Monteath & Powys Pty Ltd

SURVEYING, PLANNING, ENGINEERING DESIGN, PROJECT MANAGEMENT




PLANNING PROPOSAL

BOUNDARY ROAD, MEDOWIE

Planning Proposal

This Report was prepared by:

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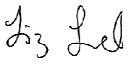
PROJECT:	Boundary Road Rezoning
CLIENT:	McCloy Medowie Pty Ltd
OUR REFERENCE:	15/0011
VERSION:	**Final – 24 June 2016**
AUTHOR:	Liz Lamb BSc (Architecture), LLB, M.P.I.A Senior Planner
CERTIFICATION:	I certify that to the best of my knowledge the information contained within this Report is neither false nor misleading.
SIGNATURE:	
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1. INTRODUCTION

This Planning Proposal has been prepared on behalf of McCloy Medowie Pty Ltd in relation to the proposed rezoning of land at Boundary Road, Medowie in the Port Stephens local government area (See Figure 1).

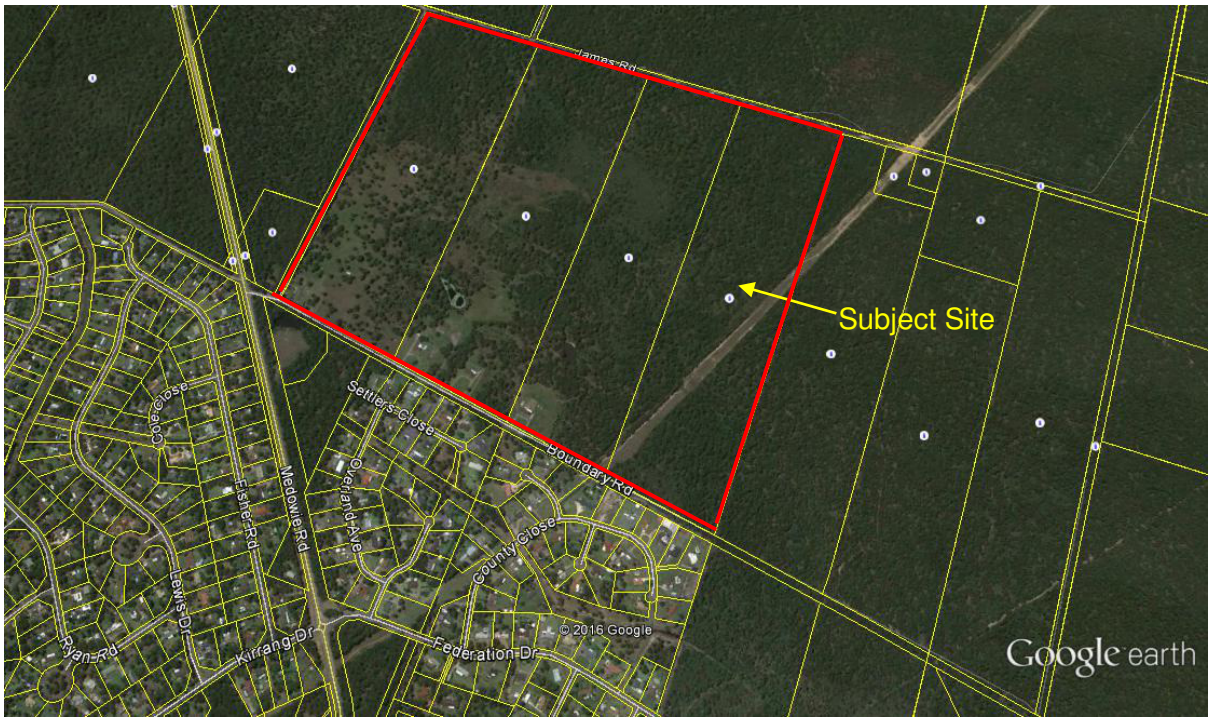


Figure 1: Locality Map

The subject site contains an isolated section of land that is currently zoned E2 Environmental Conservation, with the majority of the remainder of the site zoned R5 Large Lot Residential (See Figure 2 below).

It is proposed to increase the size of the isolated E2 land to tidy up the boundaries of this zone.

It is also proposed to rezone a portion of the remaining site R2 Low Density Residential with a minimum lot size of 500m^2. Some R5 zone is proposed to remain (refer to Appendix A).

1.1 CONTEXT

The site is located within the recently rezoned Boundary Road precinct of Medowie, with the rezoning enabling large lot residential development over a large section of the land.

1.2 SITE DESCRIPTION

The wider site is known as 63 to 69 Boundary Road, Medowie, and is legally identified as Lots 93 to 96 DP 753194.

These lots are currently zoned part R5 Rural Residential and part E2 Environmental Conservation. A development application for subdivision for residential development on the R5 land was recently lodged with Council. A voluntary planning agreement (VPA) is being put

in place to transfer the E2 land in the northern part of the site to the Office of Environment and Heritage (OEH).

Within the subject site, there is also an isolated pocket of vegetated land zoned E2 Environmental Conservation surrounded by the R5 zone (see **Figure 2** below). This land is proposed to be extended with all identified koala feed trees that are currently within in this small E2 zone to remain within this zone. That is, none of the koala feed trees currently in this E2 zone will be affected by the proposal.

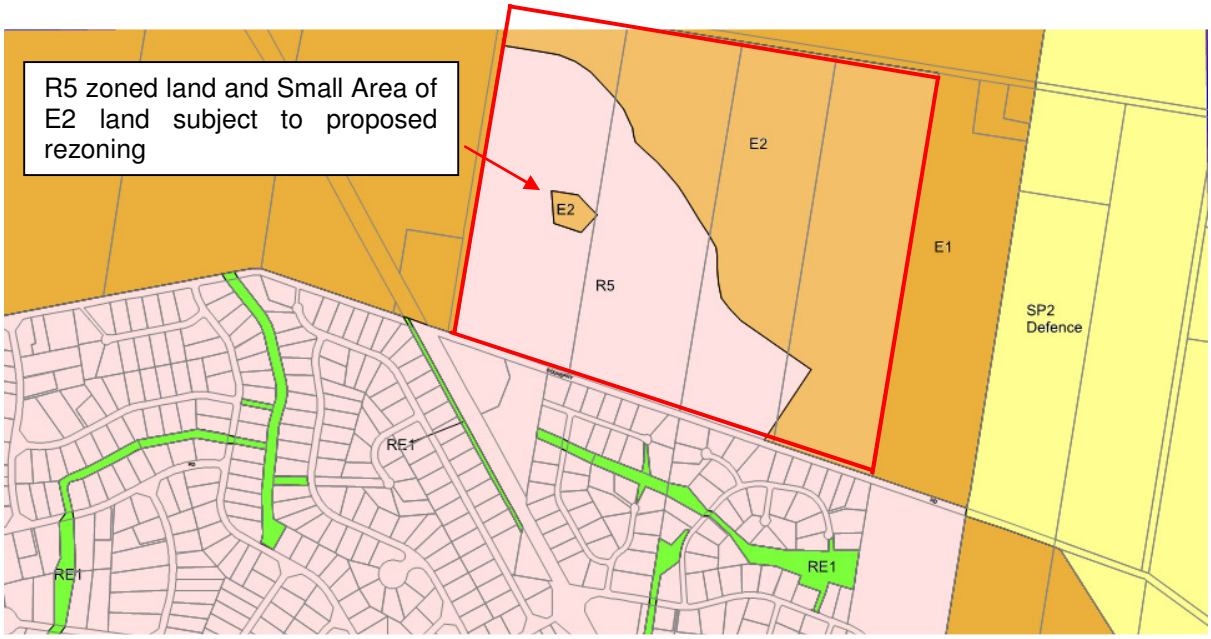


Figure 2: Subject Site Zoning

Surrounding Development

The Boundary Road precinct is located along the northern edge of the existing Medowie CBD, approximately 10km to the east of Raymond Terrace and 20km to the north of Newcastle.

The subject site is bound by rural residential lots to the south and conservation lands to the north east and west.

1.3 EXISTING ZONING

The subject site is zoned R5 Large Lot Residential and E2 Environmental Conservation under the current LEP (See Figure 2 above).

1.4 MINIMUM LOT SIZE PROVISIONS

The minimum lot size provisions of the site are currently split. The land currently zoned R5 Large Lot Residential has a minimum lot size of 4,000 square metres along the Boundary Road frontage and 1,000 square metres to the north of the 4,000 square metre minimum lot size. The land zoned E2 Environmental Conservation in the middle of the R5 zone has a minimum lot size requirement of 1ha. The E2 land in the north has a minimum lot size of 40 ha.

1.5 LAND USE HISTORY

The land has, in the past, been used for agriculture and rural residential purposes.

A development application for a residential subdivision of approximately 350 lots is expected to be determined in the short term. The current R5 zoning authorises the subdivision of the majority of the R5 zone into 1,000m^2 lots, while the isolated land zoned E2 Environmental Conservation on the subject site can be approved for subdivision into two (2) lots with its 1 ha minimum lot size.

2. THE PROPOSAL

The proposal consists of:

- Increasing the size of the area of land zoned E2 Environmental Conservation (the E2 which currently lies in the middle of the R5 zone on the site); and
- Rezoning a portion of the surrounding land R5 land to R2 Low Density Residential with a minimum lot size of 500m^2.

Figure 3 below shows the proposed zoning for the subject site (Refer also to Appendix A). Figure 4 below shows the proposed minimum lot sizes.

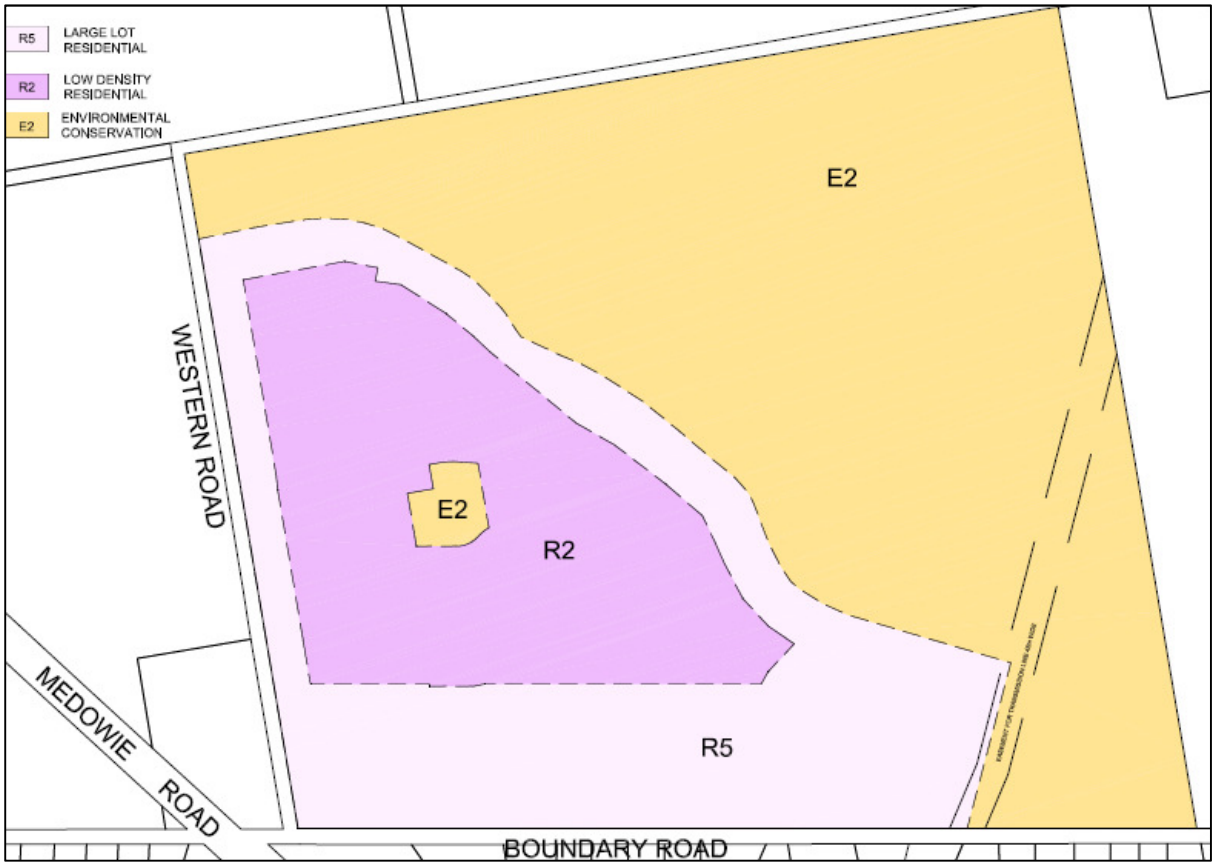


Figure 3: Proposed zoning, including the increased E2 area

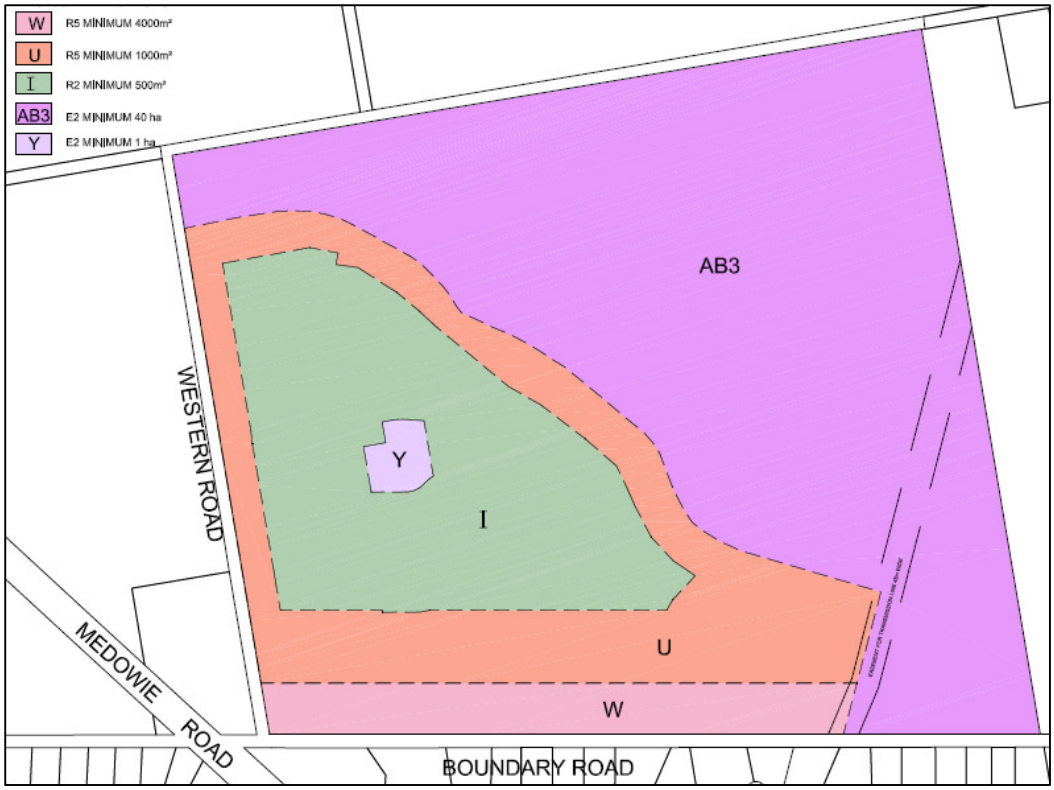


Figure 4: Proposed minimum lot sizes.

2.1 THE NEED FOR THE REZONING

The proposal will facilitate up to an additional 100 lots to the housing stock available in the Medowie area and increase the size of the land reserved as E2 Environmental Conservation. The proposal seeks to "tidy up" the boundaries of the E2 land to make it more manageable into the future once a subdivision is approved. The proposed R2 zoning is proposed to respond to market conditions and demand in the area, with the changing nature of the Medowie area from a predominantly rural residential area to a significant township in the Port Stephens area. The smaller lot sizes will also provide a mix of residential lot sizes, and more affordable lots in the estate.

2.2 LAND USE CONFLICT CONSIDERATIONS

The proposal will not conflict with the surrounding environment. The large lot zoning and lot sizes at the Boundary Road frontage is proposed to be maintained with the proposed smaller lots sitting in behind this to ensure compatibility with the rural residential development to the south. Any likely impacts from the additional lots as a result of the rezoning have been addressed elsewhere in this report.

3. MATTERS TO BE ADDRESSED IN A PLANNING PROPOSAL

The NSW Department of Planning and Environment (DoPE) have prepared a guideline for the submission of planning proposals. The guideline identifies four overarching matters that must be addressed in a Planning Proposal. These include:

1. A statement of the objectives or intended outcomes of the proposed Local Environmental Plan.

2. An explanation of the provisions that are to be included in the proposed Local Environmental Plan.

3. Justification for those objectives, outcomes and provisions and the process for their implementation, including:

    a) Need for the Planning Proposal
    b) Relationship to strategic planning framework
    c) Environmental, social and economic impact
    d) State and Commonwealth interests

4. Details of the community consultation that is to be undertaken on the Planning Proposal.

These matters are addressed below.

3.1 PART 1 – OBJECTIVES AND INTENDED OUTCOMES

THE PRIMARY OBJECTIVE OF THE PLANNING PROPOSAL

The primary objective of the Planning Proposal is to enable development of the site for low density residential purposes and to increase the land zoned E2 Environmental Conservation. This will facilitate further housing opportunities in the local area and enable additional land to benefit from environmental protections.

The proposal will be compatible with the residential and environmental adjoining land uses.

THE INTENDED OUTCOMES OF THE PLANNING PROPOSAL

The intended outcome of the planning proposal is to facilitate additional housing opportunities in the local area and to expand the land zoned for environmental conservation.

3.2 PART 2 – EXPLANATION OF THE PROVISIONS

SUMMARY OF PROPOSED CHANGES TO THE LEP

In order for the site to be developed in the manner currently conceptualised, the rezoning needs to provide for an amendment to the LEP by allowing:

- A rezoning that would increase the amount of land zoned E2 Environmental Conservation; and
- Rezone the remaining land R2 Low Density Residential with a minimum lot size of 500m^2.

3.3 PART 3A – NEED FOR THE PLANNING PROPOSAL

The planning proposal aims to increase the amount of land on the subject site zoned for environmental conservation. The additional housing that will result in the area will contribute to a more sustainable community by creating larger demand for existing services in the Medowie area, and appeal to a broader market and provide more housing choice.

IS THE PLANNING PROPOSAL A RESULT OF ANY STRATEGIC STUDY OR REPORT?

Lower Hunter Regional Strategy

Medowie is a town that is identified as a proposed urban area in the Lower Hunter Regional Strategy with boundaries to be defined through local planning. Council subsequently prepared and adopted the Medowie Strategy in 2009 to guide development. In June 2011 Council resolved to include the Boundary Road Site within the Medowie Strategy, and sought the inclusion of the site in the NSW Department of Planning and Infrastructure's review of the Lower Hunter Regional Strategy.

Draft Hunter Strategy and Draft Plan for Growing Hunter City

The proposal is also consistent with the exhibited drafts of the Hunter Regional Plan and Plan for Growing Hunter City (2015) which are anticipated to replace the Lower Hunter Regional Strategy once finalised.

The draft Hunter Regional Plan is a high level plan for the region and as such does not identify individual towns for growth. Nevertheless, Action 4.1.1 consists of encouraging a diverse range of housing choices to assist in meeting the needs of local communities. This is consistent with the planning proposal which aims to provide an affordable alternative to the surrounding large lot residential development.

The proposal is also supported by the draft Plan for Growing Hunter City which identifies that future housing development will be located within established urban areas and committed growth areas, including Medowie (Direction 7.2). It is acknowledged in the Plan that focusing growth (and presumably density) in close proximity to existing services will help “build sustainable communities by protecting the environment, maintaining water quality and

maximising the use of existing and committed urban infrastructure and services" (Direction 7.2).

Port Stephens Planning Strategy 2011-2036

Council adopted the Port Stephens Planning Strategy 2011-2036 in December 2011. It is one of a suite of high level strategic documents produced by Council to guide the operations of Council and the future growth and sustainability of the LGA. The Strategy identifies Medowie as a priority area for new release and infill development required to meet projected population growth.

Medowie Strategy

As above, Council adopted the Medowie Strategy in March 2009. Council resolved in June 2011 to include the Boundary Road site for development and conservation purposes in the Medowie Strategy. The Planning Proposal is consistent with the local planning strategy adopted for the area.

Land release areas in the Medowie Strategy, like many areas of Port Stephens LGA, are difficult to deliver due to a history of poor subdivision patterns and small allotment sizes that have hindered the ability to coordinate and deliver developable land.

The subject site at Boundary Road is free from these constraints. As it is a relatively large site under single ownership, it is capable of delivering a number of new allotments and contributing to housing stock and housing choice in the area, if rezoned as proposed.

The proposal will facilitate delivery of strategically positioned land to the market, free from ownership and coordination constraints. The site has significant advantages compared to other land identified for development in the Medowie Strategy.

IS THE PLANNING PROPOSAL THE BEST MEANS OF ACHIEVING THE OBJECTIVES OR INTENDED OUTCOMES, OR IS THERE A BETTER WAY?

The Planning Proposal seeks to allow low density residential development of the site, and will have limited conflicts (if any) with the future development of the surrounding land.

Very few opportunities exist within the locality that provides further opportunity for low density residential development without impacting significantly on the environmental qualities of land.

If the site were to continue in its current use, under its current zoning, the opportunity would be lost to deliver greater and potentially more affordable housing choices to the market.

IS THERE A COMMUNITY BENEFIT?

The community benefit lies in the provision of additional housing stock in the Medowie area and the inclusion of additional land in the E2 Environmental Conservation zone.

The various environmental constraints affecting Medowie limits the development potential of the area, with the proposal designed to add to the overall lot yield within the area.

Rezoning additional land E2 Environmental Conservation will ensure ongoing environmental protections are afforded to the pocket of koala feed trees on the site within the small pocket of E2 land (Figure 5).

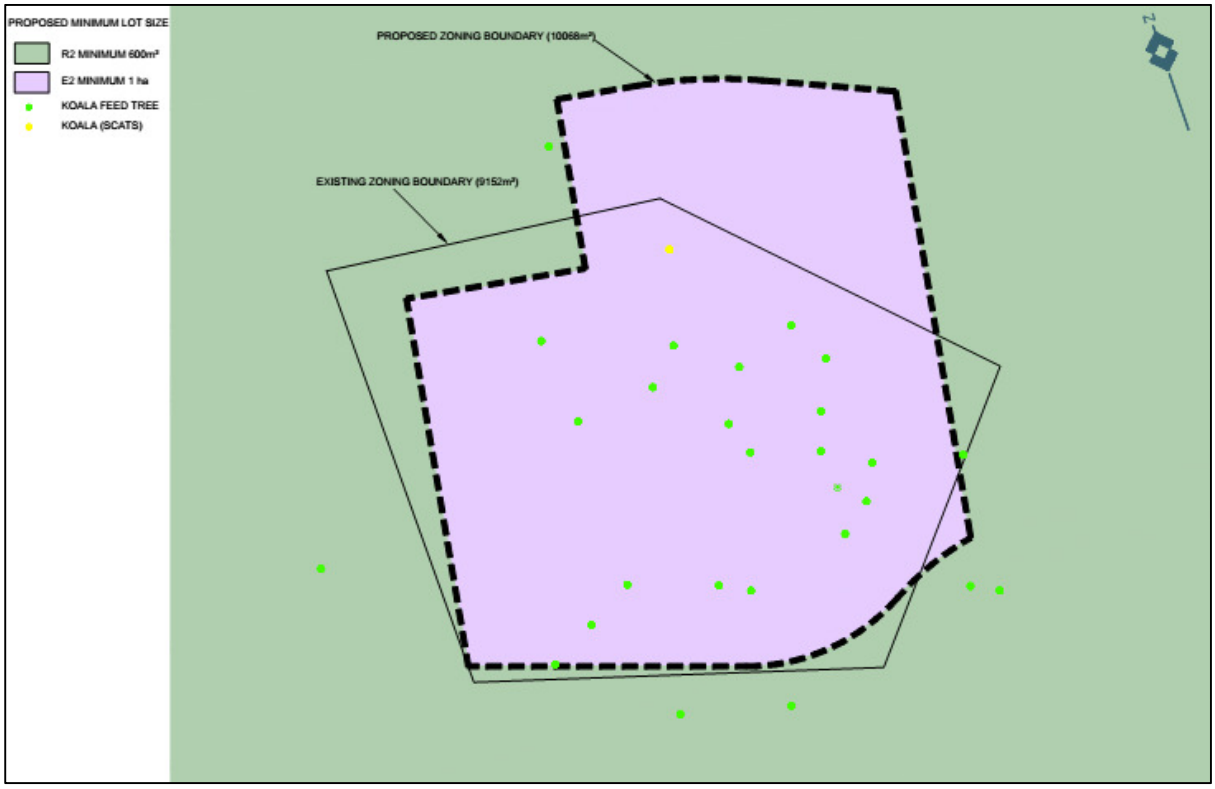


Figure 5: Proposed zoning will continue to protect koala feed trees currently located on E2 zoned land.

