

OAKDALE SOUTH ESTATE

Biodiversity Offset Strategy

For:

Goodman Property Services (Aust) Pty Ltd

August 2016

Final



**PO Box 2474
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Glossary of Terms

BAR	Biodiversity Assessment Report
BBAM	BioBanking Assessment Methodology
BBCC	BioBanking Credit Calculator v4.0
BOS	Biodiversity Offset Strategy
CEEC	Critically Endangered Ecological Community
DP&E	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
FBA	NSW Framework For Biodiversity Assessment
IBRA	Interim Biogeographic Regionalisation for Australia
IBRA region	A bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system, which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.
IBRA sub-region	a subregion of a bioregion identified under the IBRA system and based on major catchment areas
LGA	Local Government Area
NSW	New South Wales
OEH	NSW Office of Environment and Heritage of the Department of Premier and Cabinet
PCT	Plant Community Type
the Project	The staged development of a warehouse and distribution complex within the Oakdale South precinct of the broader Oakdale Estate which is located within the Western Sydney Employment Area
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
TEC	Threatened Ecological Community
TSC Act	NSW <i>Threatened Species Conservation Act 1995</i>
WSEA SEPP	NSW <i>State Environmental Planning Policy (Western Sydney Employment Area) 2009</i>

Executive Summary

S1 Introduction

Cumberland Ecology was commissioned by Goodman Property Services (Aust) Pty Ltd (Goodman) to prepare a Biodiversity Offset Strategy (BOS) for Stage 1 of the Oakdale South Estate (the 'Project'). The Project involves the staged development of a warehouse and distribution complex. The Environmental Impact Statement (EIS) for the Project was submitted in November 2015. However subsequent amendments to the Masterplan for the Project require the submission of a Section 96 (S.96) application to amend the Project.

This BOS, in conjunction with the Biodiversity Assessment Report (Cumberland Ecology 2016) will form part of the S.96 amendment being prepared for Goodman to support an application for State Significant Development Consent under Division 4.1 of Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of this BOS is to establish a commitment to offsetting the impacts of the Project on threatened species, populations and communities. The BOS has been prepared to address the NSW Department of Planning and Environment (DP&E) issued Secretary's Environmental Assessment Requirements (SEARs) for the Project which state that the impacts of the Project must be assessed in accordance with the *NSW Office of Environment and Heritage Framework for Biodiversity Assessment under the NSW Biodiversity Offsets Policy for Major Projects*.

S2 Summary of Impacts of the Project

The development site is largely located within grassland used for cattle grazing so as to minimise environmental impacts to vegetation. 96.3% of the vegetation within the development area comprises low diversity/exotic grassland with the remaining 3.7% including Critically Endangered and Endangered Ecological Communities (C/EECs). These C/EECs consist of remnant patches of fragmented, degraded and isolated vegetation, as such; it is unlikely that such small areas of C/EECs are viable in the future if left in their current state.

The proposal will unavoidably remove 3.55 ha of native vegetation and 91.81 ha of cleared land. Native vegetation formed three PCTs that are threatened ecological communities listed under the *Threatened Species Conservation Act 1995* (TSC Act):

- HN526 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (TSC Act: EEC);
- HN528 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (TSC Act CEEC); and

- HN594 Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (TSC Act EEC).

Impacts to threatened species were confined to ecosystem credit species, as no species credit species have been identified at the development site. The BioBanking credit calculator (OEH 2014d) generates a list of predicted ecosystem credit species utilising a number of site variables which includes IBRA subregion, associated PCTs, percent native vegetation in outer assessment circle, condition of vegetation, patch size and credit type. Based on these variables at the development site, the following threatened ecosystem species were predicted:

- Little Lorikeet (*Glossopsitta pusilla*);
- Swift Parrot (*Lathamus discolor*);
- Australian Painted Snipe (*Rostratula australis*); and
- Freckled Duck (*Stictonetta naevosa*).

S3 Policy Framework of the Offset Strategy

The *NSW Biodiversity Offsets Policy for Major Projects* was adopted in September 2014 and applies to State Significant Developments and State Significant Infrastructure designated under the EP&A Act. The policy provides a standard method for assessing impacts of major projects on biodiversity and determining offsetting requirements (OEH 2014c). The policy is underpinned by six principles, which must be considered when assessing offsets for major projects.

The Framework for Biodiversity Assessment (FBA) has been developed in conjunction with the policy to provide a method for determining the quantum of impacts. The FBA provides rules and software for calculating the number and type of credits that a development site will require in order to offset its impacts and thus improve or maintain biodiversity values. "Credits" are the currency used within FBA and they are not specifically area measurements. Rather, they are a measure of the current quality of habitat. Where a proponent is proposing to establish an offset site as part of the BOS, the BioBanking Assessment Methodology (BBAM) must be used to assess the biodiversity values of the offset site and to identify the number and type of credits that may be created on the offset site (OEH 2014b).

S4 Offset Site Identification

This BOS proposes two measures in accordance with the *NSW Biodiversity Offsets Policy for Major Projects* which are as follows:

- Establish an offset site adjacent to the development site secured under a BioBanking Agreement (the onsite offset site); and
- Secure additional ecosystem credits for all PCTs not fully satisfied by the onsite offset site.

The Onsite Offset Site is located immediately adjacent to the development site. The Onsite Offset Site is situated so as to make use of land that holds the highest biodiversity values within lands immediately adjacent to the development site. The Onsite Offset Site is located immediately to the west of the development site and is comprised of two isolated areas. The majority of the Onsite Offset Site is located in the north west of the lot, and encompasses a significant portion of riparian vegetation about Ropes Creek. There is a smaller portion of the Onsite Offset Site that is located to the south west of the development site, which also fringes Ropes Creek upstream from the development site.

Both portions of the Offset Site are located within the low lying areas of the Ropes Creek floodplain. Landform at the Onsite Offset Site is relatively uniform, primarily consisting of an ephemeral creek line along Ropes Creek, with adjacent areas of undulating rises and alluvial flats. The topography does not have any large variances like mountains or cliff lines, with high elevations within the development site of less than 50 m above the depressions.

Native vegetation has been surveyed at the offset site in accordance with the FBA, and it has been determined that the native vegetation comprises approximately 40% of the vegetated cover of the Onsite Offset Site in the form of two Plant Community Types (PCTs).

The PCTs that have been identified at the Onsite Offset Site are:

- HN526 (moderate – good) - Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion; and
- HN594 (moderate – good) - Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion.

The remainder of the Onsite Offset Site is currently cleared for agriculture and is dominated by exotic pasture grasses. Within areas of native vegetation, the ground layer is frequently dominated by exotic species, and the shrub layer is almost absent.

