North Tuncurry Urban Release Area

Biodiversity Certification Assessment Report & Biodiversity Certification Strategy

Prepared for
Department of Planning, Industry and Environment
May 2022

DOCUMENT TRACKING

Item	Detail
Project Name	North Tuncurry - Biodiversity Certification Assessment Report & Biodiversity Certification Strategy
Project Number	15SUTPLA-3178
Project Manager	Robert Humphries 8536 8622
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Reviewed by	Robert Humphries
Approved by	Robert Humphries
Status	Final Exhibition
Version Number	V8
Last saved on	May 2022
Cover photo	Clockwise from top left: *Corunastylis littoralis* (syn *Genoplesium littorale;* Tuncurry Midge Orchid); Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion; *Bauera capitata*; Square-tailed Kite (*Lophoictinia isura*). Brian Towle, March 2014.

This report should be cited as 'Eco Logical Australia 2022. *North Tuncurry Urban Release Area - Biodiversity Certification Assessment Report & Biodiversity Certification Strategy*. Prepared for Department of Planning and Environment.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Michael Pring and Charles Bartlett, Landcom.

Template 29/01/2014

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Abbreviations

Abbreviation	Description
APZ	Asset Protection Zones
BAM	Biodiversity Assessment Methodology under the BC Act
BAR	Biodiversity Assessment Report
BA	Biobanking Site Agreement
BBAM	Biobanking Assessment Methodology
BC Act	Biodiversity Conservation Act 2016
BCAA	Biodiversity Certification Assessment Area
BCAM	Biodiversity Certification Assessment Methodology
BCAR	Biodiversity Certification Credit Assessment Report
BCCC	Biodiversity Certification Credit Calculator
BCF	Biodiversity Conservation Fund
BCT	Biodiversity Conservation Trust
BOS	Biodiversity Offset Strategy
BOP	Biodiversity Offset Package
BSA	Biodiversity Stewardship Site Agreement
BTP	Brush-tailed Phascogale (*Phascogale tapoatafa*)
BVT	Biometric Vegetation Type
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CL Act	NSW *Crown Land Act* 1993
CLWB	former NSW Department of Industry - Crown Lands and Water Branch (now part of DPIE)
DECCW	former NSW Department of Environment, Climate Change and Water (now OEH)
DotEE	former Commonwealth Department of the Environment and Energy (now DAWE)
DoL	former Department of Lands
DPE	former NSW Department of Planning and Environment (now part of DPIE)
DP&I	former NSW Department of Planning and Infrastructure (now part of DPIE)
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

Abbreviation	Description
EPP	Eastern Pygmy Possum (*Cercartetus nanus*)
GLC	former Great Lakes Council (now MidCoast Council)
HBCV	High Biodiversity Conservation Value
IoM	Improve or Maintain
LALC	Local Aboriginal Land Council
LGA	Local Government Area
LPMA	Land and Property Management Authority (part of the Department of Lands)
MCC	MidCoast Council
MCW	former Mid Coast Water (now part of MidCoast Council)
MNES	Matters of National Environmental Significance (EPBC Act)
NPW Act	NSW *National Parks and Wildlife Act 1975*
NTURA	North Tuncurry Urban Release Area
OEH	former NSW Office of Environment and Heritage (now part of DPIE)
PCT	Plant Community Types
PEAR	Preliminary Environment Assessment Report
RBG	Royal Botanic Gardens, Sydney
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy
SSS	State Significant Site
TMO	Tuncurry Midge Orchid (*Genoplesium littorale*)
TSC Act	former NSW *Threatened Species Conservation Act 1995 (*now BC Act 2016)
TSPD	Threatened Species Profile Database

Biodiversity Certification terminology

The following table provides definitions for the terminology used in biocertification assessments. Where these terms have been used in the report they have been included in 'quotation marks'.

Definition	Description
Area of High Biodiversity Conservation Value (HBCV)	As described under Section 2.3 of the Biodiversity Certification Assessment Methodology (BCAM). Areas include critically endangered and endangered ecological communities (CEEC and EEC) not in low condition, threatened species that cannot withstand further loss, areas of vegetation that have regional or state conservation significance, and state and regional biodiversity corridors. Also termed Red Flag Areas.
Biodiversity Certification Assessment Area (BCAA)	As described in the BCAM, it includes land where certification is proposed to be conferred and any surrounding or adjacent land. Surrounding and adjacent land may be proposed for biodiversity conservation, or neither certification or development (Retained Land).
Biometric Vegetation Type (BVT)	A plant community classification system used in BioMetric Tools, including the Biobanking Tool, Biodiversity Certification Tool and Property Vegetation Planning Tool.
Conservation Area	Land within the BCAA that is proposed for conservation measures.
Conservation Measures	The range of measures identified in Section 126L of the NSW *Threatened Species Conservation Act 1995* (TSC Act).
Development Area	Land within the BCAA that is proposed for development.
Ecosystems Credit	As described under the BCAM, the class of credit for biodiversity certification that are generated for conservation measures or required for the land proposed for certification. Ecosystem credits are also generated for some threatened species that are assumed to be present based on the location of the site and the vegetation types present.
Low Biometric Condition	As described in Section 2.3 of the BCAM. To meet the 'low condition' threshold a number of criteria described in the method must be met, including <50% of the lower benchmark value of over-storey percent cover for the relevant vegetation type or native vegetation with a site value score of less than 34 (Site value score is described in Section 3.6.2 of the BCAM).
Managed and Funded Conservation Measure	As described under Section 8.1.1 of the BCAM. Examples include entering into a Biodiversity Banking Agreement with respect to the land under Part 7A of the TSC Act and the reservation of land under the NSW *National Parks and Wildlife Act 1975* (NPW Act).

Definition	Description
Managed Conservation Measure	As described under Section 8.1.2 of the BCAM. Examples include entering into a conservation agreement under Division 12, Part 4 of the NPW Act and entering into a planning agreement under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) that makes provision for development contributions to be used for or applied towards the conservation or enhancement of the natural environment.
Moderate-Good Biometric Condition	As described in Section 2.3 of the BCAM. Any vegetation that is not in 'low condition' is in 'moderate to good' condition.
Planning Instrument Conservation Measure	As described under 8.1.3 of the BCAM. Application of this measure requires a number of conditions to be met that are described under the relevant Section of the method.
Red Flags	As described in Section 2.3 of the BCAM. See 'Areas of High Biodiversity Conservation Value' above.
Retained Land	Land within the BCAA that is not land proposed for biodiversity certification or subject to proposed conservation measures.
Species Credit	As described in the BCAM, the class of credits for biodiversity certification that are generated for a conservation measure or are required for the land proposed for certification.
Statement of Credit Equivalency	The now repealed TSC Act previously provided the framework for the creation of biodiversity credits known as Biobanking and Biocertification credits. The change in legislation also included a change in the assessment methodology used to create credit obligations. To ensure that credit obligations created under the TSC Act could still be used or met within the new credit market, the Biodiversity Conservation (Savings and Transitional) Regulation 2017 preserved these credits and credit obligations and provided the power for the Environment Agency Head to determine 'reasonable equivalence' for Biobanking and Biocertification credits or obligations to the new Biodiversity Offset Scheme credit numbers and classes.

Executive summary

Eco Logical Australia Pty Ltd (ELA) was engaged by Landcom, on behalf of the former Crown Lands and Water Branch of the Department of Primary Industries (CLWB) (the development proponent) and the former Department of Planning and Environment (DPE) (now all part of the NSW Department of Planning, Industry and Environment (DPIE)) to undertake a Biodiversity Certification Assessment seeking '*biocertification of land'* for the proposed rezoning and mixed use development of the North Tuncurry State Significant Site Urban Release Area (NTURA) at Tuncurry on the NSW mid north coast (**Section 1**). The Minister for the Environment may confer biocertification if a proposal '*improves or maintains'* biodiversity values.

In order to assess and appropriately offset the biodiversity impacts that will result from the changes in land use, the proposal has been assessed using the Biodiversity Certification Assessment Methodology (BCAM) under the Biodiversity Conservation (Savings and Transitional) Regulation 2017.

The proposed development is entirely on Crown land and has been the subject of biodiversity investigations since 2005. The study area was partially burnt by wildfire in 2019/2020 and biodiversity studies were updated in June - July 2020 and April 2021 to confirm the on-going presence of threatened species in impact and proposed offset areas (ELA 2020 and 2021).

The BCAA encompasses a total area of approximately 636 ha and includes approximately 540 ha of mapped native vegetation communities comprising three Plant Community Types (PCTs), none of which are listed as endangered ecological communities on the NSW *Biodiversity Conservation Act* 2016 (BC Act) or the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. The remaining 95 ha of the study area comprises cleared land (beach and tracks/trails).

Whilst a number of threatened fauna species have been recorded in the study area since 2005, only two species, the Brush-tailed Phascogale and Eastern Pygmy Possum, both vulnerable species recorded on site in 2010 and 2012, but not re-confirmed present in 2020, require specific assessment under the Biocertification Methodology as 'species credit species'. Whilst the Koala has previously been recorded in the locality it was not recorded during extensive surveys of the BCAA and has been assessed as not likely to occur due to the absence of suitable habitat containing preferred browse species. One critically endangered plant species, the Tuncurry Midge Orchid (TMO) has also been recorded and will be directly impacted (**Section 2**).

The Master Plan proposes to develop 226.63 ha of the assessment area which will impact 198.65 ha of vegetation and threatened species habitat that is generally in biometric 'moderate to good' condition despite previous uses of the land for pine plantation and mineral sand extraction (**Section 3**).

The impact area includes 63 recorded TMO individuals which represents less than 3% of the known population in the BCAA. Impacts to TMO constitute a '*red flag'* and requires a '*variation*' from the Minister for the Environment. A request for a red flag variation is included in **Section 4** of this assessment.

The application proposes to permanently protect and manage for conservation a minimum of 312.70 ha of mapped native vegetation and threatened species habitat 'within' the assessment area (including a 4.08 ha TMO reserve) as an 'on-site' or 'within' BCAA Biodiversity Stewardship Agreement site (BSA). There is an additional 15.01 ha of cleared or managed lands within the conservation area (4WD tracks, an existing powerline maintenance corridor and access to the beach) that will be retained. The proposed on-site BSA comprises the same vegetation types to those being impacted as well as potential habitat for the two threatened fauna species previously recorded on-site and 63% of the known records of TMO and

58% of potential habitat (reconfirmed as present after the bushfires in 2021). A further 834 TMO individuals are classified as “retained” within the BCAA and will not be impacted or conserved. These individuals are within land owned by the Foster Local Aboriginal Land Council at the northern end of the study area (678) and within an existing powerline maintenance corridor running through the BCAA near the western boundary (156). The proposed on-site offset area will meet all of the offset requirements for the first 12 residential stages of development, the main access road and the E1 Business Park (likely 2024-2036), as well as preliminary earth works around proposed TMO pollinator corridors to allow these areas to be rehabilitated prior to the development of Stages 13 - 22 from year 2037.

In addition to the ‘on-site’ conservation measure, an additional area of approximately 380-400 ha at Nabiac, owned by the MCC (formerly Mid Coast Water), may also be registered as a Biodiversity Stewardship site. Preliminary ecological studies of these lands confirm that this area will meet the remaining offset requirements for Stages 13 - 22, the E2 Industrial Land, Village Centre and the redeveloped golf course. The proposed offset area includes the required matching vegetation types and confirmed habitat for the Brush-tailed Phascogale and Eastern Pygmy Possum as well as further records and habitat for the TMO and other threatened species. Landcom has entered into discussions and reached in principle agreement with MCC to make this area available for the proposal if/when required. In the interim, the area will continue to be managed by MCC as a defacto conservation area as part of MCC ground water aquifer management regime.

Alternatively, CLWB is able to meet the offset requirements for Stages 13 to 22 of the proposed development by purchasing credits from the biodiversity credit market and/or making a payment into the Biodiversity Conservation Fund (BCF) established under the BC Act as required before commencing these stages. A number of biobank sites (BAs) and Biodiversity Stewardship sites (BSAs) have been registered in recent years on the lower north coast, however, as the TSC Act has now been repealed, a ‘credit equivalency statement’ will need to be obtained from DPIE to determine the number of Biodiversity Assessment Methodology credits (BAM credits) deemed to be ‘equivalent’ to the remaining number of Biodiversity Certification credits (BCAM credits) that are not met by the on-site offset area.

The Biodiversity Certification Assessment (**Section 3**) has found that **5,744** ecosystem credits are required for impacts to 198.65 ha of three vegetation types and **2,964** credits are generated by the proposed on-site conservation measure (registration of a BSA). The **2,780** credit deficit will be met either by the registration of a BSA on MCC owned land near Nabiac, alternative biobank and or biodiversity stewardship sites or by the purchase of the ‘equivalent’ number of BAM credits from the Biodiversity Conservation Fund (BCF).

Similarly the assessment has found that **3,973** species credits are required for impacts to 198.65 ha of Brush-tailed Phascogale and Eastern Pygmy Possum habitat, and **4,846** species credits for impacts to 63 TMO individuals. **9,216** TMO species credits will be generated for the 1,536 TMO individuals protected by the proposed on-site conservation measure (registration of a BSA), including the 4.08 ha TMO Reserve. **1,662** species credits are generated for protection and management of 277.06 ha of Brush-tailed Phascogale and Eastern Pygmy Possum habitat (excluding the 4.08 ha TMO Reserve). A further 834 TMO individuals have been recorded within 9.09 ha of habitat on Foster Local Aboriginal Land Council land in the north of the BCAA (678) and within an existing powerline maintenance corridor (156) that will remain as ‘retained’ land and is not proposed for certification or conservation measures.

For an ‘improve or maintain’ outcome to be achieved for threatened species, **2,311** additional species credits (or equivalent BAM credits) for Brush-tailed Phascogale and Eastern Pygmy Possum must be secured by an ‘off-site’ conservation measure (i.e. the registration of the MCC Nabiac BSA purchase of the equivalent number of BAM credits from other registered BSAs or from the BCF (prior to the

commencement of Stage 13 of proposed development). No additional species credits are required for TMO. The **4,370** 'surplus' TMO credits will be 'retired' as a condition of Biocertification for a 'within BCAA' conservation measure and as further compensation for impacts to this species which is a 'red flag' species.

The Crown Lands and Water Branch (CLWB) of the DPIE have committed to securing the on-site offset area and submitting an application to register 327.71 ha as a BSA within 12 months of the conferral of biocertification and prior to any impacts occurring.

The proposed conservation measures will permanently protect and manage over 63% of the known TMO records within the Tuncurry project site, and 58% of the potential habitat within the project site. In addition to the retirement of these 'surplus' TMO credits, CLWB has committed to a $250,000, 5 year research and monitoring program for TMO.

Subject to the Minister's approval of the red flag variation request for TMO, and registration of the proposed Biobank sites or purchase and retirement of credits from other sites or the BCF, the proposal meets an 'improve or maintain' outcome and is eligible for biodiversity certification.

1 Preamble

1.1 Project background

Landcom submitted a preliminary environmental assessment report (PEAR) to the then NSW Department of Planning and Infrastructure (DP&I), now Department of Planning, Industry and Environment (DPIE) for a proposed mixed-use development on Crown land located at the Lakes Way, North Tuncurry (the project site) called the North Tuncurry Urban Release Area (NTURA) in January 2011 (Landcom 2011). The PEAR requested that the Minister for Planning consider including the site as a State Significant Site (SSS) under Schedule 3 of the State Environmental Planning Policy (Major Development) 2005 (the Major Development SEPP).

The land was declared a SSS by the Minister for Planning in February 2011.

The land is owned by the State of NSW and development was to be undertaken by way of an agreement between the then NSW Land and Management Authority (now Department of Industry - Crown Lands and Water Branch (CLWB) and Landcom. The PEAR was to develop the site in approximately 25 stages, over an approximate 35 year timeframe, to generate approximately 2,200-3,000 dwellings, employment lands, a new local neighbourhood centre incorporating retail, business and commercial floor space, tourist, community, education facilities, open space and environmental conservation purposes (Landcom 2011).

The project site has been subject to a broad range of strategic planning investigation and environmental assessments over a number of years by the former Great Lakes Council (GLC), the former Department of Planning, Landcom and the former Department of Lands (DoL). The North Tuncurry site was identified as an urban growth area in the Mid North Coast Regional Strategy (DoP 2009) and is also earmarked for residential and employment uses within the former GLC's' Forster-Tuncurry Conservation and Development Strategy (GLC 2003b).

As part of the SSS assessment process, the then NSW Office of Environment and Heritage (OEH) (now part of DPIE) and MCC requested that matters of ecological significance be addressed strategically at the rezoning stage to simplify the subsequent development application process. Subsequent discussions with OEH determined that Biodiversity Certification under Part 7AA of the then *Threatened Species Conservation Act* 1995 (TSC Act) was an appropriate method to assess and quantify the impacts to biodiversity values and determine the offset requirements that would meet an '*improve or maintain'* (IoM) outcome. In 2016, the NSW Government passed the new Biodiversity Conservation Act (BC Act), however, the North Tuncurry SSS project was included in the '*Proposed Applications for Biodiversity Certification Order 2017'*, which declared that the proposed application may still be made under Part 7AA of the TSC Act.

An application for Biodiversity Certification must follow the Biodiversity Certification Assessment Methodology (BCAM) (DECCW 2011) and meet the requirements of Section 126K of the TSC Act, i.e. be accompanied by a Biodiversity Certification Strategy. The methodology may be applied to land for which 'biodiversity certification' (hereafter biocertification) is sought, and conferred by the Minister for the Environment, if the 'conservation measures' proposed in the biocertification application result in an overall 'improvement or maintenance' in biodiversity values. This is referred to under the methodology as satisfying the 'improve or maintain test' (IoM test).

Only a 'Planning Authority' as defined by section 126G of the TSC Act may apply to the Minister for biocertification. The Department of Planning, Industry and Environment is a Planning Authority as defined by the TSC Act and is the applicant for this application.

The methodology provides an equitable, transparent and scientifically robust framework with which to address the often competing demands of urban development and biodiversity conservation. If the Minister for the Environment is satisfied that an IoM outcome has been achieved, he/she may confer biodiversity certification (hereafter, biocertification) on 'land'. If the Minister confers biocertification on land, a consent/approval authority does not have to take biodiversity issues into consideration when assessing development applications, i.e. for the purpose of s.5A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), the development or activity is not subject to an Assessment of Significance for threatened species, populations or ecological communities.

Eco Logical Australia Pty Ltd (ELA) were engaged by Landcom, on behalf of the then DPE, to apply the BCAM to assess the proposed mixed used development at Tuncurry. This has been done by assessing the '*loss*' of biodiversity values associated with vegetation clearance on the impacted land and the biodiversity '*gains*' that will be achieved as a result of '*conservation measures'* on land 'within' or adjacent to the proposed rezoning and mixed-use development and on land located approximately 3 km to the west near Nabiac 'outside' of the assessment area. The net result has then been considered in the context of the 'improve or maintain' test defined under the BCAM.

1.2 Biocertification Assessment Process and Implications

Matthew Doherty and Paul Hibbard of RPS undertook the initial ecological investigations associated with the rezoning application between 2010 and 2103 (RPS 2012). Further field work and associated credit calculations were undertaken in 2014, 2015, 2020 and 2021 by former and current Eco Logical Australia accredited assessors Brian Towle (Accreditation number 0229) and Lilly Gorrell (Accreditation number 0145) supported by other ELA Daniel McKenzie, Gordon Patrick, Michelle Frolich and Robert Humphries. Brief cvs for the ELA project team members are provided in **Appendix A.**

Under the BCAM, the impact of development and conservation measures on biodiversity values is quantified using 'biodiversity credits' which are defined by each of the vegetation types (ecosystem credits) and threatened species present (species credits). In this regard, the methodology determines the number of credits that are required to offset the adverse impacts of development on biodiversity values, and the number of credits that can be generated by undertaking recognised conservation measures as outlined in s126L of the TSC Act that will improve biodiversity values within the BCAA. Where the number of credits that are created is equal to, or exceeds the number required, the 'improve or maintain' test described under the methodology is considered to be satisfied, provided 'red flags' have been avoided, or a red flag variation has been approved by the Director General of OEH.

Red flags are areas of high biodiversity conservation value and include vegetation types that are >70% cleared, critically endangered ecological communities (CEECs) and endangered ecological communities (EECs) listed under the TSC Act and/or *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act), certain threatened species and areas that are recognised as biodiversity corridors of state or regional significance. This assessment report includes a red flag variation request for impacts to the Tuncurry Midge Orchid (**Section 4**).

1.3 Assessment Methodology/Consultation with the OEH / DPIE

In agreement with OEH, the Biocertification credit calculator version 1.9 was used to calculate the biodiversity credits for this assessment. Over the timeframe that the assessment has been ongoing, there

have been a number of changes to the NSW vegetation classification system and which threatened species are classified as either '*ecosystem species'* or '*species credit species*' such as the Squirrel Glider and Spot-tailed Quoll as well as the data sets behind these species used to calculate the number of credits 'required' for impacts or 'generated' for offsets. In consultation with OEH / DPIE, it was agreed that the data sets embedded in Version 1.9 of the biocertification credit calculator tool at the start of the assessment would continue to be used throughout the assessment and determination of the application. Further it was agreed that there are no 'State' or 'Regional' Biodiversity Corridors that have been approved for use in biodiversity certification assessments by the Director-General despite a number of public reports that pre-date the BCAM that identify corridors in the locality and region.

Earlier drafts of the Biodiversity Certification Assessment Report were reviewed by OEH and DPIE between 2015 and 2019 with the report deemed 'adequate' for the purpose of public exhibition in July 2019.

1.4 Biodiversity certification assessment area

The Biodiversity Certification Assessment Area (BCAA) encompasses an area of 635.79 ha on the eastern side of 'The Lakes Way', directly to the north of, and adjoining, the Tuncurry town centre. The BCAA includes Lot 331 and an area of approximately 10 ha that extends below the Mean High Water Mark). The BCAA is located within the former Great Lakes Local Government Area (LGA), now MidCoast LGA, approximately 320 km north of Sydney along the NSW coast (**Figure 1**).

The BCAA includes the North Tuncurry project site and surrounding Crown land (Lot 331 DP 1104340 and Lot 294 and 295 DP 43110) and a parcel of land owned by the Forster Local Aboriginal Land Council (LALC)(Lot 279 Dp 753207) (**Figure 2**). An off-site Biobank site is proposed on former Mid Coast Water land (part of Lot 265 DP828807 and Lot 2682 DP 1216141), now MCC, near Nabiac, located approximately 3 km to the southwest of the BCAA (and does not form part of the BCAA) (**Figure 1** and **Figure 29**). Combined these areas total over 1,500 ha of which 380-400 ha containing the appropriate vegetation types will be required to generate the additional credits outside of the BCAA to meet and IoM outcome.

The BCAA including the North Tuncurry project site is shown in **Figure 2** and **Figure 3** and is an irregular shaped waterfront parcel of land situated on a peninsula that has been created by the Wallamba River to the west. The project site is bounded by Nine Mile Beach to the east, educational facilities to the south, vacant land, Darawank Nature Reserve and the Tuncurry Waste Management Centre to the north (RPS 2012a).

Existing development within the project site includes the 18-hole Forster / Tuncurry Golf Club on the southern portion of the site, and a 66 kilovolt (kV) powerline running along the western edge of the site (parallel to The Lakes Way). There is no registered easement associated with this powerline, however, the area beneath is maintained by slashing the regrowth. A number of formal and informal access roads and tracks traverse the site and provide informal pedestrian and four-wheel drive beach access (RPS 2012a).

1.4.1 Site history

The BCAA has been subjected to numerous historical disturbances including forestry activities, mineral extraction and recreational uses.

The BCAA, previously known as Tuncurry State Forest No. 283, has been subject to historic planting of various *Pinus species* since the1890's with the earliest documented planting in 1911 (Bailey 1931). Bailey (1931) describes the methods of planting as either '*cleared and burnt'*, '*felled and burnt*' or '*brushed,*

mattocked and planted' to make way for pine plantations. Remnants of these pine plantations are still evident as dense stands of pine or where pine is a co-dominant species. The areas treated for pine plantation as shown in **Figure 4**.

The northern part of the BCAA has been subject to mineral sands extraction and has had a number of wildfires burn part of the area, including a wildfire which burnt the north-east section of the project site in 2007 (RPS 2012a) smaller fires in 2013 and 2017 which burnt an area in the south-west of the BCAA near the Lakes Way and the summer wildfires that burnt the northern third of the study area in 2019/2020. The areas subject to previous mining and recent wildfires are shown in **Figure 5**.

With the exception of the dense network of tracks and the existing golf course, vegetation within the BCAA has recovered well from these past disturbances, with scattered occurrences of *Pinus elliottii* (Slash Pine) as one of the few relics of past disturbance. Accordingly, the current vegetation on site, is all regrowth of approximately 50-60 years of age, parts of which have been affected by various fires.

1.5 Proposed project

The BCAA includes land proposed for rezoning (Ethos Urban 2020) and subsequent development within the North Tuncurry project site, '*lands to be certified*' that are the subject of the application for biocertification, land subject to '*conservation measures*' and an area of '*retained land'* (i.e. land that is not proposed for development or subject to conservation measures). The 'retained' land within the BCAA comprises part of the existing Forster-Tuncurry Golf Course, Lot 279 owned by the Foster LALC, an existing Essential Energy powerline maintenance corridor and the beach area (**Figure 2**).

1.6 Description of project timelines, management and governance

The proposed development would be staged from the south in a clockwise direction around the golf course over an approximate 35 year period with an estimated 60 residential lots per year, totalling approximately 2,100 lots and incorporates the following components (Ethos Urban 2020) (**Figure 3**):

- Clearing vegetation within the impact site
- Establishment and maintenance of Asset Protection Zones
- Earthworks to establish site levels and installation of public works (for example, new road network, sewerage, water, gas, power lines and communications)
- Remodelling of the Forster Tuncurry Golf Course to include a new practice range, a three hole beginners course, a new clubhouse and pro-shop, the relocation of five holes along the foreshore to other areas and the introduction of water into the design
- A new 'Village Centre' which co-locates the new golf clubhouse, Community Centre and mobile Surf Club, potential Cultural Centre, neighbourhood supermarket, speciality retail, destination cafes and restaurants focused around the proposed Village Green connecting the main basin to the foreshore area
- 107.6 ha of net residential land to incorporate urban lots (200-374 square metre (sqm) minimum lot size and apartments at the Village Centre), sub-urban lots (375-799 sqm minimum lot size) and large lots (800-1000 sqm minimum lot size)
- 13.2 ha employment lands
- Provision of open space parks and drainage areas, environmental conservation lands, and local active and passive recreation facilities
- Appropriate conservation of European and Aboriginal heritage located on the site; and
- Use of seven (7) existing vehicle tracks adjacent to the development footprint (as shown in Figure 2**)** to access Nile Mile Beach

As the overall development will require areas to be 'cut and filled', including the proposed TMO pollinator corridors (which will also serve a drainage function), it is proposed to commence the earthworks around the proposed TMO pollinator corridors and a 20m buffer (within Stages 13, 15, 17, 18, 19 & 20) between Years 5 and 10 after commencement of construction. The pollinator corridors will then be restored as part of a proposed Vegetation Management Plan and Construction Environment Management Plan (see **Section 6**) and will be well established prior to the development of the remaining parts of these Stages. The location of these works is shown in **Figure 6**.

The pollinator corridors have been assessed as 'impacted' as part of the Biocertification Assessment however will be fully rehabilitated to the original vegetation types (Banksia Dry Shrubland), classified as Community Land – Natural Area under the Local Government Act 1993 and subject to the preparation and implementation of a Plan of Management to protect and maintain their value as pollinator corridors, in perpetuity. A detailed description and justification of the earth works required in the pollinator corridors is provided in EMM (2018). An opinion of the efficacy of the works in relation to the restoration of these areas and continued functioning as TMO pollinator corridors is provided by Dr Colin Bower of FloraSearch (letter dated 27 April 2018, provided as part of Appendix J). Dr Bower states that "*provided the rehabilitated parts of the corridors provide near continuous heathland vegetation, they are considered likely to be effective for pollinator movement into the Orchid Reserve*".

Dr Bower concluded that:-

- The population of the Tuncurry Midge Orchid in the 4.08 hectare Orchid Reserve within the proposed North Tuncurry development is considered likely to persist in the long term provided the reserve is appropriately managed.

- It is considered likely that rehabilitation of 50% the 'finger drain corridors', prior to the development of the surrounding lands, would provide suitable habitat for movement of midge orchid pollinators between the conservation lands and the Orchid Reserve (Whilst Dr Bower refers to 50% of the corridors being revegetated, 100% of the corridors will be revegetated, however, parts of the inner 50% may be a slightly wetter form of Banksia Dry Shrubland due to the battering of the corridors and their function as finger drains. The current Banksia Dry Shrubland exhibits these minor differences with a 2-3m height variation across the site).
- Further, Dr Bower also considered that generalist chloropids are likely to colonise vegetation within backyards of the future residential development and that these may provide supplementary pollination of the Tuncurry Midge Orchid in the Orchid Reserve following a catastrophe such as a reserve-wide fire and thus providing in perpetuity functioning of the TMO Park.

1.7 Strategic Context

The land within the BCAA has been under consideration for development since before 1983, subject to several planning investigations and identified in a number of strategies as land which can accommodate population growth in the region (Coastplan 2005). The North Tuncurry project site has been earmarked for residential and employment uses within the '*Forster / Tuncurry Conservation and Development Strategy*' (Great Lakes Council 2003b) as it is contiguous with existing development in Tuncurry and to avoid impact on less disturbed vegetation. Further, the North Tuncurry site was identified as an urban growth area in the Mid North Coast Regional Strategy (DoP 2009).

1.8 Community Consultation and Stakeholder Engagement

The project site has been subject to a broad range of strategic planning investigation and environmental assessments over a number of years by the former Great Lakes Council (GLC), the former Department of Planning, Landcom and the former Department of Lands (DoL), as summarised in Ethos Urban (2020).

As part of the SSS assessment process, the former NSW Office of Environment and Heritage (OEH) and MCC have been consulted extensively and these agencies have requested that matters of ecological significance be addressed strategically at the rezoning stage to simplify the subsequent development application process. This Biodiversity Certification assessment is a strategic assessment that addresses biodiversity issues in parallel to the rezoning application, and if certified by the Minister for the Environment, will remove the requirement to address biodiversity issues at the development application stage. Further, consistent with section 126N of the TSC Act, the proposal to seek Biocertification of land at North Tuncurry will be placed on public exhibition and a report prepared responding to any submissions received.

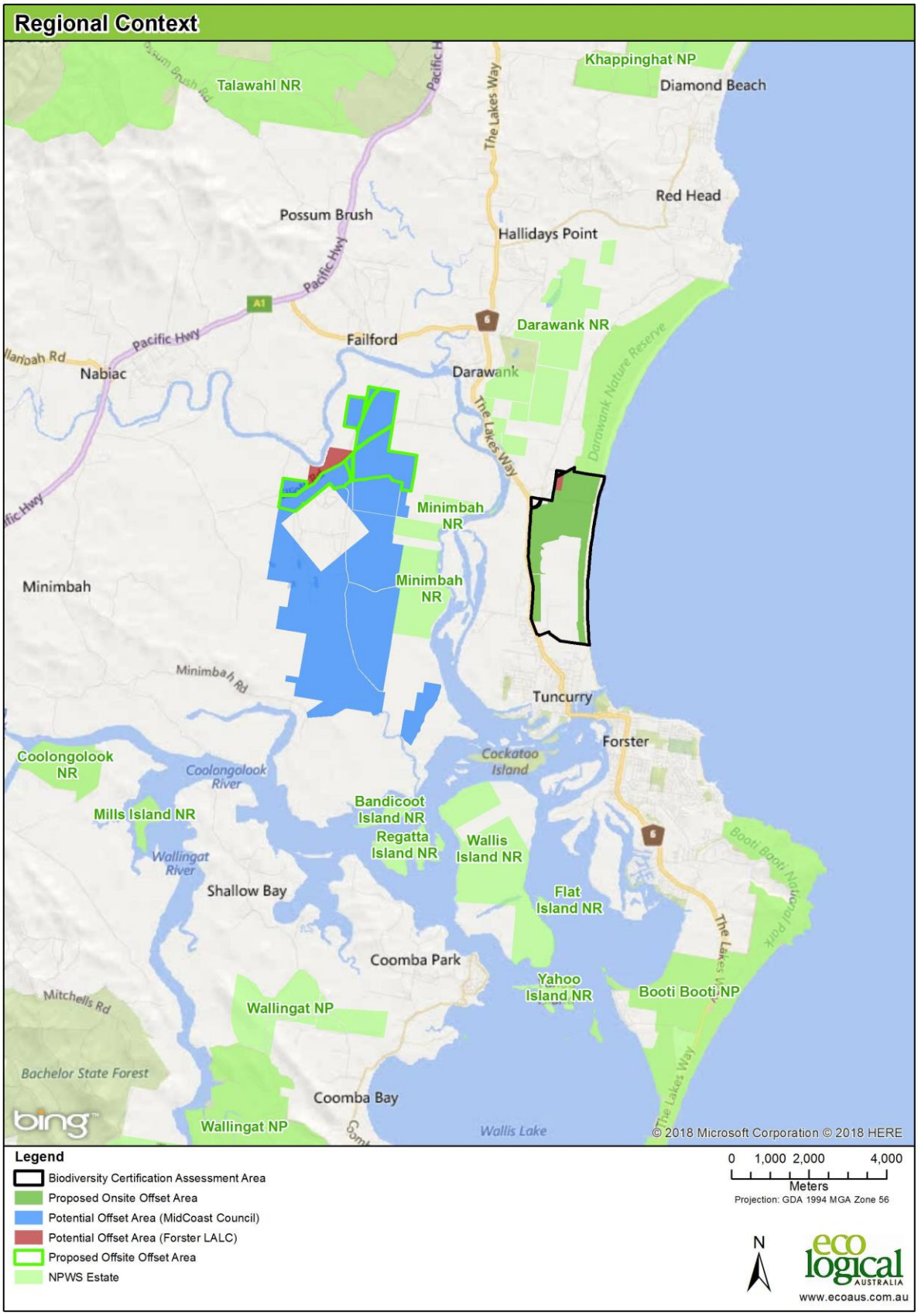


Figure 1: North Tuncurry project site in a regional context

Figure 2: North Tuncurry Project site and proposed development areas

Figure 3: Proposed Master Plan (Source Roberts Day 2015)

Note: The tracks shown to the beach are indicative of the location of existing 4WD access tracks (See Figure 2)

Figure 4: Location of former pine plantations (Source RPS 2012 and Bailey 1931)

Figure 5: Extent of previous mineral sands mining (Source RPS 2012) and wildfires

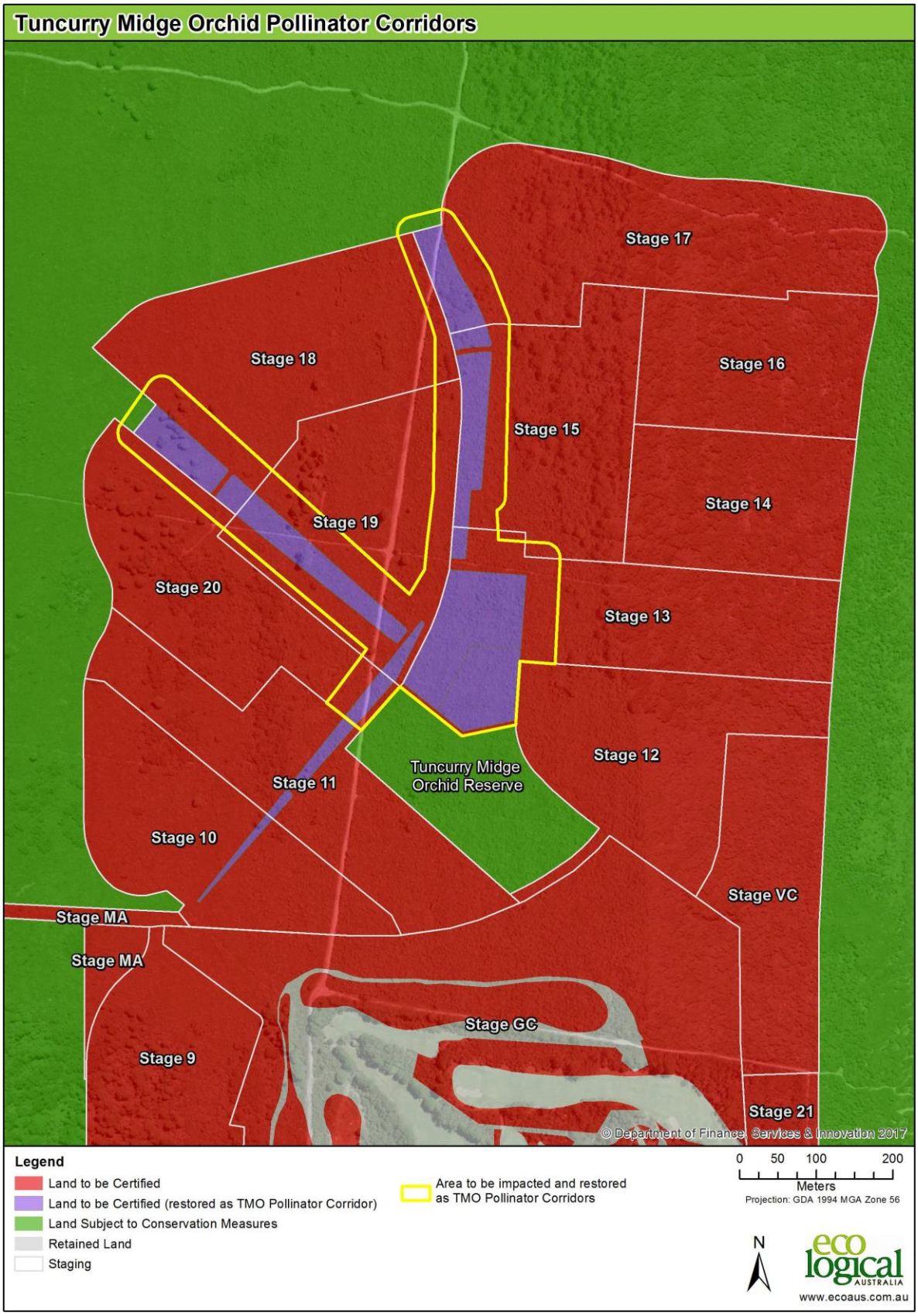


Figure 6: Preliminary earth works required around orchid pollinator corridors.

2 Biodiversity Values Assessment – methodology and results

An application for biodiversity certification must include an assessment of the biodiversity values of the BCAA undertaken in accordance with the BCAM. This section addresses this requirement.

2.1 Literature review and previous studies

2.1.1 Previous survey methods

The BCAA has been the subject of several previous ecological and planning assessments. In particular, this Biocertification Credit Assessment Report (BCAR) has been informed by the '*Ecological Inventory Report – North Tuncurry*' (RPS 2012a) which incorporates the findings of ERM (2005 & 2010b)(**Appendix B**).

RPS (2012a) presents a synthesis of previous ecological information which has been recorded for the BCAA, including ERM (2005; 2010a; 2010b), Paget (2008) and RPS (2011), in addition to the results of further investigations undertaken by RPS throughout 2010, 2011 and 2012. The methodology for this study was developed to address identified gaps in previous survey effort with reference to the survey requirements listed within the OEH survey guidelines (DEC 2004).

Vegetation surveys conducted within the BCAA by RPS included vegetation mapping and condition assessment, 23 full floristic plots (conducted according to the BCAM (DECW 2011) and 48 rapid data points (methodology outlined in RPS 2012a).

Targeted surveys were undertaken for threatened flora species listed under the TSC Act, which were considered as having potential to occur within the North Tuncurry site as outlined in section 2.1 and Appendix A of RPS (2012a), specifically;

- *Allocasuarina simulans*
- *Allocasuarina defungens*
- *Chamaesyce psammogeton*
- *Genoplesium littorale* (syn. *Corunastylis littoralis*) (Tuncurry Midge Orchid); and
- *Cryptostylis hunteriana* (Leafless Tongue-orchid)

Figure 7 shows the distribution of survey effort by RPS for threatened flora across the project site, with **Figure 8** showing the location of targeted surveys for *Genoplesium littorale*.

The combined survey effort for threatened pant species, including the Tuncurry Midge Orchid, is shown in Table 1.

Fauna surveys have been conducted across the BCAA in accordance with DEC 2004, including the following survey techniques: diurnal bird surveys; call playback; spotlighting; Elliott and cage traps; pit fall traps; hair tube surveys; anabat ultrasonic call detectors; harp traps; habitat assessments and incidental observations. The details, including survey locations, stratification units, weather conditions during surveys and total survey effort, are outlined in RPS (2012a) and summarised in **Table 2** and **Figure 9-Figure 12**. The RPS survey effort generally followed standards set in the DEC (2004) guidelines with the exception of survey effort using hair tubes and wire cage traps (targeting Spotted-tailed Quoll and Long-nosed Potoroo), however, in both instances the deficiencies were considered to have been addressed

through alternative survey techniques and previously collected data. Further, additional survey effort for these species was undertaken by ELA in June and July 2020 (ELA 2020) as summarised in Section 2.2.

2.1.2 Previous survey results

RPS (2012a) identified and mapped four vegetation communities within the North Tuncurry site (**Figure 13**):

- *Eucalyptus pilularis* Dry Sclerophyll Forest (Dunal) – Equivalent Biometric Vegetation Type: **'***Blackbutt – Smooth-barked Apple Shrubby Open Forest on Coastal Sands of the Southern North Coast'*;
- *Banksia aemula* Dry Heathland – Equivalent Biometric Vegetation Type: *'Banksia Dry Shrubland on Coastal Sands of the North Coast';*
- *Leptospermum laevigatum* Dry Sclerophyll Shrubland – Equivalent Biometric Vegetation Type: *'Coast Banksia-Coast Wattle dune scrub, Sydney Basin and South East Corner'*; and
- Foredune Complex – Equivalent Biometric Vegetation Type: No Biometric equivalent.

None of these vegetation communities are listed as endangered ecological communities (EECs) under the TSC Act or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

One threatened flora species was recorded within the BCAA (**Figure 14**), *Genoplesium littorale* (syn *Corunastylis littoralis,* hereafter referred to as TMO) which is listed as critically endangered under the TSC Act and EPBC Act. No other threatened flora species have been recorded despite extensive surveys throughout the project site over several years. The results of surveys for TMO within the BCAA are presented in detail in **section 2.3**.

A total of 15 threatened fauna species listed under the TSC Act or EPBC Act have been recorded within or adjacent to the BCAA (**Figure 15**), namely:

- *Pandion cristatus* (Eastern Osprey)
- *Haematopus longirostris* (Pied Oystercatcher)
- *Glossopsitta pusilla* (Little Lorikeet)
- *Phascogale tapoatafa* (Brush-tailed Phascogale)
- *Cercartetus nanus* (Eastern Pygmy-possum)
- *Petaurus norfolcensis* (Squirrel Glider)
- *Pseudomys novaehollandiae* (New Holland Mouse)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Syconycteris australis* (Eastern/Common Blossom Bat)
- *Miniopterus australis* (Little Bentwing-bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Mormopterus norfolkensis* (Eastern Freetail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Chelonia mydas* (Green Turtle)

A further 15 threatened fauna species were considered to have potential to occur, or likely to occur, within the BCAA based upon the presence of suitable habitat and Atlas of NSW Wildlife records (RPS 2012a, **Figure 16** and **Figure 17**), namely:

- *Calyptorhynchus lathami* (Glossy Black-Cockatoo)*;*
- *Daphoenositta chrysoptera* (Varied Sittella)*;*
- *Hieraaetus morphnoides* (Little Eagle)*;*

- *Lathamus discolor* (Swift Parrot)*;*
- *Lophoictinia isura* (Square-tailed Kite)*;*
- *Ninox strenua* (Powerful Owl)*;*
- *Tyto longimembris* (Eastern Grass Owl)*;*
- *Tyto novae-hollandiae* (Masked Owl)*;*
- *Dasyurus maculatus* (Spotted-tailed Quoll)*;*
- *Phascolarctos cinereus* (Koala)*;*
- *Myotis macropus* (Southern Myotis)*;*
- *Pseudomys novae-hollandiae* (New Holland Mouse)*;*
- *Potorous tridactylus* (Long-nosed Potoroo)*;*
- *Vespadelus troughtoni* (Eastern Cave Bat)*;* and
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)*.*

RPS (2012a and 2012c) provides a description of each of these species and habitat use within the BCAA.