ECONOMIC AND EMPLOYMENT BENEFITS

Price entry to purchase, rent or lease residential and commercial real estate is a major consideration of commercial growth and employment. Medowie real estate is still relatively affordable and accessible in comparison to other suburbs in the LGA.

By facilitating an increase in residential opportunities and adding to the choice of lot size available, the micro-economy of Medowie has an alternative to aid in the stimulation of its socio-economics.

The construction of any subsequent subdivision injects monies into the economy as does the construction of the built form. All construction draws on local suppliers of materials, local workforce and support of retail services for provisional items.

Monies are re-circulated through secondary expenditure in in-direct and support services, when businesses and additional households are added to the local demographics.

3.4 PART 3B – RELATIONSHIP TO STRAGEGIC PLANNING FRAMEWORK

IS THE PLANNING PROPOSAL CONSISTENT WITH THE OBJECTIVES AND ACTIONS CONTAINED WITHIN THE APPLICABLE REGIONAL OR SUB-REGIONAL STRATEGY

The subject site is not specifically identified in the Lower Hunter Regional Strategy (LHRS). However, as the subject site is relatively small in comparison, it is unlikely to be specifically identified in a Regional Strategy.

As previously mentioned, the Boundary Road precinct is identified in the LHRS as a proposed urban area capable of low density housing.

Overall, it is considered that the rezoning would be consistent with the objectives of the LHRS.

IS THE PLANNING PROPOSAL CONSISTENT WITH THE LOCAL COUNCIL' S COMMUNITY STRATEGIC PLAN, OR OTHER LOCAL STRATEGIC PLAN?

The proposed rezoning forms part of the local Medowie Strategy, which identifies the precinct as an urban release area. The subject site is identified as an Urban Release Area in the Port Stephens LEP as well.

IS THE PLANNING PROPOSAL CONSISTENT WITH APPLICABLE STATE ENVIRONMENTAL PLANNING POLICIES?

The relevant State Planning Legislation for NSW is the *Environmental Planning and Assessment Act 1979* (EP&A Act 1979). The EP&A Act is supplemented by a suite of Environmental Planning Instruments (EPI's), namely State Environmental Planning Policies (SEPP's) and Local Environmental Plans (LEP's). The EPI's that are potentially relevant to the proposed rezoning include:

- *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008*.
- *State Environmental Planning Policy (Infrastructure) 2007*.
- *State Environmental Planning Policy No 44—Koala Habitat Protection*
- *State Environmental Planning Policy 55 – Remediation of Land.*

In addition, it is a requirement under the EP&A Act, that directions prepared under Section 117 are considered when rezoning a site.

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

Part 2 of the *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* (**Codes SEPP**) specifies a number of development types as having minor

environmental impact that may be carried out as exempt or complying development, therefore not requiring a Development Application (**DA**) under the NSW Planning System.

Home businesses and some alterations, additions and out-buildings, e.g. garden sheds, are specified as being exempt or complying development under the Codes SEPP. This SEPP will apply to the site following rezoning.

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 may apply to development on the subject site, however, it is considered that there is sufficient infrastructure capacity in the existing networks to support the proposal, with no RMS roads directly impacted by the proposal. Current water and sewer strategies do not need to be revisited as proposed infrastructure as part of the DA lodged with Council will have the capacity for the proposed additional lots.

A traffic impact study has been prepared that considers the impact of the future development that would be facilitated by this planning proposal (Refer Appendix B).

The traffic impact study concludes that the resulting level of traffic movement is likely to result in relevant intersections operating at or near free flow conditions and there is not likely to be any major impact on the local road network.

State Environmental Planning Policy No 44 – Koala Habitat Protection

This Policy applies to the Port Stephens local government area. The objectives of this SEPP are to promote the protection of Koala habitat.

It is noted that all koala feed trees currently protected by the E2 zoning are proposed to remain protected under an E2 zoning as part of this proposal.

As part of the ecological work undertaken to accompany the previous development application for the wider site area, a SEPP 44 assessment was conducted.

It was concluded that the wider site surveys determined that the study area provided a small area of Preferred Koala Habitat and associated Supplementary Koala Habitat under the Port Stephens Comprehensive Koala Plan of Management (CKPoM). Despite the availability of habitat for the Koala, the impact assessment identified that the retention of similar habitat within the conservation lands of the wider site (to the north of the subject site), and the availability of large areas of vegetation surrounding the site, will reduce the potential for impacts upon local populations of these species.

Some recommendations for managing the impacts were identified in the flora and fauna assessment such as warning signs and koala friendly fencing. It is anticipated that the assessment of subsequent development applications on the land proposed to be rezoned for residential purposes will similarly contain a detailed SEPP 44 assessment and will propose commensurate mitigation measures.

State Environmental Planning Policy 55 – Remediation of Land

Clause 6 of the *State Environmental Planning Policy 55 – Remediation of Land* (SEPP 55) requires Councils to consider the likely contamination of land before it can be rezoned. As noted, an environmental study will be prepared as part of the rezoning.

IS THE PLANNING PROPOSAL CONSISTENT WITH APPLICABLE MINISTERIAL DIRECTIONS (S. 117 DIRECTIONS)

The relevant and applicable Section 117 Ministerial Directions are identified below.

SECTION 117 MINISTERIAL DIRECTION	CONSISTENCY
2.1 Environmental Protection zones	The objective of this direction is to protect and conserve environmentally sensitive areas. The proposal will increase the amount of land zoned for environment protection and will not significantly impact on the local environment.
2.2 Coastal Protection	The site is not in the coastal zone.
3.1 Residential Zones	The proposal is considered to be consistent with this Direction. The proposal seeks to provide a housing choice in the Medowie housing market by offering lots of at least 500m^2.
3.3 Home Occupations	The proposal would allow home occupations. The proposal is therefore consistent with this Direction.
3.4 Integrating Land Use and Transport	It is considered the proposal would be consistent with the objectives of this Direction by providing for the development in close proximity to existing services.
4.1 Acid Sulfate Soils	It is considered that the impact from the Class 5 Acid Sulfate Sols classification will not significantly impact on future development of the site.
4.2 Mine Subsidence and Unstable Land	The site is not in a mine subsidence district.
4.3 Flood Prone Land	The subject site is not identified as being within a Flood Planning area under the LEP 2013.
4.4 Planning for Bushfire Protection	Parts of the subject site are identified as in a bushfire buffer zone, and any future subdivision of residential land, will require referral to the Rural Fire Service under Section 100B of the *Rural Fires Act 1997*.
5.1 Implementation of Regional Strategies	It is considered that the proposed rezoning is consistent with planning principles outlined in the Regional Strategy. The Regional Strategy identifies Medowie as a future urban area capable of supporting residential development. The site is within close proximity to the existing Medowie town centre.
6.1 Approval and Referral Requirements	It is considered that the proposal is substantially consistent with this Direction. The proposal seeks a residential rezoning that is likely to contain minimal, if any, concurrence provisions.

3.5 PART 3C – ENVIRONMENTAL, SOCIAL AND ECONOMIC IMPACT

IS THERE A LIKELIHOOD THAT CRITICAL HABITAT OR THREATENED SPECIES, POPULATION OR ECOLOGICAL COMMUNITIES, OR THEIR HABITATS WILL BE ADVERSELY AFFECTED AS A RESULT OF THE PROPOSAL?

RPS Australia East Pty Ltd prepared a Flora and Fauna Assessment as part of the previous development application over the wider site area (Appendix C).

The aim of that assessment was to examine the likelihood of significant impact of the proposal upon any threatened species, populations or ecological communities listed within the *Threatened Species Conservation Act 1995* (TSC Act) and the threatened entities listed federally under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The assessment included site surveys, habitat assessments and database searches to determine the species of fauna listed as threatened under the TSC Act and/or EPBC Act.

The assessment identified the Riparian Melaleuca Swamp Woodland corresponds to the Swamp Sclerophyll Forest Endangered Ecological Community (EEC) listed under the TSC Act. This vegetation is located on the northern section of the site and is not present within the subject area.

The assessment further found that *'no threatened flora species have been identified on the site, and no species were considered to require further assessment under the Assessments of Significance for the TSC Act or EPBC Act.'*

Several species of other bat and birds species, that are listed as threatened under the TSC Act and migratory species listed under the EPBC Act, were also observed in the area.

However, despite the availability of habitat for identified and potentially occurring threatened species, the impact assessment concludes that the retention of similar habitat within the conservation lands to the north of the subject area will limit the potential for impacts on the species identified above as a result of future development of the subject site.

ARE THERE ANY OTHER LIKELY ENVIRONMENTAL EFFECTS AS A RESULT OF THE PLANNING PROPOSAL AND HOW ARE THEY PROPOSED TO BE MANAGED?

The site is identified as within an area affected by bushfire.

The land currently zoned E2 and the boundary of the proposed E2 zoned land will not be within land identified as vegetation buffer.

Future development applications on the subject site will be assessed against the document *Planning for Bushfire Protection 2006* and may include mitigation measures for individual dwellings and property access.

Any future development on the site involving the subdivision of residential land will require referral to the RFS under Section 100B of the *Rural Fires Act 1997* as Integrated Development.

The subject site is not identified as affected by flooding under the LEP 2013.

The site is affected by Class 5 Acid Sulfate Soils, however the likely future development of the site for residential purposes is unlikely to be considered incompatible with this classification.

HOW HAS THE PLANNING PROPOSAL ADEQUATELY ADDRESSED ANY SOCIAL AND ECONOMIC EFFECTS?

There are a number of identified needs which the proposal seeks to address. These needs arise primarily from well documented issues facing the region, as well as the changing demographic for Australia as a whole. These issues relate primarily to the following:

1. Provision of employment opportunities in the Port Stephens LGA and Hunter Region from construction works.

2. Potential for home occupations which is a growing trend within Australia.

3. Achievement of strategic planning outcomes through the provision of housing stock (and housing choice) along with employment opportunities.

4. Reinforcement of the Medowie CBD as a sub-regional centre.

3.6 PART 3D – STATE AND COMMONWEALTH INTERESTS

IS THERE ADEQUATE PUBLIC INFRASTRUCTURE FOR THE PLANNING PROPOSAL?

- The region is well serviced by medical centres, including a range of allied health professionals in the local area.

- The region is well serviced by both public and private schools, with the capacity to expand both now and into the future.

- Local augmentation of sewer, water, drainage and other infrastructure services is easily undertaken as the Planning Proposal sits within a serviced area.

- The site is well serviced by a range of local churches and other places of worship.

- A number of child care centres also exist in close proximity where capacity is available for new children.

- Regional shopping facilities are available close to the site at Medowie.

WHAT ARE THE VIEWS OF STATE AND COMMONWEALTH PUBLIC AUTHORITIES CONSULTED IN ACCORANCE WITH THE GATEWAY DETERMINATION?

The Planning Proposal has not been formally publically exhibited at this time, and as such there has been no consultation with, or responses from, State or Commonwealth Government

Agencies. There is considered few environmental issues to warrant consultation with State Government Agencies at this stage.

3.7 PART 4 – COMMUNITY CONSULTATION

The Planning Proposal has not yet been exhibited, however will be in accordance with the requirements of the EP&A Act.

The Planning Proposal has not been formally discussed with the surrounding community exhibited at this time.

4. CONCLUSION

This Planning Proposal has been prepared on behalf of McCloy Medowie Pty Ltd in relation to the proposed rezoning of land at Boundary Road, Medowie in the Port Stephens local government area.

The site contains an isolated section of land that is currently zoned E2 Environmental Conservation. It is proposed that the site be rezoned under Port Stephens Local Environmental Plan (LEP) 2013 to allow for a larger portion of the site to be rezoned E2 Environmental Conservation and to rezone the surrounding land for low density residential purposes with a minimum lot size of 500m^2. The existing zoning for large lot residential purposes along Boundary Road is proposed to be retained.

The subject site is located in close proximity to the Medowie commercial centre. Medowie is identified as a town in the Lower Hunter Regional Strategy and the Boundary Road precinct is identified for potential residential development in the Port Stephens Planning Strategy. The proposal would be consistent with these planning strategies.

This planning proposal is also consistent with the development application lodged with Council for a residential subdivision with the wider site facilitates and associated infrastructure having the capacity to handle the proposed additional lots (see also Appendix D).

APPENDIX A

Maps

EXISTING ZONING

R5 LARGE LOT RESIDENTIAL

E2 ENVIRONMENTAL CONSERVATION

N

E2

E2

R5

WESTERN ROAD

MEDOWIE ROAD

BOUNDARY ROAD

EASEMENT FOR TRANSMISSION LINE 45m WIDE

TITLE: PROPOSED SUBDIVISION OF LOT 93,94,95 AND 96
BOUNDARY ROAD MEDOWIE
EXISTING ZONING PLAN
McCLOY MEDOWIE

McCLOYGROUP

High Definition Design Drafting

KEVIN URANE 0412009891

Date: 21.03.16 Scale: 1:2000 A3 Designed: KU
Cad Ref: HDDD 3 rezoning r7

No	Amendment	Drawn	Date
RZ7	REMOVE LAYOUT	KU	12.04.16
RZ6	ORIGINAL ISSUE	KU	21.03.16

Project No HD3
Drawing No HDRZ3
Revision RZ7

EXISTING MINIMUM LOT SIZE

W	R5 MINIMUM 4000m²
U	R5 MINIMUM 1000m²
AB3	E2 MINIMUM 40 ha
Y	E2 MINIMUM 1 ha

N

AB3

Y

U

W

EASEMENT FOR TRANSMISSION LINE 45m WIDE

WESTERN ROAD

MEDOWIE ROAD

BOUNDARY ROAD

TITLE: PROPOSED SUBDIVISION OF LOT 93,94,95 AND 96
BOUNDARY ROAD MEDOWIE
PROPOSED MINIMUM LOT SIZE PLAN
McCLOY MEDOWIE

McCLOYGROUP

High Definition Design Drafting

KEVIN URANE 0412009891

Date: Scale: 1:4000 A3 Designed: KU
Cad Ref: HDDD 3 rezoning r7

Project No HD3

No	Amendment	Drawn	Date
RZ7	AMEND PLAN	KU	12.04.16
RZ6	ORIGINAL ISSUE	KU	21.03.16

Drawing No HDRZ5 Revision RZ7

PROPOSED MINIMUM LOT SIZE

- W — R5 MINIMUM 4000m²
- U — R5 MINIMUM 1000m²
- I — R2 MINIMUM 500m²
- AB3 — E2 MINIMUM 40 ha
- Y — E2 MINIMUM 1 ha

N

AB3

Y

I

U

W

EASEMENT FOR TRANSMISSION LINE 45m WIDE

WESTERN ROAD

MEDOWIE ROAD

BOUNDARY ROAD

TITLE: PROPOSED SUBDIVISION OF LOT 93,94,95 AND 96
BOUNDARY ROAD MEDOWIE
PROPOSED MINIMUM LOT SIZE PLAN
McCLOY MEDOWIE

McCLOYGROUP

High Definition Design Drafting

KEVIN URANE 0412009891

Date: 18.12.14 Scale: 1:4000 A3 Designed: KU
Cad Ref: HDDD 3 rezoning r8

No	Amendment	Drawn	Date
RZ8	AMEND PLAN	KU	12.05.16
RZ7	AMEND PLAN	KU	12.04.16
RZ6	ORIGINAL ISSUE	KU	21.03.16

Project No HD3
Drawing No HDRZ6
Revision RZ8

PROPOSED ZONING

R5 LARGE LOT RESIDENTIAL

R2 LOW DENSITY RESIDENTIAL

E2 ENVIRONMENTAL CONSERVATION

N

E2

WESTERN ROAD

E2

R2

R5

EASEMENT FOR TRANSMISSION LINE 45m WIDE

MEDOWIE ROAD

BOUNDARY ROAD

TITLE: PROPOSED SUBDIVISION OF LOT 93,94,95 AND 96
BOUNDARY ROAD MEDOWIE
PROPOSED ZONING PLAN
McCLOY MEDOWIE

McCLOYGROUP

High Definition Design Drafting

KEVIN URANE 0412009891

Date: Scale: 1:5000 A3 Designed: KU
Cad Ref: HDDD 3 rezoning r8

No	Amendment	Drawn	Date
RZ8	AMEND ZONING LINE	KU	12.05.16
RZ7	REMOVE LAYOUT	KU	12.04.16
RZ6	ORIGINAL ISSUE	KU	21.03.16

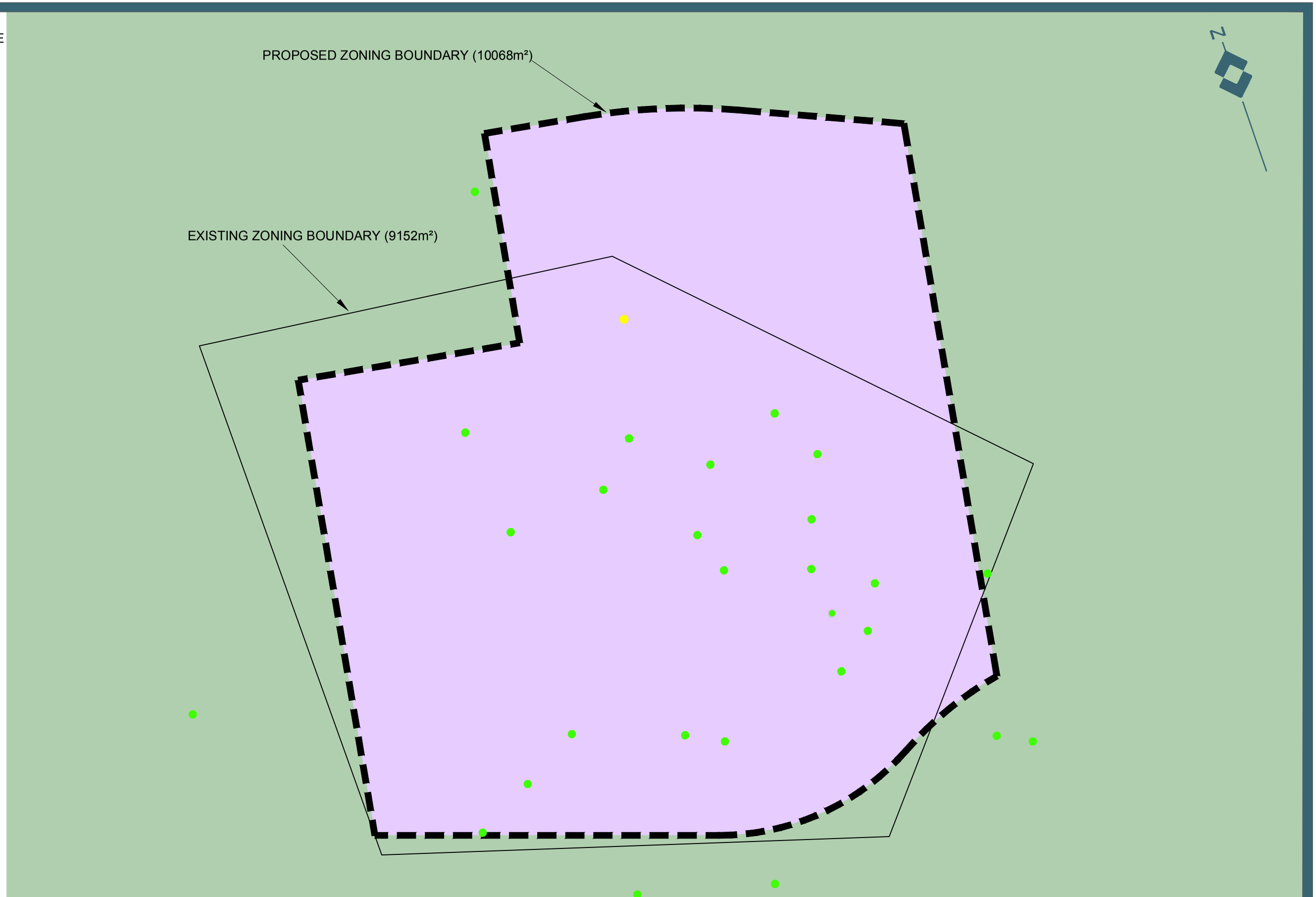
Project No HD3

Drawing No HDRZ4

Revision RZ8

PROPOSED MINIMUM LOT SIZE

- R2 MINIMUM 600m²
- E2 MINIMUM 1 ha
- KOALA FEED TREE
- KOALA (SCATS)



TITLE: PROPOSED SUBDIVISION OF LOT 93,94,95 AND 96
BOUNDARY ROAD MEDOWIE
PROPOSED MINIMUM LOT SIZE PLAN
McCLOY MEDOWIE

McCLOYGROUP

High Definition Design Drafting

KEVIN URANE 0412009891

Date: Scale: 1:600 A3 Designed: KU
Cad Ref: HDDD 3 rezoning r8

No	Amendment	Drawn	Date
RZ7	AMEND PLAN	KU	12.04.16
RZ6	ORIGINAL ISSUE	KU	21.03.16

Project No HD3
Drawing No HDRZ6
Revision RZ7

APPENDIX B

Traffic

BETTER TRANSPORT FUTURES
MARK WAUGH

Proposed Subdivision of Lots 93, 94, 95 & 96 Boundary Road Medowie NSW

McCloy Medowie Pty Ltd

Traffic Impact Statement
May 2016

Mark Waugh Pty Ltd

ABN 67 106 169 180

Document History and Status

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Name of Document:	Traffic Impact Statement
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Contents

1 Introduction

Better Transport Futures was commissioned by McCloy Medowie Pty Ltd in 2015 to prepare a Traffic Impact Statement for the proposed residential development of Lots 93-96 Boundary Rd Medowie NSW.

This latest report updates our previous work for the subject site, which is on land that is part of the Port Stephens LEP 2013 and draft DCP 2013. The updated proposal seeks to develop around 450 residential lots. The proposed subdivision layout is included as **Appendix A** to this report. All other aspects of the Traffic Impact Statement remain unchanged. This current report updates the impacts around the higher lot threshold now envisaged for the site.

The overall project is seen as providing a positive contribution to the ongoing redevelopment of the Medowie village as part of the Hunter Region.

This report presents the findings of our traffic impact assessment of the transport issues associated with the proposal and has been prepared to accompany the development application to Port Stephens Council.