The offset site will be managed for biodiversity outcomes under a BioBanking Agreement, which will provide security of funding and mandatory, auditable management requirements for the offset site in perpetuity. The offset site will primarily be managed under the stipulation of a Biodiversity Offset Management Plan to be submitted within a Biodiversity Assessment Report (BAR) for the Onsite Offset Site. Management actions at the offset site will include standard management actions as prescribed by the BBAM (OEH 2014a). Additional management actions proposed at the offset site to improve biodiversity values include fox control, and management of exotic and overabundant herbivores. Details of the management actions will be specified within the BAR for the offset site.

Some riparian corridor areas within the proposed Offset Site will be subject to management actions under a Vegetation Management Plan (VMP) which has been proposed to demonstrate compliance with the requirements of Office of Water Guidelines, even though those guidelines do not strictly apply to the Oakdale South Development given that it is State Significant Development which does not require a controlled activity approval under the *Water Management Act 2000*. As some areas subject to the VMP overlap with areas subject to the Biodiversity Offset Management Plan, a conservative approach has been taken and a

discount has been applied to credits generated in Management Zones subject to actions under the VMP, in accordance with the requirements of Section 12 and Table 10 of the BioBanking Assessment Methodology (BBAM) 2014,

S5 Conclusion

This Biodiversity Offset Strategy has been drafted to propose and establish a commitment to offset the unavoidable impacts to native vegetation resulting from the development of Oakdale South Estate. This BOS has been prepared with the specific aim of satisfying the requirements to offset as specified within *Section 10* and *Section 12* of the FBA (OEH 2014b).

Assessment using the BioBanking Assessment Methodology (OEH 2014a), found that the Onsite Offset Site would fully satisfy the offset requirement for HN526 and HN594, even after the potential application of discounts for overlapping areas subject to the VMP for Office of Water compliance. The onsite offset will be secured in perpetuity by preparing a BAR and BioBanking Agreement Application for the site following approval of the development.

The impacts to PCT HN528 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin will require further consideration by the NSW Office of Environment and Heritage (OEH). As the Onsite Offset Site is located within the Ropes Creek floodplain, the landform is considered unsuitable for the revegetation of HN528 onsite. Therefore the proponent has proposed to acquire and retire ecosystem credits to fully satisfy the offsetting requirement for HN528 as calculated by the BBCC. These credits will be acquired following approval of the development.

Introduction

Cumberland Ecology was commissioned by Goodman Property Services Ltd (Goodman) to prepare a Biodiversity Offset Strategy (BOS) for Stage 1 of the Oakdale South Project (the 'Project'). The Project involves the staged development of a warehouse and distribution complex. The Environmental Impact Statement (EIS) for the Project was submitted in November 2015. However subsequent amendments to the Masterplan for the Project require the submission of a Section 96 (S.96) application to amend the Project. This BOS, in conjunction with the Biodiversity Assessment Report (Cumberland Ecology 2016) will form part of the S.96 application to the EIS being prepared for Goodman to support an application for State Significant Development Consent under Division 4.1 of Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.1 Purpose

The purpose of this BOS is to establish a commitment to offsetting the impacts of the Project on threatened species, populations and communities. The BOS has been prepared to address the NSW Department of Planning and Environment (DP&E) issued Secretary's Environmental Assessment Requirements (SEARs) for the Project which state that the impacts of the Project must be assessed in accordance with the NSW Office of Environment and Heritage (OEH) *Framework for Biodiversity Assessment 2014* (FBA) under the *NSW Biodiversity Offsets Policy for Major Projects 2014*. Specifically, the objectives of this document are to:

- Propose an offset strategy to fully compensate for unavoidable impacts of the Project;
- Propose an offset site for the Project;
- Summarise native vegetation extent within the proposed offset site;
- Propose management actions to improve biodiversity values at the proposed offset site;
- Identify ecosystem credits generated at the proposed offset site; and
- Propose offset strategy for ecosystem credits that cannot be generated at the proposed offset site.

1.2 Objectives of the Biodiversity Offset Strategy

The objective of the BOS is to provide guidance for the delivery of mitigation for the impacts expected as a result of the Project and to achieve a long-term conservation gain for the threatened species, populations and communities impacted by the Project. The following have been considered in establishing the objectives for the BOS:

- Securing the protection and management areas containing impacted threatened species and vegetation communities in perpetuity;
- Providing an area of offset that is greater than the impacts of the Project;
- Providing habitat and vegetation communities that is of equal to or better condition than that impacted by the Project;

1.3 Overview of the Project

The Project is located within the Oakdale South precinct of the broader Oakdale Estate which is located within the Western Sydney Employment Area designated under the NSW *State Environmental Planning Policy (Western Sydney Employment Area) 2009* (WSEA SEPP). The project is located within Penrith Local Government Area (LGA) and the nearest town centres are Erskine Park and Horsley Park which are both approximately 6 km west and east respectively from the Project. The Project is accessed currently via Old Wallgrove Road; which is currently being upgraded as part of a regional development. There are several other developments adjoining the Project within a broader industrial precinct. The development site is 95.36 ha in size and is wholly located within Lot 12 DP1178389 and Lot 87 DP752041.

Cumberland Ecology conducted an initial ecological assessment of the Oakdale Concept Plan in December 2007 (Cumberland Ecology, 2007). Owing to the period of time that had elapsed since the original ecological assessment of the Oakdale Concept Plan (Cumberland Ecology, 2007), it was decided that a new ecological assessment was to be conducted that encapsulated the new design plans.

Cumberland Ecology conducted flora and fauna surveys of the development site during October 2014 and May 2015. The site was formed of both native and exotic vegetation with much of the development site being formed of Low Diversity/Exotic grassland. Native vegetation was formed of three PCTs that are also threatened ecological communities (TECs) listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act):

- Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin;
- Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin; and
- Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion.

Summary of Impacts of the Project

2.1 Impacts of the Project

2.1.1 Impacts to Plant Communities

The development site is largely located within land historically used for cattle grazing so as to minimise environmental impacts to native vegetation. Large areas of native vegetation are left intact to the west of the site. 96.3% of the vegetation within the development area comprises low diversity/exotic grassland. While the remaining 3.7% does include TECs, they consist of remnant patches of fragmented, degraded and isolated vegetation. It is unlikely that such small areas of TECs are viable in the future if left in their current state.

The proposal will unavoidably remove 3.55 ha of native vegetation and 91.81 ha of low diversity/exotic grassland. Native vegetation to be removed includes three vegetation communities; all listed under the TSC Act as either Endangered Ecological Communities (EEC) or Critically Endangered Ecological Communities (CEEC). A summary of the areas directly impacted within the development site is shown in **Table 2.1**.

