

NSW Roads and Maritime Services

Princess Highway Upgrade - Foxground and Berry Bypass Project

Biodiversity Offsets Strategy

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Glossary

Biodiversity	<p>The biological diversity of life is commonly regarded as being made up of the following three components:</p> <ul style="list-style-type: none">■ genetic diversity — the variety of genes (or units of heredity) in any population■ species diversity — the variety of species■ ecosystem diversity — the variety of communities or ecosystems.
Department of the Environment (DoE)	<p>Following the 2013 Commonwealth elections the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) was abolished, is now known as the Commonwealth Department of the Environment.</p> <p>Broadly, the Department of the Environment designs and implements the Commonwealth's policies and programmes to aid in the protection and conservation of the environment, water and heritage whilst also promoting climate action.</p>
Department of Planning and Environment (DP&E)	<p>The Department of Planning & Environment supports sustainable growth in NSW. The department's aim is to deliver strategies and decisions which balance planning and environmental issues with the goal of facilitating sustainable growth and employment in NSW.</p>
Department of Planning and Infrastructure (DP&I)	<p>A former NSW government department, the responsibilities of which now fall within the current Department of Planning and Environment.</p>
Department of Primary Industries (DPI) (Fishing and Aquaculture)	<p>The NSW Department of Primary Industries (Fishing and Aquaculture) are responsible for working with fishing and aquaculture industries, community and other agencies to ensure that fishing and aquaculture develops in a sustainable manner.</p>
Ecological community	<p>An assemblage of species occupying a particular area.</p>
Effective mitigation measures	<p>The mitigation measures implemented are successful in reducing negative impacts on biodiversity. Specifically, the mitigation measures implemented aid in retaining the original habitat usage within the study area. Mitigation measures are deemed ineffective if significant (as defined below) changes in habitat usage occur.</p>
Endangered Ecological Community	<p>An ecological community that has been listed under the <i>Threatened Species Conservation Act 1995</i>, <i>Environment Protection and Biodiversity Act 1999</i> and/or the <i>Fisheries Management Act 1994</i> as vulnerable, endangered or critically endangered.</p>
Habitat	<p>An area or areas occupied, or periodically or occasionally occupied by a species, population or ecological community, including any biotic or abiotic components.</p>

Habitat usage	Habitat usage is the way in which an animal utilises the physical, chemical and biological resources within a habitat. Different types of habitat usage include foraging, nesting, refuging and roosting. These usages may be integrated within some areas of a habitat dependent on the requirements of individual specimens. Habitat usage may alter on a seasonal or yearly basis as a result of the specific environmental resources requirements of individual/populations of fauna species within the area.
Locality	The area within 10 km of the study area.
Local population	The population that occurs within the study area, unless the existence of contiguous or proximal occupied habitat and the movement of individuals or exchange of genetic material across the boundary can be demonstrated (Department of Environment and Climate Change 2007).
Migratory species	Species protected as Migratory under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> . Listed migratory species are those listed in the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), China-Australia Migratory Bird Agreement (CAMBA), Japan-Australia Migratory Bird Agreement (JAMBA) and Republic of Korea – Australia Migratory Bird Agreement (RoKAMBA). Listed migratory species also include any native species identified in an international agreement approved by the Minister (Department of the Environment Water Heritage and the Arts 2010). Capitalisation of the term ‘Migratory’ in this report refers to those species listed as Migratory under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Office of Environment and Heritage	<p>Following the 2010 NSW elections the NSW Department of Environment Climate Change and Water (DECCW) was abolished, is now known as the Office of Environment and Heritage, and has been incorporated into the Department of Premier and Cabinet.</p> <p>Broadly, the Office of Environment and Heritage works towards a healthy environment cared for and enjoyed by the whole NSW community: manages the state’s natural resources, including biodiversity, soils and natural vegetation: manages natural and cultural heritage across the state’s land and waters: acts to minimise the impacts of climate change: promotes sustainable consumption, resource use and waste management: regulates activities to protect the environment: and conducts biodiversity, plant, environmental and cultural heritage research to improve decision making.</p>
Region	A bioregion defined in a national system of bioregionalisation. For this study, this is the Sydney Basin Bioregion as defined in the Interim Biogeographic Regionalisation for Australia (Thackway & Cresswell 1995).
Department of Sustainability, Environment, Water, Population and Communities. (SEWPaC)	The former name of the Department of the Environment.
Significant	Important, weighty, or more than ordinary (as defined by the Department of Environment and Climate Change 2007).

Study area	The specific area that would be monitored as part of the Project. The study area includes the entire construction footprint and adjacent lands likely to be impacted by the Project.
Threatened biodiversity	Threatened species, populations or ecological communities, or their habitats as listed under the <i>Threatened Species Conservation Act 1995 Fisheries Management Act 1994</i> or the <i>Environment Protection and Biodiversity Conservation Act 1999</i> . Capitalisation of the terms 'Threatened' in this report refers to listing under the relevant State and/or Commonwealth legislation.
Threatened species, populations and ecological communities	Species, populations and ecological communities listed as vulnerable, endangered or critically endangered (collectively referred to as Threatened) under the <i>Threatened Species Conservation Act 1995, Fisheries Management Act 1994</i> or the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Viable local population	A population that has the capacity to live, develop, and reproduce under normal conditions, unless the contrary can be conclusively demonstrated through analysis of records and references (Department of Environment and Climate Change 2007).
Weeds of National Significance	In 1998, Australian governments endorsed a framework to identify which weed species could be considered (WONS) within an agricultural, forestry and environmental context. Thirty one WONS were identified through this process (Australian Government 2010).

Abbreviations

BBAM	BioBanking Assessment Methodology
BOS	Biodiversity Offset Strategy
BOP	Biodiversity Offset Package
CoA	Conditions of Approval
CEMP	Construction Environmental Management Plan
EcMP	Ecological Monitoring Program
EECs	Endangered Ecological Communities
DPI	Department of Primary Industries (Fishing and Aquaculture)
DP&E	Department of Planning and Environment (previously Department of Planning and Infrastructure – DP&I)
CFFMP	Construction Flora and Fauna Management Sub-plan
LGA	Local Government Area
LLS	Local Land Services; brings together agricultural production advice, biosecurity, natural resource management and emergency management into a single organisation (includes the entities previously known as Catchment Management Authorities or CMAs)
OEH	Office of Environment and Heritage
Roads and Maritime	NSW Roads and Maritime Services
SELLS	South East Local Land Services
SRCMA	Southern Rivers Catchment Management Authority; note: CMAs now form part of Local Land Services (LLS) and the former SRCMA now falls within South East Local Land Services

1. Introduction

1.1 Project overview

Roads and Maritime Services (Roads and Maritime) is to upgrade 11.6 km of the Princes Highway between Toolijooa Road north of Foxground, to Schofield's Lane south of Berry (the Project) (Figure 1.1). The Project is located within the Kiama and Shoalhaven Local Government Areas (LGAs). The resulting upgrade will be a four lane divided highway (two lanes in each direction) with median separation. The Project includes bypasses of Foxground and Berry localities.

The Project is situated within a predominantly rural locality, which is primarily cleared of native vegetation. Some remnant native vegetation exists along creeklines and generally small areas surrounded by cleared paddocks.

Approval for the project was granted on 22 July 2013, under Part 3A of the *Environmental Planning and Assessment Act 1979* with Conditions of Approval (CoA). To satisfy the Minister for Planning and Infrastructure's CoA B7, Roads and Maritime is required to develop a Biodiversity Offset Strategy (BOS). The preparation of this BOS has included consultation with both the Office of Environment and Heritage (OEH) and Department of Primary Industries (Fishing and Aquaculture) (DPI).

This BOS has been developed for the Foxground and Berry Bypass Project (Figure 1.1) to satisfy the relevant biodiversity offset commitments for the Project.

In accordance with CoA B7 this BOS outlines the aim and objectives of the strategy, outlines vegetation impacts of the Project, details available offset measures and the decision-making framework and identifies a process for addressing offset measures arising from any changes to impacts. The BOS also outlines the options for securing and managing biodiversity offsets in perpetuity.

The hierarchy of avoid, minimise and mitigate was followed for the Project with offsetting used as a last resort to compensate for residual impacts. The offsets provided as an outcome of this BOS will be in addition to the initial avoidance approach taken during the design phase by Roads and Maritime. They will also be in addition to the substantial mitigation measures for the Project as described in the project Flora and Fauna Management Plan (Roads and Maritime Services 2014), Ecological Monitoring Program (Parsons Brinckerhoff 2014), and Environmental Impact Assessment (AECOM 2012; Biosis Research 2012).

These mitigation measures combined with the offsets required by this BOS will ensure that biodiversity impacts are managed sustainably for the Project.

1.2 Why is an offset required?

Roads and Maritime has commissioned Parsons Brinckerhoff to prepare a BOS that reflects the requirements of CoA B7. The need for biodiversity offsets is founded in the theory of 'avoid, minimise and mitigate' the impacts of projects. The accepted approach to environmental assessment requires that, in the first instance, environmental impacts are avoided or minimised as far as possible and subsequently reduced to acceptable levels through appropriate mitigation techniques. Where measures to avoid and mitigate impacts are not feasible or cost effective, then offset strategies can be used to compensate the residual impacts of the development on biodiversity.

Given that the Foxground and Berry Bypass Project would result in clearing of native vegetation, including one threatened ecological community and habitat for threatened species, it is necessary to provide biodiversity offsets to fulfil the Minister for Planning and Infrastructure's CoA B7 and the requirements of the OEH and DPI.

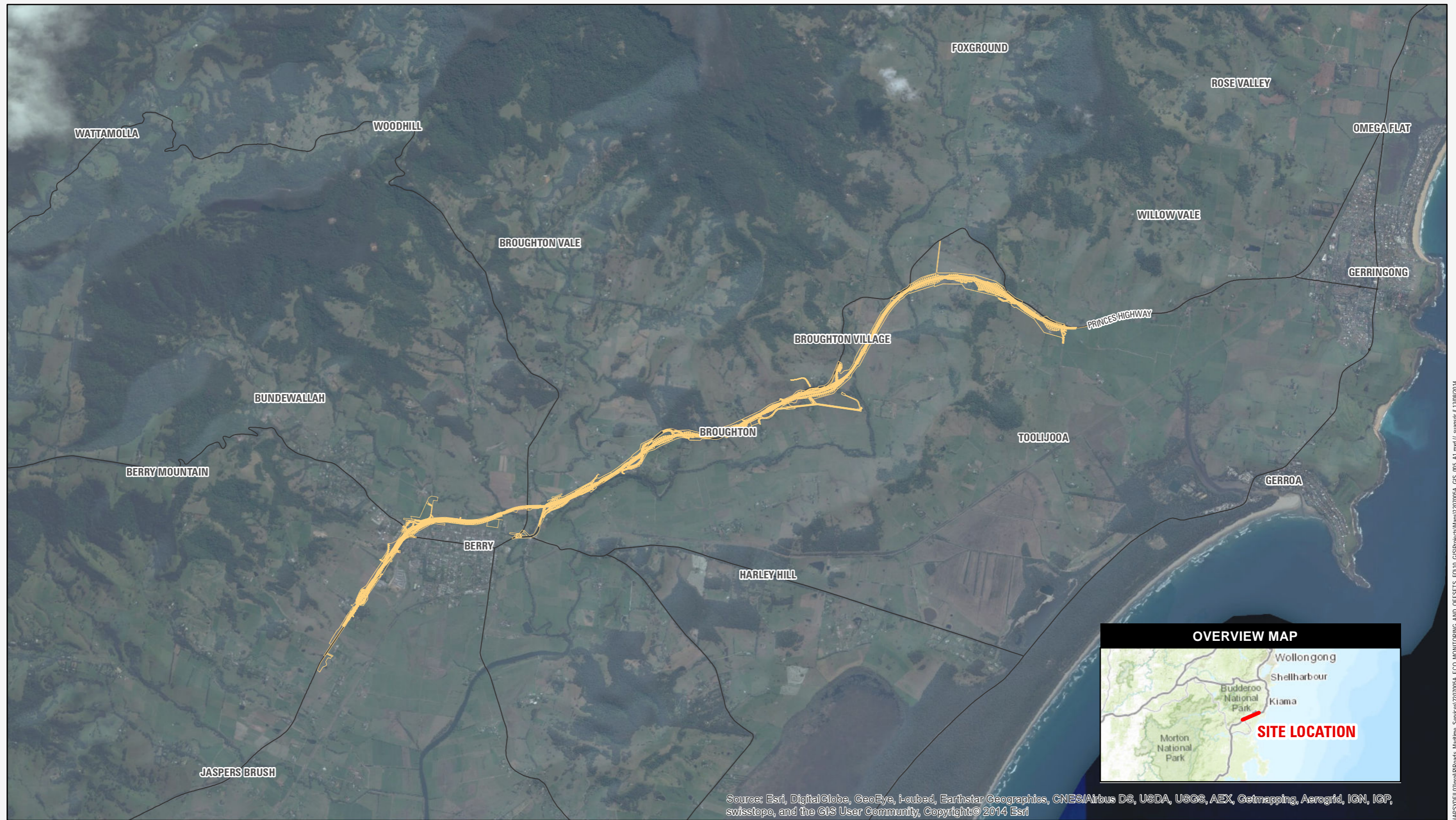
1.3 Aims and objectives

The aim of the BOS is to identify options for a Biodiversity Offset Package (BOP) that aims to achieve a net beneficial biodiversity outcome for the locality and region as a result of the Project. The objectives used to gauge success of this aim will be:

- an outcome that maintains or improves biodiversity values
- successfully securing the long-term (in perpetuity) protection and management of lands containing endangered ecological communities and habitat for threatened species
- meeting or exceeding the minimum requirements for offsets as specified in the CoA
- is consistent with the NSW OEH offset principles and policies
- the total area of lands used to offset the biodiversity impacts shall exceed the direct and indirect impacts
- the process for setting the scope and quantum of the biodiversity offsets is transparent and justifiable on environmental, social and economic grounds.