It is structured as follows:

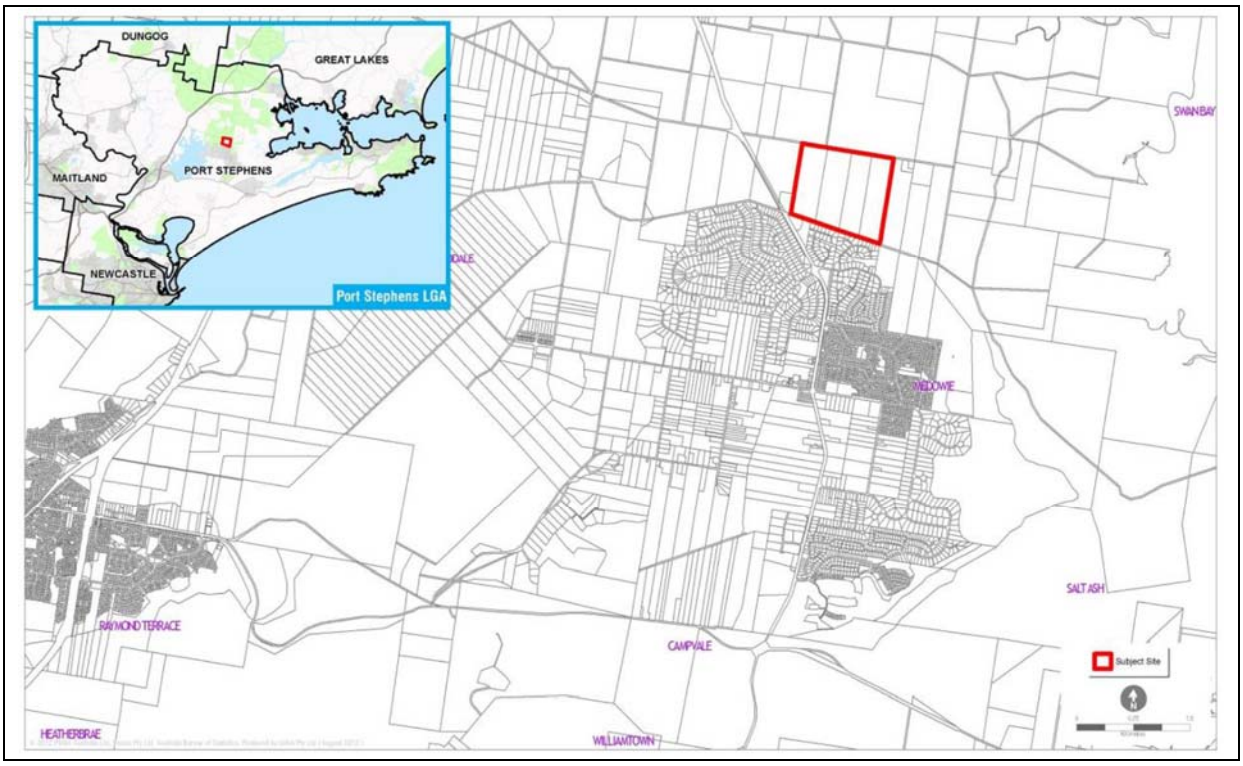
- **Chapter 2** outlines the existing situation in the vicinity of the subject site, including discussions on any other planned growth known within the vicinity and any known road network improvements.
- **Chapter 3** describes the access and traffic requirements of the proposal, its internal movement characteristics
- **Chapter 4** summarises the findings of this impact assessment
- **Chapter 5** provides an overall summary and conclusion to the assessment.

2 Existing Situation

2.1 Site Location

The site is located on a parcel of land east of Medowie Road and to the north of the existing Medowie township. It is located on the northern fringe of the town of Medowie and covers an area in the order of 127 hectares. The area of subdivision is around 50 hectares of the site. The site has road frontage along Boundary Road, James Road and along the Crown Road to the west. The land surrounding the site is generally rural in character with existing residential development to the south. Land to the east is part of Medowie State Forest and will not be developed.

The locality is illustrated in Figure 2-1 below.



Source: Port Stephens DCP 2013 Figure 1 North Medowie Residential Area (NMRA)

Figure 2-1 Site Location

Medowie Town Centre is located some 2.5 to 3 kms to the south of the site. As a local town centre it is experiencing some growth, in line with the continued development of the town of Medowie. The township has a range of local facilities including a number of schools.

The Medowie Strategy was adopted by Council in March 2009. It seeks to guide development, consolidate the facilities in Medowie and increase the resident population, whilst other initiatives seek to improve employment opportunities in the broader area. The subject land is an approved part of the Medowie Strategy. The site is referred to as the North Medowie Residential Area (NMRA) in Council's Port Stephens DCP 2013.

2.2 Local Road System

2.2.1 Existing Road Hierarchy

Medowie Road connects with the Pacific Highway to the north of the subject site. The Pacific Highway is a State Road (H10) and provides the main north-south route along the eastern coast of Australia north of Newcastle. As such it is an important road link that carries a significant volume of traffic. It is the main arterial route through the area with Roads and Maritime Services (RMS) as the consent authority for this road.

Port Stephens Council has recently completed the Medowie Traffic and Transport Study (URaP -TTW 2012). This study designates Medowie Road as a sub-arterial road in the areas hierarchy. It is a regional main road and a designation as either sub arterial or trunk collector road is appropriate for its functional role for the area. Port Stephens Council is the road authority for all roads in the area with the exception of the Pacific Highway.

Boundary Road is a local road serving a small number of existing homes and also provides access to the State Forest areas to the east of the subject site.

2.3 Road Network Characteristics

Pacific Highway

Pacific Highway (H10) in the vicinity of Medowie provides a dual carriageway configuration to rural highway standard. It has a posted speed limit of 100 km/h on this stretch north of Raymond Terrace, to take account of the series of at grade intersections with the local road system on this stretch of highway. Further north past the Buckets Way intersection the speed limit increases to 110 km/h, where the access controls and road environment provide a consistently higher standard. The Pacific Highway is part of the national highway system and carries a high proportion of interstate traffic between Sydney and Brisbane.

The Pacific Highway is the main north-south road along the coast of northern NSW. RMS is progressively extending the dual carriageways northwards as part of the Pacific Highway program being funded by the State and Federal Governments. Most recently the bypass of Bulahdelah was completed in 2014.

The Pacific Highway forms a higher speed link into Newcastle from areas to the north of Medowie which limits the popularity of Medowie Road as a through road. The intersection of the Pacific Highway with Medowie Road is a seagull island layout with full turning lanes.

Medowie Road

Medowie Road (Road No 518) is a regional main road through the town of Medowie. It provides the most northerly connection from the Pacific Highway through Medowie to Richardson Road and Nelson Bay Road, connecting to the Port Stephens Peninsula. It is also the most direct route from the north to Williamtown and the Newcastle Airport.

Medowie Road is a two lane two way road in the vicinity of the subject site. It has two traffic lanes marked as 3.5 metres wide but has an overall seal width of 9metres. It has a further 1m of unsealed shoulder on each side of the road. Outside of the urban areas it has a posted speed limit of 100 km/h, including presently past the intersection with Boundary Road. The first higher order control along the route is the intersection of Kirrang and Federation Drive with Medowie Road, which operates under roundabout control. All intersections to the north, including those of Boundary Road operate under priority control. Further to the south the intersection with Richardson Road operates under roundabout control along with that of Ferndale Road in the Medowie village centre. Medowie Road has no footways in the vicinity of the subject site. Further to the south and within the urban area closer to the Medowie town centre there are limited sections of existing footpaths and cycle paths.

Boundary Road intersects with Medowie Road as two offset T -intersections. The western section of the road is generally unformed, and while it provides some access to the rear of properties on local roads such as Fisher Road and Griffiths Avenue, this is not the primary access to these properties. This section of Medowie Road is not proposed to provide and additional access under the Medowie Strategy). Sight distances along Medowie Road in both directions from the Boundary Road intersection are very good.

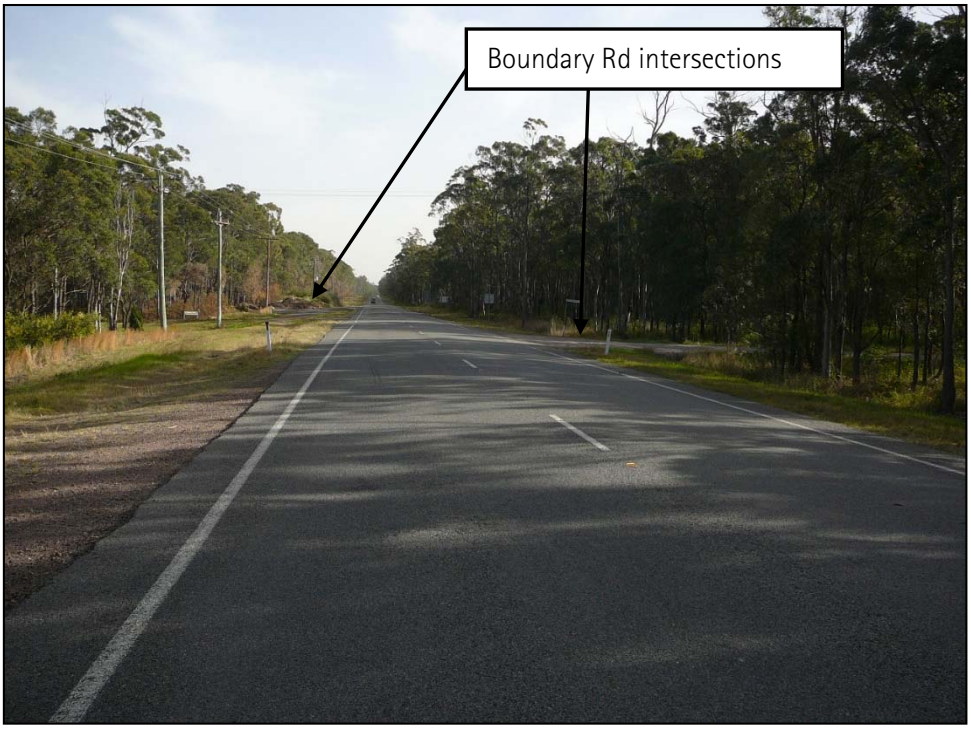


Photo 1 - North view along Medowie Rd, from south of the intersection with Boundary Rd

Photo 2 - Visibility from Boundary Road, southwards along Medowie Road

Traffic volume data has been collected from Council records. It carries comparatively low traffic flows. Traffic data for Medowie Road, been sourced from Council reports:

North of Kirrang Drive	- 2495 vehicles per day two-way.
North of Ferodale Road	- 6489 vehicles per day two-way
South of Ferodale Road	- 9238 vehicles per day two-way.
North of Richardson Road	- 10373 vehicles per day two-way

These levels of traffic reflect the busier section of Medowie Road to the south of the subject site, where local traffic forms a large proportion of the vehicles using the road.

Figure 2-2 below shows the peak hour traffic flows recorded in February 2015 at the intersection of Medowie Road with Boundary Road. They show a combined north and south bound traffic volume of 240 vph in the morning peak, and just over 300 vehicles in the evening peak hour. This equates to approximately 2500 to 3000 vehicles per day based on a typical daily to peak flow factor of 10%. Boundary Road traffic flows are minimal, with traffic generated by the limited number of residences located to the east along Medowie Road. The small amount of local traffic is supplemented by longer distance traffic using Medowie Road for access to regional facilities and destinations such as Williamtown and Newcastle Airport, and the Port Stephens peninsula. This includes sand/gravel extraction trucks which were observed using Medowie Road.

Photo 3 - Intersection of Boundary Rd and Medowie Rd looking east.

Photo 4 - General view of Boundary Rd east of Medowie Rd.

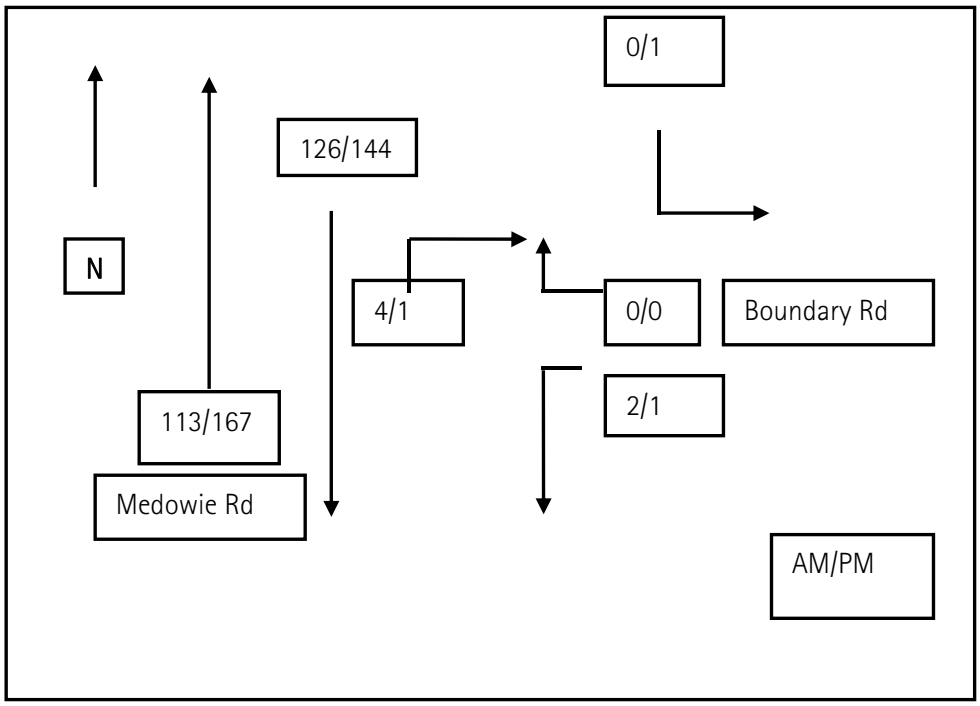


Figure 2-2 Existing Peak Hour Traffic Flows, BTF- February 2015

Boundary Road

Boundary Rd, east of Medowie Rd is an unsealed road, between 4.5m and 5m wide serving a small number of existing residences and a large area of State Forest. The road also extends across Medowie Road to the west where parts have been sealed to service residences. The two sections of Boundary Road, east and west of Medowie Road have been staggered to eliminate a four way cross roads intersection. The two intersections are approximately 40m apart and operate as two separate T intersections (Refer Photo 1).

James Road

James Road is an unsealed road approximately 4.5m wide located along the north side of the site to be rezoned. It services a small number of properties and forest areas. As no access is proposed from this road traffic surveys were not undertaken.

Crown "Paper" Road

Along the western boundary of Lot 93 is a Crown "Paper" Road. It is an unsealed road used for forest access. No counts of vehicle use of the road are available. As with James Road given the low volumes recorded at the Medowie Road / Boundary Road intersection volumes will be minimal.

2.4 Existing Pedestrian, Cyclist and Public Transport Facilities

There are no existing pedestrian or cyclist facilities in the Boundary Road area. None of the residential roads to the south or west of Boundary Road have any footpaths provided. The nearest footpath is located at the intersection with Federation Drive, about 700m to the south of Boundary Road.

Public transport services in the Medowie area are provided through Comfort Delgro Cabcharge (CDC) operating as Hunter Valley Buses. Bus Route 136 links Medowie from Raymond Terrace to Stockton via Fern Bay and the Newcastle Airport whilst Route 137 connects to Raymond Terrace and Lemon Tree Passage. In this area Route 136 uses Federation Drive, and Medowie Road south of Federation Drive. This service is located over 500m walk from the proposed rezoned land along Medowie Road.

The location of these existing services in relation to the subject site is shown in **Appendix B**

In addition to the local route services, five school buses service the area providing a connection to local schools and schools in Raymond Terrace.

2.5 Development Planning

2.5.1 Other Developments

The subject site is the only approved development in the Boundary Road area included in Council's Port Stephens LEP 2013, and draft DCP 2013. There are a number of in-fill developments proposed as part of the Strategy in the vicinity of the town centre, however, these are unlikely to impact on traffic characteristics in the vicinity of Boundary Road.

2.5.2 Traffic and Transport Planning Considerations

Council has recently considered the provision of traffic and transport facilities as part of its development of a draft Medowie Local Area Contributions Plan – Traffic and Transport. This plan is currently on exhibition, and has not been formerly adopted by Council at the time of preparing this assessment.

However the following features of the draft plan are relevant to the subject site on Boundary Road and have been considered as part of the traffic impact assessment of the subject site.

Table 1 – S94 Works directly related to Boundary Road development

Project	Location	Description	Comment
1	Medowie Road	Road network - North of Boundary Road – Gateway treatment at entrance to Medowie and change in speed zone from 100 km/h to 70 km/h	As a gateway treatment. This benefits the whole Medowie area from a road safety and environment perspective.
2	Various roads	On-road routes within rural residential area - Implement 50km/h area speed zoning, share the road signs supplemented with pavement markings (50 numerals & bicycle logos) at regular intervals throughout area	Applies across all rural roads and benefits the wider Medowie area
3	Medowie Road	Road network - Between Boundary Road and Kirrang Drive – Horizontal displacement mid-block treatment	As a LATM treatment on Medowie Road as main northern access, this benefits the whole Medowie area
4	Medowie Road	Pedestrian and cycle way - Boundary Road to Kirrang Drive - Off-road shared path on west side to future residential area. Investigate possible alternate route – Boundary road to Federation Drive via Settlers Close/Overland Avenue/Explorers Close.	Recommend consideration of the URaP alternate route been investigated? It could significantly reduce this cost.
5	Medowie Road	Pedestrian and cycle way - Federation Close to Kindlebark Drive - off-road shared path on east side	Not directly related to Boundary Road
22	Medowie Road	Pedestrian and cycle way - At Kirrang Drive/Federation Drive - Upgrade pedestrian refuge island to current standards	This benefits a wider area in Medowie than just Boundary Road precinct.

Source: Extract from Port Stephens Council Medowie Section 94 Plan Summary Sheet released for public exhibition, March 2015

The proposed introduction of a gateway treatment, with reduction in speed limit from 100 kph to 70 kph is considered as appropriate to reinforce the changing road environment as vehicles enter the Medowie urban area. Similarly the implementation of 50kph local speed limits with share the road signs and logos is considered a worthwhile safety initiative in low volume applications such as for the subject site.

The consideration of pedestrian and cyclist facilities is discussed in Section 3.5 of this report.

3 Proposed Development

3.1 The Proposal

Medowie is recognised in the Lower Hunter Regional Strategy as one of seven major Greenfield release areas. The Medowie Strategy, adopted by Port Stephens Council sets the framework for integrated and sustainable growth and development of large parts of the central and southern sections of Medowie.

The Proposed Subdivision Layout Plan for the subject site is included as **Appendix A** to this report. The total site area is approximately 127 hectares of which the proposed subdivision comprises about 50 hectares.

The initial assessment of the development proposal assumed up to 370 residential lots being developed on the subject site. This included a mix of lot sizes ranging from 1,000m^2 to 4,000m^2. No other land uses such as retail, recreational or commercial facilities are proposed as part of the plan.

The current proposal seeks to develop up to 450 residential lots on the subject land.

The site is well located approximately 2.5km north of the existing Medowie centre with direct access from Medowie Road, via Boundary Road.

3.2 Staging

The subject site is likely to be developed in stages. The road network would be upgraded in stages to match staged access needs, with Boundary Road sealed in the first stages.

3.3 Development Traffic

3.3.1 Trip Generation

Trip generation has been assessed using the rates available from the standard Guidelines for Traffic Generating Developments (RTA 2002). These guidelines indicate a range of traffic generation rates depending on the type of land use activities.

McCloy Medowie Pty Ltd are now considering a lot yield for the subject site of up to 450 lots, by reducing average lot sizes to more typical urban residential standards. This will result in a lot yield closer to 500 lots, around 450 to 480 lots depending on the final configuration of the altered subdivision.

In the past this assessment applied the pre 2013 standard residential dwelling generation rates of 9 daily vehicle trips with 0.85 trips per dwelling per peak hour have been adopted. In the process of reviewing the lot yield issue, BTF has considered the latest residential traffic generation rates published by RMS in August 2013, which show a reduction in generation when compared to older trip rates.

The residential trip rates for low density residential dwellings in regional areas have been revised to 7.4 trips per day, and 0.78 trips in the evening peak hour. (0.71 trips in the morning peak hour.)

Along with these variations in trip rates, the standard RMS practice of applying a background growth factor to traffic volumes has been applied to the through flows, north and south along Medowie Road.

Based on 450 lots this equates to 3330 vehicles per day being generated by the proposal, with 320 (AM) or 351 (PM). This compares to the previous assessment work in 2015 where the daily total was still 3330 vehicles per day, and peak factor of 315 vehicles per hour. And so the change in peak flows is only around 10% over that which was analysed previously.

3.3.2 Traffic Distribution and Assignment

It is considered that the traffic to and from the development would be heavily biased to the south, either contained within Medowie or travelling on to locations such as Raymond Terrace or Newcastle. For the purposes of this assessment, the following trip distribution has been assumed:

- South via Medowie Road – 90%
- North via Medowie Road – 10%

This directional split could vary, dependent upon new development in the area (Karuah for example) over the timeframe of the regional strategy (up to 25 years).

For the purpose of this assessment the following assumptions have been made in relation to trip distribution and assignment:

Peak Directional Split:

- 80% out AM, 20% in AM
- 80% in PM, 20% out PM

Peak Assignment

- 10 % N (Karuah and beyond)
- 90% S (Medowie and beyond)

3.3.3 Future Development Traffic Flows

The future possible total development flows based on this distribution are presented in **Figure 3-1** below:

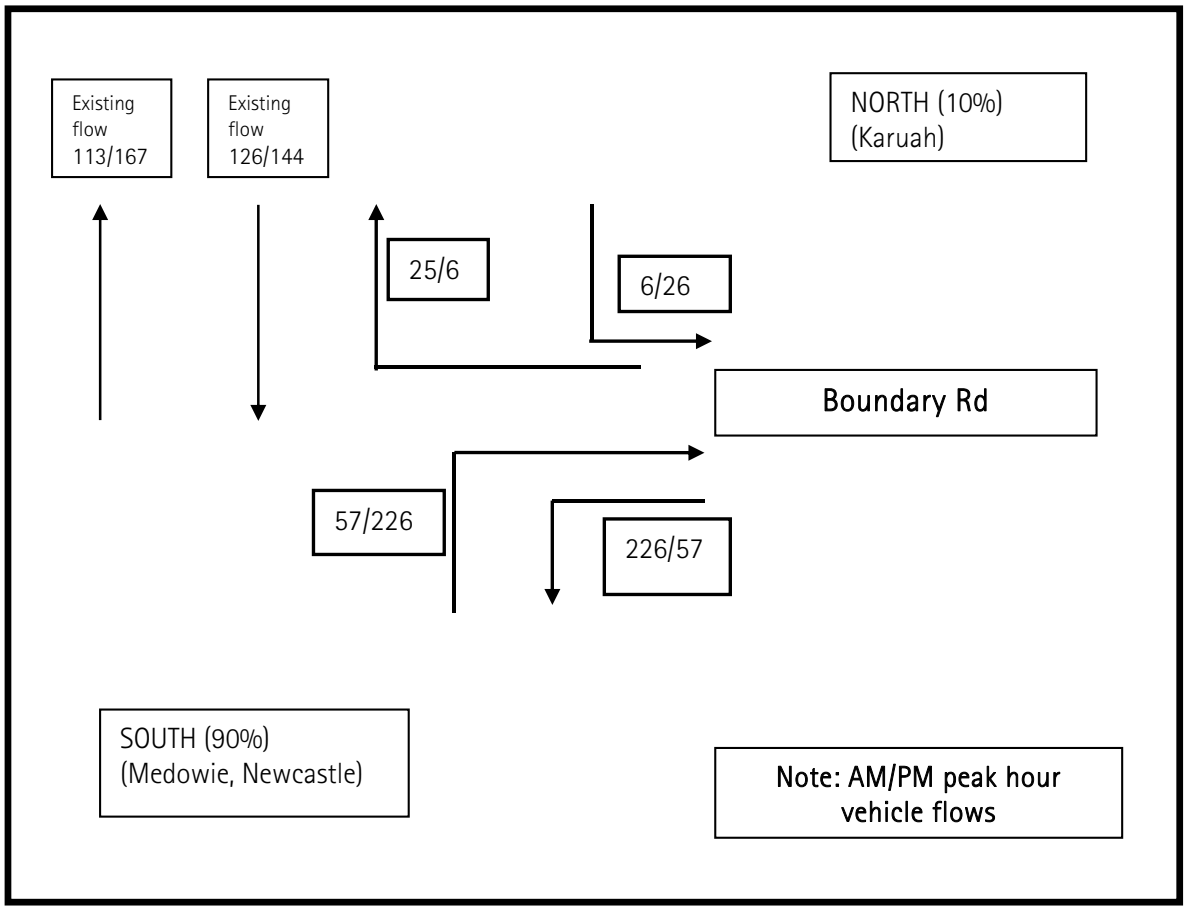


Figure 3-1 Potential Future Flows. Medowie Rd/Boundary Rd

3.4 Proposed Site Road Layout and Intersection Concepts

3.4.1 Proposed Site Road Layout

The proposed subdivision layout plan provides for four (4) connections to Boundary Road. Road widths have been discussed with Council and are understood to meet Council's requirements. Proposed road widths are illustrated in **Figure 3-2** overleaf.