Table 1: Threated Flora Survey Effort (2005-2013)

Date	Effort	Reference	Description	Results
Jan-April 2008	11 person days	Paget 2008	Targeted survey of study area during flowering season of TMO by Andrew Paget, John Riley and Barry Ralley (& Isaac Mamott)	510 TMO plants recorded east and south-east of Tuncurry tip 72 TMO plants recorded north and north-east of Tuncurry TAFE
Jan-April 2008	3.5 person days	Paget 2008	Targeted survey for TMO by Andrew Paget & Di Brown north of Tuncurry Study area (Darawank, Bonny Hills and Crowdy Bay	No threatened plant species recorded
Jan-April 2008	2 person days	Paget 2008	Targeted survey for TMO by Andrew Paget & Barry Ralley south of Tuncurry Study area (Booti and Mungo Brush)	No threatened plant species recorded
October 2005	2 person days	ERM 2005	Targeted survey of study area for Allocasuarina simulans and defungens and Cryptostylis hunteriana	No threatened plant species recorded
November 2008	4 person days	ERM 2010a	Targeted survey of study area for Allocasuarina simulans and defungens and Cryptostylis hunteriana	No threatened plant species recorded
19-21 March 2009	3 days	ERM 2010b	Targeted flora survey for the Tuncurry Midge Orchid	15 TMO plants recorded during reference site confirmation 47 TMO plants recorded in study area 31 TMO plants recorded southeast of Tip (Outside of study area)
March 2010 (23, 24, 29, 30 and 31) April 2010 (19, 20, 21, 22, 23, 28) May 2010 (14, 17, 18, 19 and 20)	32 person days	RPS 2011	Targeted flora survey for the Tuncurry Midge Orchid. Walking transects and random meanders within potential habitat on the subject site. Focused on disturbed areas, previously recorded areas and under surveyed heath area	1,293 TMO plants recorded in study area
Feb 2011	1 person day	RPS	Random meander and targeted flora survey for Tuncurry Midge Orchid, (RPS, 2012a)	
April 2011 (13)	1 person day	RPS	Targeted search for TMO	25 plants recorded, (11 considered duplicates of 2010 records)
April 2011 (11, 12 and 13)	6 person days	RPS 2012	Targeted flora survey for the Tuncurry Midge Orchid. Nine random plots (40 x 40 m) within heath vegetation. Within each plot two ecologists walked parallel transects 2 m apart (RPS, 2012a).	9 of the 25 plants recorded in 2011 were in one of the 9 plots
22, 26 & 27 March 2012	3 person days	RPS 2012	22 Transects	309 plants recorded (101 considered new records)
18-22 March 2013 23-24 April 2013	24 person days	RPS 2013	Targeted surveys by Isaac Mamott and Andrew Smith at Tuncurry, South Foster and Minimbah	6 plants recorded at Booti National Park 3 plants recorded on Midcoast Water lands at Minimbah
March 2014	6 person days	This assessment	Targeted survey of study area for Allocasuarina simulans and defungens	No threatened plant species recorded
May 2015	4 person days	This assessment	Targeted survey of study area for Allocasuarina simulans and defungens	No threatened plant species recorded
June and July 2020	10 person days	ELA 2020	Targeted survey of study area for Allocasuarina simulans and defungens	No threatened plant species recorded
18 & 19 March 2021	2 person days	ELA 2021	Rapid re-assessment of TMO following 2019/20 summer wildfires	800 plants rapidly re-located in both burnt and unburnt locations

Table 2: Combined survey effort (ERM 2005 / 2010a and RPS 2012a)

Target Species	Method		*Leptospermum laevigatum* Dry Sclerophyll Shrubland 166 ha		*Banksia aemula* Dry Heathland 237 ha	*Eucalyptus pilularis* Dry Sclerophyll Forest (dunal) 99 ha	Foredune Complex 32 ha	Site Total	Comment/ Additional Works Proposed
			Unburnt 132.43	Burnt 33.57ha					
Small mammals and reptiles	Pitfall Traps	RPS	36	24	72	72	24	216 trap nights	Pit fall trapping in the golf course is not considered desirable. Additionally, habitat is considered marginal in the golf course for the target species (New Holland Mouse).
		ERM	03	02	06	05	02	0 trap nights	
		Total Undertaken	**36**	**24**	**72**	**60**	**24**	**216 trap nights**	
		Total Required	**48 trap nights**	**24 trap nights**	**72 trap nights**	**48 trap nights**	**24 trap nights**	**216 trap nights**	
Small mammals	Terrestrial Elliott A	RPS	350		400	150	100	1000 trap nights	
		ERM	24		48	48	0	120 trap nights	
		Total Undertaken	**374**		**436**	**198**	**100**	**1120 trap nights**	
		Total Required	**200 trap nights**		**300 trap nights**	**200 trap nights**	**100 trap nights**	**800 trap nights**	
Medium sized mammals	Terrestrial Elliott B	RPS	366		388	150	100	1004 trap nights	
		ERM	0		0	0	0	0 trap nights	
		Total Undertaken	**366**		**388**	**150**	**100**	**1004 trap nights**	
		Total Required	**200 trap nights**		**300 trap nights**	**200 trap nights**	**100 trap nights**	**800 trap nights**	
Large mammals	Cage	RPS	72		44	12	20	148 trap nights	Target species (Eastern Quoll) is considered to readily traverse all stratification units and is highly mobile. Consideration of the site as a full stratification unit would require 168 trap nights, which is slightly under the DEC (2004) guidelines.
		ERM	0		0	0	0	0 trap nights	
		Total Undertaken	**72**		**44**	**12**	**20**	**148 trap nights**	
		Total Required	**48 trap nights**		**72 trap nights**	**48 trap nights**	**24 trap nights**	**192 trap nights**	
Arboreal mammals	Arboreal Elliott B	RPS	52		84	84	0	220 trap nights	
		ERM	15		0	5	0	60 trap nights	
		Total Undertaken	**67**		**84**	**129**	**0**	**280 trap nights**	
		Total Required	**48 trap nights**		**72 trap nights**	**48 trap nights**	**24 trap nights**	**192 trap nights**	
Various sized mammals	Hair Tube Terrestrial	RPS	187		165	0	0	352 trap nights	
		ERM	150		300	50	0	500 trap nights	
		Total Undertaken	**337**		**465**	**50**	**0**	**852 trap nights**	
		Total Required	**160 trap nights**		**240 trap nights**	**160 trap nights**	**80 trap nights**	**640 trap nights**	
	Hair Tube Arboreal	RPS	307		405	114	0	826 trap nights	
		ERM	0		0	0	0	0 trap nights	
		Total Undertaken	**307**		**405**	**114**	**0**	**826 trap nights**	
		Total Required	**240 trap nights**		**360 trap nights**	**120 trap nights**	**120 trap nights**	**840 trap nights**	
Bats	Harp trap	RPS	5		9	2	4	20 trap nights	Target species (microchiropteran bats and blossom bats) is considered to readily traverse all stratification units and is highly mobile. Consideration of the site as a full stratification unit would require 28 trap nights, which is slightly under the DEC (2004) guidelines.
		ERM	0		0	0	0	0 trap nights	
		Total Undertaken	**5**		**9**	**2**	**4**	**20 trap nights**	
		Total Required	**8 trap nights**		**16 trap nights**	**4 trap nights**	**4 trap nights**	**32 trap nights**	
	Ultrasonic detection	RPS	24		132	60	12	228 hours	
		ERM	7.5 hours across the site					7.5 hours	
		Total Undertaken	**24**		**123**	**60**	**12**	**235.5 hours**	
		Total Required	**16 hours**		**24 hours**	**8 hours**	**8 hours**	**56 hours**	
Various nocturnal mammals and birds	Spotlighting on foot	RPS	4		9	6	2	21 hours	
		ERM	6 hours across the site					6 hours	
		Total Undertaken	**11**		**9**	**6**	**2**	**27 hours**	
		Total Required	**4 hours**		**8 hours**	**4 hours**	**4 hours**	**20 hours**	
	Spotlighting in car	RPS	10		3	6	Driving not recommended	19 hours	
		ERM	0		0	0		0 hours	

Target Species	Method		*Leptospermum laevigatum* Dry Sclerophyll Shrubland 166 ha		*Banksia aemula* Dry Heathland 237 ha	*Eucalyptus pilularis* Dry Sclerophyll Forest (dunal) 99 ha	Foredune Complex 32 ha	Site Total	Comment/ Additional Works Proposed
			Unburnt 132.43	Burnt 33.57ha					
		Total Undertaken	**10**		**3**	**6**		**19 hours**	
		Total Required	**5 hours**		**10 hours**	**5 hours**		**20 hours**	
	Call Playback (birds) using the minimum for Masked Owl	RPS	*Note: Owl call Playback survey effort is calculated by site size and not by stratification unit.*					15 events	
		ERM						3 events	
		Total Undertaken						**18 events**	
		Total Required						**16 events**	
Flora Surveys	Random Meander	RPS	22.6		23	11.6	7.7	64.9 hours	Random meander undertaken by RPS is calculated on distance covered within each stratification unit with an estimated average speed being 1km per hour. It is believed that this is a conservative estimate and the actual time spend undertaking random meanders is likely to be greater than what is displayed.
		ERM	-		-	-	-	-	
		Total Undertaken	**22.6**		**23**	**11.6**	**7.7**	**64.9 hours**	
		Total Required	**1.5 hours**		**2.5 hours**	**1.5 hours**	**1 hour**	**6.5 hours**	
	Quadrat	RPS	6		10	4	3	23 quadrats	
		ERM	1		3	2	0	6 quadrats	
		Total Undertaken	**7**		**13**	**6**	**3**	**29 quadrats**	
		Total Required	**3 quadrats**		**3 quadrats**	**3 quadrats**	**2 quadrats**	**11 quadrats**	

Figure 7: Flora survey effort (RPS 2012a)

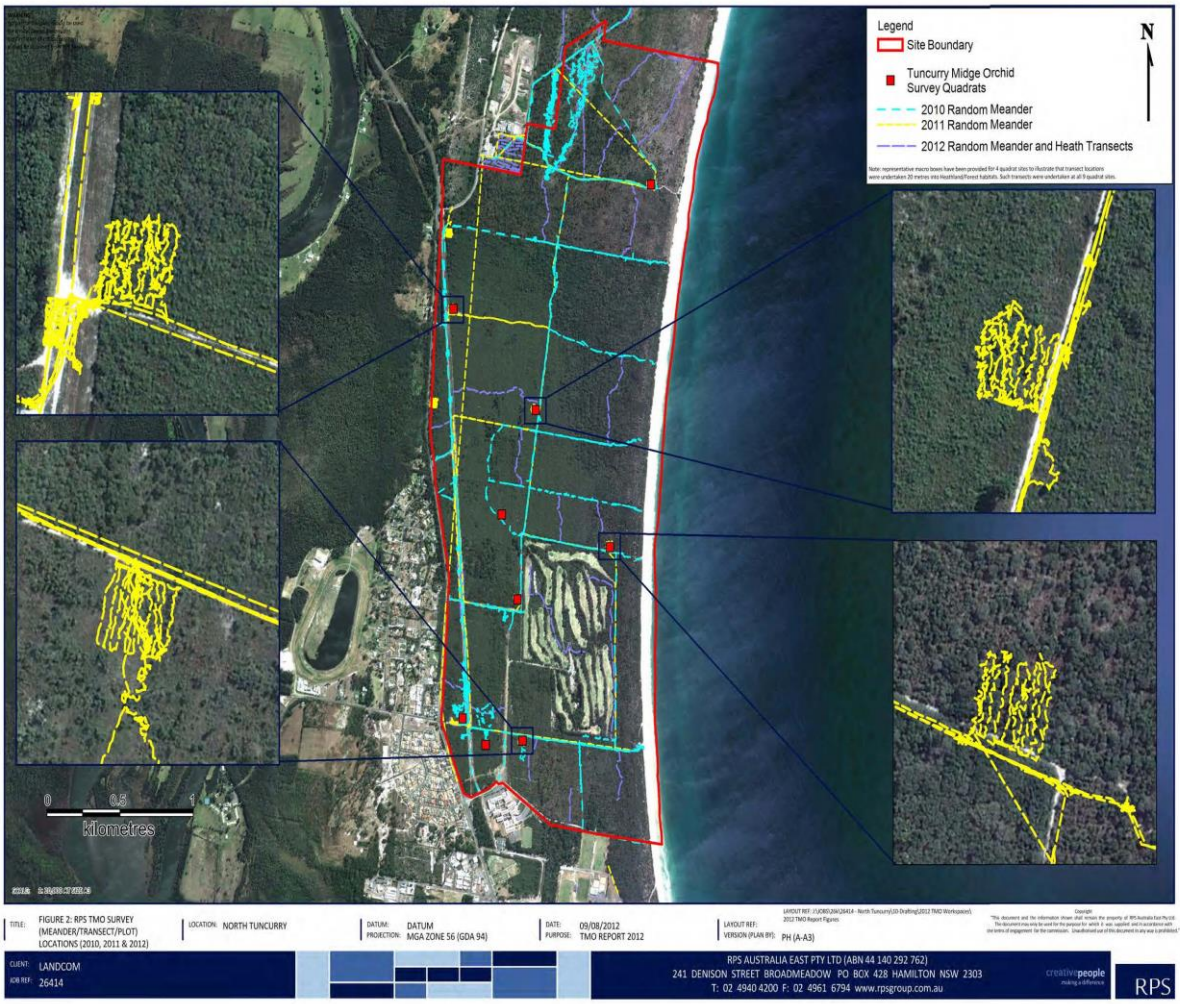


Figure 8: Combined survey effort for the Tuncurry Midge Orchid (RPS 2012b)

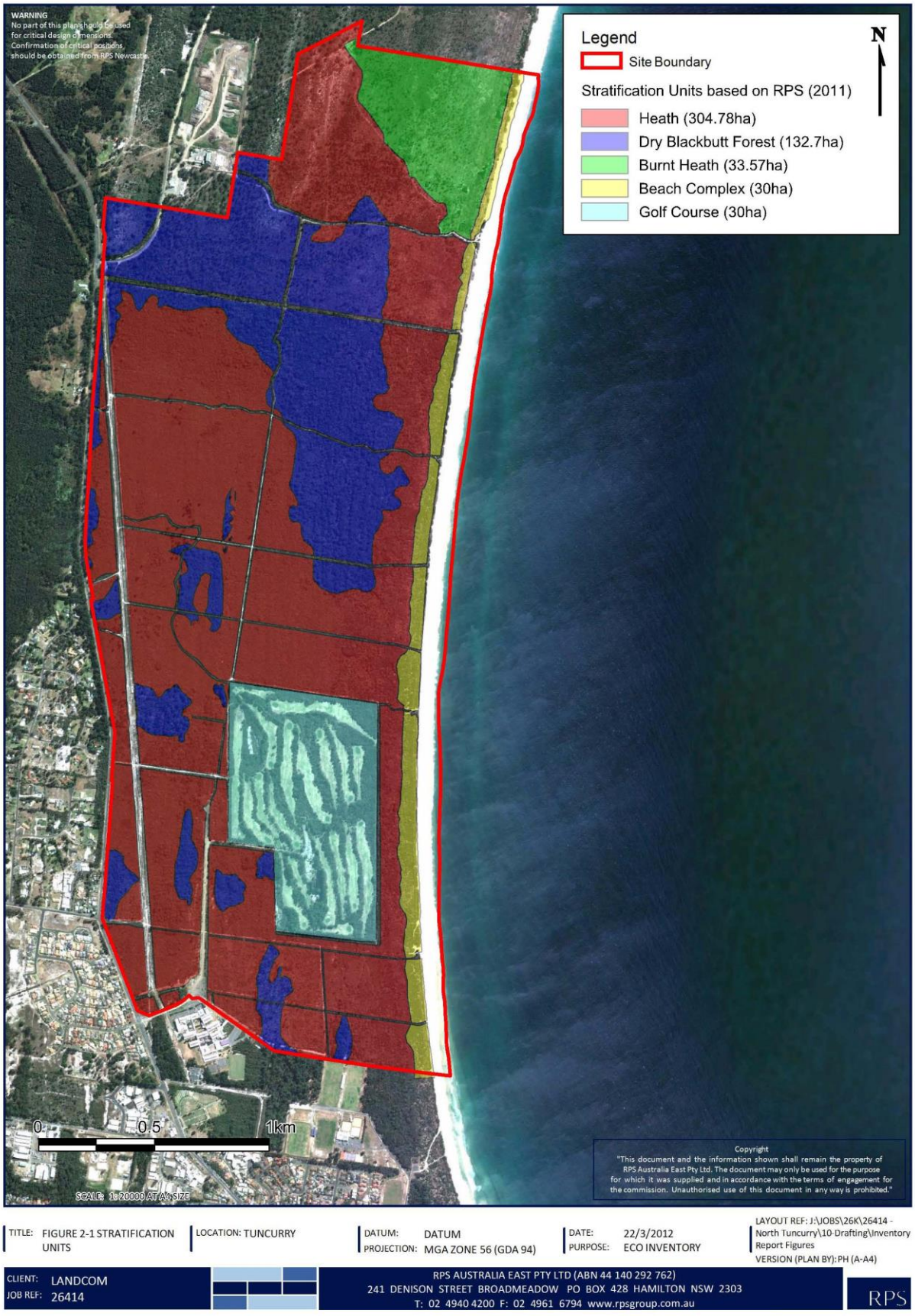


Figure 9: Stratification units for fauna surveys (RPS 2012)

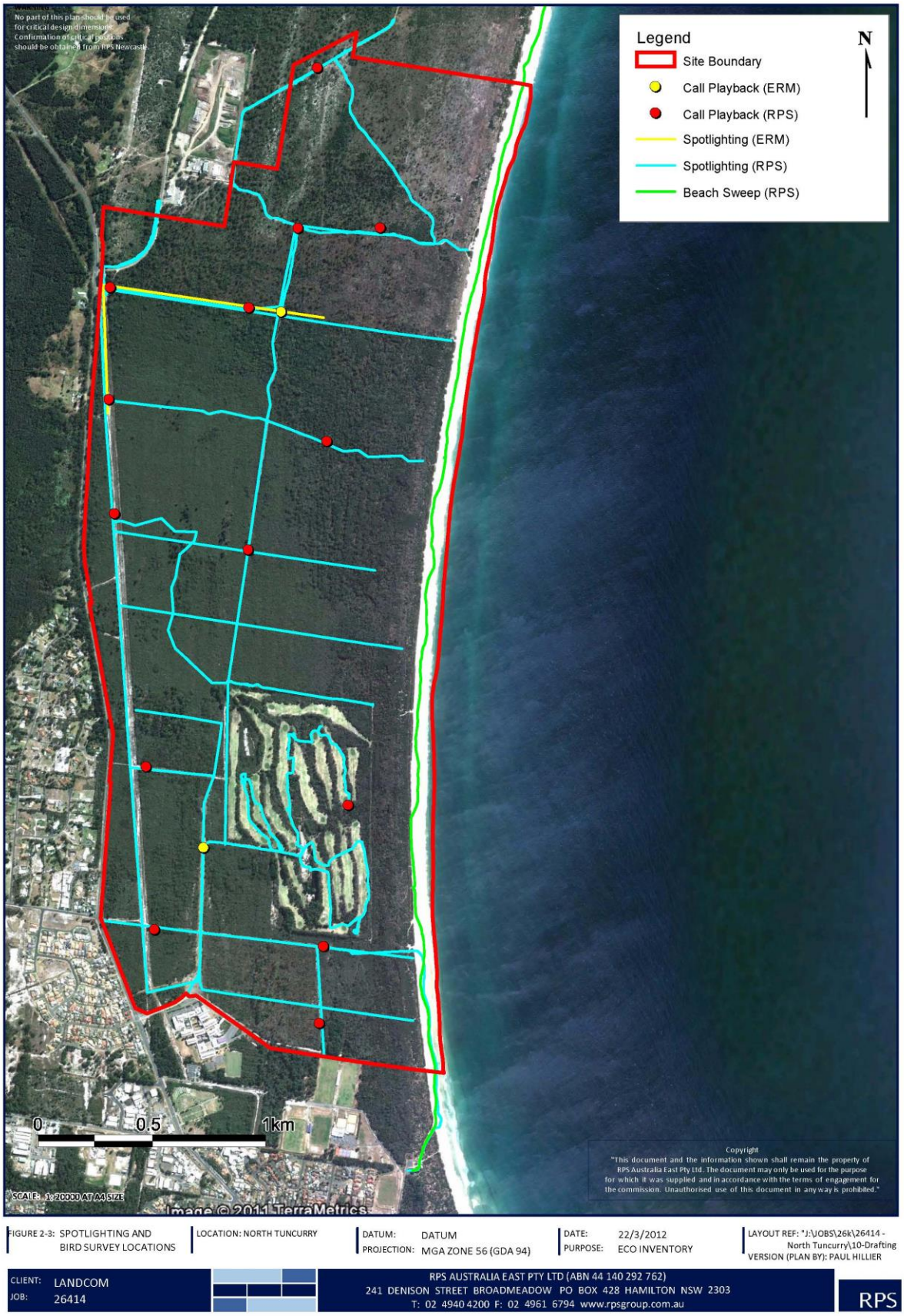


Figure 10: Spotlighting and call playback locations (RPS 2012)

Figure 11: Survey effort for arboreal and terrestrial mammals (RPS 2012)

Figure 12: Survey locations for microchiropteran bats (RPS 2012)

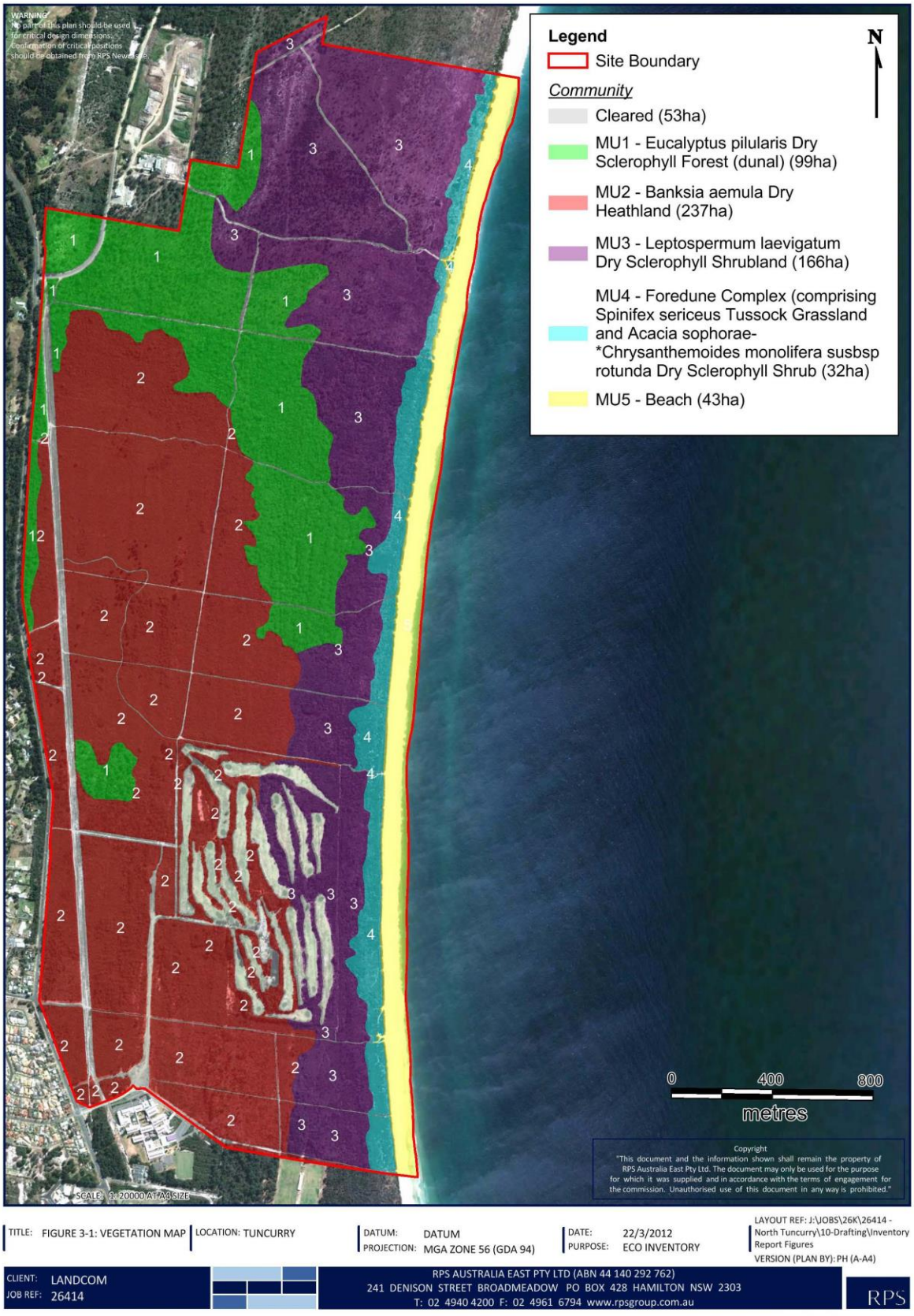


Figure 13: Vegetation communities within the project site (source RPS 2012a)

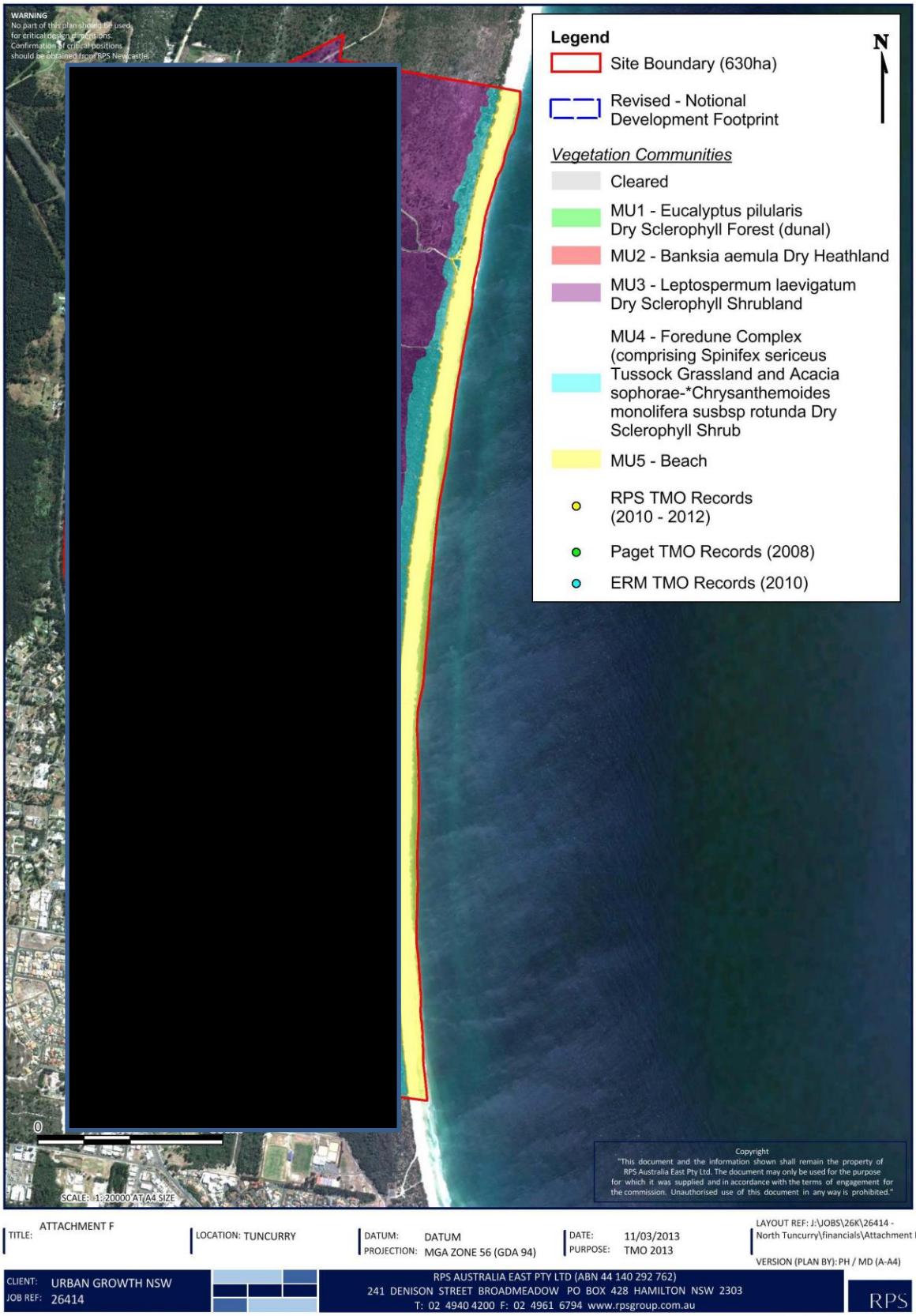


Figure 14: Previous threatened flora records within project site (source RPS 2012b)

Note: The precise location of endangered orchids have been redacted from the public exhibition version of this document

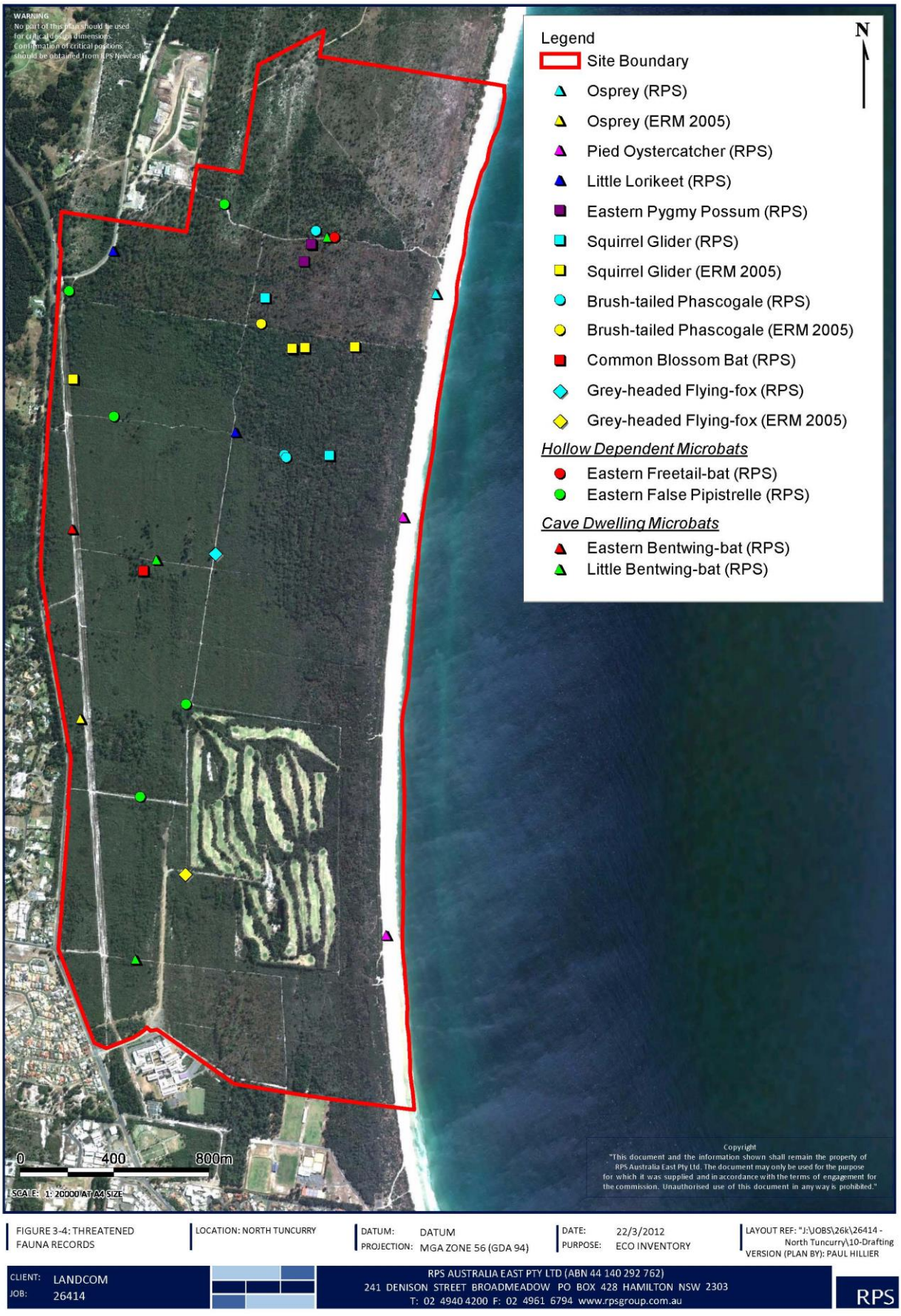


Figure 15: Threatened fauna species recorded within project site (source RPS 2012a)

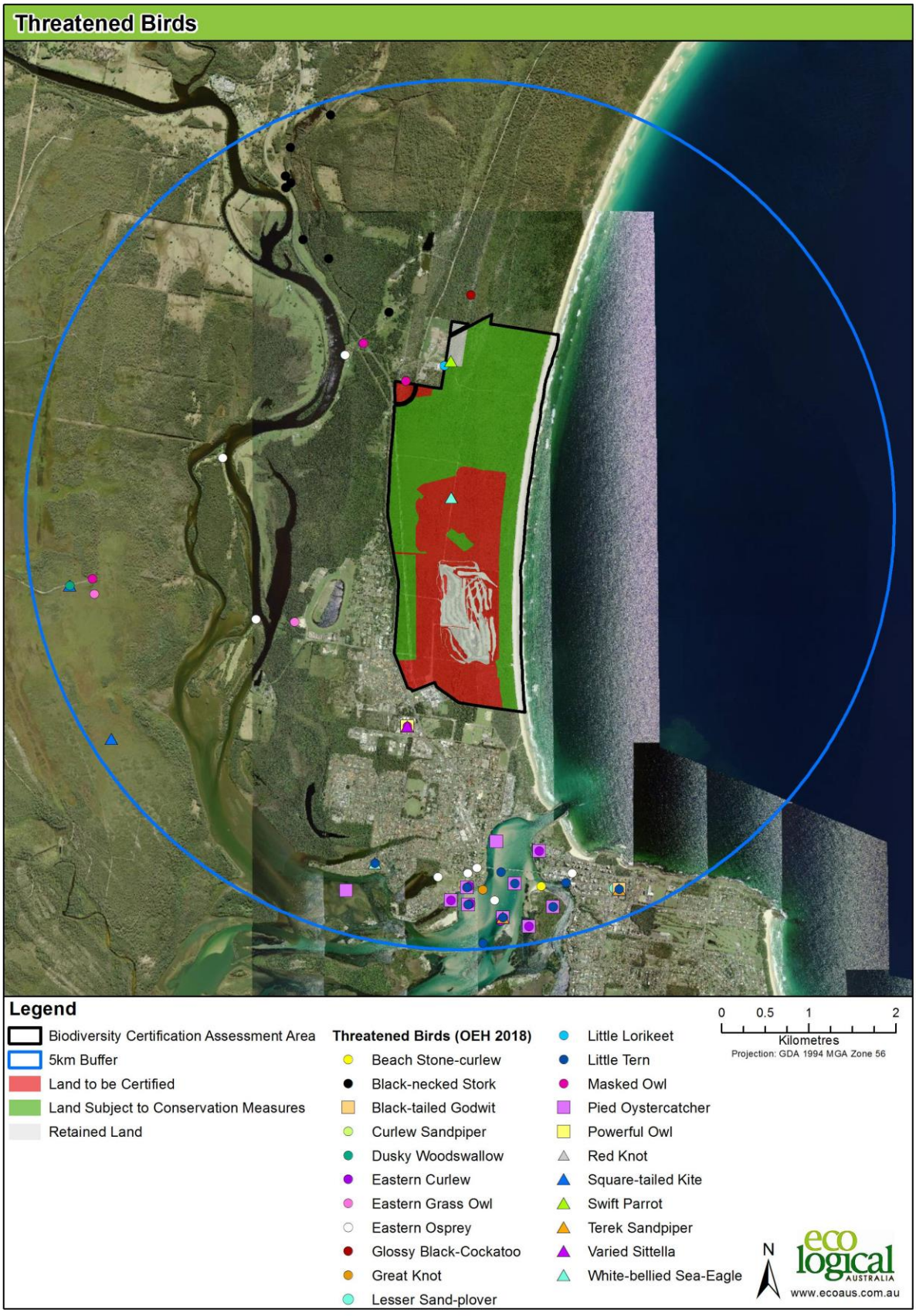


Figure 16: Threatened bird species previously recorded in a 5 km radius of the project site

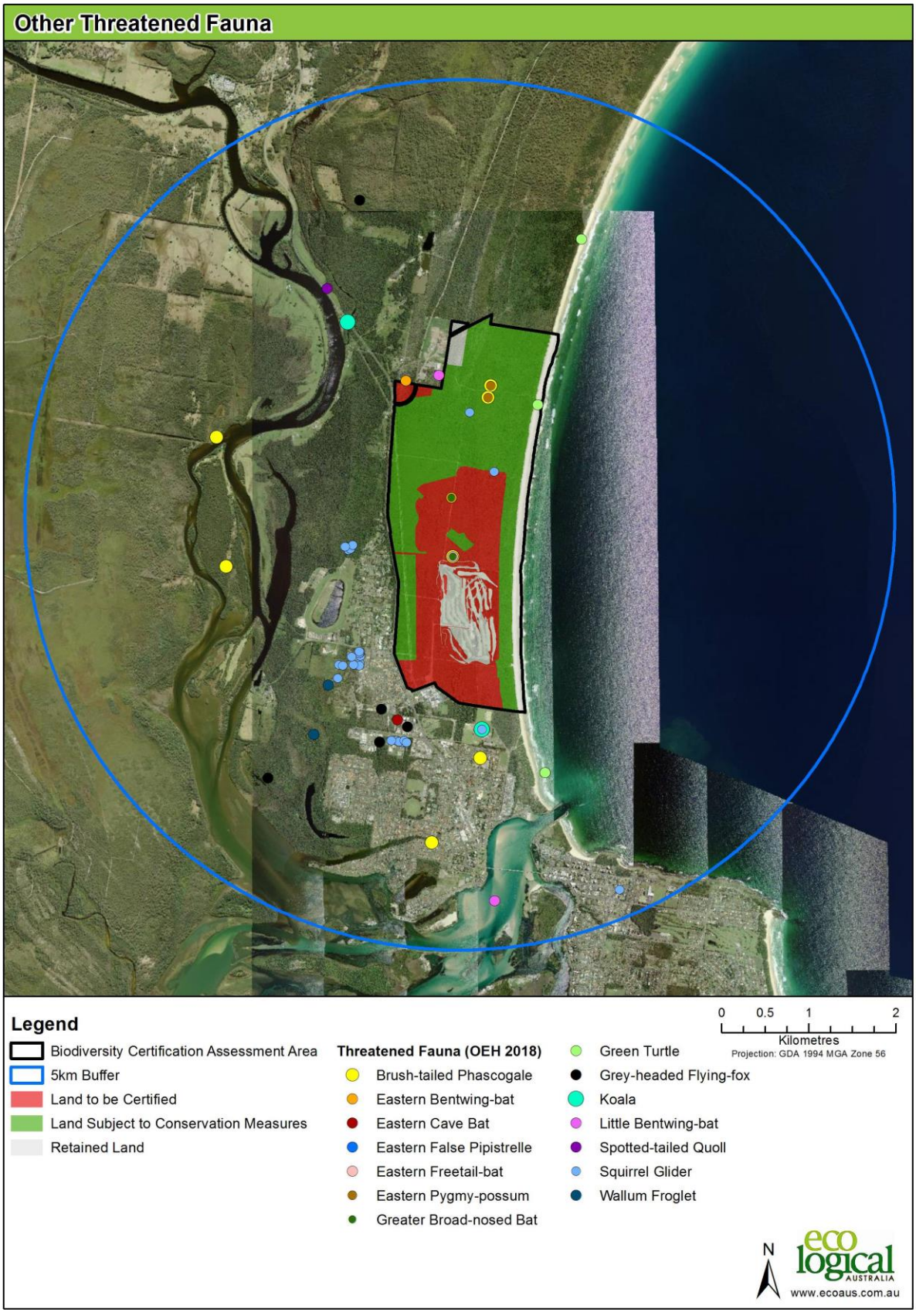


Figure 17: Threatened mammals, reptiles and amphibians species previously recorded in a 5 km radius of the project site

2.2 Additional field assessment for the Biocertification (2015) and Biobank (2020) assessments

Vegetation mapping and condition stratification within the BCAA was undertaken in accordance with the BCAM by RPS (2012a). This vegetation mapping and condition stratification was validated and refined by ELA in March 2014 and a further 13 biometric plots were collected in March 2014 and four in May 2015 by accredited assessors and former ELA staff members Brian Towle and Antony Von Chrismar (Accreditation Nos. 0229 and 0080 respectively) and a further 29 BBAM plots in June-July 2020 by accredited assessor Lily Gorrell (Accreditation No. 0145 and supported by Gordon Patrick (**Figure 18**). Brief CVs of the ELA project team are provided in **Appendix A**.

The final mapping of biometric vegetation types within the BCAA generally followed that of RPS (2012a). Minor changes were made with regard to the distribution of different 'vegetation zones', including refining areas in which the exotic *Pinus elliottii* was present. Additionally, some areas which were identified by RPS (2012a) as *Banksia Aemula* Dry Heathland with emergent *Eucalyptus pilularis* (Blackbutt) have been considered in this study as a shrubby form of the '*Blackbutt – Smooth-barked Apple shrubby open forest on coastal sands of the southern NSW North Coast Bioregion'* due to the woodland/forest structure of these areas. RPS (2012) acknowledges the woodland structure of these areas in regard to habitat structure for fauna, however, considered this area more closely aligned to the '*Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion'*, based upon floristic analyses.

The number of plots collected across the BCAA is shown in **Figure 18** and summarised in **Table 3** and is consistent with or exceeds the minimum number of plots required for each vegetation zone as defined by the BCAM.

2.2.1 Biometric vegetation type, condition and threatened status

RPS (2012a) and the additional surveys by ELA identified three biometric vegetation types within the BCAA:

- Blackbutt – Smooth-barked Apple shrubby open forest on coastal sands of the southern NSW North Coast Bioregion;
- Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion; and
- Coast Banksia – Coast Wattle dune scrub, Sydney Basin and South East Corner.

The distribution of these vegetation communities appears to be related to soil depth and distance from the ocean. Generally, forest and woodland vegetation occurred in areas with increased soil depth, with shrublands occurring in areas with shallower soils across the remainder of the site and (**Figure 18**)

None of these vegetation types represent endangered ecological communities (EECs) listed under the TSC Act. Vegetation in the BCAA was mapped into 13 'vegetation zones' based on vegetation type and ancillary codes as per the BCAM (DECCW 2011) (**Table 3**). An ancillary code is an optional field which splits zones further to reflect a more homogenous condition state. The ancillary code was used in the BCAA to identify zones that had very recently been burnt, areas regenerating from moderately recent fires, areas where a canopy of regrowth Pines were present, areas with vegetation structure considered typical for the vegetation type and areas where the vegetation structure (canopy or shrub stratum) was atypical and influenced by adjacent vegetation types. The vegetation zones and location of the BioMetric plots are shown in **Figure 18**.

Full descriptions of each biometric vegetation type within the BCAA, including the different ancillary codes identified and data presented in RPS (2012a), are provided in **Appendix C**. A summary of the plot data is provided in **Appendix D**.

Table 3: Biometric vegetation plots within Biometric vegetation types across the BCAA

Veg Zone	Biometric Vegetation Type	Ancillary	Area	Plots required (BCAM)	Number of plots completed			
					RPS 2012	ELA 2014/15	ELA 2020	Total
1	Banksia dry shrubland on coastal sands of the North Coast	Good	165.37	5	7	1	9	17
2		Burnt	15.83	2	1	2		3
3		Blackbutt	13.76	2		2		2
4		Pine	14.85	2		2	2	4
5	Blackbutt – Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	Good	102.25	5	3	2	5	10
6		Shrubby	13.21	2	1	1		2
7		Burnt	10.35	2		2		2
8		Pine	6.78	1	2		3	5
9	Coast Banksia – Coast Wattle dune scrub, Sydney Basin and South East Corner	Good	126.60	5	3	2	6	11
10		Regen	32.21	3	3	1		4
11		Blackbutt	5.75	1		1		1
12		Pine	1.82	1		1		1
13		Dune	31.69	3	3		4	7
Total			**540.47**	**34**	**23**	**17**	**29**	**69**

[1] One additional plot conducted by RPS (2012) was in the 'good' ancillary code at the time of survey, but this area burnt between 2012 – 2014 and another plot was conducted within this vegetation zone by ELA (2014) and assigned the 'burnt' ancillary code during this survey.

2.2.2 Post 2019/2020 bushfire threatened fauna survey

Due to the age since original targeted fauna surveys were undertaken by RPS (2010-2012) and the potential impact of the 2019/2020 summer wildfires, the Department of Planning, Industry and Environment requested that ELA undertake additional targeted surveys for Brush-tailed Phascogale, Eastern Pygmy Possum and Koala to confirm their continued presence/occupation of the site.

These surveys were undertaken by ELA ecologists Daniel McKenzie and Dee Ryder between the 2nd, 3rd and 4th June and 14th and 15th July 2020 by ELA ecologists Daniel McKenzie and Liam Scanlan (Table 4) and shown in Figure 19.

Table 4: ELA fauna survey effort 2020

Target Species	Method	Total site effort undertaken
Nocturnal mammals	• Spotlighting on foot	2hrs of spotlighting x 2 people x 2 nights walking at approximately 1 km per hour (**8 person hours**)
Brush-tailed Phascogale, Eastern Pygmy Possum & Spot-tailed Quoll	• Hair funnels • Remote cameras	48 hair funnels baited with universal bait for 41 nights (3 June -13 July) (**1968 trap nights**) 24 remote cameras set for 41 nights (3 June -13 July) (**984 camera nights**). 12 baited with sardines targeting Brush-tailed Phascogale, 12 with universal bait and sprayed with honey water.
Koala	• Habitat assessment • Spotlighting • Remote cameras	2hrs of spotlighting x 2 people x 2 nights walking at approximately 1 km per hour (**8 person hours**)

		24 remote cameras set for 41 nights (3 June -13 July) (**984 camera nights**)

2.2.3 Post 2019/2020 bushfire TMO survey

Severe wild fires in late 2019 burnt the northern part of the study area (where over 1,800 of the recorded TMO plants had previously been recorded) (Figure 5) and the Nabiac Sandbeds (60 plants previously recorded). A rapid re-assessment of the Tuncurry sub-population in March 2021 was able to relocate over 800 plants at 10 sample locations in 2 days, 570 of which were from within areas intensively burnt in 2019/2020 (Figure 20).

