APPENDIX 1

Letter from DPI dated 2/7/13

Planning & Infrastructure

Contact: Heather Warton
Phone: (02) 9228 6461
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Email: heather.warton@planning.nsw.gov.au

Our ref.: 09_0088

Mr John Toon
John Toon Pty Ltd
17 Bunyana Avenue
Wahroonga NSW 2076

- via email -
evjotoon@bigpond.com.au
mattphilpott@allenprice.com.au

Dear Mr Toon

Subject: Submissions received on proposed Concept Plan for a mixed use subdivision at Culburra West – part lot 5, part lot 6 and part lot 7 in DP 1065111 and lot 61 in DP 755971, Culburra Beach (09_0088)

The exhibition of the Environmental Assessment (EA) for the above project ended on 7 June 2013. Following on from our letter dated 17 June 2013, a total of 37 public submissions and seven public authority submissions were received. Two of the public submissions were petitions.

The public submissions and public authority submissions received can be viewed on the department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3846

A summary of the department's issues are included with this letter.

As this application is due to be transitioned to State significant development, a Response to Submissions (RTS) is required to be prepared in accordance with clause 85A of the *Environmental Planning and Assessment Regulation* 2000. The RTS must address the issues raised by the department and all submissions.

The RTS is required to be submitted to the department by **1 October 2013**.

I suggest that a meeting be held to discuss these issues in more detail. Please contact Ray Lawlor, Planning Officer, on 9228 6468 or at ray.lawlor@planning.nsw.gov.au to arrange a suitable time to meet with you.

Yours sincerely

Heather Warton
Director
Metropolitan and Regional Projects North

21/7/13

Department of Planning and Infrastructure – Key Issues

Concept Plan for Mixed Use Subdivision at Culburra West – MP09_0088

The following information is a list of the department's issues with many issues being supported by the public authority submissions. The issues listed below are not exhaustive - all submissions, from the public and public authorities must be thoroughly addressed by the proponent in the Response to Submissions and PPR.

1. Zoning/ Planning controls

As the application is to be transitioned to State significant development and be determined under Part 4 of the Act, the application needs to address Section 79C of the Act. This includes but is not limited to:

- the current and proposed zoning across the whole site – and the uses proposed in each zone;
- addressing the relevant clauses with Shoalhaven Local Environmental Plan 1985 (LEP1985) and the draft LEP2013; and
- addressing Development Control Plan 67 (DCP67) and DCP100 in greater detail.

There are a number of non-permissible uses (under LEP1985) proposed in the current scheme which could not have been considered if the project remained under Part 3A of the Act (because the site is located in a 'sensitive coastal location', as defined in State Environmental Planning Policy (SEPP) (Major Development) 2005), and which cannot be considered under Part 4 of the Act. These uses will need to be removed from the proposal:

- the residential development proposed in stage 1, within the 5(a) Special Uses – Community Uses is not permissible. Housing for the 55+ age group is not considered to be a 'community use'; and
- the works proposed in the 7(a) Environment Protection zone such as car parking, boat ramp, jetty, water sensitive urban design (WSUD) infrastructure, vista clearing, asset protection zones (APZ) and, recreational open space and infrastructure are all not permissible uses.

2. Development in Lake Wollumboola Catchment

The application does not provide enough justification for the following elements to be allowed within the within the Lake Wollumboola Catchment:

- parts of the collector road and corresponding parts of the some residential lots;
- the roundabout;
- the oval;
- part of the road reserve within the 3.4ha medium density site;
- the southern part of Stage 1; and
- the south western part of the Stage 5 industrial estate.

It is acknowledged some development is unavoidable in the catchment, eg the roundabout but it is still important to justify all breaches and address any adverse environmental impacts and mitigation measures.

3. Subdivision layout/ Urban design

The subdivision layout will require a significant redesign to make it more energy efficient, more permeable to pedestrians and to include useable open space. Considering a subdivision layout of more small-medium blocks of east-west orientated lots designed around useable open space may overcome many of the issues. Guidelines produced by Landcom, particularly the 'Street Design Guidelines' and the 'Open Space Design Guidelines' should be reviewed. They can be found here:

http://www.landcom.nsw.gov.au/news/publications-and-programs/the-landcom-guidelines.aspx

The department wishes to meet to discuss some amendments to the design in more detail.

4. Foreshore area

The foreshore area, zoned 7(a) Environment Protection should be managed as such to provide a buffer between the proposed development and the Crookhaven River. The foreshore area will act as a filter and also contains sensitive vegetation and Aboriginal heritage.

As mentioned in 'Zoning/ Planning controls' (above), the majority of uses proposed in this area are not permissible uses and the concept plan will need to be revised accordingly.

5. Water Quality/ Water Sensitive Urban Design

The submitted Water Cycle Management Report requires further work. The claim made in the report that a water sensitive urban design (WSUD) treatment system can be implemented to improve water quality from the site post-development does not seem possible given the relatively undisturbed and vegetated state of the site. See the comments from Office of Environment and Heritage (OEH) and Fisheries NSW (Department of Primary Industries (DPI)) for more details.

- The potential impacts on oyster aquaculture within the Crookhaven River estuary must be addressed.
- No WSUD infrastructure will be permitted in the 7(a) zone due to reasons outlined in 'Zoning/ Planning controls' and 'Foreshore area'.
- A long term water monitoring program to be implemented prior to stage 1 is required.

6. Threatened species and Offset strategy

The OEH is satisfied that development is unlikely to have a significant impact on threatened species and their habitats subject to no development or clearing occurring in the foreshore area and a suitable offset area being agreed.

Further details, comments and issues to be addressed are found in both the OEH submission and council's submission. It is acknowledged that the OEH has worked closely with the ecological consultant, SLR to resolve many issues and therefore some of the issues in council's submission (which precedes the comments by OEH) have now been resolved.

The biobanking assessment prepared by Cumberland Ecology on the request of SLR to inform an offset ratio for the development was received by the department on 19 June 2013. The department is seeking its own independent review of the assessment. It is acknowledged the final determination of an offset ratio will be subject to further discussion amongst all parties.

7. Traffic / transport/ access

As detailed in the submissions from the RMS and council, the submitted Transport and Accessibility Impact Assessment requires more work in terms of addressing the impacts of the proposal on the road network from the site to the Princes Highway with particular attention needed for the intersection of the Princes Highway and Kalandar Street. Required infrastructure upgrades will need to be proposed and submitted.

The RMS and council do not support the separate access to the stage 5 industrial area off Culburra Road, for safety reasons. All access to the stage 5 industrial area should be off the proposed roundabout and new collector road.

8. Bushfire

- All APZs and fire trails required for the development must be within the subject site and not encroach 7(a) zoned land or land within the Lake Wollumboola catchment. Some encroachment areas include: the 'leisure hub' showing 40-70m APZ partially in 7(a) land; the 3.4ha medium density site showing a 25m APZ within the catchment; Stage 1 showing the APZ within catchment land; and there appears to be a fire trail off the far western boundary of the site in the adjoining property.
- Any APZ to 55+ housing generally needs to be 70m.
- Council does not support an APZ within the land that contains the sewage treatment plant.
- The plan within the bushfire report shows APZs encroaching some lots, eg the northern industrial lots, the eastern residential lots and the northern road (road is 20m wide but a 25m wide APZ is needed). The subdivision layout will need to be altered or alternatively the development potential of affected lots will need to be demonstrated if they are partially restricted by APZs.

9. Landscaping

The planting of street trees should be consistent with council's 'Town Street Tree Planting Strategy' (ref. POL08/282) which can be found via the link below. An extract forms part of council's submission. Norfolk Island Pines do not form part of council's tree planting strategy.

http://doc.shoalhaven.nsw.gov.au/displaydoc.aspx?record=POL08/282

10. Aboriginal Cultural Heritage

- More work would be required if development were to proceed in the foreshore area as the current assessment did not look at the impacts of development on middens within the 'leisure hub' area.
- Further assessment involving test excavations should be undertaken within the survey area WC15 and a sample of the portions of WC 9 and 14 within the zone of high potential for subsurface deposits of artefacts with 200m of the shoreline.

11. Social/economic justification

The Social Impacts Scoping Study requires further work. The application must justify the residential mix proposed, the need for commercial/ retail uses, the impacts on the existing Culburra Beach commercial area and demand for community and health related uses as a result of the proposal.

12. Other

- Further details need to be provided with regard to the 3.4ha 'medium density site' on the southern side of the collector road. A 20m tower within this area is not supported because the structure and height are inappropriate in the context of the area.
- The heights proposed within stage 1 (4 storeys), stage 2 (3 storeys) and stage 4 (up to 3 storeys within the commercial development) have not been justified in the context of the site's location. The Culburra Beach area predominantly consists of single storey development and anything more than 2 storeys is unlikely to be supported.
- The 'future development zones' within stage 5 and within the area to the east of the industrial estate are not part of the concept plan application and as such should not be annotated on the proposed concept plan map.
- The clearing for vistas proposed in the land east of the industrial estate, in front of stage 2 and any clearing in front of the 'leisure hub' will not be supported due to the clearing not being a permissible use under the 7(a) zoning. The clearing of vegetation for view lines is not considered to be a legitimate reason for the clearing healthy, indigenous vegetation.
- The application must address the staging/ timing of dwelling construction in relation to the provision of electricity infrastructure. The proposal will rely on the Tomerong Transmission Substation to be established and it is programmed to be commissioned by the end of 2014.
- The site will require a 1ha area for a substation. A 0.9ha area is shown in the land to the east of the industrial estate. Endeavour Energy has requested the substation be proposed closer to Culburra Road.
- Odour impacts – Shoalhaven Water has reiterated that no residential allotment should be permitted within the 400m buffer zone of the sewage treatment plant despite the submitted Odour Impact Assessment. Any modification to this requirement will require full consultation/ approval from Shoalhaven Water. The proponent is advised to liaise directly with Shoalhaven Water.