Table 2.1 Summary of Impacts to PCTs of the Project

Vegetation	TSC Act Status*	Area to be Removed (ha)
HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	EEC	2.11
HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	CEEC	0.29
HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	EEC	1.15
Cleared Land	-	91.81
Total		95.36

*TSC Act Status: EEC = Endangered Ecological Community; CEEC = Critically Endangered Ecological Community

2.1.2 Impacts to Threatened Species

Although the condition and nature of the habitats within the development site have been greatly altered by existing and historical land uses, it is evident that they still retain some value for the resident and visiting native fauna that were recorded in the development site. The regrowth areas generally lack many habitat features required to support threatened fauna species, but areas of more mature habitat are also present in the development site that do retain valuable habitat features.

The FBA credit calculator generates a list of predicted ecosystem credit species utilising a number of site variables which includes IBRA subregion, associated PCTs, percentage native vegetation in outer assessment circle, condition of vegetation, patch size and credit type. Based on these variables at the development site, the following threatened ecosystem species were predicted:

- Little Lorikeet (*Glossopsitta pusilla*);
- Swift Parrot (*Lathamus discolor*);
- Australian Painted Snipe (*Rostratula australis*); and
- Freckled Duck (*Stictonetta naevosa*).

Targeted surveys for species credit species that were candidate species for the development site were undertaken in 2014. These species included fauna species Regent Honeyeater (*Anthochaera phrygia*) and Golden Bell Frog (*Litoria aurea*) as well as species credit flora species which included:

- *Acacia pubescens*;
- *Cynanchum elegans*;
- *Dillwynia tenuifolia*;
- *Dillwynia tenuifolia* - endangered population Kemps Creek;
- *Eucalyptus benthamii*;
- *Grevillea juniperina subsp. juniperina*;
- *Hypsela sessiliflora*;
- *Marsdenia viridiflora subsp. viridiflora* - endangered population;
- *Persicaria elatior*;
- *Persoonia bargoensis*;
- *Pilularia novae-hollandiae*;

- *Pimelea spicata*;
- *Pomaderris brunnea*; and
- *Wahlenbergia multicaulis* - endangered population.

No threatened flora species were identified within the development site. No species credit fauna species or populations have been assessed as impacted by the Project, therefore under the rules of the FBA, none will require offsetting.

2.1.3 Impacts that Require Further Consideration

Impacts of the Project that fall into the threshold of impacts that require further consideration comprise the removal of 0.29 ha of HN528 which conforms to the TSC Act listed CEEC of Cumberland Plain Woodland in the Sydney Basin Bioregion.

The impacts to HN528 will be assessed by the consent authority through consideration of the information provided in *Section 7.2.2* of the Oakdale South BAR (Cumberland Ecology 2016) However, the required ecosystem credits to offset this PCT have been calculated and are also presented in **Table 2.2**.

2.2 Impacts of the Project that Require Offsetting

2.2.1 Native Vegetation

Impacts of the Project that fall into the threshold of impacts that require offsetting comprise:

- The removal of 2.11 ha of HU526 which conforms to the River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC; and
- The removal of 1.15 ha of HU594 which conforms to Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC.

The offset requirements for HN526 and HN594 were calculated using the BioBanking Credit Calculator (BCCC) Version 4.0 (OEH 2014e). A summary of the vegetation zone impacted, threatened species associated with that vegetation zone, loss landscape value, loss in site value, and the number of ecosystem credits required for the impacts is detailed in the BAR (Cumberland Ecology 2016). A summary of the required ecosystem credits for each vegetation zone of the development site is shown in **Table 2.2**.

Table 2.2 Credit requirement of the Project

Zone	PCT	Associated TECs and/or Ecosystem Credit Species	Loss in Landscape Value	Loss in Site Value Score	Required Ecosystem Credits
1	HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Little Lorikeet Swift Parrot	12	61.63	104
2	HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Cumberland Plain Woodland in the Sydney Basin Bioregion Little Lorikeet Swift Parrot	12	50.72	12
3	HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Little Lorikeet Swift Parrot Australian Painted Snipe Freckled Duck	12	44.93	42

Policy Framework of the Offset Strategy

The *NSW Biodiversity Offsets Policy for Major Projects* was adopted in September 2014 and applies to State Significant Developments (SSD) and State Significant Infrastructure (SSI) designated under the EP&A Act. The Framework for Biodiversity Assessment (FBA) has been developed in conjunction with the policy to provide a method for determining the quantum of impacts. The FBA provides rules and software for calculating the number and type of credits that a development site will require in order to offset its impacts and thus improve or maintain biodiversity values. “Credits” are the currency used within FBA and they are not specifically area measurements. Rather, they are a measure of the current quality of habitat. Where a proponent is proposing to establish an offset site as part of the BOS, the BioBanking Assessment Methodology (BBAM) must be used to assess the biodiversity values of the offset site and to identify the number and type of credits that may be created on the offset site (OEH 2014b).

The FBA requires the preparation of the following documents:

- Biodiversity Assessment Report: to describe the biodiversity values present within the development site and the impact of the project on these values; and
- Biodiversity Offset Strategy: to outline how the proponent intends to offset the impacts of the project.

These reports are required to be submitted as part of the EIS.

3.1 Principles of Biodiversity Offsets for Major Projects

The *NSW Biodiversity Offsets Policy for Major Projects* provides a standard method for assessing impacts of major projects on biodiversity and determining offsetting requirements (OEH 2014c). The policy is underpinned by six principles, which must be considered when assessing offsets for major projects. Details of the six principles and how the current application applies are discussed below.

- i. *Principle 1: Before Offsets Are Considered, Impacts Must First Be Avoided And Unavoidable Impacts Minimised Through Mitigation Measures. Only Then Should Offsets Be Considered For the Remaining Impacts*

Impacts of the project have been primarily avoided by locating the development site in areas that have a history of disturbance. 96.7% of the development site is located in exotic

grassland which will have negligible impacts to biodiversity. Unavoidable impacts of the Project will be minimised through on ground mechanisms at the construction phase, such as methods of clearing vegetation and having suitably qualified ecologist's onsite for clearing of fauna habitat. The BAR for the development site (Cumberland Ecology 2016) details the avoidance and mitigation measures proposed for the Project.

ii. Principle 2: Offset Requirements Should Be Based On a Reliable and Transparent Assessment of Losses and Gains

The impacts of the Project have been assessed following a transparent assessment methodology, the FBA. The methods used to assess the impacts of the development site and gains at the offset site are clear and repeatable.

iii. Principle 3: Offsets Must Be Targeted To the Biodiversity Values Being Lost or To Higher Conservation Priorities

The offsets proposed have a direct relationship to the loss of biodiversity at the development site. All offsets proposed as part of this BOS are like-for-like offsets without any (permissible) deviations from the rules of offsetting outlined in the FBA. All impacts to PCTs at the development site will be offset using identical PCTs at the offset site.

iv. Principle 4: Offsets Must Be Additional To Other Legal Requirements

The proponent proposes to offset the impacts of the Project through establishment of a biobank site. Although part of the proposed BioBank site includes land zoned as E2 – Environmental Conservation, the E2 land within the proposed BioBank site has no current management obligations. As the current tenure of the offset site has no existing legal requirements in relation to improvement of biodiversity, the compulsory management actions for the offset (biobank) site will be the primary legal obligation for the offset site.