Table 5: Summary of post fire targeted survey for the Tuncurry Midge Orchid

Date	Effort	Description
18 & 19 March 2021	2 person days	Rapid re-assessment following 2019/20 summer wildfires

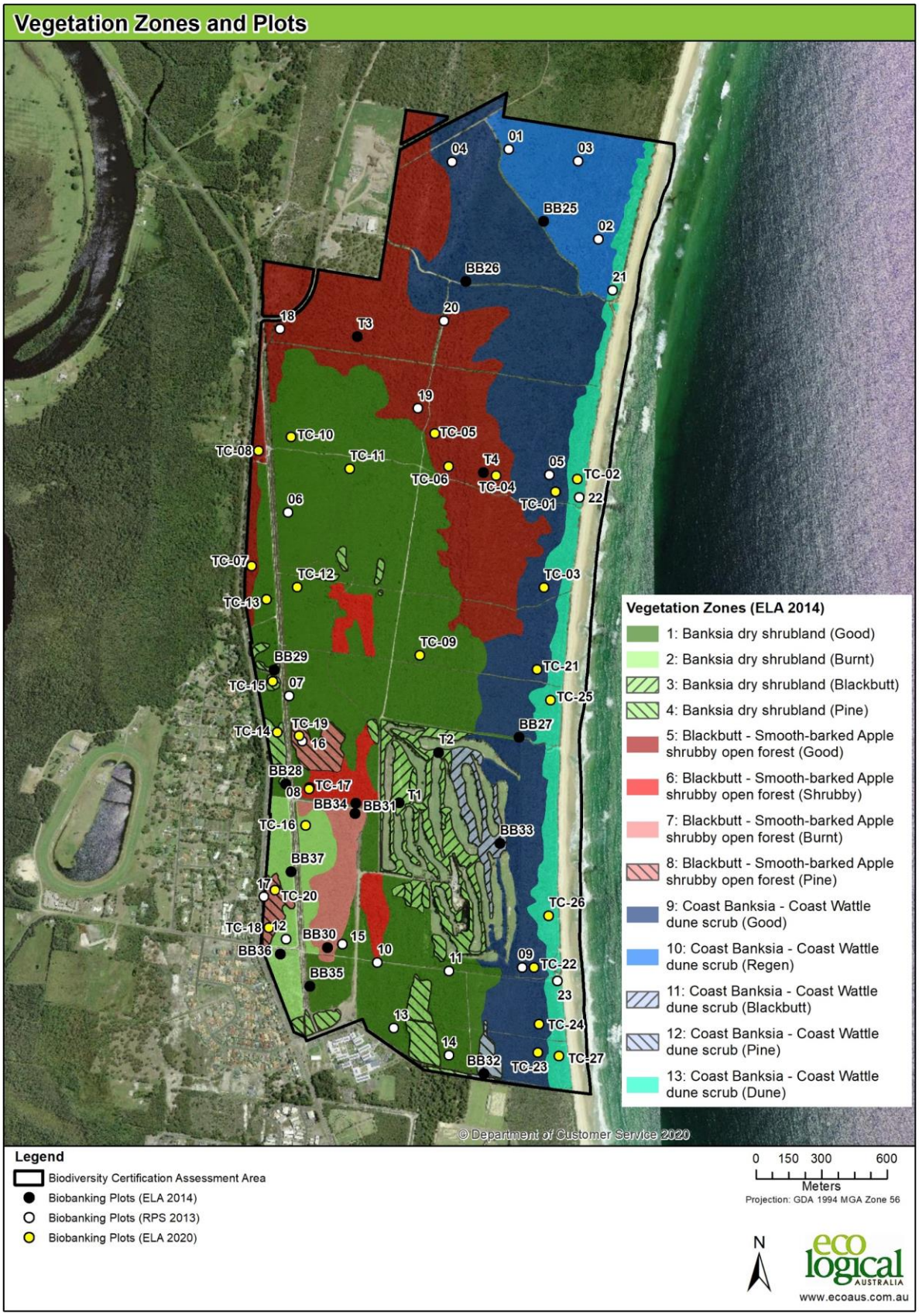


Figure 18: Biometric vegetation types, including ancillary codes, and location of vegetation plots within the BCAA

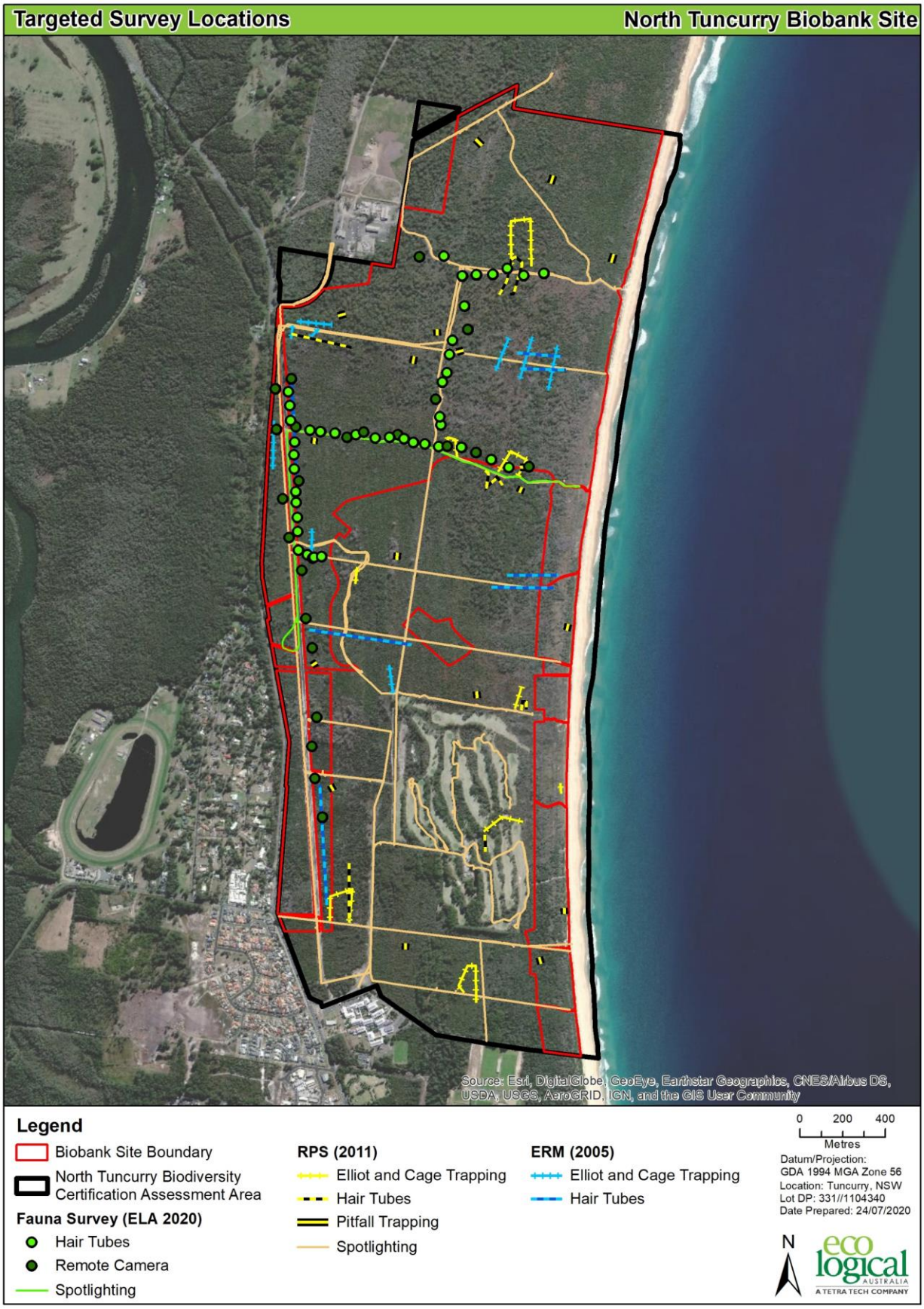


Figure 19: Combined fauna survey effort (ELA 2020)

Figure 20: Post fire TMO assessment March 2021

Note: The precise location of endangered orchids have been redacted from the public exhibition version of this document

2.3 Determination of species credit species requiring survey

'*Species credits*' are the class of biodiversity credit created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. All threatened flora and approximately half of all threatened fauna species are species credits. Furthermore, some species credit species are also 'red flag species' which the BCAM defines as "*a species that cannot withstand further loss in the CMA because it is extremely rare/critically endangered, restricted or it's ecology is poorly known*".

The BCAM requires targeted survey for threatened flora and fauna considered to be 'species credit' species, on the land that will be impacted by development. Where a survey or expert report confirms that a species credit species is present or likely to use potential habitat on land proposed for biodiversity certification then a survey must also be undertaken or expert report prepared for that species on land to be used as an offset confirming its presence or likely presence. The biocertification credit calculator will use the survey results to calculate the number of credits required to offset the loss of the threatened species on land to be certified and the number of credits generated on land subject to conservation measures to determine whether the 'improve or maintain' test is satisfied provided a Red Flag species is not impacted.

Species that require species credits for the land proposed for biodiversity certification or are being used to generate species credits for a proposed conservation measure are identified and assessed in accordance with seven steps outlined in Section 4.3 of the BCAM. The results of the candidate species identification and assessment process are presented in **Appendix E.**

2.3.1 Step 1. – identify candidate species for initial assessment

A list of candidate species were filtered into the BCAA using the biocertification credit calculator version 1.9 and validated against the threatened species profile ecological data from the BioNet Atlas of NSW Wildlife. This list is presented in **Appendix E**.

2.3.2 Step 2. – review list to include additional species

This list has been reviewed and expanded to include additional species previously recorded within the BCAA (RPS 2012a) and species previously recorded within an approximate 5 km radius of the BCAA on the Atlas of NSW wildlife (search performed for the area bounded by the decimal degrees: -32.07; 152.55; -32.17; 152.45, in May 2015). An updated search in June 2018 in a 5km radius of the BCAA has not revealed any additional threatened species although there are further records of some already documented species. The expanded list of candidate species is included in **Appendix E**.

2.3.3 Step 3. – identify candidate species for further assessment

The list of candidate species was then reviewed to identify only those species that require further assessment in the BCAA. Species removed from the list were those species for which one of the following applied:

- assessment of the habitat features within the BCAA determined that the habitat is poor quality for the particular species to utilise
- the species was only predicted (rather than known) to occur in the Karuah Manning subregion of the Hunter-Central Rivers according to the Threatened Species Profile Database
- the species is a vagrant species and unlikely to utilise habitat in the biodiversity certification assessment area, and/or
- the records of the species presence are old or have doubtful authenticity.

The species removed and a justification supporting the removal of these species from the candidate list are provided in **Appendix E.**

Rhizanthella slateri has potential to occur within the BCAA, however this determination is based upon a lack of knowledge regarding the habitat preferences of this species. *R. slateri* has been recorded from very few locations across its range, from south-east Queensland to the south coast of NSW near Jervis Bay, and no co-occurring species or associations with particular vegetation communities have been identified (Jones 2006). Thus, it is difficult to determine the likely occurrence of this species within the BCAA. Generally, given the small number of locations in which this species has been recorded, the likelihood of this species occurring in any one area is generally low. Furthermore, the underground nature of this species, with flowers maturing below the soil surface or extending up to 2 cm above the ground, makes surveying for this species extremely problematic, with most discoveries of this species being accidental during earthworks (Jones 2006).

2.3.4 Step 4. – identify potential habitat for species requiring further assessment and step 5 determine whether species is present

The flora and fauna surveys of RPS (2012a), as detailed in **Section 2.1** and **Appendix F**, identified habitat and confirmed the presence of the following species credit species:

- *Genoplesium littorale* (syn *Corunastylis littoralis*) Tuncurry Midge Orchid (TMO)
- *Pandion cristatus* (Eastern Osprey)
- *Haematopus longirostris* (Pied Oystercatcher)
- *Phascogale tapoatafa* (Brush-tailed Phascogale)
- *Cercartetus nanus* (Eastern Pygmy-possum)
- *Chelonia mydas* (Green Turtle)

Despite suitable habitat elements being identified within the BCAA, the following likely/potential species have not been detected during extensive targeted surveys over several years and are, therefore, considered unlikely to utilise this site:

- *Esacus magnirostris* (Beach Stone-curlew)
- *Ixobrychus flavicollis* (Black Bittern)
- *Charadrius leschenaultii* (Greater Sand-plover)
- *Charadrius mongolus* (Lesser Sand-plover)
- *Sternula albifrons* (Little Tern)
- *Dasyurus maculatus* (Spotted-tailed Quoll)

There are three records for the Koala in BioNet immediately south of the project site from 1988 and 1990 and one from the Lakes Way, approximately 3 km north of the impact area from 2013. The Koala is a conspicuous species and not easy to confuse with other arboreal mammals. It has a high public profile, particularly in urban areas.

The most important factor influencing Koala occurrence is the suite of food tree species available. In any one area, Koala rely primarily on regionally specific primary and/or secondary food tree species. If primary food tree species are not present or occur in low density, Koala will rely on secondary food tree species, but the carrying capacity of the habitat (i.e. number of animals per hectare) is inevitably lower. At Tuncurry, DEC (2003) recognises Swamp Mahogany (*Eucalyptus robusta*) and Tallowwood (*E. microcorys*) as of primary importance to Koala with other species utilised to a lesser extent including Broad-leaved Paperbark (*Melaleuca quinquenervia*), Blackbutt (*E. pilularis*), Red Bloodwood (*Corymbia gummifera* and Smooth-barked Apple (*Angophora costata*). DECC (2008) also recognises White Stringybark (*E. globoidea*) as a supplementary feed species in the North Coast Koala Management Area.

Given the targeted surveys undertaken for this species and lack of any public sightings over the past 25 years from the proposed impact areas, the Koala is considered unlikely to utilise habitats in the impact area.

Similarly, there is only one record for the Spot-tailed Quoll in the NSW Wildlife Atlas within 5km of the BCAA which is from 2006 but only has an accuracy of +/- 10km. This species has not been recorded within the BCAA despite extensive targeted survey effort. Large areas of suitable habitat will be protected and managed for conservation that form links to adjacent habitat areas, including Darawank National Park to the north.

It is noted that the following threatened species that have been recorded within the BCAA are assessed as '*ecosystem credit'* species within the Hunter-Central Rivers CMA, or are only listed on the EPBC Act, and do not require targeted surveys or credit calculations:

- Little Lorikeet (*Glossopsitta pusilla*)
- Squirrel Glider (*Petaurus norfolcensis*)
- Square-tailed Kite (*Lophoictinia isura*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Common Blossom-bat (*Syconycteris australis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Little Bentwing-bat (*Miniopterus australis*) (Where breeding habitat is present (caves) this species is assessed as a species credit. No breeding habitat was identified within the BCAA)
- New Holland Mouse (*Pseudomys novaehollandiae*).

2.3.5 Step 6 – identify the threatened species that trigger a red flag

One of the threatened species recorded within the BCAA, the TMO, is listed as critically endangered under the TSC Act and EPBC Act. Any areas of land in which this species occurs that are proposed for development are therefore 'red-flagged' in accordance with the BCAM. A red flag variation request is included in **Section 4** of this report.

2.3.6 Step 7 finalise the boundary of species polygons and area of impact

The following sections provide descriptions of each of the species identified as requiring species credits including the areas within the BCAA which represent habitat for each of these species. The following sections briefly describe the ecology and habitat requirement of these species in respect to their occurrence within the BCAA. Species habitat polygons are shown in **Figure 21- Figure 24**.

Genoplesium littorale (Tuncurry Midge Orchid)

Genoplesium littorale (syn. *Corunastylis littoralis*) (TMO) terrestrial orchid species which is listed as Critically Endangered under the TSC Act and EPBC Act (as *C. littoralis*). TMO is a renascent terrestrial herb, which occur as underground tubers throughout winter and spring. A single tubular leaf to 25 cm high (Jones 2006) emerges following good rainfall in late summer. The inflorescence stalk emerges from the leaf from March to May supporting 5 to 30 flowers (Jones 2006). Pollination is mediated by flies of the family Chloropidae which are hypothesised to be attracted via 'kleptomyiophily', whereby flowers emit chemicals resembling those released by dying insects which attract kleptoparisitc flies (Bower, Towle & Bickel 2015). Following flowering and seed pod development, where successful pollination has occurred, stems whither and only underground tuber remain.

Within the BCAA the species has been recorded from Blackbutt – Smooth-barked Apple open forest and Banksia Dry Shrubland including from within the disturbed areas associated with the powerline corridor and informal tracks which bisect this site. The distribution of TMO records within the BCAA is shown in

Figure 21 (together with a 30m record buffer) and the number of TMO individuals impacted is shown in **Table 13**. Sixty-three TMOs will be directly impacted by the proposal which represents under 3% of the total number of individuals recorded in the BCAA and 38% of the potential habitat within the BCAA.

Brush-tailed Phascogale (*Phascogale tapoatafa*)

The Brush-tailed Phascogale is a small marsupial carnivore feeding mainly on invertebrates (Strahan 1995). It is one of the most arboreal of the dasyurids, seldom feeding on the ground, preferring to feed on prey captured by tearing away bark from rough barked species and also feeding on nectar (Strahan 1995). Nesting occurs in tree hollows, rotten stumps and bird nests, with lactating females preferring large tree hollows with small secure entrances (Strahan 1995).

This species was recorded within the BCAA in 2008 (ERM 2010a) and 2012 (RPS 2012a) within the '*Blackbutt – Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast*' and '*Coast Banksia-Coast Wattle dune scrub, Sydney Basin and South East Corner*'. The species has also been reported in the Tuncurry Golf Course for many years and anecdotally is known to utilise areas of the club house as a den site (RPS 2012a). Whilst the species was not re-recorded in the BCAA during post fire surveys by ELA in June-July 2020, it is difficult to detect, even when present (Dr Todd Soderquist species expert DPIE to Robert Humphries) and ELA have previously been advised by DPIE, that regardless of the age of records and lack of any significant changes to habitat quality and connectivity since the earlier recordings, to "assume' that the species is present. It has thus been considered likely to still utilise all areas of the BCAA except the dunal areas, although the 'Blackbutt – Smooth-barked Apple shrubby open forest' vegetation type is considered to represent the best quality habitat for the species due to the density of potential nest sites (including hollow bearing trees) and foraging habitat (**Figure 22**). Whilst the numerous small tracks across the study area do not represent a movement barrier to the Bush-tailed Phascogale, these areas have not been included in the habitat polygon for the species for either impact or offset areas, as they are not mapped as a vegetation zone. Accordingly a habitat polygon of 508.78 ha across the BCAA has been determined for this species with 198.66 ha of habitat impacted and 277.06 ha in proposed on-site offset areas (excluding the 3.95 ha TMO reserve which will become isolated).

Eastern Pygmy-possum (*Cercartetus nanus*)

The Eastern Pygmy-possum is a small possum which occurs from rainforests through sclerophyll forest to heaths (Strahan 1995). Eastern Pygmy-possum feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes, although soft fruits are eaten when flowers are unavailable. It is an important pollinator of heathland plants such as banksias. It also feeds on insects throughout the year and this feed source may be more important in habitats where flowers are less abundant such as wet forests (Strahan 1995). This species shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, *Pseudocheirus peregrinus* (Ringtail Possum) dreys or thickets of vegetation, (e.g. grass-tree skirts). It appears to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares (Strahan 1995).

This species was recorded from close to the boundary of the '*Coast Banksia-Coast Wattle dune scrub, Sydney Basin and South East Corner*' and '*Blackbutt – Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast'* vegetation types within the North Tuncurry site in 2011 (RPS 2012a). Whilst the species was not re-recorded in the BCAA during post fire surveys by ELA in June-July 2020, it is difficult to detect, even when present. On the basis of previous records of the species in the BCAA and lack of any significant changes to habitat quality and connectivity since the earlier recordings, it has been 'assumed' present and is considered likely to utilise all vegetation types within the BCAA, except the dunal areas (due to the limited supply of feed species and nesting opportunities) (**Figure 23**). Whilst the numerous small tracks across the study area do not represent a movement barrier

to the Eastern Pygmy Possum, these areas have not been included in the habitat polygon for the species for either impact or offset areas, as they are not mapped as a vegetation zone. Accordingly a habitat polygon of 508.78 ha across the BCAA has been determined for this species with 198.66 ha of habitat impacted and 277.06 ha in proposed on-site offset areas (excluding the 3.95 ha TMO reserve which will become isolated).

*Eastern Osprey (*Pandion cristatus*)*

The Eastern Osprey is a medium-sized fish eating raptor. It is a solitary raptor usually found around coastal waters, estuaries, beaches, reefs, islands and occasionally straying to inland lakes and reservoirs (Marchant & Higgins 1993). Osprey nest high up in tall dead trees or the dead crowns of trees, usually within 1 km of the coast often using nests as a perching and feeding place throughout the year. The species fish in clear waters, often using tall foreshore vegetation as hunting and feeding perches.

This species was recorded "flying over" the BCAA by RPS and ERM (RPS 2012a). There are numerous records of the species foraging in the coastal waters south and west of the BCAA in the NSW Wildlife Atlas. This species may utilise the '*Blackbutt – Smooth-barked Apple shrubby open forest*' vegetation type for nesting and may perch within the foredune complex between foraging bouts (**Figure 24**). However no nesting trees have been recorded in the BCAA and the species was not recorded perching within the BCAA. As the species is not considered to be using habitats within the BCAA are thus no species polygon has been determined.

Pied Oystercatcher (*Haematopus longirostris*)

The Pied Oystercatcher is a large sturdy shorebird occurring singly or, more usually, in pairs or small groups or larger flocks on sandy beaches, intertidal mudflats and rocky shores (Marchant & Higgins 1993). This species mainly roosts on sandy beaches, spits, dunes and small islets in sheltered bays lagoons and inlets, especially in proximity to mudflats (Marchant & Higgins 1993) and forages on exposed sand, mud, rock or coral rubble.

This species was recorded at two locations on the beach directly adjacent to the site (RPS 2012a). There also numerous records in the NSW Wildlife Atlas in the Wallace Lake estuary, approximately 2km south of the BCAA (**Figure 24**).

As this species utilises areas that will not be 'cleared' by the proposal but are likely to be indirectly impacted by increased disturbance to the beach and dune areas resulting from increased access to the beach, it is difficult to quantify the impact in terms of the area of habitat lost. The BCAM (section 6) requires these impacts to be identified and mitigated. Further, consultation with OEH suggests that these mitigation measures could include 'supplementary offset measures' such as those identified for the species in the '*Priority Action Statement*' and '*Saving Our Species*' programs.

A number of measures and commitments to reduce impacts to this species are included in **Section 3.7** of this application.

Green Turtle (Chelonia mydas)

The Green Turtle is a large sea turtle that grows up to 1 m in length. It is widely distributed in tropical and sub-tropical seas and occasionally occurs in coastal waters of NSW where it is generally seen on the north or central coast, including scattered nesting records (NPWS 2000).

The NSW Wildlife Atlas includes three records of the Green Turtle from Nine Mile Beach (two in May 2007 and one in 2009). These records were all of dead animals found on the beach and likely representing

vagrant animals from further north. However, a single Green Turtle was recorded nesting on Nine Mile Beach, east of the proposed development in November 2011 (**Figure 24**).

As this species utilises areas that will not be 'cleared' by the proposal but are likely to be indirectly impacted by increased disturbance to the beach and dune areas resulting from increased access to the beach, it is difficult to quantify the impact in terms of the area of habitat lost. The BCAM (section 6) requires these impacts to be identified and mitigated. Further, consultation with OEH suggests that these mitigation measures could include 'supplementary offset measures' such as those identified for the species in the '*Priority Action Statement*' and '*Saving Our Species*' programs.

A number of measures and commitments to reduce impacts to this species are included in **Section 3.7** of this application.

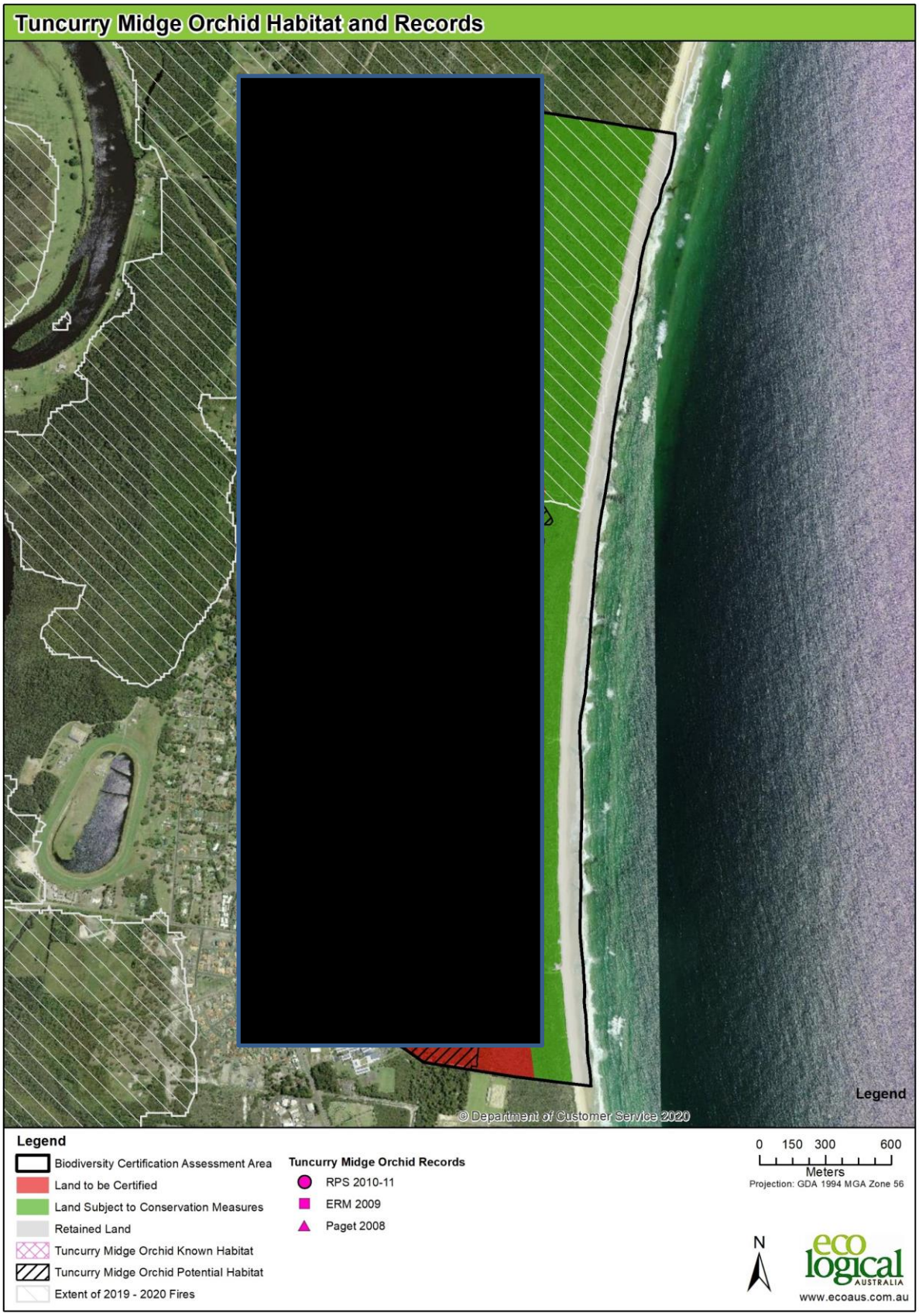


Figure 21: Records and potential habitat for Tuncurry Midge Orchid within the BCAA

Note: The precise location of endangered orchids have been redacted from the public exhibition version of this document

Figure 22: Records and habitat for the Brush-tailed Phascogale within the BCAA

Figure 23: Records and habitat for the Eastern Pygmy Possum within the BCAA

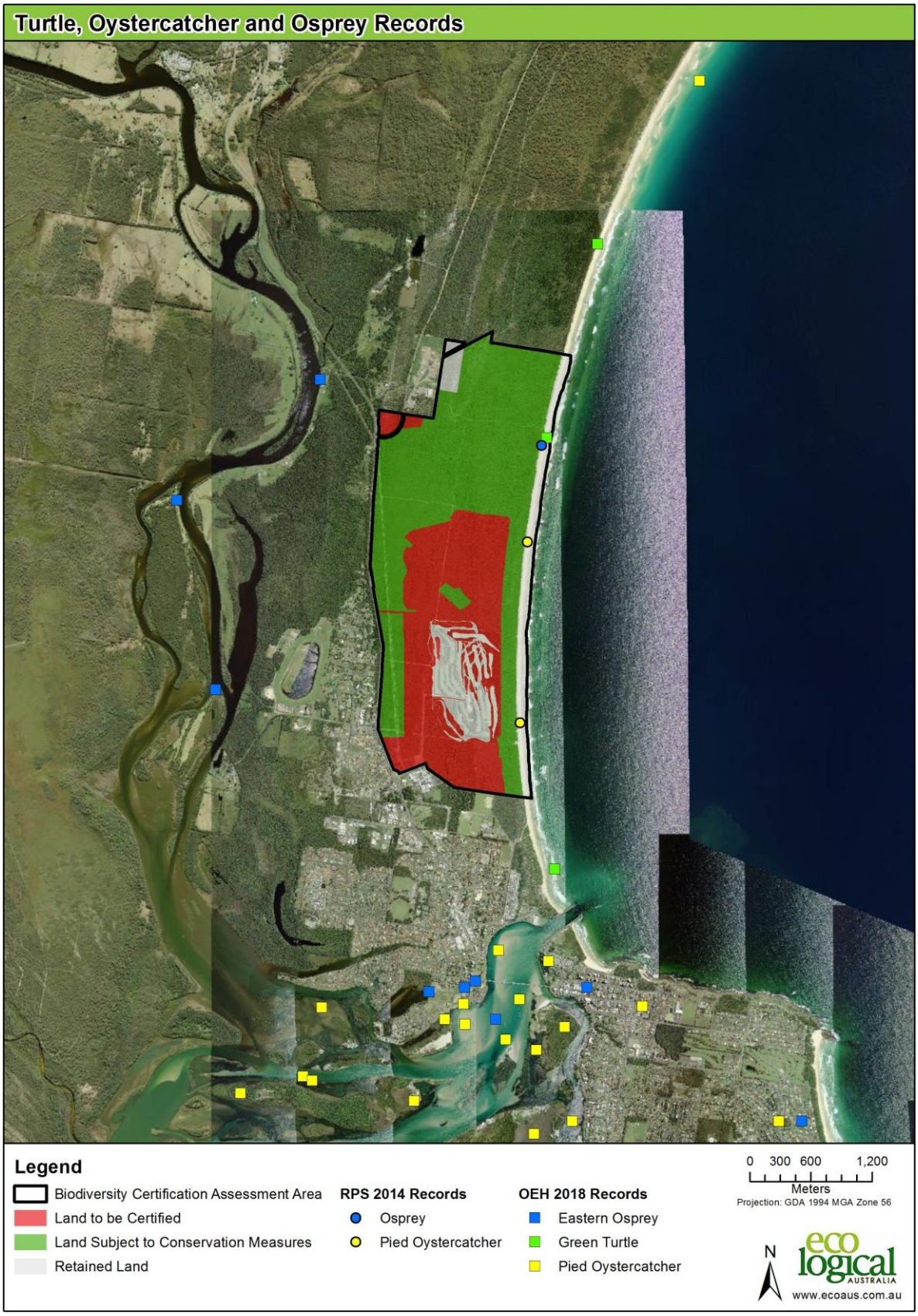


Figure 24: Records and habitat for the Green Turtle, Pied Oystercatcher and Osprey within the BCAA

3 Biocertification Assessment results

Provided below are the results of the biodiversity certification credit calculations conducted to the requirements of the BCAM. The information below relies on a broad understanding of the BCAM to understand the methods applied. Readers should make themselves familiar with the BCAM before reviewing this section of the document.

3.1 Biodiversity certification assessment area

The Biodiversity Certification Assessment Area (BCAA) is comprised of:

- Land proposed for biodiversity certification (development) – requires biodiversity credits
- Land proposed for conservation – generates biodiversity credits
- Lands where the current land use will be retained (retained lands) – neither requires nor generates biodiversity credits

The footprint proposed for biodiversity certification (development including golf course) is 226.63 ha (198.65 of which comprises native vegetation as defined by the BCAM) (**Table 6** and **Figure 2).** The land proposed for conservation, and to be registered as a Biobank site, totals 327.71 ha (of which 312.70 ha has been mapped as native vegetation and will generate credits and 15.01 ha is an existing powerline corridor and other 4WD tracks that will not generate credits). Finally, 81.45 ha of land has been identified as maintaining its current land use (i.e. the beach, part of the existing Tuncurry golf course and the Foster LALC land), and has therefore been assessed as 'retained land' (i.e. credits are neither required nor generated).

Table 6: Land use breakdown

Development Footprint	Area (ha)	% of Area	Area of Native Vegetation	% of Native Vegetation
Land Proposed for Biodiversity Certification (Development)	226.63	35.64	198.65	36.75
Land Proposed for Conservation Measures (Offsets) includes 9.63 ha of an existing powerline corridor	327.71	51.54	312.70	57.86
Retained Lands (Land excluded from this assessment – part of Golf Course and Foster LALC land)	38.59	6.01	29.12	5.39
Retained Land (B*each)*	42.86	6.74	0	0
Total	635.79	100	540.47	100

3.2 Landscape Score

The credit calculator calculated a landscape value score of **20** for the land to be certified and a score of **17.4** for the land subject to conservation measures. The landscape value is calculated from the sum of the scores obtained from the following three attributes:

- percent native vegetation cover in the landscape

- connectivity value
- adjacent remnant area determined according to the Mitchell landscape in which most of the land proposed for biocertification occurs.

Scores for the each landscape attribute for land to be certified and land subject to conservation measures are provided in **Table 7** and **Table 8**. An explanation on how the score was determined for each attribute is provided in the sub sections below.

3.2.1 Percent Native Vegetation Cover Score

The percent native vegetation cover calculation was completed within a single 2,000 ha circle (**Figure 25**). The area of vegetation cover was digitised from an aerial photograph at a scale of approximately 1:10,000. The results of the assessment are contained in **Table 7**.

A pre-certification score of **15** was determined with 987 ha (987/2000 = 49.35%) native vegetation mapped within the 41-50% native vegetation cover class. Vegetation clearance for the proposed development would result in 789 ha of vegetation cover (39.45%) remaining in the assessment circle. The post certification score is **13** as the vegetation cover falls within the 31-40% increment.

Table 7: Native vegetation cover in assessment circle

Circle	Before Certification			After Certification		
	Area of Vegetation Within Assessment Circle (Ha)	Native Vegetation Cover Class (%)	Score	Area of Vegetation Within Assessment Circle (Ha)	Native Vegetation Cover Class (%)	Score
1 (2,000ha)	987 (49.35%)	41-50%	15	789 (39.45%)	31-40%	13

The land subject to conservation measures (post-biodiversity certification) is 312.70 ha. Therefore (using Table 3 of the BCAM) a gain of **4.4** is recorded for the per cent native vegetation score after conferral of biodiversity certification.

3.2.2 Connectivity Value

There are a number of studies that have identified 'ecological corridors' on and adjoining the North Tuncurry project site including the '*Key Habitat and Corridors'* of Scotts (2003), the 'Coastal Climate Change Corridor' of DECC (2007) both of which are incorporated into the '*Draft Mid North Coast Regional Conservation Plan'* (OEH 2013). These corridors and habitat linkages are shown in **Figure 26.** It is noted that the proposed conservation lands are also connected to protected vegetation north of the Tuncurry project site (Darawank Nature Reserve), through the Minimbah sandbeds and the Minimbah Nature Reserve to protected areas south of Tuncurry (**Figure 26**).

Whilst the project site is a large area of vegetation which provides habitat values in its own right, it does not provide an ecological corridor for terrestrial flora and fauna species to the south of the project site due to the existing Forster-Tuncurry Urban area which abuts the southern end of the project site. The development footprint retains a coastal foreshore link from Darawank Nature Reserve along the eastern side of the proposed development area and a vegetated corridor up to 300 m wide between the proposed development and 'The Lakes Way' to protect viable populations of TMO. The protected area at the northern end of the project site also provides a link west across to retained vegetation on the west of 'The Lakes Way' and the Wallamba River across to the Minimbah sandbeds.

The lands proposed for 'conservation measures' (**Section 5**) will provide for the in perpetuity protection and conservation management of areas of land within this identified ecological corridor.

However, connectivity is assessed in a specific manner by the BCAM and these corridors are only used in the calculations if they have been approved for use by the Director-General (now Secretary) of OEH in accordance with section 3.7.2 of the BCAM. OEH has advised that as of the date of undertaking this assessment, none of the above corridors have been approved by the Secretary.

The current connectivity value of the site was assessed according to Section 3.7.2 of the BCAM and provided in **Table 8.** There are three components of connectivity;

- areas approved as a 'state' or 'regional' biodiversity links by the Director General,
- the hierarchy and riparian zone width of water courses in accordance with Appendix 1 of the BCAM; and
- an assessment of vegetation connectivity.

Patches of vegetation that conform to the criteria of a 'local biodiversity link' (moderate to good condition, has a patch size >1 ha which is separated by <30 m) occur on both land to be certified and land subject to conservation measures (**Figure 25**). According to Table 4 of the BCAM, the score for a local biodiversity link is '**6'.** As the local biodiversity link located on land proposed for biodiversity certification will be impacted, it was allocated a score of 0 after development. On the land subject to conservation measures, the local biodiversity link will be protected and was allocated a score of '**6'** after certification.

Table 8: Connectivity scores allocated for the assessment

Connectivity Score	Pre-certification	Post-certification
Land to be certified	6	0
Land subject to conservation measures	6	6

3.2.3 Adjacent Remnant Area

The BCAA occurs on the Manning - Macleay Barriers and Beaches Mitchell Landscape which is 24% cleared. The vegetation on-site is well connected and as such has an adjacent remnant area (ARA) of >501 ha which receives the maximum score of '**10'** for Mitchell Landscapes within the <30% cleared category. Manning - Macleay Barriers and Beaches

The land subject to conservation measures also occurs within the Manning - Macleay Barriers and Beaches Mitchell Landscape with the same ARA of >501 ha. Therefore the score allocated for the conservation lands is also '**10'**.

Figure 25: Assessment circle and Connectivity

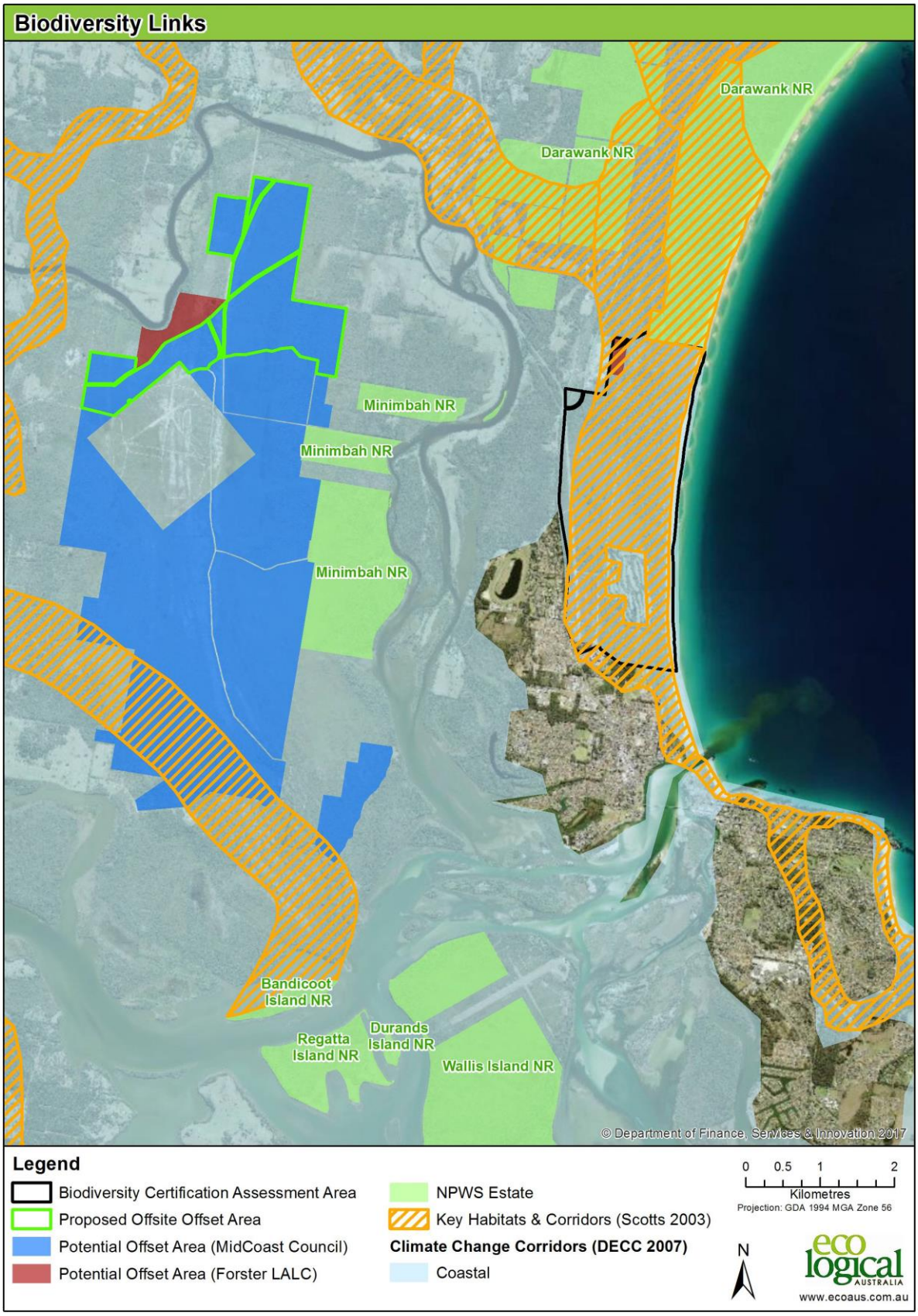


Figure 26: State, Regional and Local Biodiversity links

3.3 Vegetation mapping and zones

As discussed in **Section 2.2.1**, three biometric vegetation types were identified within the BCAA totalling 540.48 ha of native vegetation. The three vegetation types were separated into 13 vegetation zones for this assessment (**Table 10** and **Figure 18**). All zones were mapped in 'moderate to good', as defined in the BCAM. Full profiles of each of the biometric vegetation types are included in **Appendix C.** The following ancillary codes were used to further stratify the vegetation zones (see **Section 2.2.1)**:

- Good
- Burnt
- Blackbutt
- Pine
- Shrubby
- Regen
- Dune

3.4 Transect/Plot data and site value scores

Appendix 4 of the BCAM defines the minimum number of transects/plots required per vegetation zone area (DECCW 2011). The number of plots collected across the BCAA is shown in **Table 2** (**Section 2.2**) with locations shown in **Figure 18.** Data from a total of 40 BioMetric vegetation transects/plots was collected across the BCAA. The collected transect/plot data is provided in **Appendix D**. The field survey targeted locations that were considered likely to be representative of the mapped vegetation communities in their various condition states. Current site value and future site value scores were calculated for each vegetation zone using the transect/plot data collected. The BCAM credit calculator was used to produce the current and future site value scores for both development and conservation areas (**Table 6**).

Table 9: Site value scores allocated to each vegetation zone

Veg Zone	Biometric Vegetation Type	Ancillary	Current Site Value Score	Future Site Value Score (Development)	Future Site Value Score (Conservation)
1	HU503 - Banksia dry shrubland on coastal sands of the North Coast	Good	59.42	0	78
2		Burnt	63.04	0	80
3		Blackbutt	77.54	0	83
4		Pine	67.39	0	79
5	HU509 - Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	Good	44.27	0	61
6		Shrubby	46.88	0	65
7		Burnt	42.71	0	59
8		Pine	75.00	0	90
9	HU530 - Coast Banksia - Coast Wattle dune scrub, Sydney Basin and South East Corner	Good	71.74	0	83
10		Regen	55.80	0	70
11		Blackbutt	56.52	0	66
12		Pine	45.65	0	58
13		Dune	42.03	0	54

Table 10: Area of vegetation zones assessed within the BCAA

Veg Zone ID	Biometric Vegetation Type	Condition[1]	Ancillary	Area (ha) proposed for each land use			
				Land proposed for certification	Land subject to conservation measures	Retained land	Total
1	Banksia dry shrubland on coastal sands of the North Coast	Mod - Good	Good	90.44	71.18	3.75	165.37
2			Burnt	4.97	10.86	-	15.83
3			Blackbutt	3.85	-	9.91	13.76
4			Pine	8.37	2.75	3.73	14.85
5	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	Mod – Good	Good	30.52	63.74	7.99	102.25
6			Shrubby	12.40	0.64	0.17	13.21
7			Burnt	9.35	1.00	-	10.35
8			Pine	2.41	4.37	-	6.78
9	Coast Banksia - Coast Wattle dune scrub, Sydney Basin and South East Corner	Mod - Good	Good	30.43	94.26	1.91	126.60
10			Regen	-	32.21	-	32.21
11			Blackbutt	4.09	-	1.66	5.75
12			Pine	1.82	-	-	1.82
13			Dune	0.00	31.69		31.69
Total				**198.65**	**312.70**	**29.12**	**540.47**

[1] Condition as defined by the BCAM;

3.5 Ecosystem Credit Calculations

3.5.1 Ecosystem Credits

Ecosystem credits have been calculated for the impact caused by the proposed development and improvement to biodiversity values resulting from the management of conservation lands. In total, **5,744** ecosystem credits are required for the proposed residential rezoning and subsequent development (**Table 11**).

As defined in the BCAM, different levels of conservation security and ongoing management result in the generation of a different number of credits. The credit entitlement for conservation areas are broken into three broad categories, being:

- Areas that are managed and funded in perpetuity (i.e. registration of BioBank sites or transfer of land to national parks) – 100% credit entitlement
- Areas that are managed in perpetuity (e.g. reservation of dedication of Crown land under Part 5 of the Crown Lands Act 1989 or classification and management of land as community land 'Natural Area' under the Local Government Act 1993 land) – 90% credit entitlement
- Areas that are secured through planning instrument (i.e. environmental zoning) – 25% credit entitlement

It is proposed that all of the land subject to conservation measures within the BCAA, including the 4.08 ha TMO Reserve (which has 3.95 ha of mapped vegetation), will be secured by entering into a BioBanking Agreement or Agreements under Part 7A of the TSC Act as described in **Section 5** of this report, thus generating 2,964 ecosystem credits.

Table 11: Final ecosystem credit results

Veg Zone	BioMetric Vegetation Type	Condition	Ancillary Zone	Credits Required	Credits Generated (100% Conservation Measures)	Credit Status
1	Banksia dry shrubland	Moderate to good	Good	2,527	746	-2,187
2	Banksia dry shrubland	Moderate to good	Burnt	146	110	
3	Banksia dry shrubland	Moderate to good	Blackbutt	135		
4	Banksia dry shrubland	Moderate to good	Pine	260	25	
5	Blackbutt - Smooth-barked Apple shrubby open forest	Moderate to good	Good	751	614	-714
6	Blackbutt - Smooth-barked Apple shrubby open forest	Moderate to good	Shrubby	320	6	
7	Blackbutt - Smooth-barked Apple shrubby open forest	Moderate to good	Burnt	224	9	
8	Blackbutt - Smooth-barked Apple shrubby open forest	Moderate to good	Pine	92	44	
9	Coast Banksia - Coast Wattle dune scrub	Moderate to good	Good	1,120	884	120
10	Coast Banksia - Coast Wattle dune scrub	Moderate to good	Regen		299	
11	Coast Banksia - Coast Wattle dune scrub	Moderate to good	Blackbutt	123		
12	Coast Banksia - Coast Wattle dune scrub	Moderate to good	Pine	46		
13	Coast Banksia - Coast Wattle dune scrub	Moderate to good	Dune	0	266	
Total				5,744	2,964	-2,780

3.6 Threatened Species Assessment

3.6.1 Species credits

Species credits have been calculated for each of the species identified in **section 2.3** which have been surveyed for, identified on-site and likely habitat mapped as species polygons. Other threatened fauna and flora species were not detected and have not been calculated for species credit requirements. **Table 12** summaries the species credits required by impact areas and generated by offset areas within the BCAA.

As discussed in **Section 2.3.6**, species credits have not been calculated for Green Turtle and Pied Oystercatcher as there is no loss of habitat for these species. Impacts to these species has been considered as 'indirect' impacts and are addressed via mitigation and 'supplementary offset measures' outlined in **Section 3.7**.

Table 12: Final species credit results

Common Name	No. individuals Impacted / Area habitat	Credits Required	No. individuals protected / Area habitat	Credits Generated (100% Funded & Managed Measure)	Credit Status
Tuncurry Midge Orchid	63 plants	4,846	1,536 plants	9,216	4,376
Brush-tailed Phascogale	198.66 ha	3,973	277.06 ha	1,662	-2,264
Eastern Pygmy-possum	198.66 ha	3,973	277.06 ha	1,662	-2,264

3.7 Indirect impacts

The BCAM requires that any application for formal biodiversity certification must demonstrate how the "*proposed ownership, management, zoning and development controls of the land proposed for biodiversity certification is intended to mitigate any indirect impacts on biodiversity values*" (DECCW 2011).

For the BCAA, all impacts, direct and indirect (other than to species using Nine Mile Beach), have been considered to be completely contained within the area proposed for biocertification. Accordingly the development area includes all urban development areas and associated roads, stormwater management structures, infrastructure and features such as Asset Protection Zones (APZs) and other impacts within the land identified for development or proposed to be certified.

As indicated in Section 2.3.6, the proposal is likely to lead to indirect impacts to the Green Turtle and Pied Oystercatcher that have been recorded nesting on Nine Mile Beach immediately adjacent to the BCAA. These species are very susceptible to disturbance during the breeding season and will abandon breeding attempts if disturbed by people using the beach and domestic animals such as dogs.

Nine Mile Beach does not currently have formal access to the beach, however, the beach is frequented by fishers who access the beach by 4WD using the network of trails in the BCAA. These fishers often bring dogs to the beach which may disturb nesting Green Turtles and Oystercatchers.

The proposal will restrict access to the beach via these management trails which will only be used for pedestrian access and conservation management vehicles. Further, CLB will work with MCC to develop policies to restrict and minimise vehicle access to the beach adjacent to the BCAA (except surf lifesaving vehicles) and dogs other than in winter (non-breeding) months. Further, funds will be made available to support actions identified in the Saving Our Species program including the following:

- Minimise adverse lighting of beach and foredune areas
- Implement a predator control program in adjacent conservation areas (fox control)
- Monitor nesting activity along Nine Mile Beach adjacent to the BCAA and erect temporary fencing to minimise disturbance if nesting activity detected

These commitments are further summarised in **Section 5**.

3.8 Buffers on Red flag areas

Where a proposed conservation measure is used to protect land that is a red flag area, the area of the proposed conservation measure must include a buffer to mitigate any negative indirect impacts from development following the conferral of biocertification. The buffer area may be secured via a conservation measure and used to offset the impacts of biodiversity certification, or it may be a retained area in the biocertification assessment area (and not generate any credits) (see Section 6 of the BCAM).