This BOS has been prepared with due consideration of the above aim and objectives.

Biodiversity offsets are required to compensate for both terrestrial and aquatic biodiversity impacts. Essentially any identified offsets will jointly target compensatory habitat for both terrestrial and aquatic aspects and it is likely that any offset lands will be a mixture of terrestrial and aquatic environments. This assumption applies to the preparation of this entire BOS and therefore terrestrial and aquatic impacts are not addressed separately, but combined.



Source: Esri, DigitalGlobe, GeoEye, I-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Copyright© 2014 Esri

— Proposed road
— Main

0 1.25 2.5 km

Figure 1.1
Site location

W:\S\DF\GIS\proj\Roads_Maritime_Services\207065A_ECO_MONITORING_AND_OFFSETS_FO10_GIS\Projects\Maps\207065A_GIS_005_A1.mxd // sunsir / 13082014

2. Development of the biodiversity offset strategy

As part of the development of this BOS for the Project, a review of existing information has been undertaken. This review has been undertaken to enable an understanding of the status of any previously proposed offsets as part of the Environmental Assessment, and how requirements may have changed as a result of the CoA.

2.1 Existing information and proposed offset strategy in the EIS

Information that has been reviewed in the preparation of this BOS includes:

- Foxground and Berry bypass Environmental Assessment, Volume 2 – Appendix F, Technical paper: Terrestrial flora and fauna (Biosis 2012) and associated BOS in Appendix E of that document.
- Section 7.3.5 “Residual impacts and offsetting” of Foxground and Berry bypass Environmental Assessment, Volume 1 (AECOM 2012).
- The Project Approval MP10_0240 dated 22 July 2013 and particularly Conditions B7 and B8.
- Director-Generals Environmental Assessment Report (DPI 2013).

A BOS prepared by Biosis in 2012 was proposed in the EIS for the Project. That BOS relied primarily upon restoration of riparian communities in the locality as the preferred offsetting mechanism, with a backup option of acquiring and/or securing other areas of native vegetation under a legal instrument. No exact quantum of offsets was outlined, although a focus was applied to offsetting the direct impacts to 2.9 ha of River-flat Eucalypt Forest EEC.

The Director-Generals report (DP&I 2013) outlined that OEH had indicated that all native vegetation to be cleared (30.4 hectares) should in fact be offset in accordance with the RMS’ own Biodiversity Offsets Guideline and was not supportive of the offset approach in the Biosis (2012) BOS. As a result Department of Planning and Infrastructure (DP&I) (now Department of Planning and Environment or DP&E) concluded that all native vegetation types should be offset, not just the River-flat Eucalypt Forest EEC. This approach is confirmed in CoA B7, which is outlined below.

The proposed BOS by Biosis (2012) in the EIS does not address the requirements of CoA B7 and is superseded by this BOS. However, information from the Biosis BOS has been used where it remains applicable to this BOS, such as priority locations for riparian area revegetation in the locality.

2.2 Project conditions of approval

The former DP&I (now DP&E) recommended a two-staged approach to finalising the offset package, with the first stage being the development of a strategy framework to be finalised and approval by the Director-General before construction commences in areas that would affect threatened species or EEC’s. The second stage then requires implementation of the approved strategy to determine the final offset package, which must be submitted to DP&E within two years of construction commencing.

The contents of the Director-Generals report were reflected in the Project Approval Conditions of Consent, namely in conditions B7 and B8.

Condition B7 relates to the requirement for preparation of a new BOS, while B8 relates to the future preparation of the final Biodiversity Offset Package (BOP). A detailed summary of Condition B7 and where it has been addressed in this BOS is provided below in Table 2.1.

Table 2.1 Fulfilment of Condition of Approval B7

Condition details	Comment	Section in this biodiversity strategy addressed
<ul style="list-style-type: none"> ■ preparation of a BOS in consultation with OEH and DPI (Fishing and agriculture), that identifies the available options for offsetting the biodiversity impacts of the project in perpetuity, with consideration to the Principles for the use of biodiversity offsets in NSW (OEH website http://www.environment.nsw.gov.au/biocertification/offsets/htm) ■ unless otherwise agreed to by OEH and DPI (Fishing and Aquaculture), offsets shall be provided on a like-for-like basis and at a minimum ratio of 4:1 for areas of high conservation value (including EEC, salt marsh, and poorly conserved vegetation communities identified as being more than 75% cleared in the catchment management area) and 2:1 for the remainder of native vegetation areas (including threatened species habitat, mangroves, seagrass, and non-EEC riparian vegetation) ■ the strategy shall include, but not necessarily be limited to, the items listed under (a) to (f) below. 	<ul style="list-style-type: none"> ■ this BOS has been prepared in consultation with OEH and DPI and identifies the available options, referring to the principles of use of biodiversity offsets in NSW. Offsets are to be provided at the specified ratios. 	<p>Section 1 Section 2 Section 3</p>
<p>(a) the aims and objectives of the biodiversity offset strategy</p>	<ul style="list-style-type: none"> ■ aims and objectives are provided in this BOS. 	<p>Section 1.3</p>
<p>(b) confirmation of the vegetation type/habitat (in hectares) to be cleared and their condition, and the size of offsets required (in hectares)</p>	<ul style="list-style-type: none"> ■ impact and required offset in hectares is provided in this BOS. 	<p>Section 3</p>
<p>(c) details of the type of available offset measures that have been identified to compensate for the loss of threatened species and vulnerable and endangered ecological communities and/ or their habitats, and native vegetation (including mangroves, seagrasses, salt marsh and riparian vegetation). The measures shall achieve a neutral or net beneficial outcome for all the biodiversity values likely to be impacted directly or indirectly during both the construction and operation of the project</p>	<ul style="list-style-type: none"> ■ range of offset measures available is described in this BOS. 	<p>Section 4.</p>
<p>(d) the decision-making framework that would be used to select the final suite of offset measures to achieve the aims and objectives of the Strategy, including the ranking of offset measures</p>	<ul style="list-style-type: none"> ■ a decision-making framework is provided in this BOS. 	<p>Section 5</p>
<p>(e) a process for addressing and incorporating offset measures arising from changes in biodiversity impacts (where these changes are generally consistent with the biodiversity impacts identified for the project in the documents listed under condition of approval A1), including:</p> <ul style="list-style-type: none"> (i) changes to the footprint due to detailed design (ii) changes to predicted impacts as a result of changes to mitigation measures (iii) the identification of additional species/habitat through pre-clearance surveys and construction 	<ul style="list-style-type: none"> ■ process for addressing changes to biodiversity impacts is outlined in this BOS. 	<p>Section 6</p>

Condition details	Comment	Section in this biodiversity strategy addressed
(iv) addressing outcomes of the ecological monitoring program (v) additional impacts associated with the establishment of ancillary facilities		
(f) options for the securing and management of biodiversity offsets in perpetuity	<ul style="list-style-type: none"> ■ the various options for securing and managing offsets are outlined in this BOS. 	Section 7 Section 8
<ul style="list-style-type: none"> ■ the BOS shall be submitted to the Director-General for approval no later than 6 weeks prior to the commencement of construction that would result in the disturbance of native vegetation, unless otherwise agreed by the Director-General. 	<ul style="list-style-type: none"> ■ this BOS will be submitted to the Secretary (previously responsibility of Director-General) well before 6 weeks prior to construction. 	N/A

2.3 Consultation with agencies

The Foxground and Berry bypass BOS has been prepared by Parsons Brinckerhoff in consultation with Roads and Maritime representatives and representatives of the OEH and DPI (Fishing and Aquaculture) agencies. Consultation between Roads and Maritime and relevant agency representatives was undertaken to discuss the offsets approach adopted for the Project and built on the previous substantial consultation during the Environment Assessment process for the Project.

In particular, thanks go to Mr James Dawson (Senior Team Leader, Ecosystems and Threatened Species, Illawarra Region OEH) and Mr Trevor Daly (A/Regional Manager, Aquatic Ecosystems – South, DPI) who provided valuable input during a number of conversations and meetings. Consultations include:

- early phone discussions in March 2014 between Toby Lambert and James Dawson and Toby Lambert and Trevor Daly
- receipt of comment on monitoring methodology and biodiversity offsets from DPI: 1 April 2014
- receipt of comment on monitoring methodology and biodiversity offsets from OEH: 4 April 2014
- phone discussion with James Dawson to discuss approach to be used for offset calculation, given the CoA specify offset ratios: 4 June 2014
- meeting to discuss monitoring and offsets approach with OEH, DPI and Local Land Services (LLS): 18 June 2014
- receipt of comment on draft BOS from Allan Lugg (DPI): 25 August 2014
- receipt of comment on draft BOS from James Dawson (OEH): 26 August 2014

Integration of the results of this consultation has occurred. This has included:

- confirmation that due to the CoA specifying ratios of offsetting, that determining offsets by using BioBanking or the new Draft NSW Biodiversity Offsets Policy for Major Projects and Framework for Biodiversity Assessment (FBA) approaches is not required
- confirmation that OEH does not yet have a 'priority list' of properties for acquisition on the south coast
- retention of riparian restoration as one of the considered components of the BOS
- inclusion of future additional consultation with LLS regarding potentially suitable lands and potential land owner interest.

In an email dated 26 August 2014 OEH commented that while acknowledging the CoA, OEH recommends the use of the BioBanking assessment methodology to determine the appropriate offsets for the bypass, offsetting “like for like, or better” to “maintain or improve” biodiversity values. BioBanking could be used if deemed appropriate as part of the development of the future BOP to assist in determining appropriate vegetation types and regions / catchments in which the offset lands should be located.

In an email dated 25 August DPI commented on that 5km of 10m wide riparian zone revegetation work would be better than 1km of 50m wide (50m is more than what is required to protect the waterway from grazing impacts for example). If riparian revegetation is chosen as a component of the BOP, this comment will be incorporated into the related riparian restoration activities.

Future consultation between Roads and Maritime, the Secretary (previously Director General) and relevant government agencies will be required during the life of the Project, particularly during development of the more detailed BOP and finalisation of offset measures for the Project.

2.4 Guiding framework

2.4.1 Commonwealth offsets policy

Given that an EPBC Referral was not considered to be required (Biosis 2012) and that there appear to be no significant impacts to EPBC Matters of National Environmental Significance, offsets are not required at a Commonwealth level. This is stated in Section 5.1 of the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*, i.e. ‘the offsets policy does not apply to actions that have been declared as ‘Not a Controlled Action’. While technically the Department of Environment has not declared the project as not being a Controlled Action, this was the conclusion by Biosis and Roads and Maritime in the Environmental Assessment documentation, as reflected in the decision not to prepare a Referral for the project. Nevertheless the principles outlined in the EPBC Act environmental offsets policy are similar to those required at a State level and offsets will be provided that will generally be consistent with such principles at a Commonwealth level.

