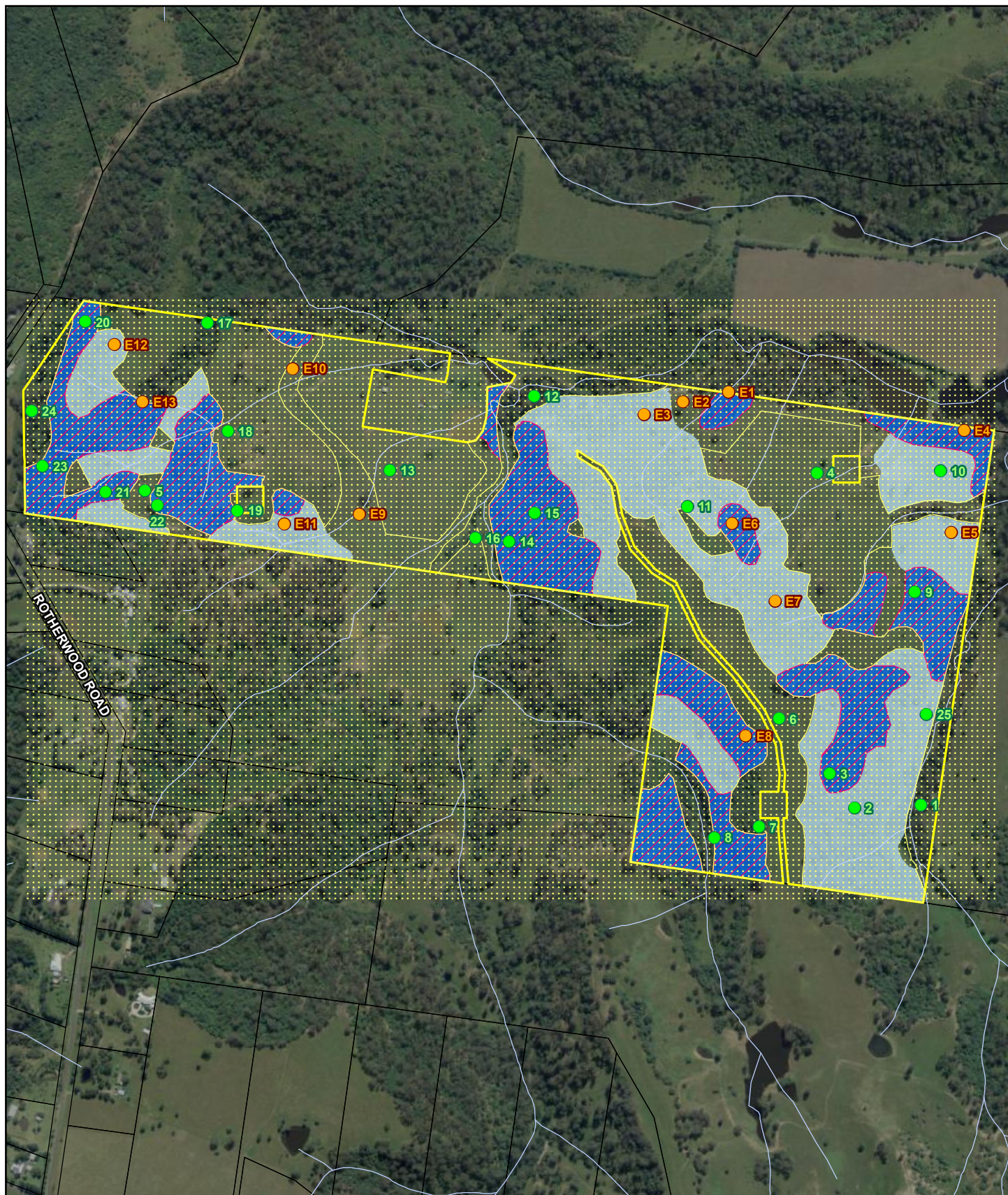


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Hampden Vale Biobank Vegetation Zones

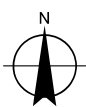
Figure 29



LEGEND

- | | |
|--------------------------------|--|
| Hampden Vale biobank | Rapid site quality plot |
| EPBC Act offset area (59.0 ha) | Grey-headed Flying-fox and Swift Parrot foraging habitat |
| Cadastre | Cumberland Plain Woodland (CEEC under the EPBC Act and BC Act) |
| Waterways | Poorer quality Cumberland Plain Woodland (CEEC under the BC Act) |
| Plot/transect | |

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Grid: GDA 1994 MGA Zone 56



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Hampden Vale Biobank Threatened Biota and Habitat

Figure 30

Quantum of offset

Offsets assessment guide calculations have been performed based on the significant residual impacts on affected threatened biota documented in Chapter 2 of the BODP (DIRD 2018), previous BioBanking assessment (GHD 2017c) and EPBC Act survey of the offset area according to the approach presented in the approved BODP, as described in section 1.6.1. EPBC Act offset assessment guide spreadsheets have been provided to the independent auditor along with work sheets presenting the approach to site quality scoring and justification for all inputs.

The 794 biodiversity credits that have been purchased have secured a 59 hectare EPBC Act offset area at the Hampden Vale biobank that contains the following quantum of direct offset for WSI:

- 23.8 hectares of Cumberland Plain Woodland with a start site quality score of 6 and a future site quality score with offset of 8 that would contribute 3.02 per cent of the offset requirement for the community.
- 28.5 hectares of poorer quality Cumberland Plain Woodland with a start site quality score of 4 and a future site quality score with offset of 6 that would contribute 2.09 per cent of the offset requirement for the community.
- 23.8 hectares of Grey-headed Flying-fox habitat with a start site quality score of 7 and a future site quality score with offset of 8 that would contribute 4.55 per cent of the offset requirement for the species.
- 23.8 hectares of Swift Parrot foraging habitat with a start site quality score of 5 and a future site quality score with offset of 6 that would contribute 1.26 per cent of the offset requirement for the species.
- The biodiversity credits summarised in Appendix Table 15 as direct offsets for impacts on plants, animals and their habitat.

EPBC Act survey results

Branch Lane Biobank


Site E1


Survey Date: Jul 2, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus microcorys</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus propinqua</i> Cover: 2 Health: Healthy, sub-mature Overstorey species: <i>Angophora costata</i> Cover: 2 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Allocasuarina torulosa</i> , <i>Pittosporum undulatum</i> Cover: 5 Health: Healthy, sub-mature	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Lomandra longifolia</i> , <i>Goodenia heterophylla</i> , <i>Hibbertia aspera</i> , <i>Pratia purpurascens</i> Cover: 70 Health: Healthy, mature	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 1 Health: Healthy, mature Notes: Occasional, isolated <i>Lantana camara</i>	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Occasional very large over mature <i>Corymbia maculata</i>	



Site E2

Survey Date: Jul 2, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus microcorys</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Syncarpia glomulifera</i> Cover: 3 Health: Healthy, sub-mature	
Midstorey	Native midstorey species: <i>Pittosporum undulatum</i> , <i>Allocasuarina torulosa</i> , <i>Glochidion ferdinandi</i> , <i>Notelaea longifolia</i> , <i>Acacia linifolia</i> Cover: 15 Health: Healthy, sub-mature Notes:	
Native ground species	Native ground species: <i>Lomandra longifolia</i> , <i>Themeda triandra</i> , <i>Imperata cylindrica</i> , <i>Smilax australis</i> , <i>Pittosporum revolutum</i> , <i>Lissanthe strigosa</i> Cover: 80 Health: Healthy, mature	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 2 Health: Healthy, mature	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Large mature <i>Corymbia maculata</i> on occasion.	





Site E3

Survey Date: Jul 2, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus microcorys</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus propinqua</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Notelaea longifolia</i> , <i>Allocasuarina torulosa</i> Cover: 5 Health: Healthy, sub-mature	
Native ground species	Native ground species: <i>Imperata cylindrica</i> , <i>Lomandra longifolia</i> , <i>Desmodium brachypodium</i> , <i>Pratia purpurascens</i> , <i>Phyllanthus hirtellus</i> , <i>Geitonoplesium cymosum</i> , <i>Billardiera scandens</i> Cover: 30 Health: Healthy, mature	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 2 Health: Healthy, mature	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Westerly aspect.	



Site E4

Survey Date: Jul 2, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus paniculata</i> Cover: 30 Health: Healthy, mature Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus globoidea</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Allocasuarina torulosa</i> , <i>Pittosporum undulatum</i> , <i>Breynia oblongifolia</i> Cover: 10 Health: Healthy, mature	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Imperata cylindrica</i> , <i>Pittosporum revolutum</i> , <i>Pultenaea villosa</i> , <i>Lepidosperma laterale</i> , <i>Dianella caerulea</i> Cover: 20 Health: Healthy, mature	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 1 Health: Healthy, sub-mature Notes: Lantana infestation downslope.	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No specific patch actions	





Site E5

Survey Date: Jul 2, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus microcorys</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Allocasuarina torulosa</i> , <i>Acacia longifolia</i> , <i>Glochidion ferdinandi</i> , <i>Breynia oblongifolia</i> Cover: 15 Health: Healthy, mature	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Lomandra longifolia</i> , <i>Pittosporum revolutum</i> , <i>Vernonia cinerea</i> , <i>Pratia purpurascens</i> Cover: 80 Health: Healthy, mature	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 3 Health: Healthy, mature Notes: <i>Lantana camara</i> is more abundant downslope	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No specific patch actions	



Site E6

Survey Date: Jul 2, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenoides</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Persoonia linearis</i> , <i>Allocasuarina torulosa</i> Cover: 2 Health: Healthy, sub-mature	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Dichelachne crinita</i> , <i>Desmodium rhytidophyllum</i> , <i>Lomandra filiformis</i> , <i>Cheilanthes sieberi</i> , <i>Solanum prinophyllum</i> Cover: 50 Health: Healthy, mature	
Exotic species	Exotic species: <i>Lantana camara</i> , <i>Lactuca serriola</i> and occasional environmental weeds Cover: 2 Health: Healthy, mature	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Hot north-westerly aspect. Canopy vegetation is possibly drought-stressed and trees exhibiting epicormic growth.	





Site E7

Survey Date: Jul 2, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus globoidea</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Corymbia maculata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca nodosa</i> , <i>Glochidion ferdinandi</i> , <i>Persoonia linearis</i> Cover: 5 Health: Healthy, mature Notes: Dense patches of occasional <i>Melaleuca nodosa</i>	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Lomandra longifolia</i> , <i>Goodenia heterophylla</i> , <i>Billardiera scandens</i> , <i>Eustrephus latifolius</i> Cover: 70 Health: Healthy, mature	
Exotic species	Exotic species: None detected. Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E1

Survey Date: Jul 1, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenoides</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Backhousia myrtifolia</i> , <i>Allocasuarina torulosa</i> Cover: 60 Health: Healthy, mature Notes: Dense mesic midstorey	
Native ground species	Native ground species: <i>Gymnostachys anceps</i> , <i>Microlaena stipoides</i> , <i>Adiantum aethiopicum</i> , <i>Adiantum formosum</i> , <i>Lomandra longifolia</i> . Cover: 20 Health: Healthy, mature Notes: Unburnt in recent fire.	
Exotic species	Exotic species: None detected. Cover: 0 Health: Absent Notes: Intact native vegetation.	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	





Site E2

Survey Date: Jul 1, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 5 Health: Overstorey species: <i>Eucalyptus umbra</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Allocasuarina torulosa</i> , <i>Dodonaea triquetra</i> , <i>Breynia oblongifolia</i> Cover: 30 Health: Healthy, mature Notes: Post fire regrowth and re-sprouting	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Cheilanthes sieberi</i> , <i>Aristida vagans</i> , <i>Pratia purpurascens</i> , <i>Hardenbergia violacea</i> Cover: 40 Health: Healthy, mature Notes: Post fire regrowth	
Exotic species	Exotic species: <i>Bidens pilosa</i> , <i>Senecio madagascariensis</i> , <i>Hypochaeris radicata</i> Cover: 1 Health: Healthy, mature Notes: Occasional herbaceous environmental weeds	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Good regrowth following moderate intensity burn in the last 12 months.	



Site E3

Survey Date: Jul 1, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Angophora costata</i> Cover: 30 Health: Healthy, mature Overstorey species: <i>Eucalyptus capitellata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenoides</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Banksia spinulosa</i> , <i>Acacia stricta</i> , <i>Dodonaea triquetra</i> Cover: 10 Health: Healthy, mature Notes: Post fire regrowth	
Native ground species	Native ground species: <i>Xanthorrhoea</i> spp., <i>Imperata cylindrica</i> , <i>Hibbertia aspera</i> , <i>Lomandra obliqua</i> , <i>Pultenaea daphnoides</i> Cover: 50 Health: Healthy, sub-mature Notes: Post fire regrowth. High species richness of native shrubs and forbs	
Exotic species	Exotic species: None detected Cover: 0 Health: Absent Notes: Advanced recovery following moderate to high intensity fire within the last 12 months	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	
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Site E4

Survey Date: Jul 1, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context:	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus umbra</i> Cover: 10 Health: Healthy, sub-mature	
Midstorey	Native midstorey species: <i>Dodonaea triquetra</i> , <i>Persoonia linearis</i> , <i>Pultenaea villosa</i> , <i>Leptospermum polygalifolium</i> Cover: 40 Health: Healthy, sub-mature Notes: Post fire regrowth	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Panicum simile</i> , <i>Dianella caerulea</i> , <i>Phyllanthus hirtellus</i> , <i>Aristida vagans</i> Cover: 40 Health: Healthy, mature Notes: Advanced post fire regeneration	
Exotic species	Exotic species: <i>Senecio madagascariensis</i> Cover: 1 Health: Healthy, mature Notes: Post fire regeneration	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E5

Survey Date: Jul 1, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Angophora costata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus capitellata</i> Cover: 25 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Dodonaea triquetra</i> , <i>Allocasuarina torulosa</i> , <i>Hardenbergia violacea</i> Cover: 60 Health: Healthy, mature Notes: Dense post fire regrowth	
Native ground species	Native ground species: <i>Desmodium varians</i> , <i>Hibbertia dentata</i> , <i>Goodenia</i> spp., <i>Entolasia stricta</i> , <i>Lomandra filiformis</i> Cover: 15 Health: Healthy, mature	
Exotic species	Exotic species: Nil Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E6

Survey Date: Jul 1, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus crebra</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus capitellata</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Allocasuarina torulosa</i> , <i>Acacia falcata</i> , <i>Persoonia linearis</i> , <i>Jacksonia scoparia</i> Cover: 5 Health: Healthy, sub-mature Notes: Early regrowth following high intensity fire	
Native ground species	Native ground species: <i>Lomandra filiformis</i> , <i>Lepidosperma laterale</i> , <i>Entolasia stricta</i> , <i>Hibbertia aspera</i> Cover: 15 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Steep with abundant rock outcrop	



Site E7

Survey Date: Jul 1, 2020		Field staff: BH,MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus umbra</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus capitellata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Allocasuarina torulosa</i> , <i>Dodonaea triquetra</i> , <i>Breynia oblongifolia</i> Cover: 10 Health: Healthy, mature	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Pratia purpurascens</i> , <i>Billardiera scandens</i> , <i>Scaevola</i> spp., <i>Hibbertia obtusifolia</i> , <i>Adiantum aethiopicum</i> , <i>Pseuderanthemum variabile</i> Cover: 60 Health: Healthy, mature Notes: Moist sheltered aspect	
Exotic species	Exotic species: <i>Lantana camara</i> , <i>Cirsium vulgare</i> Cover: 25 Health: Healthy, mature Notes: Localised infestation in gully	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Primary weed control	



