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Crighton Properties Pty Ltd

Riverside at Tea Gardens

BioBanking Assessment

January 2012

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Executive Summary

GHD was commissioned by Crighton Properties Pty Ltd (the Proponent) to conduct a Biodiversity BioBanking assessment for the proposed Riverside residential development at Tea Gardens, New South Wales (the Project). Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by Crighton Properties to prepare an environmental assessment (EA) of a Concept Plan under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for a residential and tourist development at the Riverside site (ERM, 2011).This assessment has been prepared by GHD to assist with planning the layout of the development, to assess the biodiversity impacts and to estimate the quantum of biodiversity offsets that may be required to compensate for impacts arising from the development and to provide a biodiversity offset strategy.

Crighton Properties is seeking concept approval for a residential development, an open space network, a tourist/recreational precinct and associated water management, access, landscaping and infrastructure works (ERM, 2011).

The Project will result in impacts on native biota. An ecological impact assessment of a similar (though larger) development proposal on the same site had been previously prepared and had identified and quantified the impacts on native biodiversity along with proposed measures to avoid and mitigate these impacts (Cumberland Ecology, Feb 2011). The outcome of that assessment indicated that the Project would result in residual impacts of up to 94 ha of native vegetation, including habitat for threatened species (Cumberland Ecology, Feb 2011).

Since that report was prepared the project has been amended significantly to reduce the biodiversity impacts on the site. GHD has since assessed the biodiversity impacts and offsets required in detail using the BioBanking methodology and further refined the proposed development footprint for this application. The assessments and results which support the proposed development footprint are the subject of this report.

Biodiversity offsets are required to compensate for residual impacts on EECs, threatened species and their habitats and clearing of native vegetation. The NSW Biodiversity Offsets and Bank (BioBanking) methodology has been used to estimate the quantum of offsets that would be required to compensate for impacts of the Project. It is the preferred mechanism for determining biodiversity offsets of major projects assessed under the EPA Act (OEH, 2011a). The BioBanking methodology does not strictly apply to Part 3A Projects; the OEH (2011a) interim policy provides a framework for determining biodiversity offsets for Part 3A Projects using a modified form of the BioBanking methodology.

The BioBanking methodology has been used to estimate the number of biodiversity credits that may be required to offset impacts of the proposed development portions of the Project and the biodiversity credits that would be generated by the conservation of the remainder of the study area as biobank sites. This process has been applied to multiple development scenarios for the Project to optimise the balance between development and conservation footprints within the study area, including:

- The original development footprint, based on the original concept design for the study area in November 2009.

- The Planning Assessment Commission (PAC) footprint based on the results of site observations from relevant approval authorities.
- An amended development footprint (February 2011) based on the results of the Cumberland assessment (Feb 2011).
- The proposed development footprint, developed with specific reference to the supplementary GHD site survey data and detailed mapping to minimise impacts on native biodiversity.

The remainder of the study area outside of each of the development footprint options would be retained as conservation lands and set aside as either a biobank or preserved via another conservation mechanism approved by EPA and DPI. The precise area and management details of the onsite conservation lands would depend on the final configuration of the development footprint.

The outcome of this assessment is presented in Table 1. For the four development footprint options considered the, results of this assessment indicate there is a biodiversity credit deficit i.e. additional off site biobank site(s) would be required.

Table 1 Comparison between the Development Footprint Options Credits Required and Biobank Credits Contribution

Name	Original development footprint	PAC development footprint	Amended development footprint	Proposed development footprint
Area Impacted (ha)	119.15	73.7	98.8	94.4
Ecosystem credits required	4604	2948	3832	3675
Area retained- West biobank (ha)	26.36	39.04	39.04	41.23
Ecosystem credits generated – West biobank	202	294	294	332
Area retained - East biobank (ha)	49.56	70.02	58.31	63.91
Ecosystem credits generated – East biobank	381	572	461	523
Ecosystem Credit Balance	**-4021**	**-2082**	**-3077**	**-2820**
Estimated off site biobank requirement (range in ha)	**380-550**	**190-270**	**290-395**	**260-360**
Koala population species credits	-666	-10	-495	-401
Wallum Froglet species credits	-297	197	-39	138

The above credit estimates are based on a combination of available and extrapolated data and indicative site layouts. The final biodiversity credit requirement would need to be determined after further detailed assessments and consultation with EPA and DPI. The proposed development footprint has achieved a reduction in the credit deficit of 1201 ecosystem credits compared to the original development footprint but would still need to secure biodiversity offsets off site to gain approval. It should be noted that the suggested PAC development footprint would also require significant biodiversity offsets.

It is acknowledged that all of the development footprint options would result in impacts on habitats for threatened species, including removal of over cleared vegetation types and greater than that allowed for the Wallum froglet and the Koala population (however, as the project is being assessed as a Major Project, the red flag provisions do not apply). Notwithstanding, it should be noted that most of the site within the development footprint has previously been impacted by clearing for agriculture and the establishment of a pine plantation, which operated until the 1970's. Since this time the site has been subjected to cattle grazing and regular slashing. These land uses have adversely impacted on the condition and distribution of the native vegetation on the site.

This BioBanking assessment has been able to demonstrate that economies in the number of biodiversity credits required can be obtained by concentrating development in areas supporting vegetation of poorer condition.

The proposed development footprint is considered the most appropriate layout for the study area based on the following criteria:

- It removes development proposed in the southern corner of the site and adding these lands to proposed biobank sites.
- It reduces the development scale in the north eastern corner of the site and providing additional lands for conservation.
- It increases the east-west corridor to a minimum width of 200 m throughout.
- It avoids east-west habitat corridor in the north of the study area
- It increases the conservation area by removing impacts to approx. 5 ha of vegetation associated with proposed stormwater management infrastructure.
- It includes approximately 7.8 ha of disturbed, cleared land with very little biodiversity value. This area meets the BioBanking definition of cleared land and does not require biodiversity offsets
- Achieving economies in the number of biodiversity credits required by concentrating development in poorer condition vegetation as demonstrated by:
  - An overall ratio of 38.9 credits per hectare for the proposed development footprint, versus
  - An overall ratio of 40 credits per hectare for the PAC development footprint.
  - Although the proposed development footprint is 28% larger than the PAC development footprint there is only a 25% increase in the number of ecosystem credits required due to a more efficient use of the land.
- The proposed biobanks contain the majority of vegetation types being impacted within the proposed development footprint. This ensures most of the types of ecological resources available are generally protected on site in some capacity.

- The proposed biobanks would generate a credit surplus for five of the vegetation types in the study area, including a credit surplus for three of the four over cleared vegetation types present in the study area
- The proposed biobanks would generate a credit surplus for Wallum Froglet species credits
- Inclusion of additional lands in the conservation area removes impacts to approx. 5 ha of vegetation which would have been impacted by proposed stormwater management infrastructure associated with the PAC boundary.
- Maintains a minimum 410 m wide corridor along the Myall River in the east of the site.

The onsite biobanks would contribute a suitable 'like for like' contribution to the BioBanking assessment since it will achieve conservation outcomes within an area approximately equal in size to the development area and within the same overall patch of native vegetation and habitat. Local populations of native species, including threatened biota that will be affected by the Project will directly benefit from the regeneration of degraded land in the study area. Further, the most valuable wetland and estuarine habitats within the study area would be conserved via the conservation of a riparian corridor adjoining the Myall River.

The BioBanking calculations presented in this report would be used to support a BioBanking agreement for the biobank sites. Additional offset contributions would be required which are most likely to consist of biodiversity credits from additional off site biobanks (or similar). Crighton Properties would purchase and retire biodiversity credits generated at the biobank site or protected via another agreed conservation mechanism. The development will provide resources to invest in the rehabilitation and management of proposed conservation lands on site, thereby improving their condition and biodiversity values. These lands would be conserved in perpetuity under a BioBanking agreement or alternative conservation mechanism as agreed with EPA and DPI.

The BioBanking assessment has shown that the PAC footprint does not necessarily conserve the highest conservation values on site and that the PAC footprint also requires significant biodiversity offsets, therefore the project team considers the proposed development footprint provides a more 'balanced' development given the sites constraints. This footprint has been designed using detailed site assessment and data collected in accordance with the biobanking methodology whereas the suggested PAC boundary was determined without the benefit of such information.

Whilst the need for off site offsets is higher than the PAC footprint, it is substantially less than the original development footprint. Additionally, the proposed footprint has an increased development yield when compared to the PAC but the required offsite offsets are not proportional to the increase in yield, due to development being focused in areas of lower biodiversity values. This may be viewed as a more efficient use of the site given suitable offsets are available.

Crighton anticipates preparing an appropriate biodiversity offsets package as a Condition of Consent. The preparation of this package would include consultation with EPA/DPI to ensure it meets the projects requirements. It is recommended that the offsets package be prepared to allow a staged development commencement, as described in Section 6.6. In addition, the preparation of the biodiversity offsets package and its implementation is recommended to be in accordance with the time frames described in Sections 6.8 and 6.9.

1. Introduction

1.1 Overview

GHD was commissioned by Crighton Properties Pty Ltd (the Proponent) to conduct a Biodiversity and BioBanking assessment for the proposed Riverside residential development at Tea Gardens, New South Wales (the Project). Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by Crighton Properties to prepare an environmental assessment (EA) of a Concept Plan under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for a residential and tourist development at the Riverside site (ERM, 2011).This BioBanking assessment has been prepared by GHD to assist with planning the layout of the development, to estimate the quantum of biodiversity offsets that may be required to compensate for impacts arising from the development and to provide a biodiversity offset strategy.

Crighton Properties is seeking concept approval for the following (ERM, 2011):

- Residential development, including approximately 920 dwellings (including 65 tourist lodge sites).
- Water sensitive urban design (WSUD) measures, including basin, detention ponds and outlet to the Myall River
- A residentially zoned open space network which provides for public recreation, stormwater management, a wildlife corridor, and community facilities
- Site access, upgrading of external intersections and an internal road network
- Associated landscaping and infrastructure works.

The location for the Concept Plan is referred to in this document as the 'study area' and is shown on Figure 1.

The Project will result in impacts on native biota. The ecological impact assessment for an earlier and larger proposal for the site had been previously prepared and had identified and quantified the impacts on native biodiversity along with proposed measures to avoid and mitigate these impacts (Cumberland Ecology, Feb 2011). The outcome of that assessment was that the Project would result in residual impacts of up to 94 ha of native vegetation of varying condition (Cumberland Ecology, Feb 2011).

Since that report was prepared the project has been amended significantly to reduce the biodiversity impacts on the site. GHD has since assessed the biodiversity impacts and offsets required in detail using the BioBanking methodology and further refined the proposed development footprint for this application. The assessments and results which support the proposed development footprint are the subject of this report.

Biodiversity offsets are required to compensate for residual impacts on EECs, threatened species and their habitats and clearing of native vegetation. A biodiversity offset comprises one or more appropriate actions that are put in place to counterbalance specific impacts on native biota and their habitats. Appropriate actions are considered to be long-term management activities that aim to improve biodiversity conservation. This can include legal protection of land (i.e. an offset site) to ensure security of management actions and to remove threats (DECC, 2008).

The NSW Biodiversity Offsets and Bank (BioBanking) methodology has been used to estimate the quantum of offsets that would be required to compensate for impacts of the Project. The BioBanking methodology has been used to estimate the number of biodiversity credits required to offset impacts of the proposed development portions of the Project and the biodiversity credits that would be generated by the conservation of the remainder of the study area as biobank sites. This process has been applied to multiple development scenarios for the Project to optimise the balance between development and conservation footprints within the study area. Four potential development footprints have been considered as shown on Figure 2:

- The original development footprint, based on the original concept design for the study area in November 2009.
- The Planning Assessment Commission (PAC) footprint, based on observations from approval authorities.
- An amended development footprint (September 2011) based on the results of the Cumberland Ecology assessment (2011).
- The proposed development footprint, developed with specific reference to supplementary GHD site survey data and detailed mapping to minimise impacts on native biodiversity.

BioBanking operates on an '*improve or maintain'* principle and includes a methodology for calculating offset ratios, trading biodiversity values and protecting areas with higher conservation values. The BioBanking methodology is the preferred mechanism for determining biodiversity offsets of major projects assessed under the EPA Act (OEH, 2011a). The BioBanking methodology does not strictly apply to Part 3A Projects; however the OEH (2011a) interim policy provides a framework for determining biodiversity offsets for Part 3A Projects using a modified form of the BioBanking methodology.

The BioBanking calculations presented in this report provide an estimate of the quantum of offsets that may be required to offset impacts arising from construction of the four development footprint options for the Project described above.

The remainder of the study area outside of each of the development footprint options would be retained as conservation lands and set aside as a biobank as a biodiversity offset for the Project. The precise area and arrangement of the biobank site would depend on the final development footprint approved for the Project, but would include:

- An approximately 400 m wide strip of vegetation in the eastern portion of the study area, which would act as a riparian buffer and north-south habitat corridor
- A strip of vegetation in the northern portion of the study area, which would provide a buffer adjacent to a small drainage line and act as an east-west habitat corridor.

The BioBanking calculations presented in this report could also be used to support a BioBanking agreement or other approved conservation mechanism. The BioBanking Trust Fund (or alternative conservation mechanism) would fund the management of both the onsite and offsite conservation lands in perpetuity and ensure that the site is conserved and actively managed to achieve long term gains in biodiversity values.

1.2 Objectives

The overall objectives of this assessment are to:

- Describe the ecological impacts of the Project as a guide to the scale and type of biodiversity offsets that will be required
- Calculate the quantum of biodiversity offsets required for each of four development footprint scenarios using a modified methodology agreed with the EPA. To express the quantum of offsets in biodiversity credits required for:
  - The original development footprint
  - The PAC development footprint
  - The amended development footprint
  - The proposed development footprint
- Estimate the biodiversity credits that would be generated if the remainder of the study area, outside of each of the four development footprint options, was conserved and set aside as a biobank.
- Provide a justification for the preferred development/conservation footprint for the Project
- Provide a Biodiversity Offset Strategy for the Project, including:
  - Description of the security and implementation of the offsets for the Project using the NSW BioBanking Scheme
  - Summary of the monitoring and reporting obligations for the biobank site/s using the NSW BioBanking Methodology.

1.3 Relationship with Existing Reports

This BioBanking assessment has been prepared giving consideration to information contained in the following:

- Environmental Resources Management (ERM) (2011) *Riverside at Tea Gardens Concept Plan Application Environmental Assessment Report*
- Cumberland Ecology (2010) *BioBanking Assessment Report*
- Cumberland Ecology (Feb 2011) *Riverside Tea Gardens Ecological Assessment Report*
- Cumberland Ecology (Dec 2011) *Biodiversity Assessment Report*
- Conacher Environmental (2011*) Ecological Site Management Strategy*
- Conacher Environmental (2011) *Bushfire Threat Assessment*
- Conacher Environmental (2011) *Koala Management Strategy*

Ecological values and impacts referred to in this report are referenced from the ecological assessments (as above) for the Project study area. These reports contain information relevant to the Offset Strategy, including vegetation type and condition, conservation significance, impact assessment and suggested mitigation measures.

1.4 Subdivision Planning Approach

The project team followed the '*avoid, mitigate and offset'* principles when designing a suitable development/conservation footprint at Riverside, Tea Gardens. The approach adopted is described below.

1.4.1 Measures taken to avoid impacts

The proposed development has been sited and designed to avoid, where possible, significant vegetation on the site. The design of the subdivision subsequently went through several layout changes as a greater understanding of the sites constraints was attained, these included:

- Reducing the extent of the development within the northern portion of the site to provide for a wider wildlife corridor in this area of the site. The proposed corridor will be a minimum 200 m wide.
- Removing development previously proposed in the south-eastern potion of the site creating a much larger conservation area in the east. This also creates a much wider and continuous corridor along the Myall River with a minimum width of 410 m.
- Reducing the extent of the proposed tourism development in the north-eastern corner of the site adding further lands for conservation and increasing the extent of the corridor adjacent to the Myall River.
- Removing the previously proposed basin from the far north-eastern corner of the site and increasing the area of conservation. This vegetation will be connected to a riparian corridor to the north as proposed in the Great Lakes City Council comprehensive Local Environment Plan (LEP) template.

1.4.2 Mitigation Measures

The design team also included a range of mitigation measures, to further reduce impacts on native biodiversity, including:

- Location of Asset Protection Zones (APZ) between the built form and areas of native vegetation to the west of the site. The APZ's will provide a management buffer between these land uses.
- Minimising clearing within the APZ to maintain existing vegetation (as far as possible).
- Maintaining native vegetation within the APZ's within fuel load requirements. This generally means marinating these areas with a discontinuous canopy, a maximum of 25% of the lower storey with the remaining areas 'slashed'.
- Utilising a 'ring road' network, integrated with the APZ's, to help provide a management buffer between the development and conservation areas.
- Incorporating drainage line systems throughout the site that will be rehabilitated with native species. Tree retention will also be a priority for these areas.
- Preparation of a vegetation management plan (VMP) addressing weed management, rehabilitation and replanting of native vegetation throughout the drainage line network.
- Preparation of a detailed landscaping plan using endemic species.

- Preparation of a habitat tree management plan for the subject site that identifies important habitat trees to be retained, recruitment trees to provide long-term replacement hollows, possible tree replanting areas and management measures to protect habitat resources from future potential issues relating to human safety and senescent trees etc. This plan will apply to such areas as:
  - The drainage line network
  - Proposed pocket parks
  - The streetscape
  - Public recreation areas
- Implementing appropriate stormwater and erosion control activities.

1.5 Site Context

The study area for this assessment is shown on Figure 1.

The study area is in the Great Lakes Local Government Area (LGA). It is situated to the north of existing development within Tea Gardens and is bound to the west by Myall Road, to the north by Toonang Drive and the Shearwater Residential Estate, and to the east by the Myall River. The study area has approximately 2 km frontage to the Myall River and adjoins the Myall Lakes National Park to the east and north-east (Cumberland Ecology, 2011).

The locations of the four development footprint options and potential biobank areas for the project are shown on Figure 2. The biobank areas for each of the four development footprint options have been split into 'east' and 'west' biobanks, because the eastern portion of the study area has already been fenced and managed for conservation and so may require a modified assessment once the assessment progresses to the preparation of a biobanking agreement. The study area also contains a 'Potential future development area' that may be required for construction of infrastructure at some point in the future and so has been excluded from development footprints and biobank areas.

Part of the Riverside Estate has previously been developed and comprises a range of residential, retail/commercial, recreation and tourist development (ERM, 2011).