2.4.2 NSW offset requirements

2.4.2.1 Overview of changing policy landscape

The Project was assessed under the now-superseded Part 3A major projects planning framework. The policy landscape that has guided the biodiversity offset identification process has changed multiple times since the Projects assessment and is outlined in Table 2.2 below. The multiple policies are outlined in the table and the relevant policies are confirmed.

Table 2.2 Legislative and policy landscape changes

NSW policy requirement	Date of issue	Qualitative or quantitative approach?	General approach of policy	Application to Project
Principles for the use of biodiversity offsets in NSW	2008	<ul style="list-style-type: none"> qualitative / BioBanking only considered by regulators on case by case to quantify projects offsets requirements. 	<ul style="list-style-type: none"> subjective assessment of a projects offsets against broad principles. endorsed by both department NSW DP&I and OEH 	<ul style="list-style-type: none"> identified in Conditions of Approval as the offset policy to be addressed for this Project

NSW policy requirement	Date of issue	Qualitative or quantitative approach?	General approach of policy	Application to Project
NSW offset principles for major projects	Draft 2011, July 2013	<ul style="list-style-type: none"> quantitative approach to, quantify impacts, BioBanking preferred by regulators to. provides flexibility to state significant Projects including potential for discounting. 	<ul style="list-style-type: none"> use of BioBanking to quantify projects offsets requirements. subjective assessment potential discounting of offset requirements for State significant Projects against variation criteria. Min offset ratio set at 2:1 the draft policy was only endorsed by OEH but not mandatorily adopted by NSW DP&I July 2013 adopted by NSW DP&I 	<ul style="list-style-type: none"> not required as not specified in Conditions of Approval. However, these principles have been referred to when developing the criteria for ranking preferred offsets.
Roads and Maritime Services Guideline for Biodiversity Offsets	November 2011	<ul style="list-style-type: none"> qualitative / BioBanking as required. 	<ul style="list-style-type: none"> internal Roads and Maritime policy that outlines steps to determine when offsets are required and then outlines approach to take when offsets are required. 	<ul style="list-style-type: none"> requirements generally considered in this BOS.
DPI Policy and guidelines for fish habitat conservation and management	Update 2013	<ul style="list-style-type: none"> qualitative and quantitative 	<ul style="list-style-type: none"> no net loss. Minimum 2:1 generally, 10:1 for SEPP 14 impacts. 	<ul style="list-style-type: none"> requirements generally considered in this BOS.
Draft NSW Biodiversity Offsets Policy for Major Projects	March 2014 (Draft) Expected to be adopted after June 2014	<ul style="list-style-type: none"> quantitative, mandatory use of BioBanking to quantify offset requirements. 	<ul style="list-style-type: none"> mandatory use of BioBanking to quantify offset requirements provides for the discounting of offset requirements, under strict exceptions. These exceptions are yet to be released for review but OEH have advised discounting rules will be stricter than current policy (i.e. only if final viability of a project is jeopardised by cost of offsets). policy is endorsed by <u>all</u> NSW government departments provides greater flexibility to purchasing land offsets including providing for increased consideration of supplementary measures (indirect offsets) and the ability to pay funds into the new <i>NSW Biodiversity Offsets Fund for Major Projects</i> (the fund), which, 	<ul style="list-style-type: none"> not required as not specified in Conditions of Approval. However, relevant aspects generally considered in this BOS.

The overriding policy that applies for determine offsets for this Project is the “*Principles for the use of Biodiversity Offsets in NSW*”. CoA B7 specifies offset ratios dependent on the conservation status of the impacted habitat type. The minimum offset ratio requirement under the DPI policy is met by the ratios outlined in the CoA, as the minimum offset ratio required is 2:1 under both CoA and the DPI policy. The prescribed offset ratios in the CoA also generally fall within the range that would be required under the Roads and Maritime offset policy, although no detailed BioBanking Assessment Methodology (BBAM) calculations have been undertaken. BBAM calculations are not considered to be required given that offset ratios have been prescribed. This has been confirmed during consultation with OEH for this Project.

The principles for the use of biodiversity offsets in NSW are outlined below.

2.4.2.2 Principles for the use of biodiversity offsets in NSW

OEH provided guidelines for developing biodiversity offsets to achieve conservation outcomes, particularly for projects where there will be an unavoidable loss of biodiversity (Department of Environment and Climate Change 2008). Although not a defined requirement under legislation, these guidelines provide a list of 13 principles to be followed when developing biodiversity offsets. These principles, and commentary on how this BOS approaches meeting the principles, are provided below:

- impacts must be avoided first by using prevention and mitigation measures.

The Environmental Assessment by AECOM (2012) identifies that:

“Where possible, important ecological features identified in the local area, such as patches of Illawarra subtropical rainforest, have been avoided during the options and route selection stage of the project. The project has been designed, where feasible, to minimise vegetation clearance and habitat loss. In areas where significant vegetation is located, the land area of the project area incorporating the road footprint and construction access requirements has been reduced to minimise potential impacts.”

- all regulatory requirements must be met.

This BOS has been prepared to ensure that regulatory requirements in relation to biodiversity offsets are met. The relevant regulatory requirements and their application to the project are identified in Table 2.2.

- offsets must never reward ongoing poor performance.

Impacts on ecological values have been minimised through the project planning and design process. Multiple route options were investigated in the development of the current design of the project. The route option investigation included consideration of important ecological features including patches of the EECs Illawarra subtropical rainforest and River-flat Eucalypt forest (RFEF) which were avoided to the greatest extent possible. In locations where it was not feasible to avoid important ecological features such as EECs altogether, the amount of land utilised has been reduced in order to minimise impacts on these features.

The offsets that will be selected as a result of implementation of this BOS will ensure a net gain in conserved biodiversity and will not reward poor performance.

- offsets will complement other government programs.

This BOS includes a requirement for the consideration of other government programs such as the Southern River Catchment Management Authority (now LLS) Priority Corridor Mapping and Revegetation Project Locations. It includes continuing consultation with OEH, DPI and LLS to ensure compatibility with other government programs where possible.

- offsets must be underpinned by sound ecological principles.

This BOS will ensure that offsets are selected based on ecological principles that target net gain and like for like outcomes in consultation with OEH, DPI and LLS. While like for like offsets are the priority and would be implemented wherever feasible, other options would be investigated in the event that the entire quantum of offsets cannot feasibly be achieved on a like for like basis.

- offsets should aim to result in a net improvement in biodiversity over time.

The offsets provided as a result of this BOS and the future BOP are required to provide a net improvement in biodiversity over time.

- offsets must be enduring and they must offset the impact of the development for the period that the impact occurs.

All offsets provided as a result of the BOS and future BOP will be required to be 'in perpetuity' and permanent.

- offsets should be agreed prior to the impact occurring.

The offset framework (i.e. this BOS) is required to be agreed prior to the impact occurring. The BOP will further identify and implement the specific offset outcomes in accordance with the agreed BOS. Offsets will be delivered as soon as practicable; however, it is unlikely that this will occur prior to impacts on ecological values. Specific offsets will be outlined in the BOP, which according to CoA B8 is due within two years of the date of the approval of the BOS.

- offsets must be quantifiable (the impacts and benefits must be reliably estimated).

Offsets will be quantifiable. Offset requirements are quantitatively listed in this BOS and will be required to be implemented.

- offsets must be targeted.

The BOS requires offsets to prioritise like for like outcomes to the greatest extent possible.

- offsets must be located appropriately.

This BOS outlines the decision-making framework which includes ensuring the offset outcomes provided are as local as possible.

- offsets must be supplementary.

The offsets required in this BOS are not designed to negate the need for the implementation of the hierarchy of avoid, minimise, mitigate and offset. Instead they are designed to address residual impacts and to be supplementary to the maximum impact avoidance achieved through the planning and design process and the implementation of mitigation measures such as wildlife crossings and compensatory habitat provision.

- offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.

The offsets will be enforceable via adoption of the BOS and BOP and will be required to be in perpetuity through a specified conservation mechanism selected from the range of possible mechanisms outlined in this BOS.

This BOS implements the requirements of the above principles as outlined above.

2.4.3 Relevant conservation programs

Consideration of existing conservation programs may provide opportunities to maximise the benefit of the offsets provided for the Project through coordination with adjacent existing or proposed conservation areas. Conservation programs which may be of relevance include:

- Linking Landscapes through Local Action project (part of the Green Corridors program, a Government priority action identified in the NSW 2021 Plan. The project is funded through the NSW Environmental Trust).
- Conservation Partners Program.
- Great Eastern Ranges Initiative.

Representatives of each of these programs should be consulted during the development of the BOP to identify possible offset lands and opportunities for maximising the benefits of the offsets at a landscape scale.

3. Impacts and offset requirements

As outlined earlier in this BOS, the CoA specifically prescribe offset ratios based on the type of vegetation that is being impacted.

Impacts to vegetation of high conservation value are to be offset at a ratio of 4:1. Impacts to the remaining native vegetation types are to be provided at a ratio of 2:1.

Table 3.1 outlines the likely offset requirements for the direct impacts upon each of the vegetation types that were identified in the Terrestrial Flora and Fauna Technical Paper (Biosis 2012). Refer to the Technical Paper by Biosis (2012) for additional floristic information for each of the impacted vegetation types.

The disturbed vegetation Closed Grassland was considered by Biosis and in consultation with OEH to not be a native plant or derived native plant community and is not required to be offset.

Currumbene-Batemans lowland forest has also not been included in the BOS, as the report (Biosis 2012) indicated only 0.0002 ha is likely to be impacted, a negligible figure.

Threatened species were also recorded for the project (Biosis 2012). The threatened species recorded by Biosis (2012) were those highly mobile species of bat and bird that would be expected in a highly modified landscape such as that which surrounds the Project, and included:

- Yellow-bellied Sheathtail Bat
- Eastern Freetail Bat
- Grey-headed Flying Fox
- Eastern Bentwing-bat
- Eastern False Pipistrelle
- Southern Myotis
- Greater Broad-nosed Bat
- Gang-gang Cockatoo
- Powerful Owl.

Impact mitigation and habitat supplementation measures of relevance to these species, such as the installation of nest and roost boxes, are identified in the Construction Flora and Fauna Management Sub-plan (CFFMP) and Nest Box Management Plan (in preparation). And the efficacy of such measures will be included in the monitoring program identified in the EcMP. The biodiversity offsets would be supplementary to the mitigation measures and would need to provide suitable habitat for these species, and other species identified by Biosis (2012) as having potential habitat that will be impacted by the Project. Generally, it is considered that any consolidated areas of forested vegetation in the locality or region would provide suitable habitat for these highly mobile species. Essentially, the focus should be on attempting to identify offset parcels that address the vegetation type requirements and it is considered that such outcomes would also be sufficient for the relevant threatened species affected by the Project.

The offsets outlined as being required in Table 3.1 are considered sufficient to address the direct impact requirements of DPI for riparian areas, given that the prescribed ratios meet the minimum DPI requirement of 2:1.

Table 3.1 Summary of vegetation to be impacted and areas required to offset impacts

Vegetation community	Threatened ecological community and status (NSW)	Closest biometric code, over %75 cleared in Southern Rivers CMA?	Total direct impact (ha)	Offset ratio	Required offset area (ha)
Closed grassland / sedgeland	-	-	2.2	2:1	4.4
Constructed wetland	-	SR536	0.4	2:1	0.8
Disturbed riparian open woodland	-	SR516, no	2.6	2:1	5.2
Illawarra gully wet forest	-	SR516, no	15.4	2:1	30.8
Riverbank forest	River-flat Eucalypt Forest Endangered Ecological Community	SR606, no	2.9	4:1	11.6
Warm temperate layered forest	-	SR652, no	6.9	2:1	13.8
Total	-	-	30.4	-	66.6

(1) As outlined above, a total of 66.6 ha of offset vegetation is required to be conserved in perpetuity.

4. Available offset measures

4.1 Overview

This BOS has been prepared with reference to the principles for the use of biodiversity offsets in NSW (refer to Section 2.4). In accordance with these principles, the feasibility of potential offset options has been assessed using the following criteria:

- duration - measures must offset the impact of the development for the period that the impact occurs
- accuracy - the impacts and benefits must be reliably estimated
- suitability - measures must offset the impacts on a 'like for like or better' basis
- location - measures must offset the impact in the same locality, or region if not available in the locality
- effort - measures must be undertaken beyond existing requirements and not already be funded by another scheme
- enforcement - measures must be enforceable through development consent conditions, licence conditions, covenants or a contract.