APPENDIX 2

Letter from DPI dated 7/4/2014

NSW GOVERNMENT | Planning & Infrastructure

Contact: Sally Munk
Email: sally.munk@planning.nsw.gov.au
Phone: 02 9228 6431

Our ref: MP09_0088

Mr John Toon
John Toon Pty Ltd
17 Bunyana Avenue
Wahroonga NSW 2076

Dear Mr Toon

Subject: Mixed Use Subdivision Concept Plan at West Culburra – MP 09_0088

I refer to the Response to Submissions (RtS) report dated October 2013 for the above project. The agency has undertaken a thorough review of the proposed concept plan as outlined in the RtS and has considered eight submissions from government agencies received in response to our referral of this document.

Following this review and a visual inspection of the site on Thursday 3 April 2014, the agency considers that the following key issues must be addressed in a Preferred Project Report (PPR) prior to determination of the concept plan:

1. Environmental Offsets - an environmental offset package is required that is consistent with the requirements of the Office of Environment and Heritage;
2. Subdivision Layout - the subdivision layout should have regard for Council's subdivision code (DCP 100), including more usable public open space, standard shaped lots, improved solar access and a more logical and permeable road layout;
3. Water Quality - water quality information should demonstrate a Neutral or Beneficial Effect (NorBE') on the Crookhaven Estuary, SEPP 14 Wetlands and Lake Wollumboola (please refer to the attached independent review report by WBM BMT for details);
4. Traffic and Access – resolution is required regarding the Culburra Road intersection; appropriate access arrangements must be provided for Stages 1 and 5 including the electricity substation; and further consideration must be given to impacts on the surrounding road network (e.g. safety, pavements, car parking);
5. Bushfire Management – the concept plan should illustrate the extent of all relevant APZs wholly within lot boundaries with appropriate emergency access arrangements for Stages 3 and 4 defined (south-west road connection to Culburra Road);
6. Foreshore Area and Zoning – the Cactus Point Leisure Hub requires further justification, including consideration of zoning/permissibility issues, landowners consent and the location of boat infrastructure and sea-wall revetment works on and adjacent to freehold land;
7. Economic Impacts – consistency with council's DCP 67 with respect to the extent of commercial development in the Culburra Expansion Area should be demonstrated or sufficient justification provided for any inconsistencies.

As discussed with Ms Sally Munk, A/Team Leader, the agency would like to meet with you at 2pm on Wednesday 9 April 2014 to explain and discuss these issues further prior to the preparation of the PPR.

Yours sincerely,

7/4/14

Dan Keary
Director
Industry, Key Sites and Social Projects

NSW GOVERNMENT | Planning & Infrastructure

Contact: Sally Munk
Email: sally.munk@planning.nsw.gov.au
Phone: 02 9228 6431

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Mr John Toon
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As discussed with Ms Sally Munk, A/Team Leader, the agency would like to meet with you at 2pm on Wednesday 9 April 2014 to explain and discuss these issues further prior to the preparation of the PPR.

Yours sincerely,

7/4/14

Dan Keary
Director
Industry, Key Sites and Social Projects

APPENDIX 3

Tabulated responses to issues raised by DPI/DPE.

APPENDIX 3

Tabulated Responses to Issues Raised by DPI/DPE

Principle Issue	Elaboration of Issue	Action Taken	Where Located in RT5
1. Zoning/Planning Controls	1.1 Current and proposed zoning.	All proposed land uses consistent with SLEP 1985.	Note: no zoning changes from SLEP 1985 proposed. See Appendix 4. Reported in Sections 2, 3 and 5.
	1.2 Relevant clauses of SLEP 1985 and draft SLEP 2013.	Noted. No action required.	
	1.3 Addressing DCP67 and DCP100 in greater detail.	Mixed use in 'The Circus' deleted; DCP100 to be adopted for road design unless varied by a site specific DCP.	Only major roads shown on plan See also section 8.2.
	1.4 Removal of uses: Stage 1 in 5(a) zone.	Residential uses removed from 5(a) zone; roads (a permitted use) retained for access.	See Concept Plan and Figure 15 for preliminary layout of Stage 1.
	1.5 Works proposed in 7(a) Environmental Protection Zone (car parking, boat ramp, jetty, water sensitive urban design infrastructure, vista cleaning, asset protection zones, recreational open space and infrastructure.	All ancillary works such as bio-swales, children's play areas etc have been removed from the 7(a) Environmental Protection Zone in the Concept Plan. All proposed development below mean high water mark, such as sea-walls, boat ramps and jetties have been removed from the Concept Plan. Only the indicative route of the proposed cycle/walkway is retained (see Section 8.5). The proponent seeks approval for the clearing of the foreshore vegetation (primarily mangroves) for the three vistas. This proposal was conditionally supported by Cumberland Ecology (see section 8.1).	See Concept Plan and Section 8.6.

Principle Issue	Elaboration of Issue	Action Taken	Where Located in RT5
2. Development in Lake Wollumboola catchment – justification for elements of the Concept Plan that are located within the catchment of Lake Wollumboola.	General applying to each encroachment.	Each encroachment reviewed and confirmed.	See Section 2 and Section 9. See also Water Cycle Management Report, Martens, November 2016 and Addendum to that reported dated 9 June 2017 (Appendix 7).
	2.1 Parts of collector road and some residential lots.	Parts of the collector road. Collector Road retained; residential lots deleted adjacent to industrial zone.	See Section 9.1 and Concept Plan.
	2.2 The roundabout.	The roundabout. Retained in its location. Swale added to Wattle Creek.	See Section 9.2, Figure 12 and Addendum to Water Cycle Management Plan (Appendix 7).
	2.3 The oval.	The oval is located on the most suitable site. Oval and associated access and pondage retained. Location endorsed by Council.	See Section 9.3, Concept Plan and Addendum to Water Cycle Management Plan (Appendix 7).
	2.4 Part of the road reserve in the 3.4ha medium density site.	Collector road alignment adjacent to the oval retained.	See Section 9.4 and Concept Plan.
	2.5 The southern part of Stage 1.	Southern part of Stage 1 retained. Detailed site survey enabled area that can be drained by gravity to Culburra Road to be proved up.	See Section 9.5, Concept Plan and Figure 15 for preliminary layout of Stage 1.
	2.6 The south-western part of Stage 5.	South-western part of Stage 5 (the industrial zone) is retained.	See Section 9.6, Concept Plan and Addendum to Water Cycle Management Plan (Appendix 7).
3. Subdivision layout/urban design	3.1 Energy efficiency. 3.2 Permeability. 3.3 East-west oriented lots. 3.4 Useable open space.	All local roads and all indicative residential and industrial subdivisions removed from Concept Plan. Issues no longer relevant in Concept Plan and will be dealt with in Part 4 applications to Council.	See Concept Plan, Stages 1-5; see also Sections 6 and 8.2 of RTS.
4. Foreshore Area	4.1 Buffer zone. 4.2 Proposed uses not permissible.	All the non-permissible uses have been removed.	See 1.5 above.
5. Water Quality/water sensitive urban design (WSUD)	5.1 Potential impacts on oyster leases.	The land-side Water Cycle Management Plan has been re-worked to accord with the peer-reviewers' recommendations. A marine ecology report has been completed	See Water Quality Monitoring Plan, November 2016, Martens and Addendum to that report dated 9 June 2017 (Appendix 7). See also Section 8.3 and Appendix 8)

Principle Issue	Elaboration of Issue	Action Taken	Where Located in RT5
		indicating that the marine ecology (mangroves, sea-grasses and salt marsh eco-systems) in the Crookhaven estuary are in good condition and no adverse impact is considered likely because NorBE is achieved as described in the Addendum.	
	5.2 No WSUD infrastructure in the 7(a) zone.	All WSUD devices now located in the land-side of the 7(a) zone. Following the recent review of the land-side water Cycle Management Plan all WSUD infrastructure has been deleted from the Concept Plan (see Appendix 7).	Section 8.3.
	5.3 Long term water quality monitoring plan.	Monitoring Plan proposed.	See Water Quality Monitoring Plan November 2016, Martens; and Section 8.3 and Section 10.2.
6. Threatened species and offset strategy	6.1 Determination of offset ratio.	See email from Ecology Australia outlining the number of credits required using the biobanking formula and indicating where the required credits will be sourced (see Appendix 6).	Section 8.1 and Appendix 6.
7. Traffic/transport access	7.1 Sub-regional network.	No action was required on the sub-regional network.	
	7.2 Access to the industrial zone.	Access to the industrial zone is still under consideration, being part of an assessment of the performance of Culburra Road from the roundabout to the existing edge of the settlement (Canal Street East).	For current plan see Figure 12.
8. Bushfire	8.1 All APZ's and bushfire trails to be within the subject site and not encroach on the 7(a) zone.	See Figure 14 and Section 8.5. All APZ's are within the site, none encroach on the 7(a) zone.	See Figure 14.