All TMOs located within the land proposed for conservation measures have had a 30m buffer applied and are not located immediately adjacent to land to be certified (**Figure 21**).

3.9 Red Flags

A red flag area is an area regarded as having high biodiversity conservation values. An area is regarded as a red flag area if it contains one or more of the following:

- a vegetation type that is greater than 70% cleared in the CMA area and is not in '*low*' condition
- a critically endangered or endangered ecological community
- One or more threatened species identified in the Threatened Species Profile Database (TSPD) that cannot withstand loss in the CMA area because the species is
  - Naturally very rare, is critically endangered, has few populations or a restricted distribution
  - The species or its habitat are poorly known
- Areas of vegetation recognised as having regional or state biodiversity significance. These areas include:
  - Land that is mapped or defined as a state or regional biodiversity link in accordance with section 3.7.2 of the BCAM
  - a riparian buffer 40m either side of a major river on the coast and tablelands
  - a riparian buffer 30m either side of a minor river or major creek on the coast and tablelands
  - a riparian buffer 20m either side of a minor creek on the coast and tablelands
  - areas listed as a SEPP14 wetland

There are no vegetation types greater than 70% cleared in the HCR CMA or that are listed as CEEC or EECs in the BCAA.

There are no areas of vegetation recognised as having regional or state biodiversity significance.

However, as outlined the in **Section 2.3.5** there is one critically endangered species, TMO, that has been identified within the BCAA. The areas supporting this species are therefore 'red-flagged' under the BCAM. A total of 2,433 individuals of TMO have been recorded within the BCAA following surveys undertaken by Paget (2008), ERM (2010b) and RPS (2011, 2012b, 2013) between 2008 and 2013 (**Table 13** and **Figure 22**).

The locations of all records of the TMO within the BCAA and proposed future land use ('development', 'conservation' and 'retained' as defined in the BCAM 2011) are shown in **Figure 21** and **Figure 27. Table 13** outlines the number of known TMO individuals within each of the proposed land uses within the BCAA and the area of potential habitat. As impacts to species identified as red flag entities are proposed, a red flag variation request has been prepared in accordance with Section 2.4 of the BCAM (**Section 4**).

In accordance with the procedures outlined by the OEH in undertaking a biocertification assessment, OEH were consulted to discuss impacts to this red flag species. A number of meetings have been held since 2012 culminating in various modifications to the proposed footprint and most recently the excision of a 4.08 ha TMO reserve, in addition to other 'supplementary' offset measures being proposed. These changes have reduced the impact to 63 known individuals occupying 25 locations within the BCAA and 38.46% of the potential habitat. The proposed conservation measures in this application for Biocertification will permanently protect 63% of the recorded individuals and 57.85% of the potential habitat in the BCAA (**Table 13).** Additional records and potential habitat will also be protected at the proposed off-site offset area at Nabiac (**Figure 28**).

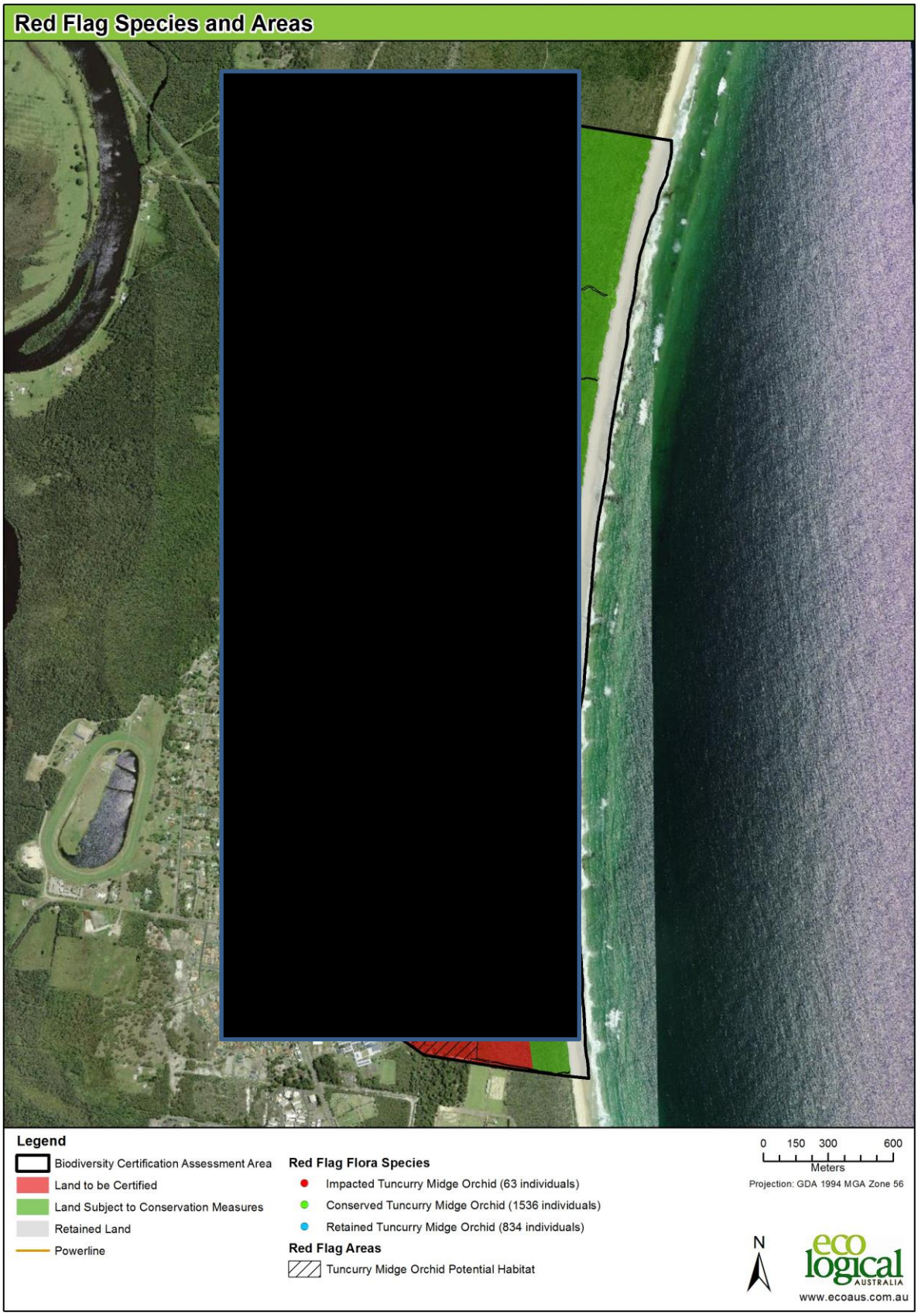


Figure 27: Red flag areas in accordance with Section 2.3 of the BCAM

Note: The precise location of endangered orchids have been redacted from the public exhibition version of this document

Table 13: Number of individuals and areas of known and potential habitat for *C. littoralis* across is known distribution

	Within Biocertification Assessment Area									Outside BCAA		Total	
	Development			Conservation			Retained						
TMO Records and Habitat	**TMO**	**% within BCAA**	**% of total**	**TMO**	**% within BCAA**	**% of total**	**TMO**	**% within BCAA**	**% of total**	**TMO**	**% of total**	**within BCAA**	**All areas**
Number of sites/locations confirmed	25	5.76%	4.89%	409	94.24%	80.04%	0	0.00%	0.00%	77	15.07%	434	511
Number of individuals recorded	63	2.59%	2.39%	1,536	63.13%	58.27%	834	34.28%	31.64%	203	7.70%	2433	2636
Potential habitat (based on vegetation types where TMO has been recorded) (ha)	192.74	38.46%	3.90%	289.95	57.85%	5.86%	18.51	3.69%	0.37%	4445.00	89.87%	501.21	4946.21

Number of sites/locations confirmed – refers to the number of locations were TMO has been recorded, noting that are some locations, multiple plants were recorded i.e. the 2,433 TMOs have been recorded at 434 locations within the BCAA.

Number of individuals recorded – refers to the count of individual plants

Potential habitat includes all vegetation types and track edges where TMO has been recorded. Within the BCAA, this excludes only Coast Banksia – Coast Wattle dune scrub other than a small area in the north of the BCAA where high numbers of TMO were recorded on the margin of regenerating Blackbutt open forest and Coast Banksia scrub

4 Red Flag Variation Request

4.1 Impact on Red Flagged Areas

Section 3.6.1 of this assessment report has identified an impact on a red flagged area as defined by the BCAM. The BCAM states that the Director General cannot confer biodiversity certification on land that is or forms part of a red flag area unless the criteria outlined in section 2.4 of the methodology have been satisfied. This section addresses this requirement. One red flagged species, the TMO, will be impacted by the proposal.

The BCAM requires each of the criteria set out in section 2.4 of the methodology to be addressed in order for the Director-General to be satisfied that impacts to red flag areas are able to be offset.

The following criteria must be addressed for a threatened species that cannot withstand further loss

1. Feasibility of options to avoid impacts on red flag area(s) where biodiversity certification is conferred (Section 2.4.1 of the BCAM)
2. Additional assessment criteria for threatened species that cannot withstand further loss
    a. Viability must be low or not viable (Section 2.4.3.1 of the BCAM)
    b. Contribution to regional biodiversity values must be low (Section 2.4.3.2 of the BCAM)

The remaining red flag variation criteria (2.4.2 – Additional Assessment criteria for vegetation types) and 2.4.4 – impacts to areas with regional or state biodiversity conservation significance) do not need to be addressed as there are no red flag vegetation types or areas of state or regional conservation significance to be impacted in the BCAA.

All occurrences of the TMO represent red flagged areas under the BCAM as this is a species listed as critically endangered and is a threatened species that cannot withstand further loss

The Minister for the Environment cannot grant Biocertification to the project unless a red flag variation is approved. The following section summarises the ecology of the TMO and presents necessary information to allow the Director-General to make a determination as to whether impacts to this red flag are able to be offset and whether a red flag variation can be approved.

In approving a red flag variation, the Director General must be satisfied that the feasibility of options to avoid impacts on red flag areas has been considered in the application for biodiversity certification. An application for biodiversity certification can address this requirement by demonstrating that:

a) all reasonable measures have been taken to avoid adverse impacts on the red flag areas and to reduce impacts of development on vegetation remaining within the biodiversity certification area

b) ***appropriate conservation management arrangements cannot be established over the red flag area given its current ownership, status under a regional plan and zoning and the likely costs of future management***

In addressing the criteria for a), the application for biodiversity certification may include information that demonstrates:

- **how the subdivision design, (including the configuration of lots, minimum lot sizes and/or options for lot averaging and lot clustering) have been used to avoid and minimise impacts on red flag areas**
- **how the spatial distribution, configuration, size of patches and connectedness of the red flag areas proposed for conservation measures within the biodiversity certification assessment area have minimised the overall impacts of conferring biodiversity certification on the red flag areas.**

Landcom NSW has undertaken extensive consultation with the OEH, DPE and MCC since 2005 to develop a Master Plan for the site that recognises and considers the ecological constraints of the site, avoids the areas of highest conservation value, including area with the highest number of recorded TMO, and protects and manages areas that are able to maintain viable populations of TMO and other threatened species (including those that may occur in the site such as Koala and Spot-tailed Quoll). Landcom NSW has sought the independent opinion of two recognised experts in TMO (Dr Lachlan Copeland and Dr Colin Bower (**Appendix H**) and has funded studies into the ecology of the species to inform the minimum protected areas required to maintain viable populations of TMO and its pollinators (**Appendix J**).

The Master Plan for the proposed development (**Figure 3**) of the BCAA has been revised numerous times in order to avoid and minimise impacts to the TMO. The final Master Plan has sought to minimise impacts to the TMO through:

- avoiding the largest known populations of the TMO located in the north and west of the BCAA (**Figure 21**); and most recently
- the inclusion of an additional 4.08 ha TMO Reserve that protects a concentration of 74 plants that reduces the impacts from 137 individuals (>5% of know individuals within the BCAA) to 63 individuals (or 3% of the known records within the BCAA).

the viability of the red flag area must be low or not viable in accordance with section 2.4.3.1

> **In making an assessment that the viability of the biodiversity values in the red flag area is low or not viable, Section 2.4.3.1 (d) of the BCAM states that the Director General can make an assessment that the viability of biodiversity values in the red flag area is low or not viable if the area of a red flag area containing a threatened species on land where biodiversity certification is conferred <u>is minor relative to the area containing that threatened species on land subject to proposed conservation measures</u>.**

As outlined in **Table 13**, the number of individual TMOs to be impacted is 63, which represents less than 3% of the total number of individuals within the BCAA and 38.46% of the potential habitat within the BCAA. The areas proposed to be subjected to conservation measures within the BCAA includes 1,536 TMO individuals (or 63% of the TMOs recorded in the BCAA) and 57.85% of the potential habitat area (**Table 13**). Accordingly, the 'number' of recorded TMO individuals to be impacted (63) is minor relative to the number on land proposed for conservation measures (1,536), however, the area of habitat occupied by TMO that is to be impacted (192.74 ha) is not minor compared to the area of habitat to be conserved (289.95 ha). It is noted that the designated 'Unit of Measure' for TMO, as defined by BCAM, is number of 'individuals' and not 'area' which is the unit of measure for threatened fauna. Section 2.4.3.2 of the variation rules in the BCAM do not reflect this difference. Further, it is noted that extensive surveys over several years have failed to record TMO across the majority of the potential habitat area mapped.

4,846 species credits are required for impacts to these 63 TMO individuals. The proposed conservation measures within the BCAA will generate 9,216 credits (**Table 12**) i.e. all offsets required for impacts to TMO are provided by the proposed on-site conservation measures, that will be legally secured by a Biobanking Agreement within 12 months of the conferral of biocertification, and all credits, including the surplus 4,376 credits, will be 'retired' as a condition of biocertification. Further, CLWB will fund a 5 years TMO research and monitoring program (**Section 5.7.5**) that will assist in the targeted management of this critically endangered species.

Dr Lachlan Copeland in his independent review of the various TMO reports concluded that '*whilst the loss of 5% of all known plants would seem unacceptable given the critically endangered status of the species, he considered that the loss in this case was acceptable given the higher level of protection measures committed to for the remaining 95% of the population*' (Copeland 2012). Since this statement was made, modifications to the Master Plan have reduced the impacts to TMO by a further 74 individuals and thus less than 3% of the known number of individuals will be impacted, however, not all of the remaining TMOs are able to be securely protected at this time (i.e. the 678 4 in the Foster LALC lands in the north of the BCAA and the 156 within the powerline maintenance corridor), although these individuals are likely to persist under current management regimes.

the contribution to regional biodiversity values of the red flag area is low in accordance with section 2.4.3.2.

> **In making an assessment that the contribution of the red flag area to regional biodiversity values for the species is low, the Director General must be satisfied that the relative abundance of the individual threatened species, threatened population or threatened species habitat on the land proposed for biodiversity certification is low relative to its abundance in the region ('Region' for the purposes of section 2.4.3.2 means the CMA subregion in which the red flag area is located and any adjoining CMA subregions).**

All known occurrences of TMO are located within the Karuah manning subregion of the Hunter-Central Rivers CMA. As outlined in **Table 13**, the number of individual TMOs to be impacted is 63, which represents 2.39% of the total number of individuals within the region, 9.19% of the known habitat and 3.9% of the potential habitat for the species within the region (**Table 13** and **Figure 28**). The small number of individuals and area of habitat which would be impacted by the proposed development is considered low relative to the total number of individuals and area of known habitat across the region. If Biocertification were granted for the BCAA a total of 1536 TMO individuals or 63% of the total known population within the BCAA would be located on land to be managed for conservation in perpetuity. Further, the proposed off-site offset areas would protect additional populations of TMO.

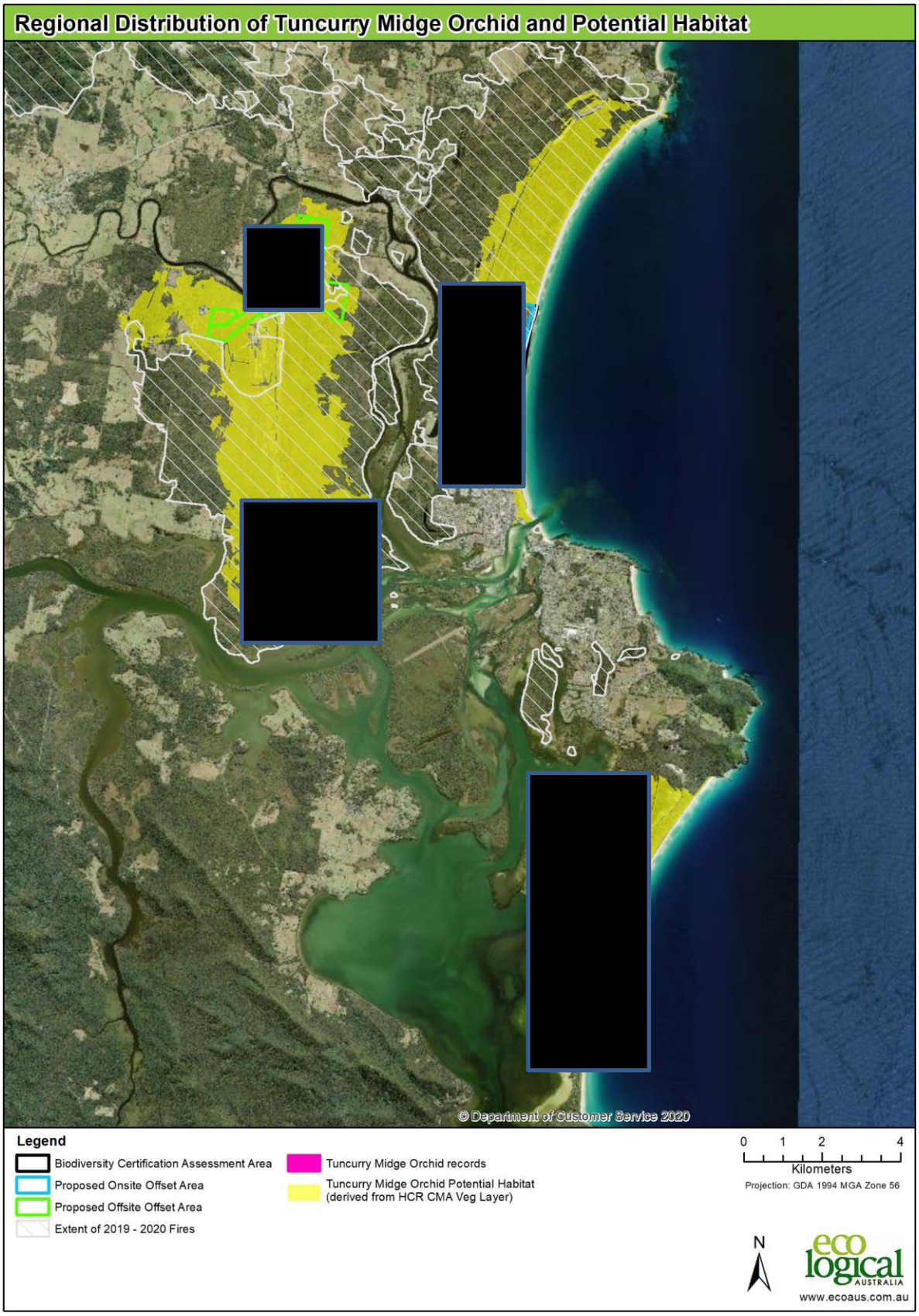


Figure 28: Known and potential habitat for Tuncurry Midge Orchid within the 'region'

Note: The precise location of endangered orchids have been redacted from the public exhibition version of this document

5 Biocertification strategy

Section 126K of the TSC Act states that Biocertification may only be conferred on land by the Minister if the applicant has a Biocertification strategy.

Section 126K (2) states that a Biocertification strategy is a policy or strategy for the implementation of conservation measures to ensure that the overall effect of biodiversity certification is to improve or maintain biodiversity values. The Biocertification strategy is to be used as the basis for the assessment of the application for biodiversity certification.

A biodiversity strategy is to include the following:

(a) the land proposed for biodiversity certification
(b) the land proposed for biodiversity conservation
(c) the proposed conservation measures
(d) any person or body proposed as a party to the biodiversity certification

This section addresses these requirements.

5.1 Land proposed for biodiversity certification

The land proposed for biodiversity certification is shown in **Figure 2** in **Section 1** of this report.

5.2 Land proposed for biodiversity conservation

The land proposed for biodiversity conservation 'within' the BCAA is shown in **Figure 2** in **Section 1** of this report. Additional land proposed for conservation 'outside' the BCAA is shown in (**Figure 29**).

5.3 Proposed conservation measures

5.3.1 Conservation measures 'within' the BCAA

The land subject to conservation measures within the BCAA will be secured by entering into a Biodiversity Stewardship site Agreement (BSA) under the BC Act (which replaces the Biobanking Agreements under the now repealed TSC Act, and will be managed by the Crown Lands and Water Branch (CLWB) of DPIE in accordance with the BSA. A Biobanking Agreement (now BSA) is a 'Permanently Managed and Funded' or 100% Conservation Measure as outlined in s126L(i) of the TSC Act and section 8.1.1 of the BCAM and will generate 100% of the calculated credits as shown in **Table 14** and **Table 15**.

The BSA will be registered on title and will be enforceable against the owner of the land (i.e. the CLWB).

The BSA site will be subject to the terms of the BSA which includes annual conservation management in perpetuity, monitoring the outcomes of management actions, submission of an annual report to the Biodiversity Conservation Trust (BCT) regarding these management obligations and audit by the BCT.

This management plan for the BSA site will be implemented annually by CLWB (or suitably qualified and experienced contractors engaged by CLWB) in perpetuity and reviewed every 5 years in accordance with the terms of the BSA.

An annual report will be prepared for the BCT by CLWB outlining the actions that have been undertaken in the previous 12 months, the response of the conservation area to the conservation management and any required modification of the management actions for the following 12 months.

An application for registration of a Biobanking Agreement was submitted to DPIE in July 2020 (ELA 2020), however, as the application could not be determined by 24 August 2021 (as this request for Biocertification had not been determined), the application will be updated and re-submitted for registration as a BSA under the BC Act within 12 months of biodiversity certification being conferred (and prior to the commencement of construction for the project). This will provide in perpetuity protection of the offset areas on title with only the Minister for the Environment being able to terminate the agreement. This area will be progressively managed for conservation over the first five (5) years following the commencement of construction by the CLWB. All credits generated by the on-site BSA will then be 'retired' prior to the commencement of the 6th year or stage 6 of development (whichever is the sooner).

The land subject to this conservation measure within the BCAA will generate **2,964** biocertification ecosystem credits, which is a deficit of **2,187** credits for the Banksia dry shrubland community and **714** credits for the Blackbutt – Smooth-barked Apple community (**Table 14**).

The residual credits for each of these vegetation types will need to be generated by the registration of additional offset areas outside of the BCAA, purchased from other existing biobank or BSA sites from outside of the BCAA or from the Biodiversity Conservation Fund (BCF). If credits are purchased from BSA sites or the BCF, a 'credit equivalency' statement will be required to convert the deficit BCAM credits into the equivalent number of BAM credits. If BBAM credits are purchased, these are taken as being 'equivalent' to BCAM credits at a ratio of 1:1, consistent with Section 9.2 the BCAM.

The land subject to these conservation measures within the BCAA will generate **1,662** biocertification species credits for Brush-tailed Phascogale and Eastern Pygmy Possum which is deficit of **2,311** credits for both species (**Table 15**). There is a 'surplus' of 4,376 TMO credits. As these credits are generated by conservation measures proposed from within the BCAA, these 'surplus' credits will be retired as a condition of certification and help justify the red flag variation request.

Table 14: Summary of ecosystem credit surplus/deficit

BioMetric Vegetation Type	Credits Required	Credits Generated	Credit Status
Banksia dry shrubland on coastal sands of the North Coast	3,068	881	-2,187
Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast	1,387	673	-714
Coast Banksia - Coast Wattle dune scrub, Sydney Basin and South East Corner	1,289	1,409	120
Total	5,744	2,964	-2,781

Table 15: Summary of species credit surplus/deficit

Common Name	Biocertification Credits Required	Biocertification Credits Generated	Biocertification Credit Status
Tuncurry Midge Orchid (*Genoplesium littorale*)	4,846	9,216	4,376
Brush-tailed Phascogale (*Phascogale tapoatafa*)	3,973	1,662	-2,311
Eastern Pygmy-possum (*Cercartetus nanus*)	3,973	1,662	-2,311

5.3.2 Conservation measures 'outside' of the BCAA

MCC owns approximately 1,500 ha of land on the Minimbah sandbeds at Nabiac, approximately 4 km north-west of the BCAA, that form part of its inland dune aquifer borefield (**Figure 29**). An area of approximately 380 ha has been identified that is outside the water extraction and monitoring zone that was subject to vegetation validation and targeted fauna surveys by ELA in March and April 2016 (**Figures 28-31**, **Appendix K and L**). These studies have confirmed that the area has the 'matching' biometric vegetation types and confirmed habitat for the Brush-tailed Phascogale and Eastern Pygmy Possum, as well as other threatened species including the Koala, Long-nosed Potoroo and Wallum Froglet. The site is capable of generating the required ecosystem and species credits deficits outlined in **Table 16** and **Table 17. Figure 32** shows the distribution of other threatened species in proximity to the proposed site, which if confirmed at the proposed offset area, may be used consistent with the variation criteria in section 10.4.1 of the BCAM to meet any remaining deficit in species credits. If required, a variation request will be submitted to the Minister.

The CLWB and Landcom have undertaken extensive consultation with the former MCW (now MCC) regarding the registration of a BSA over this land to generate the required credits and make the credits available to CLWB for the Tuncurry SSS proposal. The former MCW had indicated 'in principle agreement' to provide the credits generated to CLWB to meet the remaining credit requirements for biodiversity certification. This commitment has been re-stated by MCC (**Appendix P**). Alternatively, CLWB may purchase credits as required from other registered Biobank sites (or Biodiversity Stewardship sites) or from the Biodiversity Conservation Fund.

Regardless of the source of these additional credits, no development from Stage 13 onwards will proceed until such time as these credits have been secured, purchased and retired (see Statement of Commitments in **Section 5.7**).

Table 16: Potential number and type of ecosystem credits generated by proposed Nabiac Biobank site

PCT	Veg Type	Biometric Vegetation Type	BVT % Cleared	PCT % Cleared	Vegetation Class	Vegetation Formation	Credits required for Certified Land	Credit deficit / surplus Table 11	MCC Proposed Offset (ha)	Potential BBAM ecosystem credits generated	Credit Status (after Veg Class/Formation variations)
687	HU509	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands o	25%	Not Available	Coastal Dune Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	1,387	-714	0.00	0	883
1637	HU851	Scribbly gum - Wallum Banksia - Prickly-leaved Paperbark heathy coastal woodland on coastal lowlands	40%	42%					159.69	1,597	
772	HU530	Coast Banksia - Coast Wattle dune scrub	45%	65%	Sydney Coastal Heathlands	Heathlands	1,289	120	0.00	0	-200
663	HU503	Banksia dry shrubland on coastal sands of the North Coast	70%	70%	Wallum Sands Heath		3,068	-2,187	70.52	705	
1705	HU919	Heath-leaved Banksia-Olive Tea-tree-Wallum Boronia wet heath on coastal sands	Not available	55%					116.22	1,162	
1230	HU633	Swamp Mahogany swamp forest on coastal lowlands	60%	75%	Coastal Swamp Forest	Forested Wetlands			20.89	209	188
1704	HU918	Fern-leaf Banksia - Prickly-leaved Paperbark-Tantoon - Leptocarpus tenax wet heath on coastal sands	40%	15%	Coastal Heath Swamps	Freshwater Wetlands			6.58	66	123
1734	HU948	Wallum Bottlebrush - Leptocarpus tenax - Baloskion pallens Wallum Sedge heath	Not available	44%					1.40	14	
780	HU532	Coastal floodplain sedgelands, rushlands, and forblands	80%	80%	Coastal Floodplain Wetlands				4.32	43	
		Total Area/Ecosystem credits					**5,744**	**-2,781**	**379.62**	**3,796**	**994**

Table 17: Potential number and type of species credits generated on proposed MCC Nabiac Biobank site

 # Based on 7.1 species credits generated per ha of confirmed habitat (BBAM 2014 equation 11

PCT	Veg Type	Biometric Vegetation Type	Vegetation Class	Vegetation Formation	Credits required for Certified Land	Credit deficit / surplus Table 11	MCW Proposed Offset (ha)	Potential Eastern Pygmy Possum credits BBAM generated	Potential Brush-tailed Phascogale BBAM credits generated
687	HU509	Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands	Coastal Dune Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	1,387	-714	0.00	0	0
1637	HU851	Scribbly gum - Wallum Banksia - Prickly-leaved Paperbark heathy coastal woodland on coastal lowlands					159.69	1,134	1,134
772	HU530	Coast Banksia - Coast Wattle dune scrub	Sydney Coastal Heathlands	Heathlands	1,289	120	0.00	0	0
663	HU503	Banksia dry shrubland on coastal sands of the North Coast	Wallum Sands Heath		3,068	-2,187	70.52	501	501
1705	HU919	Heath-leaved Banksia-Olive Tea-tree-Wallum Boronia wet heath on coastal sands					116.22	825	825
1230	HU633	Swamp Mahogany swamp forest on coastal lowlands	Coastal Swamp Forest	Forested Wetlands			20.89	148	148
1704	HU918	Fern-leaf Banksia - Prickly-leaved Paperbark-Tantoon - Leptocarpus tenax wet heath on coastal sands	Coastal Heath Swamps	Freshwater Wetlands			6.58	47	47
1734	HU948	Walum Bottlebrush - Leptocarpus tenax - Baloskion pallens Wallum Sedge heath					1.40	10	10
780	HU532	Coastal floodplain sedgelands, rushlands, and forblands	Coastal Floodplain Wetlands				4.32	0	0
		Total Area/Ecosystem credits			**5,744**	**-2,781**	**379.62**	**2,665**	**2,665**

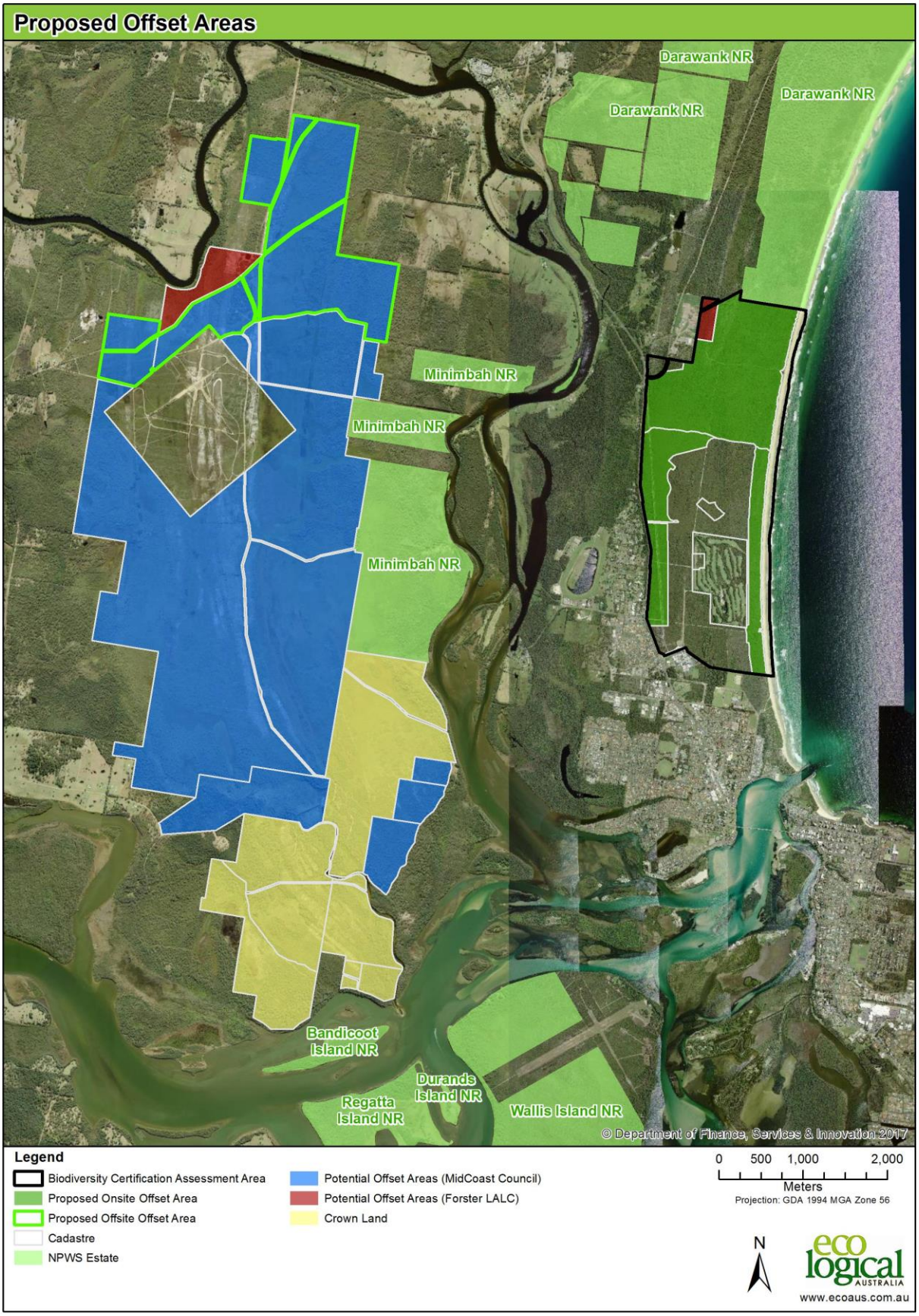


Figure 29: Potential Offset areas 'within' and 'outside' of the BCAA

Figure 30: Validated biometric vegetation types on proposed MCC Nabiac Biobank site

Note: The precise location of endangered orchids have been redacted from the public exhibition version of this document

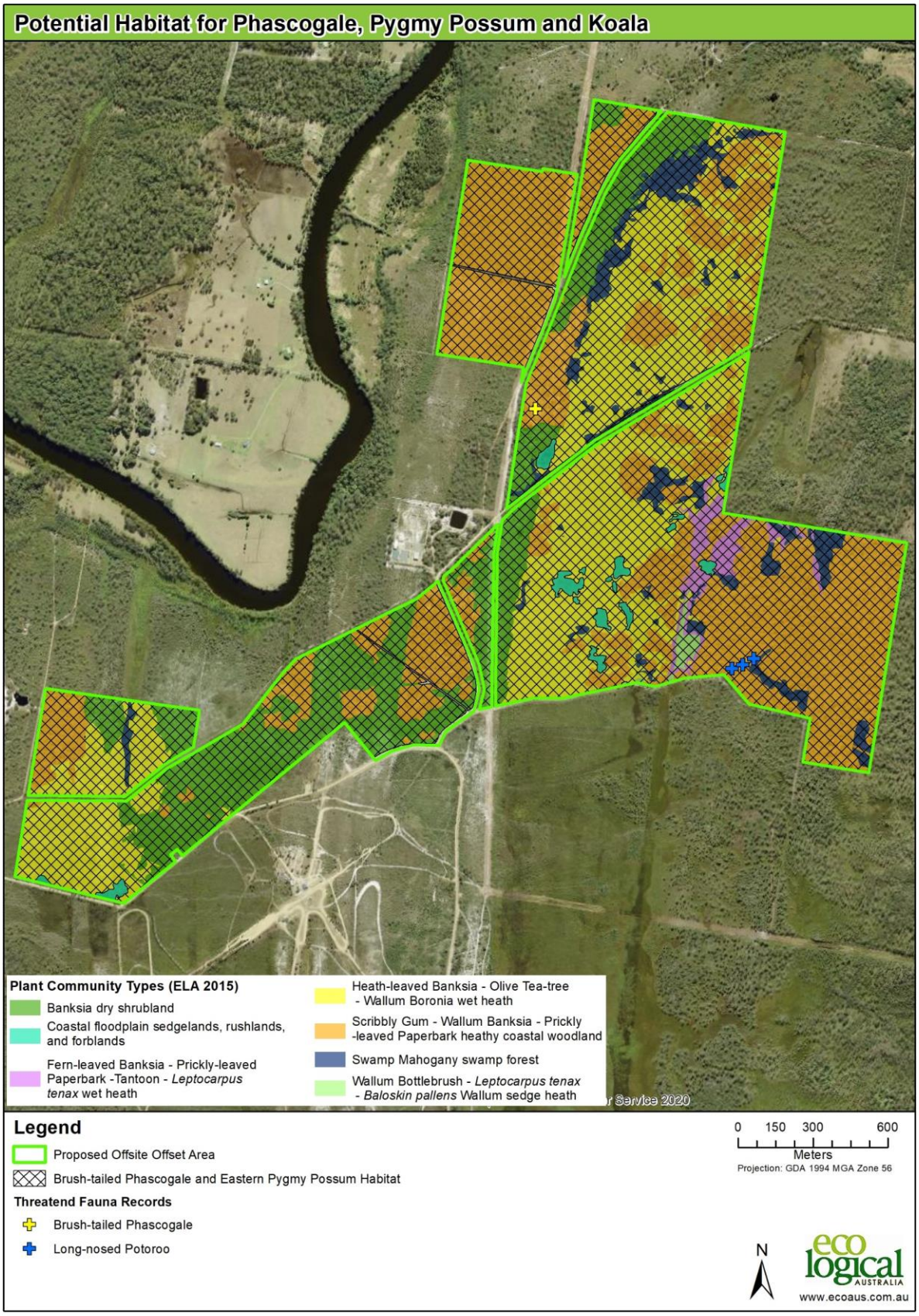


Figure 31: Brush-tailed Phascogale and Eastern Pygmy Possum habitat and potential Koala habitat on proposed MCC Nabiac Biobank site

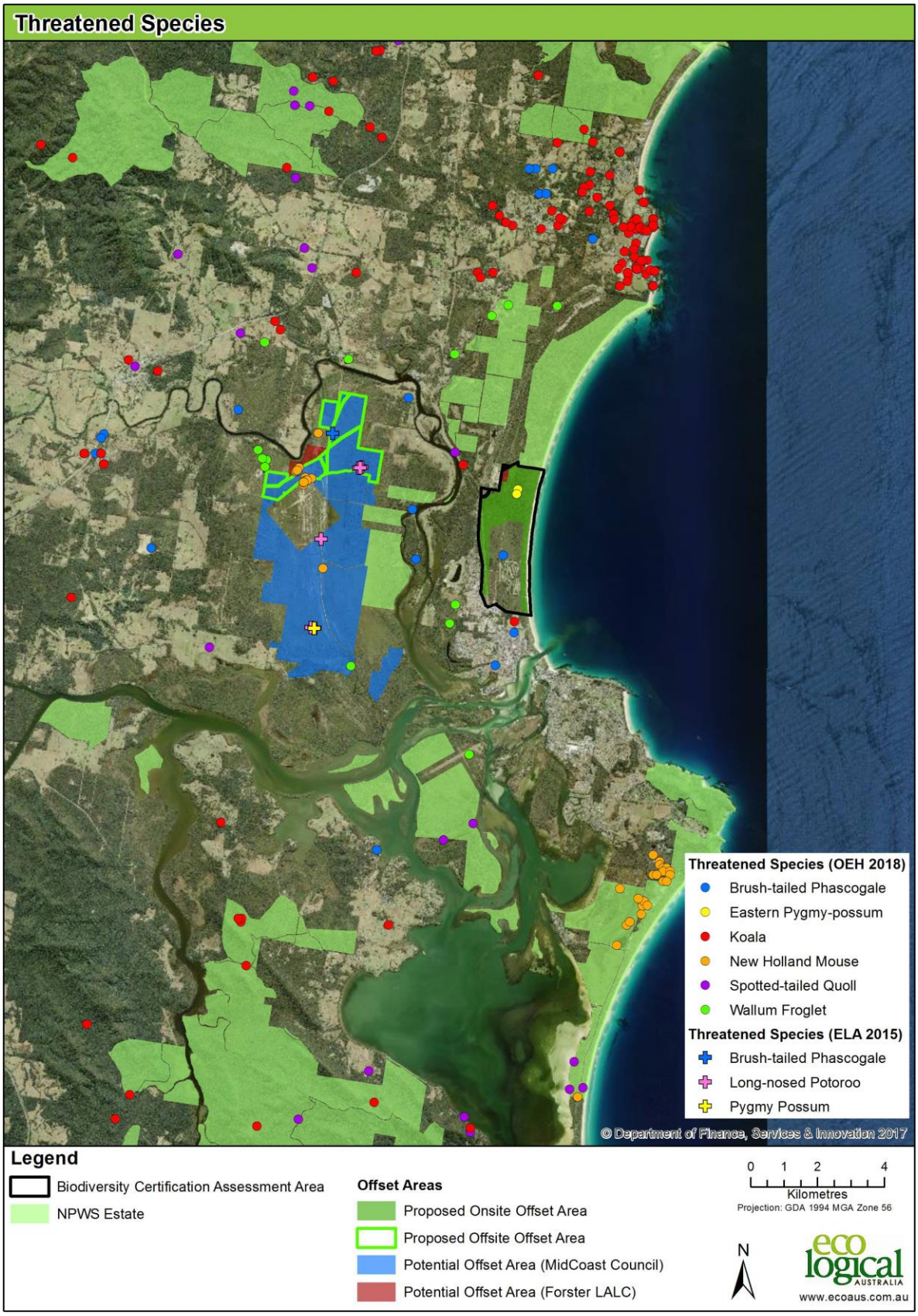


Figure 32: Threatened species records and habitat within and adjacent to proposed Nabiac offset site

Note only those records with an accuracy of 1,000m or better are included in this figure

5.4 Variation to the offset rules for using ecosystem and species credits

The BCAM outlines the rules which govern how the direct and indirect impacts on the biodiversity values of land on which biodiversity conservation is conferred are offset by the improvements in biodiversity values of land where conservation measures are proposed (DECCW 2011). Generally, credit profiles for credits generated for a proposed conservation measure are 'matched' against the credits required for biodiversity certification. The purpose of these offset rules is to ensure that losses of particular biodiversity values are offset by improvements on land with the same or similar biodiversity values.

Notwithstanding the rules, the Director-General may approve a 'variation' to these (section 10.2.1 of the BCAM for ecosystem credit offset rules, and section 10.4.1 of the BCAM for species credit offset rules).

To meet the requirements for biocertification, if CLWB were to use the credits from the MCC Nabiac site this application may require a variation to the offset rules for ecosystem credits only, specifically,

- surplus ecosystem credits generated for '*HU530 Coast Banksia –Coast Wattle dune scrub'* (120 surplus credits as per **Table 16**) to be used to meet part of the deficit for *HU503 Banksia Dry Shrubland on coastal sands'* (2,187 credit deficit) – both vegetation types are in the 'Heathlands Vegetation Formation
- ecosystem credits generated by '*HU919 Heath-leaved Banksia –Olive Tree-Wallum Boronia wet heath*' at the proposed off-site offset (estimate of 1,162 credits to be generated as per **Table 16)** to meet the remaining deficit for *HU503 Banksia Dry Shrubland on coastal sands'*) – both vegetation types are in the 'Heathlands Vegetation Formation'
- *ecosystem credits generated by 'HU581 Scribbly gum - Wallum Banksia – Prickly-leaved Paperbark heathy coastal woodland on coastal lowlands'* at the proposed off-site offset (estimate of 1,597 credits to be generated as per **Table 16)** to meet the credit deficit (714) for '*HU509 Blackbutt – Smooth-barked Apple shrubby open forest on coastal sands in southern NSW North Coast Bioregion'* – both vegetation types are in the same Vegetation Class and Formation, Coastal Dune Dry Sclerophyll Forest

ELA's response to the criteria for varying offset rules are addressed below.

5.4.1 Variation for ecosystem credits

In relation to ecosystem credits, a variation may be approved provided:

> *A. Firstly, before varying the offset rules for using ecosystem credits, the Director General must be satisfied that:*
>
> *a) all reasonable steps have been taken to secure conservation measures that generate credits that match the credit profile specified for ecosystem credits required for biodiversity certification in section 10.1 of the methodology*
>
> *Or*
>
> *b) the cost of securing a conservation measure capable of generating credits to match the credit profile specified for ecosystem credits required for biodiversity certification in section 10.1 of the methodology is disproportionate to the overall cost of the conservation measures identified in the application for biodiversity certification*
>
> *And*

c) the list of threatened species predicted to occur at the offset site is not significantly different to the list of threatened species that are assessed on land where biodiversity certification is proposed when assessed in accordance with section 4.2 of the methodology.

B. Secondly, in order to approve a variation of the offset rule in section 10.2, the Director General must also be satisfied that the alternate ecosystem credits are generated from conservation measures:

a) located on land within the same IBRA region as the land proposed for biodiversity certification, regardless of the CMA subregions identified in attribute 1

And

b) on land containing a vegetation type of the same vegetation class as the vegetation type specified in attribute 2 of the credit required for the land proposed for biodiversity certification as set out in section 10.1 of the methodology

Or

c) if paragraph (b) cannot be complied with, on land containing a vegetation type from the same vegetation formation as the vegetation type specified in attribute 3 of the credit required for the land proposed for biodiversity certification as set out in section 10.1 of the methodology.

ELA calculated the number of credits required and generated in **Section 3.5** and **3.6.1** and summaries for ecosystem and species credits are provided in **Table 14** and **Table 15** respectively.

Ecosystem credits were in deficit for two vegetation types

- '*HU509 Blackbutt – Smooth-barked Apple shrubby open forest on coastal sands in southern NSW North Coast Bioregion'* (Dry Sclerophyll Forest formation) (714 credit deficit); and
- '*HU503 Banksia Dry Shrubland on coastal sands'* (Heathlands formation) (2,187 credit deficit)

In relation to the matters set out in Part A of Section 10.2.1 of BCAM, CLWB has taken all reasonable steps to secure conservation measures 'within' and 'outside' of the BCAA that generate credits which 'match' the credit profile for ecosystem credits. Whilst a significant proportion of the matching credit types are able to be generated for 'HU503 *Banksia dry shrubland*' (705 credits) by the proposed off-site offset area, this is not sufficient to meet the credit deficit (2,187) for this vegetation type. However there are 120 surplus credits for '*HU530 Coast Banksia –Coast Wattle dune scrub'* and an estimate of 1,162 credits that can be created by 'HU919 *Heath-leaved Banksia –Olive Tree-Wallum Boronia wet heath*' which are in the same Vegetation Formation and Class respectively, that may be used to reduce this deficit. Subject to the approval of a credit variation, HU530 and HU919 may be used to offset the credit deficit for HU503.

Similarly, whilst the proposed Nabiac Biobank site does not generate any credits for '*HU509 Blackbutt – Smooth-barked apple*', there will be sufficient credits generated by '*HU581 Scribbly gum - Wallum Banksia – Prickly-leaved Paperbark heathy coastal woodland on coastal lowlands' (an estimate of 1,597 credits as per* **Table 16***) to meet this credit deficit. HU581 is in the same Vegetation Class and Formation as HU509 i.e. Coastal Dune* Dry Sclerophyll Forest) and has a higher percent cleared (40%) than HU509 (25%). Subject to the approval of a credit variation, HU851 may be used to offset the credit deficit for HU509.