Some riparian corridor areas within the proposed Offset Site will be subject to management actions under a Vegetation Management Plan (VMP) which has been proposed to demonstrate compliance with the requirements of Office of Water Guidelines, even though those guidelines do not strictly apply to the Oakdale South Development given that it is State Significant Development which does not require a controlled activity approval under the *Water Management Act 2000*. As some areas subject to the VMP overlap with areas subject to the Biodiversity Offset Management Plan, a conservative approach has been taken and a discount has been calculated for credits generated in Management Zones subject to actions under the VMP, in accordance with the requirements of Section 12 and Table 10 of the BioBanking Assessment Methodology (BBAM) 2014.

Management actions proposed at the offset site will improve biodiversity and result in a net gain for the site.

v. *Principle 5: Offsets Must Be Enduring, Enforceable and Auditable*

By entering into a BioBanking Agreement at the offset site, the offset will be secured in perpetuity under a legally binding agreement. The offset site will not be allowed to be developed or impacted in any way, other than to achieve the management objectives as specified in the BioBanking Agreement. The offset site will be audited annually by OEH and will undergo third party assessment every 6 years as recommended by OEH auditors. The offset site will be funded by annual payments from the BioBanking Trust Fund as stipulated in the Part A payment schedule submitted with the BioBanking Agreement Application. The total sum of the Part A payment will be paid by the proponent in full at the commencement date of the biobank site.

Where ecosystem credits cannot be generated at the Onsite Offset Site, the proponent will procure additional ecosystem credits from other biobank sites to ensure all offsets for the Project satisfy Principle 5 of the *NSW Biodiversity Offsets Policy for Major Projects*.

vi. *Principle 6: Supplementary Measures Can Be Used In Lieu Of Offsets*

If appropriate offsets cannot be found, proponents may provide funds for supplementary measures known to improve biodiversity values, such as:

- Actions outlined in threatened species recovery programs; or
- Actions that contribute to threat abatement programs; or
- Biodiversity research and survey programs; or
- Rehabilitating degraded aquatic habitat.

The total value to be contributed to supplementary measures would be commensurate to the costs of acquiring and retiring ecosystem credits, or establishment of a biobank site.

The Onsite Offset Site is expected to satisfy the majority of offsetting requirements of the project as detailed in **Section 4.5**. Any additional offsetting that is not secured at the proposed Offset Site is expected to be available within the BioBanking Credit market. As such it is not proposed to use additional or supplementary measures as part of this BOS.

Offset Site Identification

4.1 Proposed Offset Measures

This BOS proposes two measures in accordance with the *NSW Biodiversity Offsets Policy for Major Projects* which are as follows:

- Establish an offset site adjacent to the development site secured under a BioBanking Agreement (the Onsite Offset Site); and
- Secure additional ecosystem credits for all PCTs not fully satisfied by the Onsite Offset Site.

4.2 Onsite Offset Site Details

4.2.1 Location

The Onsite Offset Site is located immediately adjacent to the development site as shown in **Figure 4.1**. The Onsite Offset Site and Development Site are both located within Penrith Local Government Area (LGA) and the nearest town centres are Erskine Park and Horsley Park which are both approximately 6 km west and east respectively. The Onsite Offset Site will be accessed through the Development Site. The Onsite Offset Site is divided into two areas with the majority located to the north west of the development site. There is a small lobe of the Onsite Offset Site that is located to the south west of the Development Site, along the riparian buffer of Ropes Creek. The offset site is 21.12 ha in size and is wholly located within Lot 12 DP1178389 and Lot 87 DP752041.

4.2.2 General Description of Offset Site

i. Landform, Geology and Soils

Both portions of the Offset Site are located within the low lying areas of the Ropes Creek floodplain. Landform at the Onsite Offset Site is relatively uniform, primarily consisting of ephemeral creek lines along Ropes Creek and Ropes Creek Tributary, with adjacent areas of undulating rises and alluvial flats. The topography does not have any large variances like mountains or cliff lines, with high elevations within the development site of less than 50 m above the depressions.

ii. *Native Vegetation*

Native vegetation comprises approximately 40% of the vegetated cover of the Onsite Offset Site. Native vegetation within the Onsite Offset Site is primarily limited to the riparian corridor which fringes Ropes Creek and Ropes Creek Tributary and typically comprises regenerating stands of *Eucalyptus tereticornis* (Forest Red Gum) and *Casuarina glauca* (Swamp Oak). The condition of vegetation within the offset site is degraded due to persistent impacts from grazing. Within areas of native vegetation, the ground layer is frequently dominated by exotic species, and the shrub layer is almost absent.

Field surveys have been undertaken at the Onsite Offset Site in areas of native vegetation in accordance with the methodology prescribed in the FBA (OEH 2014b). A total of five full floristic plots and transects were undertaken across the Onsite Offset Site, to determine the PCTs present. PCTs were identified by assessing site data with the following criteria:

- IBRA subregion;
- Landscape position;
- Vegetation formation;
- Dominant canopy species (where present); and
- Dominant shrub and ground cover species.

Two Plant Community Types (PCTs) have been identified at the proposed offset site (**Figure 4.2**) and are shown below:

- HN526 (moderate – good) - Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion; and
- HN594 (moderate – good) - Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion.

The remaining area of the Onsite Offset Site is cleared and improved for agriculture and is dominated by exotic pasture grasses in the form of Low Diversity/Exotic Grassland. As the Onsite Offset Site is located within the Ropes Creek floodplain, the landform is considered unsuitable for the revegetation of HN528 onsite. For the purposes of this BOS, the proponent proposes to rehabilitate the remaining areas of Low Diversity/Exotic Grassland within the Onsite Offset Site back to functional woodland with species typified by the PCT HN526 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion. In addition to rehabilitation of grassland areas, the proponent intends to restore areas of the Ropes Creek Tributary first order stream realignment within the development site, to be used as part of this BOS.

A summary of the areas of each PCT at the proposed offset site are shown in **Table 4.1**.