Principle Issue	Elaboration of Issue	Action Taken	Where Located in RT5
	8.2 APZ for 55+ housing.	The 55+ housing estate has been replaced with a small lot subdivision.	See Figure 15 – Stage 1 Residential development and Concept Plan.
	8.3 No APZ on STP site.	There are no APZ's on the STP site.	See Figure 14.
	8.4 APZ's affecting proposed industrial lots.	The industrial zone has been reduced in area with consequent adjustments to the APZ's.	See Concept Plan and Figure 14.
9. Landscaping	9.1 Street tree planting to be consistent with SCC 'Town Street Tree Planting Strategy'.	Noted. Street planting will be determined in co-operation with SCC.	See Concept Plan and Section 8.2 – Local Roads.
10. Aboriginal Cultural Heritage	10.1 Impact of development on middens in the 'leisure hub' area.	Action reviewed.	See Sections 8 and Figure 11.
	10.2 Further assessment of survey areas WC15, WC9 and WC14 within 200m of shoreline.	Action reviewed.	See Section 10.7 and Figure 11.
11. Social/economic justification	11.1 Justification of residential mix proposed.	No further action on residential mix.	See Sections 2 and 3; and Figure 15 for indicative mix of lot sizes.
	11.2 Need for commercial/retail uses.	No commercial or retail uses other than tourist/recreation oriented businesses are proposed.	See Concept Plan for 'Leisure Hub', and Section 3 for employment generation.
	11.3 Demand for community and health related uses.	No proposals for community or health facilities are proposed, other than the cycle/walkways and associated facilities.	See Section 4 and 8.2.
12. Other	12.1 Medium Density site details.	The medium density site has been amended to general residential. The proponent considers that the area zoned Local Centre in SLEP 2014 is well suited to medium density development but residential development is not permitted in the zone.	See Concept Plan and Section 1.
	12.2 Heights of development.	No heights are shown anywhere.	

APPENDIX 4

Summary of relevant zonings in SLEP 1985, Draft SLEP 2009 and SLEP 2014 for each land component of the Concept Plan.

APPENDIX 4

Summary of relevant zonings in SLEP 1985, Draft SLEP 2009 and SLEP 2014 for each land component of the Concept Plan

Description of Land Component of Concept Plan	SLEP 1985	Zoning Draft SLEP 2009	SLEP 2014	Proposed Use in Concept Plan
1. **Area**: 18.1 ha Land north of Culburra Road to HWM between Canal Street East and STP, part Lot 5 and part Lot 6, DP1065111.	3(f) Business (village); 7(a) Environmental Protection.	B2 local centre; foreshore E2 Environmental Conservation.	B2 and E2 as per draft LEP 2009.	Vista Park and associated works; Culburra Road to HWM. No other uses proposed.
2. **Area**: 2.55 ha Land south of Culburra Road extending to Downs Creek, west of retirement village to former tip, part Lot 5 and part Lot 6 DP1065111.	Part 2(c) residentiqal and part 5(a) special uses.	Part E2 and part special uses.	Vacant (planning proposal).	Part residential in 2(c) zone as per SLEP 1985. Access Road is 5(a) zone.
3. **Area**: 10.95 ha Land south of STP and north of Culburra Road, defined by zone boundary at west, part Lot 6 DP1065111.	4(a) Industry (general).	IN 1 General Industry.	Existing industry, vacant (planning proposal).	Part industrial; (including site for sub-station) part woodland and part road access (the Collector Road).
4. **Area**: 84.0 ha Land west of STP extending to western boundary of Portion 61, DP755971, generally north of divide (except oval) extending to Crown reserve (foreshore), part lot 6 DP1065111 and Portion 61 DP755971	2(a) residential; foreshore 7(a) Environmental Protection.	R1 General Residential to high ridge (soouth boundary) then to low ridge at east; foreshore E2.	Foreshore E2 over Lot 6 DP1065111, not over Portion 61 DP755971; vacant (planning proposal).	Residential, sports oval, leisure hub; foreshore retained woodland and associated recreation facillities (outside E2 zone), all in 2(c) residential zone as per SLEP 1985.

APPENDIX 5

Culburra West and Millaben: A Preliminary Biobanking Assessment Report. Cumberland Ecology, September 2014.

CULBURRA WEST & MILLALEN

Preliminary BioBanking Assessment Report

For:

The Halloran Trust

September 2014

Final

PO Box 2474
Carlingford Court 2118

Report No. 14073RP1

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

Revision	Date Issued	Reviewed by	Approved by	Date Approved	Revision Type
1	18/08/2014	DR	DR	18/08/2014	draft

Approved by: David Robertson

Position: Director

Signed: David Robertson

Date: *10 September, 2014*

Table of Contents

Table of Appendices

List of Tables

List of Figures

Executive Summary

The purpose of this report is to address three residual ecological issues for a proposed residential development that is being assessed as a major project (09_0088 Mixed Use Subdivision West Culburra Concept Plan) under the NSW *Environmental Planning and Assessment Act 1979*. These issues are:

- the suitability of a proposed offset;
- the need for retention of north-south habitat corridors within the proposed development; and
- the ecological impacts of proposed viewing corridors through mangroves and other native vegetation adjacent to the proposed development.

The NSW BioBanking Credit Calculator has been run for both the development site at Culburra West and the proposed offset site at Millalen, Sussex Inlet. The results show that the development site would require to be offset by the purchase of 5,936 credits (if BioBanking were used to determine the offset). The BioBanking assessment of the offset site shows that it provides broadly the correct forms of credits, but that it only supplies about a quarter of the credits required under BioBanking.

We note that as the Culburra Project is being assessed as a Major Project and that as such it does not need to have a BioBanking outcome. We consider the offset to be adequate because of its high quality vegetation and its strategic location, specifically:

- The offset is located directly adjacent to Conjola National Park to the north and west, as well as within close proximity to Corramy Regional Park to the north;
- 90% of the offset boundary is formed by the waters of Tullarwalla Lagoon, St Georges Basin and Wandandian Creek. The area is therefore almost completely protected from disturbance and access by its natural surrounds;
- The total size of the offset is 286.06 ha, while the proposed clearing for development is 87.29 ha, 14.13 of which is cleared introduced grassland which results in an offset ratio of 1:3.2, or 1:3.9 if the grassland is excluded:
- The offset comprises a total of almost 300 hectares of native open forest and woodland in what is assumed to be excellent to good condition, including:
    - 168.33 ha of *Bangalay Sand Forest in the Sydney Basin and South East Corner Bioregions* EEC; and
    - 8.09 ha of *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions* EEC;

The proponent intends to create a public foreshore cycling/walking trail and to undertake substantial weed removal and rehabilitation works within the foreshore park, as well as creating three view corridors out into the Crookhaven River, the details of which are discussed in this report.

Chapter 1

Introduction

1.1 Purpose

The purpose of this report is to address three residual ecological issues for a proposed residential development that is being assessed as a major project (09_0088 Mixed Use Subdivision West Culburra Concept Plan) under the NSW *Environmental Planning and Assessment Act 1979*. These issues are:

- the suitability of a proposed offset;
- the need for retention of north-south habitat corridors within the proposed development; and
- the ecological impacts of proposed viewing corridors through mangroves and other native vegetation adjacent to the proposed development.

1.2 Project Background

In September 2013 Cumberland Ecology was commissioned by SLR Consulting Australia Pty Ltd to prepare a preliminary BioBanking assessment for a potential development site in Culburra West (Cumberland Ecology 2013). The proposed development area is approximately 87 ha in size of which 14.13ha is grassland, It is located at Culburra, which is in the Shoalhaven Local Government Area (LGA) and in the Southern Rivers Catchment Management Authority (CMA). The total size of the property is approximately 247 ha (**Figure 1.1**).

The BioBanking assessment was based on a vegetation map and ecological assessment provided by SLR (2013). The results of the preliminary BioBanking assessment determined what type and quantity of BioBanking credits would be needed if the development was to be offset under the NSW BioBanking scheme. This current report includes the unaltered findings from that original assessment.

The Office of Environment and Heritage (OEH) in 2013 issued a media release and published seven new principles for offsets for Major Projects on their website. These seven principles now form the principles of the current Draft Framework of Biodiversity Assessment (FBA) for Major Projects (2014). The principles state that:

- Before offsets are considered, impacts must first be avoided and unavoidable impacts minimised through mitigation measures. Only then should offsets be considered for the remaining impacts;
- Offset requirements should be based on a reliable and transparent assessment of losses and gains;
- Offsets must be targeted to the biodiversity values being lost or to higher conservation priorities
- Offsets must be additional to other legal requirements;
- Offsets must be enduring, enforceable and auditable;
- Supplementary measures can be used in lieu of offsets;
- Offsets can be discounted where significant social and economic benefits accrue to NSW as a consequence of the proposal.

In summary, NSW offset principles for major projects (OEH 2014) state that unavoidable impacts of a proposed development can be offset, as long as these offsets:

- Aim to result in a net improvement in biodiversity over time;
- Are enduring;
- Are supplementary, i.e. not already managed for conservation; and
- Are enforceable.

A potential offset area chosen by the proponent satisfies necessary criteria as it is in private ownership and is not covered by any existing conservation agreements (**Figure 1.3**). This report provides a preliminary BioBanking assessment for this area in order to ascertain its suitability as an offset.

It is to be noted that the Culburra West Development Project is being assessed as a Major Project and that as such it does not need to have a BioBanking outcome. The assessment of both, the development and offset sites, under the NSW BioBanking scheme (OEH 2012) is therefore indicative only.

This report is a desktop assessment and is based on third party information. No staff member of Cumberland Ecology has visited the proposed offset or development area.

1.3 OEH comments

A letter from OEH (OEH 2013), which was written in response to the Concept Plan for this project, dated 21/06/2013 states that:

"The EA required the need for a local corridor to be identified linking the site to areas in both the North and South of the site in the Director Generals Requirements and in the South Coast Regional Strategy recommendation. OEH considers that while it is imperative to maintain the foreshore buffer for a range of environmental and cultural heritage reason, this may not necessarily provide a functional local corridor as vegetation in the surrounding local area is likely to be cleared in the future. Rather, it is critical for the potential offset options to provide enhanced connectivity at the landscape or regional scale."