Limeburners North biobank

Site E1

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus paniculata</i> Cover: 30 Health: Healthy, mature Overstorey species: <i>Eucalyptus eugenioides</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca linearifolia</i> , <i>Callistemon sieberi</i> , <i>Myrsine variabilis</i> , <i>Leptospermum polygalifolium</i> Cover: 30 Health: Healthy, mature	
Native ground species	Native ground species: <i>Microlaena stipoides</i> , <i>Gahnia aspera</i> , <i>Lepidosperma laterale</i> , <i>Lomandra obliqua</i> , <i>Lissanthe strigosa</i> Cover: 70 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E2

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia gummifera</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus capitellata</i> Cover: 15 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Acacia longifolia</i> , <i>Banksia oblonga</i> , <i>Leptospermum polygalifolium</i> , <i>Lambertia formosa</i> , Cover: 40 Health: Healthy, mature	
Native ground species	Native ground species: <i>Lepidosperma</i> spp., <i>Grevillea linearifolia-parviflora</i> , <i>Banksia spinulosa</i> , <i>Xanthorrhoea</i> spp. Cover: 80 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No specific patch actions	




Site E3


Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus capitellata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Corymbia gummifera</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Persoonia linearis</i> , <i>Leptospermum polygalifolium</i> , <i>Leptospermum trinervium</i> Cover: 10 Health: Healthy, mature	
Native ground species	Native ground species: <i>Banksia spinulosa</i> , <i>Isopogon anemonifolius</i> , <i>Pimelea linifolia</i> , <i>Acacia ulicifolia</i> , <i>Ptilothrix deusta</i> , <i>Entolasia stricta</i> Cover: 80 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E4

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus capitellata</i> Cover: 15 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca linearifolia</i> , <i>Melaleuca decora</i> , <i>Persoonia linearis</i> , <i>Callistemon linearis</i> Cover: 15 Health: Healthy, mature	
Native ground species	Native ground species: <i>Daviesia ulicifolia</i> , <i>Lepidosperma laterale</i> , <i>Themeda triandra</i> , <i>Imperata cylindrica</i> Cover: 40 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	






Site E5


Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus globoidea</i> Cover: 30 Health: Healthy, mature Overstorey species: <i>Corymbia gummifera</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Syncarpia glomulifera</i> Cover: 15 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Ceratopetalum gummiferum</i> , juvenile <i>Syncarpia glomulifera</i> , <i>Polyscias sambucifolia</i> , <i>Allocasuarina torulosa</i> Cover: 40 Health: Healthy, mature	
Native ground species	Native ground species: <i>Gahnia sieberiana</i> , <i>Hibbertia aspera</i> , <i>Gymnanthera dentata</i> , <i>Eustrephus latifolius</i> , <i>Lomandra longifolia</i> Cover: 70 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E6



Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia gummifera</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus capitellata</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Leptospermum polygalifolium</i> , <i>Banksia paludosa</i> , <i>Acacia terminalis</i> subsp. <i>angustifolia</i> , <i>Acacia ulicifolia</i> , <i>Banksia spinulosa</i> Cover: 70 Health: Healthy, mature Notes: Dense midstorey	
Native ground species	Native ground species: <i>Gahnia sieberiana</i> , <i>Entolasia stricta</i> , <i>Xanthorrhoea</i> spp., <i>Lindsaea linearis</i> Cover: 20 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	





Site E7

Survey Date: Jul 4, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus capitellata</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Callistemon linearis</i> , <i>Callistemon linearifolius</i> , <i>Sannantha pluriflora</i> , <i>Persoonia linearis</i> Cover: 30 Health: Healthy, mature Notes: Dense patches of callistemon present.	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Entolasia stricta</i> , <i>Aristida ramosa</i> , <i>Lepidosperma laterale</i> , <i>Grevillea parviflora</i> Cover: 70 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Recent severe dieback on canopy of trees. Abundant recent epicormic growth; appears to be regenerating well.	



Limeburners South biobank

Site E1

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus eugenioides</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 15 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca styphelioides</i> , <i>Callistemon sieberi</i> , <i>Callistemon linearis</i> , <i>Acacia longifolia</i> , <i>Parsonsia straminea</i> Cover: 30 Health: Healthy, mature	
Native ground species	Native ground species: <i>Entolasia stricta</i> , <i>Lomandra longifolia</i> , <i>Lissanthe strigosa</i> , <i>Gahnia</i> spp., <i>Pratia purpurascens</i> , <i>Hibbertia aspera</i> Cover: 80 Health: Healthy, mature	
Exotic species	Exotic species: <i>Lantana camara</i> , <i>Hypochaeris radicata</i> Cover: 5 Health: Healthy, mature	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E2

Survey Date: Jul 3, 2020		Field staff: BH and MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Angophora costata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Corymbia gummifera</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 5 Health: Healthy, mature Overstorey species: Eucalyptus Stringy check plot 4 vicinity Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Leptospermum polygalifolium</i> , <i>Lambertia formosa</i> , <i>Pultenaea villosa</i> Cover: 30 Health: Healthy, mature	
Native ground species	Native ground species: <i>Imperata cylindrica</i> , <i>Phyllanthus hirtellus</i> , <i>Austrostipa</i> sp., <i>Banksia spinulosa</i> , <i>Hibbertia aspera</i> . Cover: 80 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Near intact vegetation	



Site E3

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Corymbia gummifera</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Syncarpia glomulifera</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus umbra</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Allocasuarina torulosa</i> , <i>Leptospermum polygalifolium</i> Cover: 10 Health: Healthy, mature Notes: <i>Syncarpia glomulifera</i> juveniles in midstorey	
Native ground species	Native ground species: <i>Gahnia sieberiana</i> , <i>Entolasia stricta</i> , <i>Austrostipa</i> spp. Cover: 20 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E4

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus acmenoides</i> Cover: 35 Health: Healthy, mature Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Syncarpia glomulifera</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca styphelioides</i> , <i>Breynia oblongifolia</i> , <i>Ripogonum album</i> , <i>Callistemon sieberi</i> Cover: 30 Health: Healthy, mature Notes: Check rainforest sp plot 19	
Native ground species	Native ground species: <i>Adiantum formosum</i> , <i>Pseuderanthemum variabile</i> , <i>Lepidosperma</i> spp., <i>Pellaea paradoxa</i> , <i>Pellaea falcata</i> , <i>Doodia aspera</i> Cover: 20 Health: Healthy, mature	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 40 Health: Healthy, mature	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: No patch specific actions Notes: Dense rainforest and <i>Melaleuca</i> gallery forest on creekline but mature eucalypts throughout.	



Site E5

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia gummifera</i> Cover: 30 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenoides</i> Cover: 3 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Lambertia formosa</i> , <i>Persoonia linearis</i> , <i>Banksia spinulosa</i> , <i>Acacia myrtifolia</i> , <i>Leptospermum trinervium</i> Cover: 30 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Austrostipa</i> spp., <i>Lepidosperma</i> spp., <i>Entolasia stricta</i> , <i>Gonocarpus tetragynus</i> , <i>Sprengelia incarnata</i> Cover: 80 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E6

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Corymbia intermedia</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus umbra</i> Cover: 15 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Callistemon linearifolius</i> , <i>Lambertia formosa</i> , <i>Acacia ulicifolia</i> , <i>Persoonia linearis</i> Cover: 10 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Gahnia sieberiana</i> , <i>Austrostipa</i> spp., <i>Mirbelia rubifolia</i> , <i>Dillwynia rudis</i> Cover: 80 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	





Site E7

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus pilularis</i> Cover: 50 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Syncarpia glomulifera</i> , <i>Allocasuarina torulosa</i> , <i>Acacia longifolia</i> , <i>Glochidion ferdinandi</i> Cover: 40 Health: Healthy, mature	
Native ground species	Native ground species: <i>Pteridium esculentum</i> , <i>Acacia ulicifolia</i> , <i>Pittosporum revolutum</i> , <i>Billardiera scandens</i> , <i>Entolasia stricta</i> Cover: 15 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



Site E8

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus propinqua</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus umbra</i> Cover: 5 Health: Healthy, mature Overstorey species: Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Acacia longifolia</i> , <i>Glochidion ferdinandi</i> , <i>Melaleuca linearifolius</i> , <i>Callistemon linearis</i> Cover: 15 Health: Healthy, mature	
Native ground species	Native ground species: <i>Lomandra longifolia</i> , <i>Hibbertia aspera</i> , <i>Eustrephus latifolius</i> , <i>Pratia purpurascens</i> Cover: 70 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Check species list for stringybark	



Site E9

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus propinqua</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus eugenioides</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Glochidion ferdinandi</i> , <i>Callistemon linearis</i> , <i>Allocasuarina torulosa</i> Cover: 10 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Gahnia sieberiana</i> , <i>Lomandra longifolia</i> , <i>Pratia purpurascens</i> , <i>Lissanthe strigosa</i> , <i>Polymeria calycina</i> Cover: 60 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions Notes: Check species list to doublecheck <i>E. eugenioides</i>	



Site E10

Survey Date: Jul 3, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia gummifera</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Lambertia formosa</i> , <i>Leptospermum polygalifolium</i> , <i>Leptospermum trinervium</i> , <i>Banksia paludosa</i> Cover: 40 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Entolasia stricta</i> , <i>Lepidosperma</i> spp., <i>Hibbertia aspera</i> , <i>Pimelea linifolia</i> , <i>Sprengelia incarnata</i> Cover: 80 Health: Healthy, mature	
Exotic species	Exotic species: Nil evident Cover: 0.1 Health: Absent	
Management	Management Unit: Maintain and enhance woodland or forest Actions: No patch specific actions	



BA237 Biobank

Site E1

Survey Date: Jul 20, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >100-500 ha, small gaps	
Overstorey	Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca styphelioides</i> , <i>Acacia parramatensis</i> , <i>Parsonsia straminea</i> Cover: 30 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Praria purpurescens</i> , <i>Oplismenus aemulus</i> , <i>Dichondra repens</i> , <i>Micrlaena stipoides</i> , <i>Adiantum aethiopicum</i> Cover: 60 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> , <i>Cortaderia selloana</i> , <i>Paspalum dilatatum</i> , <i>Ageratina adenophora</i> Cover: 35 Health: Healthy, mature Notes:	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Primary weed control Notes: High cover of mature <i>E.tereticornis</i>	

Survey Date: Jul 20, 2020

Field staff: BH, MW



Site E2

Survey Date: Jul 20, 2020

Field staff: BH, MW

Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >50-100 ha, small gaps
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 30 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 10 Health: Healthy, mature
Midstorey	Native midstorey species: <i>Acacia elongata</i> Cover: 2 Health: Healthy, mature Notes:
Native ground species	Native ground species: <i>Bursaria spinosa</i> , <i>Daviesia ulicifolia</i> , <i>Dillwynia rudis</i> , <i>Lomandra multiflora</i> , <i>Aristida ramosa</i> , <i>Austrostipa</i> spp. Cover: 30 Health: Healthy, mature Notes:
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:

Survey Date: Jul 20, 2020

Field staff: BH, MW



Site E3

Survey Date: Jul 20, 2020

Field staff: BH, MW

Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >50-100 ha, small gaps
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Angophora floribunda</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 2 Health: Healthy, mature Overstorey species: <i>Eucalyptus globoidea</i> Cover: 5 Health: Healthy, mature
Midstorey	Native midstorey species: <i>Acacia falcata</i> , <i>Daviesia ulicifolia</i> , <i>Acacia elongata</i> Cover: 5 Health: Healthy, mature Notes:
Native ground species	Native ground species: <i>Aristida ramosa</i> , <i>Entolasia stricta</i> , <i>Lepidosperma laterale</i> , <i>Lomandra obliqua</i> , <i>Austrostipa</i> spp. Cover: 40 Health: Healthy, mature Notes:
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:

Survey Date: Jul 20, 2020

Field staff: BH, MW

Management

Management Unit: Maintain and enhance woodland or forest

Actions:

Notes:



Site E4

Survey Date: Jul 20, 2020

Field staff: BH, MW

Habitat

Habitat Type:

Site Context: Native patch >50-100 ha, small gaps

Overstorey

Overstorey species: *Eucalyptus fibrosa*

Cover: 5 **Health:** Healthy, sub-mature

Overstorey species: *Corymbia maculata*

Cover: 2 **Health:** Healthy, sub-mature

Midstorey

Native midstorey species: *Acacia elongata*, *Acacia falcata*, *Bursaria spinosa*, *Leptospermum*

Cover: 50 **Health:** Healthy, mature

Notes:

Native ground species

Native ground species: *Microlaena stipoides*, *Lomandra multiflora*, *Echinopogon caespitosus*, *Entolasia stricta*, *Cheilanthes seiberi*

Cover: 60 **Health:** Healthy, mature

Notes:

Exotic species

Exotic species: *Hypochaeris radicata*, *Setaria parviflora*

Cover: 2 **Health:** Healthy, mature

Notes:

Management

Management Unit:

Actions:

Notes: Canopy cover too low to comprise Swift Parrot foraging habitat

Survey Date: Jul 20, 2020	Field staff: BH, MW
	

Site E5

Survey Date: Jul 20, 2020	Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >50-100 ha, small gaps
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 20 Health: Healthy, mature
Midstorey	Native midstorey species: <i>Acacia elongata</i> , <i>Bursaria spinosa</i> Cover: 5 Health: Healthy, mature Notes:
Native ground species	Native ground species: <i>Aristida ramosa</i> , <i>Goodenia rotundifolia</i> , <i>Entolasia stricta</i> , <i>Opercularia diphylla</i> Cover: 40 Health: Healthy, mature Notes:
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:

Survey Date: Jul 20, 2020

Field staff: BH, MW



Site E6

Survey Date: Jul 20, 2020

Field staff: BH, MW

Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >50-100 ha, small gaps
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Angophora costata</i> Cover: 3 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> <i>Eucalyptus punctata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus eugenioides</i> Cover: 10 Health: Healthy, mature
Midstorey	Native midstorey species: <i>Acacia elongata</i> , <i>Daviesia ulicifolia</i> , <i>Bursaria spinosa</i> , <i>Acacia parramatensis</i> , <i>Allocasuarina torulosa</i> Cover: 10 Health: Healthy, mature Notes:
Native ground species	Native ground species: <i>Entolasia stricta</i> , <i>Aristida ramosa</i> , <i>Pratia purpurea</i> , <i>Lissanthe strigosa</i> , <i>Glycine tabacina</i> Cover: 60 Health: Healthy, mature Notes:
Exotic species	Exotic species: <i>Sonchus oleraceus</i> , <i>Lantana camara</i> Cover: 2 Health: Absent Notes:

Survey Date: Jul 20, 2020		Field staff: BH, MW
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	
		

Site E7

Survey Date: Jul 20, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >50-100 ha, small gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> <i>Eucalyptus punctata</i> Cover: 5 Health:	
Midstorey	Native midstorey species: <i>Acacia elongata</i> , <i>Dillwynia rudis</i> , <i>Acacia falcata</i> Cover: 5 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Aristida ramosa</i> , <i>Lissanthe strigosa</i> , <i>Pratia purpurescens</i> , <i>Goodenia rotundifolia</i> Cover: 50 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent Notes:	

Survey Date: Jul 20, 2020		Field staff: BH, MW
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	
		