LEGEND

Study area

1:10,000 Paper Size A3

0 50 100 200 300 400

Meters

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

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Client Name
Tea Gardens Development - BioBankng Assessment

Job Number 22-15960
Revision A
Date 05 Dec 2011

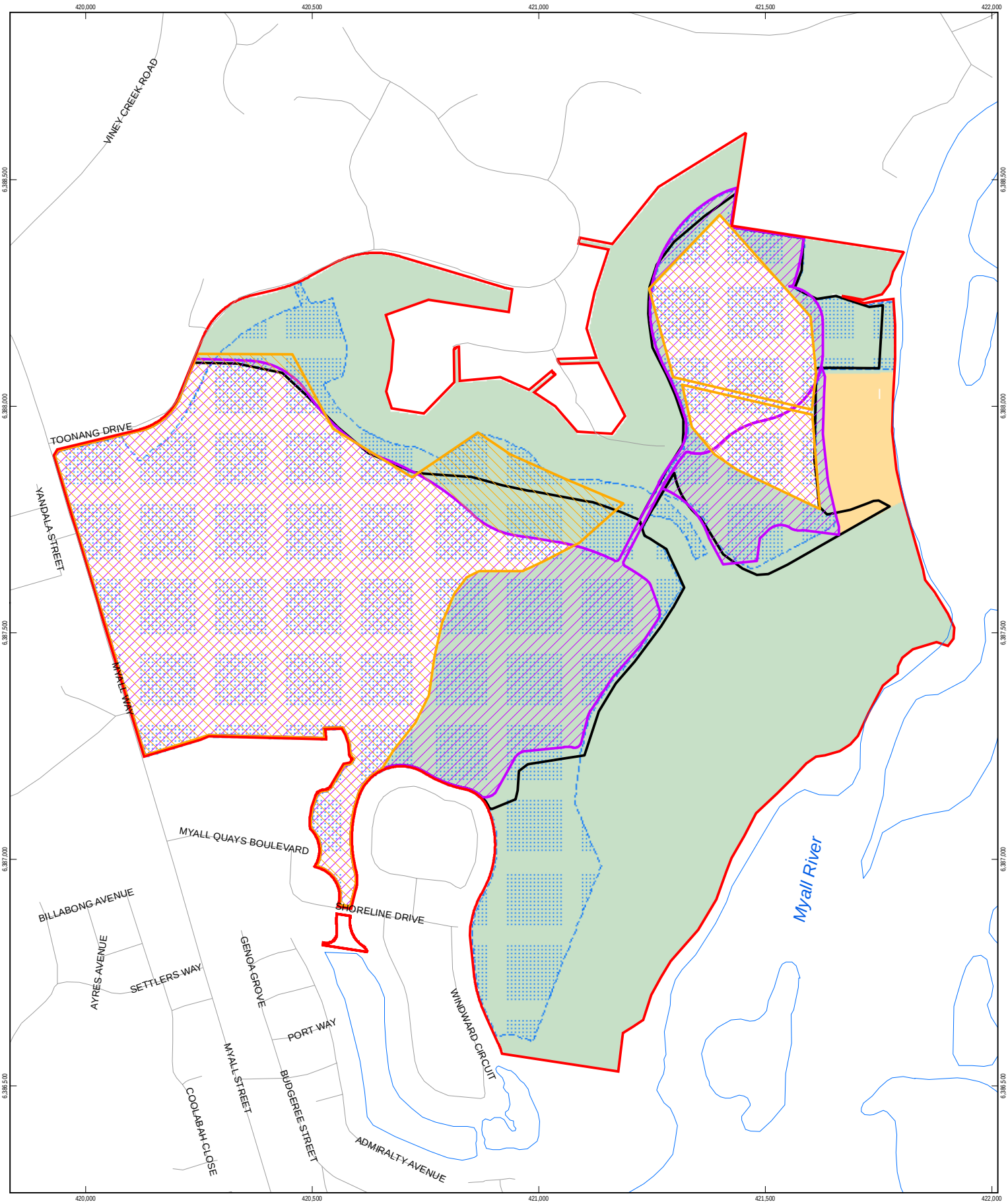
Study Area Location

Figure 1

N:\AU\Newcastle\Projects\22\15960\GIS\Maps\Deliverables\22_15960_04_TG_SitePlan_Rev_A.mxd

Level 3, 24 Honeysuckle Drive, Newcastle NSW 2300 Australia **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com

Data source: Google: Aerial - 2011; ESRI: Aerial - 2011; Crighton; Site Development Plan - 2011. Created by:cwilson



LEGEND

Study Area
Original Development Footprint
Proposed Development Footprint
Future Development
PAC Boundary
Amended Development Footprint
Potential Biobank Sites

1:7,788 Paper Size A3

0 40 80 160 240 320

Meters

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

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Crighton Properties Pty. Ltd.
Riverside at Tea Gardens - BioBanking Assessment

Job Number 22-15960
Revision B
Date 22 Dec 2011

Development & Biobank Options

Figure 2

N:\AU\Newcastle\Projects\22\15960\GIS\Maps\Deliverables\22_15960_06_Development_BiobankOptions_Rev_A.mxd

Level 3, 24 Honeysuckle Drive, Newcastle NSW 2300 Australia T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:rphamer

1.6 BioBanking

The NSW Biodiversity Banking and Offsets Scheme (BioBanking) has been established by the NSW Office of Environment and Heritage (OEH) to help address the loss of biodiversity and threatened species. BioBanking is a component of Part 7A of the *NSW Threatened Species Conservation Act 1995* (TSC Act) and is administered by OEH. To complete the legal framework, the *Threatened Species Conservation (Biodiversity Banking) Regulation 2008* establishes specific aspects of the scheme that are important for its smooth operation. The scheme attempts to create a market framework for the conservation of biodiversity values and the offsetting of development impacts. The scheme is currently voluntary.

To establish credits for a biobank site a landholder must commit to enhancing and protecting biodiversity values over time. A BioBanking Agreement is entered into and registered on the title of the land, binding both the current and future landholders to maintaining biodiversity through the completion of a range of management actions on the site. Each biobank site may generate a number of different ecosystem credits and any of these credits may be sold separately or as a group.

Developers can also apply for a BioBanking Statement that specifies the number and class of credits that must be acquired to counterbalance or offset the impacts on biodiversity values that are likely to occur as a result of development. The scheme provides an alternative path to the threatened species assessment of significance process required under the EP&A Act.

The BioBanking Assessment Methodology (the methodology) sets out how biodiversity values will be assessed, establishes rules for calculating the number and class of credits, and determines the trading rules that will apply. The methodology includes a software package known as the BioBanking Credit Calculator (the credit calculator) which processes site survey and assessment data. The credit calculator specifies the type and extent of surveys required for a BioBanking assessment and then processes survey data to calculate the number and type of biodiversity credits that are either required at a development site or will be generated at a biobank site.

The BioBanking Trust Fund ensures that landowners have the money needed to carry out the management actions required each year and provides a financial incentive to landowners to carry out those actions. The scheme is administered by OEH and ensures accountability and compliance through legislation, regular reporting requirements and financial measures.

Overall, it is intended the scheme will assist to conserve areas with high biodiversity values by providing incentives for conservation and disincentives for loss.

The DECC (2009) BioBanking methodology aims to encourage and secure investment in conservation and to provide financial incentives for the protection of biodiversity values by:

- Providing a measurable, consistent, transparent, and robust framework for the assessment and management of biodiversity offsets.
- Creating new opportunities for conservation on private land.
- Providing permanent security and management for biodiversity offsets.
- Providing a secure mechanism for investment in biodiversity conservation.

1.7 Glossary of Terms

1.7.1 Project Definitions

Study Area	The site for the Project; the parcel of land containing the various component areas of the Project.
Development footprint	The area of direct disturbance for construction of the Project. Four development footprint options are considered in this assessment: ◗ The original development footprint (November 2009), based on the original concept design for the study area ◗ The Planning Assessment Commission (PAC) footprint, based on amendment to the original design intended to minimise impacts on native biodiversity ◗ The amended development footprint (Feb 2011 – used for adequacy review) ◗ The proposed development footprint (December 2011), developed with specific reference to site survey data and detailed mapping to minimise impacts on native biodiversity.
Potential future development area	The areas of land within the study area that may be required for construction of infrastructure at some point in the future.
Development area	The area of impact included in the BioBanking calculations presented in this BioBanking assessment. Comprises the mapped area of native vegetation within the each of the four development footprint options
Biobank site	A portion of the study area outside the development footprint that would be set aside for conservation to offset biodiversity impacts arising from the Project. This area of land will be included in a BioBanking Agreement or other conservation mechanism supported by EPA and DPI.

1.7.2 BioBanking Definitions

BioBanking Agreement	An agreement entered into between the landowner and the Minister under Part 7A of the TSC Act for establishing a biobank site.
BioBanking Assessment Methodology (the methodology)	The rules of the BioBanking Scheme established under the TSC Act that determine credits created, credits required and the circumstances that improve or maintain biodiversity values.
BioBanking Credit Calculator (the calculator)	The software component of the BioBanking Assessment Methodology that calculates the credits created or credits required.
BioBanking Scheme (BioBanking; the scheme)	The biodiversity banking and offsets scheme established under Part 7A of the TSC Act.
BioBanking Statement	Specifies the number and class of credits to be retired for a particular development. A BioBanking Statement can only be issued in circumstances that improve or maintain biodiversity values.
BioBanking Trust Fund	Means the BioBanking Trust Fund established under Part 7A of the TSC Act to hold funds from the sale of credits.
Biodiversity credit	Registered biodiversity credits are created for management actions that have been carried out or are proposed to be carried out, in accordance with the BioBanking Agreement.
Biodiversity offsets	Actions put in place to counterbalance (offset) an impact on biodiversity values.
Biodiversity values	The composition, structure and function of ecosystems including threatened species, populations and ecological communities, and their habitats.
Compulsory development	Development that in the opinion of the Minister of Planning is "of State or regional environmental planning significance". Section 127ZM (7) of the *TSC Amendment (Biodiversity BioBanking Act 2006, No 125*) specifies that these projects have priorities and the Minister of Planning is not required to concur to the issue of the BioBanking statement if the project is of importance to the State. When the project has a state or regional environmental planning significance it satisfies the condition to be declared as a part 3A project.
BioBanking Credit Calculator (the credit calculator)	The credit calculator is the software component of the methodology. It is a database that contains threatened species, habitat and vegetation data. The credit calculator determines the number of ecosystem credits and species credits required at a development site and the number of ecosystem credits and species credits created at a biobank site. It does this on the basis of the existing biodiversity data, equations, information collected at the site and GIS calculations according to the assessment process outlined in the methodology.
Development site	Land that is designated by a BioBanking Statement to be a development site.

The calculator	See BioBanking Credit Calculator.
The development footprint	The portion of the subject site that is proposed for development
Ecosystem credit	A credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
Management action	An action or proposed action in respect of which a biodiversity credit may be created.
Red flag areas	A red flag area is an area of particular conservation significance, of significant scale to be viable over the medium to long term. *Note: The red flag provisions do not apply to Major Project assessments.*
Species credit	A credit that relates to an individual threatened species that cannot be reliably predicted based on habitat surrogates. Threatened species that require species credits are identified in the Threatened Species Profile Database.

2. Methodology

2.1 Previous Assessments

Cumberland Ecology (Feb 2011) prepared a notional Biobanking assessment which informed the amended development footprint the development site and two separate biobank sites. This notional assessment was based on a vegetation map with supporting field generated BioBanking plot data and assisted in informing this assessment.

Subsequently, Cumberland Ecology prepared an amended assessment (Dec 2011) after they became aware of the conclusions reached in a soils report, commissioned in 2011 (Whitehead and Associates).

2.2 Site Layout Assessment

GHD subsequently completed a range of exercises using the BioBanking methodology to assist in determining the proposed development layout. A summary of these activities is outlined below.

2.2.1 Stage 1 Assessments

GHD completed a BioBanking assessment for the original development and the amended development footprint to obtain a more accurate credit calculation than the notional assessment previously completed by Cumberland Ecology for this footprint. The Cumberland Ecology assessment was a detailed assessment based on predicted data. The methodology adopted and the conclusions reached were supported by OEH.

Subsequently, GHD completed the following activities:

- Collected detailed plot data throughout the site in accordance with the BioBanking methodology.
- Reviewed the vegetation types mapping prepared by Cumberland Ecology and adjusted accordingly to BioBanking plot data and further survey and mapping of vegetation type boundaries.
- Completed Assessment Circles and updated vegetation type maps in GIS for both the original and amended development footprints.
- Entered the data into the credit calculator and recorded the results.

2.2.2 Stage 2 Assessments

GHD consulted with OEH before commencing the stage 2 assessments. This consultation indicated that both OEH and DPI would need estimates of BioBanking results for the PAC boundary before consideration of additional development outside this boundary could be made. GHD therefore completed the following:

- Adjusted the develop footprint to that of the PAC boundary in GIS.
- Re-ran the credit calculator and recorded results.

- Reviewed the results of the PAC boundary and adjusted the proposed development footprint accordingly. This activity considered areas of development that were proposed in locations where credit impact rates were high and where credit generation rates within proposed conservation rates were low and adjusted the footprint accordingly. Put simply, some areas outside the PAC development footprint had ecological values more suited to development and some areas within the PAC development footprint (mainly in the north) were more suited to conservation.
- Re-ran the credit calculator on the adjusted footprint and discussed results with Crighton Properties, OEH and DPI. Crighton indicated they required an amendment to this footprint along the eastern edge of the site leading to the proposed development footprint presented in this BioBanking report.

2.2.3 Stage 3 Assessment

The stage 3 assessment included finalising the proposed development footprint and associated BioBanking results. Activities included:

- Completing the final adjustment to the proposed development footprint in GIS.
- Re-running the credit calculator.
- Preparation of this BioBanking assessment report

2.2.4 Stakeholder Consultation

GHD completed consultation with key stakeholders throughout all three stages of the assessment. A summary of this consultation is outlined below:

- Meetings with Crighton Properties on the 28th September, 2nd, 15th, 22nd and 28th of November 2011.
- Meeting with OEH 18th October,
- Meetings with OEH and DPI 15th and 23rd November 2011.

2.3 Vegetation Assessment

Cumberland Ecology (Feb 2011) vegetation mapping was reviewed by GHD through additional site survey. Vegetation types and extent were re-evaluated, described and matched to OEH (2011b) NSW Vegetation Types with BioBanking condition classes. Best match NSW Vegetation Types were selected via a comparative analysis between site data and vegetation descriptions provided in HCCREMS (2009).Field investigations were carried out over two days involving the collection of 19 plot/transects with reference to the BioBanking Assessment Methodology. Aerial photography analysis was used to broadly map vegetation condition prior to survey. The site was stratified with reference to this the desktop vegetation condition mapping, Cumberland Ecology (2011) vegetation mapping and the proposed development biobank partition. Additional plots were completed in vegetation types mapped by Cumberland Ecology (2011) that appeared to comprise more than one vegetation type (e.g. Swamp Mahogany Open Woodland in the western parts of the site).

Vegetation condition was re-interpreted on the basis of the revised vegetation mapping and typing. Vegetation descriptions published by HCCREMS (2009) were used as the basis for defining cover

for canopy, mid and ground cover strata. For instance, Swamp Mahogany Open Woodland was split into Swamp Mahogany Open Woodland and *Melaleuca sieberi* - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin based on canopy cover. *Melaleuca sieberi* - Tall Saw-sedge closed shrubland was separated from surrounding woodland because occasional eucalypts in this vegetation type were considered canopy emergents.

Elevation contours and soil conditions broadly correlate with the sites hydrological regimes (e.g. ponding and depth to groundwater) and hence provide insight on the type and extent of native vegetation cover. Vegetation type and extent was adjusted in accordance with this assumption.

2.4 BioBanking Methodology

2.4.1 Approach

Biodiversity credits were estimated with reference to the methodology presented in the DECC (2009) BioBanking Assessment Methodology and Credit Calculator Operational Manual. The credit calculator is the software version of the methodology. Data is entered into the credit calculator based on information collected in the desktop assessment, site surveys and from using GIS mapping software.

The BioBanking assessment methodology has been used to estimate the quantum of biodiversity offsets required for the Project as follows:

- Review of Cumberland Ecology (2011) vegetation mapping and preliminary BioBanking Assessment as described above
- Preliminary site survey of the study area using the BioBanking plot/transect methodology to refine the mapping of vegetation condition across the site and to collect site value data for each vegetation type
- Application of the BioBanking methodology to each of the four potential development footprint options to determine impacts of the development and associated offsetting requirements in terms of biodiversity credits
- Application of the BioBanking methodology to the remaining portions of the study area outside of the four potential development footprint options that would be set aside as a biobank and managed for conservation
- Comparison of the credit profiles of the development sites and biobank sites to assess whether the on-site biobanks are appropriate to offset biodiversity impacts of the Project
- Comparison of four Development/Conservation Footprint Options to determine which would result in the optimum balance between development and conservation outcomes (i.e. a balance between development credits required and biobank credits generated)
- Estimation of the size and type of additional biobank site(s) that would be required to generate appropriate biodiversity credits to offset residual impacts of the Project.

The main inputs to the BioBanking assessment are described below.

2.4.2 Desktop Assessment

Literature and Database Review

The following resources were reviewed to describe the existing environment of the site and to, as far as possible, obtain the necessary site data to perform BioBanking credit calculations:

- The Project environmental assessment (ERM, 2011) and associated concept design files
- DECC (2008a) *NSW (Mitchell) Landscapes Version 3 (2008)*
- DECC (2008b) *Descriptions for NSW (Mitchell) Landscapes*
- OEH (2011a) *Vegetation Types Database*
- OEH (2010b) *Threatened Species Profile Database*
- OEH (2010c) *NSW Interim Vegetation Extent remote sensing imagery*
- Aerial photographs and satellite imagery of the study area.

Geographical Information System (GIS) Analysis

Geographical Information System (GIS) was used in the current assessment as follows:

- Plotting of the site, development site and biobank site boundaries on a high resolution aerial photo base
- Preliminary mapping of vegetation types across the site, based on available information
- Assessment of native vegetation cover, extent and connectivity at the landscape scale
- Stratification and mapping of the site and calculation of the extent of vegetation patches.

2.4.3 Site Surveys

Site surveys of the study area were conducted according to the BioBanking methodology to supplement the Project ecological assessment. Survey effort that has directly contributed to this BioBanking assessment is summarised in Table 2 and described below.

Table 2 GHD Survey Effort

Date	Survey Effort	Survey Methods
10th, 11th and 13th October 2011	2 ecologists for 3 days 19 plot / transects	Broad-scale vegetation survey and mapping; 20 m x 50 m BioBanking plot / transect surveys; opportunistic fauna observations.