Table 4.1 PCTs at the Proposed Offset Site

PCT Number	PCT Name	Area within Offset Site
HN526 – Moderate - Good	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	1.19
HN526 – Regeneration of low condition grassland	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	12.65
HN594 - Moderate - Good	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	7.28
Total		21.12

iii. Hydrology

The Onsite Offset Site occurs within the Hawkesbury-Nepean Catchment. The Onsite Offset Site occurs at the headwaters of the alluvial plain and is bisected by Ropes Creek which converges with first order streams. Ropes Creek is a second order stream, which flows into South/Wianamatta Creek approximately 13 km north of the Onsite Offset Site. The drainage system within the offset site is in relatively poor condition, due to erosion and trampling by cattle.

iv. Land Uses

The Onsite Offset Site has previously been utilised for the purpose of cattle grazing. This land use has resulted in 60% of the Onsite Offset Site being extensively cleared of vegetation which has resulted in a significant loss of flora and fauna habitats. Land surrounding the offset site has also historically been utilised for agricultural purposes.

The Onsite Offset Site has been primarily zoned E2 – Environmental Conservation under the WSEA SEPP (DoP (NSW) 2009) within a buffer about Ropes Creek. This buffer encapsulates the majority of the existing woodland vegetation within the offset site. Areas outside the Ropes Creek buffer are zoned as IN1 – General Industrial, as part of the WSEA SEPP. The objective of the IN1 - General Industrial zoning is to facilitate a wide range of employment-generating development including industrial, manufacturing, warehousing, storage and research uses and ancillary office space.

The objective of E2 – Environmental Conservation are to protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values; and to prevent development that could destroy, damage or otherwise have an adverse effect on those values. The lands immediately adjacent to the Onsite Offset Site will be used for an industrial development which will include warehouses and associated infrastructure as detailed in the Oakdale

South BAR (Cumberland Ecology 2016). Some adjoining land within the Oakdale Estate has already been development for industrial purposes. Other nearby land uses includes a brick and roofing quarry and residential land.

4.2.3 Management Actions Proposed for the Offset Site to Improve Biodiversity Values

As part of this BOS, the following standard management actions have been identified for the Onsite Offset Site as prescribed in the BBAM (OEH 2014a) and include the following obligations:

- Management of grazing for conservation;
- Weed control;
- Ecological fire management;
- Management of human disturbance;
- Retention of regrowth and remnant native vegetation;
- Replanting where natural regeneration is not sufficient;
- Retention of dead timber;
- Erosion control; and
- Retention of rocks.

These management actions will be undertaken at all vegetation zones at the Onsite Offset Site. For areas subject to management actions under the Office of Water VMP, a discount, in accordance with Table 10 and Equation 12 of the BBAM, has been applied for the following management actions which will be undertaken under the VMP for a duration of 5 years:

- Weed control;
- Retention of regrowth and remnant native vegetation;
- Replanting where natural regeneration is not sufficient; and
- Erosion control.

In addition to the standard management actions listed above, the BBCC has prescribed additional management actions for each PCT at the Onsite Offset Site as detailed in **Table 4.2**. The location of each management zone is shown in **Figure 4.3**.

Table 4.2 Summary of Additional Management Actions at the Onsite Offset Site

Management Zone	PCT Name	Area	Additional Management Actions	Subject to Office of Water VMP
1a	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Moderate/Good Condition	0.03	Exclude commercial apiaries Exclude miscellaneous feral species Feral and/or abundant native herbivore control	No
1b	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Moderate/Good Condition	1.16	Exclude commercial apiaries Exclude miscellaneous feral species Feral and/or abundant native herbivore control	Yes – discount applied
2a	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Low condition grassland	6.55	Exclude commercial apiaries Exclude miscellaneous feral species Feral and/or abundant native herbivore control	No
2b	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Low condition grassland	0.64	Exclude commercial apiaries Exclude miscellaneous feral species Feral and/or abundant native herbivore control	Yes – discount applied
2c	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Low condition grassland	5.46	Exclude commercial apiaries Exclude miscellaneous feral species Feral and/or abundant native herbivore control	Yes – discount applied
3a	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	1.88	Control of feral pigs Exclude commercial apiaries Exclude miscellaneous feral species Feral and/or abundant native herbivore control Fox control Maintain or re-introduce	No

Table 4.2 Summary of Additional Management Actions at the Onsite Offset Site

Management Zone	PCT Name	Area	Additional Management Actions	Subject to Office of Water VMP
3a	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	5.40	natural flow regimes Control of feral pigs Exclude commercial apiaries Exclude miscellaneous feral species Feral and/or abundant native herbivore control Fox control Maintain or re-introduce natural flow regimes	Yes – discount applied

All management actions (including standard and additional actions) for the Onsite Offset Site will be described in full in a Biodiversity Assessment Report (BAR) for the offset site which will be produced at a later date. The BAR for the offset site will include a management plan which will stipulate in detail the management actions and reporting criteria for the offset site.

4.3 Improvement in Biodiversity Values at the Onsite Offset Site

The BioBanking Assessment Methodology (OEH 2014a) was used to assess the Onsite Offset Site by calculating the gain in site value based on landscape values, site values, and proposed management actions at the Onsite Offset Site.

In line with Principle 4, the E2 zoning of parts of the offset site was considered during the credit calculations for the BioBank site. As the E2 land within the proposed BioBank site has no current management obligations, the management actions associated with the BioBanking Agreement will be the primary applicable legal obligations in relation to improving biodiversity. Therefore, no discount was applied to the BioBanking Credits for the offset site in relation to the E2 zoning.

Although the Oakdale South Development, being a SSD, does not require a controlled activity approval under the *Water Management Act 2000*, a VMP has been proposed to demonstrate compliance with the requirements of Office of Water Guidelines and will apply to some riparian corridor areas within the proposed Offset Site. A conservative approach has been taken and a discount has been calculated for credits generated in Management Zones subject to actions under the VMP, in accordance with the requirements of Section 12 and Table 10 of the BioBanking Assessment Methodology (BBAM) 2014.

4.3.1 Ecosystem Credits Created at the Offset site

The change in site value at the Onsite Offset Site was calculated using the BBCC. Table of PCTs at the Onsite Offset Site and the number of ecosystem credits created is shown in **Table 4.3**. The credit calculator also generates a list of predicted ecosystem credit species utilising a number of variables which includes the following:

- IBRA subregion: Cumberland;
- Associated PCTs: HN526, HN528 and HN594;
- Percent native vegetation in outer assessment circle: 9.68%;
- Condition of vegetation: moderate to good (all vegetation zones);
- Patch size: 201.90 ha (all vegetation zones);
- Credit type: Ecosystem.