In relation to the matters set out in Part B of Section 10.2.1 of BCAM, the alternate ecosystem credits generated from conservation measures are all located on land within the same IBRA region as the land proposed for biodiversity certification. The alternate ecosystem credits were located on land containing a vegetation type from the same Vegetation Formation (and Vegetation Class in two cases) as the vegetation type with credits required for the land proposed for biodiversity certification.

The list of threatened species predicted to occur within these similar vegetation types is '*not significantly different*' to the list assessed for the vegetation types impacted. Threatened species predicted to occur were generally the same for vegetation types within the same formation (**Table 18**).

Of the 28 threatened fauna species predicted to occur in 'HU509 Blackbutt – Smooth-barked apple' 26 (or 93%) are also predicted to occur in HU581.The only two species predicted in HU509 that are not predicted to occur in HU581 being Brown Treecreeper and forging habitat for Eastern Cave Bat (**Table 18**).

Of the three threatened fauna species predicted to occur in 'HU503 Banksia Dry Shrubland', all three are also predicted to occur in HU530 but only one in HU919 (Little Eagle). The Spotted Harrier and Varied Sittella are not predicted to occur in HU919, however eight other threatened species are.

5.4.2 Existing management obligations

The 'on-site' conservation measures are on land currently zoned a mix of RU2 (Rural landscape), R2 (Low density residential) and E2 (Environmental Protection) under Great Lakes LEP 2014. There are no covenants or conservation funding arrangements for the property or any existing requirements to actively manage the site for biodiversity conservation. The entire offset site is to be managed for ecosystem and species credits.

Essential Energy have been notified of the existence of TMO and the proposed TMO research program and will notify CLWB as the land owner, of any works which will provide CLWB the opportunity to discuss changes to the management protocols that may be beneficial to the TMO habitat. CLWB will continue to liaise with Essential Energy during the implementation of the Biobank Agreement management plan to develop a maintenance regime, informed by the TMO Research program, to maintain and enhance the habitat values of this corridor for TMO, which may simply be the current regular slashing program.

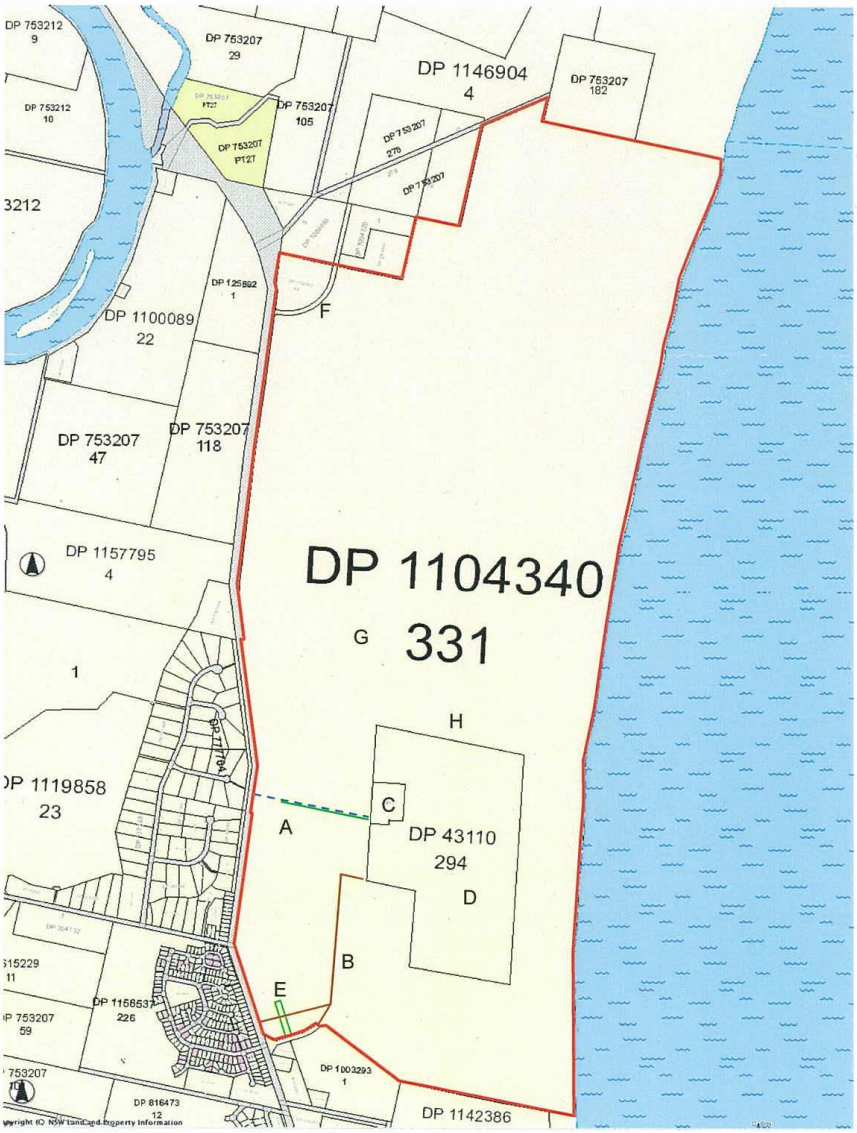
The Crown land at Tuncurry was 'reserved' in 2006 under section 87 of the *Crown Land Act 1993* as the '*Great Lakes Regional Crown Reserve'* for future public requirements including access, tourism, environmental and heritage conservation (**Figure 33**). There is no draft or adopted Plan of Management for this reserve and therefore no existing conservation obligations.

Similarly, the proposed 'off-site' Biodiversity Stewardship site at Nabiac is also zoned RU2 Rural Landscape, has no covenants or existing requirements to actively manage the site for biodiversity conservation. The entire Stewardship site will be managed for ecosystem and species credits.

The existing powerline maintenance corridor, where 156 TMO have been recorded, has not been included in the proposed offset area and is treated as "retained' land. The corridor is managed/maintained by Essential Energy who have advised that the corridor is managed in accordance with their Vegetation Management Plan, as permitted under the Section 53 of the Electricity Supply Act 1995, and if advised of the existence of threatened species, such as TMO, will take every reasonable effort to minimise impacts (see **Appendix M**).

Table 18: Threatened species predicted to occur in vegetation types, with vegetation types grouped into vegetation formations

Vegetation Class/Formation	Dry Sclerophyll Forest		Wallum Sands Heath/Heathlands		
BCAM/BBAM Predicted Species	**HU509 Blackbutt - Smooth-barked Apple shrubby open forest**	**HU851 Scribbly gum - Wallum Banksia - Prickly-leaved Paperbark heathy coastal woodland**	**HU503 Banksia dry shrubland on coastal sands**	**HU919 Heath-leaved Banksia-Olive Tea-tree-Wallum Boronia wet heath**	**HU530 Coast Banksia - Coast Wattle dune scrub**
Barking Owl	Yes	Yes			Yes
Black-chinned Honeyeater (eastern subspecies)	Yes	Yes			Yes
Brown Treecreeper (eastern subspecies)	Yes	No			Yes
Bush Stone-curlew	Yes	Yes			Yes
Common Blossom-bat		Yes		Yes	
Diamond Firetail					Yes
Eastern Bentwing-bat	Yes	Yes		Yes	Yes
Eastern Cave Bat	Yes	No			Yes
Eastern False Pipistrelle	Yes	Yes			Yes
Eastern Freetail-bat	Yes	Yes			
Eastern Grass Owl				Yes	
Gang-gang Cockatoo	Yes	Yes			
Glossy Black-Cockatoo	Yes	Yes			Yes
Greater Broad-nosed Bat	Yes	Yes			Yes
Grey-crowned Babbler (eastern subspecies)	Yes	Yes			Yes
Grey-headed Flying-fox	Yes	Yes		Yes	Yes
Hooded Robin (south-eastern form)	Yes	Yes			Yes
Little Bentwing-bat	Yes	Yes		Yes	
Little Eagle	Yes	Yes	Yes	Yes	Yes
Little Lorikeet	Yes	Yes			Yes
Long-nosed Potoroo		Yes		Yes	
Masked Owl	Yes	Yes			Yes
Powerful Owl	Yes	Yes			Yes
Regent Honeyeater	Yes	Yes			Yes
Southern Myotis	Yes	Yes		Yes	Yes
Speckled Warbler					Yes
Spotted Harrier			Yes	No	Yes
Square-tailed Kite	Yes	Yes			Yes
Squirrel Glider	Yes	Yes			Yes
Swift Parrot	Yes	Yes			
Turquoise Parrot	Yes	Yes			
Varied Sittella	Yes	Yes	Yes	No	Yes
Yellow-bellied Glider	Yes	Yes			Yes
Yellow-bellied Sheathtail-bat	Yes	Yes			Yes



A Licence 330425 Forster Tuncurry Golf Club for pipeline - - - and transmission line —
B Licence 306694 Forster Tuncurry Golf Club for access
C Lease 146708 Forster Tuncurry Golf Club for erection of buildings
D Lease 384021 Forster Tuncurry Golf Club for golf course
Reserve 98486 for public recreation gazette 3 December 1982
E Easement for transmission line gazette 8 April 1983 Folio 1671 - DP43046
F Part lot 3 DP1001320 acquired by Great Lakes Council for road purposes 11 March 2005
G Reserve 753207 for future public requirements gazette 29 June 2007 Folio 4182 excluding areas A, B, C, D, F
H Reserve 1011970 Great Lakes Regional Crown Reserve for access, public requirements, tourism purposes environmental and heritage conservation, gazette 28 July 2006, including areas A, B, C, D, E excluding area F

Figure 33: Tuncurry Crown land reservation status

5.5 Any person or body proposed as a party to the biodiversity certification

Section 126K(4)(d) requires the Biocertification Strategy to identify any person or body proposed to be a 'party' to the biodiversity certification (Parties to biodiversity certification are responsible for the implementation of the proposed 'conservation measures' (i.e. registration of the BSA site).

CLWB will be solely responsible for the preparation and submission of the application for registration of the on-site Biodiversity Stewardship Agreement. The subsequent implementation, monitoring and reporting of the agreement will also be the responsibility of CLWB unless agreement is reached with another body/party to accept transfer of the BSA site. The new land owner, would then be responsible for the implementation and reporting of the implementation of the BSA Agreement and associated management plans.

Whilst not a 'conservation measure', (and not generating any credits), it is proposed to transfer ownership of the TMO pollinator corridors, after they have been rehabilitated, to MidCoast Council, after which they will be classified as Community Land – Natural Area under the Local Government Act 1993 and be subject to the preparation and implementation of a Plan of Management to protect and maintain their value as pollinator corridors in perpetuity.

Landcom has proposed the transfer of this land as part of a Planning Agreement under the s7.4 of the EP&A Act together with the offer to transfer all or parts of the proposed Biobank site to Council (**Appendix N**). MidCoast Council considered the offer in a meeting on 10 April 2019 and resolved to enter into negotiations for a Planning Agreement including the dedication of the TMO pollinator corridors and for the dedication of Conservation Management Area 2 (the eastern coastal corridor in **Figure 35**), following completion of a BSA Agreement (**Appendix O**).

Midcoast Council has further advised that they are prepared to continue negotiations with Landcom/CLWB regarding the sale of biodiversity credits from their Nabiac landholdings, should they be required (**Appendix P**).

CLWB (or designated future developer or developers) will be responsible for purchasing and retiring the credits required for Stages 1-12 of the proposed development as outlined in Section 5.5.1 and any additional credits required for Stages 13-22, the E2 Industrial land, Village Centre and redeveloped golf course, subject to a Statement of reasonable credit equivalency, as required and prior to the commencement of these stages.

The Forster LALC has previously indicated a willingness to sell Lot 279 Dp 753207 to CLWB (approximately 9.09 ha which contains a significant proportion of the TMO population (although it is noted that the credit obligation has already been exceeded)). CLWB will continue negotiations to purchase this land and add it to the conservation outcomes. If purchased prior to submitting the application to register a BSA, Lot 279 would become part of the proposed on-site BSA site and secure a further 25% (678 individuals) of the known TMO population for conservation and provide additional credits for Brush-tailed Phascogale and Eastern Pygmy Possum.

5.5.1 Timing of credit retirement

Whilst the proposal is expected to be developed in 22 residential stages and business/employment lands over an approximate 35 year period, i.e. only a small proportion of the impacts will occur in any one year/stage (average of 5.67 ha per stage), CLWB and Landcom have committed to submit an application for registration of the 'on-site' BSA within 12 months of biodiversity certification being conferred and commence active management of this area for the first five years from the commencement of construction on an annual basis, prior to the retirement of ALL credits (It is noted that the Minster for Lands has already

approved registration of a Biobank site and an application to register a Biobank site as submitted to DPIE in July 2020).

Prior to the commencement of the 6th year (or Stage 6, whichever is sooner) after commencement of construction, CLWB will 'retire' ALL credits generated by the on-site BSA site (i.e. meeting the equivalent of 2,964 BCAM ecosystem credits, 9,216 TMO, 1,662 BTP and 1, 662 EPP species credits) and fully meet the Total Fund Deposit amount (estimated at $4.5M in 2021 dollars) which will provide for the ongoing, in perpetuity active conservation management of the offset area in accordance with the registered BSA Agreement.

The credit retirement program above will ensure that all the offset requirements for the first 12 stages of residential development and the E1 Business Park and pollinator corridors around the proposed TMO orchid park, will be secured by the end of the first five years after commencement of the 35 year development program (refer to **Tables 19** and **20** and **Figure 34)** i.e. that by the start of year 6, over 50% of the ecosystem offset requirements, 40% of the BTP and EPP and 100% of the TMO requirements for the whole project will be secured and actively managed, whilst only 15% of the impacts will have occurred. The program above will allow the disturbed orchid pollinator corridors to be revegetated and restored for up to seven years prior to the impacts of residential stages 13-22 and more than 10-15 years post bush fire recovery and restoration of fauna habitats.

The proportion and types of credits required for each stage of development and when credits are proposed to be retired is shown in **Tables 19** and **20** and **Figure 34.** A likely time frame is provided on the basis of certification being conferred in 2022 and the construction commencing in 2024 with approximately 60 lots per year, however this will be subject to the demand for housing lots and may occur sooner or later. Regardless, no clearing of vegetation will occur in each stage until the CLWB has provided proof of the retirement of the required quantum of credits. This proof will be in the form of a 'certificate' of credit retirement issued by DPIE.

The requirements for the retirement of credits from the on-site offset areas are expressed in this strategy as credits calculated using the BCAM. As the conservation commitments will be secured as BSA sites (or Biodiversity Stewardship Sites), it will be the credits calculated using the BAM 2020 that are actually 'retired'. However, consistent with Section 8.2 of the BCAM, it is the credits calculated under BCAM for the proposed 'conservation measures' that are used to determine of an IoM outcome has been met. The residual BCAM credit requirements for Stages 13-25 will be converted into an equivalent number of BAM 2020 credits in order to meet the off-site offset requirements.

Table 19: Proposed schedule of retirement of ecosystem credits

			Area (ha) of vegetation impacted			Proportion of total and equivalent no. of credits required				
Stage	**No. of Lots**	**Likely Year**	**Banksia Dry Shrubland**	**Blackbutt - Smooth-barked Apple**	**Coast Banksia - Coast Wattle dune scrub**	**Total Area (ha)**	**Proportion of Total (%)**	**No. BCAM Ecosystem Credits required for Stage**	**Cumulative No. of BCAM ecosystem credits required**	**BCAM Credits to be retired**
On-site Ecosystem credits										
Stage 1	85	2024	7.98	0.00	0.00	7.98	4.02%	231	231	
E1 (Business)		2025	5.60	0.00	0.00	5.60	2.82%	162	393	
Stage 2	74	2026	3.29	0.00	1.78	5.08	2.56%	147	539	
Stage 3	95	2027	6.73	0.00	1.19	7.92	3.99%	229	769	
Stage 4	66	2028	0.13	0.00	6.85	6.98	3.51%	202	970	
Stage 5	74	2029	5.79	0.13	0.00	5.92	2.98%	171	1,141	2964
Stage 13 pollinator corridor		2030-2032	3.53	0.01	0.00	3.54	1.78%	102	1,244	
Stage 15 pollinator corridor		2030-2032	1.76	0.00	0.00	1.76	0.89%	51	1,295	
Stage 17 pollinator corridor		2030-2032	1.03	0.00	0.00	1.03	0.52%	30	1,324	
Stage 18 pollinator corridor		2030-2032	1.48	0.39	0.00	1.87	0.94%	54	1,378	
Stage 19 pollinator corridor		2030-2032	3.55	0.17	0.00	3.72	1.87%	108	1,486	
Stage 20 pollinator corridor		2030-2032	0.81	0.01	0.00	0.82	0.41%	24	1,510	
Stage 6	90	2030	3.78	2.76	0.00	6.53	3.29%	189	1,698	
Stage 7	77	2031	0.67	5.54	0.00	6.22	3.13%	180	1,878	
Stage 8	68	2032	2.36	3.24	0.00	5.60	2.82%	162	2,040	
Stage 9	72	2033	2.65	5.39	0.00	8.04	4.05%	233	2,273	
MA (Main Access Rd)		2033	1.39	0.00	0.00	1.39	0.70%	40	2,313	

			Area (ha) of vegetation impacted			Proportion of total and equivalent no. of credits required				
Stage	**No. of Lots**	**Likely Year**	**Banksia Dry Shrubland**	**Blackbutt - Smooth-barked Apple**	**Coast Banksia - Coast Wattle dune scrub**	**Total Area (ha)**	**Proportion of Total (%)**	**No. BCAM Ecosystem Credits required for Stage**	**Cumulative No. of BCAM ecosystem credits required**	**BCAM Credits to be retired**
Stage 10	91	2035	6.22	0.26	0.00	6.48	3.26%	187	2,500	
Stage 11	95	2036	5.82	1.25	0.00	7.07	3.56%	205	2,705	
Stage 12	100	2037	3.86	1.19	2.00	7.05	3.55%	204	2,908	
Off-site Ecosystem credits (Subject to BAM credit equivalency)										
VC (Village Centre)	55	2038	0.08	0.00	5.23	5.31	2.67%	154	3,062	98
E2 (Industrial)		2039	0.00	6.78	0.00	6.78	3.41%	196	3,258	196
GC (Golf Course)		2038	20.75	3.02	5.41	29.17	14.69%	844	4,102	844
Stage 13	87	2039	0.52	3.60	0.66	4.78	2.41%	138	4,240	138
Stage 14	84	2040	0.00	4.22	1.09	5.30	2.67%	153	4,393	153
Stage 15	96	2041	1.28	4.03	0.00	5.31	2.67%	154	4,547	154
Stage 16	88	2042	0.00	5.23	0.16	5.39	2.71%	156	4,702	156
Stage 17	84	2043	1.89	5.46	1.42	8.78	4.42%	254	4,956	254
Stage 18	69	2044	7.83	-0.39	0.00	7.44	3.75%	215	5,171	215
Stage 19	104	2045	3.61	-0.05	0.00	3.56	1.79%	103	5,274	103
Stage 20	95	2046	3.23	2.46	0.00	5.69	2.86%	165	5,439	165
Stage 21	132	2047	0.00	0.00	7.67	7.67	3.86%	222	5,661	222
Stage 22	42	2048	0.00	0.00	2.89	2.89	1.45%	83	5,744	83
Total	**1,923**		**107.62**	**54.69**	**36.35**	**198.66**	**100.00%**	**5,744**		**5,744**

Table 20: Proposed schedule of retirement of species credits

		Brush-tailed Phascogale & Eastern Pygmy Possum habitat impacted & credits required				TMO individuals impacted & credits required					
Stage	**Likely Year**	**Area of habitat (ha)**	**Proportion of Total (%)**	**No. BCAM Credits required for Stage**	**Cumulative No. BCAM credits required for Stages**	**Credits to be retired**	**No. of individuals**	**Proportion of Total (%)**	**No. BCAM Credits required for Stage**	**Cumulative No. BCAM credits required for Stages**	**BCAM Credits to be retired**
On-site species credits											
Stage 1	2024	7.98	4.02%	160	160						
E1 (Business)	2025	5.6	2.82%	112	272						
Stage 2	2026	5.08	2.56%	102	373						
Stage 3	2027	7.92	3.99%	158	532		1	1.59%	77	77	
Stage 4	2028	6.98	3.51%	140	671						
Stage 5	2029	5.92	2.98%	118	790	1,662	13	20.63%	1,000	1,077	9,216
Stage 13 pollinator corridor	2030-2032	3.54	1.78%	71	860						
Stage 15 pollinator corridor	2030-2032	1.76	0.89%	35	896						
Stage 17 pollinator corridor	2030-2032	1.03	0.52%	21	916						
Stage 18 pollinator corridor	2030-2032	1.87	0.94%	37	954						
Stage 19 pollinator corridor	2030-2032	3.72	1.87%	74	1,028						
Stage 20 pollinator corridor	2030-2032	0.82	0.41%	16	1,044						
Stage 6	2030	6.53	3.29%	131	1,175		2	3.17%	154	1,231	0
Stage 7	2031	6.22	3.13%	124	1,299						
Stage 8	2032	5.6	2.82%	112	1,411						
Stage 9	2033	8.04	4.05%	161	1,572		3	4.76%	231	1,462	0
MA (Main Access Rd)	2033	1.39	0.70%	28	1,600						
Stage 10	2035	6.48	3.26%	130	1,730	67					
Stage 11	2036	7.07	3.56%	141	1,871	141	8	12.70%	615	2,077	0
Stage 12	2037	7.05	3.55%	141	2,012	141					

		Brush-tailed Phascogale & Eastern Pygmy Possum habitat impacted & credits required					TMO individuals impacted & credits required				
Stage	**Likely Year**	**Area of habitat (ha)**	**Proportion of Total (%)**	**No. BCAM Credits required for Stage**	**Cumulative No. BCAM credits required for Stages**	**Credits to be retired**	**No. of individuals**	**Proportion of Total (%)**	**No. BCAM Credits required for Stage**	**Cumulative No. BCAM credits required for Stages**	**BCAM Credits to be retired**
Off-site species credits (Subject to BAM Credit equivalency)											
VC (Village Centre)	2038	5.31	2.67%	106	2,118	106					
E2 (Employment Lands)	2039	6.78	3.41%	136	2,254	136					
GC (Golf Course)	2038	29.17	14.68%	583	2,837	583	17	26.98%	1,308	3,385	0
Stage 13	2039	4.78	2.41%	96	2,933	96					
Stage 14	2040	5.3	2.67%	106	3,039	106					
Stage 15	2041	5.31	2.67%	106	3,145	106					
Stage 16	2042	5.39	2.71%	108	3,253	108					
Stage 17	2043	8.78	4.42%	176	3,428	176					
Stage 18	2044	7.44	3.75%	149	3,577	149					
Stage 19	2045	3.56	1.79%	71	3,648	71	19	30.16%	1,461	4,846	0
Stage 20	2046	5.68	2.86%	114	3,762	114					
Stage 21	2047	7.67	3.86%	153	3,915	153					
Stage 22	2048	2.89	1.45%	58	3,973	58					
Total		**198.66**	**100.00%**	**3,973**		**3,973**	**63**	**100.00%**	**4,846**	**4,846**	**9,216**

Figure 34: Development area stages

5.6 Is an Improve or Maintain Outcome Achieved?

Subject to the Director-Generals consideration and approval of the red flag variation request for TMO (**Section 4**) and if required, the credit trading variation (**Section 5.4**) an improve or maintain outcome can be achieved by the purchase and retirement of credits from the proposed on-site and off-site Biobank/Biodiversity Stewardship sites and/or BCF sites (**Tables 11-14**).

In addition 4,376 'surplus' TMO credits will be 'retired' as a condition of Biocertification for conservation measures 'within' the BCAA.

5.7 Statement of commitments

5.7.1 Biocertification Agreement

A Biocertification Agreement will be entered into between the Crown Lands Branch of DPIE (CLB) and the Minister stating that at least 312.7 ha of land proposed for conservation measures within the BCAA as shown in **Figure 2** (including the 4.08 ha TMO Reserve but excluding 15.01 ha of existing tracks, the powerline maintenance corridor, existing management trails and access to the beach) will be submitted for registration as a Biodiversity Stewardship site within 12 months of biocertification being conferred.

5.7.2 Planning Agreement

A Planning Agreement will be entered into between the Crown Lands Branch of DPIE and MidCoast Council stating that the TMO pollinator corridors shown in **Figure 6** will be restored in accordance with a Vegetation Management Plan, dedicated to MCC, classified as Community Land – Natural Area under the Local Government Act 1993 and be subject to the preparation and implementation of a Plan of Management to protect and maintain their value as pollinator corridors in perpetuity (refer to Landcom letter of offer (**Appendix N**) and Council Resolution (**Appendix O**).

5.7.3 Avoidance, minimisation and mitigation of impacts to biodiversity values within and adjacent to land to be certified

The Crown Lands Branch of DPIE (or any future developer/developers who becomes subject to the Biodiversity Certification Agreement) will prepare and implement a Construction Environment Management Plan (CEMP), which includes restoration of the TMO orchid pollinator corridors, to guide the development of the certified land and ensure that all direct and indirect impacts (e.g. APZs, utilities, access, stormwater run-off) are contained within the development footprint and appropriate mitigation measures are put in place to minimise indirect impacts to threatened fauna utilising Nine Mile Beach.

The CEMP will include the following specific measures to reduce impacts to biodiversity values within the BCAA:-

- Temporary and permanent protective fencing will be erected around all areas identified for conservation prior to clearing activities to minimise any inadvertent damage and to prevent any threatened fauna from entering operational areas
- Bulk earth works in the vicinity of the proposed TMO Orchid Park and associated pollinator corridors associated with development stages 10, 11, 13, 15, 17, 18, 19 and 20 will be undertaken between years 5-10 after commencement of construction to allow regeneration of any disturbed habitat in the proposed pollinator corridors prior to the clearing/development of these stages to allow continuity of habitat connectivity
- Pre-clearance surveys of threatened fauna, will be undertaken in accordance with a fauna pre-clearance protocol prior to any clearing of vegetation

- Protocols for clearing vegetation and adaptive reuse of vegetative material for restoration and habitat augmentation in areas identified for restoration activity will be prepared and implemented
- Retention of Hollow Bearing Trees where possible and practical
- A fauna de-watering plan for any dams that are removed, in particular within the golf course
- A lighting plan that diverts lights away from potential sea bird and turtle breeding areas along Nine Mile Beach.
- Measures to minimise vehicle and domestic dog access to Nine Mile Beach.

5.7.4 Securing and management of on-site and off-site offsets

1. An application to register a Biodiversity Stewardship Agreement (BSA) over a minimum 312.70 ha of Crown land at North Tuncurry will be submitted for registration as a Biodiversity Stewardship site within 12 months of biocertification being conferred (and prior to the clearing of any native vegetation associated with the project). The application will include a minimum of 312.70 ha of mapped vegetation and will generate 2,964 BCAM ecosystem credits after exclusion of 15.01 ha of existing tracks and the powerline maintenance corridor. All credits generated by the BSA site will be categorised as 'committed' in the credit register and not available for use in any other project. This will permanently protect and secure over 50% of the required offset for the entire development in the first 12 months and generate all of the ecosystem and species credits required to offset the first 12 stages of residential development and the E1 Business Park.

2. Landcom and Crown Lands Branch of DPIE will continue to liaise with Essential Energy, informed by the TMO Research Program, regarding the ongoing management and maintenance of the powerline corridor that traverses the western section of the Biobank site and provides habitat for TMO (**Refer Appendix M**). This will ensure that the powerline maintenance program is sympathetic to the habitat needs of TMO. This may include the on-going slashing of heathland vegetation and/or other management practices such as regeneration burning of habitat areas (as informed by the TMO Research Program).

3. The management of the Crown lands Tuncurry BSA site will be commenced prior to the commencement of construction (expected to be approximately 3 years after the conferral of biocertification) and will be fully funded by CLB) on an annual basis for 5 years (expected to be between $100,000 and $120,000 per year). The Biobank area will be progressively managed in accordance with a BSA Management Plan with signage, access control and feral animal management occurring across the site from Year 1 of the commencement of development, and weed control/restoration works progressing in defined Management Areas (Management Areas 1, 2 and 3 as shown in **Figure 35**) from the southern end of the site to the north and targeting areas critical to TMO protection in the initial years of implementation.

4. Prior to commencement of the sixth stage or sixth year after commencement (whichever is sooner), CLB will 'retire' all ecosystem and species credits generated by the on-site BSA site thereby fully meeting the Total Fund Deposit amount (expected to be around $4.5m in 2021 dollars).

5. CLB (or any future developer/developers who become subject to the Biodiversity Certification Agreement) will either purchase the remaining credits required for development in any of the Stages from Stage 13 onwards (in accordance with a statement of reasonable credit equivalence) from a MCC Biodiversity Stewardship site at Nabiac (Refer to **Appendix P**), any other registered Biobank or Biodiversity Stewardship site) or the Biodiversity Conservation Fund, prior to the commencement of the relevant Stage or Stages of development.

5.7.5 Proposed indirect conservations measures and monitoring program

In addition to the land subject to conservation measures outlined in this biocertification assessment, CLB will commit **$250,000** of funding over a 5 year period, commencing from the first year after conferral of biocertification, to develop a long term research and monitoring program for the TMO consistent with, where available, any priorities outlined in any Conservation Strategies or Species Recovery Plans.

The TMO Research and Monitoring Fund will be established in the first year of the project and a committee formed to oversee, prioritise and report on findings. The committee will invite representatives from DPIE, DotEE, MCC and a relevant university.

This research monitoring program will include elements of:

- A commitment to continue seasonal survey for the TMO in the Tuncurry area to better inform the distribution, abundance and habitat preferences of the species.
- Continue the funding of an ex-situ propagation trial and pollinator research program with the Royal Botanic Gardens and relevant TMO experts which commenced in 2012.
- Jointly Fund an Industry / University Research Scholarship to undertake experimental manipulation of habitat (slashing and fire) to determine the response of the TMO to disturbance and inform appropriate management regimes within National Parks Estate and offset areas.
- Establish a statistically sound long term monitoring program (in conjunction with offset area monitoring requirements) of key populations.

5.7.6 Green Turtles and Pied Oyster Catcher nesting on Nine Mile Beach

- CLB, in conjunction with existing shorebird recovery programs, will establish a nesting monitoring program along Nine Mile Beach adjacent to the BCAA and erect temporary fencing, where and when necessary, to minimise disturbance if nesting activity is detected. CLB will commit **$250,000** of funding over a 10 year period, commencing from the first year after conferral of biocertification to establish this monitoring program.

- CLB will work with MCC to develop policies to restrict and minimise vehicle and domestic dog (other than in winter) access to Nine Mile Beach adjacent to the BCAA.

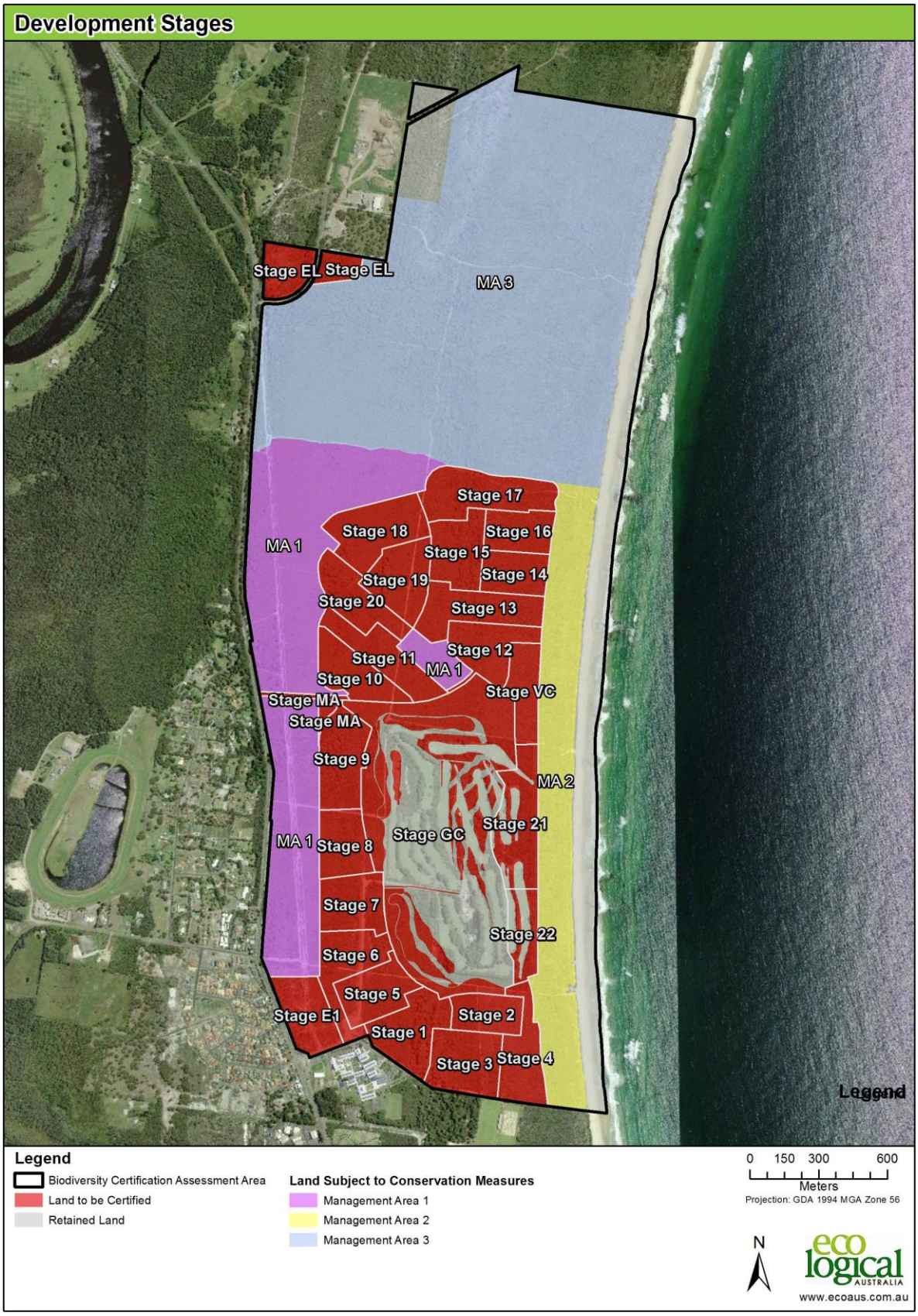


Figure 35: On-site Offset Area Management Zones

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Worley Parsons 2011b North Tuncurry Stormwater Constraints and Opportunities Assessment. Report prepared for Landcom, Worley parsons Resources and Energy, 1 September 2011.

Appendix A : Project Staff CVs

The following are brief curriculum vitae's for the key project staff. Please note that since this project commenced in 2013, there have been a number of staff movements, and some of the staff who undertook the field work and credit calculations are no longer with Eco Logical Australia, they have however been consulted in making revisions to this report.

Robert Humphries – Project Manager

CURRICULUM VITAE

Robert Humphries

MANAGER, BIOBANKING AND BIOCERTIFICATION OFFSETS PROGRAMS

QUALIFICATIONS

- Bachelor of Applied Science, Ballarat C.A.E 1983-85.
- Master of Applied Science (Research) University of Ballarat 1986-89.

Robert is an ecologist, environmental planner and project manager with over 25 years experience. Since graduating with Bachelors and Masters Degrees in wildlife management in 1985, Robert has worked mainly in the public sector with the Department of Environment and Conservation (Victoria) 1988-1996 and NSW National Parks and Wildlife Service, now NSW Office of the Environment & Heritage 1996-2006. Robert joined Eco Logical Australia in March 2008.

Robert was the Manager of the Threatened Species Section of the NSW Department of Conservation and Environment for over 10 years and has extensive experience of the NSW Threatened Species and Environmental Planning legislation, Government policy, the biodiversity of the Greater Sydney and Hunter Regions and the new biodiversity certification and biobanking provisions.

Robert was a member of the Biobanking Ministerial Reference Group from 2007-2012 and is the lead trainer in the BioBanking and Biodiversity Certification Accredited Assessor Training program.

RELEVANT PROJECT EXPERIENCE

BioCertification Assessments

Have completed or are currently undertaking formal Biodiversity Certification Assessments for:-

- Port Macquarie Airport Master Plan (Port Macquarie- Hastings Council)
- Tuncurry State Significant Site (Urban Growth NSW)
- Emerald Hills Urban Release Area (Camden City Council). Assessment completed and reviewed by OEH
- Warnervale Town Centre (Wyong Council)(Approved March 2014)
- Broulee and South Moruya Urban Release Areas (Eurobodalla Shire Council)(Approved September 2014)
- Mount Gilead Urban Release Area (Campbelltown City Council)
- Have completed informal Biodiversity Certification Assessments for

- Ralston Avenue, Belrose for Metropolitan Local Aboriginal Land Council (August 2013)
- Greater Sancrox Area for Port Macquarie –Hastings Council (August 2013)
- Glenning Valley Urban Release Area (Travers Ecology and Glenning Valley Partnership 2011);
- Kings Hill Urban Release Area, Port Stephens LGA (Mondell Property Group and Hunter Land 2011);
- Ingleside Release Area, Pittwater/Warringah LGAs (Urban Growth NSW 2011)
- Darkinjung Local Aboriginal Land Council (North Wyong Structure Area)
- Yallah-Marshall Mount Urban Release Area (Wollongong City Council)
- Whitebridge Investigation Area (Urban Growth NSW 2011)
- Balmoral Urban Release Area, north west Sydney (Urban Growth NSW 2013)

Biodiversity Offset Strategies

- North West & South West Growth Centres Biodiversity Offset Strategy for Sydney Water Infrastructure developments (May 2013)
- Biodiversity Offset Strategy for the proposed extension of the Pine Dale Mine (Enhance Place Pty Ltd, July 2013)
- Biodiversity Offset Strategy for proposed Stage 1 Modification, Moolarben Coal Mine (Yancoal, May 2013)
- Biodiversity Offset Strategy for Crudine Wind Farm (Wind Prospect CWP Pty Ltd – 2012)
- Biodiversity Offset Strategy for Sapphire Wind Farm (Wind Prospect CWP Pty Ltd – 2011)
- Biodiversity Offset Strategy for Boco Rock Wind Farm (Wind Prospect CWP Pty Ltd – 2011)
- Improve or Maintain Biodiversity Offset Strategy for Kings Hill Urban Release Area, Port Stephens LGA (Mondell Property Group, 2011)
- Biodiversity offset strategy for proposed Narrabri Coal mine (Narrabri Coal Operations Pty Ltd, 2011)
- Biodiversity offset strategy for proposed modification to Rocglen Coal Mine (Whitehaven Coal Pty Ltd, 2010)
- Biodiversity offset strategy for proposed Werris Creek LOM Coal Mine (Werris Creek Coal Pty Ltd, 2010)
- Biodiversity offset strategy for the South West Rail Link (Transport Construction Authority, 2010)
- Biodiversity offset strategy for the Richmond Rail Line duplication (Transport Construction Authority, 2011)
- Biodiversity offset strategy for the Camden Valley Way Upgrade (NSW RTA, 2011)
- Biodiversity Offset Strategy for the Oxley Highway Upgrade, Port Macquarie (NSW RTA, 2010)
- Preparation of Offset Strategy and package for the Kingsgrove to Revesby Quadruplication Project (2008/09 K2RQ/TIDC Alliance)

Biobank Site Assessments and Registrations

- 80 ha site at Salamander for Port Stephens Shire Council (Assessment currently being assessed by OEH)
- Two Biobank sites (100 ha) in Western Sydney Parklands as an amendment to the existing Cecil Hills Biobank Site (Agreement No. 120 registered August 2014)
- 54 ha proposed Biobank at the Oaks on the Cumberland Plain (Private landholder) (Agreement No. 100, registered in September 2013)
- 69 ha proposed Biobank for Shoalhaven City Council at (Agreement No. 101, registered in June 2013)
- 45 ha proposed Biobank for Lake Macquarie City Council at Belmont (Agreement No. 103, registered in June 2013)
- 51 ha site west of Camden on the Cumberland Plain (Private landholder) (Agreement No. 88, registered in January 2013)
- 25 ha site west of Camden on the Cumberland Plain (Private landholder) (Agreement No. 3, registered in January 2011).
- 24 ha site in western Sydney (Western Sydney Parklands Trust). (Agreement No. 70, registered in February 2012).
- 10 ha site at Belrose (WSN Environmental Solutions) (Agreement No. 55, registered in March 2012)
- 1,500 ha site near Gunnedah to offset an approved Coal mine (Whitehaven Coal) (Agreement No. 43, registered in August 2012).

Brian Towle, Accredited Assessor, Senior Field Ecologist – Vegetation Mapping, Biometric plots and threatened flora survey (moved to Eco Planning Pty Ltd, June 2017)

Brian Towle

SENIOR ECOLOGIST

QUALIFICATIONS

- Bachelor of Environmental Science (First Class Honours). The impacts of recreational vehicle use on vegetation and soils of a Sydney Sandstone Ecosystem. University of New South Wales – 2005.
- Accredited Biobanking Assessor

Brian is a senior ecologist with over 10 years' experience as an environmental consultant. During this time he has worked primarily as a botanist undertaking a range of projects including registered BioBanking agreements, applications for Biodiversity certification, vegetation monitoring programs, large scale vegetation mapping projects, targeted surveys and a range of impact assessments.

Brian has conducted surveys in a range of ecosystems across NSW, and in parts of QLD (Bowen Basin), from the coast to the far western plains including arid woodlands, shrublands and grasslands, wet sclerophyll forests, rainforests and coastal swamps. This experience has exposed him to a diversity of flora and fauna distributed across these ecosystems. Brian has also undertaken research into the ecology of native plants co-authoring publications within peer-reviewed journals.

Brian has a sound knowledge of environmental and planning legislation, and has applied this understanding and his ecological expertise to a range of projects including as an expert witness for the Land and Environment Court. Brian has worked for a range of clients ranging from Local Councils, to state agencies and private industry. This has required him to communicate effectively with a range of professionals and the general public in both written and oral form.

RELEVANT PROJECT EXPERIENCE

Ecological impact assessment

- Macdonaldtown Gasworks remediation (Incoll Management Pty Ltd)
- Southern Sydney Freight Line, Glenfield to Cabramatta (John Holland Pty Ltd)
- Impacts of Pacific Highway Upgrade on Koalas, Bonville (Roads & Maritime Services)
- Powerline corridor widening, Cordeaux (AAJV Pty Ltd)
- Tallawarra Part 3A Ecological Assessment
- Powerline Maintenance works, various locations (Integral Energy)
- Darkes Forest Powerline, Ecological Assessment, central NSW
- Proposed Sewer alignment El Cabello Blanco, Gledswood and Lakeside properties (Sekisui House)
- Threatened Species Impact Statement for proposed residential subdivision at Menai, Sutherland LGA, NSW (Landcom, 2009/10).
- Bald Hill carpark and lookout redesign (Wollgong City Council)
- Lucas Heights Stockpile Assessment (WSN Environmental Solutions)
- Mount Ousley Heavy Vehicle Checking Station REF (Roads & Maritime Services)
- Woodford sewer line extension, (AAJV Pty Ltd)
- Sublime Point Water Treatment Plant Upgrade (Wollongong Council)
- Pinedale Coal Mine Ecological assessment report
- Threatened Species Impact Statement Beacon Hill, Warringah LGA, NSW
- Yallah-Marshall Mount Ecological Sensitivity Analysis (Wollongong Council)

BioBanking and Biocertification Assessments

- Biodiversity Certification Application for 600ha property in south-west Sydney (Lendlease Communities)
- Biodiversity Certification Application for North Tuncurry Crown Land (UrbanGrowth NSW).
- Vegetation mapping and assessment of 54 ha Biobank site on the Cumberland Plain (Private landholder) (Agreement No. 100, registered in September 2013)

Ecological inventory & monitoring

- Monitoring impacts to vegetation associated with longwall mining, Illawarra Coalfields
- Offset sites vegetation monitoring and Landscape Function Analysis (Moolarben Coal Pty Ltd)
- Field validation and mapping of Endangered Ecological Communities (Ku-ring-gai Council)
- Updated vegetation mapping and biodiversity conservation options for the West Dapto urban release area (Wollongong City Council)
- Vegetation community mapping project, Mulwala Defence Facility
- Mapping of vegetation communities of the Darling River Floodplain (Murray-Darling Basin Authority)
- Environmentally Sensitive Land Map update Camden LGA (Camden Council)
- Validation of wetland mapping across the Lachlan River catchment (NSW Office of Environment and Heritage)
- Validation of Groundwater Dependent Ecosystem mapping across the Lachlan River catchment (NSW Department of Primary Industries)

Management Plans

- Black Fellows Hands Reserve Biodiversity Management Plan, Mingaan Aboriginal Corporation
- Biobanking Assessment and Plan of Management, Kempsey & Deerubbin LALCs
- Cooper Park Management Plan (Woollahra Council)

Ecological Review

- Expert Witness Statement, Groundwater Extraction, Bilpin
- Ecological Review, UTS Ku-ring-gai Campus Development, Ku-ring-gai

Publications

Bower, C. **Towle, B** and Bickel, D. (2015). *Reproductive success and pollination of the Tuncurry Midge Orchid (*Genoplesium littorale*) (Orchidaceae) by Chloropid Flies*. Telopea 18: 43-55.

Dr Lachlan Copeland – Orchid Expert – Advice on Tuncurry Midge Orchid

Dr Lachlan Copeland

SENIOR BOTANIST

QUALIFICATIONS

- Research PhD in plant systematics, University of New England (Systematic studies in *Homoranthus* (Myrtaceae: Chamelaucieae): species limits, phylogeny and generic boundaries) 2002-2005
- Bachelor of Natural Resources (Hons), University of New England, 1992-1995

Lachlan has over 18 years experience in vegetation survey techniques and specialises in the identification of native and naturalised vascular plant species. He is familiar with the various analytical techniques and data requirements that form the basis of vegetation survey and mapping, enabling his involvement from data collection and analysis through to vegetation description and report presentation. He possesses a solid understanding of state vegetation policy, particularly in relation to threatened plant species. Lachlan is familiar with most of the threatened plants in northern NSW and has many years experience in searching for them, photographing them in the field and mapping their distribution.

Lachlan has worked for a number of natural resource management agencies such as NSW OEH and numerous private Environmental Consultancy companies. He also has a strong ongoing involvement with the Botany Department of the University of New England where he has undertaken research into the taxonomy of a range of native plants. During this time he has published over 30 scientific papers in numerous peer-reviewed journals on a range of taxonomic, ecological and conservation issues.

Lachlan is currently situated in the Coffs Harbour Branch of Eco Logical Australia.

RELEVANT PROJECT EXPERIENCE (RECENT EXAMPLES ONLY)

- 2017: Long Term Intervention Monitoring Projects (LTIM) environmental monitoring including amphibian, bird and vegetation survey.
- 2017: Narrabri annual biodiversity monitoring including diurnal bird and vegetation survey.
- 2016: Undertake field surveys as part of the Tropical Soda Apple mapping and monitoring on the North Coast.
- 2015: Full floristic vegetation survey of North Coast Endangered Ecological Communities within State Forest tenure.
- 2015: Completed full floristic and rapid vegetation survey plots for the Barwon-Darling & Condamine-Balonne floodplain & wetland veg mapping project.
- 2015: Vegetation, habitat and Koala survey along gravel roads prior to the World Rally Championships held in forests in the Coffs Harbour district.
- 2014: Conducting a comprehensive vegetation survey of the eastern section of Washpool National Park. Duties included completion of numerous full floristic plots, species list compilation, threatened species assessments and mapping of the entire area using aerial photography.