Plot and transect surveys were conducted on site in accordance with the procedures provided in DECC (2009). The Site Value was determined by assessing ten site condition attributes against benchmark values. Benchmarks are quantitative measures of the range of variability in condition in vegetation with relatively little evidence of alteration, disturbance or modification by humans since European settlement.

Although no systematic targeted surveys for threatened species were conducted as part of this assessment, previous targeted surveys have been completed by Conacher Environmental and have assisted in informing this assessment. Opportunistic observations of fauna and threatened plants were recorded and the locations of threatened species were captured with a handheld GPS if observed, during the GHD surveys.

2.4.4 BioBanking Assessment and Credit Calculation

Vegetation Cover

The BioBanking methodology uses 100 hectare and 1,000 hectare assessment circles centred on the site to estimate the extent and connectivity of native vegetation and habitat surrounding the site. OEH (2010c) GIS data for vegetation cover was mapped across the study area. Vegetation cover and connectivity was calculated using GIS measurement within the assessment circles based on the current situation and after the development of the site. The percentage change in native vegetation cover was estimated by subtracting the area of woody vegetation within the development area from the total area within the assessment circles. Patch size and connectivity were assessed using GIS and air photo interpretation of native vegetation cover within the assessment circles and adjoining areas of native vegetation.

Connectivity

Impacts on connectivity are calculated by entering the 'primary link' for the development, which is the vegetated link that will experience the greatest change in connectivity as a result of the development.

The primary link for the development is an east west direction extending from vegetation flanking the Myall River to vegetation north of Toonang Drive and west of Miles Street. The width of this primary link is over 500 m and is characterised by:

- A tree canopy with <25% of the lower benchmark condition; and
- A groundcover with <25% of the lower benchmark condition.

Site Stratification

The study area was stratified into threatened species subzones. One threatened species subzone was created for each native vegetation type and broad condition state present within respective development or biobank sites across the study area. The area of each subzone was calculated using GIS.

The conservation status of each threatened species subzones zone within the study area was determined through GHD field survey of the site.

Site value data for each vegetation type was entered for each transect/plot field in each threatened species sub zone. Because this is a preliminary BioBanking assessment some subzones across the study area did not include the number of plot/transects specified in the methodology. In these instances, available plot data was duplicated. This would make a minor difference to the credit calculations. Once a final development footprint and biobank site layout has been determined additional plot/transect data would be collected to finalise the assessment.

Credit Calculations

Changes in site biodiversity values through the development of a site is the basis for calculation of biodiversity credits required to offset impacts. Complete clearing of vegetation for a development reduces the site values to zero. There are certain circumstances where portions of a development are managed such that some site value is retained. These circumstances include asset protection zones where only partial vegetation removal may be required. For the purposes of this assessment it is assumed that the entire development sites will be cleared and so the default decrease in site value was entered into the credit calculator. This assumes that vegetation and habitat would be completely removed within the development area.

Changes in site biodiversity values through management of a biobank site are the basis for calculation of biodiversity credits that would be available to offset impacts of a development. The credit calculations include a default gain in site value based on the standard management of a biobank site. There are certain circumstances where a biobank is managed such that there would be a greater increase in site value, for example intensive bush regeneration and tree planting. These circumstances include asset protection zones where only partial vegetation removal may be required. For the purposes of this assessment it is assumed that the entire biobank sites will be subject to standard management and so the default decrease in site value was entered into the credit calculator.

The methodology establishes two classes of biodiversity credits that may be created:

- Ecosystem credits – these are created or required for all impacts on biodiversity values (including threatened species that can be reliably predicted by habitat surrogates), except the threatened species or populations that require species credits; and
- Species credits – these are created or required for impacts on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Threatened species that require species credits are identified in the Threatened Species Profile Database (OEH, 2010b).

The credit calculator produces a number of reports, including the threatened species predicted to occur, survey effort required at the site and the biodiversity credit profile. These BioBanking assessment reports are appended to this BioBanking assessment.

The credit calculator reports the suite of threatened fauna species that are predicted to be associated with ecosystem credits generated for the development. That is, the threatened fauna species that are predicted to use habitat within the vegetation types at the site. Each of these species has a ‘Tg score’ that feeds into the ecosystem credit calculations. The fauna species with the lowest Tg score determines the overall credit requirement for the site. The lower the Tg score the greater the number of credits that are required to offset impacts on that species and all other species associated with the ecosystem credits. In certain cases, the fauna species with the lowest Tg score can be reliably excluded from occurring at the site and the credit calculations adjusted accordingly. No Tg score adjustments have been made for this assessment.

2.4.5 Assumptions and Amendments to the Methodology

The assumptions made for the purposes of this BioBanking assessment and credit calculations are as follows:

- Since field surveys for an ecological impact assessment to accompany the previous Part 3A Concept Application had already been performed (refer Cumberland Ecology, Feb 2011), it was assumed that no additional targeted threatened species surveys would be required for this assessment.
- Since assessments of significance of impacts on biodiversity to accompany a Part 3A Concept Application have already been prepared (refer Cumberland Ecology, Feb 2011), it is assumed that no additional assessment of red flag areas is required.
- The 100 hectare assessment circle was placed to 'capture' the greatest change in foliage projective cover within the development. GIS was then used to calculate percentage cover of vegetation and change in percentage cover of vegetation with the development.
- The condition of the vegetation for each threatened species sub zone was assigned based on a combination of plot/transects data (where available) and notional site attribute data.
- At least one plot/transect was collected for most Cumberland Ecology (2011) defined vegetation types identified to describe condition. Two vegetation types were not sampled directly with plot/transects: Blackbutt - Tallowwood dry grassy open forest of the southern North Coast and Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin. Plot/transect data for these vegetation types was entered as benchmark values.
- In some cases, less than the required number of plot/transects were sampled and so available plot data was duplicated within a threatened species sub zone.
- The same set of threatened species sub zones were used for each assessment to ensure consistent distribution of plot/transect data and to save assessment time, since this approach allowed plot/transect data to be imported into the credit calculator from assessments that had already been completed. Because of this approach the rules governing the minimum size of threatened species sub zones were varied; specifically, subzones with an area of less than 0.25 ha were entered instead of being included in adjoining subzones. On one occasion the area of a threatened species sub zone was actually zero (Melaleuca sieberi – Tall saw-sedge closed shrubland in moderate condition in the Original Development Footprint - west biobank as shown in Appendix A). The area of this sub zone was entered as '0.01 ha' which yielded zero biodiversity credits. Therefore this approach did not affect the credit estimates presented in this report.
- One set of assessment circles was used for this assessment. The 100 hectare circle was placed to capture the greatest possible change in vegetation cover as a result of the development or biobank.
- An additional increase in site value score with management was applied to all management zones in all biobank calculations. It is assumed that the offset package for the Project would include intensive management of the study area through supplementary planting, reinstatement of woody debris from development footprints etc.
- No Tg score adjustments have been made for this assessment.

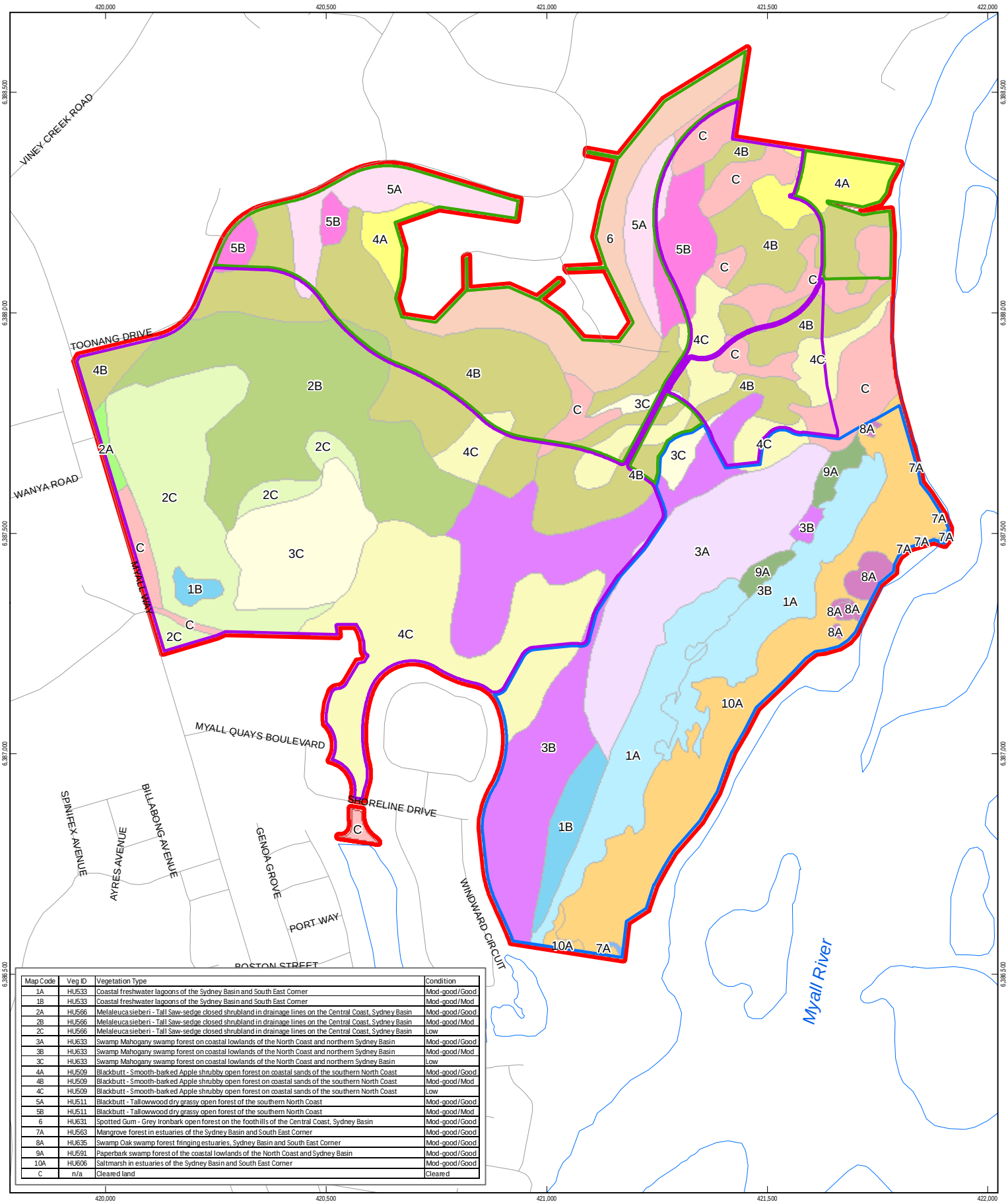
The assumptions above have been developed in consultation with the OEH BioBanking unit and have received in principal support.

2.5 Staff Qualifications

This BioBanking Assessment, including all BioBanking credit calculations, was prepared by Mark Aitkens. The assessment was peer reviewed by Daniel Williams. Staff qualifications are presented in Table 3.

Table 3 GHD Ecology Personnel and Qualifications

Name	Position / Project Role	Qualifications	Relevant Experience
Mark Aitkens	Senior Ecologist / desktop assessment, site surveys, credit calculations and reporting	BSc (Env Biology) BioBanking Assessor Accreditation*	1+ years
Chris Mason	Ecologist / site surveys	BSc	1+ years
Daniel Williams	Principal Environmental Consultant / Peer review, final credit calculation, consultation and planning	B. App. Sc. BioBanking Assessor Accreditation*	13+ years
Ben Harrington	Senior Ecologist / report compilation.	BSc, MSc (Physical Geography) BioBanking Assessor Accreditation*	7+ years
* Refer to OEH (2010c) list of accredited assessors.			



Map Code	Veg ID	Vegetation Type	Condition
1A	HU533	Coastal freshwater lagoons of the Sydney Basin and South East Corner	Mod-good/Good
1B	HU533	Coastal freshwater lagoons of the Sydney Basin and South East Corner	Mod-good/Mod
2A	HU566	Melaleucasieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	Mod-good/Good
2B	HU566	Melaleucasieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	Mod-good/Mod
2C	HU566	Melaleucasieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	Low
3A	HU633	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	Mod-good/Good
3B	HU633	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	Mod-good/Mod
3C	HU633	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	Low
4A	HU509	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	Mod-good/Good
4B	HU509	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	Mod-good/Mod
4C	HU509	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	Low
5A	HU511	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	Mod-good/Good
5B	HU511	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	Mod-good/Mod
6	HU631	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	Mod-good/Good
7A	HU563	Mangrove forest in estuaries of the Sydney Basin and South East Corner	Mod-good/Good
8A	HU635	Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner	Mod-good/Good
9A	HU591	Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin	Mod-good/Good
10A	HU606	Saltmarsh in estuaries of the Sydney Basin and South East Corner	Mod-good/Good
C	n/a	Cleared land	Cleared

LEGEND

Biobank East
Biobank West
Proposed Development Footprint
Study Area

Vegetation Types

1A, 1B, 2A, 2B, 2C, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 6, 7A, 8A, 9A, 10A, C

1:8,000 Paper Size A3

0 40 80 160 240 320

Meters

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

O

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Crighton Properties Pty. Ltd.
Riverside at Tea Gardens - BioBanking Assessment

Job Number 22-15960
Revision A
Date 22 Dec 2011

Vegetation and Preferred Development & Conservation Footprint Option

Figure 3

N:\AU\Newcastle\Projects\22\15960\GIS\Maps\Deliverables\22_15960_05_VegetationTypes_Rev_A_.mxd

Level 3, 24 Honeysuckle Drive, Newcastle NSW 2300 Australia T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:rphamer

3. Existing Environment

3.1 Site Context

The study area is located in the 'Hunter/Central Rivers' CMA region; the 'Karuah Manning' CMA sub-region; and falls within the Myall - Forster Barrier System Mitchell Landscapes (DECC, 2008).

The study area is characterised by various native vegetation types with differing condition status ranging from cleared land, low to moderate/good condition native vegetation.

The eastern portion of the site contains intact native vegetation in moderate to good condition. There is a mixture of estuarine, wetland and forest vegetation types that appears to vary with local drainage.

Vegetation in the western portion of the site appears to have been influenced by past land uses more than environmental factors. Trees in the western parts of the site are remnant from prior natural vegetation cover and are characteristic of the tree canopy structure that occurred prior to clearing (i.e. emergent tall trees above a predominantly thick canopy mostly comprising *Melaleuca* spp.).

3.2 Vegetation

Cumberland Ecology (Feb 2011) vegetation mapping was ground-truthed during the GHD site survey and matched to OEH (2011b) NSW Vegetation Types and BioBanking condition classes. Vegetation types within the study area are mapped on Figure 3. .

Condition aside, vegetation types vary from east to west in accordance with soil character and hydrological conditions (e.g. elevation contours). The eastern parts of the study area have proportionally greater sand content at surface when compared to soils of the western parts of the study area, which are more clayey in structure.

Vegetation in the east is characterised by vegetation types typically found on coastal sand masses such as dry shrubby forests comprising tree canopy species such as Blackbutt, Scribbly Gum, Red Bloodwood and Smooth-barked Apple (e.g. Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast). These dry shrubby vegetation types generally form on soils with greater than 1-2 m depth to groundwater and are regarded as obligate (i.e. reliant on groundwater resources) to facultative (i.e. partially reliant on groundwater resources) groundwater dependant (Bell and Driscoll, 2006).

Vegetation characterised by swamp sclerophyll species such as Swamp Mahogany and Broad-leaved Paperbark are obligate groundwater dependant and typically occur on sandy soils with decreasing depth to groundwater (e.g. <1 m depth to groundwater; Bell and Driscoll, 2006). Further decreases in depth to groundwater favour the formation of paperbark thickets and coastal wetlands with increased salinity influence from the Myall River enabling the formation of rushlands, salt marsh, Swamp Oak forests and mangrove woodlands.

The vegetation in the western parts of the site, where the soils are influenced by increasing levels of silt and clay, are responsive to a variety of factors, including impeded drainage (i.e. flat poorly draining lands or natural closed depressions) and depth to groundwater. These soil and

hydrological conditions give rise to complex arrangements of vegetation in terms of type and structure.

For instance, the review of the Cumberland Ecology (2011) vegetation map identified two different vegetation types within the area broadly mapped as Swamp Mahogany swamp woodland. Vegetation types identified in this area include:

- *Melaleuca sieberi* - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin; and
- Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

This area also included complex ecotone characteristics between these vegetation types (e.g. ecotone width, vegetation structure and floristic composition). These observations are consistent with the gradual change in determinant environmental resources (i.e. water availability and soil conditions) from north to south (i.e. elevated moist soils in the north grading to wet to inundated soils in a closed depression to the south).

3.3 Habitat Resources

Areas of moderate and good condition vegetation within the study area are equivalent to undisturbed vegetation for the majority of BioBanking site attribute variables (over-, mid- and understorey vegetation cover, weed cover, quantities of woody debris and over storey regeneration).

Drainage channels are largely undefined due to the relatively uniform gradient across the study area with the exception of steeper lands located at the northern edge of the study area. Water generally moves via overland flow down gradient into porous sandy soils in the central and eastern parts, into a natural closed depression at the western edge of the study area or via excavated drainage channels that drain the study area from west to east. Semi-permanent to permanent water accumulations are restricted to the excavated drainage channels, the closed depression at the western margin of the study area and throughout the swamp sclerophyll forests located between the development footprint options and the Myall River.

Habitat resources such as loose surface rock, rock outcrops and fallen logs are absent from the cleared and partly cleared parts of the study area as are caves, mine shafts, bridges and other cavernous structures. Only within the naturally vegetated parts of the study area, comprising moderate to high vegetation condition, are their noticeable accumulations of fallen logs. The study area contains relatively few hollow-bearing trees with most being restricted to lands that would be conserved in the eastern biobank with some of these occurring near to excavated drainage channels.

3.4 Habitat Connectivity

The study area forms part of the Nerong – Pindimar regional corridor, which provides a link between Nerong Waterholes and Kirks Knoll (Scotts, 2003 in Cumberland Ecology, 2011). The regional corridor extends from the west to north-east and covers part of the central and northern portion of the study area (Cumberland Ecology, 2011).

At the local scale fauna movements are restricted by the Myall River (i.e. hostile barrier to small to medium sized ground mammals, most arboreal mammals, frogs and small reptiles). However, these restrictions do not necessarily apply to most bird species, bats and larger mammals and reptiles where movements between the study area and Myall Lakes National Park are possible.

The majority of local movements for most fauna species are restricted to vegetation on the eastern margin of the study area and vegetation to the west and northwest. Movements through the partially cleared and cleared lands in the study area would be required and may act as a partial barrier for smaller species prone to predation. Larger species have the potential to move through the study area, however, this movement is impeded due to existing fencing (cyclone and barbed wire).