Based on the information above, the following ecosystem credit species are predicted at the Onsite Offset Site:

- Little Lorikeet (*Glossopsitta pusilla*);
- Swift Parrot (*Lathamus discolor*);
- Australian Painted Snipe (*Rostratula australis*); and
- Freckled Duck (*Stictonetta naevosa*).

Table 4.3 Summary of PCTs and Ecosystem Credits generated at the BioBank site

PCT	PCT Name and Associated Ecosystem Credit Species	Zone	Current Site Value Score	Future Site Value Score	Change in Landscape value Score	Ecosystem Credits Created
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Moderate/Good Condition Little Lorikeet Swift Parrot	1a	46.88	62.85	15.97	0
HN526	Forest Red Gum - Rough-barked Apple grassy	1b	46.88	62.85	15.97	13

Table 4.3 Summary of PCTs and Ecosystem Credits generated at the BioBank site

PCT	PCT Name and Associated Ecosystem Credit Species	Zone	Current Site Value Score	Future Site Value Score	Change in Landscape value Score	Ecosystem Credits Created
	woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Moderate/Good Condition Little Lorikeet Swift Parrot					
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Low condition	2a	12.50	29.25	16.75	67
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Low condition	2b	12.50	29.25	16.75	7
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion – Low condition	2c	12.50	29.25	16.75	56
HN594	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion Little Lorikeet Swift Parrot Australian Painted Snipe Freckled Duck	3a	76.09	89.37	13.28	21
HN594	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion Little Lorikeet	3b	76.09	89.37	13.28	59

Table 4.3 Summary of PCTs and Ecosystem Credits generated at the BioBank site

PCT	PCT Name and Associated Ecosystem Credit Species	Zone	Current Site Value Score	Future Site Value Score	Change in Landscape value Score	Ecosystem Credits Created
	Swift Parrot					
	Australian Painted Snipe					
	Freckled Duck					

4.3.2 Justification for any Variation to the Offset Rules

Where suitable ecosystem credits cannot be acquired by the proponent, there are provisions within Section 10.5.4 of the FBA to allow for variations of the offsetting rules. Specifically for ecosystem credits, the consent authority may approve a variation of the offset rules for matching ecosystem credits by allowing ecosystem credits created for a PCT from the same vegetation formation as the required ecosystem credit to be proposed as part of the BOS, where in the consent authority’s opinion the BOS demonstrates that:

- All reasonable steps to secure a matching ecosystem credit have been taken by the proponent;
- The required ecosystem credit is not for a PCT associated with a CEEC listed under the TSC Act or an ecological community listed on the EPBC Act; and
- The PCT from the same vegetation formation has a percent cleared value of the PCT in the major catchment area equal or greater than the percent cleared of the PCT to which the required ecosystem credit relates; or
- Where the retired ecosystem credit is for a PCT that is associated with a CEEC/EEC, the PCT from the same formation is also associated with a CEEC/EEC.

The consent authority may also approve supplementary measures to be proposed as part of the BOS for a PCT impacted at the development site, where in the consent authority’s opinion the BOS demonstrates that:

- All reasonable steps have been taken by the proponent to secure a matching ecosystem credit;
- The PCT to which a required ecosystem credit relates is associated with a CEEC/EEC or for which the impact of development does not require further consideration;
- The supplementary measure applies to that CEEC/EEC; and

- The supplementary measure is carried out in accordance with the rules of Appendix B of the NSW Biodiversity Offsets Policy for Major Projects.

This BOS does not propose to vary the offset rules for any PCT that will be impacted by the development of Oakdale South.

4.3.3 Averted Loss at the Onsite Offset Site

Averted loss was calculated by assessing the risk of decline should the Onsite Offset Site not be secured under a conservation measure. The BBAM states in *Section 12.3.1.3* that:

“Native vegetation that has a high risk of decline in site value score is on lands that were or are zoned for residential (but not rural residential), business or industrial uses in a Local Environmental Plan (LEP) prior to the development of a Standard Instrument LEP (in accordance with the Standard Instrument (LEP) Order 2006), or land that is zoned RU1 (Primary production).”

The vegetation at the offset site is not considered to be at a high risk of decline as the lands have been zoned under the WSEA SEPP (2009) after the Standard Instrument LEP Order (DoP (NSW) 2006).

4.4 Securing the Onsite Offset Site

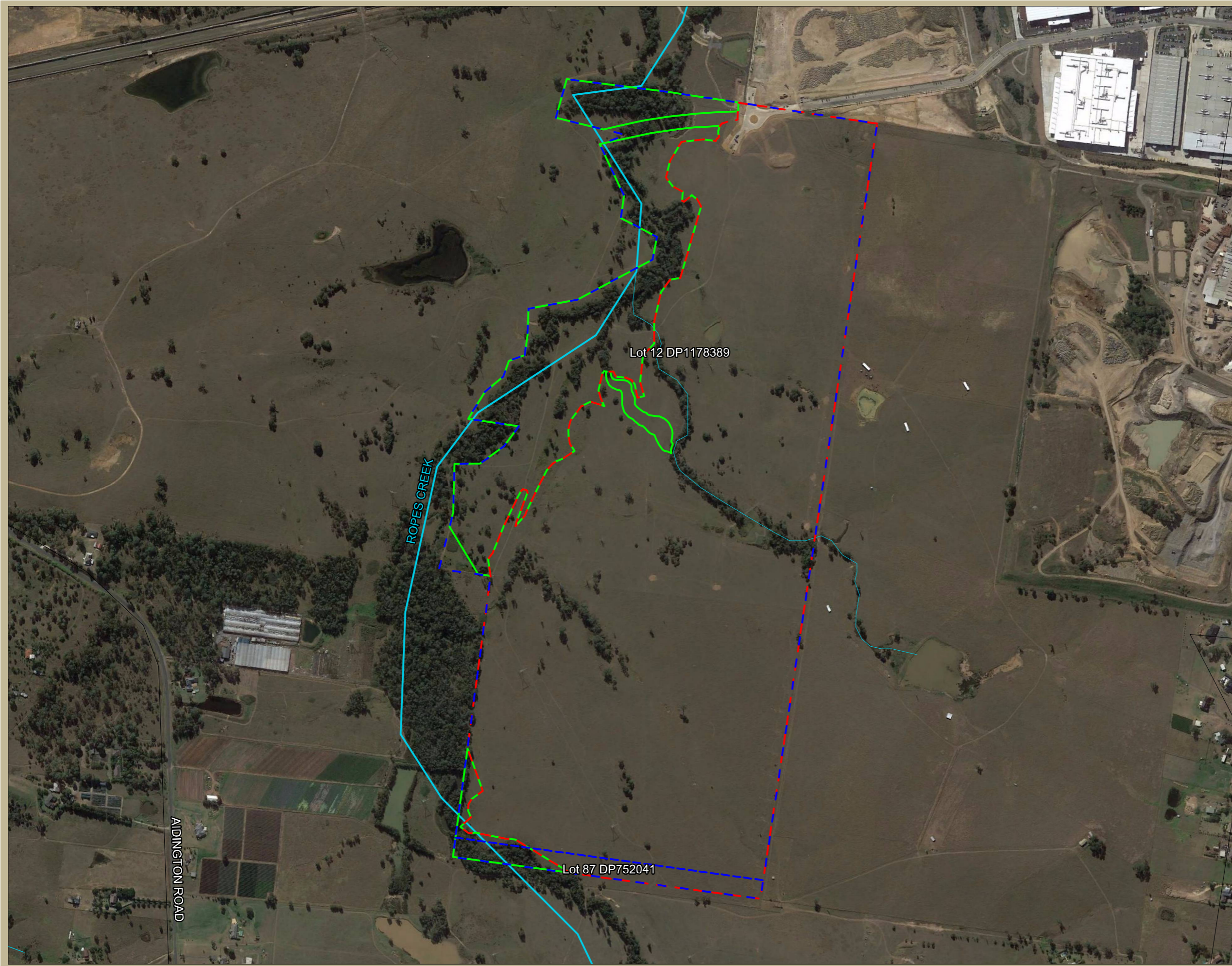
The offset site will be secured in perpetuity as a biobank site under a BioBanking Agreement. The offset site will be secured under the NSW BioBanking and Offset Scheme (the BioBanking Scheme) which establishes permanent objectives for biodiversity improvement on land under Part 7A of the TSC Act. Once established as a biobank site, the title holder of the Onsite Offset Site will be legally compelled to manage the land for biodiversity improvement as specified by the management actions within the BioBanking Agreement Application. The title holder of the biobank site will not be permitted to develop any part of the site, unless it is offset under the rules of offsetting prescribed within the BBAM (OEH 2014a).