Site E8

Survey Date: Jul 20, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >50-100 ha, small gaps	
Overstorey	Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Angophora floribunda</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca styphelioides</i> , <i>Leptospermum polygalifolium</i> , <i>Parsonsia straminea</i> Cover: 60 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Oplismenus aemulus</i> , <i>Adiantum aethiopicum</i> , <i>Microlaena stipoides</i> , <i>Breynia oblongifolia</i> , <i>Hydrocotyle laxiflora</i> Cover: 80 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> , <i>Paspalum dilatatum</i> Cover: 15 Health: Healthy, mature Notes:	

Survey Date: Jul 20, 2020

Field staff: BH, MW

Management

Management Unit: Primary to maintenance weed control in woodland or forest

Actions:

Notes:



BA105 Biobank

Site E1

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus globoidea</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 2 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Callistemon saligna</i> , <i>Mwlaleuca decora</i> , <i>Leptospermum trinervium</i> Cover: 10 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Lomandra filiformis coriaca</i> , <i>Cymbopogon refractus</i> , <i>Entolasia stricta</i> , <i>Pratia purpurescens</i> , Cover: 50 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	

Survey Date: Jul 21, 2020

Field staff: BH, MW



Site E2

Survey Date: Jul 21, 2020



Field staff: BH, MW

Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus globoidea</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 3 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 5 Health: Healthy, mature
Midstorey	Native midstorey species: <i>Callistemon linearifolius</i> , <i>Leptospermum trinervium</i> Cover: 5 Health: Healthy, mature Notes:
Native ground species	Native ground species: <i>Lomandra filiformis</i> , <i>coriaceae</i> , <i>Lomandra longifolia</i> , <i>Imperata cylindrica</i> , <i>Pratia purpurescens</i> , <i>Glycine tabacina</i> Cover: 60 Health: Healthy, mature Notes:

Survey Date: Jul 21, 2020		Field staff: BH, MW
Exotic species	Exotic species: Lantana camara Cover: 2 Health: Healthy, mature Notes:	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	
		



Site E3

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus microcorys</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Breynia oblongifolia</i> , <i>Acacia falciformis</i> , <i>Melaleuca styphelioides</i> , <i>Allocasuarina torulosa</i> Cover: 10 Health: Healthy, mature Notes:	

Survey Date: Jul 21, 2020		Field staff: BH, MW
Native ground species	Native ground species: Imperata cylindrica, Pratia purpurescens, Plectranthus parviflorus, Dianella prinina Cover: 50 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Lantana camara, Lactucca seriola Cover: 20 Health: Healthy, mature Notes:	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	
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Site E4

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 15 Health: Healthy, mature Overstorey species: Eucalyptus microcorysEucalyptus microcorys Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 5 Health: Healthy, mature Overstorey species: Eucalyptus mollucannaEucalyptus mollucanna Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 10 Health: Healthy, mature	

Survey Date: Jul 21, 2020		Field staff: BH, MW	
Midstorey	Native midstorey species: Persoonia linearis, Acacia longifolia, Melaleuca stypheliodes, Callistemon salignus Cover: 5 Health: Healthy, mature Notes:		
Native ground species	Native ground species: Lissanthe strigosa, Echinopogon caespitosus, Aristida vagans, Imperata cylindrica, Hibbertia aspera Cover: 60 Health: Healthy, mature Notes:		
Exotic species	Exotic species: Lantana camara Cover: 20 Health: Healthy, mature Notes:		
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:		
			

Site E5

Survey Date: Jul 21, 2020		Field staff: BH, MW	
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps		
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 30 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 5 Health: Healthy, mature		

Survey Date: Jul 21, 2020

Field staff: BH, MW

Midstorey

Native midstorey species: Pittosporum undulatum, Breynia oblongifolia, Acacia obtusifolia

Cover: 10 **Health:** Healthy, mature

Notes:

Native ground species

Native ground species: Imperata cylindrica, Entolasia stricta, Pratia purpurescens, Echinopogon caespitosus

Cover: 50 **Health:** Healthy, mature

Notes:

Exotic species

Exotic species: Lantana camara

Cover: 35 **Health:** Healthy, mature

Notes:

Management

Management Unit: Primary to maintenance weed control in woodland or forest

Actions:

Notes:



Site E6

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: Eucalyptus microcorys Eucalyptus microcorys Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 5 Health: Healthy, mature Overstorey species: Eucalyptus punctata Eucalyptus punctata Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: Pittosporum undulatum, Allocasuarina torulosa, Melaleuca styphelioides, Callistemon salignus Cover: 10 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Lomandra longifolia, Hibbertia aspera, Imperata cylindrica, Oplismenus aemulus, Mayetenus sylvestris Cover: 40 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Lantana camara Cover: 10 Health: Healthy, mature Notes: More severe lantana infestations in gully	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	

Survey Date: Jul 21, 2020

Field staff: BH, MW



Delta 5 biobank (BA331)

Site E1

Survey Date: Jul 22, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus globoidea</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 3 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 2 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> Cover: 1 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Notelea longifolia</i> , <i>Acacia falcata</i> , <i>Breynia oblongifolia</i> , <i>Persoonia linearis</i> Cover: 5 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Cymbopogon refractus</i> , <i>Dianella caerulea</i> , <i>Aristida vagans</i> , <i>Cheilanthes sieberi</i> , <i>Gahnia aspera</i> , <i>Pratia purpurescens</i> Cover: 70 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> , <i>Sonchus oleraceus</i> , <i>Conyza bonariensis</i> Cover: 2 Health: Healthy, mature Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes: Good recover post dieback event	

Survey Date: Jul 22, 2020

Field staff: BH, MW



Site E2

Survey Date: Jul 22, 2020

Field staff: BH, MW

Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 25 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 2 Health: Healthy, mature
Midstorey	Native midstorey species: <i>Notelea longifolia</i> , <i>Xanthorrhoea arborea</i> , <i>Allocasuarina torulosa</i> , <i>Myrsine variabilis</i> , <i>Brachychiton populneus</i> Cover: 20 Health: Healthy, mature Notes:
Native ground species	Native ground species: <i>Gahnia aspera</i> , <i>Imperata cylindrica</i> , <i>Lissanthes strigosa</i> , <i>Hardenbergia violacea</i> , <i>Oplismenus imbecillus</i> Cover: 40 Health: Healthy, mature Notes:
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 25 Health: Healthy, mature Notes:
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions:

Survey Date: Jul 22, 2020

Field staff: BH, MW

Notes:





Site E3

Survey Date: Jul 22, 2020

Field staff: BH, MW

Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 35 Health: Healthy, mature Overstorey species: <i>Eucalyptus microcorys</i> Cover: 5 Health: Healthy, mature
Midstorey	Native midstorey species: <i>Hibiscus diversifolia</i> , <i>Synoum glandulosum</i> , <i>Abrophyllum ornans</i> , <i>Capparis</i> spp. Cover: 40 Health: Healthy, mature Notes:
Native ground species	Native ground species: <i>Gymnostachys anceps</i> , <i>Oplismenus imbecillis</i> , <i>Pallea paradoxa</i> , <i>Pratia purpurescens</i> , <i>Clematis aristata</i> Cover: 35 Health: Healthy, mature Notes:
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 5 Health: Healthy, mature Notes:

Survey Date: Jul 22, 2020		Field staff: BH, MW	
Management		Management Unit: Maintain and enhance woodland or forest	
		Actions:	
		Notes: Less mesic form of HU798. High cover of eucalypts including food trees	
			

Site E4

Survey Date: Jul 22, 2020		Field staff: BH, MW	
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps		
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 20 Health: Healthy, mature		
Midstorey	Native midstorey species: <i>Cissus antarctica</i> , <i>Synoum glandulosum</i> , <i>Backhousia myrtifolia</i> , <i>Cryptocarya rigida</i> , <i>Scolopia braunia</i> Cover: 40 Health: Healthy, mature Notes:		
Native ground species	Native ground species: <i>Oplismenus imbecillis</i> , <i>Doodia aspera</i> , <i>Pteris tremula</i> , <i>Pellaea falcata</i> , <i>Gymnostachys anceps</i> , <i>Smilax australis</i> Cover: 35 Health: Healthy, mature Notes:		
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 3 Health: Healthy, mature Notes:		

Survey Date: Jul 22, 2020		Field staff: BH, MW
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	
		

Site E5

Survey Date: Jul 22, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 25 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 25 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Hdycaria angustifolia</i> , <i>Notelaea venosa</i> , <i>Hibiscus heterophyllus</i> , <i>Melaleuca styphelioides</i> , <i>Streblus brunoniana</i> Cover: 40 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Oplismenus imbecillus</i> , <i>Pittosporum multiflora</i> , <i>Stellaria flaccida</i> , <i>Adiantum aethiopicum</i> Cover: 90 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 2 Health: Healthy, mature Notes:	

Survey Date: Jul 22, 2020		Field staff: BH, MW
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	
		



Site E6

Survey Date: Jul 22, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus grandis</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca styphelioides</i> , <i>Leptospermum polygalifolium</i> , <i>Backhousia myrtifolia</i> Cover: 15 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Oplismenus imbecillia</i> , <i>Dichindra repens</i> , <i>Carex</i> spp., <i>Pseudoranthemum variable</i> , <i>Sigesbeckia orientalis</i> Cover: 30 Health: Healthy, mature Notes:	

Survey Date: Jul 22, 2020		Field staff: BH, MW
Exotic species	Exotic species: Lantana camara, Ligustrum sinensis Cover: 50 Health: Healthy, mature Notes:	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	
		



Site E7

Survey Date: Jul 22, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 25 Health: Healthy, mature Overstorey species: <i>Eucalyptus globoidea</i> Cover: 15 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Allocasuarina torulosa</i> , <i>Melaleuca linariifolia</i> , <i>Notolaea longifolia</i> , <i>Acacia longifolia</i> Cover: 15 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Lomandra filiformis</i> , <i>Imperata cylindrica</i> , <i>Maytenus silvestris</i> , <i>Gahnia aspera</i> , <i>Pratia purpurescens</i> , <i>Polyscias sambucifolia</i> Cover: 80 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i>	

Survey Date: Jul 22, 2020		Field staff: BH, MW	
		Cover: 10 Health: Healthy, mature	
		Notes:	
Management		Management Unit: Primary to maintenance weed control in woodland or forest	
		Actions:	
		Notes:	
			



Site E8

Survey Date: Jul 22, 2020		Field staff: BH, MW	
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps		
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 25 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus globoidea</i> <i>Eucalyptus globoidea</i> Cover: 5 Health: Healthy, mature		
Midstorey	Native midstorey species: <i>Persoonia linearis</i> , <i>Acacia falcata</i> , <i>Exocarpus cuppresiformis</i> , <i>Allocasuarina torulosa</i> Cover: 10 Health: Healthy, mature Notes:		
Native ground species	Native ground species: <i>Gahnia aspera</i> , <i>Lepidosperma laterale</i> , <i>Cymbopogon refractus</i> , <i>Acacia ulicifolia</i> , <i>Brunoniella australis</i> Cover: 40 Health: Healthy, mature Notes:		

Survey Date: Jul 22, 2020		Field staff: BH, MW
Exotic species	Exotic species: Lantana camara Cover: 15 Health: Healthy, mature Notes:	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	
		

Site E9

Survey Date: Jul 22, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 25 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 10 Health:	
Midstorey	Native midstorey species: <i>Persoonia linearis</i> , <i>Acacia longifolia</i> Cover: 5 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Crocea exaltata</i> subsp. <i>magnifolia</i> , <i>Pratia purpurea</i> , <i>Hibbertia obtusifolia</i> , <i>Entolasia stricta</i> , <i>Dianella caerulea</i> , <i>Cymbopogon refractus</i> Cover: 30 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i>	

Survey Date: Jul 22, 2020		Field staff: BH, MW
Cover: 30 Health: Healthy, mature Notes:		
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	
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Site E10

Survey Date: Jul 22, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus globoidea</i> <i>Eucalyptus globoidea</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Allocasuarina torulosa</i> , <i>Melaleuca linarifolia</i> , <i>Breynia oblongifolia</i> , <i>Persoonia linearis</i> Cover: 10 Health: Healthy, mature Notes:	

Survey Date: Jul 22, 2020

Field staff: BH, MW

Native ground species

Native ground species: Imperata cylindrica, Crowra exaltata subsp grandifolia, Lissanthe strigosa, Entoladia stricta, Billiardiera scandens

Cover: 60 **Health:** Healthy, mature

Notes:

Exotic species

Exotic species: Lantana camara

Cover: 15 **Health:** Healthy, mature

Notes:

Management

Management Unit: Primary to maintenance weed control in woodland or forest

Actions:

Notes:



Glenoak biobank (BA334)



Site G1

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 25 Health: Healthy, mature Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> <i>Eucalyptus punctata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Syncarpia glomulifera</i> , <i>Persoonia linearis</i> , <i>Allocasuarina torulosa</i> Cover: 10 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Lomandra longifolia</i> , <i>Cymbopogon refractus</i> , <i>Aristida vagans</i> , <i>Hibbertia aspera</i> Cover: 60 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	





Site G2

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 20 Health: Healthy, mature	
Midstorey	Native midstorey species: Syncarpia glomulifera, Breynia oblongifolia, Diospyros australis, Brachychiton populneus, Persoonia linearis Cover: 15 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Pittosporum revolutum, Microlaena stipoides, Pellaea falcata, Cissus antarctica Cover: 90 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Lantana camara Cover: 15 Health: Healthy, mature Notes:	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes: Mesic form of this community	



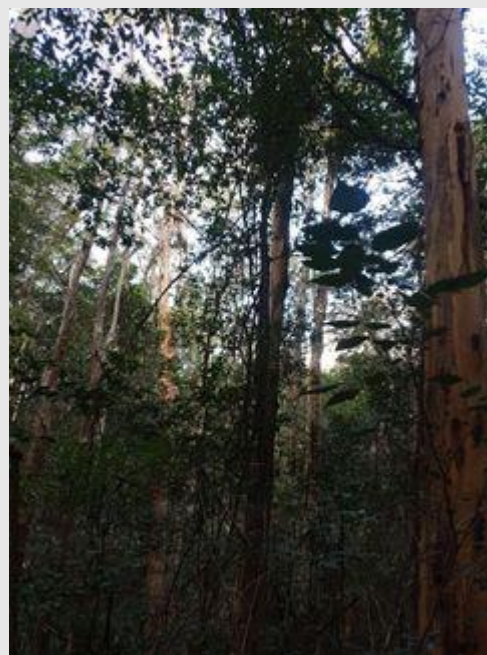
Site G3

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus paniculata</i> Cover: 30 Health: Healthy, mature Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Brachychiton populneus</i> , <i>Callistemon saligna</i> , <i>Pittosporum undulatum</i> , <i>Melaleuca styphelioides</i> Cover: 30 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Indigofera australis</i> , <i>Lomandra longifolia</i> , <i>Cymbopogon refractus</i> , <i>Sigesbeckia orientalis</i> Cover: 40 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 20 Health: Healthy, mature Notes:	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	




Site G4


Survey Date: Jul 21, 2020		Field staff: BH and MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context:	
Overstorey	Overstorey species: Eucalyptus punctata Eucalyptus punctata Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 5 Health: Healthy, mature Overstorey species: Cover: 5 Health:	
Midstorey	Native midstorey species: Backhousia myrtifolia, Streblus brunonianus, Melaleuca stypheliodes, Hibiscus diversifolia Cover: 50 Health: Healthy, mature Notes: Dense, mesic	
Native ground species	Native ground species: Pellaea falcata, Cissus antarctica, Doodia aspera, Adiantum formosum Cover: Health: Notes:	
Exotic species	Exotic species: Lantana camara Cover: 10 Health: Healthy, mature Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	