Table 4 Vegetation Types within the Study Area

Vegetation Type (OEH, 2011b)	Veg. ID (OEH, 2011b)	Conservation Significance	Description
Saltmarsh in estuaries of the Sydney Basin and South East Corner	HU606	EEC TSC Act	Characteristic species include *Sporobolus virginicus*, *Sarcocornia quinqueflora* and *Samolus repens* grading into freshwater wetlands and swamp sclerophyll forests with the ecotone comprising *Juncus kraussii* and *Baumea juncea*.
Coastal freshwater lagoons of the Sydney Basin and South East Corner	HU533	EEC TSC Act	Open swamp forests with an overstorey characterised by the shrub *Melaleuca ericifolia*. The ground layer is wet and dominated by sedges and rushes, including *Juncus kraussii* and *Baumea juncea*. Other common ground layer species include the herb *Samolus repens*. This community occurs within the study area on margins of brackish water bodies and watercourses on floodplains of the lower North coast and Central Coast.
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	HU566	EEC TSC Act	Woodlands characterised by a canopy, including Smooth-barked Apple and Red mahogany and mid storey of tall shrubs and small trees typically dominated by paperbarks (*Melaleuca sieberi* and *Melaleuca nodosa*) and often including *Leptospermum juniperinum* and *Allocasuarina littoralis*. The understorey is typically shrubby and characterised by species including *Pultenaea paleacea*, *Leptospermum juniperinum*, *Melaleuca thymifolia*, *Banksia oblongifolia*, *Epacris pulchella* and *Acacia longifolia*. The ground layer is characterised by numerous sedges and other grass like species commonly including *Lepyrodia scariosa*, *Empodisma minus*, *Ptilothrix deusta*, *Chorizandra cymbaria*, *Gahnia clarkei* and *Schoenus brevifolius*. Various

Vegetation Type (OEH, 2011b)	Veg. ID (OEH, 2011b)	Conservation Significance	Description
			grass species are also common in the ground layer, although less dominant, including *Entolasia stricta*, *Hemarthria uncinata*, *Themeda australis* and *Panicum simile*. In addition, various forbs may also be present in the ground layer such as *Gonocarpus tetragynus*, *Gonocarpus micranthus* and *Goodenia bellidifolia*.
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	HU663	EEC TSC Act	Open swamp forests with an overstorey dominated by Broad-leaved Paperbark and Swamp Mahogany and a mid storey of tall shrubs, including *Melaleuca sieberi*, *Glochidion ferdinandi* and *Acacia longifolia*. The ground layer is typically wet and dominated by sedges and other graminoids, including *Gahnia clarkei* and *Baumea juncea*. Ground ferns, in particular *Blechnum indicum*, are also common components of the ground layer. Forbs, including aquatic or semi aquatic species such as *Villarsia exaltata*, may be common, with other forbs, including *Goodenia paniculata*, *Goodenia heterophylla* and *Gonocarpus micranthus*.
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	HU509		A variable vegetation type characterised by numerous canopy species in differing proportions. Vegetation comprising various combinations of Blackbutt, Smooth-barked Apple, Red Bloodwood and Scribbly Gum occur on the sandier soils in the central and eastern parts of the study area. The understorey is typically shrubby and commonly includes *Ricinocarpos pinifolius*, *Acacia ulicifolia*, *A. suaveolens*, *Persoonia levis*, *Leucopogon lanceolatus*, *Bossiaea rhombifolia* and *Hibbertia linearis* as well as the climbers *Hardenbergia violace* and *Billardiera scandens*. The ground layer is often dominated by *Pteridium esculentum* and grasses, including *Themeda australis* and

Vegetation Type (OEH, 2011b)	Veg. ID (OEH, 2011b)	Conservation Significance	Description
			Imperata cylindrica, with various grass like species, including *Dianella caerulea* and *Lomandra longifolia* also common as well as scattered forbs, including *Gonocarpus teucrioides* and *Pomax umbellata*. Open forests characterised by an overstorey dominated by Smooth-barked and White Stringybark often in association with Swamp Mahogany where soils are seasonally waterlogged occur in the north western portion of the study area. A mid layer of tall shrubs and small trees is typically present and dominated by paperbarks, including *Melaleuca sieberi, M. linariifolia* and *M. nodosa* and commonly also includes *Allocasuarina littoralis* and *Leptospermum polygalifolium*. The shrubby understorey typically consists of a relatively diverse range of smaller shrubs, including *Pultenaea villosa*, *Pultenaea retusa*, *Dodonaea triquetra*, *Persoonia levis*, *Daviesia ulicifolia* and *Epacris pulchella* and scrambling climbers, including *Billardiera scandens, Kennedia rubicunda* and *Hardenbergia violacea*. The understorey is typically dominated by grasses, in particular *Themeda australis* and *Entolasia stricta* along with others such *Panicum simile* and *Paspalum orbiculare*, and grass like plants, including *Lomandra longifolia*, *Schoenus apogon*, *Dianella caerulea* and *Baumea teretifolia*. Numerous forbs are typically also present in the ground layer and commonly include *Gonocarpus tetragynus*, *Hydrocotyle peduncularis* and *Goodenia paniculata* along with ferns, including *Lindsaea linearis*.
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	HU511		Cumberland Ecology (2011) described this community as follows: “the tree stratum is dominated by *Eucalyptus*

Vegetation Type (OEH, 2011b)	Veg. ID (OEH, 2011b)	Conservation Significance	Description
			microcorys (Tallowwood), *Eucalyptus globoidea* (White Stringybark), *Eucalyptus resinifera* subsp*. resinifera* (Red Mahogany) and *Acacia irrorata* subsp*. irrorata* (Green Wattle). Other tree species occurring in this community include *Angophora costata* (Smooth-barked Apple) and *Corymbia gummifera* (Red Bloodwood). The tree stratum ranges in height from 12-18m. Common species in the shrub stratum include *Melaleuca linariifolia* (Snow in Summer), *Callistemon salignus* (Willow Bottlebrush), *Leptospermum polygalifolium* (Lemon Scented Tea-tree), *Melaleuca nodosa* (Ball Honeymyrtle), *Melaleuca sieberi* and the exotic *Lantana camara* (Lantana). The shrub stratum ranges in height from 1-5m. Common groundcover species include *Brunoniella pumilio* (Dwarf Blue Trumpet), *Pratia purpurascens* (Whiteroot), *Gahnia clarkei* (Tall Saw-sedge), *Lomandra longifolia* (Spinyheaded Mat-rush), *Entolasia stricta* (Wiry Panic), *Imperata cylindrica* var*. major* (Blady Grass), *Microlaena stipoides* var*. stipoides* (Weeping Meadow Grass) and *Oplismenusimbecillis*. The understorey of this community is predominantly comprised of regrowth Melaleuca species as a result of previous land use. This community is not significant impacted by weed invasion. Some weed invasion is evident in the areas surrounding the drainage line flowing through

Vegetation Type (OEH, 2011b)	Veg. ID (OEH, 2011b)	Conservation Significance	Description
			this community."
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	HU631		Cumberland Ecology (2011) described this community as follows: dominant species in the tree stratum are *Corymbia maculate* (Spotted Gum) and *Eucalyptus paniculata* subsp. *paniculata* (Grey Ironbark). There are also frequent occurrences of *Eucalyptus propinqua* var. *propinqua* (Small Fruited Grey Gum), *Eucalyptus fergusonii*, *Eucalyptus globoidea* (White Stringybark) and *Eucalyptus resinifera* subsp. *resinifera* (Red Mahogany). The tree stratum ranges in height from 15- 25m. Common species in the shrub stratum include *Pultenaea villosa*, *Melaleuca nodosa* (Ball Honeymyrtle), *Leptospermum polygalifolium* (Lemon Scented Tea-tree) and *Breynia oblongifolia* (Coffee Bush). The shrub stratum ranges in height from 0.2-3.5m. Common species in the groundcover stratum include *Dichondra repens* (Kidney Weed), *Pratia purpurascens* (Whiteroot), *Themeda australis* (Kangaroo Grass), *Entolasia stricta* (Wiry Panic), *Brunoniella pumilio* (Dwarf Blue Trumpet), *Lagenifera stipitata* (Blue Bottle-daisy), *Lomandra longifolia* (Spiny- headed Mat-rush), *Dianella caerulea* var. *producta* (Blue Flax lily) and the exotic *Conyza bonariensis* (Flaxleaf Fleabane) and *Axonopus fissifolius* (Narrow-leaved Carpet Grass). The groundcover stratum ranges in height from 0-2m. The

Vegetation Type (OEH, 2011b)	Veg. ID (OEH, 2011b)	Conservation Significance	Description
			vines *Glycine clandestina* (Twining Glycine), *Glycine microphylla* and *Glycine tabacina* were also recorded in this community. This community has been impacted by underscrubbing activities, most likely as result bushfire protection activities for the houses situated upslope. Native species continue to persist in this community, with only localised occurrences of exotic species. Both the canopy and shrub stratum are comprised of native species. Exotic species occupy approximately 5-10% of the groundcover stratum."
Mangrove forest in estuaries of the Sydney Basin and South East Corner	HU563		Low open forests to low closed forests dominated by *Avicennia marina*, often in association with *Aegiceras corniculatum*. The understorey typically includes a sparse cover of small shrubs including *Suaeda australis* and *Sarcocornia quinqueflora* and graminoids including *Juncus kraussii* and *Triglochin striata*. The ground layer is typically also sparsely vegetated and is characterised by *Sporobolus virginicus*.
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner	HU635	EEC TSC Act	Open swamp forests with an overstorey characterised by *Casuarina glauca*, and with the main understorey shrub being *Melaleuca ericifolia*. The climber *Parsonsia straminea* is also a common component of the mid and overstorey. The ground layer is wet and dominated by sedges and rushes, including *Juncus kraussii*, *Baumea juncea* and *Phragmites australis*. Other common ground layer species include the grass *Sporobolus virginicus* and the herb

Vegetation Type (OEH, 2011b)	Veg. ID (OEH, 2011b)	Conservation Significance	Description
			Samolus repens.
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin	HU591	EEC TSC Act	Open swamp forests characterised by a canopy strongly dominated by *Melaleuca quinquenervia* and commonly including *Casuarina glauca* and *Eucalyptus robusta*. An open shrub layer may be present and typically includes *Glochidion ferdinandi* and *Acacia longifolia*, along with the climber *Parsonsia straminea*. The ground layer is typically wet and dominated by sedges and other graminoids, including *Gahnia clarkei* and *Baumea juncea*. Ground ferns, in particular *Blechnum indicum*, are also common components of the ground layer.

3.5 Conservation Significance

Threatened Flora Species

No additional threatened flora species have been identified within the study area during present or prior field surveys. Suitable habitat for cryptic species exists, such as the Leafless Tongue Orchid (*Cryptostylis hunteriana*), which requires detailed seasonally appropriate targeted surveys to determine whether any further assessment is required (i.e. species credits). Targeted surveys completed by Conacher Environmental indicate this species is not present on the site.. Details of this survey effort and timing would be included in the offsets package.

Endangered Ecological Communities

As shown in Table 4, a number of the vegetation communities within the study area correspond to EECs (Cumberland 2011) listed under the TSC Act:

- Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions
- Freshwater wetlands on coastal floodplains of the NSW North Coast; Sydney Basin and South East Corner bioregions
- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions
- Swamp Sclerophyll Forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions.

The distribution of the above listed EEC's is the subject of the assessment by Cumberland Ecology (Dec 2011). The Cumberland assessment considers the distribution of these EEC's in accordance with the Scientific Committees Determination, including the influence of the soil profile.

In regards this BioBanking assessment, the default EEC status of vegetation types within the study area was included i.e. vegetation types which are described as EECs in the NSW Vegetation Types database (OEH, 2011a) were entered as EECs. The EEC status of vegetation types does not affect the number or type of ecosystem credits and so does not have a direct bearing on the quantum of offsets estimated in this report.

No EECs listed under the EPBC Act were identified in the study area or are otherwise of relevance to this assessment.

Threatened Fauna Species

The following threatened fauna have been recorded in the study area (Cumberland Ecology, Feb and Dec 2011):

- Wallum Froglet (*Crinnia tinnula*)
- Varied Sitella (*Daphoenositta chrysoptera*)
- Little Lorikeet (*Glossipsitta pusilla*)
- Black Bittern (*Ixobrychus flavicollis*)
- Osprey (*Pandion haliaetus*)
- Barking Owl (*Ninnox connivens*)
- Squirrel Glider (*Petaurus norfolcensis*)

- Koala (*Phascolarctos cinereus*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Common Blossom-bat (*Syconycteris australis*)
- Little Bentwing-bat (*Miniopterus australis*)
- Eastern Bentwing-bat (*Miniopterus screibersii oceanensis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).

All these species are listed as Vulnerable under the TSC Act. The Koala also forms part of an endangered population in the Hawks Nest and Tea Gardens area. The Grey-headed Flying-fox is also listed as Vulnerable under the EPBC Act.

The Wallum Froglet and the Koala population have been assessed in order to generate species credits as described in Section 4.

4. BioBanking Credit Calculations

4.1 Approach

The application of the BioBanking methodology was applied in a two-stage approach at the development site, a rapid assessment to allow for initial offsets planning and then a complete BioBanking assessment in accordance with the methodology.

Development has been largely proposed over lands in low to moderate condition with vegetation in better condition largely present within the proposed biobank sites. The orientation of developments to biobanks would result in changes in the landscape through changes to the primary link, total vegetation cover and associated vegetation condition.

For the rapid assessment of the development area, available and extrapolated data was entered into Version 1.2 of the credit calculator to estimate the number of credits that would need to be purchased and retired if the entire development area was included in an application for a BioBanking statement. The detailed assessment then included the collection of data according to the BioBanking methodology and entry of that data into Version 1.2 of the credit calculator to calculate the credit impact for the development site.

For the two biobank sites, data was collected according to the BioBanking methodology and entered into the calculator to calculate the number of credits that will be generated if a BioBanking agreement was obtained for each site.

The complete BioBanking Credit Reports for the development and biobank options are included as Appendices A to C.

This BioBanking assessment was completed by Mark Aitkens (Assessor Accreditation no. 101) and Daniel Williams (Assessor Accreditation no. 0082). It is based on available and extrapolated data and provides a reliable estimate for the purposes of calculating the quantum of offsets required for the Project. However, as stated in Section 2.4, data has not been collected in accordance with the strict application of the methodology and so should be considered a notional assessment for the purposes of generation and sale of biodiversity credits. The final Offsets Package for the development would need to be developed in consultation with OEH and require additional assessment. The final BioBanking Agreements would require a more detailed assessment, including additional site surveys.

4.2 BioBanking Credit Comparison

4.2.1 Ecosystem Credits

The BioBanking ecosystem credit comparison between the four development footprint options and the associated biobank sites is presented in Table 5 and Table 6. The BioBanking methodology states that impacts of a development on biodiversity values must be offset by the retirement of biodiversity credits at the biobank site determined in accordance with the offset rules. These rules may be altered or may not apply when the Project is being assessed under Part 3A of the EP&A Act using the variation criteria stated in Attachment B of the OEH (2011a) policy.

The offset rules state that ecosystem credits that are retired from a biobank site are determined to be compatible with those required by impacts at the development site if a number of conditions are met, including that “the number of ecosystem credits obtained and retired from the biobank site is

equal to or greater than the number of credits required at the development site" (DECC, 2009).

There is an overall deficit of ecosystem credits and a deficit of credits for the majority of ecosystem credit types as shown in Table 5 and Table 6. Therefore additional biodiversity credit contributions from an offsite biobank would be required for all four development footprint options.

The BioBanking methodology includes criteria for the protection of Red Flag areas and rules for the trading of biodiversity credits that must be strictly applied to BioBanking statements. If these criteria are met, then a development is deemed to have met an 'improve or maintain' standard and a BioBanking statement can be obtained. BioBanking assessments for major projects may include variations to these criteria in accordance with the OEH (2011a) policy. Depending on the type and degree of variation a major project may achieve a 'Tier 1 - Improve or Maintain', 'Tier 2 – No Net Loss' standard or 'Tier 3 - Mitigated Net Loss Standard'. DPI considers the standard of biodiversity assessment achieved in the decision making process when determining major projects (OEH, 2011a).

The OEH (2011a) policy states that if Red Flag areas are only partially protected in a Project BioBanking assessment, then the Project will achieve at best a 'Tier 2 – No Net Loss' standard. If the BioBanking assessment also includes a variation applied to offset type then the Project would achieve a 'Tier 3 - mitigated net loss standard'.

Red Flag areas will not be protected within the development area and so the Project would achieve at best a 'Tier 2 – No Net Loss' standard.

Based on the onsite biobanks included in this assessment, not all biodiversity credits within the development area would be fully offset with matching biodiversity credits and so this BioBanking assessment would achieve a Tier 3 - mitigated net loss standard. However the proponent would consider options for other off site biobanks for inclusion in the final offset package for the Project. Additional, suitable biobank sites would be located, to the best of the proponent's ability, in order to address the biodiversity credit shortfall. If a full complement of matching ecosystem credits could be located in offsite biobanks then it would be possible to achieve a 'Tier 2 – No Net Loss' standard. It may also be appropriate to include extra ecosystem credits in the final offsets package to further compensate for impacts on over cleared vegetation types (see below).

The proposed biobanks would generate a credit surplus for five of the vegetation types in the study area. The OEH (2011a) variation criteria would permit trading of these ecosystem credits with other vegetation types for which there is a deficit as part of the overall offsets package.