4.5 Credit Balance

Credit balance of the project shown in **Table 4.4** below. The Onsite Offset Site will generate a surplus of credits required to offset the impacts to both HN526 and HN594, even after any potential application of discounts for works conducted under the VMP for Office of Water requirements. The offset site will not generate any credits for HN528 and, as such, there is a 12 credit deficit for this PCT. As HN528 is a CEEC under the TSC Act, the proponent will be required to obtain and retire exactly 12 HN528 credits only.

Table 4.4 Credit Balance for Ecosystem Credits

PCT Name	Area of Impact	Ecosystem Credits Required	Area within Offset Site (ha)	Ecosystem Credits Created (before discount, if applicable)	Ecosystem Credits Created (after discount, if applicable)	Total Credits generated for PCT (after discount)	Credit Balance
HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	2.11	104	0.03	0	0	140	+36
			1.16	13	12		
HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin – low condition grassland	--	--	6.55	67	67		
			0.64	7	6		
			5.46	56	55		
HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	0.29	12	--	--	--	--	-12
HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	1.15	42	1.88	21	21	79	+37
			5.40	59	58		



Legend

- Onsite Offset Site
- Development site
- Lot Boundary
- Road

Streams

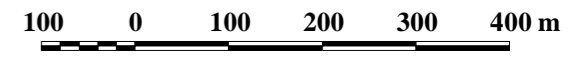
- 1st Order Stream
- 3rd Order Stream

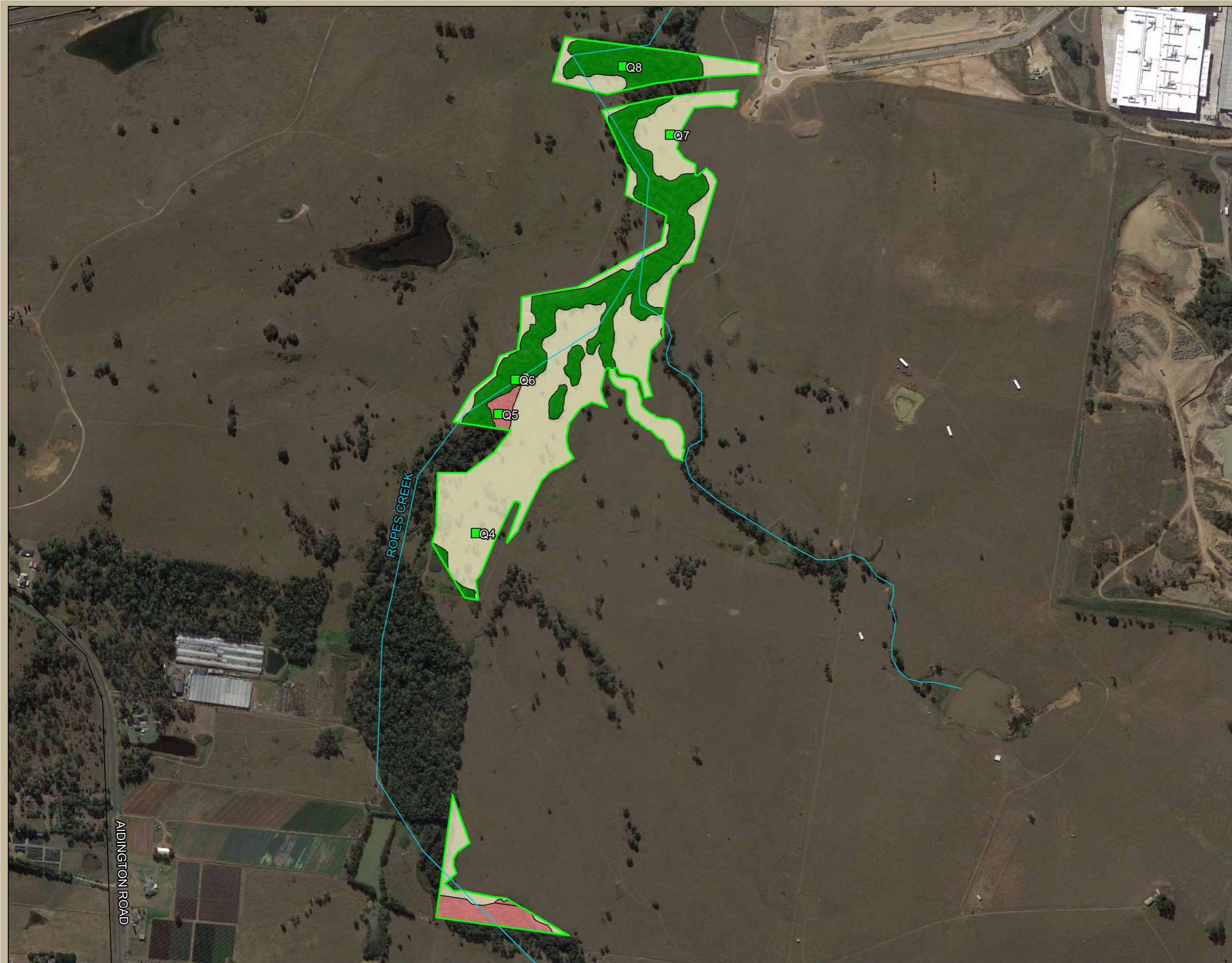
Image Source:
Google Earth
(dated 05-05-2016)