Site G5

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 15 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Corymbia maculata</i> Cover: 2 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Pittosporum undulatum</i> , <i>Melaleuca styphelioides</i> Cover: 10 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Lepidosperma</i> spp., <i>Gahnia aspera</i> , <i>Sigesbeckia australis</i> Cover: 30 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 15 Health: Healthy, mature Notes:	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	







Site G6

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus fibrosa</i> Cover: 3 Health: Healthy, mature Overstorey species: <i>Eucalyptus punctata</i> <i>Eucalyptus punctata</i> Cover: 2 Health: Healthy, mature Overstorey species: <i>Syncarpia glomulifera</i> <i>Syncarpia glomulifera</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Cissus hypoglauca</i> , <i>Pittosporum undulatum</i> , <i>Melaleuca styphelioides</i> , <i>Alphitonia excelsa</i> Cover: 30 Health: Healthy, mature Notes: Lantana management evident	
Native ground species	Native ground species: <i>Dichondra repens</i> , <i>Oplismenus aemulus</i> , <i>Microlaena stipoides</i> , <i>Getenoplesium cymosum</i> , <i>Cyperus gracilis</i> Cover: 30 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> , <i>Senecio madagascariensis</i> , <i>Solanum nigrum</i> , <i>Lactuccs serriola</i> Cover: 10 Health: Healthy, sub-mature Notes: +40% of senescent lantana	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	
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Site G7

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Corymbia maculata</i> Cover: 5 Health: Healthy, mature Overstorey species: <i>Eucalyptus mollucana</i> <i>Eucalyptus mollucana</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Persoonia linearis</i> , <i>Acacia falciformis</i> , <i>Pittosporum revolutum</i> , <i>Breynia oblongifolia</i> Cover: 10 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Themeda triandra</i> , <i>Aristida vagans</i> , <i>Microlaena stipoides</i> , <i>Gahnia aspera</i> Cover: 70 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> , <i>Senecio mafagascariensis</i> , <i>Hypochaeris radicata</i> Cover: 2 Health: Healthy, mature Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	






Site G8

Survey Date: Jul 21, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, no gaps	
Overstorey	Overstorey species: <i>Corymbia maculata</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus acmenioides</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Eucalyptus paniculata</i> Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: Syncarpia glomulifeta, Pittosporum undulatum, Pittosporum revolutum, Persoonia linearis Cover: 15 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Dianella caerulea, Sigesbeckia orientalis, Cymbopogon refractus, Pratia purpurescens, Solanum prinophyllum Cover: 40 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Lactuca seriola, Cirsium vulgare Cover: 1 Health: Healthy, mature Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	





Hunter Botanic Gardens Biobank (BA173)

Site E1



Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: <i>Eucalyptus robusta</i> Cover: 40 Health: Healthy, mature Overstorey species: Angophora costataAngophora costata Cover: 1 Health: Healthy, mature Overstorey species: Eucalyptus pilularisEucalyptus pilularis Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: Monotoca elliptica, Melaleuca decora, Parsonsia straminea Cover: 5 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Pteridium esculentum, Baloskion tetraphyllum, Blechnum indicum, Gahnia sieberiana Cover: 90 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	






Site E2

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: Eucalyptus pilularisEucalyptus pilularis Cover: 40 Health: Healthy, mature Overstorey species: Angophora costataAngophora costata Cover: 5 Health: Healthy, mature Overstorey species: Corymbia gummiferaCorymbia gummifera Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: Monotoca elliptica, Banksia serrata, Pittosporum undulatum, Xylomenulum pyriforme Cover: 40 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Pteridium esculentum, Xanthhorrea minor, Macrozamia communis, Imperata cylindrica, Entolasia stricta Cover: 30 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	





Site E3

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: Corymbia gummifera Corymbia gummifera Cover: 15 Health: Healthy, mature Overstorey species: Angophora costataAngophora costata Cover: 5 Health: Healthy, mature Overstorey species: Eucalyptus pilularis Eucalyptus pilularis Cover: 20 Health: Healthy, mature	
Midstorey	Native midstorey species: Monotoca elliptica, Banksia serrata, Ceratopetalum gummifera, Lambertia formosa Cover: 40 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Pteridium esculentum, Dianella caerulea, Acianthus spp., Pomax umbellata Cover: 35 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	



Site E4

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: Eucalyptus pilularisEucalyptus pilularis Cover: 30 Health: Healthy, mature Overstorey species: Corymbia gummiferaCorymbia gummifera Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: Monotoca elliptica, Banksia serrata, ceratopetalum gummiferum, Parsonsia straminea Cover: 60 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Lepidosperma latetale, Entolasia stricta, Pteridium esculentum, Acianthus spp. , Coryabas spp. Cover: 20 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	



Site E5

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: Eucalyptus pilularis Eucalyptus pilularis Cover: 40 Health: Healthy, mature Overstorey species: Corymbia gummifera Corymbia gummifera Cover: 20 Health: Healthy, mature	
Midstorey	Native midstorey species: Parsonsia straminea, Monotoca elliptica, Banksia serrata, Glochidion ferdinandii, Persoonia linearis Cover: 40 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Pteridium esculentum, Macrozamia communis, Themeda triandra, Dianella caerulea, Lepidosperma laterale Cover: 20 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Lantana camara Cover: 1 Health: Healthy, mature Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	





Site E6



Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: Eucalyptus pilularis Eucalyptus pilularis Cover: 20 Health: Healthy, mature Overstorey species: Corymbia gummiferaCorymbia gummifera Cover: 15 Health: Healthy, mature	
Midstorey	Native midstorey species: Monotoca elliptica, Ceratopetalum gummiferum, Banksia serrata, Glochidion ferdinandii, Acacia schinoides Cover: 50 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Pteridium esculentum, Macrozamia communis, Lambertia formosa, Xanthorrhoea minor, Lepidosperma laterale Cover: 40 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	






Site E7

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Eucalyptus robusta</i> Cover: 10 Health:	
Midstorey	Native midstorey species: Melaleuca quinquinervia, Parsonsia straminea Cover: 50 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Blechnum indica, Gahnia sieberiana, Bulboscoenus spp., Zoysia macrantha Cover: 70 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Healthy, mature Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	



Site E8

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: Eucalyptus pilularis Eucalyptus pilularis Cover: 35 Health: Healthy, mature Overstorey species: Angophora costata Angophora costata Cover: 5 Health: Healthy, mature	
Midstorey	Native midstorey species: Glochidion ferdinandii, Pittosporum undulatum, Leptospermum polygalifolium, Persoonia levis Cover: 15 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Baloskion tetraphyllum, Gahnia sieberiana, Pteridium esculentum Cover: 80 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Lantana camara Cover: 3 Health: Healthy, mature Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	



Site E9

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: <i>Eucalyptus robusta</i> Cover: 40 Health: Healthy, mature Overstorey species: <i>Eucalyptus pilularis</i> <i>Eucalyptus pilularis</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca quinquinervia</i> , <i>Glochidion ferdinandii</i> , <i>Parsonsia straminea</i> Cover: 40 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Gahnia sieberiana</i> , <i>Blechnum indicum</i> , <i>Bsloskion tetraphyllum</i> Cover: 100 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 4 Health: Healthy, mature Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	





Site E10


Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: <i>Eucalyptus tereticornis</i> Cover: 10 Health: Healthy, mature Overstorey species: <i>Angophora floribunda</i> <i>Angophora floribunda</i> Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca quinquinervia</i> , <i>Casuarina glauca</i> , <i>Parsonsia straminea</i> , <i>Glochidion ferdinandii</i> Cover: 40 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Gahnia sieberiana</i> , <i>Entolasia marginata</i> , <i>Microlaena stipoides</i> Cover: 30 Health: Healthy, mature Notes:	
Exotic species	Exotic species: <i>Lantana camara</i> Cover: 3 Health: Healthy, mature Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	



Site E11

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: <i>Eucalyptus robusta</i> Cover: 20 Health: Healthy, mature Overstorey species: <i>Angophora floribunda</i> <i>Angophora floribunda</i> Cover: 30 Health: Healthy, mature	
Midstorey	Native midstorey species: <i>Melaleuca quinquinervia</i> , <i>Glochidion ferdinandii</i> , <i>Pittosporum undulatum</i> , <i>Parsonsia straminea</i> Cover: 40 Health: Healthy, mature Notes:	
Native ground species	Native ground species: <i>Gahnia sieberiana</i> , <i>Blechnum indicum</i> , <i>Pteridium esculentum</i> , <i>Paspalidium distans</i> Cover: 60 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident Cover: 0 Health: Absent Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes:	







Site E12

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: Eucalyptus pilularisEucalyptus pilularis Cover: 20 Health: Healthy, mature Overstorey species: Corymbia gummifera Corymbia gummifera Cover: 25 Health: Healthy, mature	
Midstorey	Native midstorey species: Glochidion ferdinandii, Pittosporum undulatum, Alphitonia excelsor, Parsonsia straminea, Monotoca elliptica Cover: 60 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Pteridium esculentum, Impetsta cylindrica, Breynia oblongifolia, Pratia purpurescens Cover: 30 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Lantana camara Cover: 10 Health: Healthy, mature Notes:	
Management	Management Unit: Primary to maintenance weed control in woodland or forest Actions: Notes:	





Site E13

Survey Date: Jul 23, 2020		Field staff: BH, MW
Habitat	Habitat Type: Grey-headed Flying-fox foraging habitat, Swift Parrot foraging habitat Site Context: Native patch >500 ha, small gaps	
Overstorey	Overstorey species: Angophora costata Angophora costata Cover: 15 Health: Healthy, mature Overstorey species: Corymbia gummifera Corymbia gummifera Cover: 10 Health: Healthy, mature Overstorey species: Eucalyptus pilularisEucalyptus pilularis Cover: 10 Health: Healthy, mature	
Midstorey	Native midstorey species: Endiandra sieberi, Alphitonia excelsa, Monotoca scoparia, Banksia integrifolia Cover: 35 Health: Healthy, mature Notes:	
Native ground species	Native ground species: Imperata cylindrica, Macrozamia communis, Dianella caerulea, Acianthus spp. Cover: 70 Health: Healthy, mature Notes:	
Exotic species	Exotic species: Nil evident. Cover: 0 Health: Absent Notes:	
Management	Management Unit: Maintain and enhance woodland or forest Actions: Notes: Localised lantana infestations elsewhere in patch	
<div></div>		

Appendix B – Independent Audit Report

DEPARTMENT OF INFRASTRUCTURE, TRANSPORT, CITIES AND
REGIONAL DEVELOPMENT

INDEPENDENT REVIEW AND VERIFICATION OF WESTERN SYDNEY INTERNATIONAL AIRPORT BIODIVERSITY OFFSET DELIVERY PLAN (BODP)

APRIL 2020







Independent review and verification of Western Sydney International Airport Biodiversity Offset Delivery Plan (BODP)

Department of Infrastructure, Transport, Cities and Regional Development

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REV	DATE	DETAILS
RevA	12/02/2020	
RevB	27/04/2020	Update following DOEE comments

	NAME	DATE	SIGNATURE
Prepared by:	Clementine Watson Alex Cockerill	21/02/2020	
Reviewed by:	Alex Cockerill	27/04/2020	
Approved by:	Alex Cockerill	27/04/2020	

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GLOSSARY

BAM	Biodiversity Assessment Methodology
BAR	Biodiversity Assessment Report
BBAM	The NSW BioBanking Assessment Methodology (OEH 2014).
BC Act	Biodiversity Conservation Act 2017 (NSW)
BCT	NSW Biodiversity Conservation Trust (BCT, formerly Nature Conservation Trust)
Biobank site	Land that is designated by a biobanking agreement to be a biobank site.
Biobanking agreement	An agreement entered into between the landowner and the NSW Environment Minister under
BioBanking Trust Fund	The Trust Fund established under Part 7A of the TSC Act to hold funds from the sale of
Biodiversity credit	A unit of biodiversity value to measure specific development impacts or conservation gains in accordance with the FBA, the BBAM or the BAM. Includes ecosystem credits or species credits.
Biodiversity credit report	Specifies the number and type of biodiversity credits required to offset the impacts of a Major Project in accordance with the FBA or that would be generated through conservation and management of an offset site under a BioBanking agreement or a BSA.
Biodiversity offset delivery plan (BODP)	This plan, which sets out the specific actions to be taken to meet the offset conditions for the airport as set out in the Airport Plan.
Biodiversity offsets	Specific measures that are put in place to compensate for impacts on biodiversity values
Biodiversity Stewardship Agreement (BSA)	An agreement made under Division 2 of Part 5 of the BC Act
Biodiversity Stewardship Site (BSS)	Land that is designated by a Biodiversity Stewardship Agreement to be a Biodiversity Stewardship Site. Equivalent to the former 'biobank site'.
BOS	NSW Biodiversity Offset Strategy
CEEC	Critically endangered ecological community.
Defence	The Australian Government Department of Defence
Department of Infrastructure, Regional Development and Cities (the Department)	The Australian Government Department responsible for preparing and implementing this BODP

DoAWE	Department of Agriculture, Water and the Environment
DoE	Department of Environment (formerly Department of the Environment and Energy). now the DoAWE.
DoEE	Department of the Environment and Energy (DoEE). Now called the DoAWE.
DSEWPaC	The former Department of Sustainability, Environment, Water, Populations and Communities, now called the DoAWE.
DPI	The NSW Department of Primary Industries.
Ecosystem credit	The class of biodiversity credits created or required for the impact on EECs, 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.
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EPBC Act	The Commonwealth Environment Protection and Biodiversity Conservation Act 1999
FBA	The Framework for Biodiversity Assessment (OEH 2014a). The methodology to assess impacts on biodiversity that is used to assess all biodiversity values on the development site for a Major Project under the NSW Environmental Planning and Assessment Act 1979 (EPA Act) and in accordance with The NSW Biodiversity Offsets Policy for Major Projects (OEH 2014a).
FM Act	The Fisheries Management Act 1994 (NSW)
Food tree	A tree species that is recognised as being of value as a foraging resource for a given fauna
Habitat tree	A tree that is recognised as being of value as a shelter, roosting and/or nesting resource for fauna species. Includes hollow-bearing trees, snags (standing dead trees) and trees with nests or other signs of fauna occupancy.
Migratory species	Species that are listed as migratory under the EPBC Act.
MOU	The Memorandum of Understanding (MOU) that was entered into between Defence and Infrastructure that inter alia provides for the definition of an Offset Area of no less than 900 hectares at Orchard Hills and its conservation and management to function as a biodiversity offset for WSI.
NPWS	The NSW National Parks and Wildlife Service
OEH	The NSW Office of Environment and Heritage
Orchard Hills	Defence Establishment Orchard Hills
Offsets assessment guide	The spreadsheet offset calculator that accompanies the EPBC Act Offsets Policy (DSEWPaC 2012).
PCT	PCT Plant community type

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 EPBC Act Offsets Policy	The Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy October 2012 (DSEWPac 2012)
TEC	Threatened ecological community listed under the EPBC Act and/or the BC Act.
TSC Act	The Threatened Species Conservation Act 1995 (NSW), which was repealed and replaced by the BC Act August 2017
WSI Airport	The site for Sydney West Airport as defined in the Airports Act, now known as Western Sydney International (Nancy Bird Walton) Airport (WSI).