Table 5 Biodiversity Credit Summary for Original Development Footprint and Biobanks

Vegetation type	Area Impacted	Credits Required	Area retained WEST	Credits generated WEST	Area retained EAST	Credits generated EAST	Credit Balance
Saltmarsh in estuaries of the Sydney Basin and South East Corner					16.89	103	103
Coastal freshwater lagoons of the Sydney Basin and South East Corner	2.81	111			14.37	134	23
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	32.79	1556	0.57	4			-1552
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	26.45	993			15.5	124	-869
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	52.35	1754	9.19	89			-1665
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	4.75	190	7.37	52			-138
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin			9.23	57			57
Mangrove forest in estuaries of the Sydney Basin and South East Corner					0.25	1	1
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner					1.22	7	7
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin					1.33	12	12
Totals	**119.15**	**4604**	**26.36**	**202**	**49.56**	**381**	**-4021**
Koala population	83.55	1007	25.6	154	31.2	187	-666
Wallum Froglet	29.26	390			15.5	93	-297

Table 6 Biodiversity Credit Summary for Amended Development Footprint and Biobanks

Vegetation type	Area Impacted	Credits Required	Area retained WEST	Credits generated WEST	Area retained EAST	Credits generated EAST	Credit Balance
Saltmarsh in estuaries of the Sydney Basin and South East Corner					16.56	101	101
Coastal freshwater lagoons of the Sydney Basin and South East Corner	0.6	23			17.31	158	135
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	31.4	1491	1.79	13			-1478
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	19.3	731			21.66	182	-549
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	44.6	1479	18.78	159			-1320
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	2.9	108	9.15	65			-43
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin			9.32	57			57
Mangrove forest in estuaries of the Sydney Basin and South East Corner					0.34	2	2
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner					1.11	6	6
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin					1.33	12	12
Totals	**98.8**	**3832**	**39.04**	**294**	**58.31**	**461**	**-3077**
Koala population	65	783	25	150	23	138	-495

Vegetation type	Area Impacted	Credits Required	Area retained WEST	Credits generated WEST	Area retained EAST	Credits generated EAST	Credit Balance
Wallum Froglet	20	267			38	228	-39

Table 7 Biodiversity Credit Summary for PAC Development Footprint and Biobanks

Vegetation type	Area Impacted	Credits Required	Area retained WEST	Credits generated WEST	Area retained EAST	Credits generated EAST	Credit Balance
Saltmarsh in estuaries of the Sydney Basin and South East Corner					16.91	108	108
Coastal freshwater lagoons of the Sydney Basin and South East Corner	0.6	23			16.59	155	132
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	33	1554	1.79	13			-1541
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	7.6	270			33.74	289	19
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	29.6	990	18.78	159			-831
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	2.9	111	9.15	65			-46
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin			9.32	57			57
Mangrove forest in estuaries of the Sydney Basin and South East Corner					0.23	2	2
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner					1.22	7	7

Vegetation type	Area Impacted	Credits Required	Area retained WEST	Credits generated WEST	Area retained EAST	Credits generated EAST	Credit Balance
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin					1.33	11	11
Totals	**73.7**	**2948**	**39.04**	**294**	**70.02**	**572**	**-2082**
Koala population	38	458	25	150	49.7	298	-10
Wallum Froglet	8.5	113			51.7	310	197

Table 8 Biodiversity Credit Summary for Proposed Development Footprint and Biobanks

Vegetation type	Area Impacted	Credits Required	Area retained WEST	Credits generated WEST	Area retained EAST	Credits generated EAST	Credit Balance
Saltmarsh in estuaries of the Sydney Basin and South East Corner					16.83	105	105
Coastal freshwater lagoons of the Sydney Basin and South East Corner	0.58	23			16.6	157	134
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	33.15	1573	0.43	3			-1570
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	17.4	648			23.94	207	-441
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	40.06	1327	22.66	207	3.76	35	-1085
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	3.21	104	8.81	64			-40
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin			9.33	58			58

Vegetation type	Area Impacted	Credits Required	Area retained WEST	Credits generated WEST	Area retained EAST	Credits generated EAST	Credit Balance
Mangrove forest in estuaries of the Sydney Basin and South East Corner					0.23	1	1
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner					1.22	7	7
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin					1.33	11	11
Totals	**94.4**	**3675**	**41.23**	**332**	**63.91**	**523**	**-2820**
Koala population	50	602	8.8	53	24.7	148	-401
Wallum Froglet	8.8	117			42.5	255	138

4.2.2 Species Credits

The geographic and habitat questions in Step 2 of the credit calculator were answered based on information obtained in the desktop assessment and field surveys. The credit calculator combines this information with the vegetation and landscape data to generate lists of the threatened species predicted to occur at the site and those requiring targeted survey. Since an ecological impact assessment to accompany a Part 3A Concept Application has already been performed it is assumed that no additional targeted threatened species surveys would be required for this assessment.

The results from targeted surveys for threatened species are entered into the credit calculator in Step 5e 'Enter Threatened Species Survey Results'. For each species, the credit calculator requires a 'Yes' or 'No' answer for the question, 'Is the species impacted by the development?' Answers must be justified by recording the Identification Method as either 'Survey', 'Assumed Presence' or 'Expert Report'.

Those species determined to be present in the study area and requiring calculation of species credits include:

- Koala
- Wallum Froglet.

The BioBanking species credit comparison between the four development footprint options and the associated biobank sites is presented Table 5 and Table 6. The PAC and preferred development footprints would yield a surplus of Wallum Froglet species credits. All four development footprint options would result in a shortfall of Koala population species credits.

The Project ecological assessments were considered to provide reliable evidence that no other species would be affected by the development. Therefore in all other cases the data was entered as 'No' and 'Survey'.

The development areas contain a red flag area for greater than the allowed magnitude of impacts on the Koala population (refer Appendices A, B, C). Since the Project is subject to a Part 3A Concept Application and a BioBanking Statement is not being obtained, then no further assessment of red flag areas is required.

4.3 Biodiversity Offset Site Management Framework

The BioBanking assessment for the Project will identify biodiversity offset (biobank) sites that will be formally titled and conserved under BioBanking Agreements. To deliver the biodiversity outcomes required by a BioBanking Agreement, the following biodiversity management framework would be implemented at the biobank sites:

- ***Conservation*** – A 'conservation covenant' would be placed over the biobank sites in perpetuity. This covenant extinguishes all potential future land uses other than exploration/mining rights.
- ***Vegetation Rehabilitation*** – Existing vegetation would have a 'targeted' weed control program applied to improve 'condition' throughout the biobank sites. Revegetation activities would increase the extent of native vegetation, through time, of the biobank sites. It is recommended these works be completed within the first five to ten years of management of the biobank sites.
- ***Maintenance and monitoring*** – An annual maintenance and monitoring regime would be applied to the biobank sites in perpetuity to ensure improvements in ecological values are

maintained.

4.3.1 Conservation Covenant (BioBanking Agreement)

Entering into a BioBanking Agreement places a conservation covenant over the land, regardless of zoning. The covenant is the strongest available on private lands and extinguishes all land uses other than conservation. There are circumstances where additional approval from the NSW Minister for the Environment may overturn the covenant for mining rights and, potentially, significant infrastructure but the BioBanking methodology includes mechanisms to ensure any impacts from these activities are, again, suitably offset as an addition to any offsetting activities required by a given project in its own right. Details of this policy can be provided by the BioBanking Unit.

BioBanking Agreements include detailed contractual and financial obligations on the landowner and the purchaser and, in the absence of draft BioBanking Agreements (including the draft detailed management actions plan and contractual obligations on both parties.

4.3.2 Management Actions

A Management Actions Plan (prepared in accordance with the BioBanking Methodology), detailing rehabilitation activities and an associated management program, would be prepared and included in the final BioBanking agreements. The Management Actions Plan (MAP) forms the basis of the funds required to be placed in the BioBanking Trust when purchasing the credits. The BioBanking Trust then funds the biobank site owner to implement the MAP.

Biobank sites may have two types of management actions applied:

- Standard Management Actions.
- Site Specific Management Actions.

Standard management actions are those actions required on biobank sites to improve vegetation condition when entering into a BioBanking agreement. The standard management actions for all biobank sites are:

- Management of grazing for conservation
- Weed control
- Management of fire for conservation
- Management of human disturbance
- Retention of regrowth and remnant native vegetation
- Replanting or supplementary planting where natural regeneration would not be sufficient
- Retention of dead timber
- Erosion control
- Retention of rocks

Based on the habitat resources within the site and the suite of threatened species which are predicted to occur, the credit calculator nominates management actions that would be required to alleviate site-specific threats. Undertaking these actions is over and above the minimal requirements for a biobank site and includes measures such as:

- Cat and/or Fox control
- Control of feral and/or overabundant native herbivores (e.g. rabbit, goats, deer etc)
- Maintain or reintroduce flow regimes (aquatic flora)

The MAP will identify site specific vegetation rehabilitation and management actions appropriate for the biobank site which would be completed during the preparation of the BioBanking Agreement.

4.3.3 Monitoring of Biobank Sites

The biobank owner is then required to submit standards reports, outlining the works completed, their success and monitoring results. OEH review the reports and, if works have been completely satisfactorily, provide the next payment for the following years work. The OEH also include site visits as part of their auditing process.

Biobanking plot/transects were sampled within the biobank site and would form the baseline for monitoring of the condition of the biobank site. The BioBanking Agreement for this site would include detailed monitoring requirements which would use these plots as their focus. Further, once the Agreement has been signed by the landholder it becomes their responsibility to undertake all monitoring and the results of such would be assessed when the OEH BioBanking Trust provides management funds at the beginning of each year.

4.3.4 Compliance Assurance

The BioBanking Scheme includes a range of provisions to ensure delivery of the conservation outcomes. The OEH have the authority to:

- Enforce the provisions of the conservation covenant placed over the land.
- Adjust rehabilitation and management actions program depending on how the site responds.
- Include contingency for things such as ‘natural disasters which may impact on the success or otherwise of the program.
- Take legal actions against biobank site owners for non-compliance including, as a last resort, acquisition of the land.

5. Justification and Benefits of Proposed Development/Conservation Footprint

5.1 Development/Conservation Footprint Options Assessment

BioBanking has been used to estimate the quantum of offsets that would be required to compensate for impacts of the Project. This process has been applied to multiple development scenarios to optimise the balance between development and conservation footprints across the study area. Four potential development footprints have been considered as shown on Figure 2:

- The original development footprint (November 2009), based on the original concept design for the study area.
- The Planning Assessment Commission (PAC) footprint.
- The amended development footprint (February 2011) based on the results of the Cumberland Ecology assessment (February 2011).
- The proposed development footprint (December 2011), developed with specific reference to the supplementary GHD site survey data and detailed mapping to minimise impacts on native biodiversity.

The proposed development footprint was identified based on consideration of the credit impact rates (associated with development) and the credit generation rates (associated with conservation lands on-site). GHD's review of the results indicated the PAC boundary had included areas with lower credit impact rates than some of the areas proposed by the current development indicating that some areas of lower ecological values (predominately in the south and north east of the site) proposed for conservation were no different (and in some cases lower) than areas proposed by the PAC for development. It could therefore be argued that these areas outside the PAC boundary are just as suitable for development as areas proposed by the PAC. Similarly areas in the north of the site proposed for development by the PAC included vegetation of high ecological value and would be better suited to conservation. The outcome of this assessment is presented in Table 9.

For all development footprint options considered, there is a biodiversity credit deficit i.e. additional off site biobank site(s) would be required. The proposed development footprint has achieved a reduction in the credit deficit of 1201 ecosystem credits from the original development and a further 257 ecosystem credits or 8% compared to the amended development footprint. It should also be noted that the proposed PAC development footprint will also require significant biodiversity offsets (80 % of the total biodiversity credits required for the development footprint), including an estimated area of 190-270 ha to be secured off site. This BioBanking assessment has been able to increase the development lot yield while achieving economies in the number of biodiversity credits required by concentrating development in poorer condition vegetation: the preferred development footprint is 28% larger than the PAC development footprint but would only result in a 25% increase in the number of ecosystem credits required.

Table 9 Comparison between the Development Footprint Options Credits Required and Biobank Credits Contribution

Name	Original development footprint	PAC development footprint	Amended development footprint	Proposed development footprint
Area Impacted (ha)	`	73.7	98.8	94.4
Ecosystem credits required	4604	2948	3832	3675
Area retained- West biobank (ha)	26.36	39.04	39.04	41.23
Ecosystem credits generated – West biobank	202	294	294	332
Area retained - East biobank (ha)	49.56	70.02	58.31	63.91
Ecosystem credits generated – East biobank	381	572	461	523
Ecosystem Credit Balance	**-4021**	-2082	**-3077**	**-2820**
Estimated off site biobank requirement (ha) (1)	**509.28**	263.70	**389.72**	**357.17**
Estimated Size Range off site biobank requirement (ha)	**380-515**	190-270	**290-395**	**260-360**
Koala population species credits	-666	-10	-495	-401
Wallum Froglet species credits	-297	197	-39	138

Note: (1) It is difficult to estimate the size of offsite biobanks required as it depends on the ecological condition and other landscape factors. GHD has provided the above figures using a constant (though conservative) multiplier for comparison purposes only. The estimate quoted is expected to be an 'upper limit'.

5.2 Proposed Development/Conservation Footprint

The proposed development/conservation footprint is considered the most appropriate layout for the study area, considering its residential zoning, and based on the following criteria:

- A reduction in the credit impact of over 1,200 credits when compared to the original development footprint due to additional avoidance measures adopted by the project since this time including:
  - Removing development proposed in the southern corner of the site and adding these lands to proposed conservation lands.
  - Reducing the development scale in the north eastern corner of the site and providing additional lands for conservation.
  - Increasing the east-west corridor to a minimum width of 200 m throughout.
- Achieving economies in the number of biodiversity credits required by concentrating development in poorer condition vegetation as shown by:
  - An overall ratio of 38.9 credits per hectare for the proposed development footprint, versus
  - An overall ratio of 40 credits per hectare for the PAC development footprint.
- The proposed biobanks include all vegetation types being impacted within the preferred development footprint. This ensures that the types of ecological resources removed by the development would generally be conserved on site in some capacity.
- The proposed biobanks would generate a credit surplus for five of the vegetation types in the study area, including a credit surplus for three of the four over cleared vegetation types present in the study area
- The most substantial offset deficit is with respect to *Melaleuca sieberi* - Tall Saw-sedge closed shrubland. The majority of the affected vegetation is in moderate or low condition and has been degraded by tree removal and grazing. Securing an offsite biobank with vegetation in good condition may be considered a good outcome to compensate for this loss.
- The proposed biobanks would generate a credit surplus for Wallum froglet species credits
- It includes approximately 7.8 ha of disturbed, cleared land with very little biodiversity value. This area meets the BioBanking definition of cleared land and does not require biodiversity offsets
- The development footprint considers the distribution of over cleared vegetation types on the site. Some areas put forward for development by the PAC boundary impacted on over cleared landscapes while conserving areas of vegetation of a lesser conservation status
- Inclusion of additional lands in the conservation area as mentioned above also removes impacts to approx. 5 ha of vegetation associated with proposed stormwater management infrastructure. Both the original development footprint and the PAC boundary required significant earth works within areas proposed for conservation to enable water to be directed through the 'east-west corridor'. The additional lands proposed to be included in the corridor as part of the preferred development footprint will allow the perimeter road to act as the necessary diversion removing the need for diversions and a large detention basin to be constructed in this area.
- The proposed development/conservation footprint provides:

- an ‘east-west corridor’ of a minimum 200 m wide ensuring suitable connection of the conservation lands in the east of the development to areas of high conservation values to the north and west.
- a minimum 410 m wide corridor along the Myall River in the east of the site through until the cleared area of the north east corner.

The development will provide resources to invest in the rehabilitation and management of proposed conservation lands on site, thereby improving their condition and biodiversity values. These lands will also be conserved in perpetuity by a BioBanking agreement or equivalent conservation mechanism as agreed with EPA and DPI.

- The development/conservation footprint proposed for the north-eastern corner of the study area has been designed to consider the new zoning plan and proposed development under the comprehensive Great Lakes Council LEP including: Providing vegetated corridors to the west and along the riparian zone of the Myall River that integrate with those proposed immediately to the north. This approach ensures the Riverside development will not reduce the width of these corridors to a distance less than that immediately north of the site. Similarly, the development footprint proposed will also align with the footprint of the future development to the north.
- Conserving the large 'patch' of vegetation in the far north-eastern corner of the site. This 'patch' will be connected to a riparian corridor to the north of the site as proposed in the comprehensive LEP. Opportunities for connecting this vegetation with the conservation area to the south will be considered during the future development application associated with this area. Any future development applications will need to consider the provisions of the *Water Management Act 2000,* including the rehabilitation and management of riparian systems as approved by the NSW Office of Water.
- Providing a road network that aligns with proposed development to the north and also providing services to this area as required by Great Lakes Council once development consent is granted for the proposed development to the north.

6. Offsets Strategy

6.1 Approach

The BioBanking methodology was used to determine an appropriate number and type of biodiversity credits to offset development impacts.

Based on the biodiversity credit estimates provided above, the proposed development footprint is estimated to require the following:

- The retirement of approximately 855 ecosystem credits associated with the conservation and management of approximately 104 ha within the study area.
- The purchase and retirement of approximately 2820 additional ecosystems credits associated with an offsite biobank anticipated to be between 260-360 ha in area.
- The retirement of approximately 201 Koala population species credits and approximately 117 Wallum froglet species credits.
- The purchase and retirement of approximately 401 additional Koala population species credits associated with an offsite biobank.

The above credit estimates are based on a combination of available and extrapolated data and indicative site layouts. The final biodiversity credit requirement will need to be determined after further detailed assessments and consultation with OEH and DPI.

The BioBanking methodology will be applied to determine the final development impact. Similarly, the methodology will be applied to the proposed onsite conservation areas to work out the quantum of credits, and therefore the area of land, that may be required to be secured for conservation 'off site'. The offsite conservation lands would either be secured via a BioBanking Agreement or other suitable mechanism is approved by EPA and DPI.

6.2 Off Site Conservation Site Characteristics

The BioBanking methodology when applied using the OEH (2011a) interim guidelines dictates the required location and vegetation types that must be conserved off site to achieve the *maintain or improve* outcome. The results of the BioBanking assessment indicate two vegetation types, *Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin* and *Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast* are significantly in deficit and would be the focus of the offset site secured. The major projects interim guidelines recognise the inherent difficulties in finding offset sites which include every vegetation type impacted by such a development. The guidelines allow the applicant to focus on the minimum number of credits required from habitats of similar ecological values. For those vegetation types where a shortfall remains, the EPA can request additional credits be 'retired' to compensate for any such shortfall. These matters will be discussed with OEH/DPI during detailed assessments of potential offset sites.

The offset sites secured will also need to provide enough suitable habitat for the Koala population to alleviate the current species credit deficit.

The methodology used will endeavour to identify the general location of the offset site which this assessment indicates would need to be secured between the Hunter and Macleay River catchments.

6.3 Potential Offset Sites

The project team has already investigated a number of potential offset sites. This analysis has led to the identification of two potential offset sites and additional potential alternatives. The offset sites are located north of the site. The first being adjacent to the Nerong State Forest and the second near Crescent Head, in the Macleay River catchment. The Nerong site is dominated by Paperbark swamp forest and Spotted Gum Grey Ironbark forest vegetation types. A second site at Crescent Head is dominated by Paperbark and Swamp Mahogany Forest types. Initial assessments indicate both sites will provide 'core' Koala habitat. The site chosen would be secured by a BioBanking agreement or other conservation mechanism as agreed by EPA and DPI.

The possibility of Crighton purchasing an alternative property and entering into a biobanking agreement or 'retiring' to conservation will also be investigated during preparation of the offsets package.