Data Source:
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(Geoscience Australia) 2006



Figure 4.1. Location of the Onsite Offset Site





Legend

- Onsite Offset Site
- Road
- Watercourse
- Flora Plot Location

PCT

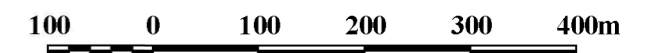
- Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (Mod/Good)
- Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (Low)
- Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (Mod/Good)

Image Source:
Google Earth
(dated 05-05-2016)

Data Source:
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Figure 4.2. PCTs at the Onsite Offset Site





Legend

- Onsite Offset Site
- Road
- Watercourse

Management Zone

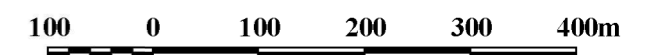
- Zone 1a: HN526
- Zone 1b: HN526
- Zone 2a: HN526
- Zone 2b: HN526
- Zone 2c: HN526
- Zone 3a: HN594
- Zone 3b: HN594

Image Source:
Google Earth
(dated 05-05-2016)

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Figure 4.3. Management Zones at the Onsite Offset Site



Conclusion

This Biodiversity Offset Strategy has been drafted to propose and establish a commitment to offset the unavoidable impacts to native vegetation resulting from the development of Oakdale South. This BOS has been prepared with the specific aim of satisfying the requirements to offset as specified within *Section 10* of the FBA (OEH 2014b).

The objective of this BOS is to propose a Biodiversity Offset Package that will achieve a long term positive outcome for endangered species, populations and communities that will be impacted by the proposed development at Oakdale South. The Project will have direct unavoidable impacts on three native vegetation communities, which are listed as either Critically Endangered or Endangered Ecological Communities under the TSC Act. These vegetation communities include:

- 2.11 ha of HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (TSC Act Endangered Ecological Community);
- 0.29 ha of HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (TSC Act Critically Endangered Ecological Community); and
- 1.15 ha of HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (TSC Act Endangered Ecological Community)

The BOS is guided by the NSW Biodiversity Offsets Policy for Major Projects (OEH 2014c), and involves two potential offset measures for consideration:

- Establish an offset site adjacent to the development site secured under a BioBanking Agreement (the Onsite Offset Site); and
- Secure additional ecosystem credits for all PCTs not fully satisfied by the Onsite Offset Site.

Assessment using the BioBanking Assessment Methodology (OEH 2014a), found that the Onsite Offset Site would fully satisfy the offset requirement for two of the PCTs impacted by the proposal: HN526 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin and HN594 Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion. The Onsite Offset Site

will be secured in perpetuity following approval of the development by preparing an Onsite Offset Site Biodiversity Assessment Report (BAR) and BioBanking Agreement Application for the site. The Onsite Offset Site BAR will stipulate the management actions as well as reporting requirements and completion criteria for each vegetation/management zone at the Onsite Offset Site.

The impacts to PCT HN528 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin will require further consideration by the NSW Office of Environment and Heritage. As the Onsite Offset Site is located within the Ropes Creek floodplain, the landform is considered unsuitable for the revegetation of HN528 onsite. Therefore the proponent has proposed to acquire and retire 12 ecosystem credits to fully satisfy the offsetting requirement for HN528 as calculated by the BBCC. These credits will be acquired following approval of the development.

References

- Cumberland Ecology. 2016. Oakdale South Estate State Significant Development Application - Biodiversity Assessment Report. Cumberland Ecology Pty Ltd, Epping.
- DoP (NSW). 2006. Standard Instrument (Local Environmental Plans) Order.
- DoP (NSW). 2009. State Environmental Planning Policy (Western Sydney Employment Area). Department of Planning.
- OEH. 2014a. BioBanking Assessment Methodology 2014. Office of Environment and Heritage, Sydney.
- OEH. 2014b. Framework for Biodiversity Assessment. Office of Environment and Heritage for the NSW Government, Sydney.
- OEH. 2014c. NSW Biodiversity Offsets Policy for Major Projects. Office of Environment and Heritage for the NSW Government, Sydney.
- OEH. 2014d. Online BioBanking Credit Calculator Version 2.0. Office of Environment and Heritage, Sydney.
- OEH. 2014e. Online BioBanking Credit Calculator Version 4.0. Office of Environment and Heritage, Sydney.

Appendix A

BioBanking Credit Calculator Report

This report identifies the number and type of credits required at a BIOBANK SITE

Date of report: 18/08/2016

Time: 10:12:11AM

Calculator version: v4.0

Biobank details

Proposal ID: 0057/2016/3784B

Proposal name: 14039 - Onsite Offset_CAA (v1=original; v2=updated mstrpln)

Proposal address: PO Box 2474 Carlingford Court NSW 2118

Proponent name: Cumberland Ecology

Proponent address: PO Box 2474 Carlingford Court NSW 2118

Proponent phone: 98681933

Assessor name: David Robertson

Assessor address: PO BOX 2474 Carlingford Court NSW 2118

Assessor phone: 02 9868 1933

Assessor accreditation: 0057

Additional information required for approval:

- Use of local benchmark
- Expert report...
- Request for additional gain in site value

Ecosystem credits summary

Plant Community type	Area (ha)	Credits created
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	13.84	143.00
Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	7.28	80.00
Total	21.12	223

Credit profiles

1. Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, (HN526)

Number of ecosystem credits created	13
IBRA sub-region	Cumberland - Hawkesbury/Nepean

2. Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, (HN526)

Number of ecosystem credits created	130
IBRA sub-region	Cumberland - Hawkesbury/Nepean

3. Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion, (HN594)

Number of ecosystem credits created	80
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Species credits summary

Additional management actions

Additional management actions are required for:

Vegetation type or threatened species	Management action details
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Exclude commercial apiaries
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Exclude miscellaneous feral species
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Feral and/or over-abundant native herbivore control
Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Control of feral pigs
Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Exclude commercial apiaries
Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Exclude miscellaneous feral species
Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Feral and/or over-abundant native herbivore control
Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Fox control
Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Maintain or re-introduce natural flow regimes