Generally the two main categories of offset measures available are known as direct offsets and indirect (or supplementary) offsets. In an email dated 26th August 2014 OEH indicated their preference for direct offset measures (secured land in perpetuity) rather than indirect offset measures for this project. OEH has also provided the following relevant comments for consideration:

- OEH endorses the proposal to look at opportunities to conserve the existing native vegetation within the acquired properties alongside the Project footprint, having due consideration to vegetation type, patch size and shape, connectivity etc.
- OEH supports the inclusion of local riparian vegetation restoration as a potential offset measure for consideration in the Biodiversity Offsets Package.
- OEH supports the conclusions of Table 4.1 in terms of the purchase of BioBanking credits and/or land acquisition and dedication as the preferred offsetting mechanisms. Restoration of local riparian vegetation is supported as the next best mechanism, with monetary contributions to be used as a final resort.
- OEH supports the proposed process for identification of offset lands, with the recommendation that habitat areas be locally (rather than regionally) located.
- With regards to land conservation within the Offsets Package, OEH endorses prioritisation of property owners who've previously expressed an interest in such conservation.

Direct offsets usually involve the permanent conservation of on-site or off-site offset lands. Indirect or supplementary offsets usually involved provision of funds towards target species conservation or research activities. OEH usually prefer that the majority of biodiversity offsets provided would be via direct offsets, with a minor percentage of indirect offset measures being provided (if any at all).

4.2 Direct offsets

Offset strategies may include both on and offsite or local area proposals that contribute to the long term conservation of threatened species (Department of Environment and Conservation 2005). Possible offset options in order of preference include:

- offsite offsets through a third party - where the developer buys credits or pays a third party to provide an offset
- offsite offsets - securing and improving the condition of existing habitats at another site or sites
- onsite offsets - such as improving the condition of existing habitat or providing a buffer to an area of existing habitat within the site.

Due to the Project being a generally linear development and containing scattered remnant native vegetation, the availability of land for onsite offsets is very limited. Therefore the majority of offset lands for the project would be likely to be located offsite.

The following potential project-specific options for offsets were assessed in the development of this BOS, generally being in accordance with the Roads and Maritime Guideline for Biodiversity Offsets (Roads and Maritime Services 2011):

- land acquisition and dedication to Local Council and/or inclusion in National Parks Estate, or conservation organisation such as Bush Heritage Fund or Australian Wildlife Conservancy, or
- BioBanking - purchase of biodiversity credits.

Offsets on Roads and Maritime land has already been considered and Roads and Maritime has identified that no known suitable land generally exists within the existing Roads and Maritime overall land portfolio that could be used to provide direct offsets.

However there remains the opportunity to conserve the existing native vegetation within the acquired properties alongside the Project footprint.

An initial calculation has identified that approximately 17 ha of Warm Temperate Layered Forest and 14 ha of Illawarra Gully Wet Forest is located within these properties, as shown in Figure 4.1.

4.3 Indirect offsets

Indirect or supplementary measures could include:

- funding of threatened species recovery, education research or conservation
- payment into a dedicated offset fund (currently in development by NSW State Government)
- funding of restoration or land management activities by others for conservation.

It is considered unlikely that these mechanisms could form a significant part of the offset package that is adopted as the CoA prescribes ratios of areas of direct offsetting required.

Roads and Maritime would be prepared to consider using indirect measures for part of the offsets. Indirect offsets would be considered, however, only in the event that direct offsets could not be provided to meet requirements.

4.4 Restoration of local riparian vegetation

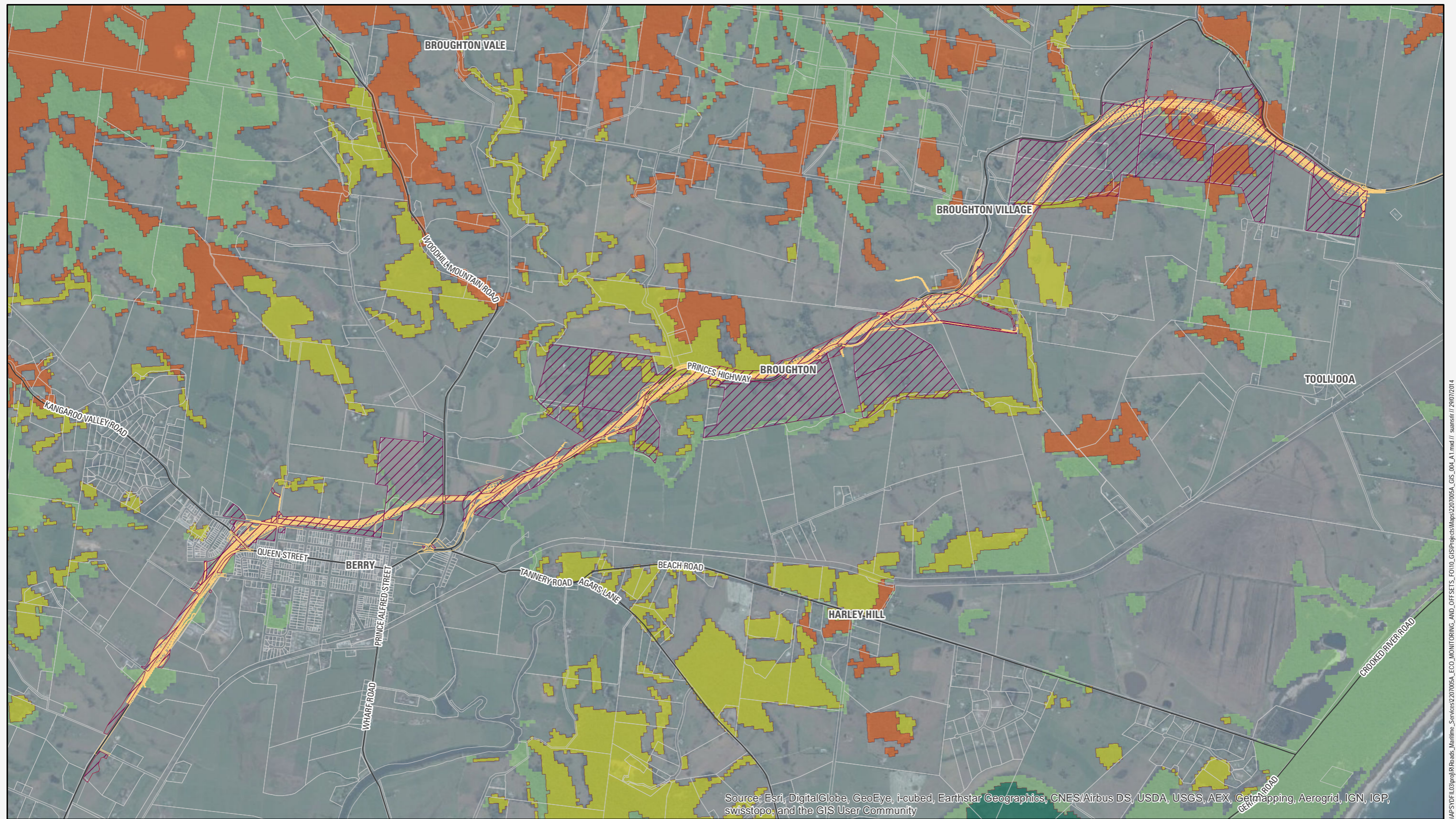
Revegetation and rehabilitation of riparian vegetation in strategic locations was identified in the Environmental Assessment (AECOM 2012) as a mechanism to achieve the biodiversity offset requirements of the project. While this mechanism alone is unlikely to be suitable for providing the entire quantum of offsets for the project, its inclusion in the offset package may be beneficial as it has potential to enhance water quality downstream and contribute to the conservation of local aquatic ecosystems through improved habitat structure. Riparian areas often form important wildlife movement corridors and the functionality of these riparian corridors as wildlife corridors may be improved through rehabilitating existing degraded vegetation and widening of riparian vegetation through revegetation. In the substantially cleared areas surrounding the Project, significant potential exists for increasing connectivity through restoration.

Roads and Maritime has acquired lands in several locations surrounding the Project. Stretches of several major watercourses pass through these lands. The extent of remnant riparian vegetation in these areas and its condition is variable however all sections of these major watercourses are likely to be at least moderately degraded. These areas would therefore benefit from active management for biodiversity conservation and water quality protection.

The focus of restoration efforts (if pursued in the BOP) would be on areas of River-flat Eucalypt Forest with the aim of improving both terrestrial and aquatic biodiversity.

Desktop mapping was carried by Biosis in the preparation of the original BOS that formed part of the environmental assessment (AECOM 2012). The Biosis mapping identified priority levels for areas that could be suitable for restoration and rehabilitation of riparian vegetation. Biosis also consulted with the Southern Rivers Catchment Management Authority (CMA or LLS) to identify priority corridor and revegetation project locations for consideration in the identification of restoration locations (Biosis 2012).

The Biosis mapping is provided in Appendix A to this BOS and could be used to guide the identification of specific restoration sites for inclusion in the future BOP in consultation with OEH, DPI and South East LLS. Based on discussion to date, DPI (Fisheries) and South East LLS are generally supportive of the inclusion of riparian area restoration in the BOP.



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

- | | |
|---|---------------|
| Relevant SCIVL vegetation | Proposed road |
| Coastal Freshwater | Main |
| Illawarra Gully Wet | Property |
| Warm Temperate Layered | |
| Other native vegetation communities not affected by the project | |



Figure 4.1
Native vegetation and property acquisitions

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4.5 Comparison of available offset measures

A summary of all potential options, their benefits and risks are provided below in Table 4.1.

The assessment of potential offset options presented in Table 4.1 identifies the following measures as preferred offset mechanisms:

- purchase of BioBanking credits
- land acquisition and dedication to suitable government body or conservation organisation as a reserve.

In addition, either or both approaches are most likely to comply with the COA prescribed ratios for offsetting for the Project.

The native vegetation within the acquired properties alongside the Project could also be considered and discussed with regulators for conservation/rehabilitation as part of the overall BOP.

Restoration of local riparian vegetation by Roads and Maritime and the other indirect measures such as research funding or land management funding are considered to still warrant further consideration as part of the overall final BOP but are not considered likely to comprise the primary offsetting mechanisms.

Roads and Maritime is committed to delivering an offset package that will appropriately offset the impacts of the Project. In the event that the preferred offsetting approach is unsuccessful, Roads and Maritime will consider the other alternative offset options in consultation with DP&E and OEHL, to deliver an offset package for the Project that satisfies the CoA.

Table 4.1 Comparison of potential offset options

Assessment	Offsetting mechanism			
	Land acquisition and dedication to suitable government body or conservation organisation as a reserve	BioBanking – purchase of biodiversity credits	Monetary contribution to land management for conservation and threatened species research	Restoration of local riparian restoration by Roads and Maritime
Risks/ negatives	<ul style="list-style-type: none"> ■ purchase of land subject to market forces ■ possibly limited availability of suitable sites in private ownership ■ may require additional survey and assessment ■ the quantum of the offset required is likely to require the acquisition of multiple properties with higher associated costs of purchase and management ■ any dedication to Council/OEH/conservation organisation is subject to approval and Agencies may be reluctant to accept additional land management responsibilities ■ additional assessment and/or consultation with Agencies would be required to ensure security of titling of the property for conservation ■ risk that proponent may be required to manage the land in perpetuity or interim before any transfer of ownership 	<ul style="list-style-type: none"> ■ possible limited availability of suitable biodiversity credits ■ credit prices are subject to market forces ■ may require additional survey and assessment ■ timeframe for establishment of BioBanking agreement with OEH may be long if credits not already available on the market. 	<ul style="list-style-type: none"> ■ unlikely to be accepted by regulators for the entire offset given Agency policies and principals, including targeting of appropriate 'like for like' offsets ■ the methodology for calculating the quantum of offsets is subjective. Difficult to quantify against project impacts ■ recurring payment and potentially also assessment may be required ■ does not specifically meet CoA. 	<ul style="list-style-type: none"> ■ demonstration of ability to provide good condition in perpetuity offsets is not well defined ■ less likely to be accepted by OEH than land acquisition or BioBanking, particularly given specific requirement of CoA