6.4 Potential Planning Mechanisms for Securing Offsets

Initial discussions with EPA and DPI indicate there are two conservation mechanisms that would be deemed suitable for the project to secure its offsets, these being:

- Purchasing and retiring the agreed credits from a suitable biobank (EPA and DPI preferred).
- Purchasing a suitable offset property and placing a Conservation Agreement on title.

It is anticipated the merits of both approaches and their suitability to the Riverside Project would be discussed between Crighton and the EPA/DPI during preparation of the biodiversity offsets package (see description below). Note: There may be other options available, however, these would need to be negotiated and agreed to by Crighton and EPA/DPI during preparation of the offsets package.

6.5 Next Steps in the Process

The project will complete the following additional activities after granting of a concept plan approval to finalise the BioBanking assessment of the development impact:

- Complete a final credit impact calculation for the approved development footprint in consultation with EPA and DPI. This calculation will include consideration of the following:
  - The potential for tree retention throughout the development area, particularly the proposed tourism development.
  - The treatment of proposed drainage lines in terms of tree retention and rehabilitation.
  - The impacts of APZ's.
  - The adjustment of any Tg scores given the results of surveys and consultation with EPA/DPI.
- Complete a final credit calculation for the proposed onsite conservation areas in consultation with EPA/DPI. This will provide the credit balance required to be secured offsite.
- Investigate potential offset sites and suitable conservation mechanisms to secure the credit balance.
- Complete a BioBanking assessment of preferred offsite conservation site/s.
- Prepare a biodiversity offsets package including the following:
  - The results of the final credit calculations for the development and onsite conservation lands.
  - The results of assessments of the preferred offset site.

- The preferred conservation mechanism and timeframe for securing the required offsets.
- The proposed staging of development aligned with credit retirement
- Any expert reports or results of targeted surveys.

- Preparation of Management Action Plans and any other associated documentation required to establish both the onsite and offsite conservation lands. These activities would commence after approval is granted for the offsets package.

6.6 Staged Development Consent

The Riverside project would seek approval for the biodiversity offsets to be delivered in a staged approach. It is anticipated that securing our onsite conservation lands would allow approval of stages 1, 2, 3 and 4 (in accordance with the Riverside Staging Plan, November 2011) of development to commence. The project recommendation would be for approximately 14.5 ha of developable land and associated drainage facilities to be approved upon achievement of this outcome. The estimated credit value of the onsite biobank would be sufficient to offset this initial impact.

The remaining development would be approved for construction once the offsite conservation lands are secured.

This approach is recommended as it would:

- Ensures that onsite conservation lands and obligations are secured at the commencement of the project.
- Allows the initial stages of the development to commence quickly providing the project with immediate cash-flow which would assist funding off site biobanks.
- Allows the initial stages of the project to commence while investigations into suitable off site conservation lands are underway while project construction is underway thereby not delaying the commencement of the project until all offsets required are secured.
- Assist in providing the necessary resources to secure the required off site conservation lands.

6.7 Koala Habitat Management

The impacts on Koala habitat have been included in the credit calculations and the development will need to retire the appropriate number of species credits to adequately offset this impact. Both the onsite and offsite biobanks would need to provide suitable Koala habitat. Should both the onsite and offsite biobank sites be conserved via a BioBanking agreement then the rehabilitation and management of these areas would be in accordance with a BioBanking Management Actions Plan (MAP).

If the onsite biobank is conserved via a different mechanism then the area would be managed in accordance with the Koala Management Study (Conacher, 2011). This plan has been prepared considering the Recovery Plan for the Hawks Nest and Tea Gardens Endangered Koala Population (2003) and the Draft Recovery Plan for the Koala (2007). Similarly, if the offsite biobank is conserved via a different mechanism then similar management activities, as described in the Koala Management Study (Conacher, 2011), would need to be applied.

6.8 Recommended Actions and Approval Timeframes

The following time frames for completing necessary assessments, consultation and documentation to secure the required offsets are recommended:

- Completion and submission of the biodiversity onsite offsets package within three (3) months of development approval of the first four stages.
- Completion of Management Actions Plans (or equivalent), other associated documentation for the onsite conservation lands and their retirement to conservation within six (6) months of project plan approval Or prior to the registration of Stages 1, 2, 3 and 4 of the proposed development (whichever date is later).
- Completion of Management Actions Plans (or equivalent), other associated documentation for the offsite conservation lands and their retirement to conservation within 18 months of project plan approval or prior to the registration of Stages 1, 2, 3 and 4 of the proposed development (whichever date is the later). Completion of this task will allow the remaining development to proceed.

6.9 Preparation of Offsets Package

The BioBanking methodology does not strictly apply to Part 3A Projects; however the OEH (2011a) interim policy provides a framework to assist in determining biodiversity offsets for Part 3A Projects using a modified form of the BioBanking methodology. This framework specifies the assessment process and decision-making criteria for using BioBanking.

This interim policy:

- Acknowledges that proposals assessed under Part 3A do not have to meet the “improve or maintain” standard, which is required under the BioBanking scheme;
- Nevertheless adopts the use of the BioBanking Assessment Methodology (BBAM) for the purpose of:-
  - Quantifying and categorising the biodiversity values and impacts of Part 3A proposals
  - Establishing, for benchmarking purposes, the offsets that would be required if the Part 3A proposal had been expected to meet the improve or maintain standard; in lieu of meeting the improve or maintain standard;
- Provides a structured approach to determining how proposals may, in lieu of meeting the improve or maintain standard, meet one of two alternative standards established under this policy.

The Offsets Package for the Project would be prepared with reference to the OEH (2011a) policy and include detailed justification of the outcome and associated decision-making criteria.

The key components of the Offsets Package would be as follows:

- Estimation of biodiversity credits required to offset impacts of the development.
- Estimation of biodiversity credits generated by conservation and management of the on and off site biobank sites.
- Comparison of development and biobank credit profiles to demonstrate that the biobank sites are appropriate to offset impacts of the development, including reference to the OEH (2011a) variation criteria as appropriate.

- Commitment to prepare Final BioBanking Assessment Reports and either enter into a BioBanking Agreement or another DPI/EPA approved Conservation Agreement.
- Commitment from Crighton Properties to either purchase credits generated at the biobank sites and to retire those credits or to enter into another approved Conservation Agreement.

The next steps in the submission of the Offsets Package and finalisation of the Project would be as follows:

- Submit Offsets Package to DPI/EPA for approval.
- The biobank site owners to complete and submit an application for BioBanking agreements, in consultation with EPA or complete and submit all or part of an agreement for these lands to be used for another approved Conservation Agreement.
- EPA to review the applications for the BioBanking agreements, the Minister to enter into agreements for the biobank sites and biodiversity credits to be generated and listed on the register.
- Crighton Properties to purchase credits and to retire those credits. An application to transfer credits and to retire credits must be made to EPA and approved.
- Money from the sale of credits to be deposited into the BioBanking Trust Fund and the land owners to be paid from this for undertaking ongoing management of the biobank sites.
- Money over and above the amount required for the trust fund (i.e. the 'profit') to be negotiated and agreed between land owners and Crighton Properties. It is anticipated that the cost of the site surveys, BioBanking credit calculations and other assessments that have been funded by Crighton Properties and provided in the Offsets Package would be recognised in the agreed credit price.

6.9.1 BioBanking Agreement

This report is an offsets package that presents preliminary BioBanking calculations for the onsite biobank sites. Biodiversity credit calculations were obtained by entering survey results collected according to the BioBanking methodology into the credit calculator. The credit calculations generated in this report provide an appropriate estimate of the credit profile of the biobank site in order to meet the offsetting requirements for the Project. However EPA may require additional information to issue a BioBanking agreement and to generate biodiversity credits.

A Final BioBanking Assessment Report will be submitted as part of the documentation required in order to obtain a BioBanking agreement or other approved Conservation Agreement for onsite conservation areas.

Information required to support an application for a BioBanking agreement is as follows:

- BioBanking Agreement application form
- Final BioBanking Assessment Report, including additional information required to support the application (request for increase in gain of Site Value
- Copy of the BioBanking agreement credit reports
- Copy of the .xml file for the proposal from the credit calculator
- A digital map (identifying the development site, boundary, vegetation zones, species polygons and any management zones where an increase in gain in Site Value is requested

- Copy of draft management actions plans (prepared in accordance with the BioBanking agreement template) for each of the biobank sites
- Credit Pricing Spread Sheets outlining the minimum fund deposit for the 'trust' and estimates of potential credit pricing
- Proof of ownership of the properties
- Any other information required by the BioBanking agreement application form.

7. Conclusions

7.1 BioBanking Credit Calculations

Impacts of a development on biodiversity values must be offset by the retirement of biodiversity credits at the biobank site(s) determined in accordance with the DECC (2009) offset rules and the OEH (2011) offsets policy.

The offset rules state that ecosystem credits that are retired from a biobank site are determined to be compatible with those required by impacts at the development site if conditions presented in the DECC (2009) methodology are met. Of these, the most critical is that 'the number of ecosystem credits obtained and retired from the biobank site is equal to or greater than the number of credits required at the development site'.

Based on the preliminary credit calculations performed to date a suite of biodiversity credits has been identified in on site biobanks that are appropriate to compensate for a proportion of the impacts of the Project. There would be a biodiversity credit deficit for each of the development footprint options assessed, that is there are not sufficient biodiversity credits able to be generated in an onsite biobank to offset the impacts of a viable Project development. The proposed development footprint has been selected based on the following criteria:

- Removing development proposed in the southern corner of the site and adding these lands to proposed biobank sites.
- Reducing the development scale in the north eastern corner of the site and providing additional lands for conservation.
- Increasing the east-west corridor to a minimum width of 200 m throughout.
- Increasing the conservation area by removing impacts to approx. 5 ha of vegetation associated with proposed stormwater management infrastructure
- Achieving economies in the number of biodiversity credits required by concentrating development in poorer condition vegetation as shown by:
  - An overall ratio of 38.9 credits per hectare for the preferred development footprint, versus
  - An overall ratio of 40 credits per hectare for the PAC development footprint.
  - The proposed development footprint is 28% larger than the PAC development footprint but would only result in a 25% increase in the number of ecosystem credits required.
- Proposed biobanks which would include each of vegetation types being impacted within the preferred development footprint. This ensures most of the types of ecological resources available are protected on site in some capacity.
- Proposed biobanks which would generate a credit surplus for five of the vegetation types in the study area, including a credit surplus for three of the four over cleared vegetation types present in the study area
- Proposed biobanks which would generate a credit surplus for Wallum Froglet species credits
- Maintaining a minimum 410 m wide corridor along the Myall River in the east of the site through to the cleared area of the north-eastern corner.

The onsite biobanks would contribute a suitable 'like for like' contribution to the biodiversity offsets for the Project since it will achieve conservation outcomes within an area approximately equal in

size to the development area and within the same overall patch of native vegetation and habitat. Local populations of native species, including threatened biota that will be affected by the Project will directly benefit from the regeneration of degraded land in the study area. Further, the most valuable wetland and estuarine habitats within the study area would be conserved via the conservation of a strip over 400 metres wide adjoining the Myall River.

On site biobanks would contribute to the quantum of biodiversity offsets required for the Project and have attributes that make them highly suitable as an offset site including:

- Landscape context – the site is continuous with a patch of native vegetation and habitat resources of many thousands of hectares that is connected to Myall Lakes National Park Potential for improvement – the site contains degraded vegetation that would regenerate, localised weed infestations that would be treated and habitat for threatened fauna that would benefit from the management of exotic predators
- Conservation significance – the site:
  - Includes intact native vegetation comprising over cleared vegetation types
  - Contains local populations of threatened fauna
  - Contains important habitat associated with wetlands and saltmarsh, drainage lines, foraging resources and hollow-bearing trees that are likely to also support a number of other threatened species.

The BioBanking methodology has been varied with reference to the OEH (2011a) interim policy for assessment of biodiversity offsets for Part 3A Projects. This framework specifies the assessment process and decision-making criteria for using BioBanking to assist a Part 3A Project to achieve an '*improve or maintain'*, '*no net loss'* or '*mitigated net loss'* outcome. Additional ecosystem credits may be appropriate to compensate for the removal of EECs within the development area.

The BioBanking assessment would aim to conserve a large, continuous parcel of native vegetation on the site including over cleared vegetation types and habitats for threatened species.

Based on the credit estimates presented in this BioBanking assessment additional offset contributions would be required. These additional contributions are most likely to consist of biodiversity credits from additional off site biobanks.

7.2 Proposed Development/Conservation Footprint

Completing the proposed biodiversity strategy and package would see the proposed development/conservation footprint for the study area optimise biodiversity offsets as required by relevant legislation. There are unavoidable impacts on native vegetation as a result of the balance between a viable development footprint and conservation areas. The use of the BioBanking methodology provides a quantifiable ecological assessment and determination of biodiversity offsets considered adequate to offset the projects impacts rather than the more subjective approaches available under a negotiated offsets process. This provides certainty that all the ecological impacts have been considered and appropriately offset.

It should be noted that the proposed PAC development footprint would have also required significant biodiversity offsets (80% of the total biodiversity credits required for the proposed development footprint), with up to an estimated of 270 ha required to be secured off site. This BioBanking assessment has been able to increase the development lot yield while achieving economies in the number of biodiversity credits required by concentrating development in poorer condition vegetation. The BioBanking assessment has shown that the PAC footprint does not

necessarily conserve the highest conservation values on site and that the PAC footprint also requires significant biodiversity offsets. Notwithstanding all of the above, the project team considers the proposed development delivers a more balanced outcome.

7.3 Alignment with Offsetting Principles

The EPA and DPI consider the merits of biodiversity offsets strategies against the DECC (2008) Principles for the use of biodiversity offsets in NSW. Table 9 summarises the alignment of the BioBanking assessment approach to the offsets strategy with the DECC (2008) offsetting principles.

Table 10 Comparison of the BioBanking assessment with the DECC (2008) Offsetting Principals

DECC (2008) Principles for the use of biodiversity offsets in NSW	Attributes of offset package
Impacts must be avoided first by using prevention and mitigation measures.	The approach to avoidance and mitigation of impacts is presented in ERM (2011). There are unavoidable impacts on native vegetation as a result of the balance between a viable development footprint and conservation areas.
All regulatory requirements must be met.	An Environmental Assessment (ERM, 2011) incorporating an ecological impact assessment (Cumberland Ecology, 2011) was prepared for the Project in accordance with regulatory requirements and appropriate guidelines.
Offsets must never reward ongoing poor performance.	The proposed offset sites have not been deliberately degraded or mismanaged. The biobank site is un-developed open space containing predominantly intact native vegetation. There has been some vegetation clearing and minor environmental degradation of the site through routine agricultural and recreational activities.
Offsets will complement other government programs.	The BioBanking assessment has been prepared using the BioBanking methodology and accordingly complements OEH and the NSW Governments' approach to biodiversity conservation. It complements other government programs and biodiversity conservation initiatives, in general, by contributing to regional habitat connectivity, managing weed and pest species and conservation of over cleared vegetation types and threatened species habitat.
Offsets must be underpinned by sound ecological principles.	The preparation of the BioBanking assessment, including identification of the proposed biobanks, was underpinned by the DECC (2009) BioBanking methodology and OEH (2011a) offsets policy.
Offsets should aim to result in a net improvement in biodiversity over time.	The proposed Offset Package would result in a net improvement in biodiversity values over time because it has been developed with the BioBanking methodology and associated management actions for biobank sites. Specifically improvements would result through assisted natural regeneration, revegetation and management of weed and pest species.
Offsets must be enduring - they must	The BioBanking assessment provides the framework for

DECC (2008) Principles for the use of biodiversity offsets in NSW	Attributes of offset package
offset the impact of the development for the period that the impact occurs.	conservation of two offset sites under BioBanking Agreements, which will ensure conservation in perpetuity.
Offsets should be agreed prior to the impact occurring.	The BioBanking assessment has been prepared and will be agreed with EPA and DPI and prior to vegetation clearing for construction of the Project.
Offsets must be quantifiable - the impacts and benefits must be reliably estimated.	Impacts and benefits were quantified using the BioBanking methodology.
Offsets must be targeted.	The biobank sites were targeted to achieve, as far as practicable: like for like conservation of vegetation types to be removed; conservation of threatened species habitat; conservation of remnant vegetation in the regional locality of the development site; and viable patches of habitat with good connectivity to other habitat in the locality.
Offsets must be located appropriately.	The biobank sites are in the same IBRA bioregion and CMA sub region as the development area. The biobank sites have very similar suites of vegetation types as the development site, including matching vegetation types. The biobank sites would support a very similar suite of native flora and fauna, including threatened biota. The biobank sites are part of a relatively large, viable patch of habitat with good connectivity to other habitat in the locality including frontage to the Myall River and associated wetland, saltmarsh and estuarine habitats.
Offsets must be supplementary.	Conservation of the eastern biobank site is currently achieved by land use zoning. Conservation of the western biobank site is not currently achieved by land use zoning, a Covenant or by any other restriction on title. Management of both biobank sites is not funded by any other scheme. The management actions that would be planned and funded under BioBanking agreements for the sites would be supplementary to the current situation.
Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.	Conservation and management of the offset sites would be enforced through BioBanking Agreements or other conservation mechanism approved by DPI and EPA.

8. Disclaimer

This BioBanking assessment for the proposed Riverside development at Tea Gardens ("Report"):

- has been prepared by GHD Pty Ltd ("GHD") for Crighton Properties Pty Ltd
- may only be used and relied on by Crighton Properties Pty Ltd
- must not be copied to, used by, or relied on by any person other than Crighton Properties Pty Ltd without the prior written consent of GHD
- may only be used for the purpose of gaining necessary project approvals (and must not be used for any other purpose).

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To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by GHD in connection with preparing this Report:

- were limited to those specifically detailed in section 2 of this Report.

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions listed throughout section 2 being incorrect.

Subject to section 2 of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation and may be relied on for a period of 6 months, after which time, GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with those opinions, conclusions and any recommendations.