1 PROJECT BACKGROUND

Australian Government announced on 15 April 2014 that Badgerys Creek will be the site for the new Western Sydney Airport (the airport). The site is approximately 1768 hectares of land, acquired by the Commonwealth through the 1980s and 1990s. The airport will provide both domestic and international services once airport operations commence in 2026.

Western Sydney Airport Plan (Airport Plan) contains a number of conditions that require measures to reduce potential biodiversity impacts and offset unavoidable residual impacts. Condition 30 requires the preparation of a Biodiversity Offset Delivery Plan (BODP) to compensate for residual significant impacts associated with the Stage 1 development. The BODP (which was approved on the 24 August 2018) outlines a number of direct offsets and supplementary measures to be implemented by the Department in order to offset the biodiversity impacts of construction of Stage 1 of the Western Sydney Airport (the Airport). Offsets must be secured and implemented in accordance with the BODP, Airport Plan condition 30 and the EPBC Act Environmental Offsets Policy.

GHD has assisted the Department of Infrastructure, Regional Development and Cities (the Department) in the preparation and the implementation of the Biodiversity Offset Delivery Plan (BODP). Western Sydney Airport Plan Condition 39(3) states that following approval of the BODP, the Department must report to DoAWE every 12 months on its implementation until all biodiversity offsets and other compensatory measures identified in the BODP have been secured or implemented. Each BODP implementation report will outline the activities undertaken in the previous 12 months to identify and deliver biodiversity offsets and the quantum of offset that has been secured. GHD has assisted the Department with the compilation of BODP implementation reports in accordance with Airport Plan Condition 39(3) (GHD, 2020).

As required with Airport Plan Condition 30(11), Alex Cockerill of WSP has been engaged as suitably qualified subconsultant to verify all of GHD reports, credit calculations and other deliverables as required in GHD's role assisting the Department with the implementation of the BODP. The main focus of this independent verification of the BODP implementation reports will be on accuracy of the offset calculations presented and consistency with the approved BODP, EPBC Act Offsets Policy and Airport Plan conditions.

1.1.1 WESTERN SYDNEY AIRPORT APPROVAL

The construction and operation of WSI was assessed in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Approval for the construction and operation of WSI is controlled by the *Airports Act 1996* (Airports Act) which provides for the preparation of an Airport Plan identifying a staged development of the airport.

1.1.2 BIODIVERSITY OFFSET DELIVERY PLAN

The Airport Plan conditions required The Department to prepare for approval a BODP to compensate for significant residual impacts associated with the construction and development of the WSI. The BODP was prepared in accordance with the requirements set out in condition 30 of the Airport Plan, including that the BODP takes into account the *EPBC Act 1999 Environmental Offsets Policy October 2012* (EPBC Act Offsets Policy) (Department of Sustainability Environment Water Population and Communities, 2012). The BODP was approved by the Department of the Environment and Energy on 24 August 2018. For more detail on the staged process of delivering a Biodiversity Offset package and then the Biodiversity Offset Delivery Plan refer to Figure 2.1 below.

Biodiversity offsets are required for significant residual impacts of WSI on:

- The threatened species and communities listed under the EPBC Act (affected threatened biota):
 - Cumberland Shale Plains Woodland and Shale-Gravel Transition Forest (Cumberland Plain Woodland) listed as a critically endangered ecological community (CEEC) under the EPBC Act. Construction of WSI would require the permanent removal of 141 hectares;

- Grey-headed Flying-fox (*Pteropus poliocephalus*) listed as a vulnerable under the EPBC Act. Construction of WSI would remove 187.8 hectares of potential foraging habitat;
- Swift Parrot (*Lathamus discolor*) listed as a critically endangered species under the EPBC Act. Construction of WSI would remove 187.8 hectares of potential winter foraging habitat;
- Spiked Rice-flower (*Pimelea spicata*) listed as an endangered species under the EPBC Act. Construction of WSI is likely to have a significant impact on *Pimelea spicata* through the complete removal of this population and 2.94 hectares of occupied habitat.; and
- Other plants, animals and their habitat on Commonwealth Land, including threatened biota listed under the New South Wales (NSW) Biodiversity Conservation Act 2016 (BC Act).

The EPBC Act Offsets Policy requires biodiversity offset sites to be secured under a legally binding conservation covenant (or other appropriate mechanisms) and the calculation of offsets for impacts on the affected threatened biota using the ‘offsets assessment guide’ spreadsheet. The guide calculates the percentage of the total requirement for the individual protected matter that would be delivered by an offset proposal. Further to this, offsets for significant residual impacts on plants, animals and their habitat have been calculated with reference to the NSW Framework for Biodiversity Assessment (FBA) methodology (Office of Environment and Heritage, 2014). The FBA is based on the NSW Biodiversity Banking and Offsets Scheme (BioBanking) credit calculator and assessment methodology (Office of Environment and Heritage, 2014), which was the methodology used to calculate offsets for major projects in NSW at the time that the airport EIS was prepared.

1.1.3 BODP IMPLEMENTATION REPORT

Western Sydney International Airport (WSI) BODP Implementation Report has been prepared by GHD on behalf of The Department to demonstrate to an auditor (WSP) that the Department has delivered the offset proposal presented in the BODP in accordance with the Airport Plan conditions (GHD, 2020).

The 2019 BODP Implementation Report (prepared by GHD) presents BODP implementation activities undertaken by the Department during the first year following the approval of the BODP.

The purpose of this 2019 BODP implementation report (GHD, 2020) is to demonstrate to an auditor how Infrastructure has delivered the offset proposal presented in the BODP in accordance with the Airport Plan conditions, including:

- 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;
- Calculation of the quantum of direct biodiversity offsets secured for the airport based on information presented in the BODP and detailed biodiversity assessments for offset sites.

A summary of the BODP implementation activities that have been implemented during the 2019 period comprise of:

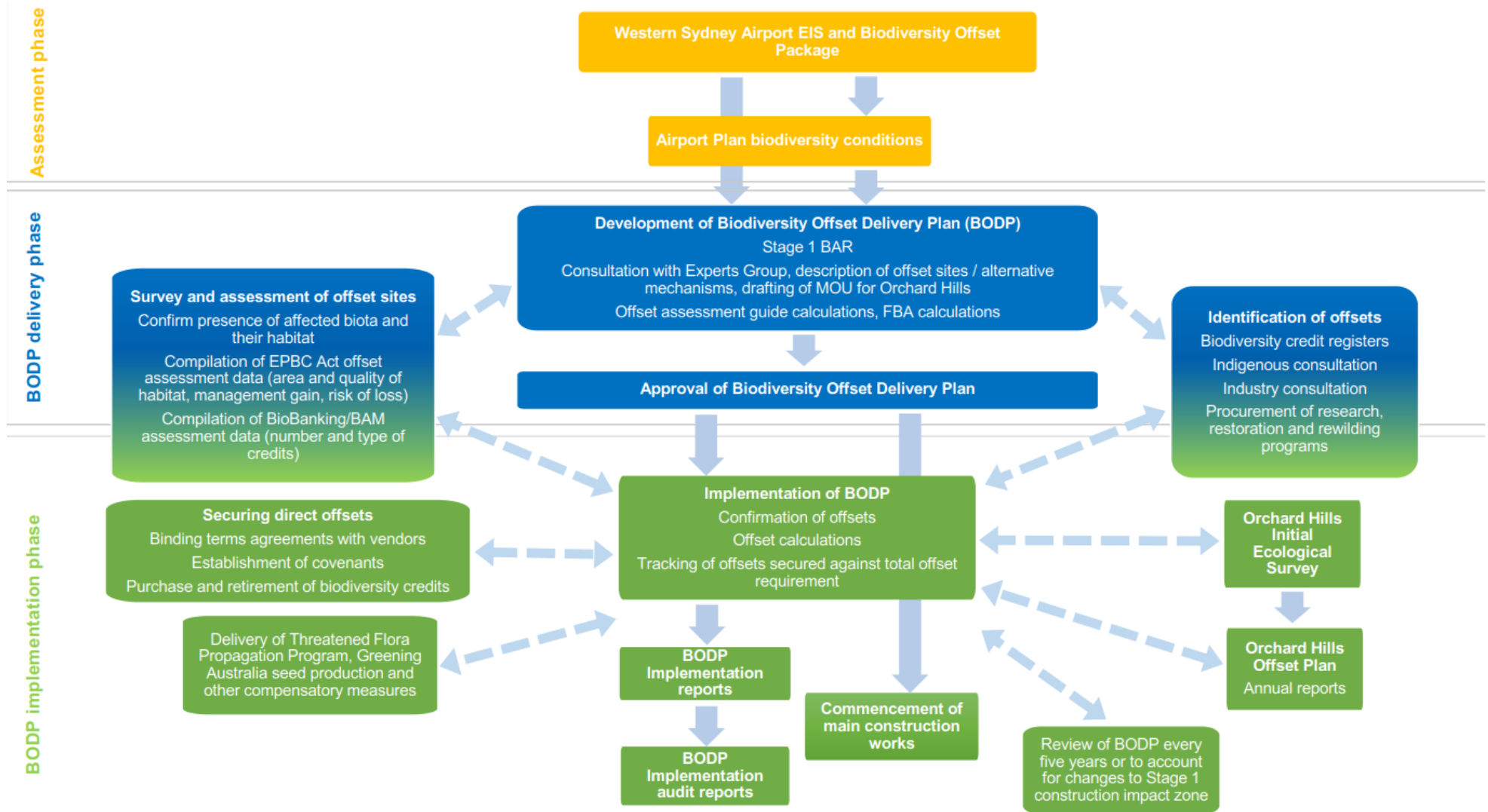
- Synthesis of existing information and consultation with various offset vendors to identify and secure direct offsets;
- Establishment of the Offset Area at Defence Establishment Orchard Hills, including execution of a Memorandum of Understanding to secure at least 900 hectares of land as an offset, completion of an Initial Ecological Survey and consultation with Defence on the preparation of the Offset Plan for management of the site;
- Purchase of biodiversity credits to secure direct offsets for Cumberland Plain Woodland, the Grey-headed Flying-fox and Swift Parrot foraging habitat and for various plants, animals and their habitat;
- Finalisation of the threatened flora propagation program required by Condition 33 of the Airport Plan, delivery of a *Pimelea spicata* genetic research program and initial stages in the establishment of an ex situ *Pimelea spicata* population to support conservation of the species;

- Continued implementation of the Greening Australia seed collection and production program required by Condition 32 of the Airport Plan;
- Consideration of potential research, restoration and rewilding programs; and
- Other activities include discussions with key stakeholders from governments, private industry, and communities.

1.1.4 *OTHER IMPORTANT DOCUMENTATION*

This independent audit and review also assesses the following related documents;

- the biodiversity assessment and offset package in the airport EIS (GHD, 2016)
- the updated biodiversity survey of the WSI site and impact calculations presented in the Western Sydney Airport Stage 1 Biodiversity Assessment Report Addendum (GHD, 2018); and
- the EPBC Act Offsets Policy (Department of Sustainability Environment Water Population and Communities, 2012).
- Orchard Hills Offset Area Initial Ecological Survey Report (GHD in prep) and The Defence Establishment Orchard Hills Offset Plan (GHD in prep)
- Western Sydney International Airport Threatened Flora Propagation Program Delivery Report (ABGMA, 2019); and
- Conservation genomics of *Pimelea spicata* (Spiked Rice-flower) in support of management and translocation activities (RBGDT, 2019,)
- Memorandum of Understanding (MoU), Agreement to conserve and manage a biodiversity offset area at Defence establishment Orchard Hill, between The Department of Defence and Department of Infrastructure, Regional Development and Cities (Defence, 2018).
- Credit transfer reports (supplied by Infrastructure)
- Spatial data (supplied by GHD)
- EPBC offset calculator assessment guides for all offset sites (supplied by Infrastructure)



1.1

Implementation stages of the BODP

2 AUDIT DETAILS

2.1 AUDIT DETAILS

Table 2.1 Audit details

ASSESSMENT TITLE	INDEPENDENT VERIFICATION OF THE AIRPORT BODP
Client	Department of Infrastructure, Transport, Regional Development and Communications (previously The Department of Infrastructure, Transport, Cities and Regional Development)
Client Address	111 Alinga Street, CANBERRA ACT 2601
Client Telephone	1800 075 001
Main Auditee Contact	Ben Harrington, Technical Director – Biodiversity, GHD T: +61 2 9239 7189 M: 0407 049 006 E: ben.harrington@ghd.com
Lead Auditor	Alex Cockerill
Auditor's Telephone	02 4929 8300

2.1.1 SUITABLY QUALIFIED EXPERT

Alex Cockerill (WSP) has been subcontracted by GHD on behalf of The Department as the Suitably Qualified Expert responsible for auditing this 2019 BODP implementation report. Environment approved Alex Cockerill as the independent auditor prior to the commencement of the audit in accordance with Condition 30 (12) of the Airport Plan.

Alex has more than 19 years' experience in botanical and terrestrial ecological research, ecological impact assessment and conservation landscape management. He is responsible for managing large scale environmental impact assessment projects, including the coordination of field staff, preparation of reports, agency negotiations and ongoing facilitation of projects towards positive outcomes.

He is an Accredited BAM Assessor and recognised expert in the application of the BAM in NSW, regularly providing support to the NSW Government as a third-party reviewer. He has acted as an independent ecological expert participating in compliance audits on behalf of State and Commonwealth governments and as an Expert Witness on flora and vegetation matters in the NSW Supreme Court, NSW Land and Environment Court and the Victorian Court of Arbitration and Tribunal. Alex previously completed the independent verification of the Biodiversity Assessment Reports (BARs) for WSI in accordance with the Airport Plan conditions.

2.2 BODP DETAILS

Summary of the offset proposal presented in the BODP;

DIRECT OFFSETS

- Orchard Hills Offset Area; the Department has made an agreement with Defence and established an offset site at the Defence Establishment Orchard Hills (DEOH). A Memorandum of Understanding (MOU) was entered into between Defence and Infrastructure that includes provisions that are additional to any Commonwealth Heritage Listing requirements relating to the Offset Area.
- Based on preliminary Offsets assessment guide calculations the Orchard Hills Offset Area could meet around:

- 90 % of the offset for Cumberland Plain Woodland, including
- 61 % through conservation of EPBC Act Cumberland Plain Woodland and
- 0 % through improvement of poorer quality Cumberland Plain Woodland;
- 71% of the offset requirement for the Grey-headed flying-fox; and
- 47% of the offset requirement for Swift Parrot foraging habitat.
- Purchase of biodiversity credits through the NSW Biodiversity Offsets Scheme (BOS) (Office of Environment and Heritage, 2017); The quantum of offset that would be delivered is subject to the identification of suitable suites of credits sourced from appropriate offset sites. This purchasing of credits will be staged and is likely to deliver (based on preliminary site surveys):
 - at least 10% of the offset requirement for Cumberland Plain Woodland;
 - around 15 to 25% of the offset requirement for the Grey-headed Flying-fox;
 - up to 35% of the offset requirement for Swift Parrot foraging habitat; and
 - up to 60% of the offset requirement for *Pimelea spicata* when linked to an area of occupied habitat.
- Acquisition of land; Acquisition of strategic parcels of and that promote connectivity for the Cumberland Plain Corridor
- Restoration and rewilding programs; improve the extent, connectivity and condition of native vegetation and habitat in the Cumberland Plain on non-biodiversity stewardship sites.