The proposed subdivision layout plan focuses on the one key route in and out of the site. Under these arrangements Boundary Road would perform the function of a collector street/road for the subdivision, all other roads being local streets.

It is recommended that the intersection of Boundary Road with Medowie Road be designed in accordance with Council and RMS road design guidelines. The combination of Basic Left Turn (BAL and Channelised Right (CHR) turn treatments are recommended and are discussed in the Section 4 of this report.

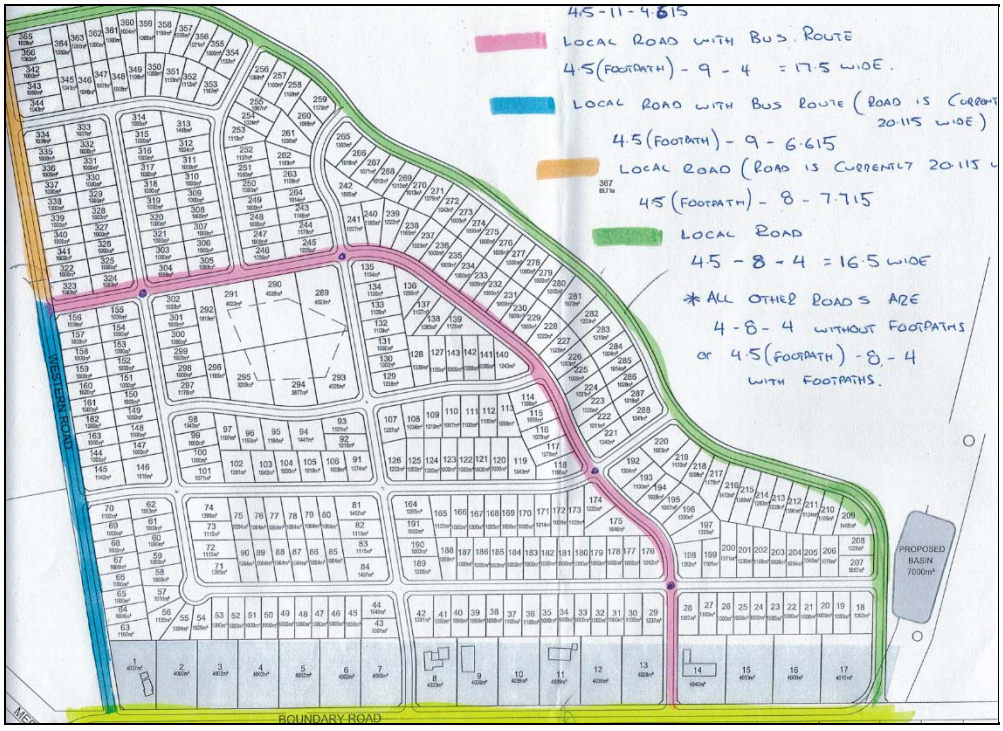


Figure 3-2 Proposed Road Widths as supplied by McCloy Medowie Pty Ltd

The internal road layout and alignment will be developed to provide an environment that encourages low speed vehicle movement, improving overall safety and enhancing the environmental amenity for the residents.

The proposed subdivision layout makes use of the Crown Road to access Boundary Road, with two further connections to the east onto Boundary Road. All traffic would use the intersection with Medowie Road.

The Crown (Paper) Road north of Boundary Road will also be sealed for its full length along the site boundary to provide access to the subject site.

3.4.2 Intersection Concepts

Traffic volumes within the subdivision by way of dispersion via multiple routes will have traffic volumes substantially below the flows predicted for the Medowie Road / Boundary Road intersection. As such they will all operate well below the intersection volume thresholds for free flow conditions (refer to Section 4.2 for further explanation of these thresholds.)

With such low traffic volumes and a proposed local 50 kph speed limit the operation of the internal local road network will perform essentially at free flow conditions throughout the subject site.

A number of 4-way local intersections are proposed within the site, to reinforce the adopted grid layout. It is recommended that stop sign controls be incorporated at these junctions, and in a pattern that breaks up the movement of vehicles throughout the site, as an added traffic calming feature.

It has been suggested that roundabouts be used within the subdivision to provide equal priority and control as traffic calming features. Such treatment is considered excessive, both in functional and costs terms, given the extremely low traffic volumes expected within the estate. At such low volumes, and within an estate that encourages pedestrian and cycling movements, they are not considered the best treatment and are not recommended in this instance.

Bus access to the site is another reason to avoid placement of roundabouts at the proposed 4-way junctions, as these are difficult to negotiate in the limited geometry of local streets.

3.5 Pedestrian and Cyclist Access

3.5.1 Off-site Connections

Current pedestrian and cyclist facilities in the vicinity of the site are very limited, due to the limited amount of development within the surrounding area. There are currently no footpaths on the surrounding roads and specifically no footpaths on Medowie Road in this area. The nearest pedestrian facility is provided at Federation Drive, around 700 metres away.

Council has considered the provision of pedestrian and cyclist facilities as part of its recent development of the Medowie Local Area Contributions Plan – Traffic and Transport> This draft plan is based on the Medowie Traffic and Transport Study (URaP –TTW 20012). The plan is currently on exhibition, and has not been formerly adopted by Council at the time of preparing this assessment.

However the draft plan includes pedestrian and cycling features that are relevant to the subject site on Boundary Road. The Medowie Traffic and Transport Study quotes the Austroads and RTA Bicycle guides as the basis for justifying the extent of pedestrian and cycling infrastructure proposed for the Medowie area.

The draft contribution plan as it relates to pedestrian and cycling facilities in the vicinity of Boundary Road is justified in part on the basis of:

"Provision of off-road shared paths within footways along major routes leading to the town centre and joining with major attractors such as schools."

This directly affects the Boundary Road development, in that it proposes an off road pedestrian / cycle path from Boundary Road to Kirrang Drive, at a considerable estimated cost of $460,000

Of note is the studies recommendation included in the plan summary to:

"Investigate possible alternate route – Boundary road to Federation Drive via Settlers Close/Overland Avenue/Explorers Close."

The alternate pedestrian and cycling route option nominated in the Medowie Traffic and Transport Study would look to utilise the corridor created by the existing high voltage power lines connecting the site with the residential development to the south. This would provide connectivity for pedestrian and cyclists to the adjoining housing area via Squire Close and County Close and would provide a more direct pedestrian access to the existing bus route run along Federation Drive.

This route is considered a sensible alternative. It uses quiet residential streets, keeping cyclists and pedestrian's away from exposure to higher passing traffic and connects with the existing local bus route. By utilising existing residential streets, the implementation costs are likely to be substantially less than the Medowie Road alternative.

It is therefore recommended that the Medowie Traffic and Transport Study recommendation to *"Investigate possible alternate route – Boundary road to Federation Drive via Settlers Close/Overland Avenue/Explorers Close."* be actioned prior to finalising any pedestrian and cycling facilities on Medowie Road.

3.5.2 On-Site Facilities

As part of the development of the site, pedestrian and cyclist links will be developed in line with Council's guidelines for new subdivisions. As the site is essentially a green site, the provision of pedestrian and cycle routes from the beginning of the development is highly desirable, so as to act as a positive encouragement to the use of these facilities as well as ease of construction.

The development plan proposed outlines proposed road widths. Footpaths and dedicated cycling facilities are not generally required in rural residential developments due to the low traffic flows. Traffic volumes in these developments are generally low enough for pedestrians and cyclists to use the road network. This is acknowledged in the Medowie Traffic and Transport Study with the recommendation that *"on-road routes within rural residential area be established through the implementation of a 50km/h area speed zoning with share the road signs supplemented with pavement markings and signs at regular intervals throughout the area".* The subject site is considered a suitable area for this treatment of cycling movements.

Based on the assumption the proposed road layout will be a very permeable road network with no cul-de-sacs, the traffic can be expected to be evenly distributed with only Boundary Road carrying more than 1000vpd. Consequently, all roads will be suitable for pedestrian and cyclist use.

Allowance will be made for a footpath on Boundary Road to link into any future footpaths on Medowie Road should they be constructed.

Similarly Boundary Road will be designed to allow cyclist access to Medowie Road. This area of Medowie is largely level terrain making cycling attractive with many local destinations being within a short distance of the site.

3.6 Public Transport

Public transport services are limited to the existing urban area to the south, with the closest service running along Federation Drive (**See Appendix B**). There is an opportunity for longer term improvements to the public transport in this area, and preliminary discussions indicate that provision of a bus route through the subject site is warranted. The proposed road layout allows for a bus route to give good coverage of the site and two alternate routes have been considered as illustrated in **Figure 3.3 below.** It is recommended that the optional route as shown be adopted because of the better coverage it provides within the 400 metre planning threshold for access to a bus stop.

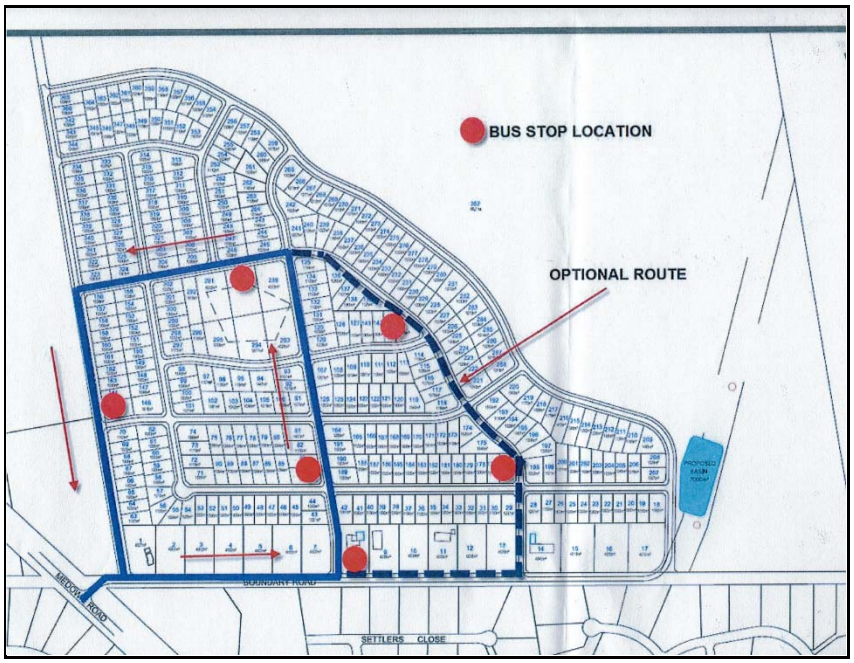


Figure 3-3 Possible Bus Routes as supplied by McCloy Medowie Pty Ltd

Transport for New South Wales advises that they are endeavouring to enable more responsive arrangements for all of their bus services, providing greater flexibility to emerging demands where the customer is at the centre of the transport experience. It is noted that the existing contract structure does provide incentives for operators to provide services which support student patronage. This may enable the provision of some bus services to the subject site however this will be dependent upon the demographics of the end purchasers of the site residences. School bus routes currently run through the housing area west of Medowie Road as well as along Federation Drive south of the site.

The provision of public transport infrastructure is a requirement of Council with all new developments to provide bus shelters which are DDA compliant. Advice from Council is that bus infrastructure is to be in place prior to the occupation of a development. The location of such infrastructure will be considered as part of the detailed design of the development. The detailed design of the road network within the site should provide the opportunity for future bus circulation with the majority of lots being within 400 metres of a bus stop.

The alternate pedestrian and cycling route option nominated in the Medowie Traffic and Transport Study and recommended here for further investigation (in line with that study's recommendation) would provide a more direct pedestrian access to the existing bus route run along Federation Drive. This could provide early access to public transport as the staged development of the subdivision proceeds.

4 Traffic Impact Assessment

4.1 Road Network Requirements

A key factor in the planning of any new development is access and the capacity of the surrounding road system. The forecast flows along Medowie Road as predicted in the Medowie Traffic and Transport Study indicate the road in the vicinity of Boundary Road will continue to operate at good levels of service, as a two lane two way road. This will also apply even allowing for growth in the background traffic levels of traffic of 3% per annum for 10 years on Medowie Road.

The predicted traffic flow of about 3330 vehicle trips per day from the development is able to be catered for within the existing road network, even allowing for growth in the background traffic levels of traffic of 3% per annum for 10 years on Medowie Road. The base traffic load of around 310 vehicles per hour (two-way) would only grow to around 400 vehicles per hour (two way), and with the forecast southbound peak traffic flow in the order of 283 vph (two way) the total traffic volume is well within the technical capacity of two lanes at 900 vehicles per hour per lane (as adopted by Austroads for capacity analysis). Even allowing for peak one directional factors the forecast peak one directional flow, allowing for 10 year growth is well within the technical capacity of 900 vehicles per hour per lane.

As far as the local road system is concerned, Boundary Road will perform as a Collector Street / Road and is proposed to be upgraded in line with Council's guidelines for road design. The subdivision layout will also adopt local street standards consistent with Council's road design guidelines.

No considerations have been made about road upgrading other than the operations of the Medowie Road / Boundary Road intersection as outlined below.

4.2 Intersection Operations

A key factor in the planning of any new development is access and the capacity of the surrounding road system. The proposed development provides for one key access to the external road system at the existing intersection of Boundary Road with Medowie Road. It is recognised as part of the development that the intersection with Medowie Road will need to be designed to cater for this level of movement to ensure access and egress to the site is satisfactory as well as road conditions for existing road users' remains satisfactory.

Observations on site show that there are essentially no delays for through traffic movements along Medowie Road at its intersection with Boundary Road. Vehicles entering or exiting the side roads also experience minimal delay, essentially only geometric delay caused by drivers having to slow down and negotiate the intersection.

Figure 4-1 drawn from Austroads Guide to Traffic Management Part 3 Traffic Studies and Analysis provides advice on intersection operation where traffic flows are relatively low. Where these limits are not met, traffic effectively operates under free flow conditions.

Type of road	Light cross and turning volumes maximum design hour volumes vehicles per hour (two way)		
Two-lane major road	400	500	650
Cross road	250	200	100
Four-lane major road	1000	1500	2000
Cross road	100	50	25

Figure 4-1 Intersection volumes below which capacity analysis is unnecessary

Source: Austroads Guide to Traffic Management Part 3 Traffic Studies and Analysis

It can be seen that for the current traffic flows, these limits are not met and therefore capacity modelling is not required at the intersections of Medowie Road and Boundary Road for the existing situation. Based on **Figure 4-1** above the traffic volumes on Medowie Road could more than double before there is a need to undertake capacity modelling.

By applying the above and assessing intersection capacity based on approach lane capacity the existing number of approach lanes (one in each direction) is considered satisfactory. In fact the future traffic flows would suggest a near even split of movements with Boundary Road south (283 vph) and Medowie Road (240 vph) the less dominant flow.

4.3 Medowie Rd / Boundary Rd SIDRA Analysis

Previous capacity analysis performed using the SIDRA 6.1 traffic modelling software, indicated that as traffic volumes increase during the evening peak hour, there may be some minor delays to vehicles turning right into Boundary Road. Vehicles may have to wait momentarily in the centre of the road to turn.

In order to assess the impacts of a likely increase in lot yield for the subject site, a series of sensitivity analyses were completed. This included the following changes to the previous analysis to reflect the potential future traffic flow scenario under higher density development:

1. Junction control remains as a 3 way priority (Give Way) controlled intersection
2. PM Threshold analysis is to be applied for 450, 500 & even 600 lots. (Up from the previously assumed 370 lots). A yield of 600 lots has been assumed initially on the basis that if this level of development is technically able to be accommodated through the Boundary Road access, then it follows that the lesser yields of 450 to 500 lots will also perform well, and in fact better than the 600 lot threshold predictions. The results will be repeated for a lower yield should the 600 test indicate an unsatisfactory performance level.
3. RMS Updated Trip rates and + 10 year growth factor applied to traffic flows
4. Applying the 600 lot threshold, the resulting SIDRA analysis shows:
    a. Intersection and individual movement Levels of Service are still at LoS 'A'
    b. 95% back of queue levels are still very minor (~ 2 @ PM peak.)
5. No changes were made to the previously assumed configuration of the Medowie Road / Boundary Road intersection. That is, a Short Urban Channelised Right Turn (CHR(S)) treatment operating under priority control.

A summary of the future PM analysis is included as **Appendix D** to this report.

This is not a major issue with delays only up to around 6 seconds and a vehicle storage length of one vehicle being forecast by the traffic analysis. The overall road environment is also improved with Council's proposed reduction of the Speed limit from 100 kph to 70 kph at a point north of the Boundary Road intersection.

The Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009) provides guidance on the warrants for various auxiliary lane treatments at intersections. **Figure 4-2** below illustrates the principles for a design speed of less than 100 kph. The posted speed limit on Medowie Road is proposed to be reduced from 100 kph to 70 kph at a new gateway treatment proposed by Council. This treatment and speed reduction is supported by the proposed development. The warrants relate turn treatments to a combination of major road traffic volume and turning volumes.

For the forecast traffic flows at the Boundary Road intersection a **BA**sic **L**eft turn treatment (BAL) and a **CH**annelised **R**ight Turn Treatment (CHR) are the appropriate turn treatments for this junction.

The intersection analysis performed indicates that queues for vehicles waiting to turn right from Medowie Road into Boundary Road will be minimal (one vehicle in the evening peak) and so a short urban Channelised Right turn treatment (CHR (S) is considered adequate for this intersection.

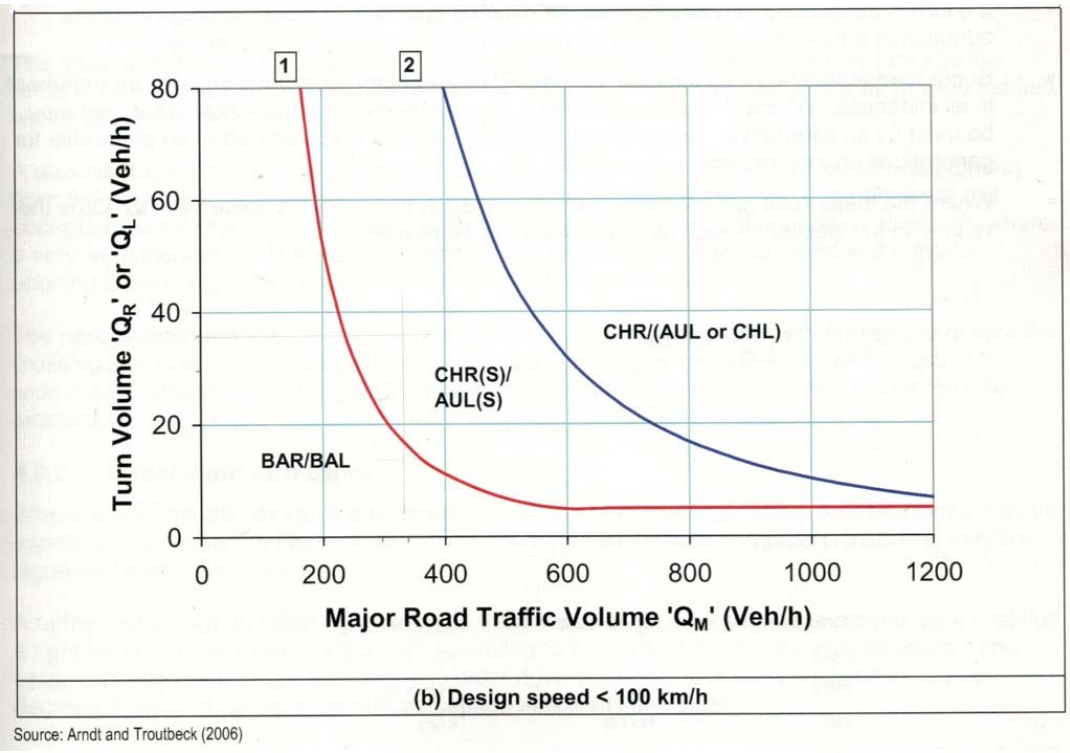
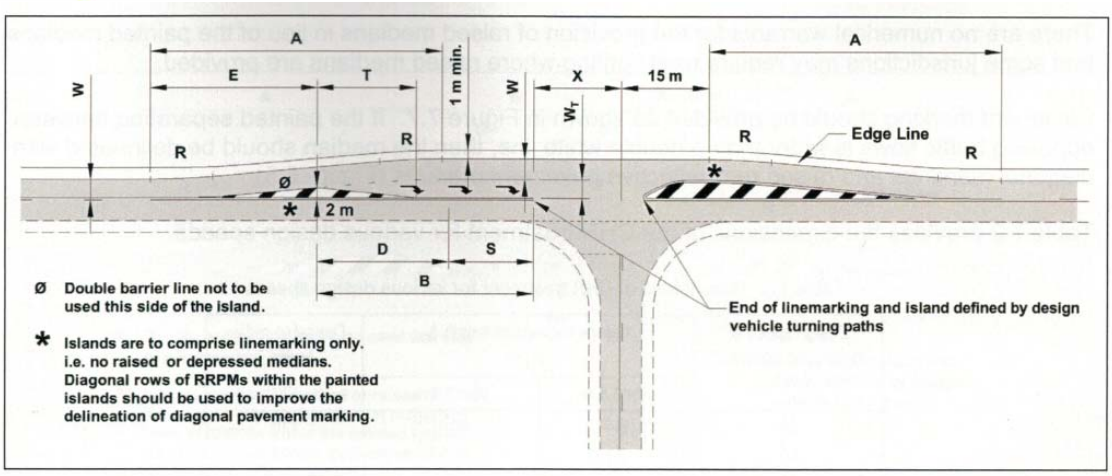


Figure 4-2 Warrants for turn treatments on major roads at Unsignalised intersections
Source: Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009)

Given the nominated sub-arterial function of Medowie Road and with a proportion of the traffic flow being heavy trucks it is recommended the intersection with Boundary Road be upgraded to provide a northbound right turn lane into Boundary Road east. **Figure 4-3** illustrates the concepts for the junction proposed.



Note: The dimensions of the treatment are defined below and values of A, D, R and T are shown in Table 7.1:

W = Nominal through lane width (m) (including widening for curves). For a new intersection on an existing road, the width is to be in accordance with the current link strategy.