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Appendix A

On Site Biobanks BioBanking Credit Reports

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 14/12/2011 Time: 08:59 Tool Version: 1.2

Property Details

Proposal ID: 0101/2011/B087

Biobank Name: Riverside EAST (Original Development)

Biobank Location: Tea Gardens (Original Development)

Biobank Adress:

CMA: Hunter/Central Rivers

Landholder Name: Crighton

Landholder Address:

Landholder Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- ☐ **All or part of the biobank site is covered by a covenant, has received govt funding or is crown land**
- ☐ **Local reference data is required for the following vegetation zones**
- ☐ **Expert Report for the following species:**
- ☑ **Justification for request of additional increase in site value score with management for the following vegetation zones:**

  Coastal freshwater lagoons of the Sydney Basin and South East Corner

  Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin

  Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

  Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner

- ☐ **The minimum number of plots were not entered for the following vegetation zones**

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Coastal freshwater lagoons of the Sydney Basin and South East Corner	14.23	133
Coastal freshwater lagoons of the Sydney Basin and South East Corner	0.14	1
Mangrove forest in estuaries of the Sydney Basin and South East Corner	0.25	1
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin	1.33	12
Saltmarsh in estuaries of the Sydney Basin and South East Corner	16.89	103
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	12.57	93
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	1.84	17
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	1.09	14
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner	1.22	7

Credit Profile

Grou p 1 : Ecosystem credits: 133 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Coastal freshwater lagoons of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 14.23 ha

Grou p 2 : Ecosystem credits: 1 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Coastal freshwater lagoons of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 0.14 ha

Group 3 : Ecosystem credits: 1 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Mangrove forest in estuaries of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 0.25 ha

Group 4 : Ecosystem credits: 12 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.33 ha

Group 5 : Ecosystem credits: 103 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Saltmarsh in estuaries of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 16.89 ha

Group 6 : Ecosystem credits: 93 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 12.57 ha

Group 7 : Ecosystem credits: 17 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.84 ha

Group 8 : Ecosystem credits: 14 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 1.09 ha

Group 9 : Ecosystem credits: 7 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.22 ha

Species Credits

The property is capable of creating species credits for 2 species.

Wallum Froglet	***Crinia tinnula***
Number of Species Credits capable of being created:	**187 Credits**
Area of habitat:	31.2 ha

Koala population, Hawks Nest and Tea Gardens	***Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens***
Number of Species Credits capable of being created:	**93 Credits**
Area of habitat:	15.5 ha

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Control exotic fish species	
Wallum Froglet	31.2 ha
Exclude miscellaneous feral species	
Koala population, Hawks Nest and Tea Gardens	15.5 ha
Maintain or reintroduce flow regimes (aquatic flora)	
Wallum Froglet	31.2 ha
Cat and/or Fox control	
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	0.14 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.23 ha
Mangrove forest in estuaries of the Sydney Basin and South East Corner (HU563)	0.25 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Saltmarsh in estuaries of the Sydney Basin and South East Corner (HU606)	16.89 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.09 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.84 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.57 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha

Control feral pigs	
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	0.14 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.23 ha
Exclude miscellaneous feral species	
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.09 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.84 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.57 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha
Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)	
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	0.14 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.23 ha
Mangrove forest in estuaries of the Sydney Basin and South East Corner (HU563)	0.25 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Saltmarsh in estuaries of the Sydney Basin and South East Corner (HU606)	16.89 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.09 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.84 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.57 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha

Maintain or reintroduce flow regimes (aquatic flora)	
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	0.14 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.23 ha
Mangrove forest in estuaries of the Sydney Basin and South East Corner (HU563)	0.25 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Saltmarsh in estuaries of the Sydney Basin and South East Corner (HU606)	16.89 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.09 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.84 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.57 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 14/12/2011 Time: 09:19 Tool Version: 1.2

Property Details

Proposal ID: 0101/2011/B086

Biobank Name: Riverside WEST (Original Development)

Biobank Location: Tea Gardens (Original Development)

Biobank Adress:

CMA: Hunter/Central Rivers

Landholder Name: Crighton

Landholder Address:

Landholder Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- ☐ **All or part of the biobank site is covered by a covenant, has received govt funding or is crown land**
- ☐ **Local reference data is required for the following vegetation zones**
- ☐ **Expert Report for the following species:**
- ☑ **Justification for request of additional increase in site value score with management for the following vegetation zones:**

  Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

  Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

  Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

- ☐ **The minimium number of plots were not entered for the following vegetation zones**

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	3.72	31
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	5.29	56
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	0.18	2
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	5.72	35
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	1.65	17
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	0.01	
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	0.56	4
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	9.23	57

Credit Profile

Grou p 1 : Ecosystem credits: 31 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 3.72 ha

Grou p 2 : Ecosystem credits: 56 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 5.29 ha

Grou p 3 : Ecosystem credits: 2 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 0.18 ha

Grou 4 : Ecosystem credits: 35 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 5.72 ha

Grou 5 : Ecosystem credits: 17 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.65 ha

Grou 6 : Ecosystem credits: 0 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 0.01 ha

Grou 7 : Ecosystem credits: 4 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 0.56 ha

Grou 8 : Ecosystem credits: 57 credits
p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 9.23 ha

Species Credits

The property is capable of creating species credits for 1 species.

Koala population, Hawks Nest and Tea Gardens	***Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens***
Number of Species Credits capable of being created:	**154 Credits**
Area of habitat:	25.6 ha

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Exclude miscellaneous feral species	
Koala population, Hawks Nest and Tea Gardens	25.6 ha

Cat and/or Fox control	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	0.18 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.72 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	5.29 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	1.65 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	5.72 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.01 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.56 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.23 ha

Exclude miscellaneous feral species	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	0.18 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.72 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	5.29 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	1.65 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	5.72 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.01 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.56 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.23 ha
Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	0.18 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.72 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	5.29 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	1.65 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	5.72 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.01 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.56 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.23 ha

Maintain or reintroduce flow regimes (aquatic flora)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	0.18 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.72 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	5.29 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	1.65 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	5.72 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.01 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.56 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.23 ha

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 13/12/2011 Time: 09:22 Tool Version: 1.2

Property Details

Proposal ID: 0101/2011/B087

Biobank Name: Riverside EAST (Amended Development)

Biobank Location: Tea Gardens (Amended Development)

Biobank Adress:

CMA: Hunter/Central Rivers

Landholder Name: Crightons

Landholder Address:

Landholder Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- ☐ **All or part of the biobank site is covered by a covenant, has received govt funding or is crown land**
- ☐ **Local reference data is required for the following vegetation zones**
- ☑ **Expert Report for the following species:**

  Phascolarctos cinereus - endangered population Koala population, Hawks Nest and Tea Gardens Hawks Nest and Tea Gardens
- ☑ **Justification for request of additional increase in site value score with management for the following vegetation zones:**

  Coastal freshwater lagoons of the Sydney Basin and South East Corner

  Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin

  Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

  Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner
- ☐ **The minimium number of plots were not entered for the following vegetation zones**

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Coastal freshwater lagoons of the Sydney Basin and South East Corner	14.98	136
Coastal freshwater lagoons of the Sydney Basin and South East Corner	2.33	22
Mangrove forest in estuaries of the Sydney Basin and South East Corner	0.34	2
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin	1.33	12
Saltmarsh in estuaries of the Sydney Basin and South East Corner	16.56	101
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	11.88	88
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	9.02	84
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	0.76	10
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner	1.11	6

Credit Profile

Grou p 1 : Ecosystem credits: 136 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Coastal freshwater lagoons of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 14.98 ha

Grou p 2 : Ecosystem credits: 22 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Coastal freshwater lagoons of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 2.33 ha

Group 3 : Ecosystem credits: 2 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Mangrove forest in estuaries of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 0.34 ha

Group 4 : Ecosystem credits: 12 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.33 ha

Group 5 : Ecosystem credits: 101 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Saltmarsh in estuaries of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 16.56 ha

Group 6 : Ecosystem credits: 88 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 11.88 ha

Group 7 : Ecosystem credits: 84 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 9.02 ha

Grou p 8 : Ecosystem credits: 10 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 0.76 ha

Grou p 9 : Ecosystem credits: 6 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.11 ha

Species Credits

The property is capable of creating species credits for 2 species.

Wallum Froglet	***Crinia tinnula***
Number of Species Credits capable of being created:	**228 Credits**
Area of habitat:	38 ha
Koala population, Hawks Nest and Tea Gardens	***Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens***
Number of Species Credits capable of being created:	**138 Credits**
Area of habitat:	23 ha

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Control exotic fish species	
Wallum Froglet	38 ha
Exclude miscellaneous feral species	
Koala population, Hawks Nest and Tea Gardens	23 ha
Maintain or reintroduce flow regimes (aquatic flora)	
Wallum Froglet	38 ha

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 13/12/2011 Time: 09:23 Tool Version: 1.2

Property Details

Proposal ID: 0101/2011/B086

Biobank Name: Riverside WEST (Amended Development)

Biobank Location: Tea Gardens (Amended Development)

Biobank Adress:

CMA: Hunter/Central Rivers

Landholder Name: Crighton

Landholder Address:

Landholder Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- ☐ **All or part of the biobank site is covered by a covenant, has received govt funding or is crown land**
- ☐ **Local reference data is required for the following vegetation zones**
- ☑ **Expert Report for the following species:**

  Phascolarctos cinereus - endangered population Koala population, Hawks Nest and Tea Gardens Hawks Nest and Tea Gardens
- ☑ **Justification for request of additional increase in site value score with management for the following vegetation zones:**

  Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

  Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

  Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin
- ☐ **The minimum number of plots were not entered for the following vegetation zones**

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	3.54	29
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	12.89	137
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	2.35	22
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	6.83	42
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	2.32	23
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	1.2	9
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	0.59	4
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	9.32	57

Credit Profile

Grou p 1 : Ecosystem credits: 29 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 3.54 ha

Grou p 2 : Ecosystem credits: 137 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 12.89 ha

Grou 3 : Ecosystem credits: 22 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 2.35 ha

Grou 4 : Ecosystem credits: 42 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 6.83 ha

Grou 5 : Ecosystem credits: 23 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 2.32 ha

Grou 6 : Ecosystem credits: 9 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.2 ha

Grou 7 : Ecosystem credits: 4 credits

p

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 0.59 ha

Grou p 8 : Ecosystem credits: 57 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 9.32 ha

Species Credits

The property is capable of creating species credits for 1 species.

Koala population, Hawks Nest and Tea Gardens	***Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens***
Number of Species Credits capable of being created:	**150 Credits**
Area of habitat:	25 ha

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Exclude miscellaneous feral species	
Koala population, Hawks Nest and Tea Gardens	25 ha

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 10/11/2011 Time: 20:29 Tool Version: 1.2

Property Details

Proposal ID: 0101/2011/B087

Biobank Name: Riverside PAC EAST

Biobank Location: Tea Gardens

Biobank Adress:

CMA: Hunter/Central Rivers

Landholder Name: Crightons

Landholder Address:

Landholder Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- ☐ **All or part of the biobank site is covered by a covenant, has received govt funding or is crown land**
- ☐ **Local reference data is required for the following vegetation zones**
- ☐ **Expert Report for the following species:**
- ☑ **Justification for request of additional increase in site value score with management for the following vegetation zones:**

  Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

  Coastal freshwater lagoons of the Sydney Basin and South East Corner

  Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

- ☐ **The minimum number of plots were not entered for the following vegetation zones**

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	2.5	27
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	13.39	127
Coastal freshwater lagoons of the Sydney Basin and South East Corner	14.26	133
Coastal freshwater lagoons of the Sydney Basin and South East Corner	2.33	22
Mangrove forest in estuaries of the Sydney Basin and South East Corner	0.34	2
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin	1.33	11
Saltmarsh in estuaries of the Sydney Basin and South East Corner	16.91	108
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	12.79	98
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	19.65	174
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	1.3	17
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner	1.22	7

Credit Profile

Group 1 : Ecosystem credits: 27 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 2.5 ha

Group 2 : Ecosystem credits: 127 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 13.39 ha

Group 3 : Ecosystem credits: 133 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Coastal freshwater lagoons of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 14.26 ha

Group 4 : Ecosystem credits: 22 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Coastal freshwater lagoons of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 2.33 ha

Group 5 : Ecosystem credits: 2 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Mangrove forest in estuaries of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 0.34 ha

Group 6 : Ecosystem credits: 11 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.33 ha

Group 7 : Ecosystem credits: 108 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Saltmarsh in estuaries of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 16.91 ha

Group 8 : Ecosystem credits: 98 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 12.79 ha

Group 9 : Ecosystem credits: 174 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 19.65 ha

Group 10 : Ecosystem credits: 17 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 1.3 ha

Group 11 : Ecosystem credits: 7 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.22 ha

Species Credits

The property is capable of creating species credits for 2 species.

Wallum Froglet	***Crinia tinnula***
Number of Species Credits capable of being created:	**310 Credits**
Area of habitat:	51.7 ha
Koala population, Hawks Nest and Tea Gardens	***Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens***
Number of Species Credits capable of being created:	**298 Credits**
Area of habitat:	49.7 ha

Additional Management Action

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Control exotic fish species	
Wallum Froglet	51.7 ha
Exclude miscellaneous feral species	
Koala population, Hawks Nest and Tea Gardens	49.7 ha
Maintain or reintroduce flow regimes (aquatic flora)	
Wallum Froglet	51.7 ha
Cat and/or Fox control	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	2.5 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	13.39 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	2.33 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.26 ha
Mangrove forest in estuaries of the Sydney Basin and South East Corner (HU563)	0.34 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Saltmarsh in estuaries of the Sydney Basin and South East Corner (HU606)	16.91 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.3 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.79 ha

Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	19.65 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha
Control feral pigs	
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	2.33 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.26 ha
Exclude miscellaneous feral species	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	2.5 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	13.39 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.3 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.79 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	19.65 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha

Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	2.5 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	13.39 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	2.33 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.26 ha
Mangrove forest in estuaries of the Sydney Basin and South East Corner (HU563)	0.34 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Saltmarsh in estuaries of the Sydney Basin and South East Corner (HU606)	16.91 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.3 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.79 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	19.65 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha

Maintain or reintroduce flow regimes (aquatic flora)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	2.5 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	13.39 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	2.33 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.26 ha
Mangrove forest in estuaries of the Sydney Basin and South East Corner (HU563)	0.34 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Saltmarsh in estuaries of the Sydney Basin and South East Corner (HU606)	16.91 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.3 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.79 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	19.65 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 25/10/2011 Time: 16:31 Tool Version: 1.2

Property Details

Proposal ID: 0101/2011/B086

Biobank Name: Riverside West

Biobank Location: Tea Gardens

Biobank Adress:

CMA: Hunter/Central Rivers

Landholder Name: Crighton

Landholder Address:

Landholder Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- ☐ **All or part of the biobank site is covered by a covenant, has received govt funding or is crown land**
- ☐ **Local reference data is required for the following vegetation zones**
- ☑ **Expert Report for the following species:**

  Phascolarctos cinereus - endangered population Koala population, Hawks Nest and Tea Gardens Hawks Nest and Tea Gardens
- ☑ **Justification for request of additional increase in site value score with management for the following vegetation zones:**

  Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

  Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

  Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin
- ☐ **The minimum number of plots were not entered for the following vegetation zones**

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	3.54	29
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	12.89	137
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	2.35	22
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	6.83	42
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	2.32	23
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	1.2	9
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	0.59	4
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	9.32	57

Credit Profile

Group 1 : Ecosystem credits: 29 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 3.54 ha

Group 2 : Ecosystem credits: 137 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 12.89 ha

Group 3 : Ecosystem credits: 22 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 2.35 ha

Group 4 : Ecosystem credits: 42 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 6.83 ha

Group 5 : Ecosystem credits: 23 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 2.32 ha

Group 6 : Ecosystem credits: 9 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.2 ha

Group 7 : Ecosystem credits: 4 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 0.59 ha

Group 8 : Ecosystem credits: 57 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 9.32 ha

Species Credits

The property is capable of creating species credits for 1 species.

Koala population, Hawks Nest and Tea Gardens	***Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens***
Number of Species Credits capable of being created:	**150 Credits**
Area of habitat:	25 ha

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Exclude miscellaneous feral species	
Koala population, Hawks Nest and Tea Gardens	25 ha

Cat and/or Fox control	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	2.35 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.54 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	12.89 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	2.32 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	6.83 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.59 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	1.2 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.32 ha

Exclude miscellaneous feral species	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	2.35 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.54 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	12.89 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	2.32 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	6.83 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.59 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	1.2 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.32 ha
Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	2.35 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.54 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	12.89 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	2.32 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	6.83 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.59 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	1.2 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.32 ha

Maintain or reintroduce flow regimes (aquatic flora)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	2.35 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.54 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	12.89 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	2.32 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	6.83 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.59 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	1.2 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.32 ha

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 07/12/2011 Time: 12:55 Tool Version: 1.2

Property Details

Proposal ID: 0101/2011/B087

Biobank Name: Riverside EAST (Preferred Development)

Biobank Location: Tea Gardens (Preferred Development)

Biobank Adress:

CMA: Hunter/Central Rivers

Landholder Name: Crightons

Landholder Address:

Landholder Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number 0101

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- ☐ **All or part of the biobank site is covered by a covenant, has received govt funding or is crown land**
- ☐ **Local reference data is required for the following vegetation zones**
- ☐ **Expert Report for the following species:**
- ☑ **Justification for request of additional increase in site value score with management for the following vegetation zones:**

  Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

  Coastal freshwater lagoons of the Sydney Basin and South East Corner

  Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

  Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner

- ☐ **The minimum number of plots were not entered for the following vegetation zones**

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	3.76	35
Coastal freshwater lagoons of the Sydney Basin and South East Corner	14.26	135
Coastal freshwater lagoons of the Sydney Basin and South East Corner	2.33	22
Mangrove forest in estuaries of the Sydney Basin and South East Corner	0.23	1
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin	1.33	11
Saltmarsh in estuaries of the Sydney Basin and South East Corner	16.83	105
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	12.67	96
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	10.01	95
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	1.26	16
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner	1.22	7

Credit Profile

Grou 1 : Ecosystem credits: 35 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 3.76 ha

Grou 2 : Ecosystem credits: 135 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Coastal freshwater lagoons of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 14.26 ha

Grou 3 : Ecosystem credits: 22 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Coastal freshwater lagoons of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 2.33 ha

Grou 4 : Ecosystem credits: 1 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Mangrove forest in estuaries of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 0.23 ha

Grou 5 : Ecosystem credits: 11 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.33 ha

Grou 6 : Ecosystem credits: 105 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Saltmarsh in estuaries of the Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 16.83 ha

Grou 7 : Ecosystem credits: 96 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 12.67 ha

Grou 8 : Ecosystem credits: 95 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 10.01 ha

Grou 9 : Ecosystem credits: 16 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 1.26 ha

Grou 10 : Ecosystem credits: 7 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.22 ha

Species Credits

The property is capable of creating species credits for 2 species.