Assessment	Offsetting mechanism			
	Land acquisition and dedication to suitable government body or conservation organisation as a reserve	BioBanking – purchase of biodiversity credits	Monetary contribution to land management for conservation and threatened species research	Restoration of local riparian restoration by Roads and Maritime
Benefits	<ul style="list-style-type: none"> likely a favoured option with regulators and meets CoA more likely to be able to directly address impacts and provide landscape scale benefits due to greater flexibility of location a less complex process to implement than BioBanking the level of additional survey and assessment is likely to be less than for BioBanking. 	<ul style="list-style-type: none"> a one off assessment and payment which would meet CoA proponent is not required to be a land manager the methodology for calculating the quantum of offsets is transparent and quantifiable supported by some Councils as it provides long-term conservation funding for management to their existing lands. 	<ul style="list-style-type: none"> may be targeted to compensate for impacts on biota that will not be directly offset by BioBanking or land acquisition a less complex process to implement than other options would not require additional survey and assessment. 	<ul style="list-style-type: none"> would contribute to restoration of riparian environment in a location where riparian environments are heavily disturbed would contribute to increasing connectivity of local fragments of remnant native vegetation.
Conclusion	<ul style="list-style-type: none"> preferred mechanism given: agency endorsement of this approach; stipulations of conditions of approval; greater flexibility in delivering biodiversity outcomes; and less complex process of implementation may address the requirements of the entire offset package or form the bulk of the package with supplementation via other indirect mechanisms. 	<ul style="list-style-type: none"> preferred mechanism given: agency endorsement of this approach; stipulations of conditions of approval; greater flexibility in delivering biodiversity outcomes; and less complex process of implementation may address the requirements of the entire offset package or form the bulk of the package with supplementation via other indirect mechanisms 	<ul style="list-style-type: none"> unsuitable on its own but may form part of the offset package if land acquisition and dedication is unable to fulfil the entire offset requirement. 	<ul style="list-style-type: none"> unsuitable on its own but may form part of the offset package if land acquisition and dedication is unable to fulfil the entire offset requirement. OEHL has indicated its preference for this mechanism over monetary contributions, where supplementary measures are required. Landholder agreement with the LLS is a possible means for implementation of this mechanism

5. Decision-making framework

5.1 Identification of offset land

Conservation of offset land has already been identified as the preferred biodiversity offset mechanism (either via purchase of BioBank credits or land), and as such other indirect offset approaches will be considered only if direct offsets cannot fulfil the requirement of the CoA.

The first step in identifying potential offset land will involve a review of sites currently on the offset market followed by, if required, a broader search for land deemed to be suitable as an offset. Offsets in the existing market will be identified by reviewing credits available for registered BioBank sites and the BioBanking Expression of Interest (EOI) register.

A brief review of the OEH BioBanking website shows that there are currently:

- one BioBank site in Shoalhaven LGA and no BioBank sites in Kiama LGA
- two EOI's in Shoalhaven LGA and no EOI in Kiama LGA.

These sites should be considered as part of the future BOP preparation.

A further optional opportunity at this stage will be to advertise in local media (or relevant specialist media) to seek expressions of interest from landowners willing to trade land of interest. Such an expression of interest could potentially elicit sites with potential to meet the criteria for suitability.

Assessment of the suitability of lands already on the offset market and any additional lands to be considered will initially involve a desktop review of suitability. The sources of information considered in this review would as a minimum include:

- contacting Councils such as Shoalhaven, Kiama and Wollongong to determine potentially suitable lands (note Shoalhaven and Wollongong Councils are both in the OEH linking landscapes program as described in Section 2.4.3).
- vegetation mapping
- land use zone mapping
- other relevant mapping; e.g. SRCMA/South east LLS priority corridor mapping
- regional land management plans and policies
- broad-scale biodiversity survey reports
- wildlife databases; e.g. Bionet Atlas of NSW Wildlife (Office of Environment and Heritage 2013).

Site characteristics considered in this initial review would include:

- distance of the sites from the project
- mapped presence of the vegetation communities requiring offsets
- current condition and potential for improvement
- size and shape of remnants and hence their likely viability as habitat, particularly for threatened species
- suitability of the land use zoning and potential for conflicts between sites and adjacent current and future uses (e.g. bushfire hazard considerations)

- vulnerability of the lands to loss of biodiversity value without protection as an offset
- connectivity between sites and other areas of habitat
- records of threatened species and suitability of mapped vegetation as potential habitat.

These criteria are described in further detail below.

5.1.1 Distance from the Project

Biodiversity offsets should be located appropriately. Ideally, offset habitat areas should be located within the local area and if not available then the region of the Project.

Choosing offsets within the locality or region of the Project is also consistent with the need to provide compensatory habitat of similar type and quality to that being removed. The integrity of the habitat network and biodiversity values of the locality are retained and habitat is secured and existing corridors consolidated for local flora and fauna populations.

In addition to the ecological benefits, by choosing offsets located within the locality or region of the Project, conservation planning can be integrated with development planning and this is also likely to benefit the reputation of the proponent, particularly with local stakeholders.

5.1.2 Presence of relevant vegetation communities

When determining offsets, they must be targeted and offset the impacts on a 'like for like or better' basis. Given that the Project includes clearing of six vegetation communities, including a Threatened ecological community, the offsets should include these communities if possible.

The likely presence of these vegetation communities would initially be identified through analysis of existing vegetation mapping. However ground-truthing of vegetation is likely to be required prior to the finalisation of the offset package if insufficient site-specific data is available to confidently verify the presence and distribution of the required communities.

5.1.3 Current condition and potential for improvement

Habitat condition gives an indication of its quality for flora and fauna habitat and long-term viability. The condition of a remnant is a result of a number of factors including weed invasion, fragmentation, pollution and disturbances including clearing, fire and grazing. The condition provides an index of a site's potential to support Threatened species, populations and communities. Although it is preferable that the condition/habitat quality of offset areas exceeds or matches that of habitat removed, this is not always achievable. Where the condition or quality of the offset is not equivalent to that of the area being cleared, a greater area of offset may be required.

Where the condition of habitats can be improved through changes in management (for example cessation of grazing, weed control), this improvement in condition can be used to offset a development.

The scope for improvements to the condition of offset sites and proposed methods of restoration and enhancement would be identified in the Biodiversity Offset Package and detailed in site-specific management plans for offset sites.

The direct offsetting approach requires the presence of existing relevant biodiversity values on offset sites. Therefore, revegetation is not appropriate as a primary means of direct offsetting. However, revegetation is appropriate for inclusion in an offsets package if it improves the condition of existing values by expanding habitat, reducing edge effects and increasing connectivity.

5.1.4 Size and shape of remnants

The size and shape of remnants contributes significantly to their long-term viability as native vegetation communities and habitat. Smaller vegetation remnants and remnants with a high edge to area ratio are more susceptible to threatening processes such as weed invasion, the introduction of pathogens and altered environmental characteristics such as sunlight penetration, wind, soil moisture and nutrient levels. Native animals in these remnants are likely to be at higher risk of threats such as predation and competition with introduced animals and overly abundant native animals which are typically associated with the interface between native vegetation and adjacent cleared areas.

Smaller patches may not be of sufficient size to support viable populations of some animal species that require large home ranges. The small populations supported by such remnants are likely to be more susceptible to local extinction due to reduced breeding success and disturbance events such as fires and disease epidemics.

5.1.5 Suitability of the land use zoning and potential for management conflicts

The zoning of potential offset sites may affect their suitability. If sites are located in areas identified in strategic regional planning as future locations of significant infrastructure, residential or industrial development, they are unlikely to be available as offset sites.

The existing and planned land use in adjacent lands also affects the suitability of sites as offsets due to issues such as bushfire hazard management, noise, lighting and stormwater management which may affect adjacent vegetation and associated habitat.

5.1.6 Vulnerability of the lands to loss of biodiversity value without protection

If the offsets are to be effective and genuine it is also important that they are not currently effectively protected from a loss of biodiversity values through development controls, binding conservation arrangements and/or management for conservation purposes.

An effective offset needs to be an area that, in the absence of the protection and management provided by its use as an offset, would be likely to see a reduction in biodiversity values and/or a failure to recover values.

5.1.7 Connectivity

Connectivity of habitats is essential to the long-term survival of many species because it facilitates movement on a local scale, for foraging and sheltering, as well as on a regional or even national scale as a wildlife corridor for dispersal and migration. Remnants with habitat linkages are more likely to maintain their biodiversity in the long-term because wildlife corridors:

- Provide increased foraging area for wide-ranging species.
- Provide cover for movement between habitat patches, particularly for cover-dependent species and species with poor dispersal ability and enhance the movement of animals through sub-optimal habitats.
- Reduce genetic isolation.
- Facilitate access to a mix of habitats and successional stages to those species which require them for different activities (for example, foraging or breeding).
- Provide refuge from disturbances such as fire.

- Provide habitat in itself.
- Link wildlife populations and maintain immigration and re-colonisation between otherwise isolated patches. This in turn may help reduce the risk of population extinction (Wilson & Lindenmayer 1995).

Connectivity of habitats creates larger remnants that are likely to be of higher quality and support higher biodiversity.

Offsets are likely to be of greater biodiversity value where they are located adjacent to remnant vegetation creating a larger remnant or where they provide linkages within otherwise fragmented landscapes. Compensatory habitat should act to consolidate existing corridors or, occur adjacent to existing areas of native vegetation in order to maintain or increase their habitat quality and long-term viability.

5.1.8 Records of threatened species and potential habitat

The recorded presence, on offset sites, of species likely to be impacted by the project provides direct evidence of the suitability of sites as offsets for impacts on these species. However, the absence of records on a potential offset site does not, in the absence of very intensive survey effort, necessarily indicate that the species is absent. Records of threatened species on potential offset sites and in surrounding habitat would therefore be used, in conjunction with assessment of vegetation types as habitat, to determine the potential value of offsets to these species.

5.2 Preliminary identification of possible sites

The first step in identifying potential offsets is to undertake a desktop assessment. An initial overview of areas in the locality with possibly suitable native vegetation for inclusion in an offsets package for the project is shown in Figure 5.1. The biodiversity offset strategy proposed in the EIS included ranking of riparian corridors in the locality with regard to restoration priority and mapping of SRCMA priority corridors and restoration project locations. This mapping would be considered in the identification of sites for inclusion in the Biodiversity Offset Package; an excerpt of this mapping is included in Appendix A.

Additional assessment to be undertaken would include a review of readily available information for the south coast region including but not limited to:

- regional vegetation mapping
- land use zone mapping
- other relevant mapping
- regional land management plans and policies (such as South Coast Regional Conservation Plan, Southern Rivers Catchment Management Authority (SRCMA) Community Action Plan, Berry Corridors Project etc.)
- broad-scale biodiversity survey reports
- wildlife databases e.g. Bionet Atlas of NSW Wildlife (Office of Environment and Heritage 2013).

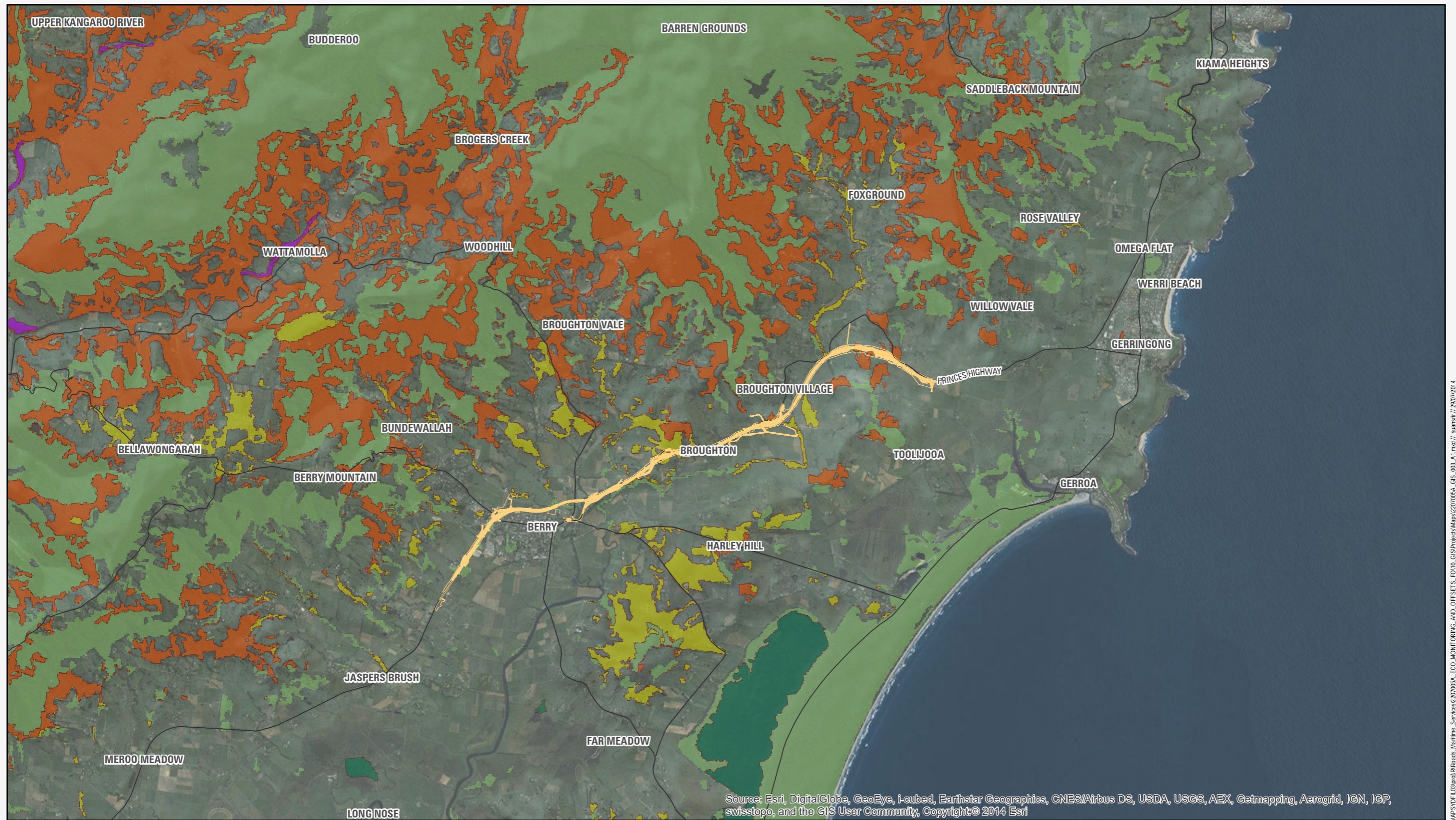
These data sources would be used to locate areas that:

- contain the biodiversity values to be offset i.e.:
 - ▶ known occurrences of recorded threatened fauna species (no threatened flora were recorded)
 - ▶ potential habitat for the other threatened species of animals and plants considered likely to occur in the Project area as outlined in Biosis (2012)
 - ▶ the same threatened ecological communities affected by the Project

- are not currently protected from development by existing legislation or binding conservation arrangements
- exhibit appropriate biodiversity and landscape characteristics (refer Section 5.1).

Consultation with the OEH, DPI, LLS and relevant local councils would also be used to identify priority lands for conservation and potential use as offsets.

These sites would require further refinement, as described below, to identify a short list of potential offset sites.



Source: Esri, DigitalGlobe, GeoEye, I-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Copyright © 2014 Esri

- Relevant SCIVI vegetation**
- Coastal Freshwater
 - Illawarra Gully Wet
 - Riverbank
 - Warm Temperate Layered
 - Other native vegetation communities not affected by the project
- Proposed road
 Main



Figure 5.1
Native vegetation in the locality possibly suitable for offsets

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5.3 Desktop assessment and ranking of potential sites

The sites identified during the desktop review would require refinement based on more detailed investigation of issues including:

- tenure and zoning of the potential offset sites
- current land ownership and availability of land for purchase, including those landowners who have already expressed an interest in such conservation
- likelihood of loss without protection as an offset; considering factors such as physical constraints on land use and proposed developments
- potential interaction with adjacent land uses; e.g. required fire regimes with regard to bushfire hazard reduction and biodiversity conservation
- size, shape and connectivity with other vegetation/habitat
- price.

Considerations relevant to each issue are outlined in Table 5.1 below. The considerations should be taken into account when further refining a short-list of potential sites for discussion with OEH and DPI and subsequent final site selection.

Table 5.1 Ranking considerations for potential offset sites

Issues	Considerations
Tenure	<ul style="list-style-type: none"> ■ potential offsets would be ranked by the suitability of the land tenure category into which they fall. Categories used here are based on the tenure descriptions used by Geoscience Australia (Geoscience Australia 2014) ■ the priority for offset sited would be land that fall under the following tenure categories which are most likely to be suitable as use as offsets: <ul style="list-style-type: none"> ▶ freehold land ▶ crown leasehold land ▶ vacant crown land. ■ other land tenure categories may also be suitable for use in offsets if current and proposed land uses are compatible with biodiversity conservation or if landowners open to the sale of the lands. Such categories may include: <ul style="list-style-type: none"> ▶ mining reserves ▶ aboriginal reserves ▶ water reserves ▶ forestry reserves ▶ defence land ▶ other Crown land. ■ Nature Conservation Reserves and other land tenures which already provide protection for biodiversity values are not likely be suitable as they are not at significant risk of loss and therefore do not represent a genuine offset.

Issues	Considerations
Zoning	<ul style="list-style-type: none"> ■ the zoning of land affects its suitability as an offset in relation to the risk of loss without inclusion in an offset and the compatibility of adjacent land uses with biodiversity conservation. ■ the following standard land zoning categories (NSW Government 2014) are considered most likely to be contain areas suitable for inclusion in offsets: <ul style="list-style-type: none"> ▶ environment protection zones ▶ rural zones ▶ recreation zones ▶ waterway zones ▶ special purpose zones. ■ while Environmental Protection Zones may seem like an obvious choice for inclusion in offsets, depending on the details of what is permissible in these areas and their condition with regard to existing biodiversity values, dedication of lands in these zones may not represent a genuine offset if there is little risk of loss to be averted ■ land use zoning categories less likely to include land suitable for offsets include: <ul style="list-style-type: none"> ▶ industrial zones ▶ business zones ▶ residential zones.
Current land ownership and availability	<ul style="list-style-type: none"> ■ the ownership of potential offset lands is likely to affect their availability. Private landowners who are involved in existing regional land management schemes are more likely to be amenable to the inclusion of their properties, or part thereof, in the offsets package and to facilitate ongoing conservation management. Properties with owners who have already shown an interest in conservation should therefore be given priority. Government departments with local officers such as LLS, DPI and OEH can provide advice in this regard.
Likelihood of loss without protection	<ul style="list-style-type: none"> ■ lands which are in a location or of a landform that is amenable to development or degradation through incompatible land use are at greater risk of loss without protection as an offset. Such areas represent a more valuable offset than areas that are less amenable ■ lands at greater risk of loss are likely to include: <ul style="list-style-type: none"> ▶ floodplain areas and areas of higher soil fertility which are particularly suitable for agriculture ▶ areas with low relief in proximity to arterial roads and existing centres which are likely to be desirable for residential and/or industrial development ▶ the likelihood of loss without protection is also affected by other factors such as tenure, zoning and ownership which are discussed above.
Potential interaction with adjacent land uses	<ul style="list-style-type: none"> ■ adjacent land uses may affect the suitability of lands as offsets. Land uses which result in high noise levels, light spill or dust generation may affect biodiversity values in adjacent lands by interfering with animal behaviour or adversely affecting plant health. In the absence of mitigation such as fencing, the close proximity of major roadways may affect the viability of an offset through impacts on animal populations associated with animal mortality due to collision with vehicles. Adjacent residential land use may also affect the suitability of lands as offsets due to bushfire asset protection requirements and predation of wildlife by uncontrolled domestic animals.

Issues	Considerations
Size, shape and connectivity	<ul style="list-style-type: none"> ■ the size of potential offset lands affects their ability to support viable animal and plant populations, particularly for animal species with large exclusive home ranges. The connectivity of potential offset lands with other areas of vegetation and habitat also affects the viability of these areas as offsets as it influences genetic interaction between subpopulations and the ability of habitat to be recolonised after localised loss of species due to disturbance events such as fires ■ the shape of potential offset lands also affects their suitability. Patches of vegetation/habitat with a high edge to area ratio are more impacted by edge effects such as altered water, light and wind conditions, weed invasion and dominance of fauna assemblages by introduced and generalist species. This affects their biodiversity value and their restoration and maintenance requirements ■ the most suitable offsets would be those that are: <ul style="list-style-type: none"> ▶ large ▶ of high area to edge ratio ▶ well connected to other substantial areas of habitat in the locality.
Price	<ul style="list-style-type: none"> ■ as a government agency, funded by taxpayers, it is important that Roads and Maritime Services receives value for money in the acquisition of offset sites. Where offset sites with similar biodiversity values can be obtained for a lower price, these lower cost sites would be preferred.

The outcome of the refinement process would be a short list of potential offset sites for detailed investigation ranked in terms of their suitability based on the above criteria.

5.4 Site inspection and identification of preferred site/s

Preliminary field investigations of short-listed sites would be required to verify their suitability as offsets with regard to:

- habitat suitability for the threatened species of animals and plants considered likely to occur in the Project area
- presence and distribution of the threatened ecological communities affected by the Project
- current vegetation/habitat condition and potential for improvement
- long-term management issues.

The results of the inspection would be used to further refine the ranking of short-listed offset sites and identify a preferred site or sites for adequacy assessment.

5.5 Assessment against offsetting principles

The sites will need to be assessed against the *Principles for the use of biodiversity offsets in NSW* to determine their suitability for offsetting the impacts of the Project. All sites that would form part of the Biodiversity Offsets Package would need to be consistent with these principles. Preference would be given to sites that are best aligned with the intent of the principles.

5.6 Indirect offset options

If any shortfall in the availability of direct offsets is identified, options for the implementation of other compensatory measures as indirect offset measures will be explored. Options considered would include, but not be limited to, funding for:

- restoration of local riparian vegetation
- research programs into the ecology and management of relevant Threatened species
- public education programs aimed at reducing impacts associated with human behaviour (e.g. rubbish dumping, horse riding)
- conservation of relevant threatened species in other regions.

6. Addressing changes to biodiversity impacts

One of the requirements of this BOS is to outline a process for addressing and incorporating offset measures arising changes in biodiversity impacts (where these changes are generally consistent with the biodiversity impacts identified for the project in the documents listed under condition A1), including:

- changes to the footprint due to detailed design
- changes to predicted impacts as a result of changes to mitigation measures
- the identification of additional species/habitat through pre-clearance surveys and construction
- addressing outcomes of the ecological monitoring program
- additional impacts associated with the establishment of ancillary facilities.

There is a possibility that prior to, or during construction, design changes may be required for a number of reasons. Such design changes may impact upon additional areas of remnant native vegetation.

This BOS has calculated the offset quantum based on the currently known impacts to native vegetation. The process for this calculation (refer to Table 3.1) was in accordance with CoA B7, which stated that “offsets shall be provided on a like-for-like basis and at a minimum ratio of 4:1 for areas of high conservation value (including EEC, salt marsh, and poorly conserved vegetation communities identified as being more than 75% cleared in the catchment management area) and 2:1 for the remainder of native vegetation areas (including threatened species habitat, mangroves, seagrass, and non-EEC riparian vegetation)”.

If these impacts were to change as a result of design amendments, a consistency assessment would be required to be undertaken against the CoA. Consistency assessments essentially compare impacts predicted as part of the Environmental Assessment and approved under CoA with the proposed new level of impact.

If the additional impacts are considered substantial and likely to change the outcome of the original Technical Paper (Biosis 2012), a Project Modification would be required to be submitted to DP&E for consideration.

If the additional impacts were considered to be generally consistent with the impacts predicted in the Technical Paper (Biosis 2012) it is considered appropriate that construction could continue.

Detailed ongoing monitoring would be undertaken during construction to monitoring the amount of vegetation clearing against the approved quantum of clearing. At the end of construction, if additional clearing has been required to occur (still generally consistent with predicted impacts), the additional amount of cleared vegetation would be notified to DP&E, OEH and DPI to determine whether additional biodiversity offset areas, revegetation or indirect measures such as research funding is required in addition the requirements already outlined in this BOS and refined in the BOP.

7. Options for securing and managing offsets

Roads and Maritime is committed to delivering a BOP that will provide ongoing conservation of land in perpetuity for the benefit of future generations. Offset sites must be enduring and must offset the impact of the development for at least the period that the impact occurs. The security of land tenure and ongoing management of offset site(s) is critical to the long-term viability of offsets and must be carefully considered.

To ensure the conservation of lands in-perpetuity, the offset strategy will require the dedication of the identified offset sites under a secure conservation arrangement. There are a number of options available to secure land under permanent conservation agreements. RMS is committed to exploring and identifying the most suitable conservation arrangement for land in consultation with the relevant stakeholders. Potential options may include:

- transfer of lands to National Park Estate
- obtaining a BioBanking agreement
- voluntary Conservation Agreements under the NPW Act
- trust Agreements under the *Nature Conservation Trust Act 2001* (NCT Act)
- a Property Vegetation Plan registered on title under the Native Vegetation Act 2003 (NV Act)
- a Planning agreement under s93F of the EPA Act.