W_T = Nominal width of turn lane (m), including widening for curves based on the design turning vehicle = 3.0 m minimum.

B = Total length of auxiliary lane including taper, diverge/deceleration and storage (m).

E = Distance from start of taper to 2.0 m width (m) and is given by:

$$E = 2\left(\frac{A}{W_T}\right)$$

T = Taper length (m) and is given by:

$$T = \frac{0.33xVxW_T}{3.6}$$

S = Storage length to cater for one design turning vehicle (m).

V = Design speed of major road approach (km/h).

X = Distance based on design vehicle turning path, typically 10–15 m.

Source: QDMR (2006)

Figure 4-3 Channelised Right-turn treatment for a short turn slot [CHR(S)]

Source: Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2009)

5 Summary and Conclusion

5.1 Summary

The following summary is provided of the development proposal for the subject site, Lots 93-96 Boundary Road, Medowie.

With an area of 127 ha, it is proposed to subdivide about 50 hectares into now up to 450 residential lots.

Access to the residential area will be via a single access on Medowie Road at the location of the existing Boundary Road intersection.

Existing traffic flows along Medowie Road in the vicinity of the site are low (in the order of 2500vpd) and well within acceptable limits for a two lane two way road.

Council's Medowie Traffic and Transport Study forecast future flows on Medowie Road in the vicinity of the subject site at a peak of around 600 vph two way (and this includes the subject site traffic flows). This is well within the capacity of the existing road.

The development will have a single vehicle access on Medowie Road at Boundary Road

Whilst the additional traffic generated by the development will increase the daily traffic flows on Medowie Road the forecast level of traffic, even allowing for 10 year growth in background traffic levels, is still well within the capacity of this road.

No capacity improvements are warranted for Medowie Road as a result of the subject development.

Assessment of the proposed single access to the site has highlighted that the intersection of Boundary Road and Medowie Road will continue to operate well under priority control. The forecast level of traffic movements is such that intersection operations are at or near to free flow conditions, with minimal delays predicted. This remains so even under the tested threshold levels of yield up to 600 lots.

Consideration of the warrants for auxiliary lanes indicates that a northbound Channelised Right turn (CHR(S)) auxiliary lane, and a southbound Basic Left (BAL) auxiliary lane are appropriate for intersection control. These will enhance safety for the intersection under future flow conditions.

Council has produced a draft Medowie contributions plan – Traffic and Transport. Features relevant to the subject site include:

- Proposed gateway treatment, with speed limit reduction from 100 kph to 70 kph. This is considered appropriate to reinforce the changing road environment as vehicles enter the Medowie urban area.
- Implementation of 50kph local speed limits with share the road signs and logos is considered a worthwhile safety initiative in low volume area such as the subject site.
- Investigation of the alternate pedestrian and cycling route option as nominated in the Medowie Traffic and Transport Study is recommended prior to confirming facilities for pedestrians and cyclists.

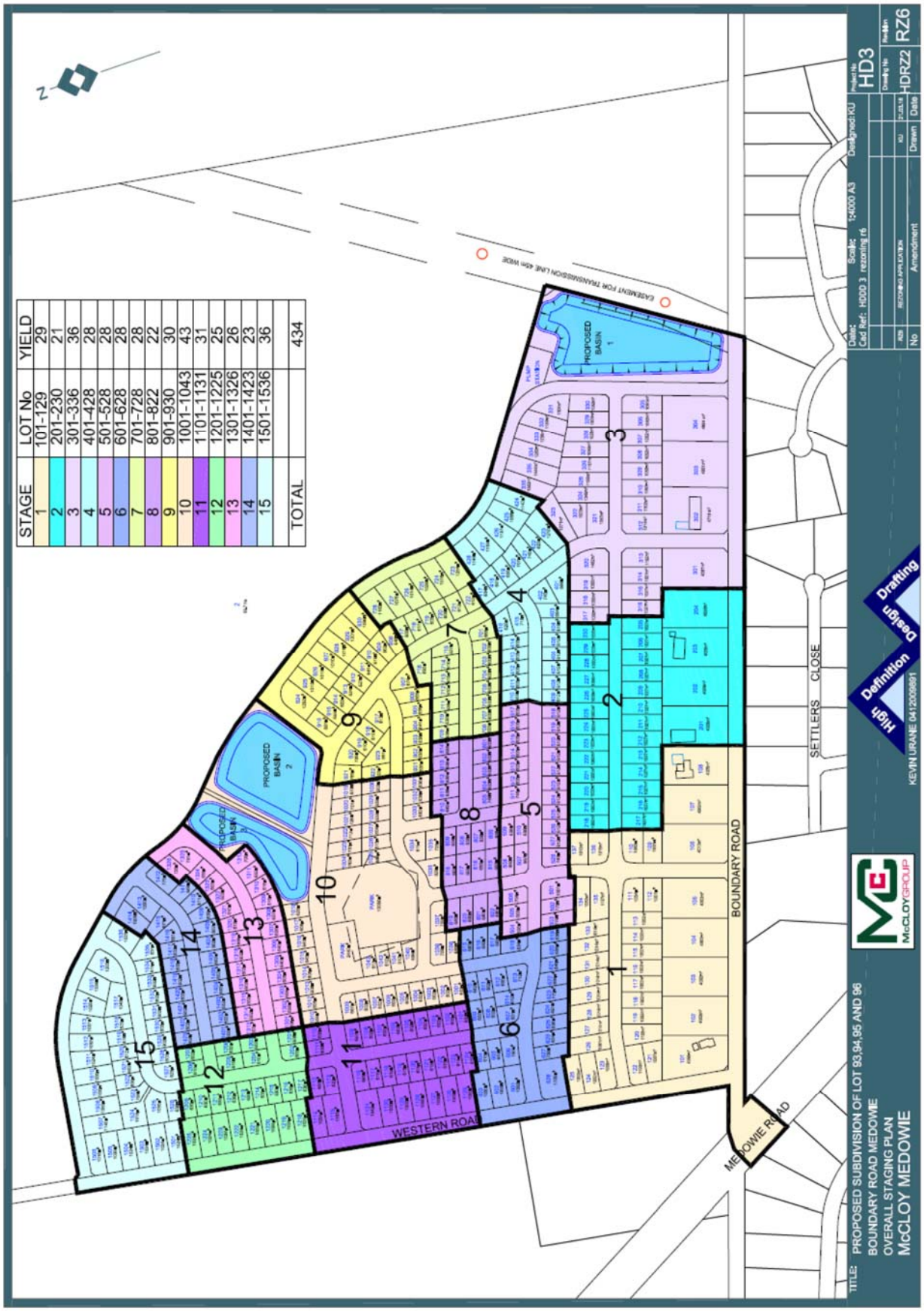
Features of the site's road network are planned to cater for bus movements, and pedestrian and cyclist movements in a low volume environment. Road design will conform to Council's road design guidelines.

Traffic calming is effectively provided through the layout of the subdivision roads. Priority controls (Stop signs) are recommended for internal 4-way junctions. Higher order junction controls are not cost effective and are not warranted on capacity grounds. They also are not recommended on proposed bus routes,

5.2 Conclusion

Based on the traffic impact assessment conducted into the development of the subject site, and subject to the recommendations contained herein, it is concluded that the proposed development of Lots 93-96 Boundary Road, Medowie into up to 450 lots is acceptable on traffic planning and engineering grounds. The proposed development will not have a major impact upon the local road network, and with the minor upgrade to the Medowie Road / Boundary Road intersection will continue to offer good levels of service into the future.

Appendix A. Proposed Subdivision Layout Plan



Appendix B. CBC Medowie Bus Routes

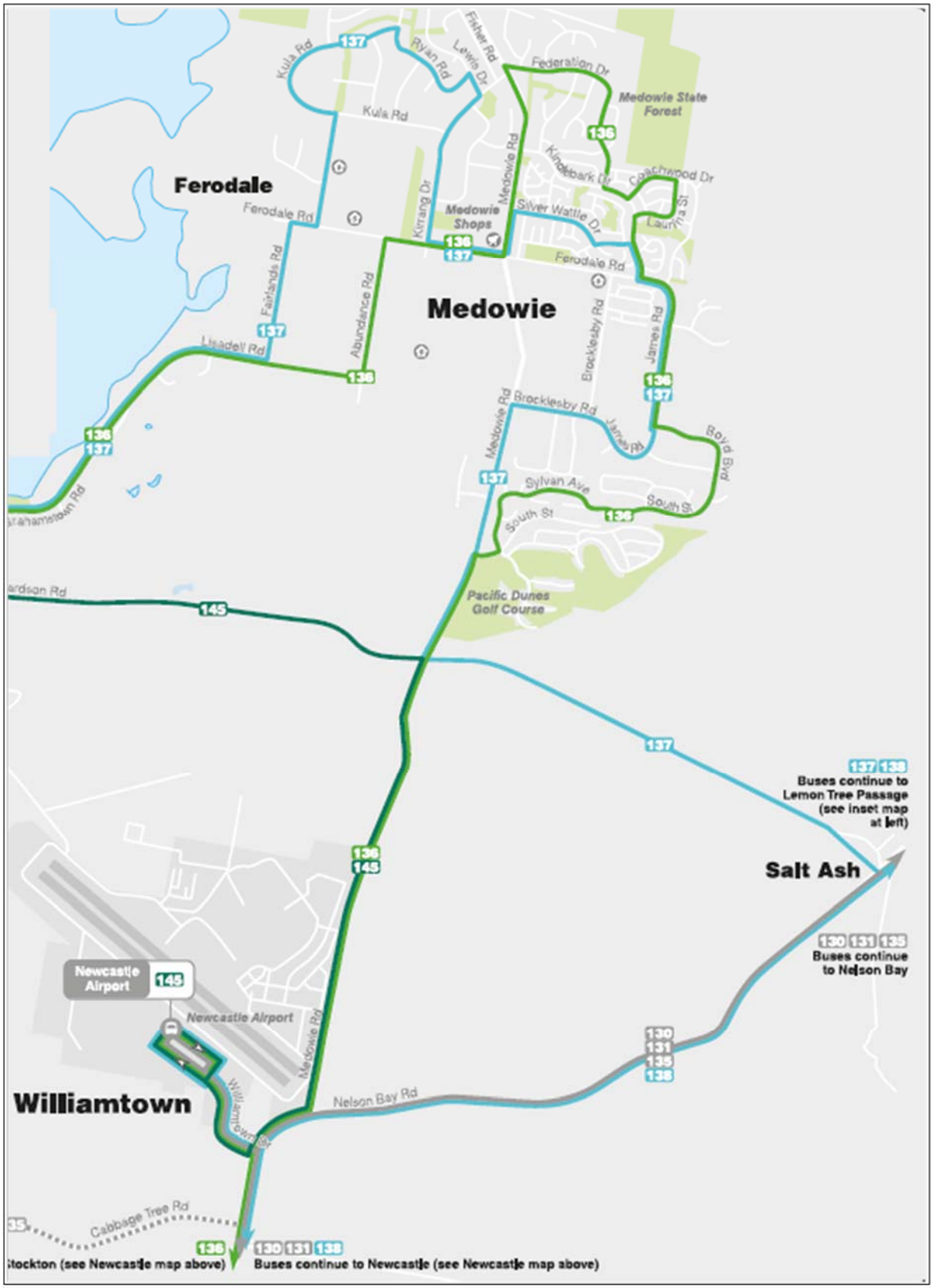


Figure B -1 Existing Bus Routes (Effective January 2015)

Source: Adapted from http://www.cdcbus.com.au/IgnitionSuite/uploads/docs/Maitland%20E%20Raymond%20Terrace%20Region%20Map%20effective%2027%20January%202015.pdf

Appendix C. Proposed S94 Works directly related to NMRA

Table C -1 – S94 Works directly related to North Medowie Residential Area (NRMA) development

Project	Location	Description	Comment
1	Medowie Road	Road network - North of Boundary Road – Gateway treatment at entrance to Medowie and change in speed zone from 100 km/h to 70 km/h	As a gateway treatment. This benefits the whole Medowie area from a road safety and environment perspective.
2	Various roads	On-road routes within rural residential area - Implement 50km/h area speed zoning, share the road signs supplemented with pavement markings (50 numerals & bicycle logos) at regular intervals throughout area	Applies across all rural roads and benefits the wider Medowie area
3	Medowie Road	Road network - Between Boundary Road and Kirrang Drive – Horizontal displacement mid-block treatment	As a LATM treatment on Medowie Road as main northern access, this benefits the whole Medowie area
4	Medowie Road	Pedestrian and cycle way - Boundary Road to Kirrang Drive - Off-road shared path on west side to future residential area. Investigate possible alternate route – Boundary road to Federation Drive via Settlers Close/Overland Avenue/Explorers Close.	Recommend consideration of the URaP alternate route been investigated? It could significantly reduce this cost.
5	Medowie Road	Pedestrian and cycle way - Federation Close to Kindlebark Drive - off-road shared path on east side	Not directly related to Boundary Road
22	Medowie Road	Pedestrian and cycle way - At Kirrang Drive/Federation Drive - Upgrade pedestrian refuge island to current standards	This benefits a wider area in Medowie than just Boundary Road precinct.

Figure C -2 Project Locations

Source: Extracts from Port Stephens Council Medowie Section 94 Plan Summary Sheet released for public exhibition, March 2015

Appendix D. SIDRA Analysis – Future Conditions Summary

INTERSECTION SUMMARY

▽ Site: Boundary Rd East - PM Threshold Analysis

Medowie Road
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values		
Performance Measure	**Vehicles**	**Persons**
Travel Speed (Average)	55.6 km/h	55.6 km/h
Travel Distance (Total)	926.9 veh-km/h	1112.2 pers-km/h
Travel Time (Total)	16.7 veh-h/h	20.0 pers-h/h
Demand Flows (Total)	917 veh/h	1100 pers/h
Percent Heavy Vehicles (Demand)	0.0 %	
Degree of Saturation	0.244	
Practical Spare Capacity	301.2 %	
Effective Intersection Capacity	3753 veh/h	
Control Delay (Total)	0.87 veh-h/h	1.05 pers-h/h
Control Delay (Average)	3.4 sec	3.4 sec
Control Delay (Worst Lane)	6.8 sec	
Control Delay (Worst Movement)	12.6 sec	12.6 sec
Geometric Delay (Average)	2.9 sec	
Stop-Line Delay (Average)	0.5 sec	
Idling Time (Average)	0.0 sec	
Intersection Level of Service (LOS)	NA	
95% Back of Queue - Vehicles (Worst Lane)	1.3 veh	
95% Back of Queue - Distance (Worst Lane)	8.8 m	
Queue Storage Ratio (Worst Lane)	0.00	
Total Effective Stops	300 veh/h	360 pers/h
Effective Stop Rate	0.33 per veh	0.33 per pers
Proportion Queued	0.18	0.18
Performance Index	18.8	18.8
Cost (Total)	382.04 $/h	382.04 $/h
Fuel Consumption (Total)	64.9 L/h	
Carbon Dioxide (Total)	152.5 kg/h	
Hydrocarbons (Total)	0.012 kg/h	
Carbon Monoxide (Total)	0.189 kg/h	
NOx (Total)	0.041 kg/h	

Level of Service (LOS) Method: Delay (RTA NSW).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Intersection Performance - Annual Values		
Performance Measure	**Vehicles**	**Persons**
Demand Flows (Total)	440,084 veh/y	528,101 pers/y
Delay	420 veh-h/y	504 pers-h/y
Effective Stops	143,837 veh/y	172,604 pers/y
Travel Distance	444,898 veh-km/y	533,878 pers-km/y
Travel Time	8,002 veh-h/y	9,602 pers-h/y
Cost	183,382 $/y	183,382 $/y
Fuel Consumption	31,139 L/y	
Carbon Dioxide	73,176 kg/y	
Hydrocarbons	6 kg/y	
Carbon Monoxide	91 kg/y	
NOx	20 kg/y	

Organisation: MARK WAUGH PTY LTD | Processed: Wednesday, 16 September 2015 1:26:21 PM
Project: C:\Users\mark.waugh\Documents\WORK\PROJECTS\Closed Projects\BTF201501 McCloys Boundary Rd Medowie\SIDRA\BTF20151 McCloys Boundary Rd.sip6

APPENDIX C

Flora and Fauna

Flora and Fauna Assessment

Lot 93-96 Boundary Road, Medowie

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Client Manager: Joel Stibbard
Report Number: PR126297
Version / Date: Final / April 2015

IMPORTANT NOTE

We have prepared this report for the sole purposes of McCloy MEDOWIE PTY LTD ("**Client**") for the specific purpose of only for which it is supplied ("**Purpose**"). This report is strictly limited to the purpose and the facts and matters stated in it and does not apply directly or indirectly and will not be used for any other application, purpose, use or matter.

In preparing this report we have made certain assumptions. We have assumed that all information and documents provided to us by the Client or as a result of a specific request or enquiry were complete, accurate and up-to-date. Where we have obtained information from a government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. We are not aware of any reason why any of the assumptions are incorrect.

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Document Status

Version	Purpose of Document	Orig	Review	Review Date
Draft	Draft for Client Review	JS	RD/CA	16-04-15
Final	Final Report	JS	JG	27-04-15

Approval for Issue

Name	Signature	Date
Joel Stibbard		27-04-15

Summary

RPS Australia East Pty Ltd (RPS) was engaged by McCloy Medowie Pty Ltd to provide a Flora and Fauna Assessment for the proposed subdivision of lands at Lots 93-96 Boundary Road, Medowie (hereafter referred to as the 'site'). The proposal involves the subdivision of lands identified as the North Medowie Residential Area (NMRA) under *Port Stephens Development Control Plan 2013* (PS DCP 2013) and correspondingly zoned under the Port Stephens *Local Environmental Plan 2013* (PS LEP 2013) as R5 – Large Lot Residential. The proposal also seeks to include a small area (<1 hectare) of land zoned as E2 – Environmental Conservation that occurs within the R5 lands as part of the subdivision (the 'study area').

This assessment aims to examine the likelihood of the proposal to have a significant impact on any threatened species, populations or ecological communities listed within the *Threatened Species Conservation Act 1995* (TSC Act). The report recognises the relevant requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as amended by the *Environmental Planning and Assessment Amendment Act 1997* (EP&AA Act). Assessment is also made with regard to those threatened entities listed federally under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Vegetation ground-truthing identified that the following vegetation communities will potentially impacted upon by the proposal:

- Coastal Plains Smooth-barked Apple Woodland (MU30) – 22.8 hectares
- Riparian Melaleuca Swamp Woodland (EEC) (MU42) – 3.47 hectares
- Forest Red Gum/Red Mahogany Open Forest – 1.73 hectares; and
- Derived Grassland with Scattered Canopy Trees – 20.47 hectares.

The Riparian Melaleuca Swamp Woodland corresponds to the Swamp Sclerophyll Forest Endangered Ecological Community (EEC) listed under the TSC Act.

No threatened flora species have been identified on the site, and no species were considered to require further assessment under the Assessments of Significance for the TSC Act or EPBC Act.

Site surveys, habitat assessments and database searches determined that 21 species of fauna listed as threatened under the TSC Act and/or EPBC Act were considered to be potentially impacted upon by the proposal and subsequently required further assessment. Site surveys determined that the study area provided a small area of Preferred Koala Habitat and associated Supplementary Koala Habitat under the CKPoM (PSC 2002), and also provided potential breeding habitat for the Powerful Owl and Masked Owl which are known to occur on the site and surrounds. Several species of microbat and woodland birds listed as threatened under the TSC Act and migratory species listed under the EPBC Act including the Rufus Fantail and White-throated Needletail were also observed on the site.

Despite the availability of habitat for identified and potentially occurring threatened species, particularly the Koala, Powerful Owl and Masked Owl, impact assessments concluded that the retention of similar habitat within the conservation lands of the site, and the availability of large areas of vegetation surrounding the site, will reduce the potential for impacts upon local populations of these species. Taking into account these considerations, and provided the recommendations presented in this report are adhered to, the potential impact of the proposal upon the habitat of identified and potentially occurring threatened fauna or ecological communities listed under the TSC Act and/or EPBC Act is considered unlikely to significantly impact upon these species.

Contents

Tables

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Plates

Appendices

1.0 Introduction

RPS Australia East Pty Ltd (RPS) was engaged by The McCloy Group to provide a Flora and Fauna Assessment for the proposed subdivision of lands at Lots 93-96 Boundary Road, Medowie (hereafter referred to as the 'site'). The proposal involves the subdivision of lands earmarked as the North Medowie Residential Area (NMRA) under PS DCP 2013 and correspondingly zoned under the PS LEP 2013 as R5 – Large Lot Residential. The proposal also seeks to include a small area (<1 hectare) of land zoned as E2 – Environmental Conservation that occurs within the R5 lands as part of the subdivision. These areas are hereafter collectively referred to as the 'study area'. The remainder of the site is to be retained in perpetuity as conservation lands as part of this proposal (see **Figure 1**).

This assessment examines the likelihood of the proposal to have a significant impact on any threatened species, populations or ecological communities listed within the *Threatened Species Conservation Act 1995* (TSC Act). The report recognises the relevant requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as amended by the *Environmental Planning and Assessment Amendment Act 1997* (EP&AA Act). Assessment is also made with regard to those threatened entities listed federally under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and specific reference to the Port Stephens Comprehensive Koala Plan of Management (CKPoM) is conducted where appropriate.

1.1 Site Particulars

Locality – Lots 93 – 96 of DP753194, Boundary Road, Medowie, NSW.

LGA – Port Stephens Council

Area – The site is approximately 127.6 hectares in total and includes approximately 58.11 hectares that are the subject of this proposal (the study area) and an additional 69.49 hectares that are to be retained in perpetuity as conservation lands.

Zoning – The study area includes 57.13 hectares of land zoned as R5 – Large Lot Residential and 0.98 hectares zoned as E2 – Environmental Conservation under PS LEP 2013. The remaining areas of the site include an additional 69.49 of E2 lands that are to be retained as part of the proposal.

Boundaries – The site is situated on the northern side of Boundary Road, and occurs just to the east of Medowie Road. The eastern, northern and western boundaries of the site immediately adjoin Medowie State Conservation Area (SCA), whilst the majority of the southern boundary adjoins existing residential areas.

Current Land Use – The three westernmost lots include rural residential dwellings and have been exposed to varying degrees of clearing and associated disturbance as a result. A transmission line runs northeast through the easternmost lot. The remainder of the site predominantly exists as remnant vegetation however some areas show signs of disturbance such as low-density logging and rubbish dumping.

Topography – The site is relatively flat but gently slopes from approximately 30 metres in the southwest and northeast to 20 metres Australian Height Datum (AHD) in the centre of the site.

Hydrology- A shallow, ephemeral drainage line associated with the lower areas of the site runs northwest-southeast through the middle of the site. Several small artificial dams occur on the site and highly ephemeral ponds occur in lower lying areas of impeded drainage during wet periods.

Vegetation – The vegetation in the southwest of the site has been subjected to varying levels of disturbance as a result of clearing, grazing and underscrubbing. The remainder of the site is predominantly remnant vegetation that includes areas of dry sclerophyll forest and adjacent swamp sclerophyll vegetation within the

lower lying areas associated with the ephemeral drainage line in the centre of the site. Areas of remnant vegetation on site form a contiguous tract of vegetation with surrounding areas of vegetation that includes Medowie SCA.