- 2014: Completion of a Ground Orchid Survey specifically targeting Rare or Threatened Species in the Lake Macquarie Local Government Area underpinning development of management recommendations and research priorities.
- 2014: Vegetation surveys including targeted survey of *Philotheca obovatifolia* in Werrikimbe National Park and expert advice on *Homopholos belsonii* and *Eucalyptus magnificata*.
- 2013: Conducting a comprehensive vegetation survey of Oxley Wild Rivers National Park, a wilderness are of over 150 000 ha. Duties included doing many full floristic plots, species list compilation, threatened species assessments and mapping of the entire area using aerial photography.
- 2013: Vegetation surveys including; five sites on the Carrai Plateau, targeted surveys for *Neoastelia spectabilis* and *Phebalium glandulosum*.
- 2013: Vegetation survey of over 250 km of gravel roads prior to the World Rally Championships held in forests in the Coffs Harbour district.
- 2012: Establishing permanent vegetation monitoring plots on Daunia Coal Mine in the Queensland Bowen Basin, and assessing the condition of the vegetation in their native offset sites.
- 2012: Establishing permanent vegetation monitoring plots around Keepit Dam to collect benchmark data and subsequent monitoring of native vegetation communities.
- 2011: Collecting vegetation data from over 50 full floristic plots in the Coffs Harbour LGA.
- 2011: Collecting vegetation condition data from numerous mine rehabilitation sites in the Gunnedah and Werris Creek districts.
- 2011: Collecting vegetation condition assessment data from numerous private properties in the Tamworth/Gunnedah/Walgett/Quirindi/Narrabri districts for the Namoi CMA .
- 2010: Collecting vegetation data from over 100 full floristic plots in the Northern Rivers CMA for DECCW as part of their Vegetation Classification and Assessment process.
- 2010: Vegetation survey of Kirramingly Nature Reserve, including collection of full floristic data from 22 plots and compilation of comprehensive species list.
- 2009: Vegetation survey and assessment of proposed windfarm sites on the NSW Northern Tablelands using Biobanking assessment techniques.
- 2009: Identification of c. 1000 plant specimens collected in a proposed mining area on the Woronora Plateau to the south of Sydney.
- 2009: Collecting full floristic data and monitoring vegetation plots on the rehabilitation site of the Timbarra Gold Mine, east of Tenterfield.
- 2009: Collecting vegetation data and validating vegetation maps in a coal-mining Biodiversity Offset Area in the Gunnedah district.
- 2009: Compiling vegetation data and writing community profiles on a range of vegetation communities on the NSW North Western slopes for the Namoi Catchment Management Authority.
- 2008: Collecting full floristic data from >100 vegetation sites in TSRs on the NSW Central Western slopes for the Lachlan Catchment Management Authority.
- 2008: Compiling distribution/population size information and writing reports on the conservation status of numerous threatened plant species and vegetation communities for the NSW Scientific Committee.

Daniel McKenzie – Fauna Ecologist – threatened fauna survey – Nabiac

CURRICULUM VITAE

Daniel McKenzie

ECOLOGIST

QUALIFICATIONS

- Bachelor of Environmental Science and Management (Honours), University of Newcastle, 2011

Daniel has completed a Bachelor of Environmental Science and Management degree with honours at the University of Newcastle. Daniel's honours research project involved estimating the population size and examining the demography of the endangered *Litoria aurea* (Green and Golden Bell Frog) on Kooragang Island near Newcastle, NSW.

Daniel has developed considerable experience in the environmental industry. During the last 7 years working with Eco Logical Australia (5 years full-time and 2 years casual employment), Daniel has worked on a diverse range of projects throughout NSW. These have included targeted threatened fauna and flora surveys, ecological assessments, biodiversity monitoring projects, Bio-banking assessments, pre-clearing surveys and supervision of land clearing operations.

Daniel has previously utilised his environmental knowledge and excellent communication skills to work as a tour guide for the NSW National Parks and Wildlife Service and also been employed as a Research Assistant for the University of Newcastle and during this time worked on projects studying the ecology of the Green and Golden Bell Frog at both Kooragang Island and Sydney Olympic Park populations. Daniel has also worked as a Research Assistant examining the effectiveness of mine rehabilitation techniques in the central Hunter Valley for the University of Newcastle.

RELEVANT PROJECT EXPERIENCE

Biodiversity Offsets and Bio-banking

- Tomago Offset Investigations - vegetation mapping and preliminary fauna survey/habitat assessment for a potential biodiversity offset in a wetland area near Tomago, NSW
- Nabiac Offset Investigations – vegetation mapping and fauna survey near Nabiac, NSW as part of investigations for proposed biodiversity offsets for the Tuncurry State Significant Site
- Kurri Kurri Aluminium Smelter Biodiversity Offset Project – vegetation mapping and threatened flora and fauna survey for a proposed redevelopment of a disused aluminium smelter and surrounding buffer lands in the lower Hunter Valley.
- Caroona Offset Area - vegetation mapping and validation for a potential biodiversity offset for BHP's Caroona Coal Project in the Liverpool Plains region.

- Glenrock Station Biodiversity Offset Investigations - detailed investigations within the Upper Hunter Region to validate vegetation types, condition and threatened species habitat in areas of high biodiversity value and document these values to enable marketing of the offset potential of property.
- OEH Linking Landscapes - Jewells Swamp Biobank Assessment – a Biobanking assessment and preparation of a management plan at a biobank site owned and managed by local government.
- Salamander Bay Biobank Site Assessment – floristic surveys and vegetation mapping to complement a Biobanking Assessment report for Port Stephens Shire Council.
- Karuah East Quarry Offset Site Investigation – Vegetation mapping / validation and threatened flora and fauna surveys.
- Warnervale Precinct 7a - 7g Wetland Biobank Assessment – several Biobanking floristic quadrats and threatened species searches were completed to enable the preparation of a Biobank Assessment report for the site.
- Darkinjung Land Council - Norah Head – an ecological investigation of Darkinjung landholdings at Norah Head to enable a Biocertification application to be submitted.
- Darkinjung Land Council - Bushells Ridge & Associated Conservation Lands - an ecological investigation of land holdings to enable a Biocertification application to be submitted
- Warnervale Town Centre and Wyong Employment Zone - several Biobanking floristic quadrats were completed for the preparation of a Biodiversity Certification Assessment.

Ecological Assessment

- Warnervale Fire Station Upgrade Flora and Fauna Assessment - Assessment of flora and fauna impacts for a proposed upgrade of Warnervale Fire Station on behalf of NSW Office of Public Works.
- Nine REF's for Port Stephens Council – Assessment of flora and fauna impacts for the preparation of several REFs for nine separate construction and maintenance works across Port Stephens LGA
- Flora and Fauna Impact Assessment for proposed geological investigations for Wambo Coal Pty Ltd (Peabody Energy) – A literature review followed by an ecological inspection of each proposed drill site and access track and writing of a Flora and Fauna Impact Assessment report
- Bridge Replacement REF – a site inspection of several wooden bridges that required replacement and areas to be disturbed for the temporary re-routing of traffic was conducted for Great Lakes Shire Council in order to prepare a Review of Environmental Factors (REF).
- Kurri Kurri Aluminium Smelter Demolition Ecological Assessment - threatened flora and fauna survey and prepared an ecological assessment report for the demolition of a disused aluminium smelter at Kurri Kurri in the lower Hunter Valley.
- ENSW - Corehole Impact Assessment - a targeted threatened flora survey for the preparation of an ecological assessment report for the installation of 3 - 10 exploration coreholes in Pilliga East State Forest, NSW.
- Mt Owen Piezometer Inspections – conducted ecological inspections, worked with archaeological sub-contractor and prepared a due diligence report for eight proposed piezometers for Glencore Coal Assets Australia in the Falbrook and Glennies Creek area in the Hunter Valley.
- Telecommunications Tower, Cameron Park – conducted site inspection, targeted threatened flora survey and prepared an ecological assessment for a proposed telecommunications tower at Cameron Park near Newcastle.

- Narrabri Gas Project - Ecological Impact Assessment - conducted a wide range of fauna surveys and assisted with threatened species habitat and vegetation mapping and validation within the Pilliga Scrub near Narrabri, NSW.
- Belmont to Marks Point Shared Pathway Design Development – Conducted fauna survey and assessment and assisted with flora survey for the ecological component of an EIS for the planning and then construction of ~1km of shared pathway (bicycle and pedestrian) adjacent to Belmont Lagoon wetlands in Belmont, Lake Macquarie.
- Ecological survey - Metford Road, Tenambit - Flora survey, habitat assessment and preparation of ecological assessment report for incorporation into REF for proposed road widening.
- Oceanic Coal Pre-feasibility Environmental Constraints Analysis - targeted flora and fauna surveys for proposed underground coal mine west of Newcastle.
- Laguna, Great North Road –a preliminary flora and fauna assessment was prepared for a proposed road maintenance project.
- Windale, Proposed retail development – conducted flora and fauna surveys and counts of threatened flora to complement a Species Impact Statement.
- Queensland Rail Facility, Hexham - targeted threatened fauna survey utilising call playback and spotlighting.
- Liddell Due Diligence Ecological Assessment of Drill Site - conducted an ecological inspection and prepared a due diligence report for a proposed drill site.
- Newcastle University NIER Ecological Assessment – conducted fauna survey and prepared ecological assessment for a proposed building extension.
- West Wallsend Stage 2 Flora and fauna surveys for a Part 3A assessment – detailed flora and fauna surveys targeting threatened fauna species were completed over several weeks
- Colonial Ridge Retreat – ecological assessment and advice for the widening of an existing asset protection zone (APZ).
- Narrabri Gas Project – assisted with survey and data collection for an aquatic and groundwater dependant ecosystem (GDE) assessment.
- Bengalla Coal Mine Stygofauna Impact Assessment - assisted with stygofauna survey and water quality data collection.

Ecological Monitoring

- Biodiversity monitoring and landscape function analysis for Wambo Coal 2015, 2016 & 2017.
- Muswellbrook Coal Rehabilitation Monitoring 2015, 2016 and 2017 – Flora and fauna surveys were completed at both post-mining rehabilitation and remnant bushland sites, including analysis of bird call recordings
- Gwydir Long-term Intervention Monitoring (LTIM)– Bird and amphibian surveys were conducted on multiple occasions in conjunction with the NSW Office of Environment and Heritage, National Parks and Wildlife Service and Office of Water
- Warrego / Darling Long-term Intervention Monitoring (LTIM) – Collection of water samples, micro and macro invertebrate sampling and recording of water quality data, combined with bird and amphibian surveys over several years
- Hexham LTTSF Ecological Monitoring Year 1 and Aurizon Hexham Ecological Monitoring - Construction Phase – floristic and fauna surveys for long term train support facility adjacent to Hexham Swamp near Newcastle
- Drayton Coal Mine (Anglo-American Coal) - Ecological Monitoring 2013 and 2014 –

- Werris Creek Coal Mine (Whitehaven Coal) - Annual Ecological Monitoring 2012 - 2014 – collection of flora and fauna data, data analysis and preparation of ecological monitoring report.
- Liddell Coal Mine (Glencore) Flora and Fauna Monitoring – Floristic surveys, Landscape Function Analysis and various fauna survey techniques were used to collect flora and flora data. A monitoring report, including recommendations was prepared.
- Hamlyn Terrace Nest Box Monitoring – Installation and monitoring of nest boxes to identify maintenance issues and use by fauna

Pre-clearing surveys and tree clearing supervision

- Wadalba Woolworths clearing supervison – Inspection of felled trees for fauna following tree clearing at Wadalbe on the NSW Central Coast
- Pre-clearing survey at Wambo Coal Mine for Peabody Energy – marking of hollow-bearing trees and other fauna habitat features prior to clearing
- Tree Clearing Supervision- Boggabri Coal Expansion Project - rescue and relocation of fauna during tree clearing
- Maules Creek WCL Clearing surveys 2014 - rescue and relocation of fauna during tree clearing within Laird State Forest for Maules Creek Coal Mine
- ENSW - Ecological Services- The provision of ecological services during the pre-clearing and clearing phases of the ENSW program in the Pillga East State Forest
- Shortland WWTW Pre-clearing Survey 2013 - Pre-clearing survey and completion of report
- Pre-clearance inspection for the South Pit Link Road Extension - Liddell Coal Mine
- Hamlyn Terrace Phase 2 Pre-clearing works - marking of hollow-bearing trees and other fauna habitat features prior to clearing for an aged care facility. This project also included the capture and relocation of fauna during tree clearing operations.
- Werris Creek Pre-Clearing Surveys and Clearing Supervision - Hollow-bearing tree surveys, call playback, spotlighting and bird census was completed as part of several pre-clearing surveys and supervision of clearing for Werris Creek Coal Mine
- Liddell Coal Mine - Supervision and documentation of vegetation clearing
- Greta Pre-Clearing Survey - Hollow-bearing tree surveys including spotlighting and stagwatches for nocturnal fauna were completed as part of a pre-clearing survey for Abigroup.

Other work for Eco Logical Australia

- Lower Hunter Koala Study - ELA carried out a research project to determine measures that need to be taken to ensure that the Koala persists in perpetuity in the Lower Hunter region.
- Hunter Valley Operations overland conveyor CEMP – Monthly inspections of the construction area were conducted followed by a report, as per the environmental management plan. This was to ensure correct sediment control and environmental management.
- Tuggerah Lakes Saltmarsh Mapping for Wyong Shire Council – vegetation mapping of the saltmarsh endangered ecological community at Tuggerah Lakes using a differential GPS.
- Tailout Channel Condition Assessment for The Hills Shire Council – mapping of stormwater tailout channels, assessment of type and condition and identification of ecological constraints.

Michelle Frolich – Revised mapping and area calculations

CURRICULUM VITAE

Michelle Frolich

BIODIVERSITY OFFSETS PROGRAM CO-ORDINATOR

QUALIFICATIONS AND TRAINING

- Bachelor of Science (Marine Science Honours), University of Sydney, 2007
- BioBanking and Bio-Certification Assessors Training Courses, 2010 and 2013
- Biodiversity Offset Scheme and Biodiversity Assessment Method Training Course, 2017
- BAM Accredited Assessor

Michelle is a Biodiversity Offsets Program Coordinator with over 12 years' experience in Geographic Information Systems, BioBanking, Biocertification, ecological impact assessment and ecological surveys. She has a thorough understanding of the BioBanking Assessment Methodology (BBAM), Biodiversity Certification Assessment Methodology (BCAM) and the Framework for Biodiversity Assessment (FBA) for Major Projects. She has also recently completed the Biodiversity Assessment Method (BAM) training course and is a BAM Accredited Assessor under the NSW *Biodiversity Conservation Act 2016*. Michelle also has extensive experience in Geographic Information Systems such as ESRI ArcGIS and MapInfo Professional.

Michelle is an experienced project manager with skills in field surveys, data analysis, mapping, ecological assessments and reporting. She also has highly developed communication and organisation skills, which she applies when dealing with project teams, clients and government agencies.

Michelle has previously worked in other ecological consultancies and NSW Government agencies.

RELEVANT PROJECT EXPERIENCE

BioBanking, Bio-certification and Framework for Biodiversity Assessment

- Biodiversity feasibility assessments under the BBAM for development and biobank sites (across NSW)
- Biobank Agreement Applications using BBAM (Biodiversity Assessment Report, Total Fund Deposit Spreadsheets, Management Action Plan) in the Hunter Valley and Western Sydney
- Biodiversity assessments for Major Projects (State Significant Developments) under the FBA in Western Sydney and Hunter Valley
- Biodiversity assessments under BCAM for mines in the Hunter Valley for the Upper Hunter Strategic Assessment

Ecological Impact Assessment

- Flora and fauna assessments for proposed developments in the Greater Sydney region
- Species Impact Statements for proposed developments in Western Sydney and the Lower Hunter Valley

Ecological Surveys

- Botanical surveys in the Greater Sydney, Upper and Lower Hunter Valley, and Central West regions
- Feral animal monitoring for a mine within the Hunter Valley
- Targeted surveys for threatened flora and fauna species in the Hunter Valley and Greater Sydney regions
- Pre-clearing and clearing supervision

Appendix B RPS Ecological Inventory Report

RPS 2012 *Ecological Inventory Report North Tuncurry*. Report prepared by RPS Australia for Landcom, March 2012.

Provided as a separate Pdf report

Appendix C : Vegetation Community Descriptions within BCAA (Tuncurry)

Biometric Vegetation Type	**Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern NSW North Coast Bioregion**
	
Description	This community ranged from a woodland to forest structure (Specht and Specht 2002). A mid stratum was uniformly present within this vegetation type, though the cover of this layer ranged from mid-dense (approximately 40% projected foliage cover) to sparse (approximately 10% projected foliage cover). The ground stratum included a combination of low shrubs, ferns, graminoids and grasses.
Location and habitat	This vegetation type occurred within both the North Tuncurry and Nabiac offset sites, occurring on deep freely draining podzolised sands and generally in areas of increased depth including slight rises throughout the BCAA.
Ancillary codes	Five different ancillary codes were identified for this vegetation types as follows: • Good – applied to relatively undisturbed stands of this vegetation type • Shrubby – applied to stands with a low canopy and dense midstorey of *Banksia aemula* typically occurring at the ecotone with 'Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion' • Burnt – applied to stands of this vegetation which have been recently been burnt (estimated at less than 18 months) • Pine – applied to stands of this vegetation type in which *Pinus elliottii* was present • Cleared – applied to a single area where this vegetation type has previously been cleared and in which no canopy is present
Sampling locations	Good – Plots 18, 19, and 20 (RPS 2012), T3 & T$ (ELA) Shrubby – BB34; Plot 8 (RPS 2012) Burnt – BB30 and BB31 Pine – Plots 16 and 17 (RPS 2012)

Upper stratum	The canopy of this vegetation type was dominated by *Eucalyptus pilularis (*Blackbutt*)* with a number of other species occurring occasionally or as sub-dominants including *E. robusta* (Swamp Mahogany)*, E. signata* (Scribbly Gum)*, E. globoidea* (White Stringybark)*, Corymbia gummifera* (Red Bloodwood) and *C. intermedia (*Pink Bloodwood)*.* The canopy was generally up to 25 m in height with projected foliage cover of 10 to 30%, although the height and cover of the canopy commonly decreased close to the boundaries with adjacent vegetation types.
Midstorey	A diverse midstorey was present within this vegetation type, commonly including *Banksia aemula*, *Acacia longifolia* subsp. *longifolia, Leptospermum trinervium* and *Leucopogon lanceolatus*.
Groundcovers	A ground layer of up to approximately 1.5 m in height occurred within this vegetation type and was typically dominated by *Pteridium esculentum* (Common Bracken) and *Lomandra longifolia* (Spiny-headed mat-rush) with a number of other species common including *Dillwynia retorta s.l. Xanthorrhoea macronema, Pomax umbellata* and *Imperata cylindrica*
Corresponding vegetation types	• Sandhill Blackbutt –Dry Open Forest (ID Landscape Management 2004); • *Eucalyptus pilularis* Dry Sclerophyll Forest (dunal)(RPS 2012) • Blackbutt – Bloodwood/Apple (GLC 2003)

Biometric Vegetation Type	**Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion**
	
Description	This community occurred ranged from an open-scrub to tall shrubland (Specht and Specht 2002). A diverse understory was present within this vegetation type including sub-shrubs, sedges and graminoids.
Location and habitat	This vegetation type occurred within both the North Tuncurry and Nabiac offset sites, occurring on freely draining podzolised sands.
Ancillary codes	Four different ancillary codes were identified for this vegetation types as follows: • Good – applied to relatively undisturbed stands of this vegetation type • Burnt – applied to stands of this vegetation which have been recently been burnt (estimated at less than 18 months) • Pine – applied to stands of this vegetation type in which *Pinus elliottii* was present as a canopy emergent • Blackbutt – applied to areas of this vegetation type in which emergent eucalyptus species, (mostly *E. pilularis*) were present.
Sampling locations	Good - Plots 6, 7, 10, 11, 12, 13, 14, 15 – RPS (2012), BB35 ELA Burnt – Plots 12 RPS (2012), BB36 and BB37 Pine – ELA BB28 and BB29 Blackbutt – ELA T1 & T2
Upper Stratum	The upper stratum of this vegetation type was up to 5 m in height (RPS 2012), although commonly only 3 m in height, with projected foliage cover generally between 10 – 40% (RPS 2012). This stratum was dominated by *Banksia aemula* (Wallum Banksia) with a co-dominant or sub-dominant species present including *Allocasuarina littoralis* and *Leptospermum* spp. Emergent low *Eucalyptus* species were present close to the margins of this vegetation community with emergent *Pinus elliottii* also present within the North Tuncurry site.
Midstorey	A range of sub shrubs were present within this vegetation type frequently merging with the upper stratum including *Ricinocarpos pinifolius* (Wedding Bush*) Dillwynia retorta, Boronia pinnata, Persoonia lanceolata* (Lance Leaf Geebung), *Leucopogon lanceolatus, Conospermum taxifolium, Acacia longifolia* var*. longifolia* (Sydney Golden Wattle), *Melaleuca nodosa*, *Leptospermum semibaccatum* (Prickly-leaved Paperbark).
Groundcovers	A low and sparse ground layer generally less than 1 m in height with projected foliage cover less than 60 % (RPS 2012) occurred within this vegetation type. Dominant species included *Hypolaena fastigiata* and *Caustis recurvata*, with a diverse range of low shrubs and graminoids also present.

Corresponding vegetation types	• Banksia (GLC 2003) • *Banksia aemula* Dry Heathland (RPS 2012) • *Banksia aemula* – Dry Heath (ID Landscape Management 2004)

Biometric Vegetation Type	**Coast Banksia-Coast Wattle dune scrub, Sydney Basin and South East Corner**
	
Description	This community occurred as a tall shrubland to closed-scrub (Specht 1970) with a variety of tall shrubs and midstorey species dominant with an understorey of varying density including low shrubs and graminoids.
Location and habitat	This community was restricted to the North Tuncurry site and more specifically within the eastern portion of this site on the Holocene foredune close to the sea (RPS 2012).
Ancillary codes	Four ancillary codes were identified for the vegetation type as follows: • Good – applied to relatively undisturbed stands of this vegetation type • Regen – applied to a stand of this vegetation type which has been more recently burnt than the majority of this vegetation type within the North Tuncurry site (estimated at up to 4 years prior to survey) • Pine – applied to stands of this vegetation type in which *Pinus elliottii* was present as a canopy emergent • Blackbutt – applied to areas of this vegetation type in which emergent eucalyptus species, (mostly *E. pilularis*) were present.
Sampling locations	Good – BB26 and BB27; Plots 4, 5 and 9 (RPS 2012) Regen – BB25; Plots 1, 2 and 3 (RPS 2012) Pine – BB32 Blackbutt – BB33 Dune – RPS (2012) Plots 21, 22 & 23
Upper Stratum	This community occurred as a tall shrubland to closed-scrub (Specht 1970) up to 6 m in height with projected foliage cover of up to approximately 60% with a variety of tall shrubs and midstorey species dominating the upper stratum including *Leptospermum laevigatum*, *Banksia serrata, Leptospermum trinervium, Monotoca elliptica, Banksia integrifolia* and *Acacia longifolia* subsp*. longifolia.* Emergent *Eucalyptus* species and *Pinus elliottii* were occasionally present within this vegetation type, generally in proximity to the Golf Course.
Midstorey	A mid-dense to sparse midstorey was present within this vegetation type including a number of medium sized to low shrub species which commonly mixed with the upper and lower stratums. Commonly recorded species included *Leucopogon parviflorus, Dillwynia retorta, Acacia suaveolens* and *Bossiaea rhombifolia* subsp*. rhombifolia.*

Groundcovers	A variable groundcover occurred within this vegetation type with density varying in response to density of the taller stratum. This layer was dominated by *Lomandra longifolia, Pteridium esculentum, Themeda australis* (Kangaroo Grass)*, Gonocarpus tetragynus* and *Dianella caerulea* var, *caerulea* (Blue Flax Lily).
Corresponding vegetation types	• Scrub (GLC 2003) • *Leptospermum laevigatum* Dry Sclerophyll Shrubland (RPS 2012)

Appendix D : Transect/plot data

Vegetation Zone 1: Banksia dry shrubland on coastal sands of the North Coast (Good)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
BB35	27	12.5	0	0	8	34	0	0	1	0	452176	6441848	56
6	20	49	0	2	18	96	0	0	1	0	452074	6444012	56
7	25	74.5	0	0	96	100	0	0	1	2	452079	6443175	56
10	22	3	0	0	98	66	0	0	1	1	452484	6441956	56
11	23	16.5	0	0	100	82	0	0	1	7	452811	6441918	56
13	19	30	0	0	96	72	0	0	1	0	452557	6441657	56
14	16	17.5	0	0	48	86	0	0	1	28	452809	6441533	56
15	17	13.2	0	0	98	62	0	0	1	0	452325	6442042	56

Vegetation Zone 2: Banksia dry shrubland on coastal sands of the North Coast (Burnt)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
BB36	19	5	0	0	22	42	0	0	1	0	452040	6441995	56
BB37	20	12.5	0	0	20	42	0	0	1	0	452088	6442371	56
12	24	37.5	0	0	34	58	0	0	1	16	452066	6442065	56

Vegetation Zone 3: Banksia dry shrubland on coastal sands of the North Coast (Blackbutt)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
T1	30	37	0	0	14	38	0	0	1	0	452853	6442687	56
T2	27	30.5	0	0	4	74	0	0	1	5	452763	6442915	56

Vegetation Zone 4: Banksia dry shrubland on coastal sands of the North Coast (pine)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
BB28	34	37.5	0	0	16	52	0	0	0.33	1	452065	6442772	56
BB29	26	50	0	2	4	32	15	0	0.33	0	452013	6443294	56

Vegetation Zone 5: Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (Good)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
T3	20	22	3	0	16	40	0	0	1	6	452392	6444817	56
T4	16	6	14.5	0	8	78	0	0	1	4	452968	6444196	56
18	13	39	13.9	12	36	100	0	0	1	0	452037	6444850	56
19	12	33.8	20.5	8	42	92	0	0	1	14	452669	6444489	56
20	11	38	10.2	2	52	94	0	0	1	3	452789	6444889	56

Vegetation Zone 6: Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (Shrubby)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
BB34	28	11.5	22.5	0	22	26	2	0	1	4	452386	6442684	56
8	23	4	45	2	18	96	0	0	1	0	452074	6444012	56

Vegetation Zone 7: Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (Burnt)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
BB30	16	39	0	0	14	8	0	0	0.5	0	452256	6442024	56
BB31	16	41	7.5	0	4	36	0	0	0.5	1	452381	6442637	56

Vegetation Zone 8: Blackbutt - Smooth-barked Apple shrubby open forest on coastal sands of the southern North Coast (Pine)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
16	28	26.5	17.8	58	10	45	6	1	1	15	452142	6442971	56
17	19	33.5	25	8	32	49	0	0	1	6	451965	6442256	56

Vegetation Zone 9: Coast Banksia - Coast Wattle dune scrub, Sydney Basin and South East Corner (Good)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
BB26	17	44.5	0	16	6	54	0	0	1	0	452887	6445068	56
BB27	22	41	0	12	0	64	0	0	1	5	453130	6442985	56
4	19	0	15.2	6	38	56	0	0	1	0	452824	6445614	56
5	10	22.5	18.5	12	6	94	0	0	1	3	453268	6444184	56
9	26	20	15.5	2	32	86	0	0	1	1	453145	6441932	56

Vegetation Zone 10: Coast Banksia - Coast Wattle dune scrub, Sydney Basin and South East Corner (Regen)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
BB25	24	4.4	0	10	14	36	0	0	0.8	0	453242	6445343	56
1	22	11	14	32	100	96	4	0	0.8	6	453084	6445673	56
2	19	1.5	7.7	66	58	98	0	0	0.8	5	453493	6445260	56
3	24	8	2.5	78	26	96	0	0	0.8	29	453399	6445618	56

Vegetation Zone 11: Coast Banksia - Coast Wattle dune scrub, Sydney Basin and South East Corner (Blackbutt)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
BB33	32	36.5	0	0	6	86	0	0	1	39	453042	6442501	56

Vegetation Zone 12: Coast Banksia - Coast Wattle dune scrub, Sydney Basin and South East Corner (pine)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
BB32	10	9	0	4	0	28	32	0	1	0	452970	6441448	56

Vegetation Zone 13: Coast Banksia - Coast Wattle dune scrub, Sydney Basin and South East Corner (dune)

Plot name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
21	15	0	0	24	72	86	0	0	0	0	453557	6445030	56
22	12	0	0	54	70	48	0	0	0	0	453405	6444082	56
23	13	0	0	34	66	74	2.5	0	0	0	453306	6441872	56

Appendix E : Candidate species justification – species credit species only

An assessment of likelihood of occurrence was made for threatened and migratory species identified from searches of the Atlas of NSW Wildlife, species known or likely to occur within the CMA subregion and vegetation zones identified within the BCAA (identified from BCCC) and species identified from literature searches (candidate species).

The likelihood of occurrence was considered for all species credit species, and is provided for each under the 'likelihood of occurrence' column. Two columns are provided and represent assessment of likelihood of occurrence prior to field survey and following field survey. The assessment of the likelihood of occurrence for each species is provided for the BCAA.

Five terms for the likelihood of occurrence of candidate species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the field survey and professional judgement. The terms for likelihood of occurrence are defined below:

- "yes" = the species was or has been observed within the BCAA
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site due to: only poor quality habitat being present; species is not known from the CMA subregion; the species is only likely to occur as a vagrant; records are old and/or have doubtful authenticity
- "no" = habitat on site and in the vicinity is unsuitable for the species.

Scientific Name	Common Name	TSC Act	EPBC Act	BCAM Credit Type	Data source	Habitat Associations	Likelihood of occurrence within impact areas of BCAA	
							Pre field survey	Post field survey
Flora								
Allocasuarina defungens	Dwarf Heath Casuarina	E	E	Species Credit	Atlas of NSW Wildlife	Found only in NSW from the Nabiac area, north-west of Forster, to Byron Bay on the North Coast. It is a straggly shrub about 2m high with blue-green foliage found in heath on sand (sometimes clay and sandstone soils), and swamp sclerophyll forest margins, and also extends onto exposed nearby-coastal hills or headlands adjacent to sandplains (DECC 2007).	Potential	Unlikely
Allocasuarina simulans	Nabiac Casuarina	V	V	Species Credit	Atlas of NSW Wildlife	Restricted to the Mid North Coast of NSW between Nabiac and Forster. It grows in heathland on coastal sands (DECC 2007).	Potential	Unlikely
Asperula asthenes	Trailing Woodruff	V	V	Species Credit	Atlas of NSW Wildlife	Occurs only in NSW, in scattered locations from Bulahdelah north to near Kempsey, with several records from the Port Stephens/Wallis Lakes area (DECC 2007). It grows in damp sites often along river banks (Harden 1993).	Unlikely	Unlikely
Callistemon linearifolius		V		Species Credit	BCCC	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW, growing in dry sclerophyll forest (DECC 2007).	Unlikely	Unlikely
Chamaesyce psammogeton		E		Species Credit	BCCC	Known from coastal sites north from near Jervis Bay as well as on Lord Howe Island. It is a prostrate perennial herb, which grows on foredunes and exposed sites on headlands often with Spinifex (DECC 2007).	Potential	Unlikely
Corybas dowlingii		E		Species Credit	BCCC	Grows in clonal colonies and flowers from June to August, and is restricted to New South Wales where it is currently known from 4 localities including Port Stephens (2 localities), Bulahdelah and Freemans Waterhole south of Newcastle (DECC 2007). It typically grows in gullies in tall open forest on well-drained gravelly soil at elevations of 10-200m (DECC 2007).	Unlikely	Unlikely
Genoplesium littorale (syn *Corunastylis littoralis*)	Tuncurry Midge Orchid	CE		Species Credit	BCCC	Known from three small populations in the Forster-Tuncurry district on the NSW North Coast. Grows in coastal heath in sandy soils within a few kilometres of the ocean.	Yes	Yes
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	Species Credit	BCCC	Cryptostylis hunteriana is known from a range of vegetation communities including swamp-heath and woodland (DECC 2007). The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); where it appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*) (DECC 2007). Ell (2001) has identified Coastal Plains Scribbly Gum Woodland and Coastal Plains Smoothed-barked Apple Woodland as potential habitat on the Central Coast. Flowers between November and February, although may not flower regularly (DECC 2007; Bell 2001).	Potential	Unlikely
Cynanchum elegans	White-flowered Wax Plant	E	E	Species Credit	Atlas of NSW Wildlife	Climber or twiner with a variable form, and flowers between August and May, peaking in November (DECC 2007). It occurs in dry rainforest gullies, scrub and scree slopes, and prefers the ecotone between dry subtropical rainforest and sclerophyll woodland/forest (NPWS 1997). The species has also been found in littoral rainforest; *Leptospermum laevigatum – Banksia integrifolia* subsp. *integrifolia* coastal scrub; *Eucalyptus tereticornis* open forest/ woodland; *Corymbia maculata* open forest/woodland; and *Melaleuca armillaris* scrub to open scrub (DECC 2007).	Potential	Unlikely
Eucalyptus camfieldii	Camfield's Stringybark	V	V	Species Credit	BCCC	Associated with shallow sandy soils bordering coastal heath with other stunted or mallee eucalypts, often in areas with restricted drainage and in areas with laterite influenced soils, thought to be associated with proximity to shale (DECC 2007).	Unlikely	Unlikely
Grevillea parviflora subsp. *parviflora*	Small-flowered Grevillea	V	V	Species Credit	BCCC	Sporadically distributed throughout the Sydney Basin mainly around Picton, Appin and Bargo. Separate populations are also known further north from Putty to Wyong and Lake Macquarie and Cessnock and Kurri Kurri. It grows in sandy or light clay soils over thin shales, often with lateritic ironstone gravels. It often occurs in open, slightly disturbed sites such as tracks (DECC 2007).	Unlikely	Unlikely
Lindernia alsinoides	Noah's False Chickweed	E		Species Credit	Atlas of NSW Wildlife	Occurs north from Bulahdelah, including Shannon Creek, near Grafton, where it grows in damp paperbark swamp with *Melaleuca alternifolia* and *Melaleuca quinquenervia* (DECC 2007).	Unlikely	Unlikely
Maundia triglochinoides		V		Species Credit	BCCC	Restricted to coastal NSW and extending into southern Queensland. The current southern limit is Wyong; former sites around Sydney are now extinct (DECC 2007). Aquatic herbaceous plant found in swamps or shallow fresh water on heavy clay on the north and central NSW coast.	Unlikely	Unlikely
Melaleuca biconvexa	Biconvex Paperbark	V	V	Species Credit	BCCC	Occurs in coastal districts and adjacent tablelands from Jervis Bay north to the Port Macquarie district. It grows in damp places often near streams (PlantNet 2011).	Unlikely	Unlikely
Melaleuca groveana		V		Species Credit	BCCC	Grove's Paperbark grows in heath and shrubland, often in exposed sites, at high elevations, on rocky outcrops and cliffs (DECC 2007). It also occurs in dry woodlands (DECC 2007). Occurs north from Port Stephens (Harden 1994).	Unlikely	Unlikely
Persicaria elatior	Tall Knotweed	V	V	Species Credit	BCCC	Recorded from a number of localities along the NSW coast. It normally grows in damp places, especially beside streams and lakes or occasionally in swamp forest or associated with disturbance (DECC 2007).	Unlikely	Unlikely

Scientific Name	Common Name	TSC Act	EPBC Act	BCAM Credit Type	Data source	Habitat Associations	Likelihood of occurrence within impact areas of BCAA	
							Pre field survey	Post field survey
Prostanthera densa	Dense Mintbush	V	V	Species Credit	BCCC	Recorded from the Currarong area in Jervis Bay, Royal National Park, Cronulla, Garie Beach and Port Stephens (Gan Gan Hill, Nelson Bay) (DECC 2007). It is associated with sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone (Harden 1992).	Unlikely	Unlikely
Rhizanthella slateri	Underground Orchid	V	E	Species Credit	BCCC	An underground orchid with a whitish, fleshy underground stem to 15 cm long and 15 mm diameter (DECC 2007). Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed. Flowers October to November (DECC 2007).	Potential	Potential
Rulingia prostrata		E	E	Species Credit	BCCC	Occurs on sandy, sometimes peaty, soils in a wide variety of habitats: Snow Gum (*Eucalyptus pauciflora*) woodland at Rose Lagoon; Blue leaved Stringybark (*E. agglomerata*) open forest at Tallong; and in Brittle Gum (*E. mannifera*) low open woodland at Penrose; Scribbly Gum (*E. haemastoma*)/ Swamp Mahogany (*E. robusta*) ecotonal forest at Tomago (DECC 2007). Associated native species may include *Imperata cylindrica, Empodisma minus* and *Leptospermum continentale* (ibid). Appears to respond positively to some forms of disturbance (eg. some Victorian records are from gravel road surfaces and the Tomago population is on an area previously subject to sandmining); however, there are conflicting reports about the response of the species to fire (ibid).	Unlikely	Unlikely
Senna acclinis	Rainforest Cassia	E		Species Credit	Atlas of NSW Wildlife	In NSW, occurs in coastal districts and adjacent tablelands north from the Illawarra. It grows in or on the edges of subtropical, littoral and dry rainforest and in open eucalypt forest (DECC 2007).	Unlikely	Unlikely
Tetratheca juncea		V	V	Species Credit	BCCC	Occurs on predominantly low nutrient soils with a dense grassy understorey of grasses although it has been recorded in heathland and moist forest (DECC 2007). It is associated with dry open forest or woodland habitats dominated by *Corymbia gummifera*, *Eucalyptus capitellata, E. haemastoma* and *Angophora costata* (Payne 1993). *Themeda australis* is generally the dominant ground cover (Payne 1993). Displays a preference for southern aspect slopes, although is known from slopes with different aspects (DECC 2007). Flowers July to December.	Unlikely	Unlikely
Zannichellia palustris		E		Species Credit	BCCC	Inhabits shallow, still to slowly moving waterbodies which contain either fresh or brackish waters (NSW Fisheries 2002, Greenwood 2001). The species appears to prefer ephemeral habitats which dry out completely. Winning (1992) suggests the species prefers fresh to brackish water adjacent to tidal estuaries, as both known populations occurred in previously estuarine areas which had been separated from tidal flows by control structures.	Unlikely	Unlikely

Common Name	Scientific Name	TSC Act	BCAM Credit Type	EPBC Act	Data source	Habitat Associations	Likelihood of occurrence	
							Pre field survey	Post field survey
Fauna								
Amphibians								
Giant Barred Frog	*Mixophyes iteratus*	E	Species Credit	E	Atlas of NSW Wildlife, BCCC	Found on forested slopes of the escarpment and adjacent ranges in riparian vegetation, subtropical and dry rainforest, wet sclerophyll forests and swamp sclerophyll forest (DECC 2007; Ehmann 1997). This species is associated with flowing streams with high water quality, though habitats may contain weed species (Ehmann 1997). This species is not known from riparian vegetation disturbed by humans (NSW Scientific Committee 1999). During breeding eggs are kicked up onto an overhanging bank or the streams edge (DECC 2007).	Unlikely	Unlikely low quality habitat
Green and Golden Bell Frog	*Litoria aurea*	E	Species Credit	V	BCCC	This species has been observed utilising a variety of natural and man-made waterbodies (Pyke & White 1996; Pyke and White 1996) such as coastal swamps, marshes, dune swales, lagoons, lakes, other estuary wetlands, riverine floodplain wetlands and billabongs, stormwater detention basins, farm dams, bunded areas, drains, ditches and any other structure capable of storing water (DECC 2009). Fast flowing streams are not utilised for breeding purposes by this species (Mahony 1999). Preferable habitat for this species includes attributes such as shallow, still or slow flowing, permanent and/or widely fluctuating water bodies that are unpolluted and without heavy shading (DEC 2005). Large permanent swamps and ponds exhibiting well-established fringing vegetation (especially bulrushes–*Typha* sp. and spikerushes–*Eleocharis* sp.) adjacent to open grassland areas for foraging are preferable (Ehmann 1997; Robinson 2004). Ponds that are typically inhabited tend to be free from predatory fish such as *Gambusia holbrooki* (Mosquito Fish) (DEC 2005; NPWS 2003). Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing Typha spp. (Bullrushes) or Eleocharis spp. (Spikerushes).	Potential	Unlikely, low quality habitat, not recorded within 5 km of BCAA.
Green-thighed Frog	*Litoria brevipalmata*	V	Species Credit		BCCC	Wet sclerophyll forest along the northern coast of NSW to Ourimbah (Anstis 2002). Also in a variety of habitats including dry to wet sclerophyll forest, rainforests and shrubland with a healthy understorey (DECC 2007). Breeding aggregations occur in still water habitats such as grassy temporary to semi-permanent ponds and flooded ditches in late spring and summer (Cogger 2000; Anstis 2002; DECC 2007).	Unlikely	Unlikely
Wallum Froglet	*Crinia tinnula*	V	Species Credit		Atlas of NSW Wildlife, BCCC	Restricted to the Wallum swamps and associated low land meandering watercourses on coastal plains (Ehmann 1997). Occurs in elevations up to around 50m and is closely related to freshwater habitats in the coastal zone (DECC 2007). Found most commonly in wallum wetlands characterised by low nutrients, highly acidic, tanin-stained waters that are typically dominated by paperbarks and tea-trees. Also found in sedgeland and wet heathland (DECC 2007)	Potential	Unlikely
Birds - Diurnal								
Beach Stone-curlew	*Esacus magnirostris*	CE	Species Credit		BCCC	Beaches, mudflats, reefs and especially islands (Blakers et al. 1984). Open undisturbed beaches, islands, reefs, intertidal sand and mudflats, preferably with estuaries or mangroves nearby (DECC 2007).	Potential	Unlikely
Black Bittern	*Ixobrychus flavicollis*	V	Species Credit		BCCC	Occurs in both terrestrial and estuarine wetlands generally in areas of permanent water and dense vegetation (DECC 2007). In areas with permanent water it may occur in flooded grassland, forest, woodland, rainforest and mangroves (DECC 2007)	Potential	Unlikely
Black-necked Stork	*Ephippiorhynchus asiaticus*	E	Species Credit		Atlas of NSW Wildlife	Associated with tropical and warm temperate terrestrial wetlands, estuarine and littoral habitats, and occasionally woodlands and grasslands floodplains (Marchant & Higgins 1993). Forages in fresh or saline waters up to 0.5m deep, mainly in open fresh waters, extensive sheets of shallow water over grasslands or sedgeland, mangroves, mudflats, shallow swamps with short emergent vegetation and permanent billabongs and pools on floodplains (Marchant & Higgins 1993; DECC 2007).	Unlikely	Unlikely – Low quality habitat
Broad-billed Sandpiper	*Limicola falcinellus*	V	Species Credit	M	BCCC	The eastern form of the Broad-billed Sandpiper breeds in northern Siberia before migrating southwards in winter to Australia (DECC 2007). In Australia, Broad-billed Sandpipers over-winter on the northern coast, particularly in the north-west, with birds located occasionally on the southern coast (DECC 2007). In NSW, the main site for the species is the Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary (DECC 2007). There are few records for inland NSW (DECC 2007). Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat (DECC 2007). Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons (DECC 2007). Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches.	Unlikely	Unlikely
Comb-crested Jacana	*Irediparra gallinacea*	V	Species Credit		BCCC	Freshwater wetlands, such as lagoons, billabongs, swamps, lakes and reservoirs, generally with abundant floating aquatic vegetation (Marchant and Higgins 1999).	Unlikely	Unlikely, low quality habitat
Emu in NSW North Coast Bioregion and Port Stephens LGA - endangered population	*Dromaius novaehollandiae*	E	Species Credit		BCC	Occupies a range of mainly open habitats including plains, grasslands, woodlands, shrubs and occasionally forest (NSW Scientific Committee 2002). Not found in rainforest (Simpson & Day 1999).	Unlikely, Low quality habitat	Unlikely, Low quality habitat

Common Name	Scientific Name	TSC Act	BCAM Credit Type	EPBC Act	Data source	Habitat Associations	Likelihood of occurrence	
							Pre field survey	Post field survey
Eastern Osprey	*Pandion cristatus*	V	Species Credit		Atlas of NSW Wildlife, BCC	Associated with waterbodies including coastal waters, inlets, lakes, estuaries, beaches, offshore islands and sometimes along inland rivers (Schodde and Tidemann 1986; Clancy 1991; Olsen 1995). Osprey may nest on the ground, on sea cliffs or in trees (Olsen 1995). Osprey generally prefer emergent trees, often dead or partly dead with a broken off crown (Olsen 1995).	Yes	Yes
Greater Sand-plover	*Charadrius leschenaultii*	V	Species Credit		BCCC	Entirely coastal in NSW, foraging on intertidal sand and mudflats in estuaries, roosting during high tide on sandy beaches or rocky shores (DECC 2007)	Potential	Unlikely
Lesser Sand-plover	*Charadrius mongolus*	V	Species Credit	M	BCCC	Favours coastal areas including beaches, mudflats and mangroves where they forage (DECC 2007). They may be seen roosting during high tide on sandy beaches or rocky shores (DECC 2007).	Potential	Unlikely
Little Tern	*Sternula albifrons*	E	Species Credit		BCCC	Almost exclusively coastal, preferring sheltered areas (DECC 2007), however may occur several kilometres inland in harbours, inlets and rivers (Smith 1990). Australian birds breed on sandy beaches and sand spits (Simpson & Day 1999).	Potential	Potential
Pied Oystercatcher	*Haematopus longirostris*	E	Species Credit		Atlas of NSW Wildlife	Roosts and forages on sandy beaches, sand banks, mudflats and estuaries (Marchant & Higgins 1993, Simpson & Day 1999).	Yes	Yes
Regent Honeyeater	*Anthochaera phrygia*	CE	Species Credit	E	BCCC	Occurs on Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Occupies Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana (*River Oak). Two of three known key breeding areas are in NSW: the Capertee Valley and Bundarra-Barraba region. The species breeds between July and January and usually nests in horizontal branches or forks in tall mature eucalypts and Sheoaks. The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes.	Potential	Unlikely
Terek Sandpiper	*Xenus cinereus*	V	Species Credit	M	BCCC	A rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east (DECC 2007). The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary (DECC 2007). In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries (DECC 2007). Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools (DECC 2007). Generally roosts communally amongst mangroves on dead trees, often with related wader species (DECC 2007).	Unlikely	Unlikely
Mammals (excluding bats)								
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	Species Credit		Atlas of NSW Wildlife, BCCC	The Brush-tailed Phascogale prefered habitat is Dry Open forest with a sparse open understorey, however, has been located in heath, swamps and rainforest and wet sclerophyll forest (DECC 2007).	Yes	Yes
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	Species Credit	V	BCC	Rocky areas in a variety of habitats, typically north facing sites with numerous ledges, caves and crevices (Strahan 1995).	Unlikely	Unlikely
Common planigale	*Planigale maculata*		Species Credit		BCC	Subtropical to dry rainforest, dry sclerophyll forest, heathland and grassland up to 400m elevation (DECC 2007; Strahan 1998). Habitat selection is dependent on surface cover (DECC 2007).	Unlikely	Unlikely
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*		Species Credit		BCC	In NSW the Eastern Chestnut Mouse is mostly found, in low numbers, in heathland and is most common in dense, wet heath and swamps (DECC 2007). Optimal habitat appears to be in vigorously regenerating heathland burnt from 18 months to four years previously (DECC 2007). By the time the heath is mature, the larger Swamp Rat becomes dominant, and Eastern Chestnut Mouse numbers drop again (DECC 2007).	Potential	Unlikely
Eastern pygmy possum	*Cercartetus nanus*	V	Species Credit		BCC	The Eastern Pygmy Possum occurs in wet and dry eucalypt forest, subalpine woodland, coastal banksia woodland and wet heath (Menkhorst & Knight 2004). Pygmy-Possums feed mostly on the pollen and nectar from banksias, eucalypts and understorey plants and will also eat insects, seeds and fruit (Turner & Ward 1995). The presence of Banksia sp. and Leptospermum sp. are an important habitat feature (DECC 2007). Small tree hollows are favoured as day nesting sites, but nests have also been found under bark, in old birds nests and in the branch forks of tea-trees (Turner & Ward 1995).	Yes	Yes
Koala (incl. Hawks Nest and Tea Gardens endangered population)	*Phascolarctos cinereus*	V,P	Species Credit	V	Atlas of NSW Wildlife, BCCC	Associated with both wet and dry Eucalypt forest and woodland that contains a canopy cover of approximately 10 to 70% (Reed et al. 1990), with acceptable Eucalypt food trees. Some preferred Eucalyptus species are: *Eucalyptus tereticornis, E. punctata, E. cypellocarpa, E. viminalis*	Potential	Unlikely Lack of suitable habitat

Common Name	Scientific Name	TSC Act	BCAM Credit Type	EPBC Act	Data source	Habitat Associations	Likelihood of occurrence	
							Pre field survey	Post field survey
Spotted-tailed Quoll	*Dasyurus maculatus*	V,P	Species Credit	E	Atlas of NSW Wildlife	The Spotted-tailed Quoll inhabits a range of forest communities including wet and dry sclerophyll forests, coastal heathlands and rainforests (Mansergh 1984; DECC 2007j), more frequently recorded near the ecotones of closed and open forest and in NSW within 200km of the coast. Preferred habitat is mature wet forest (Belcher 2000b; Green & Scarborough 1990; Watt 1993), especially in areas with rainfall 600 mm/year (Edgar & Belcher 2008; Mansergh 1984). Unlogged forest or forest that has been less disturbed by timber harvesting is also preferable (Catling et al. 1998, 2000). This species requires habitat features such as maternal den sites, an abundance of food (birds and small mammals) and large areas of relatively intact vegetation to forage in (DECC 2007). Maternal den sites are logs with cryptic entrances; rock outcrops; windrows; burrows (Environment Australia 2000).	Potential	Potential
Squirrel Glider	*Petaurus norfolcensis*	V,P	Species Credit		Atlas of NSW Wildlife	Associated with dry hardwood forest and woodlands (Menkhorst et al. 1988; Quin 1995). Habitats typically include gum barked and high nectar producing species, including winter flower species (Menkhorst et al. 1988). The presence of hollow bearing eucalypts is a critical habitat value (Quin 1995).	Yes	Yes
Bats								
Golden-tipped Bat	*Kerivoula papuensis*	V	Species Credit		BCC	The most favoured habitat for this species is moist closed forests often with a rainforest influence, however, some captures have been made in dry forests some distance from any rainforest (Lunney et. al. 1986; Parnaby and Mills, 1994). It has been suggested that the amount of vines and complex tree layers allows for increased numbers of spiders and webs and such areas are sought by the Golden-tipped Bat (Schulz & Eyre 2000). Often caught over streams within rainforest. Known to frequently roost within the pendulous nests of Yellow-throated and Large-billed Scrub Wrens and Brown Gerygone in rainforest areas (Schulz & Eyre 2000).	Unlikely	Unlikely
Grey-headed Flying-fox (Breeding Habitat)	*Pteropus poliocephalus*	V	Species Credit	V	Atlas of NSW Wildlife, BCCC	Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Churchill 1998, Eby 1998). Camps are often located in gullies, typically close to water, in vegetation with a dense canopy (Churchill 1998).	No – no known current or historic camps within BCAA	No –no known current or historic camps within BCAA
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	Species Credit	V	BCCC	The Large-eared Pied Bat has been recorded in a variety of habitats, including dry sclerophyll forests, woodland, sub-alpine woodland, edges of rainforests and wet sclerophyll forests (Churchill 1998; DECC 2007). This species roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces (Churchill 1998; DECC 2007).	Unlikely	Unlikely
Little Bentwing-bat (Breeding Habitat)	*Miniopterus australis*	V	Species Credit		Atlas of NSW Wildlife, BCCC	Prefers well-timbered areas including rainforest, wet and dry sclerophyll forests, Melaleuca swamps and coastal forests (Churchill 1998). This species shelter in a range of structures including culverts, drains, mines and caves (Environment Australia 2000). Relatively large areas of dense vegetation of either wet sclerophyll forest, rainforest or dense coastal banksia scrub are usually found adjacent to caves in which this species is found (DECC 2007). Breeding occurs in caves, usually in association with M. schreibersii (Environment Australia 2000, DECC 2007).	Yes, although no breeding habitat (maternity caves)	Yes, although no breeding habitat (maternity caves)
Southern Myotis (prev. Large-footed Myotis) (Breeding Habitat)	*Myotis macropus*	V	Species Credit		BCC	Will occupy most habitat types such as mangroves, paperbark swamps, riverine monsoon forest, rainforest, wet and dry sclerophyll forest, open woodland and River Red Gum woodland, as long as they are close to water (Churchill 1998). While roosting is most commonly associated with caves, this species has been observed to roost in tree hollows, amongst vegetation, in clumps of Pandanus, under bridges, in mines, tunnels and stormwater drains (Churchill 1998). However the species apparently has specific roost requirements, and only a small percentage of available caves, mines, tunnels and culverts are used (Richards 1998).	Unlikely	Unlikely
Reptiles								
Green Turtle	*Chelonia mydas*	V	Species Credit	V	Atlas of NSW Wildlife	Green Turtles nest, forage and migrate across tropical northern Australia. They usually occur between the 20°C isotherms, although individuals can stray into temperate waters (SEWPAC 2010).	Yes	Yes
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	Species Credit		BCCC	Wide range of habitats from rain or wet sclerophyll forest to drier eucalypt forests (Cogger 1996).	Unlikely	Unlikely

Appendix F : Summary of targeted survey effort – North Tuncurry Project site (RPS 2012)

Targeted survey for candidate species

The following sections outline the targeted surveys which have been conducted for each of the candidate species outlined in **Section 3**.