If any riparian zone revegetation is proposed, mechanisms for this could also include a landholder agreement with the LLS. The final selected mechanism for securing the offset will be dependent on a number of factors such as whether it is already a BioBank site, whether it is located next to existing National Parks Estate or whether private property holders are willing to implement a Property Vegetation Plan for their land. The mechanism would be agreed with the DP&E and other government stakeholders.

If not conserved under a BioBanking agreement or National Park Estate however, the offset sites may be subject to discounting. If public use of offset lands was proposed, this could also reduce the offset credits generated by the offset lands subject to public use. Such issues would increase the total area of land required to be conserved. This issue would be further considered in the BOP if required.

8. Acquiring offset sites

8.1 Property acquisition

Roads and Maritime is currently investigating the viability of acquiring private properties, near the Project, which contain high quality native vegetation suitable for offsetting the vegetation to be cleared. Roads and Maritime would seek to eventually transfer acquired properties into the NSW conservation reserve estate or local council reserve system as appropriate.

Acquired offset land would need to be actively managed in order to maintain or improve the condition of the vegetation and habitats. Property acquisition could be used to improve connectivity in wildlife corridors and/or consolidation of high conservation areas.

If suitable sites are found which are in the possession of land owners who have already expressed interest in providing offsets, then negotiations with offset brokers and/or directly with landowners will be undertaken to establish their sale (or management) price, to allow evaluation of options and determination of a 'best value' package of suitable sites.

The sites identified through the desktop assessment (and potential associated EOI process) would require further refinement, as described below, to identify a short list of potential offset sites.

Consultation with land owners would be required and would involve:

- engaging with landowners to gauge initial interest
- facilitating field access
- negotiating with landowners over commercial terms
- where required, drawing up offset agreements.

9. Summary and way forward

The Foxground and Berry Bypass Project will require clearing of 30.4 ha of native vegetation. Roads and Maritime commits to providing a biodiversity offset of 66.6 ha and/or consideration of other combinations of measures considered to satisfy the equivalent value of this figure.

A BOS has been prepared with reference to the principles for the use of biodiversity offsets in NSW, as specified in the CoA B7.

The preferred offset approach for the Project is the purchase of off-site offset land or BioBanking credits using selection criteria outlined in this BOS, as well as consideration of on-site vegetation within Roads and Maritime-owned land. While other offset measures will also continue to be considered, such as riparian revegetation and indirect measures, the permanent conservation of direct offsets within the locality and region is required by the CoA and will be the primary biodiversity offset mechanism. No preferred offset site has yet been identified. It can be stated with confidence though that suitable offset land exists in the area that would satisfy the requirements of the BOS.

Roads and Maritime is committed to delivering a BOP that will appropriately offset the impacts of the Project. In the event that the preferred offsetting approach is unsuccessful, Roads and Maritime will consider other alternative offset options in consultation with DP&E, OEH and DPI, to deliver an offset package for the Project that satisfies the CoA and agency requirements.

In accordance with CoA, B8 within **two years** of the date of approval of this BOS, unless otherwise agreed by the Secretary (previously Director-General), Roads and Maritime will prepare and submit the BOP for approval. The BOP shall be prepared in consultation with OEH and DPI and shall include, but not be limited to:

- details of the final suite of the biodiversity measures to be implemented for the project demonstrating how it achieves the requirements of this BOS (including the specified offset ratios)
- the final selected means of securing the biodiversity values of the BOP in perpetuity, including ongoing management, maintenance and monitoring requirements
- timing and responsibilities for the implementation of the provisions of the BOP over time
- the requirements of the BOP shall be implemented by the responsible parties according to the timeframes set out in the BOP, unless otherwise agreed by the Secretary (previously Director-General).

10. References

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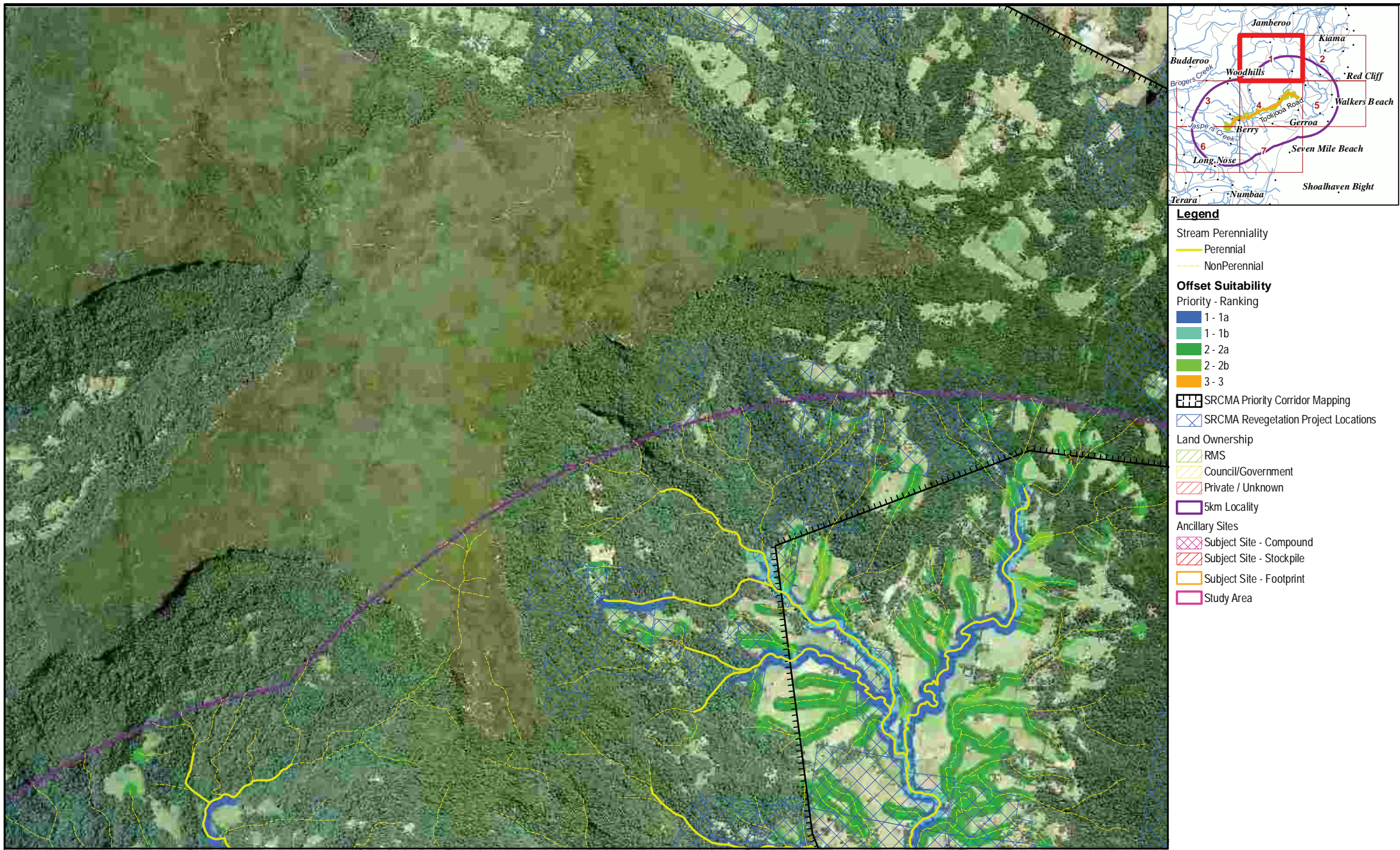
Appendix A

Map excerpt from the Biodiversity Offset Strategy proposed in the EIS showing priority locations for riparian area revegetation in the locality



Table AE.1 Offset suitability mapping scheme.

Priority	Map colour	Physical attribute	Plant community (current surveys)	Restoration strategy
1	a	50 m riparian zone on perennial drainage with no native vegetation cover	-	Revegetation to replicate RFEF
	b	50 m riparian zone on perennial drainage with native vegetation cover	Riparian forest Illawarra wet gully forest	Weed control and supplementary planting
2	a	50 m riparian zone on non - perennial drainage with no native vegetation cover	-	Revegetation to replicate RFEF
	b	50 m riparian zone on non - perennial drainage with native vegetation cover	Riparian forest Illawarra wet gully forest	Weed control and supplementary planting
3	3	50 m riparian zone on perennial drainage with native vegetation cover	Floodplain swamp forest	Weed control and supplementary planting



- Legend**
- Stream Perennality
 - Perennial
 - NonPerennial
 - Offset Suitability**
 - Priority - Ranking
 - 1 - 1a
 - 1 - 1b
 - 2 - 2a
 - 2 - 2b
 - 3 - 3
 - SRCMA Priority Corridor Mapping**
 - SRCMA Revegetation Project Locations
 - Land Ownership**
 - RMS
 - Council/Government
 - Private / Unknown
 - 5km Locality
 - Ancillary Sites**
 - Subject Site - Compound
 - Subject Site - Stockpile
 - Subject Site - Footprint
 - Study Area

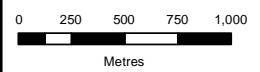


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Figure C.1: Offset Strategy Model

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Scale: 1:25,000 at A3
 Map Projection: Transverse Mercator
 Horizontal Datum: Geocentric Datum of Australia 1994
 Grid: Map Grid of Australia, Zone 56



Figure 3



- Legend**
- Stream Perennality
 - Perennial
 - NonPerennial
 - Offset Suitability
 - Priority - Ranking
 - 1 - 1a
 - 1 - 1b
 - 2 - 2a
 - 2 - 2b
 - 3 - 3
 - SRCMA Priority Corridor Mapping
 - SRCMA Revegetation Project Locations
 - Land Ownership
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 - 5km Locality
 - Ancillary Sites
 - Subject Site - Compound
 - Subject Site - Stockpile
 - Subject Site - Footprint
 - Study Area

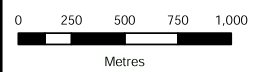


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Figure C.2: Offset Strategy Model

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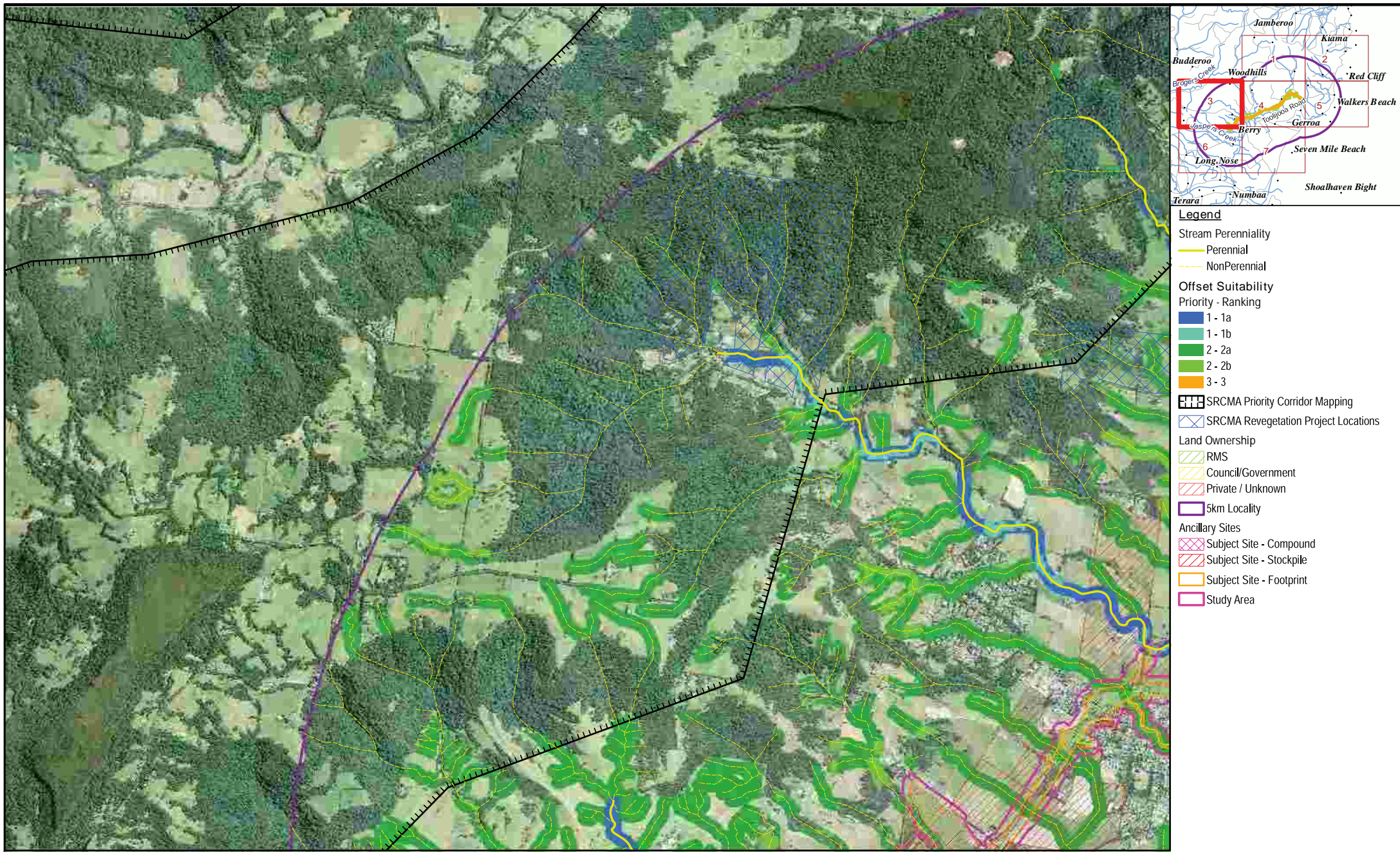
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Figure 3