1.2 Description of the Proposal

The proposal includes a 363 lot subdivision, with associated road infrastructure and stormwater detention basin, that seeks to appease the objectives stated within the PS DCP 2013 (C11) for the NMRA. The subdivision includes a small area of E2 zoned lands in the centre of the study area that is proposed for subdivision but will be retained within the large residential lots planned for the area (see **Figure 2**). The nature of the proposal is likely to allow for areas of habitat within the development footprint to be retained (as envisioned under the DCP); however a precautionary approach is applied for the purposes of this assessment whereby all vegetation within the residential lands is assumed to be removed for the proposal. Subsequently, the development footprint will potentially require the removal of up to 28 hectares of remnant vegetation, 20.47 hectares of open grassland and scattered trees, and 7.97 hectares of cleared and disturbed areas. A total of 67.99 hectares of remnant vegetation that includes the central E2 zone and 2.61 hectares of regenerating vegetation will be retained in perpetuity as conservation lands as a result of the proposal.

1.3 Scope of the Study

The scope of this flora and fauna assessment is to:

- Identify vascular plant species occurring within the study area, including any threatened species listed under the TSC Act or EPBC Act;
- Ground-truth and refine existing vegetation mapping for the site, including the presence and extent of any Endangered Ecological Communities listed under the TSC Act or EPBC Act;
- Identify any fauna species, including threatened and migratory species, and populations or their habitats, which occur within the study area and are known to occur in the wider locality;
- Assess the level of utilisation of the study area by Koalas and verify the habitat mapping within the Port Stephens Council's (PSC) Comprehensive Koala Plan of Management (CKPoM);
- Assess the potential of the proposed development to have a significant impact on any threatened species, populations or ecological communities (or their habitats) identified from the study area and wider site; and
- Recommend measures that could be implemented to avoid, minimise, manage or monitor potential impacts of the proposal.

In addition to the survey work conducted within the study area, site and immediate surrounds, consideration has been afforded to habitats within 10 kilometres of the site in order to appreciate the environmental context therein. This assessment has included assessment of potential indirect impacts.

TITLE: FIGURE 1: SITE LOCATION

LOCATION: MEDOWIE

DATUM: GDA 94
PROJECTION: MGA ZONE 56

DATE: 27/03/2015
PURPOSE: FFA

LAYOUT REF: "J:\JOBS\126k\126297 Medowie\10 - Drafting\MapInfo Workspaces\Eco"
VERSION (PLAN BY): JS (A A3)

CLIENT: MCCLOY MEDOWIE
JOB REF: 126297

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TITLE: FIGURE 2:PROPOSED LOT LAYOUT

LOCATION: MEDOWIE

DATUM: GDA 94
PROJECTION: MGA ZONE 56

DATE: 23/03/2015
PURPOSE: FFA

LAYOUT REF: "I:\JOBS\126k\126297 Medowie\10 - Drafting\MapInfo Workspaces\Eco"
VERSION (PLAN BY): JS (A A3)

CLIENT: MCCLOY MEDOWIE
JOB REF: 126297

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1.4 Legislation and Policy

1.4.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as matters of National Environmental Significance (NES). Matters of NES identified in the Act include:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (listed under the Ramsar Convention);
- Threatened species and communities;
- Migratory species protected under international agreements;
- Commonwealth marine areas; and
- The Great Barrier Reef Marine Park.

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of NES require approval from the Australian Government Minister for Sustainability, Environment, Water, Population and Communities (the Minister).

1.4.2 NSW Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) regulates development carried out in New South Wales. The proposed subdivision is to be assessed under Part 4 of the EP&A Act.

Under Part 4 of the Act, council is the consent authority who is required to examine fully and take into consideration all matters likely to affect the environment as a result of such activity. This report will inform the preparation of a Development Application (DA) in accordance with Section 78A of the Act, and assists in establishing whether or not the activity is likely to significantly affect the environment.

1.4.3 NSW Threatened Species Conservation Act 1995

The NSW *Threatened Species Conservation Act 1995* (TSC Act) provides for the protection and management of threatened species, populations and ecological communities listed under Schedules 1, 1A and 2 of the Act. The purpose of the TSC Act is to:

- Conserve biological diversity and promote ecologically sustainable development;
- Prevent the extinction and promote the recovery of threatened species, populations and ecological communities;
- Protect the critical habitat of those species, populations and ecological communities that are endangered;
- Eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities;
- Ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed; and
- Encourage the conservation of threatened species, populations and ecological communities through co-operative management.

1.4.4 National Parks and Wildlife Act 1974

Part 8A of the *National Parks and Wildlife Act 1974* (NPW Act) regulates the undertaking of activities which may impact on threatened species, populations and ecological communities listed under the TSC Act and their habitats. The NPW Act provides that a person must not harm any animal that is a threatened species, population or ecological community; pick any plant which is part of a threatened species, population or ecological community; damage any critical habitat; or damage any habitat of a threatened species, population or ecological community without a licence being obtained under the NPW Act or TSC Act or unless another exception applies.

1.4.5 Noxious Weeds Act 1993

The *NSW Noxious Weeds Act 1993* provides for the identification and classification for noxious weeds in each New South Wales Local Government Area (LGA). The Act imposes obligations on occupiers of land to control noxious weeds declared for their LGA.

1.4.6 Port Stephens Councils Comprehensive Koala Plan of Management (CKPoM, 2002)

The Port Stephens Councils CKPoM has been prepared in accordance with State Environmental Planning Policy No. 44 - Koala Habitat Protection (SEPP 44). *Schedule 2 of State Environmental Planning Policy (SEPP) No. 44 – 'Koala Habitat Protection'* aims to encourage the conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range, and to reverse the current state trend of Koala population decline. The Port Stephens Councils CKPoM intends to supersede the requirements of SEPP 44 for the investigation of potential and core Koala habitat within Port Stephens Council Local Government Area.

1.4.7 NSW State Groundwater Dependent Ecosystems Policy (2002)

The Groundwater Dependent Ecosystem (GDE) policy was prepared as a component of the NSW State Groundwater Policy Framework. It is designed to protect ecosystems reliant upon groundwater for survival so that ecological prossess and biodiversity of these ecosystems are maintained or restored.

1.5 Qualifications and Licensing

Qualifications

This report was written by Joel Stibbard (BSc) and reviewed by Rob Dwyer (BSc, Grad Dip Urban and Regional Planning) of RPS. The academic qualifications and professional experience of all RPS consultants involved in the project are documented in **Appendix 8**.

Licensing

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence S100536 (Valid 31 December 2015);
- Animal Research Authority (Trim File No: 01/1142) issued by NSW Agriculture (Valid 12 March 2016);
- Animal Care and Ethics Committee Certificate of Approval (Trim File No: 01/1142) issued by NSW Agriculture (Valid 12 March 2016); and
- Certificate of Accreditation of a Corporation as an Animal Research Establishment (Trim File No: 01/1522 & Ref No: AW2001/014) issued by NSW Agriculture (Valid 22 May 2017).

2.0 Methodology

A variety of field survey techniques were employed over the course of fieldwork for this assessment to record the ecological characteristics inherent across the site. A review of previous surveys conducted within the site were initially conducted, and flora transects were conducted within the conservation lands to confirm existing vegetation mapping in these areas, whilst targeted threatened flora searches, flora transects and various fauna sampling methodologies were conducted within development lands over 7 days between 25-26th February and the 2-6th March 2015. A hand held *Trimble* differential global positioning system (D-GPS), accurate to less than one metre, was used to record the location of survey methodologies along with notable results including the location of threatened flora and/or fauna species.

Further details on survey effort and survey techniques are described below.

2.1 Desktop Assessment

2.1.1 Literature Review

A review of relevant information was undertaken to provide an understanding of ecological values occurring or potentially occurring within the site and within 10 kilometres of the site ('the locality'). Previous reports prepared for the site have been reviewed for the purpose of assessing the likelihood of threatened species or ecological communities occurring, and to understand existing vegetation mapping therein. Information sources reviewed included:

- Review of fauna and flora records contained in the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife within the sites' locality;
- Review of fauna and flora records contained in the Department of the Environment (DoE), Protected Matters Search tool within the sites' locality; and
- Review of previous ecological surveys and vegetation mapping undertaken within the site including:
  - Umwelt (2009) Ecological and Bushfire Assessment for Rezoning Application, Lots 93-96 Boundary Road, Medowie; and
  - Oregon (2007) Flora and Fauna Study Lots 93-96 Boundary Road, North Medowie.

2.2 Flora Surveys

2.2.1 Vegetation Mapping

Confirmation and refinement of the existing vegetation mapping produced by Umwelt (2009) for the site was undertaken via flora transects. A total of 4 walking transects were conducted within the study area, with an additional 4 transects conducted within the northern conservation lands to verify previous vegetation mapping conducted across the site. These transects involved walking 100m and recording every flora species encountered within 5m of the transect line. Physical attributes of the area discovered along each transect (vegetation structure, soil type, elevation, slope, aspect, physiographical position) were also recorded, and photographs taken for later reference. Plant specimens of unknown or significant status are collected for later identification or lodgement with the National Herbarium in Sydney. All field data were recorded on RPS proformas.

An inventory of plant species recorded on-site was compiled and is included in **Appendix 3**.

2.2.2 Threatened Flora Survey

A list of potentially occurring threatened flora species from the locality was compiled and targeted flora searches were conducted during field surveys within potential habitats of the study area using the "Random Meander Technique" described by Cropper (1993).

2.2.3 Fauna Surveys

A desktop assessment of the potential use of the site by threatened fauna species (as listed under the TSC Act and/or EPBC Act) identified from the vicinity of the site was undertaken prior to the commencement of field surveys.

The presence of fauna within the study area was determined through a variety of survey techniques including Elliot traps, hair tubes, camera traps, spotlighting, call playback, Anabat recordings and opportunistic sightings. These methodologies were conducted between 2nd and 6th March 2015. Survey effort is provided in **Table 1** below:

Table 1 Total Survey Effort

Terrestrial Elliot A	Terrestrial Elliot B	Arboreal Elliot B	Camera Traps	Hair Tubes	Harp Trap	Anabat	Spotlighting	Flora Transects
Trap Nights						Hours		
200	200	48	8	160	8	40	12	8

2.2.4 Mammal Trapping

2.2.4.1 Terrestrial Mammals

Terrestrial trapping was undertaken using Elliott A, Elliott B and camera traps. Elliott traps were baited with a mixture of rolled oats, peanut butter and honey. Camera traps were baited with commercial tinned cat food. Traps were checked within two hours of sunrise each morning, with any captures identified and released at point of capture. Traps were re-baited where necessary. The selected locations of the trap lines focused on intact vegetation within the development lands as well as areas consisting of understorey that would provide protection for terrestrial mammal species.

Terrestrial traps targeted small terrestrial mammals such as dasyurids (e.g. Antechinus and Dunnarts), and rodents (e.g. rats and mice). A total of three trapping transects were undertaken within the study area containing 25 Elliot A, 25 Elliot B and one camera trap per line. This resulted in 300 Elliott A trap nights, 300 Elliott B trap nights and twelve camera trap nights within the study area.

2.2.4.2 Arboreal Mammals

Arboreal trapping was undertaken using tree mounted Elliott B size traps. Traps were mounted on brackets set at approximately three metres in height on trees with a DBH greater than 30 centimetres. Traps were baited with a rolled oats, peanut butter and honey mixture and the tree trunks were sprayed liberally with a brown sugar and water mix every second day in the late afternoon. Traps were checked early each morning.

Arboreal traps targeted arboreal mammals such as the threatened Squirrel Glider (*Petaurus norfolcensis*), which has been previously recorded within the site (Umwelt 2009). A total of three trapping transects, containing six Elliott B size arboreal traps were installed. Trapping was undertaken over four nights, resulting in 72 arboreal trap nights within the study area.

2.2.5 Hairtubes

Hairtubes were deployed at three separate locations across the proposed development lands on site. These are plastic tubes fitted with double-sided sticky tape and baited at the end with rolled oats, peanut butter and honey. Mammalian fauna attracted to the baits enter the tubes, brushing against the sticky tape and depositing hair samples that can be analysed for species identification. One hairtube was deployed on the side of the tree approximately 1 metre off the ground, with another deployed at the base of the tree. Trees in which hairtubes were erected were sprayed every second day with a brown sugar and water mix as an attractant.

Hair Tubes targeted small-medium mammals such as dasyurids (e.g. Antechinus and Dunnarts), rodents (e.g. rats and mice), gliders, and bandicoots. At each location, 10 arboreal and 10 terrestrial hairtubes were set, resulting in 90 arboreal trap nights and 90 terrestrial trap nights across the three sampling locations.

Any hair samples retrieved during the survey were sent to Barbara Triggs at 'Dead Finish' for analysis.

2.2.6 Avifauna Census

An avifauna census was conducted for 20 minutes at multiple locations across the study area. Surveys were restricted to mornings or late afternoons in order to record birds during peak activity periods.

All birds observed or heard within or flying over the area were recorded. Birds that were detected outside the search area were recorded separately as opportunistic during all days of fieldwork. Birds were identified by direct observation or by recognition of calls or distinctive features such as nests, feathers and owl regurgitation pellets.

Nocturnal surveys (see **sections 2.2.6** and **2.2.7**) were undertaken to detect nocturnal bird species occurring within the study area.

2.2.7 Herpetofauna

Herpetofauna (frog and reptile) searches were carried out across the study area, targeting areas of appropriate habitat. Some suitable reptile habitat was scattered throughout the site including areas of rock assemblages, logs and/or leaf litter. Swamp areas, dams and drainage lines were targeted for amphibians and call playback was used to elicit calls.

2.2.8 Micro-Chiropteran Bats

Microbat echolocation calls were recorded using Anabat II Detector and CF ZCAIM units set to remotely record for the entire night (6pm to 6am). Each surveyed location had two consecutive nights of sampling, with emphasis placed on those areas deemed likely to provide potential foraging and flyway sites for microbats.

Bat call analysis was undertaken by Echo Ecology. Each call sequence ('pass') was assigned to one of three categories, according to the confidence with which an identification could be made, being:

- Definite - Pass identified to species level and could not be confused with another species;
- Probable - Pass identified to species level and there is a low chance of confusion with another species; or
- Possible - Pass identified to species level but short duration or poor quality of the pass increases the chance of confusion with another species.

2.2.9 Koala Surveys

Koala surveys and habitat assessments were undertaken in accordance with the Port Stephens Councils CKPoM. Ground truthing confirmed or refined areas of Preferred Koala Habitat as mapped by the Port Stephens Councils Koala Habitat Planning Map. The Koala Spot Assessment Technique (SAT) methodology as described by Phillips and Callaghan (2011) was conducted within the study area. A total of 6 SATs, each sampling 30 mature trees, were conducted within the study area. In addition, all Koala food trees as listed under the CKPoM that were identified on the study area were recorded with a Trimble D-GPS. The SATs were used to measure Koala activity levels and establish the extent of habitat utilisation within the study area.

2.2.10 Spotlighting

Spotlighting was undertaken with the use of a 75-Watt hand-held spotlight and head torch whilst walking over the development lands. Areas of dense bush were targeted, however tracks were also spotlighted whilst entering and exiting the site. A total of 8 person hours of spotlighting was conducted over two nights.

2.2.11 Nocturnal Call Playback

Pre-recorded calls of threatened Owl, Koala, Frog and Glider species with the potential to occur within the site were broadcast during the surveys in an effort to elicit vocal responses or to attract the species to the playback site. The swamp areas and drainage lines were targeted for frogs. The calls were broadcast through an amplification system (loud hailer) designed to project the sound for at least one kilometre under still night conditions.

As described by Kavanagh and Peake (1993) and Debus (1995), the call of each species was broadcast for at least five minutes, followed by five minutes of listening, and stationary spotlighting. Following the final broadcast and listening, the area was spotlighted on foot. Species targeted included the Powerful Owl (*Ninox strenua*), Barking Owl (*N. connivens*), Masked Owl (*Tyto novaehollandiae*), Yellow-bellied Glider (Petaurus australis) Squirrel Glider (*Petaurus norfolcensis*) and Koala (*Phascolarctos cinereus*). Two call playback sessions were undertaken within the study area. However, additional targeted call playback sessions for frogs were undertaken at potential habitat locations.

2.2.12 Secondary Indications and Incidental Observations

Opportunistic sightings of secondary indications (scratches, scats, diggings, tracks etc.) of resident fauna were noted. Such indicators included:

- Distinctive scats left by mammals;
- Scratch marks made by various types of arboreal animals;
- Nests made by various guilds of birds;
- Feeding scars on Eucalyptus trees made by Gliders;
- Whitewash, regurgitation pellets and prey remains from Owls;
- Aural recognition of bird and frog calls;
- Skeletal material of vertebrate fauna; and
- Searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, and diggings).

Any scats or pellets collected on-site were sent to Barbara Triggs at “Dead Finish” for analysis.

2.2.13 Habitat Survey

An assessment of the relative value of the habitat present within the study area was conducted. Significant fauna habitat including hollow-bearing trees, hollow logs and termite nests were identified. This was undertaken to assist with the development of actions to minimise potential impacts of the proposal on resident fauna. The assessment also considered the potential value of the study area (and surrounds) for all major guilds of native flora and fauna.

Habitat assessment for threatened species known to occur or with the potential to occur in the area was based on the specific habitat requirements of each threatened fauna species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements. Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages.

The locations of flora and fauna survey methodologies across the site are provided in **Figure 3**.

2.3 Limitations

Limitations associated with this Flora and Fauna Assessment have been taken into account specifically in relation to threatened species assessments, results and conclusions. In these instances, a precautionary approach has been adopted; as such 'assumed presence' of known and expected threatened species, populations and ecological communities has been made where relevant and scientifically justified to ensure a holistic assessment.

2.3.1 Seasonality

Threatened flora species should be surveyed within their respective flowering periods to ensure accurate identification. Surveys have been undertaken outside the flowering period of some cryptic species and in these cases the precautionary principle has been applied and the potential presence of these species has been analysed based on the presence of suitable habitat.

The flowering and fruiting plant species that attract some nomadic or migratory threatened species, often fruit or flower in cycles spanning a number of years. Furthermore, these resources might only be accessed in some areas during years when resources more accessible to threatened species fail. As a consequence, threatened species may be absent from some areas where potential habitat exists for extended periods and this might be the case for nomadic and opportunistic species.

2.3.2 Data Availability & Accuracy

The collated threatened flora and fauna species records provided by the Atlas of NSW Wildlife are known to vary in accuracy and reliability. Traditionally, this is due to the reliability of information provided to the NPWS for collation and/or the need to protect specific threatened species locations. For the purposes of this assessment, this information has been considered to have a maximum accuracy of ± 1 kilometre.

Threatened flora and fauna records within the region were predominantly sourced from the online OEH Bionet and DoE Protected Matters Search Tool. Limitations exist with regards to this data and its accuracy.

2.3.3 Fauna

The presence of fauna within a particular area is not static over time, may be seasonal or in response to the availability of a particular resource. Some fauna species that have been recorded in the local area occur on a seasonal or migratory basis and may be absent from the locality for much of the year. Fauna behaviours may have also affected detectability; species that are easily disturbed or cryptic may not have been detected during surveys.

As such, habitat assessment and prediction of the occurrence of threatened fauna species has been applied where survey effort targeting particular threatened fauna species could not been undertaken. The precautionary principle was applied where marginal habitat was identified or predicted to occur or where species are migratory or nomadic and were therefore likely to utilise habitat components at some stage during their life cycle.

2.3.4 Flora

The cryptic nature of many flora species makes them very difficult to detect even when they are known to be present. There is a range of cryptic plant species that have a brief flowering period and hence a small window of effective 'detectability'. Due to seasonality and other factors some threatened species that are not detected cannot be discounted as occurring within the site. Both targeted and opportunistic threatened flora surveys were undertaken between the 23rd February and the 6th March. **Table 2** provides information regarding the seasonal flowering periods for flora species considered to potentially occur within the study area (see **Section 4.2**).

Table 2 Threatened Flora Species with potential to occur within the site. (Seasonality).

Threatened Flora Species	Recommended Survey Time	Flowering Period in Months of the Year											
		January	February	March	April	May	June	July	August	September	October	November	December
Callistemon linearifolius	Survey Anytime	■								■	■	■	■
Corybas dowlingii	**Survey Only During Flowering**						■	■	■				
Cryptostylis hunteriana	**Survey Only During Flowering**											■	■
Diuris arenaria	**Survey Only During Flowering**								■	■			
Diuris praecox	**Survey Only During Flowering**						■	■	■				
Eucalyptus parramattensis subsp. *decadens*	Survey Anytime	■										■	■
Grevillea parviflora subsp. *parviflora*	Survey Anytime								■	■			
Maundia triglochinoides	Survey Anytime	■	■	■						■	■	■	■
Melaleuca biconvexa	Survey Anytime										■	■	
Persicaria elatior	Survey Anytime												
Phaius australis	**Survey Only During Flowering**								■	■	■		
Pterostylis chaetophora	**Survey Only During Flowering**									■	■	■	
Tetratheca juncea	**Survey Only During Flowering**	■								■	■	■	■

TITLE: FIGURE 3: SURVEY EFFORT

LOCATION: MEDOWIE

DATUM: GDA 94
PROJECTION: MGA ZONE 56

DATE: 23/03/2015
PURPOSE: FFA

LAYOUT REF: "I:\OBS\126k\126297 Medowie\10 - Drafting\MapInfo Workspaces\Eco"
VERSION (PLAN BY): JS (A A3)

CLIENT: MCCLOY MEDOWIE
JOB REF: 126297

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3.0 Results

3.1 Desktop Assessment

3.1.1 Literature Review

A review of the database search results identified 21 threatened flora species, 44 threatened fauna species and eight threatened ecological communities as potentially occurring within the site or its locality. All potential and known occurring marine species were excluded from the assessment as no marine habitats occur on the site. These species are tabulated and considered in depth within the Impact Assessment in **Section 4.2**.