The north-south corridor issue is further discussed in **Section 5.3** of this report.

1.4 BioBanking

The Biodiversity Banking and Offsets Scheme endeavours to address the loss of biodiversity in NSW by enabling landowners in NSW to establish BioBanking sites to secure conservation outcomes and offset impacts on biodiversity values. The landowners create BioBanking credits by committing to improve and/or increase the habitat of threatened species and ecological communities. Developers can buy the credits to offset impacts from their development. They will need to source particular types of credits in accordance with the offset rules in the BioBanking Assessment Methodology and Credit Calculator Operational Manual (DECC 2009):

- Ecosystem credits can only be used to offset biodiversity impacts in the same ecological community, or in another community of the same formation that has an equal or greater percentage of land cleared and the same predicted threatened species; and
- Species credits can only be used to offset biodiversity impacts on the same threatened species.

The BioBanking offsetting rules are more stringent than the NSW or federal requirements for offsets, as they are based on scientific data and detailed survey techniques. The strict like-for-like rules might not always be applicable in reality. While an offset might not achieve all the requirements under the BioBanking rules, it cannot be automatically rejected, as it might form an important and valuable contribution to biodiversity conservation. The NSW Government has recognized this and the BioBanking scheme is currently under review. The new Framework for Biodiversity Assessment (FBA) is in draft form and available for public comment (OEH 2014). Under the FBA, monetary contributions can be deposited into the NSW Biodiversity Offset Fund, rather than each developer having to source his own offsets. The new scheme will include a policy document and a new calculator tool.

1.5 Proposed Development Site – Culburra West

The proposed development area is approximately 87 ha in size, located at Culburra and comprises part of DP 1065111, Lot 2 of DP 1182151 and portions 61, 81 & 90 of DP 755971. It forms part of a larger property, which is approximately 247 ha (**Figure 1.1**).

The ecology of the site has been extensively researched by SLR Consulting Australia Pty Ltd (SLR 2013). The following documents have been used for this report:

- "Ecological & Riparian Issues & Assessment Report for Culburra West Urban Development Project, Culburra Beach", by SLR, dated 2013; and
- "Sketch Plan showing site constraints & proposed subdivisions over part of DP 1065111, Lot 2 DP 1182151 and portions 61, 81 & 90 DP 755971 at West Culburra for Realty Realizations", by allen, price & associates, dated September 2013.

The proposed development is considered a Part 3A project and the land is zoned for urban development in the relevant planning instrument (Shoalhaven LEP 1985).

The vegetation of the proposed development site has been assessed, described and mapped by SLR (**Figure 1.2**) and has not been ground-truthed by Cumberland Ecology staff.

The vegetation communities as described by SLR were related to the closest corresponding Biobanking Vegetation Types (BVTs). It should be noted that BVTs consist of broad definitions of vegetation communities and can encompass several 'variant' communities, some which may be classified as Endangered Ecological Communities (EECs) under the TSC Act. Therefore some non-listed vegetation communities may be treated as EECs under the Biobanking Scheme due to the broad-nature of BVTs

Based on the BVT definitions, the following vegetation communities will be cleared for the proposed development, three of which are an Endangered Ecological Community (EEC):

- Bangalay Woodland/Open Forest (2.24 ha), forming part of the *Bangalay Sand Forest in the Sydney Basin and South East Corner Bioregions* EEC;
- Swamp Oak Closed Forest (0.49 ha), forming part of the Swamp oak floodplain forest of the *NSW North Coast, Sydney Basin and South East Corner* EEC;
- Bangalay/Woolybutt/Rough-barked Apple Open Forest (0.39 ha), forming part of the *Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* EEC;
- Blackbutt Open Forest (36.35 ha);
- Forest Red Gum Open Forest (0.26 ha);
- Black She-oak Closed Forest (9.02 ha);
- Grey Ironbark/Rough-barked Apple Open Forest (0.44 ha);
- Hard-leaved Scribbly Gum Woodland (23.97 ha); and
- Pasture/grassland (14.13 ha).

1.6 Proposed Offset Site - Millalen

The proposed offset is directly adjacent to Conjola National Park and surrounded by the waters of the St Georges Basin and Tullarwalla Lagoon (**Figure 1.3**). It comprises Lot 8 in DP 755937 and part of Lot 1 in DP 1174562. It is called Millalen, is almost 300 ha in size and is located on and adjacent to the Tullarwalla Peninsula.

The following document has been used in preparation of this report:

- "Plan showing Masterplan over Lot 52 DP 1033684 & Lot 2 DP 1094024 at Sussex Inlet Road, Sussex Inlet for Realty Realizations Pty Ltd", by allen, price & associates, dated 8th October 2013.

The vegetation communities on the proposed offset site have not been assessed on-ground. This preliminary assessment is based on a vegetation map by OEH (2010) (**Figure 1.4**) and the corresponding BVTs to these vegetation communities. The vegetation communities within the offset, based on the BVT definitions are listed below, two of which are EECs:

- Coastal Sand Forest (168.33 ha), forming part of the *Bangalay Sand Forest in the Sydney Basin and South East Corner Bioregions* EEC;
- Floodplain Swamp Forest EEC (8.09 ha), forming part of the *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions* EEC;
- Morton Mallee-Heath (4.98 ha);
- Illawarra Gully Wet Forest (1.9 ha);
- Currambene-Batemans Lowlands Forest (73.38 ha); and
- Southern Turpentine Forest (29.38 ha).

Coordinate System: MGA Zone 56 (GDA 94)

Legend

- Development Boundary
- Property Boundary

BioBanking Assessment Circles

- 1000 ha Circle
- 100 ha Circle

- Native Woody Vegetation

N
Grid North

Image Source:
Image © 2013 TerraMetrics
Image © 2013 DigitalGlobe

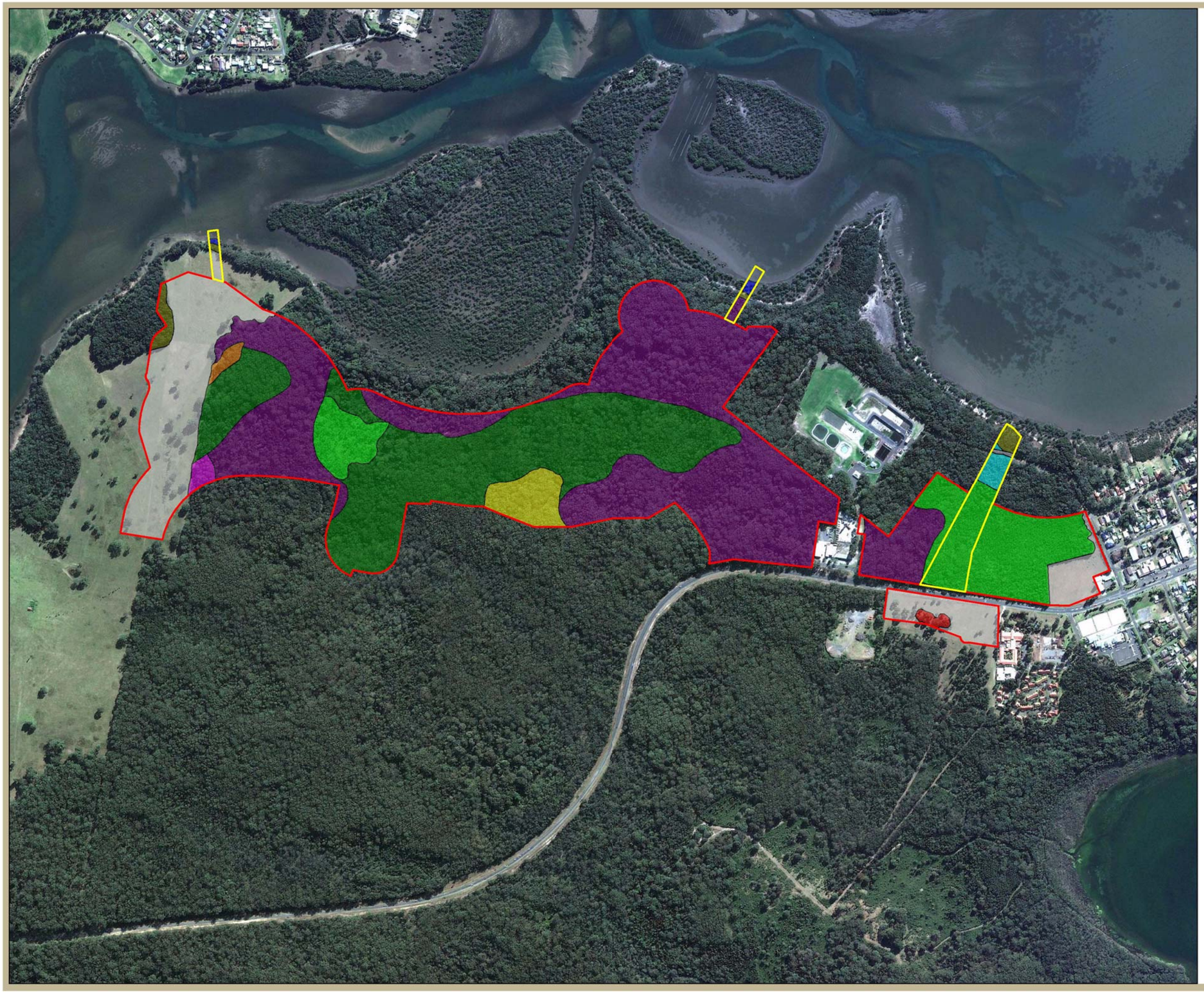
CUMBERLAND ECOLOGY

I:\...\14073\Figures\Figure 1.1 Development Locality 20140813

Figure 1.1 Culburra West Preliminary BioBanking - Locality of Development Site

0.5 0 0.5 1 1.5 2 km

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Development Boundary
- Viewing Corridor