OTHER COMPENSATORY MEASURES

- Threatened Flora Propagation Program (TFPP); Propagation, research program and in situ collection of threatened plants species found at the airport site (including *Pimelea spicata*, *Marsdenia viridiflora subsp. viridiflora* and *Pultenaea parviflora*). As required by Condition 33 of Airport Plan, the Australian Botanic Gardens, Mount Annan (ABGMA) and Royal Botanic Gardens and Domain Trust (RBGDT) have been engaged by GHD as a sub-consultant to deliver a Threatened Flora Propagation Program (TFPP). Stage 1 works of the TFPP have been completed, and the following plant materials have been collected for conservation work and research;
 - *Pimelea spicata* (190 plants in the nursery, 6,100 seeds held in PlantBank).
 - *Marsdenia viridiflora subsp. viridiflora* (560 plants, 108 seeds).
 - *Pultenaea parviflora* (500 plants, 50 seeds).
- Greening Australia seed collection and production program; In accordance with Condition 32 (1) of the Airport Plan, the Department has entered into an agreement with Greening Australia to contribute funds to the organisation's Cumberland Seed Hub program in Western Sydney. The objective of the program is to deliver a reliable source of native seed for ecological restoration work, with the primary focus on species associated with Cumberland Plain Woodland
- Longer term research and capacity building, including training

COMPLEMENTARY OUTCOMES

- Aboriginal land management; Secure long-term training and employment opportunities in land management and restoration for Aboriginal peoples in Western Sydney.

3 AUDIT PROCESS

3.1 AUDIT SCOPE

Condition 30 of the Airport Plan states:

(10) The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth.

(11) The Infrastructure Department must:

- (a) ensure that an independent audit of its compliance with condition 30(10) is conducted in respect of;
 - (i) the 12-month period commencing with the approval of the Biodiversity Offset Delivery Plan; and
 - (ii) each subsequent 18-month period until all biodiversity offsets required by the Biodiversity Offset Delivery Plan have been secured or implemented; and
- (b) submit a report of each audit that is carried out to the Environment Department within six months of the end of the period in respect of which the audit was conducted.

(12) For each audit, the independent auditor must be approved by an Approver prior to the commencement of the audit. Audit criteria must be agreed to by an Approver and the audit report must address the criteria to the satisfaction of an Approver.

The Auditor, Alex Cockerill was approved as the independent auditor along with audit criteria on the 12/2/2020. The audit process consisted of an initial opening meeting/ field inspection of the proposed Orchard Hills Offset, review of the BODP implementation report, and audit interview. A summary of the outcome of the independent audit and compliance with the Airport Plan conditions are presented below.

3.2 AUDIT METHODOLOGY

3.2.1.1 OPENING MEETING

An opening meeting was held on 1 November 2019 at Orchard Hill. The participants at this meeting and their roles are listed in Table 3.1. This meeting was also located at the Orchard Hills offset site so verification of the Orchard Hills Offset Plan could also be conducted. See Appendix A. The purpose of the opening meeting was to discuss the scope of the audit and the audit process. The methods to be used by the auditor to conduct the audit were explained however this was prior to the finalisation and approval of the Audit criteria.

Table 3.1 Opening meeting attendees

STAFF	ORGANISATION	TITLE
Ben Harrington	GHD	Technical Director - Biodiversity
Alex Cockerill	WSP	Manager - Biodiversity

3.2.1.2 AUDIT INTERVIEW

Audit interviews were conducted by the approved independent auditor on 14 February 2020, at which time key compliance requirements and site management issues were discussed specifically in relation to the audit criteria.

Where possible, documents and data collected during the audit were reviewed during the interview. A number of documents used for the audit were reviewed off-site following the site audit interview.

Information obtained during the audit was verified where possible. For example, statements made by on-site staff were verified by reviewing relevant documentation and/or site inspections.

3.2.1.3 *SITE INSPECTION*

A site inspection of the Orchard Hills Offset was undertaken across the entire site by vehicle on 01 November 2019 by Alex Cockerill, who investigated the implementation of relevant compliance requirements. An earlier site inspection was conducted on Orchard Hills Offset on the 06 March 2019. The site inspections covered the entire Orchard Hills Offset however, field verification was focused on proposed mapping of vegetated areas and combined random meander and rapid assessment survey methodologies, as detailed in the following sections. See Figure 1 and Appendix A. The results of the site inspection were incorporated into the audit finding on the verification and accuracy of the proposed Orchard Hills Offset and specifically the justification of the offsets in accordance with the Environmental Offsets Policy October 2012.

3.2.2 *RANDOM MEANDERS SURVEYS*

Due to the large extent of the site, random meander surveys were undertaken to validate existing vegetation community, condition mapping and weed mapping. Random meander surveys are a variation of the transect type survey and were completed in accordance with the technique described by Cropper (1993), whereby the recorder walks in an unsystematic manner throughout the site recording all species observed, boundaries between various vegetation communities and condition of vegetation. The time spent in each vegetation community was generally proportional to the size of the community and its species richness.

3.2.3 *RAPID ASSESSMENT*

To assess biodiversity values and site condition, a total of 18 rapid assessments were undertaken throughout the site on two occasions (March and November 2019) see Figure 1. The rapid assessments incorporated methodologies from the BioBanking Operation Manual prepared by Seidel & Briggs 2008 and included an assessment of weed species diversity and cover, regeneration. The information was used to review and assess the “Start site value” scores for the proposed Orchard Hill offsets calculations in accordance with the Environmental Offsets Policy October 2012. The rapid assessments focused on the offset areas in moderate/poor and low conditions, as these condition classes provide the potentially greatest areas of gain and variability in condition classification. The majority of the RA were undertaken within the southern offset area as this area contained the greatest area of low and poor condition vegetation and greatest variability in condition classification. Good condition vegetation is generally unimpacted by weed infestations and less likely to be subject to inaccurate condition classification

3.2.4 *CONDITION AND QUALITY ASSESSMENT OF VEGETATION COMMUNITIES*

The general condition of vegetation was assessed during the field surveys using parameters such as intactness, diversity, history of disturbance, weed invasion and health.

Three general categories were used to describe the condition of vegetation communities:

- **Good:** Vegetation still retains the species complement and structural characteristics of the pre-European equivalent. Such vegetation has usually changed very little over time and displays resilience to weed invasion due to intact groundcover, shrub and canopy layers.
- **Moderate:** Vegetation generally still retains its structural integrity, but has been disturbed and has lost some component of its original species complement. Weed invasion can be significant in such remnants.
- **Low:** Vegetation that has lost most of its species and is significantly modified structurally. Often such areas have a discontinuous canopy of the original tree cover, with very few shrubs. Exotic species, such as introduced pasture grasses or weeds, replace much of the indigenous ground cover. Environmental weeds are often co-dominant with the original indigenous species. .

3.3 REPORTING

Following completion of the site component of the audit, audit notes were reviewed and outstanding information was clarified with GHD. The audit requirement checklists were completed following the receipt of outstanding information or clarification of data gaps.

This report was then prepared to provide an overview of any compliance issues and any other observations made by the auditor during the audit.

3.4 DEFINITIONS

The determination of results from the audit was based on the definitions provided in Table 3.2.

Table 3.2 Audit definitions

RATING	DESCRIPTION
Compliant (Y)	The Department has been found to comply with the specific requirement of a plan or condition of approval.
Observation (O)	The Department has been found to be compliant with the specific requirement of an approval condition or plan, although issues relevant to that requirement were noted.
Not compliant (N)	The Department has been found to have not met the specific requirement of a plan or condition of approval.
Not applicable (NA)	A specific requirement of a condition of approval or plan relevant to the site falls outside the scope of the audit, is addressed or duplicated by another audit condition or has not been triggered.

4 AUDIT FINDINGS

This section provides an overview of the findings of the audit. A detailed assessment of compliance for each requirement of the approved audit protocol against the criteria is described in Appendix B

4.1 STATUS OF OPERATIONS

The following direct offset sites were secured during the 2019 BODP implementation period (specifically 25 August 2018 to 25 August 2019):

- The Offset Area at Defence Establishment Orchard Hills, including at least 900 hectares of habitat secured through the MOU with Defence (with an estimated 11,414 biodiversity credits) in September 2018;
- A 0.6 hectare EPBC Act offset area at the ‘Lot 502 Roscrea Drive biobank’ secured through the purchase of six biodiversity credits by Infrastructure in March 2019 from this established Biodiversity Stewardship Agreement (BSA) site (Agreement ID 256);
- A 37.3 hectare EPBC Act offset area at the ‘Montpelier biobanks’ (Agreement IDs 399, 358, 235 and 336) secured through the purchase of 528 biodiversity credits by Infrastructure in March 2019;
- A 26.9 hectare EPBC Act offset area at the ‘Sunnyside biobank’ (Agreement ID 321) secured through the purchase of 295 biodiversity credits by Infrastructure in March 2019;
- A 41.0 hectare EPBC Act offset area at the ‘Williamstown biobank’ offset site (Agreement ID 147) secured through the purchase of 411 biodiversity credits by Infrastructure in March 2019;
- A 22.8 hectare EPBC Act offset area at the ‘Cawdor Heights biobank’ (Agreement ID 284) secured through the purchase of 409 biodiversity credits by Infrastructure in March 2019;
- A 85.2 hectare EPBC Act offset area at the ‘Hardwicke Stage 2 biobank’ (Agreement ID 213) secured through the purchase of 1277 biodiversity credits by Infrastructure in March 2019;
- A 24 hectare EPBC Act offset area at the ‘Flaggy Creek Farm Stage 2 biobank’ (Agreement ID 354) secured through the purchase of 339 biodiversity credits by Infrastructure in July 2019; and
- A 59.0 hectare EPBC Act offset area at the ‘Hampden Vale biobank’ (Agreement ID 250) secured through the purchase of 794 biodiversity credits by Infrastructure in July 2019.

4.2 COMPLIANCE

There were no non-compliances identified as part of this audit (see Table 4.1). A full checklist of compliance and auditor comments against each requirement is provided in Appendix B.

Table 4.1 Summary of compliance

COMPLIANCE INDICATOR	COMPLIANCE FINDING
CONDITION 30(10) THE INFRASTRUCTURE DEPARTMENT MUST IMPLEMENT THE APPROVED BIODIVERSITY OFFSET DELIVERY PLAN ON BEHALF OF THE COMMONWEALTH	
The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth	Compliant (Y)
CONDITION 30(6) THE BIODIVERSITY OFFSET DELIVERY PLAN MUST:	

COMPLIANCE INDICATOR	COMPLIANCE FINDING
(a) be consistent with the EPBC Act Environmental Offsets Policy (2012) to the satisfaction of the Approver, including in particular:	Compliant (Y)
(i) offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter;	Compliant (Y)
(ii) offsets must be built around Direct Offsets but may include Other Compensatory Measures (including that the offsets must be 'like-for-like');	Compliant (Y)
(iii) offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs; and	Compliant (Y)
(iv) the identification of offsets must be informed by scientifically robust information and incorporate the precautionary principle in the absence of scientific certainty	Compliant (Y)
(b) include measures to offset impacts on foraging habitat for the Swift Parrot (<i>Lathamus discolor</i>) in addition to those species and ecological communities listed in the Biodiversity Offset Strategy provided as part of the EIS;	Compliant (Y)
(c) identify biodiversity credits (or other measure as appropriate) required to offset the total impacts of the Stage 1 Development on biodiversity, determined in accordance with the relevant policies;	Compliant (Y)
(d) provide evidence that the required biodiversity credits (or other measure as appropriate) can be secured in accordance with the relevant policies;	Compliant (Y)
(e) provide evidence that the arrangements for managing the Direct Offsets will be provided through mechanisms that are enduring, enforceable and auditable; and	Compliant (Y)
(f) if any Other Compensatory Measures are proposed, provide details of those measures along with a justification of why they should be considered acceptable.	Compliant (Y)
CONDITION 30 (11) THE INFRASTRUCTURE DEPARTMENT MUST	
(a) ensure that an independent audit of its compliance with condition 30(10) is conducted in respect of;	Compliant (Y)
(i) the 12-month period commencing with the approval of the Biodiversity Offset Delivery Plan; and	Compliant (Y)
(ii) each subsequent 18-month period until all biodiversity offsets required by the Biodiversity Offset Delivery Plan have been secured or implemented; and	Not applicable (NA)
(b) submit a report of each audit that is carried out to the Environment Department within six months of the end of the period in respect of which the audit was conducted.	Compliant (Y)

4.3 SUMMARY OF AUDIT OBSERVATIONS

A number of observations were made during the audit when reviewing the 2019 BODP implementation report and biodiversity credit and area calculations. These observations were determined to not affect compliance against the agreed audit requirements protocol (Appendix B), however observations and recommendations have been provided below (Table 4.2).

Table 4.2 Summary of audit observations

COMPLIANCE INDICATOR	AUDIT OBSERVATIONS
CONDITION 30(10) THE INFRASTRUCTURE DEPARTMENT MUST IMPLEMENT THE APPROVED BIODIVERSITY OFFSET DELIVERY PLAN ON BEHALF OF THE COMMONWEALTH	
The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth	<p>Observations cited within the 2019 BODP Implementation report include;</p> <ul style="list-style-type: none"> — Montpelier Agreements IDs listed in text are 339, 358, 235 and 336. The agreement ID number is 399 (not 339). — Table 7 (same table as in the Executive Summary) – Grey headed flying-fox ‘percentage direct offset provided by 2019 offset proposal’ is 105%, but the table fill is red (indicating it does not meet requirements), the table fill should be green here. This table formatting error occurs again for River Flat Eucalypt Forest for ‘Total 2019 BODP implementation period % of total requirement’, here table fill is red, however it should be green. — No footnotes are provided for Table 1, Appendix A.
CONDITION 30(6) THE BIODIVERSITY OFFSET DELIVERY PLAN MUST:	

COMPLIANCE INDICATOR	AUDIT OBSERVATIONS
<p>a) (iv) the identification of offsets must be informed by scientifically robust information and incorporate the precautionary principle in the absence of scientific certainty</p>	<p>Vegetation surveys, assessment and management for Orchard Hills are substantially advanced and generally consistent with accepted methodology and adequacy. However, in the absence of Orchard Hills Survey Report, findings within this audit are limited to the information available to date.</p> <p>However preliminary data provided and cited has indicated that the application of consistent survey methodology as described by NSW Biobanking Scheme and assessment has been applied, and the projects impacts have been assessed under the Framework for Biodiversity Assessment (FBA) for consistency.</p> <p>The Orchard Hills site identified within the BODP was also subject to preliminary field surveys and assessment, in accordance with State and Commonwealth surveys methods and guidelines. The assessment incorporates the precautionary principle in the absence of scientific certainty by conservatively excluding areas of low condition from contributing to the offset requirements for Cumberland Plain Woodland. The surveys and assessment was determined to be appropriate and approved by DoEE on 24 August 2018.</p> <p>The site inspections and verification of the preliminary findings of the Orchard Hills Initial Ecological Survey found that only one (RA4) of the 18 rapid assessments (or approximately 6%) were inconsistent. The inconsistency identified an area Cumberland Plain Woodland (HN 528) rather than Shale Gravel Transitional Forest (HN 512), which it is currently mapped. However, as both of these communities are characteristic of the TEC Cumberland Plain Woodland as listed under the EPBC Act, the finding it is inconsequential to the assessment and quantification of offsets.</p> <p>Importantly all areas of low poor and moderate condition vegetation subject to rapid field verification were generally found to be consistent with the assessed condition.</p> <p>It is recommended that the independent audit of its compliance with condition 30(10) for the next 12 months must include a detailed field verification of the final Orchard Hills Survey Report.</p>