3.1.2 Existing Vegetation Mapping

A review of previous vegetation mapping produced by Orogen (2007) and refined by Umwelt (2009) for the site was undertaken. This vegetation mapping identified 5 vegetation types within the site, including;

- Coastal Plains Smooth-barked Apple Woodland ;
- Forest Red Gum/Red Mahogany Open Forest;
- Swamp Sclerophyll Forest (EEC);
- Derived Grassland with Scattered Canopy Trees; and
- Derived Grassland

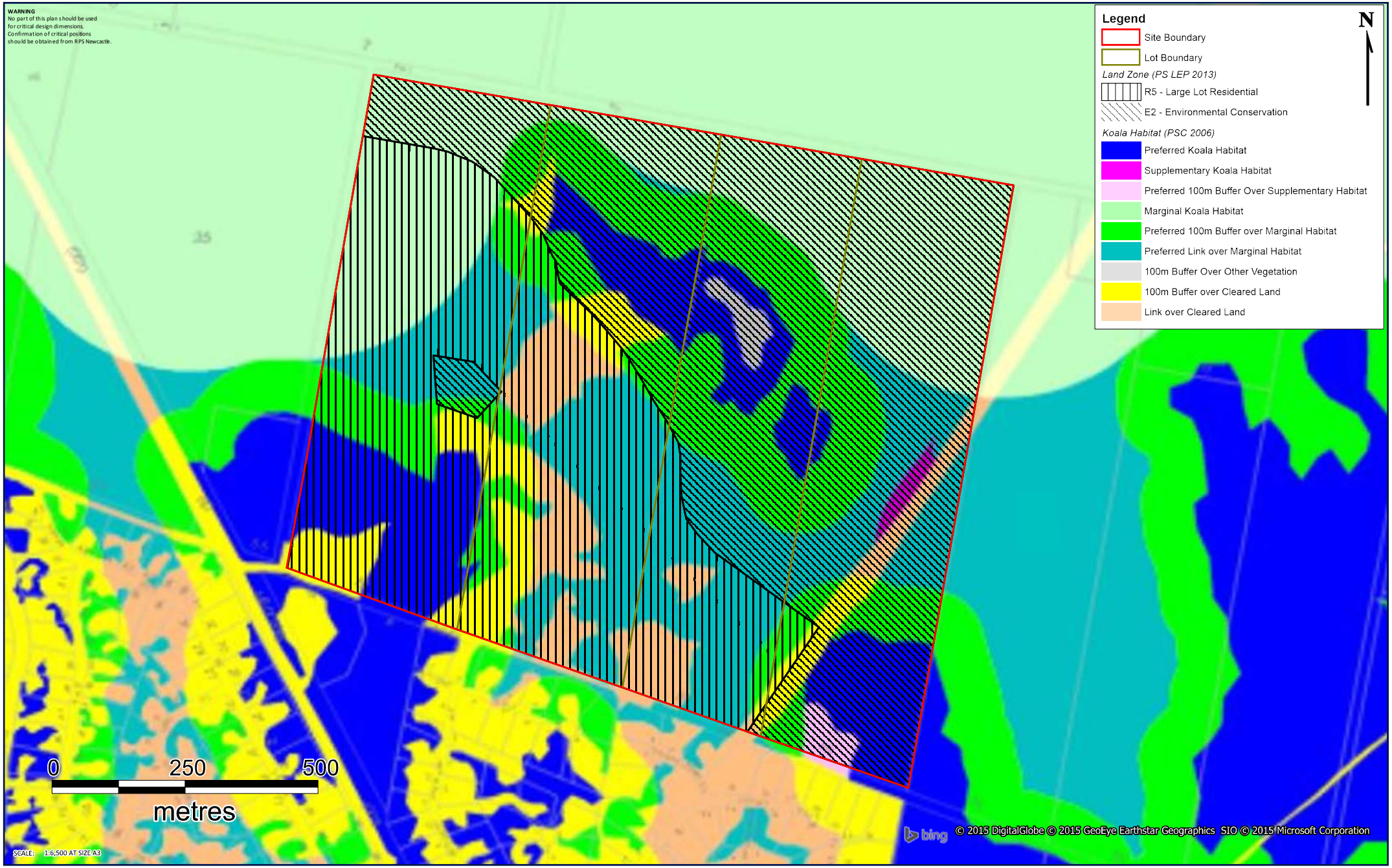
Ground truthing of vegetation on-site established that previous mapping was relatively accurate. However, areas of Swamp Sclerophyll Forest in the north-western portion of the site was determined to be drier, modified and of a similar species composition to that of the Derived Grassland with Scattered Canopy Trees community as described by Umwelt (2009) In addition, the area of Forest Red Gum/Red Mahogany Open Forest was slightly modified to include all Forest Red Gum individuals in the vicinity, and aerial photographic interpretation (API) of cleared areas on the site was used to update boundaries between vegetated and cleared areas.

3.1.3 Port Stephens Koala Plan of Management (KPoM)

The site has been identified as containing small areas of 'Preferred Koala Habitat' as detailed within the Koala Habitat Planning Map produced by PSC for the Medowie/Tilligerry region (PSC 2006) (see **Figure 4**). Three patches of Preferred Koala Habitat occur on the site, with associated buffers and links, with two of these patches occurring in previously-mapped Swamp Sclerophyll Forest (Oregon 2006; Umwelt 2009) and contained within lands zoned for environmental conservation (E2) that are to be retained and protected as part of the proposal. The patch of Preferred Koala Habitat that exists within the residential lands (R5) occurs in the south-western portion of the site. This area is included within the 'Derived Grasslands with Scattered Canopy Trees' community mapped on site during previous surveys (see above).

3.1.4 SEPP 14 - Coastal Wetlands

No SEPP 14 Coastal Wetlands were determined to exist within the site or in close proximity. The closest SEPP 14 Coastal Wetlands to the site are located to the south at Moffats Swamp Nature Reserve and to the east in areas that include Twelve Mile Creek, approximately 1.7km and 3.3km from the site respectively (see **Figure 1**). As a result, the proposed development is unlikely to impact upon any identified SEPP 14 Coastal Wetlands and no further assessment is required.



TITLE: FIGURE 4: KOALA HABITAT

LOCATION: MEDOWIE

DATUM: GDA 94
PROJECTION: MGA ZONE 56

DATE: 23/03/2015
PURPOSE: FFA

LAYOUT REF: "J:\JOBS\126k\126297 Medowie\10 - Drafting\MapInfo Workspaces\Eco"
VERSION (PLAN BY): JS (A A3)

CLIENT: MCCLOY MEDOWIE
JOB REF: 126297

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3.1.5 Weather Conditions

The prevailing weather conditions during the site survey period are presented in **Table 3** below:

Table 3 Prevailing Weather Conditions (Williamtown)*

	25 February 2015	26 February 2015	2 March 2015	3 March 2015	4 March 2015	5 March 2015	6 March 2015
Temperature (^{o}C)	19.5-27.0	19.3-26.2	20.1-24.7	12.3-28.9	20.0-30.4	20.2-31.5	14.0-30.7
Wind (Max-kilometres/h)	35	28	54	39	35	63	NA
Cloud (8th at 9am)	6	5	7	1	7	1	NA
Rain (mm (24 hrs to 9 am))	0	0.2	8.8	0	0.2	0	0
Sun Rise	06:37	06:38	06:42	06:42	06:43	06:44	06:45
Sun Set	19:34	19:33	19:28	19:27	19:25	19:24	19:23

*Sources: http://www.bom.gov.au/climate/dwo/IDCJDW2145.latest.shtml
http://www.ga.gov.au/bin/geodesy/run/sunrisenset

3.2 Flora Surveys

3.2.1 Vegetation Mapping

Walking transects conducted across the site confirmed the five vegetation communities described by Umwelt (2009). Two of these communities directly correlate with LHCCREMS (NPWS 2000) regional vegetation map units (MUs) including:

- MU 30 Coastal Plains Smooth-barked Apple Woodland; and
- MU 42 Riparian Melaleuca Swamp Woodland

Other areas of the site have undergone significant modifications as a result of clearing and/or understory disturbance whereby they are no longer commensurate with MUs as described by LHCCREMS (NPWS 2000). Field surveys determined that these communities were described accurately by Umwelt (2009) and subsequent naming conventions have been retained from previous surveys for ease of reference. These communities include:

- Forest Red Gum/Red Mahogany Open Forest;
- Derived Grassland with Scattered Canopy Trees; and
- Derived Grassland/Cleared Areas.

The area of each vegetation community within the land zones on site are provided in **Table 4** below.

Table 4 Vegetation Communities and Land Zones

Vegetation Community	Area (ha)			
	Development Lands	Conservation Lands Central	Conservation Lands Northern	Total
MU 30 - Coastal Plains Smooth-barked Apple Woodland	22.80	0	35.52	**58.32**
MU 42 – Riparian Melaleuca Swamp Woodland (EEC)	3.47	0	31.67	**35.14**
Forest Red Gum/Red Mahogany Open Forest	1.73	0.80	0	**2.53**

Vegetation Community	Area (ha)			
	Development Lands	Conservation Lands Central	Conservation Lands Northern	Total
Derived Grassland with Scattered Canopy Trees	20.47	0.22	0	**20.69**
Derived Grassland	7.97	0	2.39	**10.36**
Other (Waterbodies)	0.68	0	0	**0.68**
Total	**57.12**	**1.02**	**69.58**	**127.72**

3.2.2 Vegetation Community Descriptions

3.2.2.1 MU 30 – Coastal Plains Smooth-barked Apple Woodland

Plate 1 MU 30 Coastal Plains Smooth-barked Apple Woodland

Description: This community occupies vegetated areas of the site at slightly higher elevations with unimpeded drainage. It is the dominant vegetation type on the site, occurring within the north-west and southern portions of the development lands and the northeastern extents of the conservation lands. Structural differences do occur within this community, with the drier areas of this community containing a less dense ground and shrub stratum compared to the moist areas that fringed the Swamp Woodland in the centre of the site (see below). This community is also likely to have occurred in the southwestern areas of the site but have since been modified to an extent whereby it is no longer commensurate (see below).

Total area: 58.32 hectares

Impact area: 22.80 hectares of this community occurs within the development lands on site.

Canopy Layer: Dominant species include *Angophora costata* (Smooth-barked Apple), *Eucalyptus globoidea* (White Stringybark) and *Corymbia gummifera* (Red Bloodwood). *Eucalyptus piperita* (Sydney Peppermint) was also fairly common in this community.

Shrub Layer: In the majority of areas, the understorey was fairly diverse and dominated by native species including *Leptospermum polygalifolium* (Tantoon), *Allocasuarina littoralis* (Black sheoak), *Banksia spinulosa* var. *spinulosa* (Hairpin Banksia) and *Melaleuca linaarifolia* (Flax-leaved Paperbark).

Ground Layer: The ground layer was dominated by a variety of grass and herb species including *Entolasia stricta* (Wiry Panic), *Gahnia clarkei* (Tall Saw-sedge), *Pteridium esculentum* (Bracken Fern) and *Lomandra longifolia* (Spiky-headed Mat-rush).

Classification: This vegetation community does not correspond with any Threatened Ecological Community (TEC) under either the TSC Act or the EPBC Act.

3.2.2.2 MU 42 – Riparian Melaleuca Swamp Woodland

Plate 2 MU 42 – Riparian Melaleuca Swamp Woodland – Conservation Lands

Description: This community occurs within the low-lying areas of impeded drainage that run northwest-southeast on the site. The community includes and surrounds an ephemeral drainage line and is prone to waterlogging following rainfall.

Total area: 35.14 hectares

Impact area: 3.47 hectares of this community occurs within the development lands on site.

Canopy Layer: A moderately dense to sparse canopy layer of Eucalypts including *Eucalyptus resinifera* (Red Mahogany), *Eucalyptus globoidea* (White Stringybark) and the occasional *Eucalyptus tereticornis* (Forest Red Gum) is present within this community. Importantly, no *Eucalyptus robusta* (Swamp Mahogany) were identified during field surveys, however it is known to occur in isolated instances (see Umwelt 2009).

Shrub Layer: A dense shrub layer dominated by *Melaleuca* and *Leptospermum* spp., including *Melaleuca nodosa* (Prickly-leaved Paperbark), *Melaleuca sieberi* (Sieber's Paperbark) and *Leptospermum polygalifolium* (Tantoon). *Allocasuarina littoralis* (Black she-oak) and *Allocasuarina torulosa* (Forest Oak) are occasional elements within the shrub layer of this community.

Ground Layer: The dense ground layer was dominated by species such as *Gahnia clarkei* (Tall Saw-sedge), and *Entolasia stricta* (Wiry Panic), with a high diversity of herbs and ferns including *Pratia purpurescens* (Whiteroot), *Dianella caerulea* (Blue Flax Lily) and *Pteridium esculentum* (Bracken Fern). Much of the community also included climbing herbs including *Parsonsia straminea* (Common Silkpod) and *Glycine clandestina.*

Classification: A detailed assessment conducted by Umwelt (2009) determined that this community is commensurate with the 'Swamp Sclerophyll Forest on Coastal Floodplains of the North Coast, Sydney Basin and South-east Corner Bioregions' Endangered Ecological Community (EEC) as listed under the TSC Act. This community is also considered to constitute a Groundwater Dependent Ecosystem (GDE) as defined under Section 2.1 of the NSW State Groundwater Dependent Ecosystems Policy.

3.2.2.3 Forest Red Gum/Red Mahogany Open Forest

Plate 3 Forest Red Gum / Red Mahogany Open Forest

Description: This open forest community is characterised by the dominant presence of *Eucalyptus tereticornis* (Forest Red Gum) within the canopy. The community occurs within a larger area of moderately disturbed vegetation (classified as Derived Grassland with Scattered Canopy Trees), and is considered to be a variation of what was once Smooth-barked Apple Woodland.

Total area: 2.53 hectares

Impact area: 1.73 hectares of this community occurs within the development lands on site.

Canopy Layer: The canopy layer was dominated by *Eucalyptus tereticornis* (Forest Red Gum) with associated *Eucalyptus resinifera* (Red Mahogany).

Shrub Layer: The shrub layer has been substantially modified within this community, and has been removed in areas. Where the shrub layer persists, species such as *Acacia longifolia* (Golden Wattle), *Leptospermum polygalifolium* (Tantoon) and *Melaleuca linaarifolia* (Flax-leaved Paperbark) occur at low to moderate densities.

Ground Layer: The ground layer also shows signs of disturbance, with a typically grassy layer of native and exotic species including *Andropogon virginicus* (Whisky Grass), *Echinopogon caespitosus* (Hedgehog Grass), *Paspalum dilatatum* (Paspalum) and *Imperata cylindrica* (Blady Grass).

Classification: This vegetation community is considered to be a highly modified variant of the Smooth-barked Apple Woodland community, and is therefore not commensurate with any TEC listed under the TSC Act or the EPBC Act.

3.2.2.4 Derived Grassland with Scattered Canopy Trees

Plate 4 Derived Grasslands with Scattered Canopy Trees

Description: This community is a highly modified area likely to have been commensurate with the Smooth-barked Apple Woodland prior to disturbance. It occurs within the southwestern portion of the site and shows signs of active understorey management such as mowing and slashing.

Area: 20.69 hectares

Impact area: 20.47 hectares of this community occurs within the development lands on site.

Canopy Layer: An open canopy of species such as *Angophora costata* (Smooth-barked Apple), *Eucalyptus globoidea* (White Stringybark) and *Eucalyptus resinifera* (Red Mahogany) persists in this community.

Shrub Layer: Largely modified and removed, with only regeneration of species such as *Melaleuca nodosa* (Prickly-leaved Tea-tree), *Acacia longifolia* (Sydney Wattle) and *Daviesia ulicifolia* (Gorse Bitter Pea).

Ground Layer The ground layer is highly modified and has been actively managed. Identifiable species included species regularly encountered in modified and pastural areas including *Cynodon dactylon* (Common Couch), *Imperata cylindrical* (Blady Grass), *Paspalum dilatatum* (Paspalum) and *Setaria pumila* (Pale Pigeon Grass).

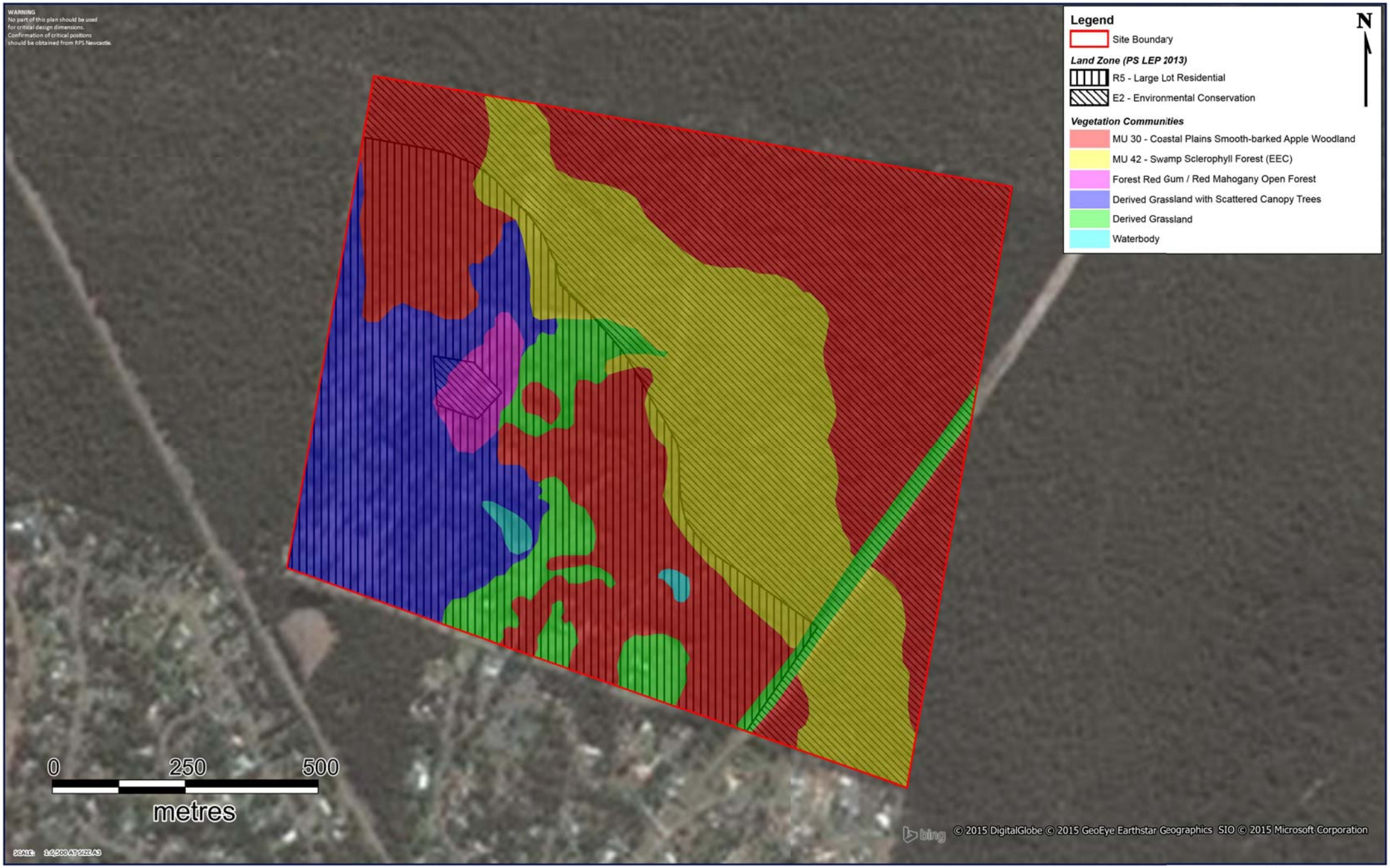
Classification: This vegetation community does not correspond with any TSC Act and/or EPBC Act listed TEC.

3.2.2.5 Derived Grassland/Cleared Areas

Description: These areas occur in the south of the site and include existing infrastructure and their immediate surrounds, including the powerline easement to the east. The area has been modified to an extent whereby little native vegetation remains, however the powerline easement does show signs of native vegetation regeneration.

Area: 10.36 hectares

Impact area: 7.97 hectares of this community occurs within the development lands on site.



TITLE: FIGURE 5: VEGETATION MAP

LOCATION: MEDOWIE

DATUM: GDA 94
PROJECTION: MGA ZONE 56

DATE: 23/03/2015
PURPOSE: FFA

LAYOUT REF: "I:\OBS\126k\126297 Medowie\10 - Drafting\MapInfo Workspaces\Eco"
VERSION (PLAN BY): JS (A A3)

CLIENT: MCCLOY MEDOWIE
JOB REF: 126297

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3.2.3 Significant Flora

A total of 227 flora species have been identified on the site during current and previous surveys (see **Appendix 3**).

Targeted searches for threatened flora species identified as potentially occurring within the study area (see **Table 2**) were conducted during field surveys. No species listed under the TSC Act or EPBC Act were identified during these searches.

3.3 Fauna Surveys

Survey techniques employed to determine the composition of fauna species within the study area resulted in a total of 122 species being detected (**Appendix 4**).

3.3.1 Terrestrial Mammal Trapping

Three species of native mammal were captured in the terrestrial Elliot traps deployed across the study area. Two of these species were frequently encountered, particularly within the more densely vegetated areas of the site, including the Brown Antechinus (*Antechinus stuartii*) (Plate 5) and the Bush Rat (*Rattus fuscipes*) (see Plate 6). In addition, terrestrial trapping efforts also captured the Brushtail Possum (*Trichosurus vulpecula*) on three consecutive nights (Plate 7). This species is typically arboreal, roosting in tree hollows and constructed dreys high in the canopy, however they are known to occasionally occupy ground roosts.

3.3.2 Arboreal Mammal Trapping

No fauna species were caught in arboreal traps during the trapping period.

Plate 5 Brown Antechinus (*Antechinus stuartii*) released following capture

Plate 6 Bush Rat (*Rattus fuscipes*) released following capture

Plate 7 Brushtail Possum (*Trichosurus vulpecula*) captured on site

3.3.3 Avifauna

A total of 52 bird species were recorded during recent field surveys. Bird species identified predominantly consisted of common woodland species such as the Eastern Yellow Robin (*Eopsaltria australis*), Noisy Friarbird (*Philemon corniculatus*), Rainbow Lorikeet (*Trichoglossus haematodus*) and Yellow-faced Honeyeater (*Lichenostomus chrysops*). The Little Lorikeet (*Glossopsitta pusilla*) was also observed flying high over the study area. This species is listed as Vulnerable under the TSC Act.

Surveys of the waterbodies within the study area identified common waterfowl species such as the Australian Wood Duck (*Chenonetta jubata*), Pacific Black Duck (*Anas superciliosa*) and the Little Black Cormorant (*Phalacrocorax sulcirostris*).

Nocturnal surveys and call playback identified the Tawny Frogmouth (*Podargus strigoides*) and the Powerful Owl (*Ninox strenua*). A male Powerful Owl was heard calling on several nights from conservation lands in the north of the site and adjacent vegetation within Medowie SCA, and a female was observed within a tree in the study area. It is listed as Vulnerable under the TSC Act.

Two migratory species listed under the EBPC Act were identified; including the White-throated Needletail (*Hirundapus caudacutus*) foraging high over the study area and the Rufous Fantail (*Rhipidura rufifrons*) observed foraging within the conservation lands in the north of the site.

A total of 84 bird species have been identified on the site to date, including the Varied Sittella (*Daphoenositta chrystoptera*), Glossy Black-cockatoo (*Calyptorhynchus lathami*) and Masked Owl (*Tyto novaehollandiae*) (Umwelt 2009; Oregon 2006). These species are listed as Vulnerable under the TSC Act.

The locations of all threatened species identified on the site during recent and previous surveys are provided in **Figure 6**.

3.3.4 Hairtube Results

Hairtube sampling identified two hair samples within the study area. Analysis by Barbara Triggs at “Dead Water” confirmed that the samples came from a *Trichosurus* species, most likely a Common Brushtail Possum (*Trichosurus vulpecula*).

3.3.5 Herpetofauna

Seven (7) herpetofauna species were identified during the recent survey, including the Common Garden Skink (*Lampropholis delicata*), Lace Monitor *(Varanus varius*), Common Eastern Froglet (*Crinea signifera*), Spotted Marsh Frog (*Limnodynastes tasmaniensis*) and Red-backed Toadlet (*Pseudophryne coriacea*) (Plate 8).

Plate 8 Red-backed Toadlet (*Pseudophryne coriacea*) encountered on site

A total of thirteen herpetofauna species have been identified on the site during previous and recent field surveys. None of these species are listed as threatened under the TSC and/or EPBC Act.

3.3.6 Micro-Chiropteran Bats

A total of nine microbat species were positively identified via the use of Anabat echolocation call recorders, with an additional nine species listed as 'potentially' occurring. Of the positively identified species, three are listed as Vulnerable under the TSC Act – the Little Bentwing Bat (*Miniopterus australis*), Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*) and the East coast Free-tailed Bat (*Mormopterus norfolkensis)*.

The other confirmed species include:

- Gould's Wattled Bat (*Chalinolobus gouldii*);
- Chocolate Wattled Bat (*Chalinolobus morio*);
- Eastern Free-tailed Bat (*Mormopterus ridei*);
- *Nyctophilus sp.*
- Eastern Horseshoe Bat (*Rhinolophus megaphyllus*); and
- White-striped Free-tailed Bat (*Tadarida australis*).

The additional species listed as potentially occurring within the study area are provided within the Anabat Report provided in **Appendix 6**.