Vegetation Community (Development Area)

- Bangalay Woodland/Open Forest (SR512) (Bangalay Sand Forest EEC)
- Bangalay/Woolybutt/Rough-barked Apple Open Forest (SR648) (Swamp Sclerophyll Forest EEC)
- Swamp Oak Closed Forest (SR649) (Swamp Oak Floodplain Forest EEC)
- Blackbutt Open Forest (SR516)
- Forest Red Gum Open Forest (SR544)
- Grey Ironbark/Rough-barked Apple Open Forest (SR592)
- Black She-oak Closed Forest (SR592)
- Hard-leaved Scribbly Gum Woodland (SR592)
- Cleared (Paddock)
- Cleared (Road)

Vegetation Community (Viewing Corridors)

- Swamp Oak Closed Forest (SR649) (Swamp Oak Closed Forest EEC)
- Black She-oak Closed Forest (SR592)
- Blackbutt Open Forest (SR516)
- Swamp Oak/Bangalay/Woolybutt Forest
- Mangrove Forest
- Cleared (Paddock)

Image Source:
Image © 2013 DigitalGlobe

Data Source:
SLR 2013,
Ecological & Riparian Issues &
Assessment Report for Culburra
West Urban Development Project,
Culburra Beach

CUMBERLAND ECOLOGY

N
Grid North

200 0 200 400 600 800 m

I:\...\14073\Figures\Figure 1.2 Vegetation Development 20140813

Figure 1.2 Culburra West Preliminary BioBanking - Vegetation on Development Site

Coordinate System: MGA Zone 56 (GDA 94)

Corramy Regional Park

Conjola National Park

Legend

- Offset Boundary
- NSW National Park Estate
- Native Woody Vegetation

BioBanking Assessment Circles

- 1000 ha Circle
- 100 ha Circle

N

Grid North

Image Source:
Image © 2013 TerraMetrics
Image © 2013 DigitalGlobe

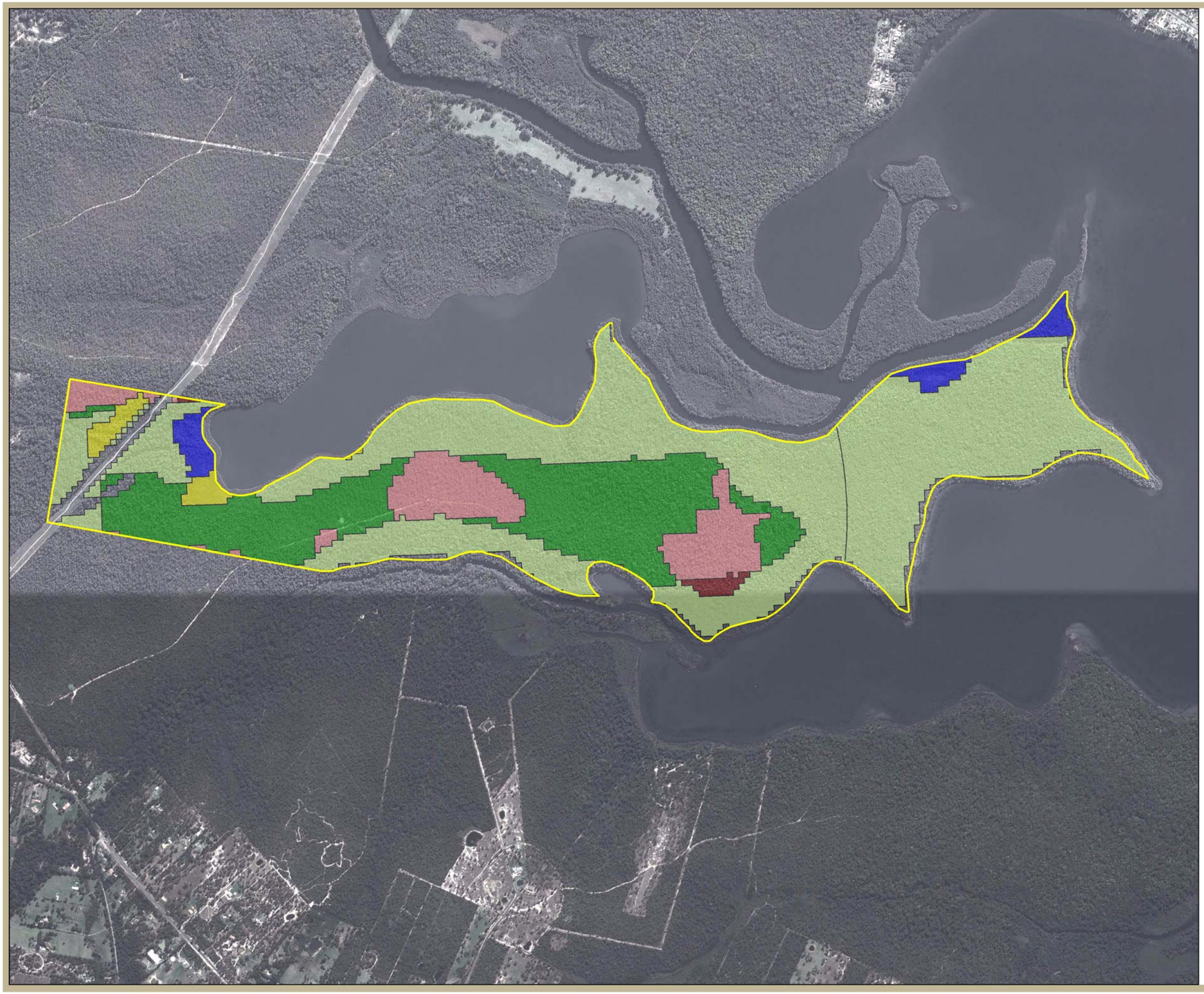
CUMBERLAND ECOLOGY

I:\...\14073\Figures\Figure 1.3 Offset Locality 20140813

Figure 1.3 Millalen Preliminary BioBanking - Locality of Offset Site

0.5 0 0.5 1 1.5 2 km

Coordinate System: MGA Zone 56 (GDA 94)



Legend

Offset Boundary

Vegetation Community

- Floodplain Swamp Forest (SR649) (Swamp Oak Floodplain Forest EEC)
- Coastal Sand Forest (SR512) (Bangalay Sand Forest EEC)
- Morton Mallee-Heath (SR513)
- Illawarra Gully Wet Forest (SR516)
- Currambene-Batemans Lowlands Forest (SR592)
- Southern Turpentine Forest (SR658)

N
Grid North

Image Source:
Image © 2013 TerraMetrics
Image © 2013 DigitalGlobe

Data Source:
SCIVI OEH 2011
(Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0)

CUMBERLAND ECOLOGY

I:\...\14073\Figures\Figure 1.4 Offset Vegetation 20140813

Figure 1.4 Millalen Preliminary BioBanking - Vegetation on Offset Site

0.25 0 0.25 0.5 0.75 1 km

Chapter 2

Methodology

2.1 BioBanking

The BioBanking assessment methodology is outlined in the BioBanking Assessment Methodology and Credit Calculator Operational Manual (DECC 2009) and the Draft Operational Manual for using the BioBanking Credit Calculator v2.0 (OEH 2012). The Calculator Tool used was Version 2.0. The BioBanking Credit Calculator is a computer software program that calculates "biodiversity credits", which are effectively the units of BioBanking transactions.

Biodiversity credits are ecosystem or species credits required to offset the loss of biodiversity values on development sites. It is important to understand that such credits are not directly equivalent to areas in hectares and the credits generated for an area of impact will vary based upon the vegetation types present, the patch size of each vegetation type, threatened species present or likely to occur and the connectivity of vegetation.

Most threatened species are included in ecosystem credit calculations. However, for threatened plants and for a limited number of threatened fauna, BioBanking calculates what is known as species credits. Species credits are created for threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. For flora species the actual number of individual plant specimens is entered into the calculator, while for fauna species the size of potential habitat within the site is estimated, which usually consists of the total area of vegetation communities known to provide habitat for the species in question.

The BioBanking methodology must be applied separately for proposed development sites and for proposed offset sites. The methodology can be divided into three distinct phases:

1. Preliminary Assessment;
2. Field Data Collection; and
3. Generating Credit Profile.

The attached BioBanking assessments are preliminary assessments for the development and offset areas. Cumberland Ecology has not undertaken any survey work for this assessment. The required vegetation plot data is based on BioBanking benchmark values.

2.2 Vegetation Communities

Ecological communities are used in the methodology as a surrogate for general biodiversity values. They are referred to as Vegetation Types. The names used for vegetation types in a BioBanking Assessment are selected from a database within the Credit Calculator itself. The names available differ to some extent from those used in the existing vegetation maps for the sites and also from names used for Commonwealth and State endangered ecological communities (EECs). The selection of vegetation types influences the outcome of the assessment because different vegetation types produce different credit calculations, due to some plant communities supporting more threatened flora/fauna species than others. The vegetation type selected for BioBanking purposes should be the original vegetation type assumed to have originally occurred at the site.

Vegetation community nomenclature can vary depending on the scale and origin of the mapping and it is common for the same vegetation community to be known by several different names. The vegetation communities as described by SLR were related to the closest corresponding BioMetric Vegetation Types (BVTs).

BVTs consist of broad definitions of vegetation communities and can encompass several 'variant' communities, some which may be classified as Endangered Ecological Communities (EECs) under the TSC Act. Therefore some non-listed vegetation communities may be treated as EECs under the Biobanking Scheme due to the broad-nature of BVTs.