COMPLIANCE INDICATOR	AUDIT OBSERVATIONS
<p>(c) identify biodiversity credits (or other measure as appropriate) required to offset the total impacts of the Stage 1 Development on biodiversity, determined in accordance with the relevant policies;</p>	<p>The biodiversity credits (or other measure as appropriate) required to offset the total impacts of the Stage 1 was previously approved by DoEE for the EIS, including preliminary calculation of Orchard hills within the BODP. The assumptions and criteria used to determine the offset liability for the impact under the EPBC Offset policy calculator, are consistent with the assumptions for determining the quantum of the offset.</p> <p>Site inspections and verification of the preliminary findings of the Orchard Hills Initial Ecological Survey found that only one (RA4) of the 18 rapid assessments (or approximately 6%) were inconsistent. The inconsistency identified an area Cumberland Plain Woodland (HN 528) rather than Shale Gravel Transitional Forest (HN 512) which it is currently mapped. However, as both of these communities are characteristic of the TEC Cumberland Plain Woodland as listed under the EPBC Act, the finding it is inconsequential to the assessment and quantification of offsets.</p>

COMPLIANCE INDICATOR	AUDIT OBSERVATIONS
(d) provide evidence that the required biodiversity credits (or other measure as appropriate) can be secured in accordance with the relevant policies;	<p>While evidence was cited for all credit transfers within BODP Implementation report, no evidence was provided these credits were subsequently retired. It is recommended that in future compliance reporting that evidence (documented dates) that the credits are now retired should be provided</p> <p>Minor area calculation disparities between BODP Implementation report, geospatial file review and EPBC calculator;</p> <ul style="list-style-type: none"> • Page 62; Appendix A Table 1 - the area of poor quality CPW for Orchard Hill Site is 304.9 ha in table however stated as 307.7 ha in the calculator. Geospatial review found that poor quality CPW was 307.7 ha. • Page 74 Appendix A; Section 1.1.2 -the sum of derived grassland and scrub that would be regenerated is stated as 346.9 ha in text, however geospatial verification only calculated 342.85 ha. • Page 135; Appendix A Table 14 –The area of CPW for Hardewicke Biobank offset in the calculator is 21.72 ha, however in stated as 22.2 ha in the table in the report. The area of low quality CPW in the calculator is 42.9 ha, however in stated as 43.9 ha in the table in the report. The Geospatial review returned the following calculations; 22.1 ha for CPW, and 43.9 for poor quality CPW. • Page 86, Appendix A Table 8 - Geospatial verification of calculations found small discrepancies for CPW calculations for Montpelier biobank site. Geospatial review of CPW found 33.7 ha (instead 33.6 ha as stated in Table 6 in report) and CPW poor quality 3.7 (instead of 3.6 ha as stated in Table 6 in report). And therefore, GHFF and Swift Parrot habitat was found to be 33.7 rather 33.6 as stated in the report. • Page 156; Appendix A Table 18-. Area of CPW in report is 23.8 ha, however in calculator it is 19.4 ha. The Geospatial review returned the same calculations as stated in the report.

4.4 RECOMMENDATIONS

The BODP Implementation report and this Audit assessment included preliminary documents and finding of the Orchard Hills offsets. However, all calculations and quantification will be subject to further review following completion of the Orchard Hills Ecological Survey Report.

It is recommended that the independent audit of its compliance with condition 30(10) for the next 12 months must include a detailed field verification of the final Orchard Hills Survey Report.

These findings will be required for the audit of 2020 BODP implementation report.

It is recommended that The Implementation of the Biodiversity Offset Delivery Plan (BODP) incorporates an estimate of progress against a timeframe for completion and fulfilment of the Biodiversity Offset Delivery Plan

It is also recommended that in future compliance reporting, evidence (i.e. documented dates) that the credits transferred are now retired, should be provided.

4.5 CONCLUSIONS

Based on the review of available documentation and observations made during the audit, the Department are meeting compliance criteria for the Implementation of the Biodiversity Offset Delivery Plan (BODP) in accordance with the Airport Plan conditions.

5 LIMITATIONS

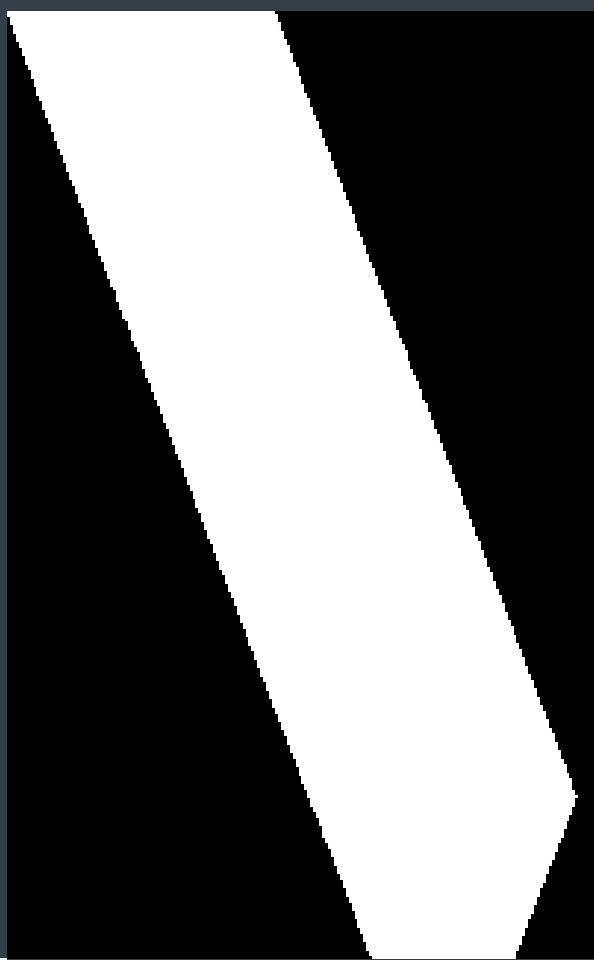
- This report has been developed from certain information provided by GHD at the request of and exclusively for the use and benefit of the Department (the Auditee).
- This report has been prepared in accordance with the scope of work/services set out in a contract, or as otherwise agreed, between the Auditor and the Auditee. In preparing this report, the Auditor has relied upon data, surveys, analyses, designs, plans and other information provided by the Auditee and other individuals and organisations, most of whom are referred to in the report (the data).
- The Auditor assumes no responsibility and will not be liable to any other person or organisation for, or in relation to any matter dealt with in this report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in this report.
- The Audit has examined the Auditee's compliance with the period from 25 August 2018 to 25 August 2018. The Auditor has relied on information provided by the Auditee. The Auditor expresses no opinion as to the accuracy, truth, sufficiency or legality of the information provided by the Auditee in respect of the Auditee's compliance standards.
- Neither the Auditor nor any member, associate or employee of WSP undertakes any responsibility for any injury, loss or damage claimed by the Auditee arising out of a claim by any third party against the Auditee in connection with this Report.

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APPENDIX A


SITE INSPECTIONS





A1 SITE INSPECTIONS OF ORCHARD HILL OFFSET SITE


Table 3 Orchard Hill Offset Area Inspection November 2019


RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 1	150.704506519457,- 33.8282690413289,0	01/11/2019	Poor condition <i>Cumberland Plain</i> <i>Woodland</i> high weed cover some shrub cover <i>Bursaria sp.</i> <50% Native. Site condition score 3-4	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 2	150.712093794386,- 33.8243503143856,0	01/11/2019	<p>Good condition</p> <p><i>Cumberland Plain Woodland</i> (Upgrade from poor) –</p> <p>High native diversity</p> <p>structural diversity present all levels</p> <p>Regen present</p> <p>Low <20% exotic</p> <p>Site condition score 7-8</p>	


RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 3	150.715260263717,- 33.8247254938672,0	01/11/2019	<i>Threatened Marsdesia</i> sp. Location. Confirmed Present. Note this site was not a Site condition verification	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 4	150.715466203788,- 33.8247787645893,0	01/11/2019	<p>Good condition Cumberland Plain Woodland (HN 528) however it is mapped as <i>HN 512</i>. Shale Gravel Transition Forest <i>zone</i></p> <p>High native diversity structural diversity present all levels Regen present Low <10% exotic Site condition score 7-8</p>	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 5	150.719882697458,- 33.8228216792349,0	01/11/2019	<p>Cooks river Ironbark</p> <p>HN513 good condition Moderate native diversity</p> <p>structural diversity present all levels</p> <p>Regen present</p> <p>Low <10% exotic</p> <p>Site condition score 7-8</p>	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 6	150.725146270106,- 33.8266920774169,0	01/11/2019	<p>Good condition <i>Derived Native Grassland</i> . Corresponds with Poor condition <i>Cumberland Plain Woodland</i>.</p> <p>Recommend; planting and revegetation here.</p> <p>Moderate weeds Site condition score 4-5</p>	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 7	150.727184848866,- 33.8297830634923,0	01/11/2019	<p>Low condition exotic grassland Very little native species present not <i>Cumberland Plain Woodland</i></p> <p>Site condition score 1-3.</p> <p>Note this site is not within the Offset area</p>	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 8	150.736093307655,- 33.8051666701978,0	01/11/2019	<p>Good condition <i>Cumberland Plain Woodland</i> (previously mapped as poor).</p> <p>High native diversity structural diversity present all levels Regen present Low <10% exotic Site condition score 7-8</p>	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 9	150.710111859634,- 33.8103192234591,0	01/11/2019	<p><i>Derived Native Grassland</i></p> <p>Poor condition</p> <p>High exotic cover</p> <p><i>Eragrostis curvula</i> and <i>Themeda triandra</i> 50/50 cover.</p> <p>Areas of dominance of both</p> <p>Site condition score 3-4</p>	






RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 10	150.705346884923,- 33.808055249428,0	01/11/2019	<p><i>Derived Native Grassland</i></p> <p>Poor condition</p> <p><i>Cumberland Plain Woodland</i> but with</p> <p><i>Themeda triandra</i></p> <p>75% cover</p> <p>Site condition score 4</p>	


Table 4 Orchard hill Offset site inspection March 2019


RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 11	150.685747956978,- 33.8233775926397,0	06/03/2019	<p>Derived Grassland inspection</p> <p>Meets Poor condition</p> <p><i>Cumberland Plain Woodland</i></p> <p>Mixed dominance of <i>Themeda triandra</i> with more than 1-year growth patches of <i>Eragrostis curvula</i> and isolated native shrub regrowth <i>Davesia</i> sp and <i>Bursaria</i> sp.</p> <p>Site condition score 3-4</p>	


RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 12	150.686790906624,- 33.8256582161901,0	06/03/2019	<p>Good condition</p> <p><i>Cumberland Plain Woodland</i></p> <p>High native diversity</p> <p>structural diversity present all levels</p> <p>Regen present</p> <p>Low <20% exotic</p> <p>Site condition score 7-8</p>	


RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 13	150.687785655335,- 33.8261928160767,0	06/03/2019	<p>Good/moderate condition</p> <p><i>Cumberland Plain</i> <i>Woodland</i> with erosion and waste dump</p> <p>Moderate native diversity</p> <p>Limited diversity present all levels</p> <p>Regen present</p> <p>Low <20% exotic</p> <p>Site condition score 6-7</p>	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 14	150.687546516648,- 33.827374334261,0	06/03/2019	<p>Low Condition. Not <i>Cumberland Plain Woodland</i></p> <p>Isolated <i>Angophora sp.</i> Regen with disturbance from land clearing and earthworks</p> <p>Site condition score 2</p>	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 15	150.691060426956,- 33.8264579732816,0	06/03/2019	<p>Low Condition. Not <i>Cumberland Plain Woodland</i></p> <p>High exotic cover >70%</p> <p><i>Eragrostis env</i> dominant</p> <p>Site condition 1. Note this area does not contribute to the offset requirements.</p>	

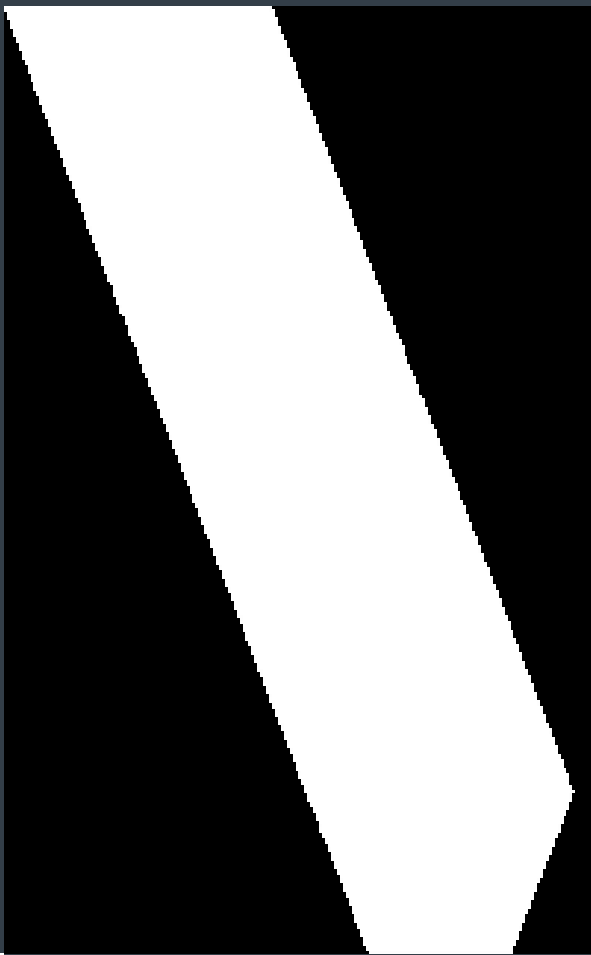
RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 16	150.71378290756,- 33.8235144883698,0	06/03/2019	<p>Good condition</p> <p><i>Cumberland Plain Woodland</i></p> <p>(HN 512. Shale Gravel Transition Forest zone)</p> <p>High native diversity</p> <p>structural diversity</p> <p>present all levels</p> <p>Regen present</p> <p>Low <10% exotic</p> <p>Site condition score 7-8</p>	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 17	150.716120831735,- 33.8242482687954,0	06/03/2019	<p>Cooks river Ironbark HN513 good condition Moderate native diversity structural diversity present all levels. M. nodosa dominant Regen present Low <10% exotic Site condition score 7-8</p>	

RAPID ASSESSMENT #	COORDINATES	DATE	DESCRIPTION	PHOTO
RA 18	150.717648048954,- 33.8251337493344,0	06/03/2019	<p>Good condition</p> <p><i>Cumberland Plain Woodland</i></p> <p>(HN 512. Shale Gravel Transition Forest zone)</p> <p>High native diversity</p> <p>structural diversity</p> <p>present all levels</p> <p>Regen present</p> <p>Low <10% exotic</p> <p>Site condition score 7-8</p>	