Flora species

Targeted surveys for threatened flora species considered likely to occur within the North Tuncurry site were undertaken by RPS and ERM with survey documented in RPS (2012). For the purpose of these surveys the site was divided into four stratification units (Heath, Dry Blackbutt Forest, Beach Complex and Golf Course). Random meanders / targeted surveys were conducted for a total of 20 hours across the four stratifications units (**Table 21**) exceeding the requirements outlined in DEC (2004), with the locations of these surveys shown in **Figure 7**. It should be noted that no targeted surveys were undertaken within the fairways of the Golf Course, though no potential habitat was identified for the candidate threatened flora species within this stratification unit.

The timing of these surveys coincided with surveys requirements for the targeted species as outlined in the BCCC. Specifically, surveys undertaken on 20 and 21 December 2010 were within the identified survey period for *Cryptostylis hunteriana* (November – February) and surveys in March and April 2010 (March 23, 24, 29, 30 and 31; April 19, 20, 21, 22 and 23) were within the survey period for TMO (January – April). Surveys for TMO in 2010 continued into May (14, 17, 18, 19 and 20) which is outside the identified survey period for this species. The remaining flora candidate species can be surveyed for at any time of year, with the exception of *Rhizanthella slateri*. The specified survey period for *Rhizanthella slateri* is September to November, although as discussed above survey for this species are very difficult given the cryptic underground nature of this species.

Additionally, plot based floristic surveys have been undertaken across the North Tuncurry site by ERM, RPS and Eco Logical Australia including 33 biometric vegetation plots conducted in accordance with the BCAM (DECCW 2011) by RPS (2012) and Eco Logical Australia, and 48 flora Rapid Data Points (RPS 2012) which included recording dominant flora in each strata, vegetation structure and the presence of threatened flora or weed species at locations throughout the North Tuncurry site. The locations of these flora quadrats within the North Tuncurry site are shown in **Figure 7**. The number of biometric vegetation plots completed within in each biometric vegetation type and zone, including the minimum requirements outlined in the BCAM, are shown in Error! Reference source not found.. In all biometric vegetation types a nd zones the minimum number of plots have been completed with the exception of the Banksia dry shrubland on coastal sands of the North Coast attributed the ‘blackbutt’ ancillary code. This vegetation zones was restricted to small linear areas of vegetation between the fairways of the golf course and random meanders were conducted within these areas. Despite the absence of any biometric vegetation plots within this vegetation zone it is considered that these areas have been adequately surveyed during targeted surveys and random meanders under taken by RPS (2012; **Figure 7)**.

Table 21: Survey effort for targeted surveys for threatened flora, RPS (2012)

	Stratification Units				
	Heath (338.35 ha)	Dry Blackbutt Forest (132.7 ha)	Beach Complex (65.9 ha)	Golf Course (30 ha)	Total
Random meanders / Targeted surveys	10	6	4	0	20
Required (DEC 2004)	5	1.5	1.5	1	9

Fauna species

For the fauna surveys, and in accordance with DEC (2004), the North Tuncurry site was stratified into units based upon vegetation structure (**Figure 9**). For the purposes of selected survey techniques the 'Heath' stratification unit was further divided into two areas, one area in the north-east which had burnt in a 2007 fire (RPS 2012) referred to as 'Burnt heath' and the remaining heath which was not impacted by the fire in 2007 (referred to as heath).

Diurnal birds

Surveys for diurnals bird surveys involved incidental observations undertaken in conjunction with other diurnal surveys RPS (2012), habitat assessments and targeted surveys across select areas of the North Tuncurry site. Targeted surveys for diurnal birds were conducted across the golf course and the beach and foredune areas [termed beach sweeps in RPS (2012)]. Beach sweeps, involved driving, walking and searching into the sand dune along the beach from one end of the site to the other. Beach sweeps were undertaken at dawn and dusk on nine occasions in 2012 (13 – 16 and 21 – 22 February 2012) to target bird species or secondary indications thereof. Habitat assessments were conducted which involved taking note of habitat quality based on structural complexity, vegetation community age cohort and evidence of successional growth patterns (RPS 2012). Habitat assessments included targeted searches for habitat attributes used by threatened species considered as having some potential to occur within the site, including the seasonally occurring Swift Parrot and Regent Honeyeater.

There is no suggested minimum survey effort for diurnal birds by DEC (2004) rather area search methods, involving surveying area of pre-determined size for a pre-determined length of time, are recommended for surveys which aim to recorded the longest list of species possible as quickly as possible. The survey effort conducted by RPS (2012) for diurnal birds is considered adequate for the purposes of this study.

Nocturnal Birds

Surveys for nocturnal birds, involving nocturnal call playback and diurnal habitat searches, have been undertaken within the North Tuncurry site by ERM and RPS (RPS 2012). Nocturnal surveys involved broadcasting of calls of targeted species through an amplification system for at least 5 minutes followed by periods of listening and stationary spotlighting as described by Kavanagh and Peake (1993). Targeted species included Powerful Owl, Easterm Grass Owl, Barking Owl, Masked Owl and Sooty Owl. The timing of these surveys is outlined in **Table 22** with locations of call playback sites shown in **Figure 10**.

The DEC (2004) guidelines requires a minimum survey effort of at least 5 visits per site, on different nights for the Powerful Owl, Eastern Grass Owl and Barking Owl, 6 visits per site for Sooty Owl and 8 visits per sites for Masked Owl (with sites required to be separated by 800m to 1km). DEC (2004) designates

minimum requirement per site and not by stratification units. The survey effort conducted for nocturnal birds has exceeded the minimum survey effort suggested by DEC (2004).

Table 22: Survey effort for nocturnal birds

Date	Surveyor	Number of call playback locations
23/03/2010	RPS	2
24/03/2010	RPS	2
29/03/2010	RPS	2
30/03/2010	RPS	1
07/02/2012	RPS	1
13/02/2012	RPS	1
14/02/2012	RPS	2
15/02/2012	RPS	2
21/02/2012	RPS	1
Nov 2008	ERM	1
Nov 2008	ERM	1
2005	ERM	1

Mammals (excluding bats)

Surveys for arboreal and terrestrial mammals were undertaken within the North Tuncurry site by RPS (2012). Survey techniques included spotlighting, trap lines with cage, terrestrial and tree-mounted Elliott traps, hair tubes and pitfall traps.

Spotlighting in car and on foot was undertaken on three nights by RPS in 2010 and on four nights in 2012, equating to 42 person hours of survey effort (2 people x 7 nights for 3 hrs per night; RPS 2012). In addition, ERM undertook walking spotlighting transects with a total survey effort of six person hours across the entire North Tuncurry site (RPS 2012). During spotlighting, priority was given to those areas that were deemed most likely to contain nocturnal species, particularly arboreal and terrestrial mammals (RPS 2012) with locations of spotlighting transects across the North Tuncurry site shown in **Figure 10**.

The spotlighting on foot survey effort undertaken by RPS is not specified for each stratification unit, although the total effort across the site exceeds the suggested minimum requirements for spotlighting on foot (42 hours undertaken, 20 hours suggested DEC (2004)). The spotlighting from vehicle survey effort, including the suggested minimum survey effort (DEC 2004), is outlined in **Table 23**. The suggested minimum effort has been met for all stratification units except the Golf course where survey effort was less than that the suggested minimum by three hours. It should be noted that spotlighting from a vehicle was not undertaken within the Beach complex due to the safety concerns regarding driving within this environment at night. The Golf course and Beach complex stratification units represent low quality habitat for targeted mammal and nocturnal bird species and while the reduced spotlighting from a vehicle survey effort is acknowledged as a limitation of this study, it is not considered to impact upon the results and finding of this study.

Table 23: Spotlighting from vehicle survey effort

Stratification unit	Area (ha)	Spotlighting effort (hours)	Total required (DEC 2004)
Dry Blackbutt forest	130	11	10
Heath	338	6	5
Beach complex[1]	66		
Golf course	30	2	5
Total	**564**	**19**	**17**

[1] Spotlighting from vehicle not undertaken on beach complex due to safety issues with driving in this environment at night.

Trap lines with arboreal and terrestrial Elliott traps (A and B) and cage traps were set out across the site in November 2008 (ERM) and March 2010 and February 2012 (RPS 2012; **Figure 11**). **Table 24** shows the total survey effort for Elliott traps over the site and **Table 25** outlines the total survey effort for cage traps. Elliott traps were baited using a mixture of peanut butter, rolled oats and honey, with the entrances of the arboreal traps and the trunk of the tree immediately above and below the trap also sprayed with a mixture of vanilla essence, honey and water to further attract potential animals (RPS 2012). For the cage traps, half were baited with the mixture of peanut butter, rolled oats and honey and the other half was baited with chicken legs.

Table 24: Total number of trap nights for Elliott traps

Stratification unit	Area	Elliott B trap (arboreal)	Total required (DEC 2004)	Elliott B trap (terrestrial)	Total required (DEC 2004)	Elliott A trap (terrestrial)	Total required (DEC 2004)
Heath	338	127	96	566	400	598	400
Dry Blackbutt forest	130	129	48	238	200	322	200
Beach complex	66	0	24	100	100	100	100
Golf course	30	24	24	100	100	100	100
Total	**564**	**280**	**192**	**1004**	**800**	**1004**	**800**

Table 25: Total number of trap nights for cage traps

Stratification unit	Area	Cage trap	Total required (DEC 2004)
Heath	338	76	96
Dry Blackbutt forest	130	32	48
Beach complex	66	20	24
Golf course	30	20	24
Total	**564**	**148**	**192**

Pit fall trap lines targeting the *Pseudomys novaehollandiae* (New Holland Mouse) and herpetofauna were undertaken in February 2012 across all stratification types over the North Tuncurry site (RPS 2012; **Table 26, Figure 11**). A total of 18 pit fall trap lines, each containing three pits, were set up across the site, equating to a total of 216 trap nights.

Table 26: Pitfall trap survey effort

Stratification unit	Area	Number of pitfall trap nights	Total required (DEC 2004)
Heath	304.78	96	96
Burnt heath	33.57	24	24
Dry Blackbutt forest	132.7	72	72
Beach complex	65.90	24	24
Golf course	30	0	24
Total	**566.95**	**216**	**240**

Hair tube trapping was undertaken across the North Tuncurry site in November 2008 (ERM) and March 2010 and February 2012 (RPS 2012, **Figure 11**). 'Faunatech' hairtubes with tubes baited with peanut butter, honey and rolled oats, were placed on the trunk or lower branches of trees to target arboreal and terrestrial mammals (RPS 2012). Hair samples were forwarded to a recognised expert in hair identification, Barbara Triggs, for analysis (RPS 2012). The location of these trap lines across the North Tuncurry site are shown in **Figure 11** with total survey effort across stratification units shown in **Table 27**. The suggested minimum requirements (DEC 2004) have been completed for all stratification units with the exception of arboreal hair tubes within the Heath and Beach complex stratification units and terrestrial hair tubes within the Beach complex stratification unit.

Table 27: Hair tube survey effort

Stratification unit	Area	Hair tube (arboreal)	Total required (DEC 2004) (arboreal)	Hair tube (terrestrial)	Total required (DEC 2004) (terrestrial)
Heath	338	187	480	487	320
Dry Blackbutt forest	130	790	240	200	160
Beach complex	66	0	120	0	80
Golf course	30	165	120	165	80
Total	**564**	**1142**	**960**	**852**	**640**

In addition to spotlighting outlined above, the potential presence of Koala was assessed through the identification of potential Koala food trees, followed by inspection for signs of Koala usage. Trees were inspected for the presence of Koalas, characteristic scratch and claw marks on the trunk, and scats around the base of each tree (RPS 2012).

Microchiropteran Bats

Surveys for microchiropteran bats utilising ultrasonic detection and harp traps were undertaken across the North Tuncurry site in February 2012 by RPS (RPS 2012). Additionally, ERM surveyed for microchiropteran bat utilising ultrasonic detection for a total of 11.5 hours across the site, although the specific locations of this survey are unknown.

Anabat ultrasonic call detectors were used to record bat echolocation calls over ten nights, equating to a survey effort of 228 hours (2 Anabats x 9 nights for 12hrs per night + 1 Anabat x 1 night for 12 hrs per night; RPS 2012). Harp trapping was performed over six, four night periods equating to a survey effort of 20 trap nights (1 Harp trap x 4 nights + 2 Harp traps x 3 nights + 4 Harp traps x 2 nights + 1 Harp trap x 2 nights; RPS 2012). The location of these surveys are shown in **Figure 12** with total survey effort per stratification unit, including suggested minimum effort (DEC 2004), outlined in **Table 28**.

Table 28: Survey effort for Microchiropteran bats

Stratification unit	Area	Ultrasonic detection (hours)	Required (DEC 2004)	Harp trap nights	Required (DEC 2004)
Heath	338	132	32	10	16
Dry Blackbutt forest	130	84	16	6	8
Beach complex	66	12	8	4	4
Golf course	30	0	8	0	4
Total	**564**	**228**	**64**	**20**	**32**

Megachiropteran Bats

Megachiropteran bat surveys were conducted during nocturnal spotlighting surveys by RPS (RPS 2012). Habitat for these species, specifically the Grey-headed Flying Fox and Common Blossom-bat, was assessed by targeting blossom-producing and fruit-bearing tree species (RPS 2012).

Herpetofauna

Surveys or herpetofauna (frog and reptile) were limited to opportunistic recordings and habitat assessments conducted during vegetation surveys across the site by RPS (RPS 2012). Attributes targeted during habitat assessment for amphibian species included: dams and wetter habitats. Understorey forest debris levels, as well as understorey complexity and densities, were noted with regard to potential reptile habitat (RPS 2012).

Appendix G : Tuncurry Midge Orchid Reports

G1_RPS (2011) *Corunastylis littoralis* Tuncurry Midge Orchid Combined Survey Results 2010/2011 North Tuncurry. Report prepared by RPS Australia for Landcom, August 2011.

G2_RPS (2012) Review of Tuncurry Midge Orchid (*Genoplesium littorale syn. Corunastylis littoralis*) for a proposed rezoning). Crown Lands, North Tuncurry NSW. Report prepared for Landcom by RPS Australia East Pty Ltd, Draft August 2012.

Provided as a separate Pdf documents.

Appendix H : Independent Review of Tuncurry Midge Orchid Report

ELA (2011) Independent review of Tuncurry Midge Orchid Investigations – North Tuncurry Investigation Area. Letter prepared by Dr Lachlan Copeland of Eco Logical Australia for Landcom, December 2011.

Provided as a separate Pdf document.

Appendix I : TMO 2013 Survey Report

RPS (2013) 2013 Tuncurry Midge Orchid Survey results. Letter prepared by RPS to Landcom NWS, 7 August 2013.

Provided as a separate Pdf document.

Appendix J : TMO Pollinator Reports

J1_Flora Search (2013) Pollination of the Tuncurry Midge Orchid (*Genoplesium littorale*). Report prepared for Landcom NSW by Colin Bower Phd of Flora Search, June 2014.

J2_Flora Search (2014). Pollination of the Tuncurry Midge Orchid (*Genoplesium littorale*) Supplementary Information. Report prepared for Landcom NSW by Colin Bower Phd of Flora Search, June 2014.

J3_Flora Search (2018). Efficacy of the ‘Orchid Reserve’ and ‘Orchid Pollinator Corridors’ in the proposed North Tuncurry Development. Letter to Landcom dated 27 April 2018. FloraSearch, Orange, NSW.

Provided as separate Pdf documents.

Appendix K : Summary of ecological investigations of MCC Nabiac offset site

Ecological Assessment of proposed MCC Nabiac Offset site

The proposed Nabiac offset site is located on the Minimbah sandbeds approximately 3km to the north-west of the BCAA and is surrounded by land supporting relatively undisturbed bushland, including parts of the Minimbah Nature Reserve (Figure 29 and **Figure 36**).

The Nabiac offset site generally supports native vegetation in a largely undisturbed condition other than access tracks and water bore monitoring wells. The Nabiac offset site does not include large areas where the impacts of previous mineral extraction activities remain evident.

The soils of the Nabiac site are predominantly composed of Quaternary barrier sands and beach ridges with undifferentiated Quaternary alluvium occurring along the Wallamba River (AEP 2004). The sediments of the Nabiac offset site include a layer of slightly fine to medium grained sand to a depth of 3 – 6 m below the surface which acts as an aquitard creating a perched aquifer above this layer (ID Landscape Management 2004). The depth to this aquitard and groundwater appears to have a large influence on the distribution of vegetation communities within the Nabiac offset site.

The Nabiac offset site supports a mosaic of vegetation communities, the distribution of which is closely related to soil depth and depth to ground water (**Figure 37**). Generally, taller forest vegetation occurs in areas of deeper sediments and greater depth to groundwater with vegetation grading to low open woodland, heathlands and sedgelands as sediment depth decreases and the depth to ground water decreases. Swamp forest vegetation occurred in proximity to minor depressions and drainage lines particularly in areas influenced by the Wallamba and Colongolook Rivers.

Mapping of biometric vegetation communities across the Nabiac offset site was undertaken by ELA in conjunction with mapping of biometric vegetation types across the BCAA (**Figure 37**). The mapping of vegetation communities within the Nabiac offset site confirmed the presence of one of the biometric vegetation types within the BCAA:

- HU503 - Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion.

Additionally, the following eight biometric vegetation types were identified within the Nabiac offset site:

- HU581 - Scribbly gum - Wallum Banksia - Prickly-leaved Paperbark heathy coastal woodland on coastal lowlands
- HU918 - Fern-leaf Banksia - Prickly-leaved Paperbark-Tantoon - Leptocarpus tenax wet heath on coastal sands of the Central Coast and lower North Coast
- HU532 - Coastal floodplain sedgelands, rushlands, and forblands of the North Coast
- HU919 - Heath-leaved Banksia-Olive Tea-tree-Wallum Boronia wet heath on coastal sands of lower North Coast;
- HU948 - Wallum Bottlebrush – Letocarpus tenax – Baloskin pallens Wallum sedge heathand; and
- HU633 - Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion

The distribution of these vegetation types is shown in **Figure 37**) and full descriptions of these vegetation types are included within **Appendix L.**

The TMO has been recorded in the proposed offset area with the entire are mapped as potential habiuat (**Figure 28**) and at least two other threatened species are likely (*Allocasuarina simulans* and *A. defungens).*

ID Landscape Management Environment Consultancy (ID Landscape Management 2004) identified six threatened fauna species which are known to utilise the vegetation communities within the Nabiac Sand-plain:

- Brush-tailed Phascogale (*Phascogale tapoatafa*) (Bartim and Martin 1990)
- Wallum Froglet (*Crinia tinnula*) HWR Ecological (2004)
- Eastern Grass Owl (*Tyto capensis*; also known as *Tyto longimembris*)
- Little Bent-wing Bat (*Miniopterus australis*) (Resource Planning Pty Ltd 1993)
- Common Bent-wing Bat (*Minipoterus schreibersii*) (Resource Planning Pty Ltd 1993) and
- Grey-headed Flying-fox (*Pteropus poliocephalus*) (Resource Planning Pty Ltd 1993).

A further 23 threatened species were considered to have a high potential for occurrence within the Nabiac Borefield either as resident or seasonal and altitudinal migrants, specifically:

- *Phascolarctos cinereus* (Koala)
- *Lathamus discolor* (Swift Parrot)
- *Litoria brevipalmata* (Green-thighed Frog)
- *Pseudomys gracilicaudatus* (Eastern Chestnut Mouse)
- *Cercartetus nanus* (Eastern Pygmy-possum)
- *Dasyurus maculatus* (Spotted-tailed Quoll)
- *Petaurus norfolcensis* (Squirrel Glider)
- *Petaurus australis* (Yellow-bellied Glider)
- *Syconycteris australis* (Queensland Blossom bat)
- *Mormopterus norfolkensis* (Eastern Freetail-bat)
- *Kerivoula papuensis* (Golden-tipped Bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Ixobrychus flavicollis* (Black Bittern)
- *Ephippiorhynchus asiaticus* (Black-necked Stork)
- *Neophema pulchella* (Turquoise Parrot)
- *Lophoictinia isura* (Square-tailed Kite)
- *Calyptorhynchus lathami* (Glossy Black Cockatoo)
- *Tyto novaehollandiae* (Masked Owl)
- *Ninox strenua* (Powerful Owl)
- *Tyto tenebricosa* (Sooty Owl)
- *Pandion haliaetus* (Eastern Osprey)
- *Hoplocephalus bitorquatus* (Pale-headed Snake)
- *Hoplocephalus stephensii* (Stephen's Banded Snake)

Preliminary surveys by ELA in March and April 2016 using remote cameras and hair tubes confirmed the presence of Brush-tailed phascogale, Eastern Pygmy Possum and Long-nosed Potoroo (**Figure 38** and **Figure 39)**.

Indicative Credit Calculations – Nabiac Offset site

Based upon the results of the ecological assessment of the Nabiac Offset site, indicative credit calculations have been undertaken to determine the number and types of credits which would be generated by registering this site as a Biobank (**Table 16** and **Table 17**).

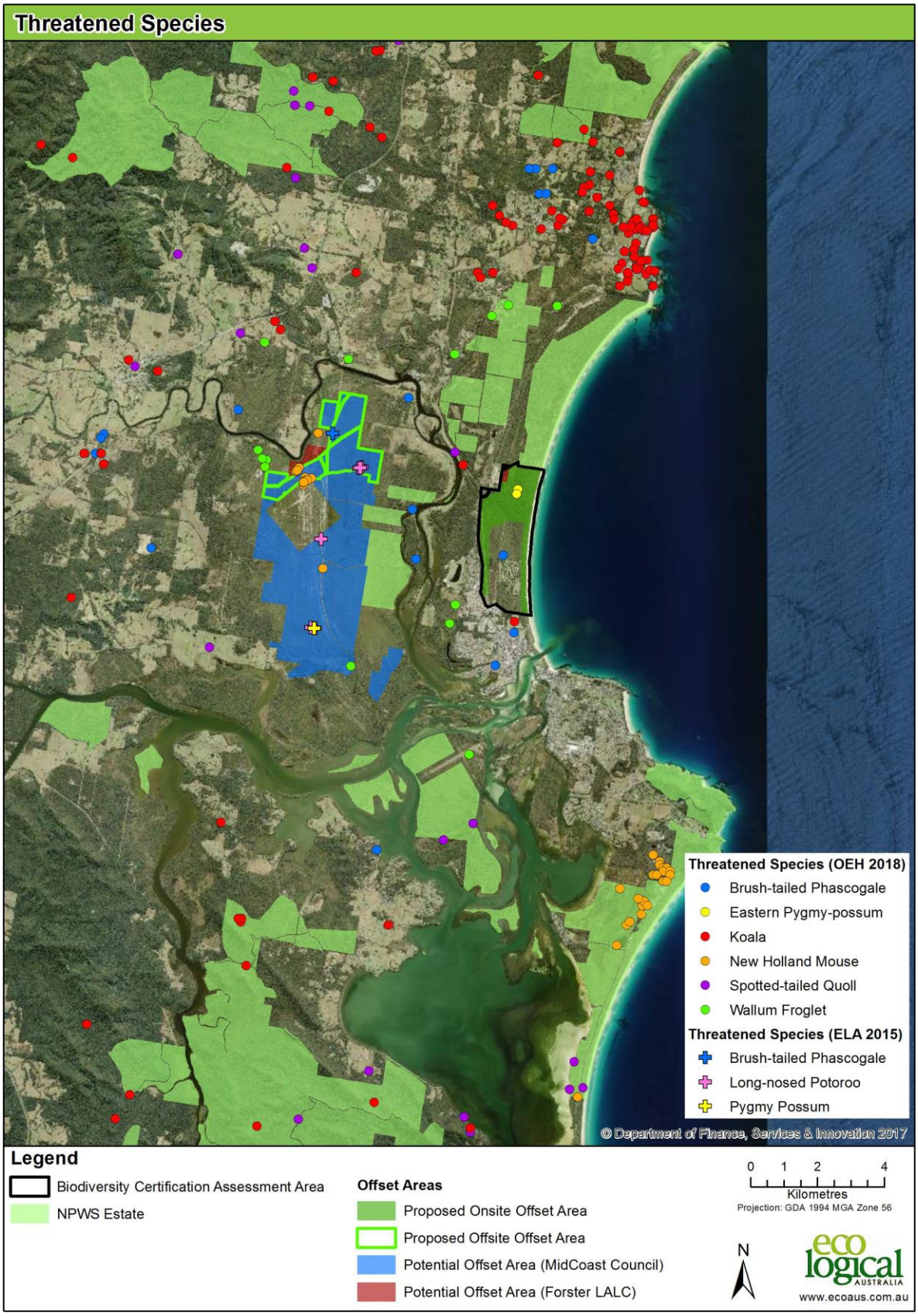


Figure 36: Threatened species records in locality of proposed Nabiac Offset Site

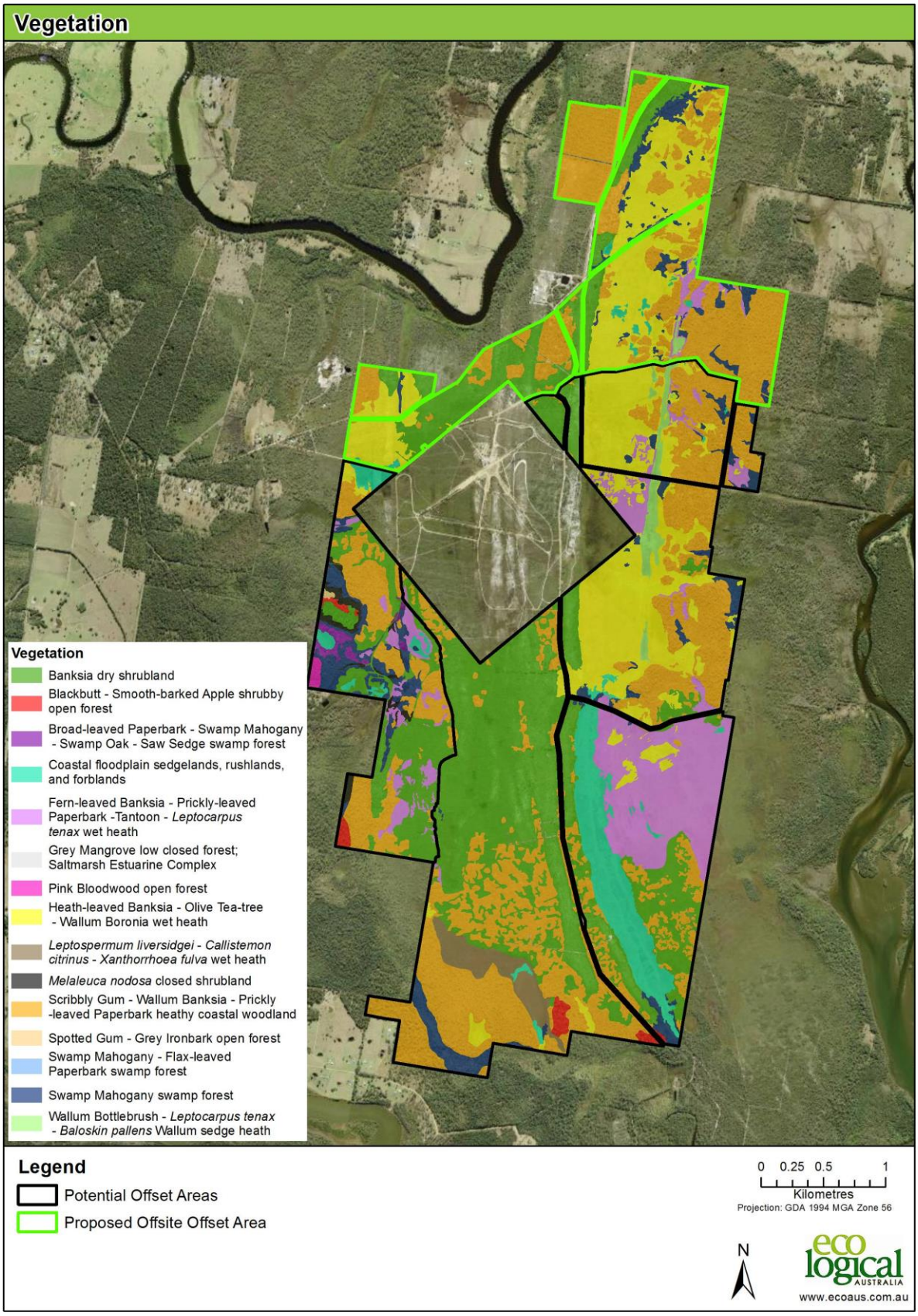


Figure 37: Vegetation Validation of MidCoast Council (formerly Mid Coast Water) and Crownland land holdings at Nabiac

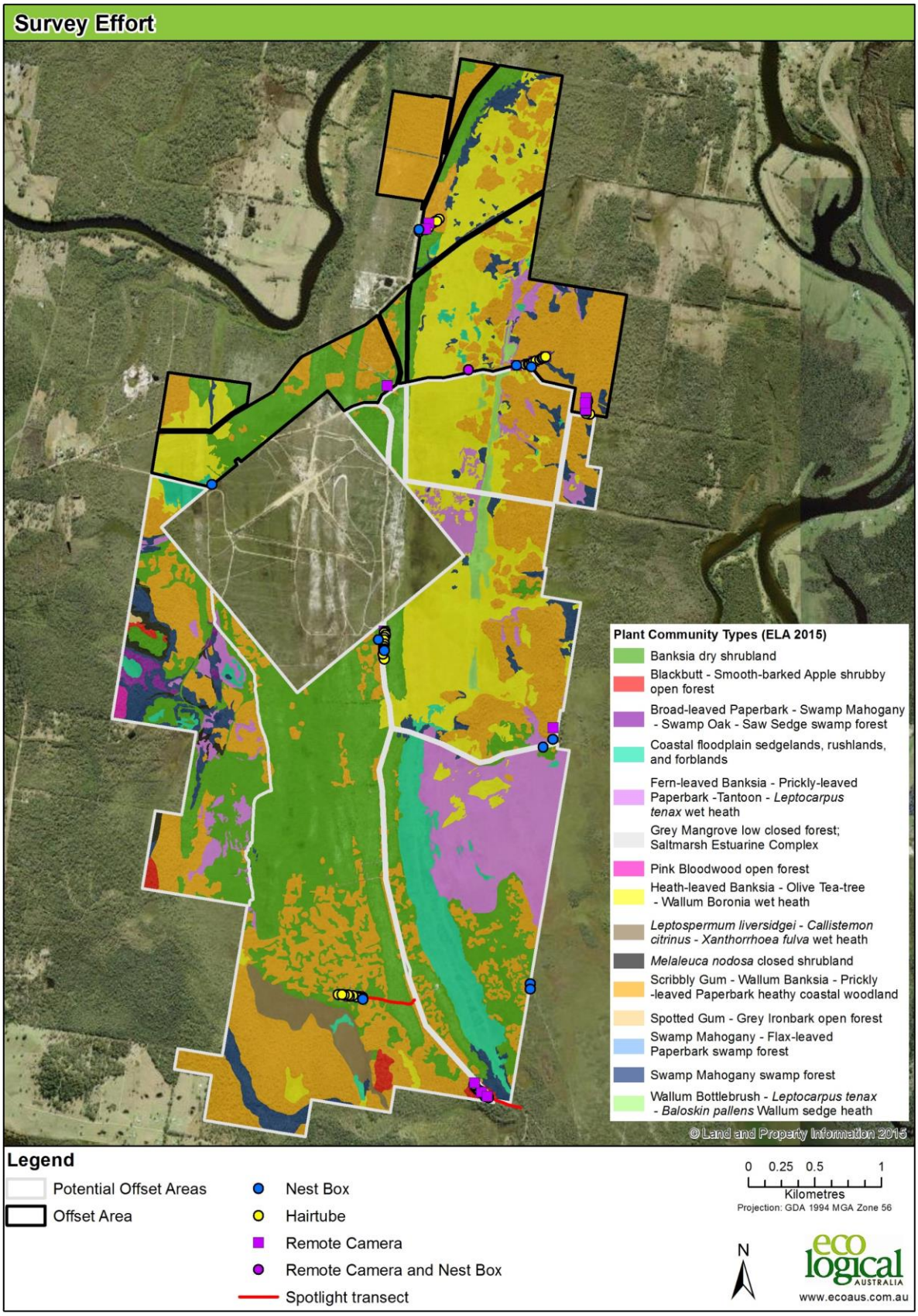


Figure 38: Fauna survey effort and results of MidCoast Council (formerly Mid Coast Water) land holdings at Nabiac

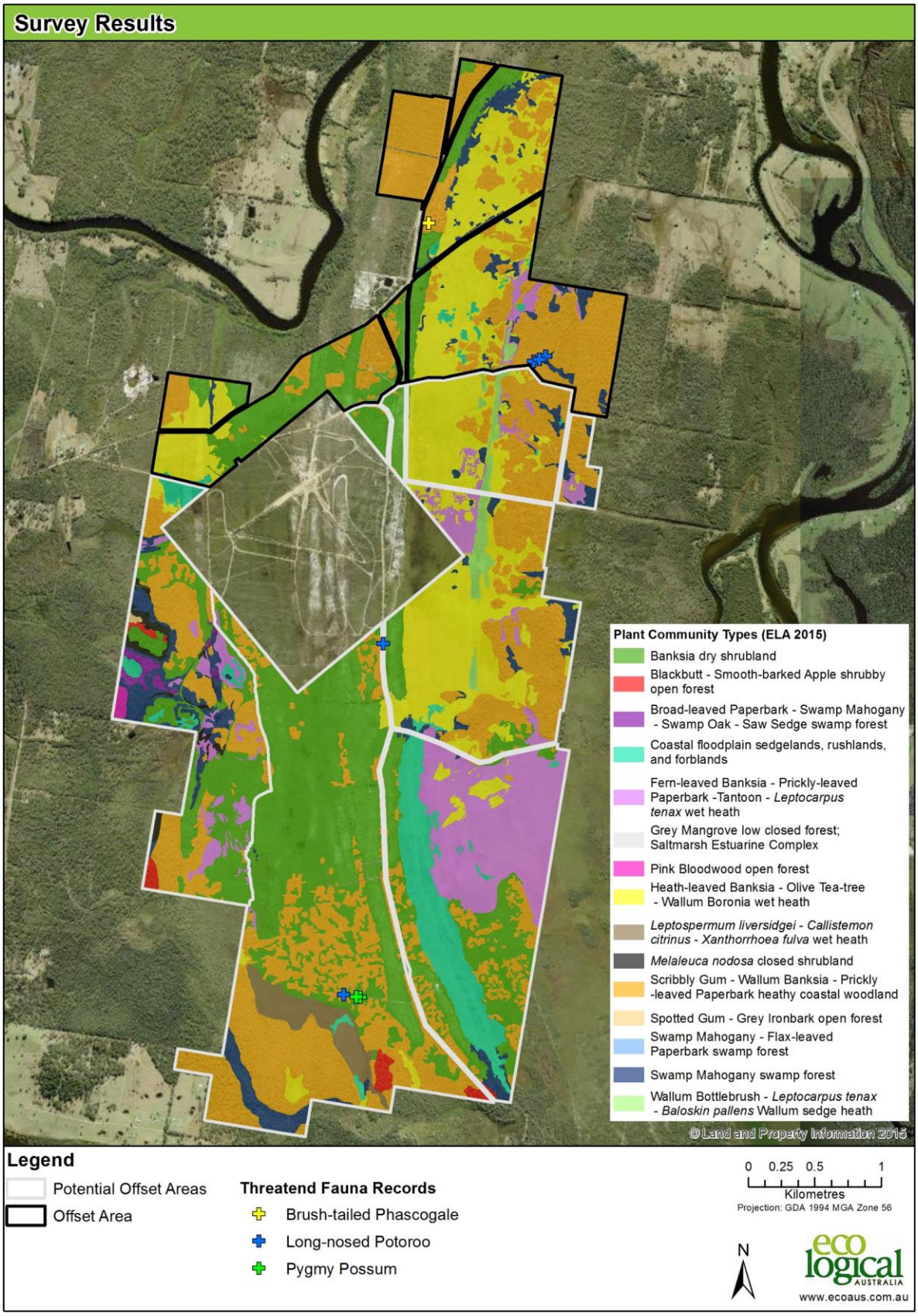


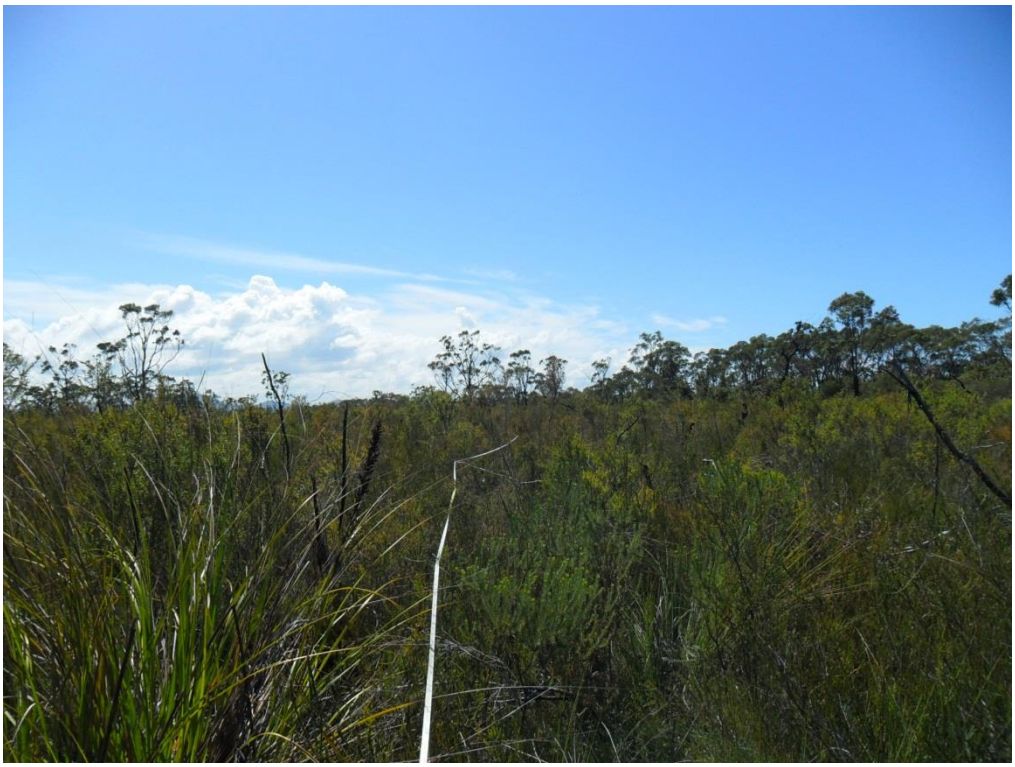
Figure 39: Threatened fauna records of MidCoast Council (formerly Mid Coast Water) land holdings at Nabiac

Appendix L : Vegetation Community Descriptions – Proposed MCC Nabiac Biobank site

Biometric Vegetation Type	**Scribbly gum - Wallum Banksia - Prickly-leaved Paperbark heathy coastal woodland on coastal lowlands**
	
Description	This vegetation type generally occurred as a low open woodland with a dense diverse shrubby mid and lower stratums.
Location and habitat	This vegetation type was restricted to the Nabiac offset site although it was widespread within the south and west of this site. It occurred on freely draining sandy soils on intermediate depth and graded into the Blackbutt - Smooth-barked Apple shrubby open forest with increased soil depth and graded into Banksia dry shrubland on coastal sands with reduced soil depth.
Sampling locations	Plots to be completed as part of Biobank Assessment
Upper Stratum	The upper stratum of this vegetation was dominated by *Eucalyptus signata* (Scribbly Gum) generally up to 12 m in height with project foliage cover of less than 20 %. Few other canopy species were common within this vegetation type, although *E. globoidea* was present and *Banksia aemula* within the midstorey often mixed with the canopy layer.
Midstorey	A diverse shrubby midstorey was present in this vegetation type including taller shrub species such as *Banksia aemula, Leptospermum trinervium* and *Melaleuca nodosa* and lower shrub species including *Dillwynia retorta s. l., Gompholobium virgata, Leptospermum semibaccatum, Brachyloma daphnoides*, *Boronia pinnata* and *Leucopogon leptospermoides.* The height of the midstorey generally ranged from 1 to 8 metres with projected foliage cover of up to 30 %.
Lower Stratum	A diverse and variable layer of ground cover species was present within this vegetation type with the sedges *Hypolaena fastigiata* and *Caustis recurvata* (Curly Wig) dominant. A number of other species were common including *Astroloma pinifolium*, *Lomandra glauca, Coleocarya gracilis* (identified as regionally significant Griffith 2004)) and *Bossiaea scolopendria*.
Corresponding vegetation types	• Scribbly Gum Woodland – Dry Sclerophyll Woodland (ID Landscape Management 2004) • Scribbly Gum (GLC 2003)

Biometric Vegetation Type	**Banksia dry shrubland on coastal sands of the NSW North Coast Bioregion**
	