As some of the vegetation communities as described by SLR correspond to BVTs that encompass 'variants' that are listed as EECs, these communities have been classified as EECs for the purpose of Biobanking.

Table 4.1 shows the nomenclature used for plant communities, as well as the codes used by SLR and the BVT codes (BVT). The BioBanking reports can be found in **Appendices A and B**.

Chapter 3

Assumptions and Limitations

Although BioBanking methodology is systematic, there is also considerable scope for "professional judgment" to be applied; meaning different operators may arrive at differing credit calculations. Thus, a number of assumptions have been made throughout the assessment process.

The following assumptions are made with respect to the development site assessment:

- The vegetation mapping provided by SLR (SLR 2013) has not been "ground-truthed" by Cumberland Ecology and is assumed to be correct. Any change in vegetation type and area size of each patch will influence the type and number of credits necessary to offset the development;
- The GIS files provided by SLR (SLR 2013) contradict some of the Figures provided by SLR. For the purpose of this assessment it is assumed that the published Figures are correct;
- While some on-ground flora plot surveys were undertaken by SLR (SLR 2013) the BioBanking calculator requires very specific BioBanking plot data with additional information. The existing plot data could therefore not be used for the Biobanking assessment and benchmark values were assumed. Once further field surveys have been conducted these values can be adjusted in the calculator;
- It is assumed that the three patches of land cleared for grazing (14.13 ha) originally formed part of the most common vegetation community on site, i.e. Blackbutt Open Forest (Figure 1.2). The fourth cleared patch (0.06 ha) forms part of the road to the Culburra Sewerage Treatment Plant and has been excluded from this assessment;
- According to the Ecological Assessment Report by SLR (SLR 2013) the cleared areas are "improved pasture dominated by introduced grass species". For vegetation to be in low condition under the BioBanking methodology it has to satisfy the following criteria:
    - The native over-storey percent foliage cover has to be less than 25% of the lower value of the benchmark for this vegetation type; and
    - Less than 50% of the ground-cover has to be native or more than 90% of the ground-cover has to be cleared;

- The cleared areas are therefore assumed to be in low condition. The following benchmark values for these areas have been reduced to zero: native over-storey cover, native mid-storey cover, native ground cover (shrubs), number of trees with hollows, over-storey regeneration and total length of fallen logs. The percent foliage cover for weeds is assumed to be 50%, which is an environmentally conservative figure, given that the pasture is "dominated by introduced species";

- The condition of the remaining vegetation on the site and within the 1,000 ha circle around the site was assumed to be in moderate to good condition. It is possible that some additional patches of vegetation within the site are in low condition. These values can be adjusted in the calculator once additional field surveys have been conducted and the condition of the vegetation has been confirmed;

- No threatened flora species were found on site during the surveys conducted by SLR (SLR 2013). Some of the threatened fauna species found during these surveys are included in ecosystem credits and some produced species credits as outlined in Section 4.2. If further surveys provide evidence of additional threatened flora and fauna species occurring on the development site, species credits might need to be calculated for those new species; and

- It has been assumed that the whole area within the site will be cleared for the proposed development. If some areas within the site could be retained, i.e. would not be impacted by the development, the number of credits generated for the affected vegetation communities may change.

The following assumptions are made with respect to the proposed offset site:

- The vegetation on the offset site has not been surveyed at this preliminary stage. The availability of vegetation mapping for this area is limited. OEH produced a map in 2011 called “The native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0”, which was used for this assessment. The resolution of the GIS layer is low and the boundaries therefore appear pixellated (Figure 1.4). The vegetation communities have not been “ground-truthed” by Cumberland Ecology. Any change in vegetation type and area size of each patch, once the area has been surveyed, will influence the type and number of credits produced;

- No on-ground flora plot surveys have been undertaken and benchmark values were assumed for the Biobanking assessment. Once further field surveys have been conducted these values can be adjusted in the calculator;

- The condition of the vegetation on the site and within the 1,000 ha circle around the site was assumed to be in moderate to good condition; and

- No surveys for threatened flora and fauna species have been conducted and no species credits have been generated by this assessment.

Chapter 4

Key Findings

4.1 Ecosystem Credits

Assuming the entire development site will be cleared, a total of **5,936** ecosystem credits would be required to offset the development. An estimated **1,576** ecosystem credits are generated by the proposed offset site, which is **26.6%** of the required credits if the subject site were to be formally required to undergo BioBanking.

The **Swamp Oak Floodplain Forest EEC** has been 95% cleared within the catchment. It is represented in the offset, as well as the development site and 146.9% of the required ecosystem credits are achieved. The size of this community within the development is 0.49 ha, while the offset contains 8.09 ha, which results in an offset ratio of almost 1:17.

The offset area contains 168.33 ha of the **Bangalay Sand Forest EEC**, which has been 50% cleared within the catchment. The proposed development removes 2.24 ha of this community. Therefore, the offset ratio is 1:75 and under the BioBanking scheme, 520% of the required ecosystem credits are achieved.

The **Swamp Sclerophyll Forest EEC** is not represented within the offset area, while 0.39 ha are proposed to be removed within the development area (SR648 in **Figure 1.2**). If possible, it should be considered to exclude this vegetation community from the development footprint.

While the Forest Red Gum vegetation community is not listed as an EEC, it has been 90% cleared within the catchment. This triggers a “red flag” under the BioBanking methodology. The area of Forest Red Gum is in Stage 1 of the proposal: initial detailed design studies indicate this area being retained as open space within the residential development.

Table 4.1 summarises the areas and ecosystem credits for each vegetation community on the proposed development site as well as the offset site.

4.2 Species Credits

The following threatened fauna species were found on the development site or directly adjacent to the site by SLR (SLR 2013):

- Square-tailed Kite *(Lophoictinia isura);*
- Glossy Black Cockatoo *(Calyptorhynchus lathami);*

- Powerful Owl *(Ninox strenua);*
- East-coast Freetail Bat *(Mormopterus norfolkensis);*
- Common Bent-wing Bat *(Miniopterous schreibersii);*
- Eastern Falsistrelle *(Falsistrellus tasmaniensis);*
- Greater Broad-nosed Bat *(Scoteanax rueppellii);*
- Yellow-bellied Sheath-tail Bat *(Saccolaimus flaviventris);* and
- Grey-headed Flying-fox *(Pteropus poliocephalus).*

Species credits are generated for two of these fauna species only, the Square-tailed Kite and the Grey-headed Flying-fox. All other surveyed threatened species are included in ecosystem credits by the BioBanking calculator. The species credits created by these two species are:

- **1,180 species credits** for the Square-tailed Kite *(Lophoictinia isura)*; and
- **939 species credits** for the Grey-headed Flying-fox *(Pteropus poliocephalus).*

No other threatened flora or fauna species that might generate species credits are assumed to occur on the development site at this stage.

Since the offset site has not been surveyed, no species credits have been generated by the BioBanking calculator. The proposed offset site seems to be little disturbed, in close proximity of national parks and forest reserved and in good condition. For these reasons, it has been assumed that the same or more threatened species occupy the same vegetation communities as in the development area.

Table 4.1 Ecosystem Credits for Development and Offset per Vegetation Community

Vegetation Community	SLR Code *	BVT **	Area ha (Impact)	Area ha (Offset)	Credits Required (Impact)	Credits Generated (Offset)	% Credits Achieved
Bangalay - Old Man Banksia open forest on coastal sands, Sydney Basin and South East Corner (**Bangalay Sand Forest EEC**)	D2	SR512	2.24	168.33	178	926	520.22%
Banksia - Red Bloodwood - Hard-leaved Scribbly Gum heathy open woodland on sandstone plateaux, southern Sydney Basin		SR513		4.98		27	N/A
Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin	D3	SR516	50.48	1.9	3024	10	0.33%
Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner	D5	SR544	0.26		21		0.00%
Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin	D1, D6 & D8	SR592	33.43	73.38	2654	404	15.22%
Swamp Mahogany swamp sclerophyll forest on coastal lowlands, Sydney Basin and South East Corner (**Swamp Sclerophyll Forest EEC**)	D4	SR648	0.39		27		0.00%
Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner (**Swamp Oak Floodplain Forest EEC**)	SOF	SR649	0.49	8.09	32	47	146.88%
Turpentine - Red Bloodwood - Sydney Peppermint shrubby open forest on the foothills, southern Sydney Basin and northern South East Corner		SR658		29.38		162	N/A
TOTAL			**87.29**	**286.06**	**5936**	**1576**	**26.55%**

* Vegetation Code used by SLR (2013)

** BioBanking Vegetation Type (OEH 2012)

Chapter 5

Discussion

5.1 Suitability of Offset

The proposed offset has a number of desirable environmental features that include the following points:

- **Location and connectivity of the offset:**

The offset is located directly adjacent to Conjola National Park to the north and west, as well as within close proximity to Corramy Regional Park to the north. Ninety percent of the offset boundary is formed by the waters of Tullarwalla Lagoon, St Georges Basin and Wandandian Creek. The area is therefore almost completely protected from disturbance and access by its natural surrounds (**Figure 1.3**). The offset will assure conservation in perpetuity of Tullarwalla Lagoon and the St Georges Basin foreshore by protecting a substantial area of foreshore and the southern shoreline of the lagoon. Additionally, the offset land will enhance connectivity between existing natural habitat, such as the adjacent Conjola National Park and other reserves and parks.