APPENDIX B

AUDIT CRITERIA CHECKLIST



B1 AUDIT CRITERIA CHECKLIST

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
Condition 30(10)	The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth				
The Infrastructure Department must implement the approved Biodiversity Offset Delivery Plan on behalf of the Commonwealth	This 2019 BODP implementation report provides a summary of the Actions of Infrastructure Department to implement the BODP. Site inspection of Orchard Hills offset verifying preliminary survey findings has been conducted (See Appendix A) A review of 2019 BODP Implementation Report has been completed including; A review of the accuracy and size of all spatial data. A review of each EPBC Act offset calculations for each MNES being offset, including assessment of inputs against previously approved assumptions provided in the BODP and findings of the site inspection.	Review of BODP implementation report for consistency with mapping and spatial files. Confirms. and review credit transactions identified within the BODP implementation report Site inspections and verification of the preliminary findings of the Orchard Hills Initial Ecological Survey found that only one (RA4) of the 18 rapid assessments (or approximately 6%) were inconsistent. EPBC offset calculations Review of each individual EPBC Act offset calculations for each MNES against findings of site inspection condition site values scores and assertions	Has a Biodiversity Offset Delivery Plan Implementation Report been prepared to guide the implementation of the Biodiversity Offset Delivery Plan's requirements?	On-site: undertaking site inspection of offset site as Defence Establishment Orchard Hills Off-site: reviewing of the Biodiversity Offset Delivery Plan Implementation Report.	Compliant
Condition 30(6)	The Biodiversity Offset Delivery Plan must:				

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
(a) be consistent with the EPBC Act Environmental Offsets Policy (2012) to the satisfaction of the Approver, including in particular:	<p>This requirement is considered in the description of offset proposals throughout the approved BODP. Consistency with specific criteria is demonstrated in Chapter 9 of the approved BODP. The calculations of offsets for Stage 1 development impacts has used the EPBC 'offsets assessment guide' spreadsheet and NSW FBA methodology. The BODP Implementation report incorporates an assessment of each offset delivered consistent with</p> <p>Biodiversity offsets have been secured through the establishment of a in perpetuity conservation management area at Orchard Hills. Orchard Hills Site Covenant Agreement MOU cited. And ecosystems credits have been purchased from offsets sites secured under the NSW Biobanking Scheme.</p> <p>The BODP Implementation report outlines offsets delivered and consistent with the EPBC Act Environmental Offsets Policy (2012).</p>	<p>Review of BODP implementation report for consistency with mapping and spatial files.</p> <p>EPBC offset calculations reviewed for each individual MNES against findings of site inspection condition site values scores and assertions</p> <p>Confirms. and review credit transactions identified within the BODP implementation report</p> <p>Site inspections and verification of the preliminary findings of the Orchard Hills Initial Ecological Survey found that only one (RA4) of the 18 rapid assessments (or approximately 6%) were inconsistent.</p>	<p>Has the Biodiversity Offset Delivery Plan taken into account the biodiversity assessment and offset package in the EIS and the requirements of the <i>Environment Protection and Biodiversity Conservation Act 1999</i> Environmental Offsets Policy October 2012 (EPBC Act offsets policy)?</p> <p>Has the calculation of offsets for impacts on affected biota used the 'offsets assessment guide' spreadsheet?</p> <p>Have the offsets for significant residual impacts on plants, animals and their habitat been calculated with reference to the NSW Framework for Biodiversity Assessment (FBA) methodology? Are the biodiversity</p>	<p>On-site: n/a</p> <p>Off-site: reviewing of the Biodiversity Offset Delivery Plan Implementation Report and quantum of calculated offsets has been in line with guiding methodologies.</p>	compliant

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
			offset sites securely titled under a legally binding conservation covenant (or other appropriate mechanisms) and actively managed?		

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
(i) offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter;	The BODP provides evidence that the proposed offsets deliver an overall conservation outcome that improves or maintains the viability of the protected matters This was approved by DoEE on 24 August 2018. The BODP Implementation report outlines offsets delivered and consistent with the BODP.	<p>Review of BODP implementation report for consistency with mapping and spatial files.</p> <p>EPBC offset calculations reviewed for each individual MNES against findings of site inspection condition site values scores and assertions</p> <p>Confirms. and review credit transactions identified within the BODP implementation report</p> <p>Site inspections and verification of the preliminary findings of the Orchard Hills Initial Ecological Survey found that only one (RA4) of the 18 rapid assessments (or approximately 6%) were inconsistent.</p>	Has the Biodiversity Offset Delivery Plan proposed management actions to effectively improve maintain the viability of the relevant protected matters being offset?	On-site: undertake a site inspection of offset sites at Orchard Hills to confirm the implementation of management actions. Off-site: review of the potential management actions within the Offset Management Plan to be prepared for the offset sites.	compliant

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
(ii) offsets must be built around Direct Offsets but may include Other Compensatory Measures (including that the offsets must be 'like-for-like');	The BODP was approved by DoEE on 24 August 2018. It incorporates Direct offsets through the establishment of a land based in perpetuity conservation management area at Orchard Hills and purchasing of credits. Orchard Hills Site Covenant Agreement MOU has been cited. All purchased Like for Like credits under the NSW Biobanking Scheme have been reviewed. All credit transferred documents have been cited, a review of a total of 4,059 credits purchased from 8 established biobanking sites has been conducted. A review of the individual biobanking sites has been completed, including a consistency assessment against EPBC offset guidelines, offset calculations and areas, and the spatial data provided.	<p>Review of BODP implementation report for consistency with mapping and spatial files.</p> <p>EPBC offset calculations reviewed for each individual MNES against findings of site inspection condition site values scores and assertions</p> <p>Confirms. and review credit transactions identified within the BODP implementation report</p> <p>Site inspections and verification of the preliminary findings of the Orchard Hills Initial Ecological Survey found that only one (RA4) of the 18 rapid assessments (or approximately 6%) were inconsistent.</p>	<p>Are the offsets direct offsets?</p> <p>Are any other compensatory measures being applied? Are the offsets 'like-for-like' for the protected matters being impacted?</p>	<p>On-site: undertake inspection of the direct land-based protected matter offsets to confirm or otherwise 'like-for-like'.</p> <p>Off-site: review the Biodiversity Offset Delivery Plan to confirm that the offsets are at least 90% direct land-based offsets and are 'like-for-like' for each protected matter offset.</p>	compliant

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
(iii) offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs; and	The Orchard Hills offset is recognised under the MOU as providing additional conservation requirements and security to its current existing land use, which is currently managed for Defence capability purposes, Defence training activities and the use and safe storage of explosives. The Transfer of the Orchard Hills site from Defence to Infrastructure with result in the site being permanently conserved and development of an Offset Plan, funded and implemented to provide measurable ecological improvements to the Offset Area consistent with the Environmental Offsets Policy. The Purchase of credits from established Biobanks under the NSW Biobanking scheme ensures offsets are additional to existing requirements and will be in perpetuity conservation and management.	<p>Review of BODP implementation report for consistency with mapping and spatial files.</p> <p>Confirm credit transactions identified within the BODP implementation report are from existing in perpetuity Biobank sites in accordance with NSW Biobanking Scheme.</p> <p>Review Orchard Hills MOU for confirmation proposed management actions additional to what is already required, determined by law</p>	Are the offset for each protected matter additional to what is already required?	On-site: n/a Off-site: review of the Biodiversity Offset Delivery Plan to check if the offsets are additional to what is already required.	compliant

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
(iv) the identification of offsets must be informed by scientifically robust information and incorporate the precautionary principle in the absence of scientific certainty	The purchase of existing credits offsets from Biobanks is based on the NSW Biobanking Scheme and considered to be of scientific robust methodology. The establishment of these sites requires accredited assessors to describe and assess the site which is subsequently reviewed by NSW regulators period to approval. The Orchard Hills surveys and assessment report is yet to be finalised or provided, at the time of this audit. However preliminary data provided and cited has indicated that the application of consistent survey methodology as described by NSW Biobanking Scheme and assessment has been applied, and the projects impacts have been assessed under the Framework for Biodiversity Assessment (FBA) for consistency. The Orchard Hills site identified within the BODP was subject to preliminary field surveys and assessment, in accordance with State and commonwealth surveys methods and guidelines. The assessment incorporates the precautionary principle in the absence of scientific certainty by	<p>Review of BODP implementation report for consistency with mapping and spatial files.</p> <p>Review and confirm preliminary Orchard Hills survey reporting is based on methodology consistent with the both NSW Biodiversity Assessment Methodology (BAM) and Framework for Biodiversity Assessment (FBA) for consistency with project impacts.</p>	<p>Has the identification of offsets been informed by scientifically robust field data capture and offset calculation methodologies, such as the NSW Framework for Biodiversity Assessment (FBA) methodology?</p> <p>Is there an absence of scientific certainty? If so, has the precautionary principle been applied?</p>	<p>On-site: check and confirm the location of field survey data collection and check each survey site aligns with the data captured for the site.</p> <p>Off-site: review of Biodiversity Offset Delivery Plan Implementation Report to check the methodologies used are scientifically robust.</p>	compliant

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
	conservatively excluding areas of low condition from contributing to the offset requirements for CPW. The surveys and assessment was determined to be appropriate and approved by DoEE on 24 August 2018.				
(b) include measures to offset impacts on foraging habitat for the Swift Parrot (<i>Lathamus discolor</i>) in addition to those species and ecological communities listed in the Biodiversity Offset Strategy provided as part of the EIS;	The implementation report incorporates direct offset for foraging habitat for the Swift Parrot (<i>Lathamus discolor</i>). A total of 139.3 Ha of habitat has been purchased from 8 established biobank sites, and the Orchard site is considered to have an additional 517.9 ha of habitat. These area calculations have been reviewed.	Review and confirm BODP implementation report for inclusions of specific offset assessment and quantification using the EPBC offset calculations for foraging habitat for the Swift Parrot (<i>Lathamus discolor</i>).	Have measures been included to offset impacts on foraging habitat for the Swift Parrot? Is the offset additional to the species and ecological communities listed for offsetting in the Biodiversity Offset Strategy that was provided as part of the EIS documentation?	On-site: n/a Off-site: review the Biodiversity Offset Delivery Plan to check that a Swift Parrot foraging habitat offset will be provided.	compliant

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
(c) identify biodiversity credits (or other measure as appropriate) required to offset the total impacts of the Stage 1 Development on biodiversity, determined in accordance with the relevant policies;	A total of 4,059 biodiversity credits from 8 Established biobanks have been purchased within the implementation period. The Orchard site has generated 14,800 biodiversity credits. A total of 18,859 biodiversity credits have been determined in accordance with relevant guidelines within the implementation year. For plants, animals and habitats impacted by Stage 1 Development, the BODP implementation report provides an outline of how ecosystem and species credits requirements have been met. Table 7 and Table 8 Section 3 of report.	<p>All credit transactions included within the BDOP implementation report have had evidence cited of transaction within the 12 month period</p> <p>EPBC offset calculations reviewed for each individual MNES against findings of site inspection condition site values scores and assertions</p> <p>Site inspections and verification of the preliminary findings of the Orchard Hills Initial Ecological Survey found that only one (RA4) of the 18 rapid assessments (or approximately 6%) were inconsistent.</p> <p>Review Orchard Hills MOU execution and date</p>	Are biodiversity credits (or other measure) required to make up the offset for the total impacts upon biodiversity associated with the Stage 1 development? If so has relevant policies been referred to?	On-site: n/a Off-site: review the Biodiversity Offset Delivery Plan Implementation Report to check if biodiversity credits are being purchased and that it has been done in accordance with relevant policies.	compliant
(d) provide evidence that the required biodiversity credits (or other measure as appropriate) can be secured in accordance with the relevant policies;	A total of 4,059 credits from 8 Established biobanks have been purchased within the implementation period. The MOU has been sited, Orchard Hills site will provide a substantial areas of the offset requirements. The Orchard site will generate an estimated 14,800 biodiversity credit. Credit transferred documents have been cited and are compliant, however evidence of credit retirement has not been provided	<p>All credit transactions included within the BDOP implementation report have had evidence cited of transaction within the 12 month period</p> <p>Review Orchard Hills MOU execution and date</p>	Have the biodiversity credits (or other measure) been secured in accordance with relevant policies?	On-site: n/a Off-site: review the Biodiversity Offset Delivery Plan Implementation Report and Biodiversity Offset Delivery Plan to check if biodiversity credits have been secured in accordance with relevant policies.	compliant

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
(e) provide evidence that the arrangements for managing the Direct Offsets will be provided through mechanisms that are enduring, enforceable and auditable; and	The MOU for the Orchard Hills site incorporates details of the enforceable and auditable mechanisms for review of the proposed direct actions. The Biobanking scheme incorporates legislative reporting monitoring requirements to ensure gains and outcomes are being achieved on the biobank.	Review Orchard Hills MOU execution and date and confirm mechanisms that are enduring, enforceable and auditable Review and confirm all credit transaction within BODP implementation report are from existing established Biobanks.	Have arrangements to manage the direct offsets been provided through mechanisms that are reasonably enduring, enforceable and auditable?	On-site: undertake site visit to check if initial management mechanisms are being implemented. Off-site: review the Biodiversity Offset Delivery Plan Implementation Report and Biodiversity Offset Delivery Plan to check that the management mechanisms to be applied to the direct offsets are enduring, enforceable and auditable.	compliant
(f) if any Other Compensatory Measures are proposed, provide details of those measures along with a justification of why they should be considered acceptable.	Section 1.6.3 of the implementation report and BODP outline proposed Compensatory Measures and appropriate justification. These include Threatened Flora Propagation Program (TFPP) and Greening Australia seed collection and production programs, as well as other research and capacity building activities.	Review and confirm Other Compensatory Measures within BODP implementation report	Are other compensatory measures proposed? If so, what are the measures and have justifications as to why they should be considered acceptable been provided?	On-site: Off-site: review the Biodiversity Offset Delivery Plan Implementation Report and Biodiversity Offset Delivery Plan to check if other compensatory measures are to be implemented and corresponding justifications.	compliant
Condition 30 (11)	The Infrastructure Department must:				

Indicator	Independent Auditor Comments	Measures made	Requirement	Verification Method	Compliance Finding
(a) ensure that an independent audit of its compliance with condition 30(10) is conducted in respect of;	This audit	Completed in accordance with the Audit criteria.	Audit to be completed by a suitable qualified and experienced auditor.	Undertake audit on-site and off-site in accordance with Condition 30(11) requirements.	Compliant
(i) the 12-month period commencing with the approval of the Biodiversity Offset Delivery Plan; and	The Audit was completed by the 24 February 2020 on the BODP implementation report covering the 12 month implementation period following approval of the Biodiversity Offset Delivery Plan by 24 August 2018.	Completion of this Audit dated 24 February 2020 criteria.	Audit to be completed by a suitable qualified and experienced auditor.	On-site: undertake audit of direct land-based offsets at 12-month mark. Off-site: undertake audit of offset delivery compliance report.	Compliant
(ii) each subsequent 18-month period until all biodiversity offsets required by the Biodiversity Offset Delivery Plan have been secured or implemented; and	noted	NA	Audit to be completed by a suitable qualified and experienced auditor.	On-site: undertake audit of direct land-based offsets at 18-month intervals until all offset have been secured and implemented. Off-site: undertake audit of offset delivery compliance report.	Not applicable (NA)
(b) submit a report of each audit that is carried out to the Environment Department within six months of the end of the period in respect of which the audit was conducted.	This Audit was completed before the 24 February 2020 and within the 6 months period following the end of the 12 month period of implementation of the Biodiversity Offset Delivery Plan	Email submission of this audit	Audit report to be prepared by a suitable qualified and experienced auditor.	On-site: n/a Off-site: prepare an audit report within 6 months of conducting an audit on behalf the Environment Department.	Compliant

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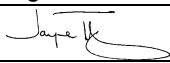
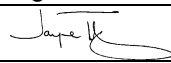
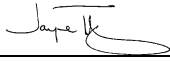
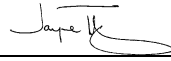
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