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Figure C.3: Offset Strategy Model

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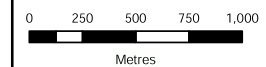
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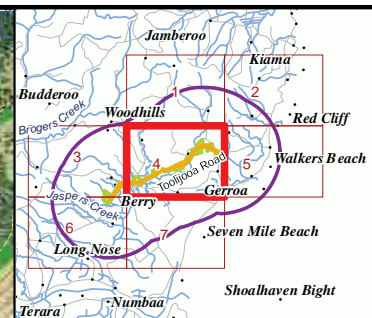
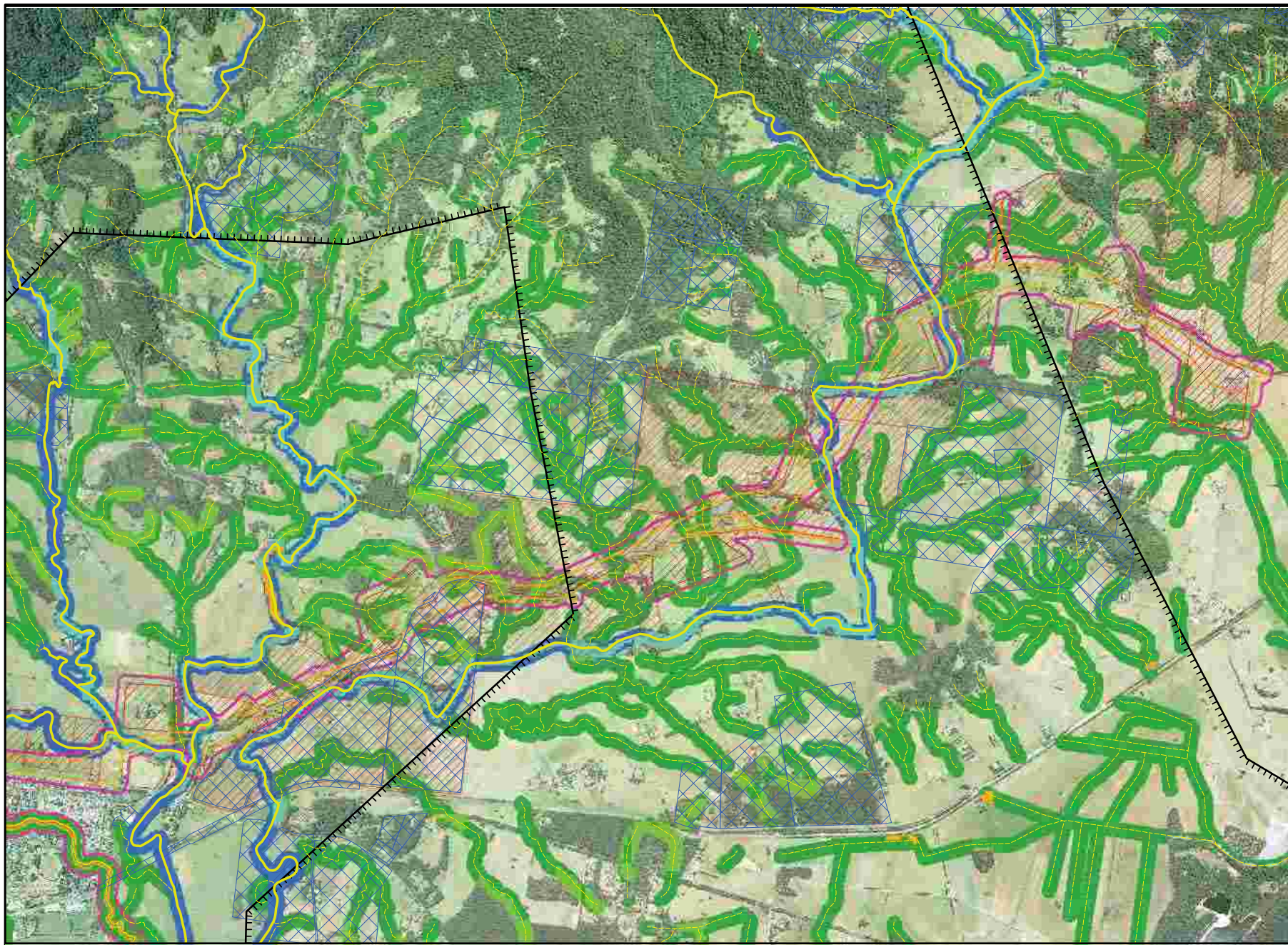
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Grid: Map Grid of Australia, Zone 56



Figure 3



- Legend**
- Stream Perennality
 - Perennial
 - NonPerennial
 - Offset Suitability
 - Priority - Ranking
 - 1 - 1a
 - 1 - 1b
 - 2 - 2a
 - 2 - 2b
 - 3 - 3
 - SRCMA Priority Corridor Mapping
 - SRCMA Revegetation Project Locations
 - Land Ownership
 - RMS
 - Council/Government
 - Private / Unknown
 - 5km Locality
 - Ancillary Sites
 - Subject Site - Compound
 - Subject Site - Stockpile
 - Subject Site - Footprint
 - Study Area

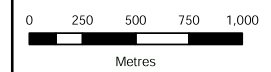


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Figure C.4: Offset Strategy Model

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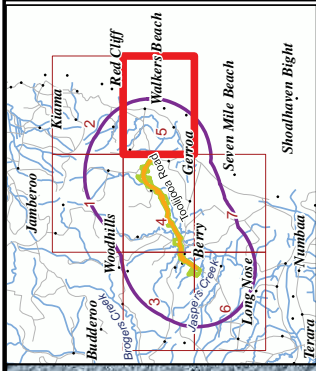
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Grid: Map Grid of Australia, Zone 56



Figure 3



Legend

Stream Perenniality

- Perennial
- NonPerennial

Offset Suitability

Priority - Ranking

- 1 - 1a
- 1 - 1b
- 2 - 2a
- 2 - 2b
- 3 - 3

- SRCMA Priority Corridor Mapping
- SRCMA Revegetation Project Locations

Land Ownership


- RMS
- Council/Government
- Private / Unknown

5km Locality

Ancillary Sites

- Subject Site - Compound
- Subject Site - Stockpile
- Subject Site - Footprint
- Study Area





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Figure C.5: Offset Strategy Model

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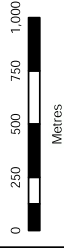
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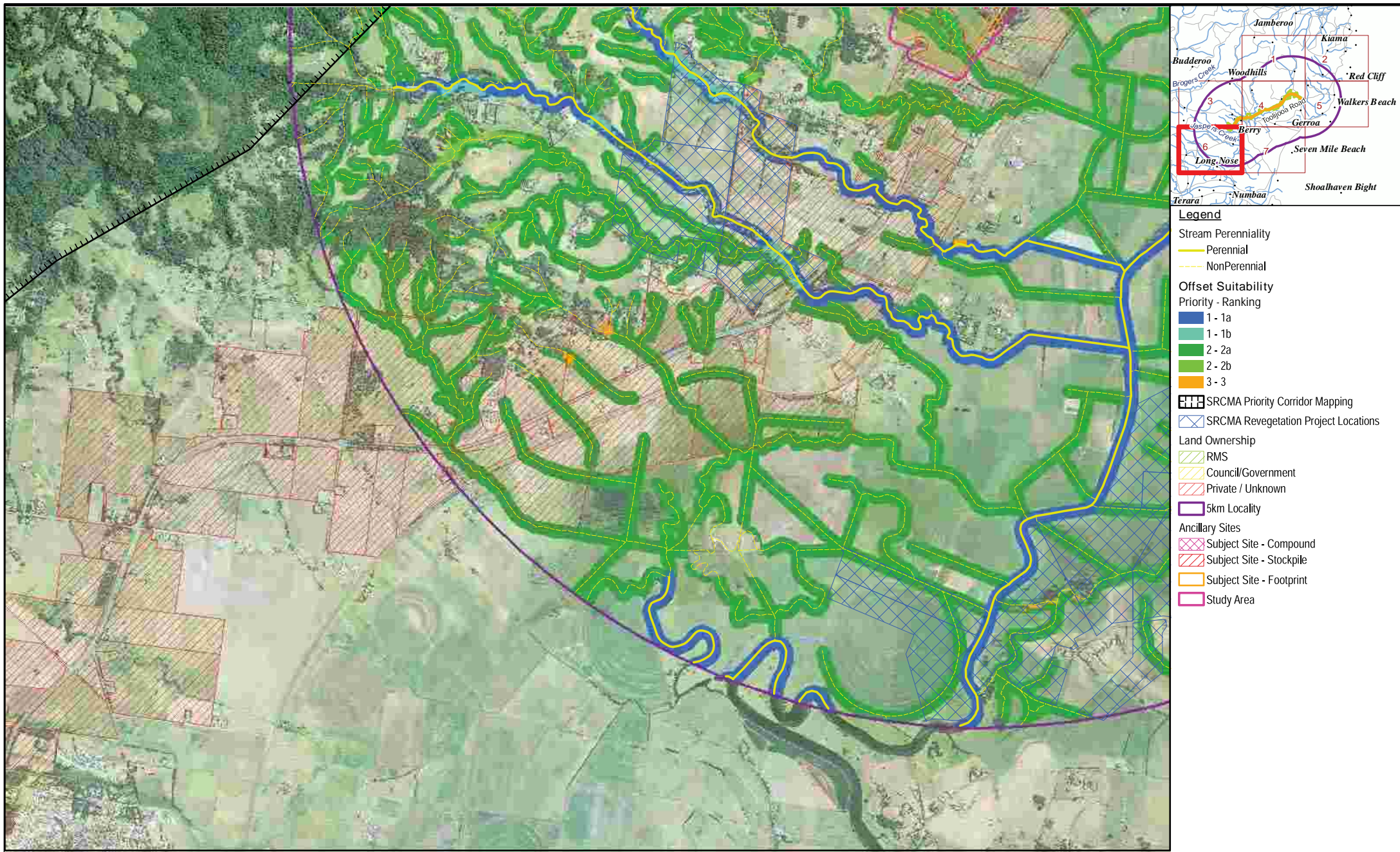
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Grid: Map Grid of Australia, Zone 56



Figure 3



- Legend**
- Stream Perennality
 - Perennial
 - NonPerennial
 - Offset Suitability
 - Priority - Ranking
 - 1 - 1a
 - 1 - 1b
 - 2 - 2a
 - 2 - 2b
 - 3 - 3
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 - Ancillary Sites
 - Subject Site - Compound
 - Subject Site - Stockpile
 - Subject Site - Footprint
 - Study Area

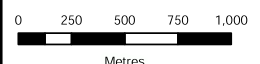


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Figure C.6: Offset Strategy Model

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Figure C.7: Offset Strategy Model

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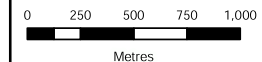
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Figure 3