- **Area size and high ecological value of vegetation:**

The offset comprises a total of almost 300 hectares of native open forest and woodland in what is assumed to be excellent to good condition, including:

- 168.33 ha of *Bangalay Sand Forest in the Sydney Basin and South East Corner Bioregions* EEC;
- 8.09 ha of *Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions* EEC;
- Fringing coastal saltmarsh and mangroves; and
- It is noted that these EEC's are of higher ecological value than the Red Gum Forest which is not an EEC, yielding a net environmental benefit.

- **Like-for-like development/offset:**

The offset is located within the area of the same catchment authority as the proposed development and contains similar vegetation communities. It can therefore be assumed that the offset provides habitat to same suite of threatened flora and fauna species as the development site. The total size of the offset is 286.06 ha, while the proposed clearing for development is 87.29 ha, of which 14.13 is cleared grassland. This results in an offset ratio

of 1:3.2. The offset can be dedicated to the OEH immediately on provision of approval for the Culburra West Concept Plan.

5.2 Environmental Benefits of Proposed Concept

The following components of the Concept Plan (09-0088) are environmentally beneficial:

- **Crookhaven River Foreshore Park**:

An additional 20.14 ha of private open forest and woodland, between the Crookhaven River and the Culburra West Development will be rehabilitated and dedicated to be the Crookhaven River Foreshore Park. All of this land is to be dedicated for biodiversity conservation purposes with some limited and carefully designed and constructed boardwalks and paths, educational signage and 'look outs'. Another 4.34 ha of existing mostly cleared grassland at the western end of the Crookhaven River Foreshore Park will be dedicated in part for community recreation purposes (open grassy space, paths, picnic tables, barbecues etc.) and in part for biodiversity conservation.

- **Maintenance and Protection of Aboriginal Heritage:**

The culturally significant middens along the Crookhaven River Foreshore will be maintained and protected. Additionally, educational material within the Crookhaven River Foreshore Park with respect both to ecological values and Aboriginal heritage will be provided.

- **Improvement of Fauna Habitat**

Tree-hollows will be salvaged where applicable and re-used, as well as the provision of artificial nest boxes at a ratio of 2 replacements for each hollow lost. New habitat and resources for aquatic biota will be created within the detention basins and bio-retention swales within the development site (on the southern side of the Crookhaven River Foreshore Park).

5.3 Biodiversity Corridor Link (North-South)

As confirmed in a letter by OEH (OEH 2013), the establishment of a north-south Biodiversity Corridor, the location of which has not been specified, has been considered, but is deemed unnecessary.

The following fauna groups have been recorded within or adjacent to the proposed development area by SLR (2013), as listed in Appendix L of the assessment report:

- Aquatic and estuarine birds;
- Raptors and parrots;
- Forest Birds, including nocturnal ones;
- Woodland birds;
- Possums and gliders;

- Kangaroos and wallabies;
- Small mammals (e.g. bandicoot, antechinus);
- Microchiropteran bats;
- Frogs; and
- Skinks, snakes and lizards.

None of these fauna groups are likely to travel between the water of the estuarine habitat and the inland woodland/forest habitats. The water in the estuary is brackish and there is no evidence of any fauna species drinking the water. Aquatic and estuarine birds are unlikely to leave their aquatic habitat to venture inland and the species within the forest/woodland habitat have no reason to access saltwater. Additionally, local fauna would be likely to be able to find adequate alternate means of dispersing around the subject land. There seems to be no ecological benefit of creating a north-south fauna corridor, since such a corridor would connect two entirely different habitats. We believe that there is little ecological benefit to be gained from provision of such a link.

5.4 Viewing Corridors

The proponent is considering the creation and maintenance of three viewing corridors (**Figure 1.2**), which are effectively gaps through the mangroves and other riparian vegetation to afford a view of the water. The intention is that vegetation above 50cm height be cleared for a width of 50m in the case of the two westerly corridors and 70-80m in the case of the corridor to the east. The object of these vistas is to heighten the awareness of Culburra being a place surrounded by water. These corridors would also provide managed access to the Crookhaven River for the public via a proposed continuous foreshore cycle/walkway, which will be commenced at Canal Street East and continue to Cactus Point, just west of Billys Island. At a later stage it is proposed this cycle/walkway will be extended westwards to the extremity of the proponents land.

The vegetation that would be impacted by the three viewing corridors outside the development footprint is a total of 3.5 ha and comprises (**Figure 1.2**):

- 0.17 ha of Blackbutt Open Forest (SR516);
- 2.31 ha of Black She-oak Closed Forest (SR592);
- 0.38 ha of Swamp Oak Closed Forest EEC (SR649);
- 0.54 ha of Swamp Oak/Bangalay/Woolybutt Forest;
- 0.12 ha of Mangrove Forest; and
- 0.24 ha of pasture/cleared land.

We recommend that the mangrove vegetation within the viewing corridors be carefully reduced and that the lower lying areas be managed to promote the growth of shrubs and groundcover plants that are part of the *Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* EEC.

Coastal Saltmarsh occurs at the highest portions of the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include *Baumea juncea*, Sea Rush (*Juncus krausii subsp. australiensis*), Samphire (*Sarcocornia quinqueflora subsp. quinqueflora*), Marine Couch (*Sporobolus virginicus*), Streaked Arrowgrass (*Triglochin striata*), Knobby Club-rush (*Ficinia nodosa*), Creeping Brookweed (*Samolus repens*), Swamp Weed (*Selliera radicans*), Seablite (*Suaeda australis*) and Prickly Couch (*Zoysia macrantha*). Occasionally mangroves are scattered through the saltmarsh. Note that the species in bold are typically already present in mangrove forests in NSW and would not need to be introduced.

It is important to note that SLR (2013) surveyed over 40 ha of Mangrove Forest along the foreshore, of which only 0.12 ha will be modified, which is 0.3%.

The remaining vegetation within the viewing corridors could be managed as a low shrubby version of the original vegetation community, which would entail removal of the canopy stratum only.

These viewing corridors are unlikely to have any ecological impact for the following reasons:

- Rather than removing the mangrove forest, it will be managed as a more open habitat, Coastal Saltmarsh EEC, which increases the ecological value of the habitat;
- The majority of mangroves (i.e. 99.7%) in the study area would be conserved and would be maintained in perpetuity.

Provided that other areas of vegetation are to be retained intact along the river frontage, we believe that there would be limited and manageable ecological impacts.

Chapter 6

Conclusion

We consider the proposed biodiversity offset to be adequate because of its high quality vegetation and its strategic location. The conservation of Millalen and its potential addition to the adjacent Conjola National Park would result in a positive net environmental outcome. The size of the EECs to be protected within the offset is significantly larger than the relatively small patches of these EECs proposed to be cleared for the development. The remaining vegetation to be cleared is still well represented within the catchment.

Although under the BioBanking scheme, however, only 26.6% of the ecosystem credits required under the biobanking scheme are provided by the proposed Millallen offset area, that offset area is substantially larger, by a factor of 4, than the proposed area of native forest to be removed for the development. In addition the offset area is only part of the total package proposed. The total package includes a range of additional offsets for the required removal of native forest from the development site. These additional offsets are consistent with the Draft FBA offset principles for Major Projects which allow for reduced offsetting requirements in proportion to the economic benefits of the proposed development.

The ecological benefit of the north-south corridor recommended by OEH is not transparent and thus deemed unnecessary.

We consider the proposed viewing corridors to have minimal environmental impact if they are managed as discussed within this report.

References

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DECC (2009). BioBanking Assessment Methodology and Credit Calculator Operational Manual. Hurstville, NSW, Department of Environment and Climate Change.

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OEH (2012). Draft BioBanking Assessment Methodology. Hurstville, NSW, Office of Environment and Heritage.

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OEH (2012). "Vegetation Types Database." Retrieved 3/7/13, 2013, from http://www.environment.nsw.gov.au/biobanking/vegtypedatabase.htm.

OEH (2013). Exhibition of Environmental Assessment for Concept Plan Approval - Mixed Use Subdivision, West Culburra (MP09_0088).

OEH (2014). Draft Framework for Biodiversity Assessment - NSW Biodiversity Offsets Policy for Major Projects, Office of Environment and Heritage.

SLR (2013). "Ecological & Riparian Issues & Assessment Report for Culburra West Urban Development Project, Culburra Beach."

Appendix A

Development BioBanking Credit Report

BioBanking Credit Calculator

BioBanking credit report

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

Date of report: 14/05/2013 Time: 10:47:45AM Tool version: 2.0

Development details

Proposal ID:	0057/2013/0670D
Proposal name:	13046 - Development
Proposal address:	1 Mountain Street Epping NSW 2121
Proponent name:	Cumberland Ecology
Proponent address:	1 Mountain Street Epping NSW 2121
Proponent phone:	(02) 9868 1933
Assessor name:	David Robertson
Assessor address:	PO BOX 2474 Carlingford Court NSW 2118
Assessor phone:	9868 1933
Assessor accreditation:	0057

Improving or maintaining biodiversity

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

Red flag	Reason
Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner	Vegetation type being > 70% cleared; or it contains an endangered ecological community;

The application for a red flag determination should address the criteria set out in the BioBanking Assessment Methodology. Please note that a biobanking statement cannot be issued unless the determination is approved.