Wallum Froglet	***Crinia tinnula***
Number of Species Credits capable of being created:	**255 Credits**
Area of habitat:	42.5 ha
Koala population, Hawks Nest and Tea Gardens	***Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens***
Number of Species Credits capable of being created:	**148 Credits**
Area of habitat:	24.7 ha

Additional Management Action

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Control exotic fish species	
Wallum Froglet	42.5 ha
Exclude miscellaneous feral species	
Koala population, Hawks Nest and Tea Gardens	24.7 ha
Maintain or reintroduce flow regimes (aquatic flora)	
Wallum Froglet	42.5 ha
Cat and/or Fox control	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.76 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	2.33 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.26 ha
Mangrove forest in estuaries of the Sydney Basin and South East Corner (HU563)	0.23 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Saltmarsh in estuaries of the Sydney Basin and South East Corner (HU606)	16.83 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.26 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	10.01 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.67 ha

Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha
Control feral pigs	
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	2.33 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.26 ha
Exclude miscellaneous feral species	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.76 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.26 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	10.01 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.67 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha
Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.76 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	2.33 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.26 ha
Mangrove forest in estuaries of the Sydney Basin and South East Corner (HU563)	0.23 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Saltmarsh in estuaries of the Sydney Basin and South East Corner (HU606)	16.83 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.26 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	10.01 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.67 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha

Maintain or reintroduce flow regimes (aquatic flora)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.76 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	2.33 ha
Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)	14.26 ha
Mangrove forest in estuaries of the Sydney Basin and South East Corner (HU563)	0.23 ha
Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)	1.33 ha
Saltmarsh in estuaries of the Sydney Basin and South East Corner (HU606)	16.83 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	1.26 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	10.01 ha
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)	12.67 ha
Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner (HU635)	1.22 ha

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 07/12/2011 Time: 12:28 Tool Version: 1.2

Property Details

Proposal ID: 0101/2011/B086

Biobank Name: Riverside WEST (Preferred Development)

Biobank Location: Tea Gardens (Preferred Development)

Biobank Adress:

CMA: Hunter/Central Rivers

Landholder Name: Crighton

Landholder Address:

Landholder Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number 0101

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- ☐ **All or part of the biobank site is covered by a covenant, has received govt funding or is crown land**
- ☐ **Local reference data is required for the following vegetation zones**
- ☐ **Expert Report for the following species:**
- ☑ **Justification for request of additional increase in site value score with management for the following vegetation zones:**

  Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

  Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

  Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

- ☐ **The minimum number of plots were not entered for the following vegetation zones**

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	3.79	32
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	18.87	175
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	6.67	42
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	2.14	22
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	0.43	3
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin	9.33	58

Credit Profile

Group 1 : Ecosystem credits: 32 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 3.79 ha

Group 2 : Ecosystem credits: 175 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 18.87 ha

Group 3 : Ecosystem credits: 42 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Tallowwood dry grassy open forest

	of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 6.67 ha

Grou p 4 : Ecosystem credits: 22 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 2.14 ha

Grou p 5 : Ecosystem credits: 3 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 0.43 ha

Grou p 6 : Ecosystem credits: 58 credits

CMA	Hunter/Central Rivers
CMA Sub-region	Karuah Manning (76)
Vegetation type	Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 9.33 ha

Species Credits

The property is capable of creating species credits for 1 species.

Koala population, Hawks Nest and Tea Gardens	***Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens***
Number of Species Credits capable of being created:	**53 Credits**
Area of habitat:	8.8 ha

Additional Management Action

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Exclude miscellaneous feral species	
Koala population, Hawks Nest and Tea Gardens	8.8 ha

Cat and/or Fox control	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.79 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	18.87 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	2.14 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	6.67 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.43 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.33 ha

Exclude miscellaneous feral species	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.79 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	18.87 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	2.14 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	6.67 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.43 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.33 ha

Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.79 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	18.87 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	2.14 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	6.67 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.43 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.33 ha
Maintain or reintroduce flow regimes (aquatic flora)	
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	3.79 ha
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509)	18.87 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	2.14 ha
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)	6.67 ha
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)	0.43 ha
Spotted Gum - Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin (HU631)	9.33 ha

Appendix B

Development Options BioBanking Credit Reports

Biobanking Credit Report

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

Date of report: 13/12/2011 Time: 15:47 Tool Version: 1.2

Development Details

Proposal ID: 0101/2011/D002

Development Name: Riverside (Original Development)

Development Location: Tea Gardens (Original Development)

Development Address:

CMA: Hunter/Central Rivers

Proponent Name: Crighton Properties

Proponent Address:

Proponent Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Statement (where ticked)

☐ **Local reference data is required for the following vegetation zones**

☐ **An Expert Report for the following species**

☐ **The minimium number of plots were not entered for the following vegetation zones**

Improving or maintaining biodiversity values

The proposal has 1 or more Red Flag areas, as listed below:

Red Flag	Reason
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	Vegetation type contains an endangered ecological community;
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast	Vegetation type contains an endangered ecological community;
Coastal freshwater lagoons of the Sydney Basin and South East Corner	Vegetation type contains an endangered ecological community;
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	Vegetation type contains an endangered ecological community;
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	Vegetation type contains an endangered ecological community;
Koala population, Hawks Nest and Tea Gardens	An impact greater than that allowed;

The development does not improve or maintain biodiversity values and a biobanking statement cannot be issued.

Ecosystem Credits

Vegetation Type	Area (ha)	Credits Required	Red Flag
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	1.2	31	Yes
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	28.5	1,026	Yes
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	22.6	697	No
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast [HU511]	1.5	70	Yes
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast [HU511]	3.3	120	Yes
Coastal freshwater lagoons of the Sydney Basin and South East Corner [HU533]	2.8	111	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	0.3	15	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	18.4	995	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	14.1	546	No
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	0.2	11	Yes
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	17.8	679	Yes
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	8.4	303	No

Credit Profiles

Group: 1 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 31 credits

Total area of vegetation(s): 1.21 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 2 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 1,026 credits

Total area of vegetation(s): 28.5 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 3 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 697 credits

Total area of vegetation(s): 22.64 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 100 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 4 Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

Ecosystem credits: 70 credits

Total area of vegetation(s): 1.45 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 100 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)

Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast (HU620)

Group: 5 Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

Ecosystem credits: 120 credits

Total area of vegetation(s): 3.3 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)
	Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast (HU620)

Group: 6 Coastal freshwater lagoons of the Sydney Basin and South East Corner

Ecosystem credits: 111 credits

Total area of vegetation(s): 2.81 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 10%	**Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)
Macleay Hastings	Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin (HU673)

Group: 7 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines

on the Central Coast, Sydney Basin

Ecosystem credits: 15 credits

Total area of vegetation(s): 0.32 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565) Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566) Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591) Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 8 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Ecosystem credits: 995 credits

Total area of vegetation(s): 18.39 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565) Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566) Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)

Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 9 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Ecosystem credits: 546 credits

Total area of vegetation(s): 14.1 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565)
	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)
	Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)
	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 10 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 11 credits

Total area of vegetation(s): 0.22 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 11 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 679 credits

Total area of vegetation(s): 17.83 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 12 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 303 credits

Total area of vegetation(s): 8.41 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Species Credits

Species credits are required for 2 species.

Wallum Froglet	Crinia tinnula
Number of species credits required:	**390**

Extent of impact:	29.26 ha
Identification method:	Survey
Impact on red flag area?	No
Reason for red flag area:	

Koala population, Hawks Nest and Tea Gardens	**Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens**
Number of species credits required:	**1,007**
Extent of impact:	83.55 ha
Identification method:	Survey
Impact on red flag area?	Yes
Reason for red flag area:	An impact greater than that allowed;

Biobanking Credit Report

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

Date of report: 13/12/2011 Time: 13:42 Tool Version: 1.2

Development Details

Proposal ID: 0101/2011/D002

Development Name: Riverside (Amended Development)

Development Location: Tea Gardens (Amended Development)

Development Address:

CMA: Hunter/Central Rivers

Proponent Name: Crightons Properties

Proponent Address:

Proponent Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Statement (where ticked)

☐ **Local reference data is required for the following vegetation zones**

☐ **An Expert Report for the following species**

☐ **The minimium number of plots were not entered for the following vegetation zones**

Improving or maintaining biodiversity values

An application for a red flag determination is required for the following red flag areas:

Red Flag	Reason
Coastal freshwater lagoons of the Sydney Basin and South East Corner	Vegetation type contains an endangered ecological community;
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	Vegetation type contains an endangered ecological community;
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	Vegetation type contains an endangered ecological community;
Koala population, Hawks Nest and Tea Gardens	An impact greater than that allowed;

The application for a red flag determination should address the criteria set out in section 2.3 of the BiobBanking Assessment Methodology. A BioBanking Statement cannot be issued unless the determination is approved.

Ecosystem Credits

Vegetation Type	Area (ha)	Credits Required	Red Flag
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	1.3	34	No
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	21.6	778	No
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	21.7	667	No
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast [HU511]	0.3	12	No
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast [HU511]	2.6	96	No
Coastal freshwater lagoons of the Sydney Basin and South East Corner [HU533]	0.6	23	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	0.3	15	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	17.7	956	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	13.4	520	No
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	0.9	46	Yes
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	10.3	392	Yes
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	8.1	293	No

Credit Profiles

Group: 1 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 34 credits

Total area of vegetation(s): 1.33 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 2 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 778 credits

Total area of vegetation(s): 21.62 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 3 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 667 credits

Total area of vegetation(s): 21.66 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 4 Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

Ecosystem credits: 12 credits

Total area of vegetation(s): 0.25 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)

Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast (HU620)

Group: 5 Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

Ecosystem credits: 96 credits

Total area of vegetation(s): 2.63 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 100 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)
	Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast (HU620)

Group: 6 Coastal freshwater lagoons of the Sydney Basin and South East Corner

Ecosystem credits: 23 credits

Total area of vegetation(s): 0.58 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 10%	**Minimum area: 25 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)
Macleay Hastings	Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin (HU673)

Group: 7 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines

on the Central Coast, Sydney Basin

Ecosystem credits: 15 credits

Total area of vegetation(s): 0.32 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565) Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566) Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591) Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 8 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Ecosystem credits: 956 credits

Total area of vegetation(s): 17.67 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565) Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566) Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)

Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 9 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Ecosystem credits: 520 credits

Total area of vegetation(s): 13.43 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565)
	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)
	Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)
	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 10 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 46 credits

Total area of vegetation(s): 0.91 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 11 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 392 credits

Total area of vegetation(s): 10.29 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 12 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 293 credits

Total area of vegetation(s): 8.13 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Species Credits

Species credits are required for 2 species.

Wallum Froglet	Crinia tinnula
Number of species credits required:	**267**

Extent of impact:	20 ha
Identification method:	Survey
Impact on red flag area?	No
Reason for red flag area:	

Koala population, Hawks Nest and Tea Gardens	**Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens**
Number of species credits required:	**783**
Extent of impact:	65 ha
Identification method:	Assumed
Impact on red flag area?	Yes
Reason for red flag area:	An impact greater than that allowed;

Biobanking Credit Report

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

Date of report: 10/11/2011 Time: 19:30 Tool Version: 1.2

Development Details

Proposal ID: 0101/2011/D003

Development Name:

Development Location: Tea Gardens (PAC Boundary)

Development Address:

CMA: Hunter/Central Rivers

Proponent Name: Crighton Properties

Proponent Address:

Proponent Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Statement (where ticked)

☐ **Local reference data is required for the following vegetation zones**

☐ **An Expert Report for the following species**

☐ **The minimum number of plots were not entered for the following vegetation zones**

Improving or maintaining biodiversity values

An application for a red flag determination is required for the following red flag areas:

Red Flag	Reason
Coastal freshwater lagoons of the Sydney Basin and South East Corner	Vegetation type contains an endangered ecological community;
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	Vegetation type contains an endangered ecological community;
Koala population, Hawks Nest and Tea Gardens	An impact greater than that allowed;

The application for a red flag determination should address the criteria set out in section 2.3 of the BiobBanking Assessment Methodology. A BioBanking Statement cannot be issued unless the determination is approved.

Ecosystem Credits

Vegetation Type	Area (ha)	Credits Required	Red Flag
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	0.7	18	No
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	17.9	638	No
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	11.0	334	No
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast [HU511]	0.4	21	No
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast [HU511]	2.5	90	No
Coastal freshwater lagoons of the Sydney Basin and South East Corner [HU533]	0.6	23	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	0.5	24	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	18.4	990	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	14.1	540	No
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	7.6	270	No

Credit Profiles

Group: 1 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 18 credits

Total area of vegetation(s): 0.72 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 2 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 638 credits

Total area of vegetation(s): 17.9 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 3 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 334 credits

Total area of vegetation(s): 10.98 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 4 Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

Ecosystem credits: 21 credits

Total area of vegetation(s): 0.44 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511) Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast (HU620)

Group: 5 Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

Ecosystem credits: 90 credits

Total area of vegetation(s): 2.5 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)
	Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast (HU620)

Group: 6 Coastal freshwater lagoons of the Sydney Basin and South East Corner

Ecosystem credits: 23 credits

Total area of vegetation(s): 0.58 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 10%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 25 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)
Macleay Hastings	Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin (HU673)

Group: 7 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Ecosystem credits: 24 credits

Total area of vegetation(s): 0.52 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565) Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566) Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591) Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 8 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Ecosystem credits: 990 credits

Total area of vegetation(s): 18.42 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565) Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566) Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591) Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 9 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Ecosystem credits: 540 credits

Total area of vegetation(s): 14.09 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 5 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565) Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566) Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591) Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 10 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 270 credits

Total area of vegetation(s): 7.59 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 25 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Species Credits

Species credits are required for 2 species.

Wallum Froglet	Crinia tinnula

Number of species credits required:	**113**
Extent of impact:	8.5 ha
Identification method:	Survey
Impact on red flag area?	No
Reason for red flag area:	

Koala population, Hawks Nest and Tea Gardens	**Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens**
Number of species credits required:	**458**
Extent of impact:	38 ha
Identification method:	Assumed
Impact on red flag area?	Yes
Reason for red flag area:	An impact greater than that allowed;

Biobanking Credit Report

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

Date of report: 13/12/2011 Time: 09:30 Tool Version: 1.2

Development Details

Proposal ID: 0101/2011/D002

Development Name: Riverside (Preferred Development)

Development Location: Tea Gardens (Preferred Development)

Development Address:

CMA: Hunter/Central Rivers

Proponent Name: Crighton Properties

Proponent Address:

Proponent Phone:

Assessor Name: Mark Aitkens

Assessor Address:

Assessor Phone:

Assessor Accreditation Number: 0101

The following information is required to be submitted with this BioBanking Statement (where ticked)

☐ **Local reference data is required for the following vegetation zones**

☐ **An Expert Report for the following species**

☐ **The minimium number of plots were not entered for the following vegetation zones**

Improving or maintaining biodiversity values

The proposal has 1 or more Red Flag areas, as listed below:

Red Flag	Reason
Coastal freshwater lagoons of the Sydney Basin and South East Corner	Vegetation type contains an endangered ecological community;
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin	Vegetation type contains an endangered ecological community;
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin	Vegetation type contains an endangered ecological community;
Koala population, Hawks Nest and Tea Gardens	An impact greater than that allowed;

The development does not improve or maintain biodiversity values and a biobanking statement cannot be issued.

Ecosystem Credits

Vegetation Type	Area (ha)	Credits Required	Red Flag
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	1.1	29	No
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	19.2	691	No
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast [HU509]	19.7	607	No
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast [HU511]	0.4	19	No
Blackbutt - Tallowwood dry grassy open forest of the southern North Coast [HU511]	2.8	103	No
Coastal freshwater lagoons of the Sydney Basin and South East Corner [HU533]	0.6	23	Yes
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	0.5	24	No
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	18.5	1,003	No
Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin [HU566]	14.1	546	No
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	0.1	6	Yes
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	9.7	367	Yes
Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin [HU633]	7.6	275	No

Credit Profiles

Group: 1 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 29 credits

Total area of vegetation(s): 1.14 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 2 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 691 credits

Total area of vegetation(s): 19.2 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 100 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 3 Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast

Ecosystem credits: 607 credits

Total area of vegetation(s): 19.72 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 100 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (HU509) Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin (HU595) Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the southern Central Coast, Sydney Basin (HU622) Sydney Peppermint - Smooth-barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin (HU641) Yellow Bloodwood - ironbark shrubby woodland of the dry hinterland of the Central Coast, Sydney Basin (HU657)

Group: 4 Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

Ecosystem credits: 19 credits

Total area of vegetation(s): 0.4 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 100 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)

Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast (HU620)

Group: 5 Blackbutt - Tallowwood dry grassy open forest of the southern North Coast

Ecosystem credits: 103 credits

Total area of vegetation(s): 2.81 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 100 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Blackbutt - Tallowwood dry grassy open forest of the southern North Coast (HU511)
	Small-fruited Grey Gum - Tallowwood shrubby open forest on coastal foothills of the southern North Coast (HU620)

Group: 6 Coastal freshwater lagoons of the Sydney Basin and South East Corner

Ecosystem credits: 23 credits

Total area of vegetation(s): 0.58 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 10%	**Minimum area: 25 ha**

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Coastal freshwater lagoons of the Sydney Basin and South East Corner (HU533)
Macleay Hastings	Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin (HU673)

Group: 7 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines

on the Central Coast, Sydney Basin

Ecosystem credits: 24 credits

Total area of vegetation(s): 0.52 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565) Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566) Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591) Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 8 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Ecosystem credits: 1,003 credits

Total area of vegetation(s): 18.53 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565) Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566) Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)

Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 9 Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin

Ecosystem credits: 546 credits

Total area of vegetation(s): 14.1 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 5 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Melaleuca nodosa closed shrubland on alluvium of the Central Coast, Sydney Basin (HU565)
	Melaleuca sieberi - Tall Saw-sedge closed shrubland in drainage lines on the Central Coast, Sydney Basin (HU566)
	Paperbark swamp forest of the coastal lowlands of the North Coast and Sydney Basin (HU591)
	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 10 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 6 credits

Total area of vegetation(s): 0.12 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 30%	**Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 11 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 367 credits

Total area of vegetation(s): 9.65 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Group: 12 Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin

Ecosystem credits: 275 credits

Total area of vegetation(s): 7.63 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. **Minimum percent cover: 30%**	Description: Minimum area of contiguous vegetation in which credits must be obtained. **Minimum area: 25 ha**

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hunter/Central Rivers

CMA Sub-Region(s)	Veg Type(s)
Karuah Manning	Swamp Mahogany swamp forest on coastal lowlands of the North Coast and northern Sydney Basin (HU633)

Species Credits

Species credits are required for 2 species.

Wallum Froglet	Crinia tinnula
Number of species credits required:	**117**

Extent of impact:	8.8 ha
Identification method:	Survey
Impact on red flag area?	No
Reason for red flag area:	

Koala population, Hawks Nest and Tea Gardens	**Phascolarctos cinereus - endangered population Hawks Nest and Tea Gardens**
Number of species credits required:	**602**
Extent of impact:	50 ha
Identification method:	Assumed
Impact on red flag area?	Yes
Reason for red flag area:	An impact greater than that allowed;

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Document Status

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		Name	Signature	Name	Signature	Date
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2.	B Harrington	D Williams		J Tipping		23/01/12