Description	This community occurred ranged from an open-scrub to tall shrubland (Specht and Specht 2002). A diverse understory was present within this vegetation type including sub-shrubs, sedges and graminoids.
Location and habitat	This vegetation type occurred within both the North Tuncurry and Nabiac offset sites, occurring on freely draining podzolised sands.
Sampling locations	Plots to be completed as part of Biobank Assessment
Upper Stratum	The upper stratum of this vegetation type was up to 5 m in height (RPS 2012), although commonly only 3 m in height, with projected foliage cover generally between 10 – 40% (RPS 2012). This stratum was dominated by *Banksia aemula* (Wallum Banksia) with a co-dominant or sub-dominant species present including *Allocasuarina littoralis* and *Leptospermum* spp. Emergent low *Eucalyptus* species were present close to the margins of this vegetation community with emergent *Pinus elliottii* also present within the North Tuncurry site.
Midstorey	A range of sub shrubs were present within this vegetation type frequently merging with the upper stratum including *Ricinocarpos pinifolius* (Wedding Bush*) Dillwynia retorta, Boronia pinnata, Persoonia lanceolata* (Lance Leaf Geebung), *Leucopogon lanceolatus, Conospermum taxifolium, Acacia longifolia* var*. longifolia* (Sydney Golden Wattle), *Melaleuca nodosa*, *Leptospermum semibaccatum* (Prickly-leaved Paperbark).
Groundcovers	A low and sparse ground layer generally less than 1 m in height with projected foliage cover less than 60 % (RPS 2012) occurred within this vegetation type. Dominant species included *Hypolaena fastigiata* and *Caustis recurvata*, with a diverse range of low shrubs and graminoids also present.
Corresponding vegetation types	• Banksia (GLC 2003) • *Banksia aemula* Dry Heathland (RPS 2012) • *Banksia aemula* – Dry Heath (ID Landscape Management 2004)

Biometric Vegetation Type	**Fern-leaf Banksia - Prickly-leaved Paperbark-Tantoon - Leptocarpus tenax wet heath on coastal sands of the Central Coast and lower North Coast**
	
Description	This vegetation type ranged from an open heath to heathland with an understorey of sedges and low shrubs.
Location and habitat	This vegetation type was restricted to the Nabiac offset site where it occurred in areas of relatively shallow quaternary sands. This vegetation type occurred in areas with some groundwater influence, although was generally the driest of the heathland vegetation types.
Ancillary codes	Only one ancillary code was identified for this vegetation type, good condition, reflecting the relatively undisturbed condition of the vegetation type.
Sampling locations	Plots to be completed as part of Biobank Assessment
Upper Stratum	The upper stratum of this vegetation type was generally up to 2 min height with percent foliage cover of less than 30 %. Dominant species included *Banksia oblongifolia* (Fern-leaved Banksia), *Banksia ericifolia* subsp*. macrantha* (Heath –leaved Banksia), with *Callistemon pachyphyllus* (Wallum Bottlebrush), *Leptospermum liversidgei* (Olive Tea-tree)*, Melaleuca nodosa and Leptospermum polygalifolia* (Tantoon) also common.
Lower Stratum	The lower stratum was dominated by a range of sedges and rushes including *Leptocarpus tenax*, *Gahnia sieberiana* (Red-fruit saw-sedge), *Eurychorda complanata*, *Empodisma minus* (Spreading rope-rush), *Baloskion pallens* and *Lepyrodia scariosa*. A number of other species were also common in the lower stratum including *Leptospermum arachnoides* (noted as regionally significant (Griffith (2004)) and *Xanthorrhoea sp.*
Corresponding vegetation types	• *Banksia oblongifolia* – Dry Heath • Heath (GLC)

Biometric Vegetation Type	**Heath-leaved Banksia-Olive Tea-tree-Wallum Boronia wet heath on coastal sands of lower North Coast**
	
Description	This vegetation occurred as a heathland with a dense understorey of sedges and low shrubs. Occasional stunted trees and tall shrubs occurred within this vegetation type but generally in isolated patches and at low densities.
Location and habitat	The vegetation type was restricted to the Nabiac offset site where it occurred in areas of relatively shallow quaternary sands. This vegetation type occurred in areas with intermediate groundwater influence.
Ancillary codes	Only one ancillary code was identified for this vegetation type, good condition, reflecting the relatively undisturbed condition of the vegetation type.
Sampling locations	Plots to be completed as part of Biobank Assessment
Upper Stratum	The upper stratum of this vegetation type was generally less than 2 m in height with projected foliage cover of less than 30%. Dominant species included *Banksia ericifolia* subsp. *macrantha*, *Leptospermum liversidgei, Leptospermum polygalifolia* and *Boronia falcifolia*. Stunted individuals of *Eucalyptus robusta* (Swamp Mahogany) and mature *Melaleuca sieberi* were occasionally present as emergents within this vegetation type.
Lower Stratum	The lower stratum of this vegetation type was dominated by *Xanthorrhoea sp.* and sedges and rushes including *Baumea sp*., *Gahnia sieberiana, Eurychorda complanata, Empodisma minus* and *Baloskion pallens* with projected foliage cover of up to 50 %.
Corresponding vegetation types	• *Banksia ericifolia* var. *macrantha* – Swamp Heath (ID Landscape Management 2004) • Heath (GLC)

Biometric Vegetation Type	**Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion**
	
Description	This vegetation type generally occurred as an open forest with a dense groundcover of sedges and ferns. Additionally, one small area of this vegetation type was present without a canopy as a result of previous clearing.
Location and habitat	This vegetation type was restricted to the Nabiac offset area and occurred in the north-east and south-west of the site in low lying areas adjacent to the Wallamba River and a tributary of the Coolongolook River.
Sampling locations	Plots to be completed as part of Biobank Assessment
Upper Stratum	The canopy of this vegetation type generally occurred as pure stands of *E. robusta* (Swamp Mahogany) up to 20 m in height with percent foliage cover of up to 30 %. Other canopy species were generally restricted to the margins of this vegetation type.
Mid Stratum	A variable midstorey was present within this vegetation type ranging from absent to mid-dense with *Leptospermum polygalifolium, Livistona australis, Callistemon salignus* and *Melaleuca* spp. all recorded within this layer.
Lower Stratum	The dense lower stratum was present within this vegetation type, frequently dominated by *Baloskion tetraphyllum* subsp. *meiostachyum* (Plume Rush) with *Blechnum indicum* and *Gahnia clarkei* (Tall Saw-sedge) also common.
Corresponding vegetation types	• *Eucalyptus robusta Melaleuca quinquenervia* – Swamp Sclerophyll Forest (ID Landscape Management 2004) • Swamp Mahogany (GLC 2003)

Biometric Vegetation Type	**Coastal floodplain sedgelands, rushlands, and forblands of the North Coast**
	
Description	This vegetation type occurred as a sedgeland with isolated shrubs.
Location and habitat	This vegetation type was restricted to the Nabiac offset site where it occurred in areas where the groundwater table was at or near the surface. Soils were generally sandy with high organic content while some peat formation was observed.
Ancillary codes	Only one ancillary code was identified for this vegetation type, good condition, reflecting the relatively undisturbed condition of the vegetation type.
Sampling locations	Plots to be completed as part of Biobank Assessment
Upper Stratum	A single stratum dominated by sedges was present within this vegetation type with projected foliage cover of up to 80 %. This stratum was dominated by sedges including *Leptocarpus tenax* and *Baloskion pallens* with a number of other sedges species also common including *Gahnia sieberiana, Eurychorda complanata, Lepyrodia imitans* and *Baumea sp*. A numbers of shrubs occurred within the vegetation type, although at very low densities, including *Callistemon pachyphyllus, Leptospermum arachnoides, Banksia ericifolia* subsp. *macrantha, Leptospermum liversidgei* and *Sprengelia incarnata.*
Corresponding vegetation types	• Tassel Rush – Swamp Sedgeland • Swamp (GLC)

Appendix M : Essential Energy's statement of management obligations regarding powerline corridor

15 May 2019

Mr Michael Pring
Development Director
Landcom
Level 14, 60 Station St
Parramatta NSW 2150

Dear Mr Pring

North Tuncurry State Significant Site – Lakes Way, North Tuncurry

Reference is made to a proposed mixed-use development on land located at the Lakes Way, North Tuncurry and declared to be a State Significant Site under Schedule 3 of the *State Environmental Planning Policy (Major Development) 2005* (the Major Development SEPP) (**the Project**) in 2011.

Essential Energy understands, based on information provided by Landcom:

- The land is owned by the State of NSW and development is to be undertaken by way of an agreement between the then NSW Land and Management Authority (now Department of Industry - Crown Lands and Water Branch) and Landcom.
- The Project involves development of the site in approximately 25 stages to generate approximately 2,200-3,000 dwellings, employment lands, a new local neighbourhood centre incorporating retail, business and commercial floor space, tourist, community, education facilities, open space and environmental conservation purposes.
- The Project site has been subject to a broad range of strategic planning investigation and environmental assessments over a number of years.
- The NSW Office of Environment and Heritage (**OEH**) has requested that matters of ecological significance be addressed strategically at the rezoning stage to simplify the subsequent development application process, this includes Biodiversity Certification under Part 7AA of the *Threatened Species Conservation Act 1995* (**TSC Act**)[1] to assess and quantify the impacts to biodiversity values and determine the offset requirements that would meet and 'improve or maintain' outcome.
- This Biodiversity Certification assessment is a strategic assessment that addresses biodiversity issues in parallel to the rezoning application, and if certified by the Minister for the Environment, will remove the requirement to address biodiversity issues at the development application stage.
- The Biodiversity Certification Assessment Area (**BCAA**) encompasses an area of 635.79 ha on the eastern side of 'The Lakes Way', directly to the north of, and adjoining, the Tuncurry town centre, including located on Lot 331 DP 1104340.

[1] Since the introduction of the *Biodiversity Conservation Act 2016* (NSW) and repeal of the TSC Act, the Project was included in the 'Proposed Applications for Biodiversity Certification Order 2017', which declared that the proposed application may still be made under Part 7AA of the TSC Act.

PO Box 5730 Port Macquarie NSW 2444 | ABN 37 428 185 226
Telephone: (02) (02) 6588 6195 | Interpreter Services 13 14 50 | essentialenergy.com.au

Essential Energy powerlines within Lot 331 DP 1104340

According to Essential Energy data, the following powerlines are located within Lot 331 DP 1104340.

1. 11kV overhead powerline and 66kV overhead powerline.
2. Various other 11kV overhead powerlines.
3. 11kV underground powerlines x2.

Part of the 66kV powerline is protected by a registered easement, where it comes through Lot 331 DP1104340 and into Lot 1 DP1180218.

The remainder of the powerlines are part of Essential Energy's network of powerlines which supply the local community, and they are afforded protection under section 53 of the *Electricity Supply Act 1995* (NSW).

OEH Request

We understand Landcom will soon be preparing a plan of management for the conservation of the Tuncurry Midge Orchids (**TMOs**) (listed as critically endangered under both State and Federal legislation). We are informed the orchids are in close proximity to Essential Energy's powerlines and have been provided with the attached diagram depicting the locations of the TMO (*"26414 Figure 10 Tuncurry Midge Orchid Habitat A-A4"*).

You have advised that, *"OEH requests that Landcom provides OEH with documentation of an agreement over the best practice management of the Tuncurry Midge Orchid under the electricity easement prior to public exhibition."*

The purpose of this letter is to outline Essential Energy's historic and future powerline vegetation management activities, relevant to Lot 331 DP 1104340.

Historic and Future Powerline Vegetation Management Activities, relevant to Lot 331 DP 1104340.

Essential Energy powerlines located on Lot 331 DP 1104340 are part of three different Vegetation Maintenance Areas with three different maintenance cycle due dates. These are summarised below:

Vegetation Maintenance Area (**VMA**)	Last Treated	Next Cycle Due	Cyclic Frequency
V-368 – Darawank	30/4/2017	31/3/2019	Two-year cycle
V-6715 - 66kV - Manning - Bohnock/Forster [0868]	31/8/2017	31/8/2019	Two-year cycle
V-Forster - Urban Tuncurry	28/6/2018	28/6/2019	Annual cycle

Powerline vegetation management activities carried out in the last 4 years in the above VMAs include all of the following;

- Standard Trim
- Standard Removal & Herbicide
- Standard Removal
- Overhang
- Mechanical
- Manual Cut & Herbicide
- Manual Cut
- Initial Spray

The above management activities will all most likely continue to be required over the next 5 years.

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Powerline Vegetation Management by Essential Energy

Compliance with legislation and Essential Energy policies and procedures

Essential Energy's aim is to carry out vegetation management in compliance with relevant legislation, subject to any exemptions that may apply. This may include routine vegetation management, emergency clearing and protection of electricity assets. Relevant legislation includes:

- Planning laws (EP&A Act and relevant SEPPs, including the SEPP (Coastal Management) 2018 and SEPP (Infrastructure) 2007); and
- Biodiversity conservation laws (the BC Act (NSW) and LLS Act (NSW)).

Generally, vegetation management is exempt development under the SEPP (Infrastructure) 2007[2], being vegetation management carried out in accordance withEssential Energy's *Vegetation Management Plan*[3] (VMP) details the requirements and methodology of vegetation control near powerlines and is to be treated as Essential Energy's Tree Management Plan for the purpose of the *Electricity Supply (Safety and Network management) Regulation 2014 (NSW).* The purpose of the VMP is to (among other things):

- ensure proper guidelines and methodology are in place to promote Best Practice in the maintenance of vegetation under or near powerlines; and
- address compliance with appropriate legislation.

Whilst exempt development does not require development consent under the EP&A Act or environmental assessment under Part 5 of the EPA Act, notification of works to affected property occupiers or owners is required.

Details about powerline easement widths or corridor requirements are set out in *Network Planning: Easement Requirements* (CEOP8046) Section 8. The distances specified in CEOP8046 take into account factors other than those specifically related to vegetation safety clearances such as access to infrastructure, structure encroachments, and public safety associated with stray currents.

In addition, Essential Energy vegetation management workers shall conduct activities in accordance with *Flora and Fauna* (CECM1000.77). Where Essential Energy is made aware of, or identifies, the existence of threatened species, every reasonable effort will be made to minimise the impact or manage the situation.

Future maintenance activities and ongoing consultation

The above maintenance activities will all most likely be required over the next 5 years and will be carried out in accordance with relevant policies and procedure in place from time to time (such as the VMP).

As stated in the VMP, review of the VMP is undertaken in a way that gives an opportunity to comment on the proposed plan to all relevant stakeholders, including the relevant council or councils for the areas in which it is to operate, the residents and local community groups. The consultation includes:

- Direct consultation with Councils and Regional Advisory Groups (who represent the local communities) and other identified community groups; and
- Written notice to the relevant Essential Energy customers when work is planned on their property.

[2] Under cl.43(1):

(k) vegetation management that is in accordance with a tree management plan established under clause 37 of the Electricity Supply (Safety and Network Management) Regulation 2014,
(k1) vegetation management that is exempted under clauses 24 and 35 (4) of Schedule 5A to the Local Land Services Act 2013,
(k2) vegetation management that is carried out on category 1-exempt land (within the meaning of section 60D of the Local Land Services Act 2013),

[3] CEOP8008. The VMP may change from time to time. Current version - Issue 10, dated 6 February 2018

Whilst exempt development does not require development consent or environmental assessment under the EP&A Act, notification of works to affected property occupiers or owners is required. In accordance with the VMP, notification letters provide details of the work requirements and include contact details providing an opportunity for the occupier to discuss the matter further.

The VMP is also made available to the general public via the Essential Energy website.

Essential Energy recognises the importance of conserving Australia's unique biodiversity and ensures that the effects of its work activities on biodiversity are minimised and comply with the relevant legislation.

Yours sincerely

Pat Kelleher
Manager External Delivery
Customer & Network Services


N
Legend
Site Boundary
Tuncurry Midge Orchid (RPS)
Tuncurry Midge Orchid (Paget 2008)
Tuncurry Midge Orchid (ERM 2010)
Habitat Value
Not Habitat – areas not presently providing preferred or potential habitat (eg. Foredune Complex).
Potential Habitat – areas not presently providing known/preferred habitat but have the potential to provide preferred habitat (at least temporarily) for species exploitation following a natural or anthropogenic event (eg. fire, storm, clearing).
Known/Preferred Habitat - areas where TMO has been recorded + areas presently having a high likelihood of occurrence of the species (eg. cleared 4WD tracks)
0
400
800m
SCALE: 1: 20000 AT A4 SIZE
Copyright
"This document and the information shown shall remain the property of RPS Australia East Pty Ltd. The document may only be used for the purpose for which it was supplied and in accordance with the terms of engagement for the commission. Unauthorised use of this document in any way is prohibited."
TITLE: FIGURE 10: TUNCURRY MIDGE ORCHID HABITAT MAP
LOCATION: NORTH TUNCURRY
DATUM: DATUM
PROJECTION: MGA ZONE 56 (GDA 94)
DATE: 26/07/2012
PURPOSE: TMO REPORT 2012
LAYOUT REF: J:\JOBS\26K\26414 - North Tuncurry\10-Drafting\Orchid Investigations\2012 TMO Report Figures
VERSION (PLAN BY): PH / MD (A-A4)
CLIENT: LANDCOM
JOB REF: 26414
RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4940 4200 F: 02 4961 6794 www.rpsgroup.com.au
RPS

Appendix N : Landcom Planning Agreement outline to MidCoast Council

23 November 2018

LANDCOM

Mr Adrian Panuccio
General Manager
Midcoast Council
PO Box 450
Forster NSW 2428

Dear Adrian,

Planning Agreement North Tuncurry

Applicant

1 The Applicant is the NSW Department of Primary Industry – Crown Lands and Water (ABN 72 189 919 072).

Background

2 The Applicant has prepared a planning proposal ('**Planning Proposal**') to rezone land in North Tuncurry described as Lot 331 DP 1104340 and Lots 294-295 DP43110 (**'Land'**) for a range of uses including retail, employment, housing, open space and community facilities.

3 In preparing the Planning Proposal, Landcom, on behalf of the Applicant has submitted a State Significant Precinct Study ('**SSP Study**') to the Department of Planning and Environment ('**DPE**'). The SSP Study has undergone a 'test of adequacy' by the DPE. It is intended that the proposed rezoning will be effected by the making of a State Environmental Planning Policy which operates to amend the planning controls of the *Great Lakes Local Environmental Plan 2014*.

4 In conjunction with the preparation of the Planning Proposal, the Applicant has prepared a master plan for the development of the Land as part of the SSP Study ('**Master Plan**').

5 The Applicant intends to carry out development of the Land generally in accordance with the Master Plan ('**Development**')

6 The Applicant submits that the proposed Development will:

6.1 accommodate the housing and employment needs of the region's population over the next 25 years,

6.2 improve housing affordability and diversity,

6.3 secure approximately 330ha of land for permanent biodiversity conservation including over 90% of the known on site population of the critically endangered Tuncurry Midge Orchid,

6.4 provide positive outcomes for the traditional owners of the land, the Worimi and Birpai People of Forster Tuncurry, and

6.5 enhance Forster Tuncurry as a tourist destination.

Level 12, 19 Martin Place
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Offer

7 The Applicant offers to enter into negotiations with Mid Coast Council ('**the Council**') with a view to preparing a planning agreement ('**VPA**') under section 7.4 of the *Environmental Planning and Assessment Act 1979* on the terms set out in this letter ('**Offer**').

8 The Applicant has appointed Landcom as project manager for the Planning Proposal and the Development. Landcom will be negotiating and preparing the VPA on behalf of the Applicant.

9 The VPA is intended to be entered into in connection with the rezoning of the Land in accordance with the Planning Proposal.

10 The VPA is intended to secure the provision of development contributions specified in this letter if development consent is granted for the Development on the Land

11 The Applicant submits that the development contributions being offered meet the demand for public facilities and services generated by the Development.

Subject Land

12 The Land the subject of this Offer is located in North Tuncurry, details of which are included in Item 1 of Schedule 1 to this Offer ('**Schedule 1**').

Basis of the Offer

13 The terms of the Offer are set out in Schedules 1-3.

14 The development contributions offered in this letter are intended to replace any development contributions that may be imposed by the Council pursuant to section 7.11 or section 7.12 of the EPA Act.

15 It is proposed that the standard clauses contained in the planning agreement template used by Landcom will be included in the VPA. A copy of this template can be provided to Council on request.

Conclusion

16 It is considered that the development contributions proposed to be provided by the Applicant as detailed in this letter will meet the demand generated by the Development for public services and public amenities.

17 Subject to the Council's agreement to this Offer, the Applicant is seeking to enter into negotiations with the Council with a view to preparing a VPA on the basis of this Offer.

Yours sincerely,

Michael Pring
Development Director

1. Schedule 1

Details of Intended Offer to Enter into a Planning Agreement with Midcoast Council relating to rezoning and development of the Subject Land at North Tuncurry.

1	**Description of Land to which the Offer applies**	• Lot 331 DP 1104340 owned by The State of New South Wales • Lot 294 DP43110 owned by Crown Lands Reserve Trust • Lot 295 DP43110 perpetual lease to Forster-Tuncurry Golf Club Limited
2	**Development to which the Offer applies/Changes to the EPI to which the Agreement Applies**	Planning Agreement entered into in connection with a rezoning of the Subject Land to enable a range of uses including retail, employment, housing, open space and community facilities. Development contributions required to be provided subject to development consent being granted for the Development.
3	**Is Section 7.11 excluded?**	Section 7.11 is to be excluded from applying to the Development. Section 7.24 is not to be excluded from applying to the Development unless approval referred to in s7.4 (5A) of the *Environmental Planning and Assessment Act 1979* is obtained from the Minister or a development corporation designated by the Minister.
4	**Nature of the Contribution**	Monetary contributions, carrying out of works and dedication of land.
5	**Extent of the Contribution**	<u>Monetary contribution</u> Monetary contributions in the amounts which, when added to the contribution value of works and land to be dedicated do not exceed the amount of monetary contributions the Applicant would have had to pay if section 7.11 of the *Environmental Planning and Assessment Act, 1979* applied to the Development. Monetary contributions would be provided on a per residential lot basis for regional open space upgrades, library facilities and aquatic centre.
		<u>Carrying out of works</u> Works in the following categories: • open space – embellishment of parks generally in accordance with the landscape masterplan prepared by Context and submitted with the SSP Study, • major roads - extension and upgrading of Beach Street, construction of intersection of Lakes Way and northern access road, • community facilities being the construction of a 350m^2 community centre including storage for mobile surf life-saving facility. Details of work to be provided to be negotiated between the parties.

		Dedication of land • A northern conservation area to be dedicated to Council as a registered Biobank Agreement (now Biodiversity Stewardship Agreement) in the event it is not accepted by NPWS. The obligations and funding arrangements of the biobank site are set out in Schedule 3. • An eastern and western conservation corridor to be dedicated to the Council as a registered Biobank Agreement (now Biodiversity Stewardship Agreement). The obligations and funding arrangements of the biobank site are set out in Schedule 3. • An Orchid Reserve to be dedicated to the Council as a registered Biobank Agreement (now Biodiversity Stewardship Agreement). The obligations and funding arrangements of the biobank site are set out in Schedule 3. • Orchid pollinator corridors (as identified within the Tuncurry Biodiversity Certification Assessment Report prepared by Eco Logical and dated 8 August 2018) to be dedicated to Council. The management requirements for the orchid pollinator requirements outlined in the Tuncurry Biodiversity Certification Assessment Report will be registered on title prior to dedication. An in perpetuity funding package will be provided to Council to cover management of the corridors in line with an appropriate plan of management. • Local parks as shown in the Draft Masterplan to be dedicated to Council. • Community Centre and carpark to be dedicated to Council. A plan showing all lands to be dedicated to Council is annexed to this offer. Details of land to be dedicated to be negotiated between the parties.
6	**Timing of provision of development contribution**	Monetary contributions per residential lot will be provided before the issuing of the subdivision certificate that creates that lot. Open space and drainage works located in a particular stage of the development to be carried out during the development of that stage. Community centre to be provided by the later of the issuing of the subdivision certificate that creates the 1,100th residential lot or the issuing of the subdivision certificate for the 'B2 Local Centre stage' referred to in the Draft Master Plan. Beach Street upgrade and extension to be provided before the issuing of the subdivision certificate for Stage 4 of the Development. Lakes Way intersection to be provided before the issuing of the subdivision certificate that creates residential lots located north of the reconfigured golf course as shown in the Draft Master Plan. The Biobank sites will be dedicated in accordance with the requirements of the Biodiversity Certification. Details of timing of any other development contributions to be negotiated between the parties.

7	**Resolution of Disputes**	Disputes to be resolved through expert determination or mediation.
8	**Security**	Security for monetary contributions Monetary contributions to be secured through requiring monetary contributions in respect of a residential lot to be paid before the issuing of a subdivision certificate that creates that residential lot. Section 6.15 operates to prohibit the issuing of a subdivision certificates unless and until the relevant monetary contributions are paid.
		Security for carrying out of work Work to be secured through requiring completion of work before the issuing of a certain subdivision certificate. Section 6.15 operates to prohibit the issuing of that subdivision certificates unless and until the work is complete.
		Security for dedication of land Land to be dedicated to be secured by a provision allowing the Council to compulsorily acquire the land for nominal consideration if the land is not dedicated by the time required.
9	**Preparation of the Explanatory Note**	Applicant in conjunction with the Council
10	**Liability for the costs of preparing the agreement including the preparation of the Explanatory Note**	Applicant
11	**Is the Agreement to be registered on the Land to which it applies?**	The Agreement is not to be registered on title unless and until the land is sold to a third party developer.

2. Schedule 2

Details of Intended Monetary Contributions to be reflected in a Planning Agreement with Midcoast Council relating to rezoning and development of the Subject Land at North Tuncurry.

Major Roads		
Obligation	$651.95/trip x 7 trips/lot x 2123 dwgs	$9,688,628.90
	Less value of WIK (Beach St)	$743,600.00
		$8,945,028.90
	North Tuncurry Per lot rate	$4,213.40
Aquatic Centre		
Obligation	Contribution as per Council Section 94 Plan	
	North Tuncurry Per lot rate	$620.57
Surf Lifesaving		
Obligation	$165.8/lot x 2123 lots.	$351,983.00
	To be satisfied by WIK. WIK comprise establishment of mobile surf club.	
Library		
Obligation	Contribution as per Council Section 94 Plan	
	North Tuncurry Per lot rate	$1,026.88
Community Facilities		
Obligation	$533.76/person x 2.1 x 2123 lots	$2,379,622.00
	Less value of proposed community centre WIK on site	$1,500,000.00
		$879,622.00
	North Tuncurry Per lot rate	$414.33
Open Space		
Foreshore Development Obligation	Contribution for works at Point Road, Little Street and Breckenridge Channel ($216/lot adjusted for CPI to 2014-15)	$458,568.00
	North Tuncurry Per lot rate	$244.99
	Provision of WIK to minimum value of $300,000.00 comprising beach access (including new 4wd access at a time and location to be negotiated with Council) boardwalks etc. Recognition given to, and offset for, non-resident patronage of facilities	
Sports Fields Development Obligation	Contribution of $699/dwelling adjusted for CPI to 2014-15	
	North Tuncurry Per lot rate	$792.80

Linkages Program Obligation	Obligation as per Section 94 Plan adjusted for CPI to 2014-15 = $159,678.00 Contribution by WIK to minimum value of $159,678.00 North Tuncurry Per lot rate	$0.00
General Park Improvement Obligation	Obligation as per Section 94 Plan adjusted for CPI to 2014-15 = $641,184.62 Contribution by WIK – embellishment of 9 proposed parks in accordance with the North Tuncurry Landscape Masterplan at an estimated value of $7,130,000.00 North Tuncurry Per lot rate	$0.00
Land Acquisition	Dedication of 6.1ha of parks (@$150,000 = $915,000) Contribution for acquisition of land for sports fields 3.6ha @$150,000 $540,000/2123 lots = $254.35/lot adjusted for CPI to 2014-15 North Tuncurry Per lot rate	$288.44

Summary Table

	Cash Contribution Per Lot	Total Value of Cash Contribution (2123 lots)	Value of WIK & Land Dedication	Total Value of Cash Contribution + WIK
Major Roads	$4,123.00	$8,753,129.00	$743,600.00	$9,496,729.00
Aquatic Centre	$620.57.00	$1,317,470.00		$1,317,470.00
Surf Lifesaving			$351,983.00	$351,983.00
Library	$1,026.88.00	$2,180,066.00		$2,180,066.00
Community Facilities	$414.33	$879,622.00	$1,500,000.00	$2,379,622.00
Open Space	$1,326.23	$2,815,586.00	$8,504,678.00	$11,320,264.00
Total	**$7,511.01**	**$15,945,873**	**$11,100,261.00**	**$27,046,134.00**

3. Schedule 3

1.1 Proposed Conservation Lands and Biodiversity Stewardship Agreement

The North Tuncurry State Significant Site Biocertification Assessment has identified 327.71 ha of land at North Tuncurry to be permanently protected and registered as a Biobank Agreement site (now a **Biodiversity Stewardship Agreement site** following the repeal of the TSC Act). The assessment has identified three Management Areas which are proposed to be registered as a single Agreement site by the Crown Lands and Water Branch of the Department of Primary Industries (**Figure 1**):-

- Management Area 1 - an approximate 70 ha Tuncurry Midge Orchid (TMO) habitat corridor and 4 ha TMO Reserve to the west of the proposed development;
- Management Area 2 - an approximate 55 ha Coast corridor to the east of the proposed development; and
- Management Area 3 - an approximate 200 ha northern conservation area adjacent to Darawank National Park.

In addition to the above, the assessment has also identified a number of TMO pollinator corridors along 'finger drains' that 'link' the TMO Reserve to other areas of protected habitat (**Figure 2**). These 'finger drains' will be dedicated to MCC, classified as Community Land – Natural Area under the Local Government Act 1993 and be subject to the preparation and implementation of a Plan of Management to protect and maintain their value as pollinator corridors in perpetuity.

A Biodiversity Stewardship Agreement is entered into with the **NSW Biodiversity Conservation Trust** (BCT), is registered on title, and requires the owner, and subsequent owners, to manage the land in accordance with the agreement, 'in perpetuity'.
The owner of a stewardship site undertakes **agreed management activities** to *'improve and maintain'* the conservation values of the land. All stewardship sites are required to implement 'standard' management actions' and, depending on what threatened species may also be present (e.g. TMO, Koala, Eastern Pygmy Possum and Brush-tailed Phascogale), 'additional management actions' may also be required.

Standard management actions include:-

- 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 will not be sufficient;
- Retention of dead timber;
- Erosion control; and
- Retention of rocks.

'Additional' management actions include:

- Control of feral and/or overabundant native herbivores (Kangaroo, rabbits, goats, pigs, deer, foxes and/or miscellaneous species);
- Nutrient control; and
- Maintenance or reintroduction of natural flow regimes (as relevant).

A landowner may continue to use a stewardship site for other purposes (e.g. passive recreation) so long as that use is consistent with the primary objective of conservation management.

When an application to register a BSA site is submitted to the BCT, a **Management Plan** is prepared and the cost of meeting the above management actions is calculated on an annual and in perpetuity basis using a specially designed 'in perpetuity management cost calculation spreadsheet'. Eco Logical Australia have estimated the in perpetuity management cost for the areas shown in **Figure 1** using this spreadsheet, at $3.0M over and above the first 5 years of management which will be undertaken by the Crown Lands and Water Branch of the Department of Industry.

Once registered, the stewardship site owner receives annual payments from the Biodiversity Conservation Fund (BCF) to enable the management actions to be undertaken (the amount depends on the extent of management required). The $3.0M invested in the BCF, will generate around $100,000-$110,000 per annum to undertake the required management and reporting of the BSA site in perpetuity.

The stewardship site owner is required to submit an annual report to the scheme manager (BCT) to demonstrate that they have fulfilled their management obligations (The cost of this reporting is included in the $3.0M). The stewardship site owner is then provided with an annual payment (indexed to the CPI) from the BCF. If management activities are completed at a lower cost than the annual payment, the owner keeps the difference, if they are more, the owner bears the cost, hence it is important to make sure that the calculation of likely future management costs are as accurate as possible.

1.2 Obligations & Risks for Stewardship site owner/operators

Once a Biodiversity Stewardship Agreement is registered on title, it establishes an obligation on the owner of the land to manage and report on the implementation of the obligations within the Agreement in perpetuity.

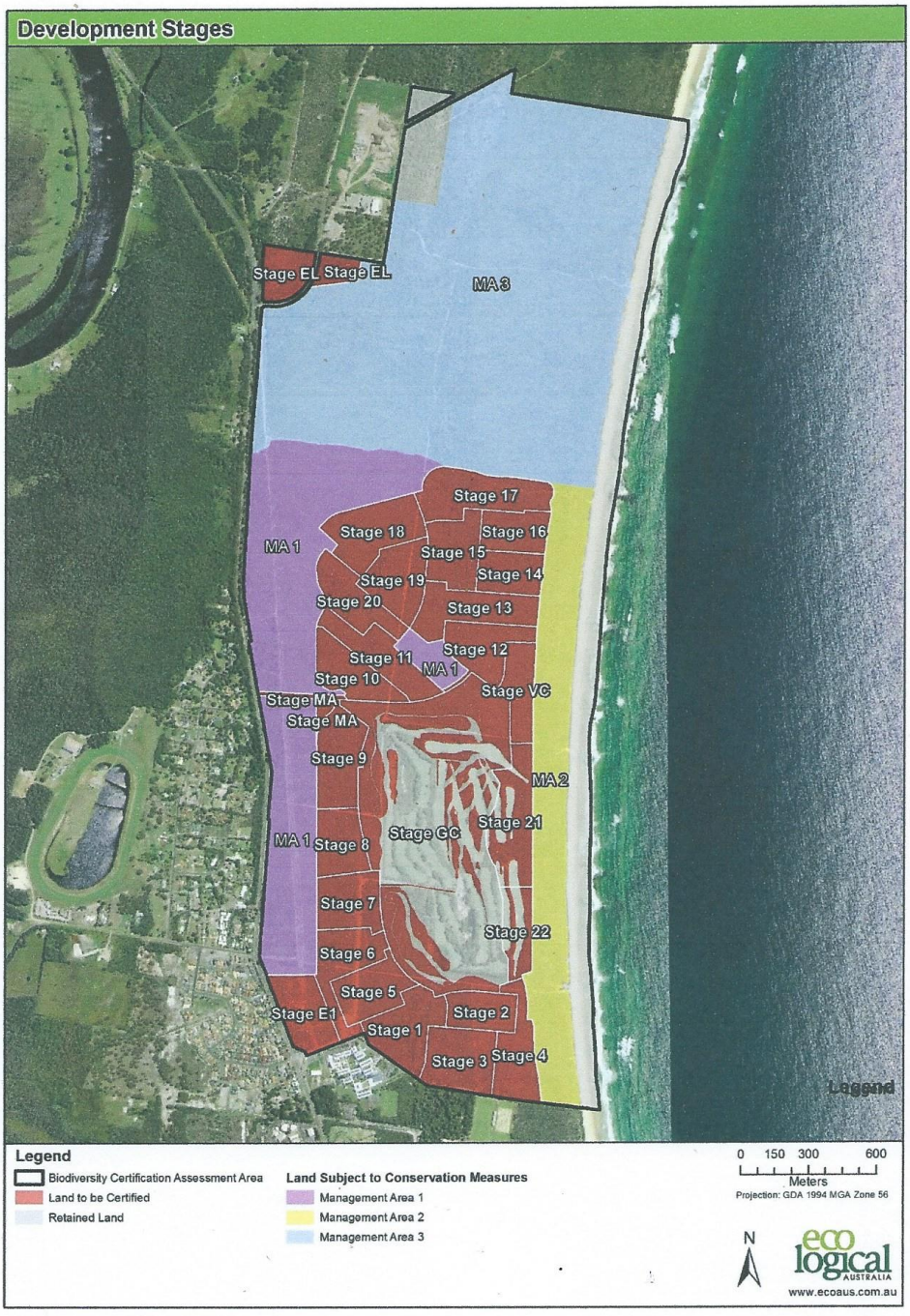
Stewardship site owners can either manage these obligations themselves, or contract a private manager. The owner receive annual payments from the BCF from the 'Anniversary or Commencement Date' of the Agreement (once the credits have been 'retired and the funds for in perpetuity management have been deposited in the BCF) on provision of a 'satisfactory' annual report. Owners may be subjected to random and targeted compliance checks by the BCT to ensure that the property is being managed in accordance with the agreement.

If management obligations are not met, annual payments may be withheld until management actions are completed, or money held in the BCF may be used by the Trust to engage third parties to complete management actions not completed by the owners. It is therefore important that stewardship site owners keep accurate and detailed records of all management activities.

1.3 Proposed future ownership of the Biodiversity Stewardship Agreement Area

Whilst the North Tuncurry SSS Biocertification Assessment commits the Crown Lands and Water Branch of the Department of Industry to submit for registration, a Biodiversity Stewardship site application over the lands shown in Figure 1 within 12 months of biocertification being conferred, this does not prevent the land being transferred to another long term land manager. Subject to the Agreement of any future land owners, a stewardship site may be transferred and the new owner will then take on the legal responsibility for the ongoing management of the subject land, including the funds held in the BCF.

It is possible that parts of the identified conservation lands may be managed by MCC and the NSW National Parks and Wildlife Service.


Development Stages
Stage EL
Stage EL
MA 3
Stage 17
Stage 18
Stage 16
MA 1
Stage 15
Stage 19
Stage 14
Stage 20
Stage 13
Stage 12
Stage 11
MA 1
Stage 10
Stage VC
Stage MA
Stage MA
Stage 9
MA 2
Stage 21
Stage GC
MA 1
Stage 8
Stage 7
Stage 22
Stage 6
Stage 5
Stage E1
Stage 2
Stage 1
Stage 3
Stage 4
Legend
Legend
Biodiversity Certification Assessment Area
Land to be Certified
Retained Land
Land Subject to Conservation Measures
Management Area 1
Management Area 2
Management Area 3
0 150 300 600
Meters
Projection: GDA 1994 MGA Zone 56
N
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Tuncurry Midge Orchid Pollinator Corridors
Stage 17
Stage 18
Stage 16
Stage 15
Stage 14
Stage 19
Stage 20
Stage 13
Stage 12
Tuncurry Midge Orchid Reserve
Stage 11
Stage 10
Stage VC
Stage MA
Stage MA
Stage GC
Stage 9
Stage 21
© Department of Finance, Services & Innovation 2017
Legend
Land to be Certified
Land to be Certified (restored as TMO Pollinator Corridor)
Land Subject to Conservation Measures
Retained Land
Staging
Area to be impacted and restored as TMO Pollinator Corridors
0 50 100 200
Meters
Projection: GDA 1994 MGA Zone 56
N
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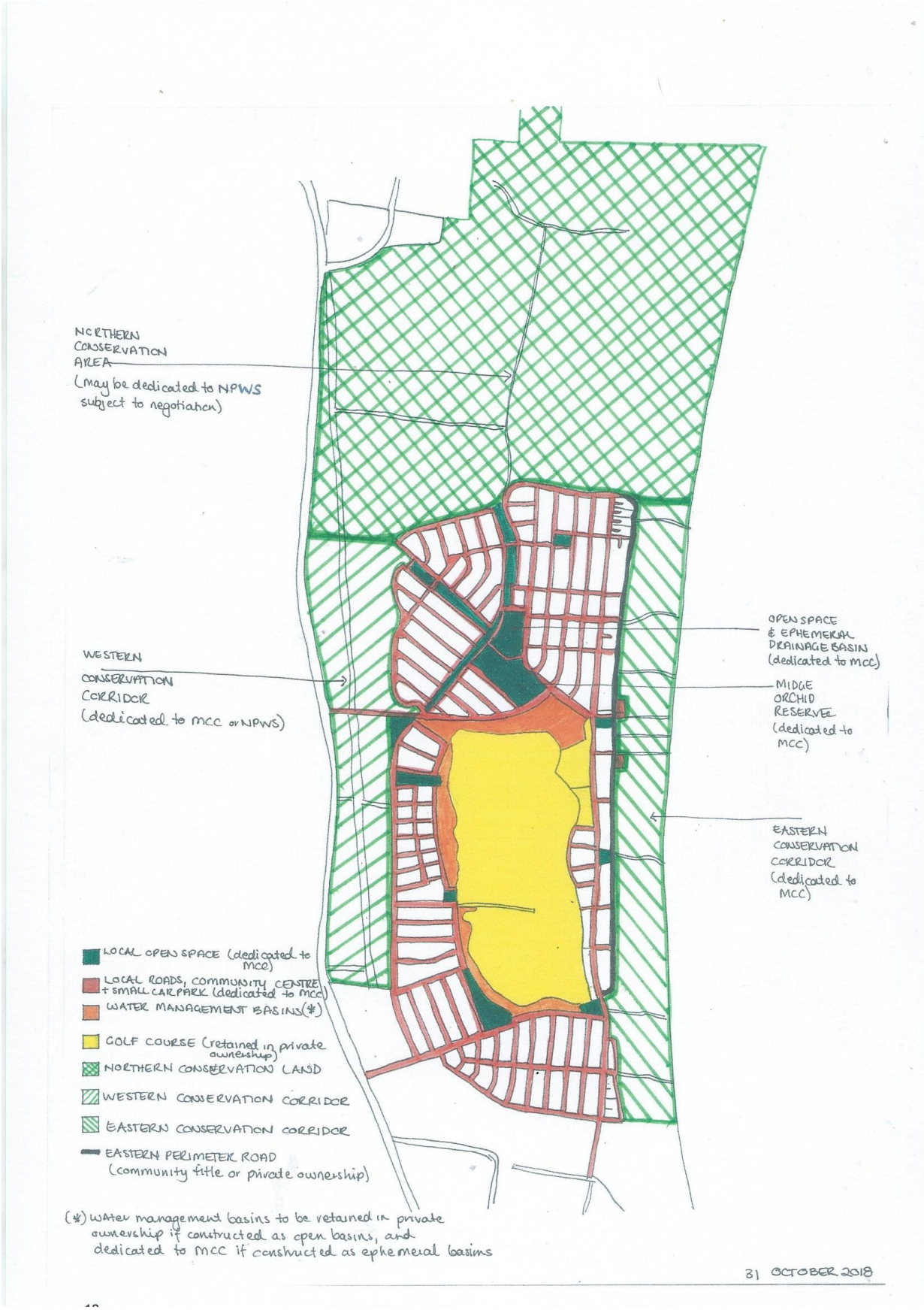
NORTHERN CONSERVATION AREA
(may be dedicated to NPWS subject to negotiation)
WESTERN CONSERVATION CORRIDOR
(dedicated to MCC or NPWS)
OPEN SPACE & EPHEMERAL DRAINAGE BASIN (dedicated to MCC)
MIDGE ORCHID RESERVE (dedicated to MCC)
EASTERN CONSERVATION CORRIDOR (dedicated to MCC)
LOCAL OPEN SPACE (dedicated to MCC)
LOCAL ROADS, COMMUNITY CENTRE + SMALL CARPARK (dedicated to MCC)
WATER MANAGEMENT BASINS(*)
GOLF COURSE (retained in private ownership)
NORTHERN CONSERVATION LAND
WESTERN CONSERVATION CORRIDOR
EASTERN CONSERVATION CORRIDOR
EASTERN PERIMETER ROAD (community title or private ownership)
(*) water management basins to be retained in private ownership if constructed as open basins, and dedicated to MCC if constructed as ephemeral basins
31 OCTOBER 2018

Appendix O : MidCoast Council response and resolution to planning proposal, land transfers and management of Biobank areas

MIDCOAST council

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4 Breese Parade | PO Box 450
Forster NSW 2428

18 April 2019

Michael Pring
Development Director
Landcom
PO Box Q1744, QVB
Sydney NSW 2000

Ref: Land Use and Planning/ North Tuncurry Release Area

Enquiries: Louise Morris

Dear Michael,

Planning Agreement North Tuncurry Urban Release Area

I refer to your correspondence dated 23 November 2018, offering to enter into a planning agreement with Council in relation to the proposed rezoning and associated master plan on land in North Tuncurry (Lot 331 DP 1104340 and Lots 294-295 DP 43110).

Council considered this offer at its Ordinary meeting held on the 10 April 2019 and resolved the following;

A. *That Landcom be advised that Council will not accept the 270 hectares of western and northern conservation areas referred to as 'Management Areas 1 and 3' located adjacent to the Lakes Way and the Darawank Nature Reserve.*
B. *That Landcom be advised that Council is prepared to consider entering into negotiations for a Planning Agreement for the North Tuncurry Release Area for:*
    1. *The dedication of Conservation Management Area 2, as described in the letter of offer from Landcom dated 23 November 2018, following the completion of the Biobanking Agreement and Stewardship Agreement, including payment of sufficient funding into the Biodiversity Conservation Fund.*
    2. *The application of developer contributions applicable to the proposed development and possible credits for works in kind and the provision of services and facilities.*
C. *That Landcom be advised that any documentation placed on public exhibition should only refer to Council's position as set out in this resolution.*

The full Council Report and Resolution are enclosed for your information.

Please contact me in relation to the next steps to negotiating a planning agreement for the North Tuncurry Urban Release Area.

Yours sincerely

Roger Busby
Manager, Strategic Planning

Enclosed: Council Report dated 10 April 2019 'North Tuncurry Urban Release Area' and associated Council Resolution

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Extract from Council Resolution

4 NORTH TUNCURRY URBAN RELEASE AREA

Report Author	**Roger Busby - Manager Strategic Planning**
File No. / ECM Index	**Land Use and Planning/ North Tuncurry Release Area**
Date of Meeting	**10 April 2019**
Authorising Director	**Paul De Szell - Acting Director Planning and Natural Systems**

RECOMMENDATION

A) That Landcom be advised that Council will not accept the 270 hectares of western and northern conservation areas referred to as 'Management Areas 1 and 3' located adjacent to the Lakes Way and the Darawank Nature Reserve.

ORDINARY Meeting of MIDCOAST COUNCIL held 10 APRIL 2019 Page 7

B) That Landcom be advised that Council is prepared to consider entering into negotiations for a Planning Agreement for the North Tuncurry Release Area for:

1. The dedication of Conservation Management Area 2, as described in the letter of offer from Landcom dated 23 November 2018, following the completion of the Biobanking Agreement and Stewardship Agreement, including payment of sufficient funding into the Biodiversity Conservation Fund.

2. The application of developer contributions applicable to the proposed development and possible credits for works in kind and the provision of services and facilities.

C) That Landcom be advised that any documentation placed on public exhibition should only refer to Council's position as set out in this resolution.

128/19 RESOLUTION

(Moved Cr D Keegan/Seconded Cr K Smith)

That the above recommendation be adopted.

FOR VOTE - Cr D West, Cr K Smith, Cr B Christensen, Cr L Roberts, Cr D Keegan, Cr C Pontin, Cr K Bell, Cr T Fowler, Cr K Hutchinson, Cr P Epov
AGAINST VOTE - Nil
ABSENT. DID NOT VOTE - Cr J McWilliams

Appendix P : Mid Coast Councils Agreement to the sale of biodiversity credits to Landcom

MIDCOAST council

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Taree NSW 2430

18 February 2019

Michael Pring
Development Director
Landcom
Level 14, 60 Station Street
Parramatta NSW 2150

Ref: A663852
Enquiries: Brendan Guiney

Dear Michael

Biobank dealing – Western Minimbah

I apologise for the delay in responding to your email dated 5 June 2018.

Whilst we haven't responded to the specifics of your email, Council was briefed in August and acknowledged progress with negotiating a sale of biobank credits to date. Council continues to be supportive of reaching an agreement.

We will provide a more specific response to the dot points contained in your email in due course.

In the meantime I trust that this letter provides Landcom with sufficient assurance of Council's interest in reaching a deal with biobank credits.

Yours sincerely

Brendan Guiney
Director Water Services

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F 02 4268 4361

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