Additional information required for approval:

- ☐ Change to percent cleared for a vegetation type/s
- ☐ Use of local benchmark
- ☐ Change negligible loss
- ☐ Expert report
- ☐ Predicted threatened species not on site
- ☐ Change threatened species response to gain (Tg value)

Ecosystem credits summary

Vegetation type	Area (ha)	Credits required	Red flag
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner	2.24	178	No
Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin	14.13	138	No
Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin	36.35	2,886	No
Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner	0.26	21	Yes
Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin	33.43	2,654	No
Swamp Mahogany swamp sclerophyll forest on coastal lowlands, Sydney Basin and South East Corner	0.39	27	No
Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner	0.49	32	Yes
Total	87.29	5,936	

Credit profiles

1. Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin, (SR592)

Number of ecosystem credits required	2,654
CMA sub-region	Jervis
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	Offset options - CMA sub-regions
Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin, (SR592)	Jervis Richmond - Tweed (Qld - Scenic Rim) (Part A) Macleay Hastings - Northern Rivers Coffs Coast & Escarpment Bateman Illawarra South East Coastal Ranges (Part C)

2. Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin, (SR516)

Number of ecosystem credits required	138
CMA sub-region	Jervis
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	

Offset options - vegetation types	Offset options - CMA sub-regions
Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin, (SR516) Brown Barrel - Mountain Grey Gum tall moist forest on basalts of the Southern Highlands, Sydney Basin, (SR526) Sydney Peppermint - White Stringybark moist shrubby forest on elevated ridges, Sydney Basin, (SR655)	East Gippsland Lowlands (Part A) East Gippsland Lowlands (Part B) South East Coastal Ranges (Part A) South East Coastal Ranges (Part B) East Gippsland Lowlands (Part C) Burragorang Moss Vale - Southern Rivers Ettrema Jervis Bungonia - Southern Rivers Bateman Illawarra New South Wales Alps - Southern Rivers Kybeyan - Gourock (Part A) Kybeyan - Gourock (Part B) South East Coastal Ranges (Part C) Monaro (Part A) Monaro (Part B) Monaro (Part C) South East Coastal Plains Southern Rivers - marine zone

3. Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin, (SR516)

Number of ecosystem credits required	2,886
CMA sub-region	Jervis
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	Offset options - CMA sub-regions

Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin, (SR516) Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the North Coast, (HU508) Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast, (HU543) Sydney Blue Gum open forest on coastal foothills and escarpment of the North Coast, (HU640) Spotted Gum - Grey Ironbark shrubby open forest of the Richmond Range of the North Coast, (NR248)	Jervis Clarence Lowlands Richmond - Tweed (Qld - Scenic Rim) (Part A) Washpool Yengo - Hunter/Central Rivers Wyong Macleay Hastings - Hunter/Central Rivers Macleay Hastings - Northern Rivers Upper Manning Comboyne Plateau - Northern Rivers Dalmorton Chaelundi Coffs Coast & Escarpment Clarence Sandstones Rocky River Gorge Cataract Ettrema Bateman Illawarra South East Coastal Ranges (Part C) Upper Hunter Woodenbong Stanthorpe Plateau

4. Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner, (SR544)

Number of ecosystem credits required	21
CMA sub-region	Jervis
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	**Offset options - CMA sub-regions**
Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner, (SR544) Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin and South East Corner, (SR669)	Jervis Clarence Lowlands Wyong

	Walcha Plateau - Northern Rivers Macleay Hastings - Hunter/Central Rivers Macleay Hastings - Northern Rivers Coffs Coast & Escarpment Clarence Sandstones Pittwater Bateman Illawarra South East Coastal Ranges (Part C) Stanthorpe Plateau

5. Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner, (SR512)

Number of ecosystem credits required	178
CMA sub-region	Jervis
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	**Offset options - CMA sub-regions**
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner, (SR512)	Jervis Clarence Lowlands Richmond - Tweed (Qld - Scenic Rim) (Part A) Murwillumbah (Qld - Southeast Hills and Ranges) Wyong Macleay Hastings - Hunter/Central Rivers Macleay Hastings - Northern Rivers Coffs Coast & Escarpment Bateman Illawarra South East Coastal Ranges (Part C) Stanthorpe Plateau

6. Swamp Mahogany swamp sclerophyll forest on coastal lowlands, Sydney Basin and South East Corner, (SR648)

Number of ecosystem credits required	27
CMA sub-region	Jervis
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	Offset options - CMA sub-regions
Swamp Mahogany swamp sclerophyll forest on coastal lowlands, Sydney Basin and South East Corner, (SR648)	Jervis Clarence Lowlands Richmond - Tweed (Qld - Scenic Rim) (Part A) Murwillumbah (Qld - Southeast Hills and Ranges) Wyong Macleay Hastings - Hunter/Central Rivers Macleay Hastings - Northern Rivers Coffs Coast & Escarpment Bateman Illawarra South East Coastal Ranges (Part C) Stanthorpe Plateau

7. Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner, (SR649)

Number of ecosystem credits required	32
CMA sub-region	Jervis
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	Offset options - CMA sub-regions
Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner, (SR649) Swamp Oak swamp forest fringing estuaries, Sydney Basin and South East Corner, (SR650)	Jervis Bateman Illawarra

Species credits

Common name	Scientific name	Extent of impact	Number of species credits required
Square-tailed Kite	Lophoictinia isura	87.35	1,180
Grey-headed Flying-fox (Breeding)	Pteropus poliocephalus	87.35	939

Appendix B

Offset BioBanking Credit Report

BioBanking credit report

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

Date of report: 23/07/2014 Time: 12:45:57PM Tool version: v2.1

Biobank details

Proposal ID:	0057/2014/1232B
Proposal name:	14073 - Offset
Proposal address:	Shoalhaven LGA Shoalhaven NSW 2121
Proponent name:	Cumberland Ecology
Proponent address:	PO Box 2474 Carlingford Court NSW 2118
Proponent phone:	98681933
Assessor name:	David Robertson
Assessor address:	PO BOX 2474 Carlingford Court NSW 2118
Assessor phone:	9868 1933
Assessor accreditation:	0057

Additional information required for approval:

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

Ecosystem credits summary

Vegetation type	Area (ha)	Credits created
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner	168.33	926.00
Banksia - Red Bloodwood - Hard-leaved Scribbly Gum heathy open woodland on sandstone plateaux, southern Sydney Basin	4.98	27.00
Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin	1.90	10.00
Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin	73.38	404.00
Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner	8.09	47.00
Turpentine - Red Bloodwood - Sydney Peppermint shrubby open forest on the foothills, southern Sydney Basin and northern South East Corner	29.38	162.00
Total	286.06	1,576

Credit profiles

1. Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin, (SR592)

Number of ecosystem credits created	404
CMA sub-region	Jervis
Minimum percent native vegetation cover class	>70%
Minimum adjacent remnant area class	>100 ha

2. Turpentine - Red Bloodwood - Sydney Peppermint shrubby open forest on the foothills, southern Sydney Basin and northern South East Corner, (SR658)

Number of ecosystem credits created	162
CMA sub-region	Jervis
Minimum percent native vegetation cover class	>70%
Minimum adjacent remnant area class	>100 ha

3. Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin, (SR516)

Number of ecosystem credits created	10
CMA sub-region	Jervis
Minimum percent native vegetation cover class	>70%
Minimum adjacent remnant area class	>100 ha

4. Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner, (SR512)

Number of ecosystem credits created	351
CMA sub-region	Jervis
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

5. Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner, (SR512)

Number of ecosystem credits created	575
CMA sub-region	Jervis
Minimum percent native vegetation cover class	>70%
Minimum adjacent remnant area class	>100 ha

6. Banksia - Red Bloodwood - Hard-leaved Scribbly Gum heathy open woodland on sandstone plateaux, southern Sydney Basin, (SR513)

Number of ecosystem credits created	27
CMA sub-region	Jervis
Minimum percent native vegetation cover class	>70%
Minimum adjacent remnant area class	>100 ha

7. Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner, (SR649)

Number of ecosystem credits created	27
CMA sub-region	Jervis
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

8. Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner, (SR649)

Number of ecosystem credits created	20
CMA sub-region	Jervis
Minimum percent native vegetation cover class	>70%
Minimum adjacent remnant area class	>100 ha

Species credits summary

Additional management actions

Additional management actions are required for:

Vegetation type or threatened species	Management action details
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner	Exclude miscellaneous feral species
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner	Feral and/or over-abundant native herbivore control
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner	Fox control
Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin and South East Corner	Maintain or re-introduce natural flow regimes
Banksia - Red Bloodwood - Hard-leaved Scribbly Gum heathy open woodland on sandstone plateaux, southern Sydney Basin	Exclude miscellaneous feral species
Banksia - Red Bloodwood - Hard-leaved Scribbly Gum heathy open woodland on sandstone plateaux, southern Sydney Basin	Feral and/or over-abundant native herbivore control
Banksia - Red Bloodwood - Hard-leaved Scribbly Gum heathy open woodland on sandstone plateaux, southern Sydney Basin	Fox control
Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin	Exclude miscellaneous feral species
Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin	Feral and/or over-abundant native herbivore control
Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin	Fox control
Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin	Maintain or re-introduce natural flow regimes
Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin	Exclude miscellaneous feral species
Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin	Feral and/or over-abundant native herbivore control
Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin	Fox control
Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest on coastal foothills, southern Sydney Basin	Maintain or re-introduce natural flow regimes
Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner	Feral and/or over-abundant native herbivore control
Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner	Fox control
Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains, Sydney Basin and South East Corner	Maintain or re-introduce natural flow regimes

Turpentine - Red Bloodwood - Sydney Peppermint shrubby open forest on the foothills, southern Sydney Basin and northern South East Corner	Exclude miscellaneous feral species
Turpentine - Red Bloodwood - Sydney Peppermint shrubby open forest on the foothills, southern Sydney Basin and northern South East Corner	Feral and/or over-abundant native herbivore control
Turpentine - Red Bloodwood - Sydney Peppermint shrubby open forest on the foothills, southern Sydney Basin and northern South East Corner	Fox control
Turpentine - Red Bloodwood - Sydney Peppermint shrubby open forest on the foothills, southern Sydney Basin and northern South East Corner	Maintain or re-introduce natural flow regimes