3.3.7 Koala Surveys

Habitat assessments were carried out in accordance with methodology described in the Port Stephens Councils CKPoM and Phillips and Callaghan (2011). Six Koala SATs were conducted within the study area,

including within the area listed as 'Preferred Koala Habitat' under the Port Stephens Council Koala Habitat Planning Map (2006), and involved a comprehensive search of every tree listed as a 'Preferred Koala Feed Tree' under the CKPoM that occurs within the study area. A total of 18 mature *Eucalyptus tereticornis* (Forest Red Gum) trees were identified as occurring within the Forest Red Gum/Red Mahogany Forest that occurs within the development lands, with an additional 25 individuals located within the adjacent E2-zoned lands (see **Figure 6**). Of the 180 trees surveyed during the SATs conducted within the study area, six trees were found to have Koala scats below them (see Plate 9). However, five of the six scats collected were buried underneath shedded bark and leaf litter, suggesting that they were at least a couple of years old, with only the northernmost scat appearing to be fresh (see **Figure 6**). As per Phillips and Callaghan (2011) methodology, this sum is then converted to a percentage (3.3%) and is categorised in terms of Koala activity within the area. This resulted in the surveyed area being categorised as low Koala activity across the study area.

Plate 9 Koala scats collected on site

3.3.8 Spotlighting

Two fauna species listed as Vulnerable under the TSC Act; the Grey-headed Flying-fox (*Pteropus poliocephalus*) and Powerful Owl (*Ninox strenua*), were recorded within the study area during spotlighting events. The Grey-headed Flying Fox, which is also listed as Vulnerable under the EPBC Act, was observed flying over the site in moderate numbers (50+) during both spotlighting nights. As previously mentioned, the Powerful Owl was heard calling on several nights from conservation lands in the north of the site and adjacent vegetation within Medowie SCA, and was observed within a tree in the study area.

3.3.9 Nocturnal Call Playback

Call playback failed to elicit any direct response from target fauna, with the Powerful Owl observation occurring in the absence of any call playback event. This suggests that the species does utilise the study area for foraging and roosting purposes, rather than being attracted to the study area from elsewhere as a result of call playback activities.

An inventory of fauna species recorded on the site is provided in **Appendix 4**.

3.4 Habitat Survey

3.4.1 Terrestrial Habitats

The forested areas of the study area are predominantly comprised of an intact and diverse canopy, shrub and ground layer that provides potential habitat for terrestrial fauna species. A structurally diverse ground layer that includes many fallen logs and debris provides adequate foraging and shelter for mammal and reptile species, and the shrub and canopy layer are of sufficient diversity to provide habitat for a range of woodland bird species. Variations in habitat structure do occur within the identified vegetation communities, with the drier areas of Smooth-barked Apple Woodland containing a less dense shrub layer than those areas within and immediately surrounding the Riparian Swamp Woodland in the centre of the site.

Surveyed vegetation was determined to be of sufficient maturity to provide a moderate density of hollow-bearing trees across the study area. Areas of Smooth-barked Apple Woodland in the south-west, and areas of Riparian Melaleuca Woodland within the centre of the study area were found to have some of the more mature trees, with large hollows that provide potential roosting and nesting habitat for larger fauna including Forest Owls. A regurgitation pellet was discovered underneath a mature *Angophora costata* (Smooth-barked Apple) tree in the south-west of the study area (see Plate 10 and **Figure 6**). This tree was identified as having large hollows and analysis determined the pellet included Ringtail Possum (*Pseudocheirus peregrinus*) remains, suggesting that the tree is used as a roost site for forest owls and may be utilised as a nest tree during breeding periods.

The more open areas of the study area that include the Derived Grasslands communities are limited in their potential as habitat for the small terrestrial mammals known to occupy the site, however they do provide open foraging habitat for macropods including the Red-necked Wallaby (*Macropus rufogriseus*) and Eastern Grey Kangaroo (*Macropus giganteus*), which were both observed foraging in these areas. The open areas would also provide foraging opportunities for microchiropteran bat species that could utilise these areas as flyways. The scattered trees in these communities were of a sufficient size to provide arboreal habitat for arboreal mammals and birds, however hollow density was low and restricted the potential for hollow-dependent fauna to occupy these areas in significant densities.

Plate 10 Potential owl roost tree on site

3.4.2 Koala Habitat

Section 3.1.3 and **Figure 4** detail Koala habitat mapping that exists for the site under the Port Stephens CKPoM (2006). Within this mapping, the southwestern portion of the study area has been mapped as 'Preferred Koala Habitat'. however no 'Preferred Koala Feed Trees' listed under the PSC CKPoM (2002) were identified as occurring within this area during field surveys. Although the area is likely to be utilised by Koalas intermittently or as a thoroughfare between higher quality habitat (as evidenced by the discovery of a Koala scat in this area – **Figure 6**), the area is not considered to be Preferred Habitat for the Koala given the absence of Koala feed trees. This conclusion is supported by the Koala Habitat Atlas mapping works produced by the Australian Koala Foundation (AKF). This map is identical to the CKPoM mapping in many areas, but maps the vegetated areas in the southwest of the site as 'Secondary Habitat (Class C)' (see Plate 11). This habitat type is defined as *'forested areas of koala habitat comprised of secondary and supplementary feed tree species (primary koala food tree species absent), where secondary food tree species comprise less than 30% of the overstorey trees'* (AKF 2013). The dominance of species such as *Eucalyptus globoidea* (White Stringybark), *Angophora costata* (Smooth-barked Apple) and *Corymbia gummifera* (Red Bloodwood) and the lack of preferred Koala food tree species in this area suggests this area is correctly mapped by the AKF.

Conversely, areas of the Forest Red Gum/Red Mahogany vegetation community in the centre of the study area are not mapped under either the CKPoM mapping or the Koala Habitat Atlas as 'Preferred Koala Habitat', however the presence of *Eucalyptus tereticornis* (Forest Red Gum) and discovery of scats in this area (see **Figure 6**) suggests that this area can be considered as Preferred Habitat for the Koala as defined under the CKPoM. The location of this habitat within the study area seems to justify the current E2 zoning within its centre, however the ongoing viability of the area as Koala habitat following development is questionable (see **Section 4.1.4** below).

Plate 11 Koala Habitat Atlas mapping for the site

It is to be noted that the extent of *Eucalyptus tereticornis* and other listed Koala Feed Trees including *Eucalyptus robusta* (Swamp Mahogany) were not comprehensively mapped within the conservation lands outside of the study area as part of this survey, but these species are known to occur in these areas. Opportunistic sightings suggest that the 'Preferred Koala Habitat/Primary Habitat' mapped within the conservation lands on site is relatively accurate.

3.4.3 Aquatic Habitats

Aquatic habitats within the study area are limited to the freshwater dams and small, isolated watercourses (see Plate 12) that occur within the site, however ephemeral watercourses within areas of impeded drainage in the centre of the study area are likely to provide temporary habitat during wet periods. These areas provide intermittent habitat for frogs, wading birds and waterfowl, with common species including the Pacific Black Duck (*Anas superciliosa*), Australian Wood Duck (*Chenonetta jubata*) and Little Pied Cormorant (*Microcarbo melanoleucos*) observed, however the quality of these habitats is limited given the small size and isolation of identified watercourses, and the high degree of disturbance and infiltration of exotic flora species to surrounding areas.

3.4.4 Connectivity

3.4.4.1 Interconnectivity

The forested areas of the site are directly connected to large tracts of vegetation to the east, west and north that are included within the Medowie SCA and beyond (see **Figure 1**). This increases the value of remnant

habitat located on the site for many species, particularly terrestrial and arboreal species, as it provides unobstructed access to the larger areas of habitat within and beyond the Medowie SCA. The town of Medowie limits available connectivity between the vegetation on site and areas to the south, with only patches of vegetation occurring in areas including south of Ferodale Road around Campvale Drain and south of Lisadell Road.

The site is not included within any identified biodiversity corridor, with the site occurring to the north of the Stockton – Watagans corridor as detailed within the Lower Hunter Regional Conservation Plan (DECCW 2009b).

3.4.4.2 Intraconnectivity

Connectivity within and across the study area and larger site is tentatively maintained in the southwest through scattered trees and grasslands. This tenuous link is continued through the Forest Red Gum/Red Mahogany vegetation within which the E2 zoned land occurs, and includes the dense clumps of *Eucalyptus tereticornis* that represent the highest quality of potential foraging habitat for the Koala within the study area. This potential Koala habitat is tentatively linked via scattered trees and grasslands to other areas of similar habitat that occur within the site approximately 250 metres to the north (see **Figure 6**). Trees linking the two areas of Koala feed trees include *Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus piperita* (Sydney Peppermint). These species are not listed as 'Preferred Koala Feed Trees' but are mentioned as potentially important to Koalas within the Port Stephens LGA under Appendix 8 of the KPoM (PSC 2002).

Plate 12 Watercourse with surrounding *Eucalyptus tereticornis* (Forest Red Gum) on site

TITLE: FIGURE 6: THREATENED FAUNA AND HABITAT FEATURES

LOCATION: MEDOWIE

DATUM: GDA 94
PROJECTION: MGA ZONE 56

DATE: 23/03/2015
PURPOSE: FFA

LAYOUT REF: "J:\JOBS\126k\126297 Medowie\10 - Drafting\MapInfo Workspaces\Eco"
VERSION (PLAN BY): JS (A A3)

CLIENT: MCCLOY MEDOWIE
JOB REF: 126297

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RPS

4.0 Impact Assessment

4.1 Potential Ecological Impacts

Potential ecological impacts are those impacts that may arise as a result of activities associated with clearing of native vegetation, on site construction, ongoing activities associated with the development such as roads, traffic, and runoff, and further degradation of retained vegetation such as weed infestation, erosion and sedimentation.

4.1.1 Loss of native vegetation

The development footprint will potentially require the removal of 28 hectares of remnant vegetation, 20.47 hectares of open grassland and scattered trees, and 7.97 hectares of cleared and disturbed areas. A total of 69.49 hectares of remnant vegetation will be retained in perpetuity as conservation lands as a result of the proposal.

4.1.2 Potential Impacts to Groundwater Dependent Ecosystems

One vegetation community on site was classified as a GDE, being:

- MU 42 – Riparian Melaleuca Swamp Woodland

Swamp forests and woodlands are known to be highly dependent upon groundwater (NOW 2012), and the topographical location and floristic composition of the swamp woodland on site suggests that it is reliant upon groundwater recharge to persist, particularly during dry periods where overland flow is non-existent. The development footprint is located in areas of slightly higher elevation that would subsequently drain into the swamp woodland within the site. As a result, the modification of flow regimes and influx of pollutants and sediment that are likely to occur as a result of the proposal may impact upon the GDE on site. However, the proposed subdivision does include for the provision of a detention basin (see **Appendix 7**) that when integrated with other water sensitive urban design features can limit potential impacts upon downstream GDEs.

4.1.3 Loss of fauna habitat

The resources within the habitat affected include loose tree bark, fissures, foraging and hollow-bearing trees, stags, freshwater bodies, and ground debris such as grass cover, logs and leaf litter.

The woodland and open forest communities on the site provide foraging and shelter opportunities for a range of fauna species including woodland birds, terrestrial and arboreal mammals, microbats and reptiles. Approximately 28.0 hectares of open forest and woodland vegetation will be impacted upon by the proposal, with an additional 20.47 hectares of sub-optimal habitat within the 'Derived Grassland with Scattered Trees' community also to be impacted.

Preferred Koala Feed Trees in the form of *Eucalyptus tereticornis* (Forest Red Gum) were identified as occurring within the centre of the site. Approximately 43 mature *E. tereticornis* were identified as occurring within the study area, representing approximately 2.53 hectares of Preferred Koala Habitat as defined under the CKPoM (PSC 2001), which will be impacted upon as a result of the proposal.

The permanent (man-made) and ephemeral waterbodies on the site provide habitat for wetland birds, some microbat species, reptiles and frogs. Approximately 0.68 hectares of permanent waterbodies will be impacted upon by the proposal, along with other ponds that occur intermittently within the lower-lying and impeded drainage areas of the study area.

Exotic pasture grass habitats are suitable for grazing macropods and ground foraging bird species. These areas are included within the 20.47 hectares of 'Derived Grasslands and Scattered Trees' and within those areas of 'Derived Grassland' that do not include existing infrastructure.

4.1.4 Habitat fragmentation/ loss of fauna habitat connectivity

The location of the proposed subdivision within the southwest of the site will limit the amount of fragmentation and/or loss of habitat connectivity that may occur through the site and surrounds. A small area (~3.5 hectares) of R5 zoned lands to the immediate southwest of the site is likely to be partially isolated from areas of vegetation within the Medowie SCA to the northwest, however this land can be considered likely to be developed in the future given the current zoning. Retained vegetation within the conservation lands on site will maintain connectivity to larger adjoining patches of surrounding vegetation that includes Medowie SCA, with connectivity to the surrounding vegetated environments in the north, east and west to be maintained in perpetuity for the movement of mobile fauna through the area.

It should be noted that current zoning for the study area is likely to result in the fragmentation and isolation of the 0.98 hectares of E2 zoned lands that occurs therein. This area contains some of the Preferred Koala Feed Trees listed under the CKPoM (PSC 2013) that occur on site and is therefore considered to be Preferred Koala Habitat. Despite the retention of all vegetation within, the development of surrounding areas will isolate the area from vegetated areas by a minimum of 200 metres, and from other areas of Preferred Koala Habitat by at least 250 metres. Given the subdivision will require the fencing of lots and will increase vehicle and dog presence as a result of heightened human habitation, this area will be severely compromised as habitat for many fauna species including the Koala in the future.

4.1.5 Fauna injury and/or mortality

The proposal involves the removal of potential habitat for resident and migratory fauna species on-site. Ongoing threats as a result of the proposal include increased traffic movement and therefore the likelihood of vehicle-animal strikes on the site will increase. Noise and light levels will also intensify and the area of extent will increase as a result of the proposed development, which may negatively impact upon fauna behaviour and utilisation on site, and may make the site less favourable for cryptic species including Forest Owls. Cats and dogs are likely to increase in number given the increase in density of residential lots in the area. Cats and dogs are a threat to native fauna, particularly birds, small mammals, reptiles and Koalas, which are known to occur within the locality.

4.1.6 Edge effects and weed invasion

Disturbed areas of the site were found to contain a number of weed species, with infestations of species such as *Lantana camara* (Lantana), *Bidens pilosa* (Cobblers Pegs) and *Solanum mauritianum* (Wild Tobacco Bush) occurring within the more disturbed areas of the study area. Ground disturbance associated with construction and operational phases of the development could potentially increase the spread of these species on the site, and could potentially facilitate the establishment of some of these species within conservation areas. Mitigation controls will need to be implemented and enforced during construction works to prevent the spread of weed species across the site.

4.1.7 Key Threatening Processes

A Key Threatening Process (KTP) is defined in the TSC Act as a process that "threatens, or could threaten, the survival or evolutionary development of species, populations or ecological communities". They are listed under Schedule 3 of the TSC Act and may adversely affect threatened species, populations or ecological communities or could cause species, populations or ecological communities that are not threatened to become threatened.

Eight KTPs have the potential to arise as a consequence of the proposed development:

- Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners *Manorina melanocephala*;
- Anthropogenic Climate Change;
- Clearing of native vegetation;
- Infection of native plants by *Phytophthora cinnamomi*;
- Invasion, establishment and spread of *Lantana camara*;
- Invasion of native plant communities by exotic perennial grasses;
- Loss of hollow-bearing trees; and/or
- Removal of dead wood and trees.

No other KTPs are believed to be likely to occur as a consequence of the proposed development.

4.2 Likelihood of Occurrence Assessment

Database searches identified 21 threatened flora species, 44 threatened fauna species and eight EECs listed on the TSC Act and/or EPBC Act that are known, or predicted, to occur within a 10 kilometre radius of the site (the locality).

The likelihood of occurrence is presented in tabulated form (refer to **Table 5**).

'**Species / Community'** – Lists each threatened species / EEC known from the locality (10 kilometre radius). The status of each threatened species under the TSC Act and the EPBC Act are also provided.

'**Habitat Description'** – Provides a brief account of the species / community and the preferred habitat attributes required for the existence / survival of each species / community. Unless stipulated otherwise, all habitat descriptions have come from the *Handbook of Australian New Zealand and Antarctic Birds (HANZAB)* Volume 1 – 7 (Higgins *et al.,* eds), DoE SPRAT Profiles and/or the OEH Threatened species profiles.

'Likelihood of Occurrence on Site' – Assesses the likelihood of each locally recorded species and EEC to occur within the site, using knowledge of each species' habitat and lifecycle requirements and with regard the habitat types present within the site, results of the literature review and database searches and current field investigations. The location and number of records of the species (OEH Atlas of NSW Wildlife) were also considered in determining probability of occurrence.

'Potential for Impact' – Assesses the likelihood of impacts to each species / community that would result from the proposed development, taking into account direct and indirect short and long-term impacts.

Table 5 Threatened Species/Communities Assessment Table

Species/Community	TSC Act	EPBC Act	Habitat Description	Likelihood of Occurrence	Potential Impact
Flora					
Allocasuarina defungens Dwarf Heath Casuarina	E	E	Small, prostrate shrub found in low heath, open woodland, dry sclerophyll, generally on loamy clays and sand. Occurs from the Lower Hunter south to Southern Highlands. Recently found in several locations within the Cessnock LGA where it has been found growing in Kurri Sand Swamp Woodland (KSSW). Has also been recently recorded as isolated populations within Yellow Bloodwood Woodland and Blue-leaved Stringybark Woodland.	This species has not been recorded on-site in current or previous surveys or within 10 kilometres of the Site ('the locality'). The woodland occurring on the Site is not commensurate with any of the associated vegetation types. Given the extensive survey efforts targeting this species presence on site and the suboptimal habitat present, it is considered **unlikely** to occur.	This species was not recorded on-site and suboptimal habitat exists on site, thus, this species is unlikely to be affected by the proposed activities. Therefore, an AoS for this species is not considered necessary
Angophora inopina Charmhaven Apple	V	V	Small to medium tree found in shallow sandy soils in open woodland, swamp woodland and wet heath. The main occurrences of this species are in the Wyong and Lake Macquarie LGA's (from Charmhaven to Wyee and Morisset, and north to near Toronto), with disjunct populations also in Port Stephens LGA (south of Karuah).	This species was not recorded on-site during previous or current surveys, and Atlas records for the species are limited to areas east and north of the site (NSW Wildlife Atlas data). Given extensive surveys on the site failed to identify the species, it is considered **unlikely** to occur.	The species has not been identified on the site, and favoured habitat for the species in the form of swamp woodland is largely retained within the conservation lands. The species is therefore unlikely to be impacted upon by the proposed activities and an AoS for this species is considered unnecessary.
Asperula asthenes Trailing Woodruff	V	V	This small herb is restricted to scattered locations in NSW between Bulahdelah to Kempsey, with several records occurring in the Port Stephens LGA. It occurs in damp sites, often along river banks.	The species was not recorded on site during current or previous surveys, and the Atlas record within the vicinity of the site occurs to the west near Raymond Terrace (NSW Wildlife Atlas data). In addition, the damp sites required for the species predominantly occur within the swamp woodlands of the conservation lands. It is therefore considered **unlikely** to occur.	The species has not been identified on the site, and favoured damp habitats are largely retained within the conservation lands. The species is therefore unlikely to be impacted upon by the proposed activities and an AoS for this species is considered unnecessary.
Asterolasia elegans	E	E	Occurs on Hawkesbury sandstone. Found in sheltered forests on mid-to-lower slopes and valleys, e.g. in or adjacent to gullies that support sheltered forest. The canopy at known sites includes Turpentine (*Syncarpia glomulifera* subsp. *glomulifera*), Smooth-barked Apple (*Angophora costata*), Sydney Peppermint (*Eucalyptus piperita*), Forest Oak (*Allocasuarina torulosa*) and Christmas Bush (*Ceratopetalum gummiferum*).	This species has not been recorded on-site in current or previous surveys or within 10 kilometres of the Site. The site is outside the known distribution of this species. This species is **unlikely** to occur within the site.	Given the site occurs outside the known distribution of this species, the species is unlikely to be impacted upon by the proposed activities and an AoS for this species is considered unnecessary.
Callistemon linearifolius Nettle Bottle Brush	V	-	Shrub that grows in dry sclerophyll forest on the coast and adjacent ranges. Re-sprouting / juvenile specimens difficult to distinguish from other *Callistemon* species such as *C. rigidus* (Stiff Bottlebrush) or *C. linearis* (Narrow-leaved Bottlebrush) without the aid of flowering parts.	Surveys on-site did not detect this species, however records do exist for the species within close proximity of the site (NSW Wildlife Atlas data) and potential habitat exists across the site. Therefore, it has **potential** to occur.	Despite the fact that there is limited potential for this conspicuous species to occur on the site, the majority of potential habitat for the species will be retained within the conservation lands. Given the lack of records for the species within the development lands on the site and retention of favoured habitat in the conservation lands, an AoS for this species is not considered necessary.
Commersonia prostrata (syn. *Rulingia prostrata*). Dwarf Kerrawang	E	E	A ground-hugging shrub forming mats more than 1m across. Occurs predominantly on the Southern Highlands and Tablelands, with less than 100 plants recorded on the Tomago Sandbeds in the Port Stephens LGA. It occurs on sandy soils and is associated with Scribbly Gum and Swamp Mahogany ecotones at Tomago.	Surveys on site did not detect this species, and Atlas records within 10 kilometres of the site are limited to the Tomago sandbeds south of the site (NSW Wildlife Atlas data). Given the restricted distribution for the species, it is considered **unlikely** to occur.	Given the site occurs outside the known distribution of this species and it was not identified during surveys, the species is unlikely to be impacted upon by the proposed activities and an AoS for this species is considered unnecessary.
Corybas dowlingii Red Helmet Orchid	E	-	It is restricted to New South Wales where it is currently known from 4 localities including Port Stephens (2 localities), Bulahdelah and Freemans Waterhole south-west of Newcastle. It prefers sheltered areas such as gullies and southerly slopes in tall open forest on well-drained gravelly soil at elevations of 10-200 m.	The targeted flora surveys were conducted outside of flowering period for this cryptic species, however records for the species within the locality are restricted to a lone record within Moffats Swamp Nature Reserve to the south. The habitat within the development lands can be considered sub-optimal, and it is more likely to occur within the sheltered gullies of the conservation lands. However, it has **potential** to occur.	Despite having potential to occur on-site, this species is most likely to occur in the sheltered areas of the conservation lands. The limited potential for the species to occur within the development lands has determined that an AoS for this species is not considered necessary.
Cryptostylis hunteriana Leafless Tongue-orchid	E	V	This cryptic orchid isknown to occur within a range of habitats including woodlands to swamp heaths. Within the Hunter region, larger populations have been typically found in woodland dominated by *E. racemosa* (Scribbly Gum) and it prefers areas with an open grassy understorey. The species typically prefers moist sandy soils in sparse to dense heath and sedgeland, or moist to dry clay loams in coastal forests. In the Port Stephens LGA, this species is strongly associated	This species was not identified during targeted surveys on the site, and no Atlas records exist for the species within the locality. However, limited habitat isfound on the site, but it is largely restricted to the swamp habitats within conservation lands. It has **potential** to occur.	Despite the fact that there is limited potential for this species to occur on the site, the majority of potential habitat for the species will be retained within the conservation lands. Given the lack of records for the species within the locality of the site and retention of favoured habitat in the conservation lands, an AoS for this species is not considered necessary.

Species/Community	TSC Act	EPBC Act	Habitat Description	Likelihood of Occurrence	Potential Impact
			with, and typically restricted to, Nerong volcanic peaks (eg. Gan Gan hill, Lemon Tree Passage water reservoir, Tomaree headland).		
Diuris arenaria Sand Doubletail	E	-	This species occurs in coastal heath and dry grassy eucalypt forest on sandy flats. Grows in gently undulating country in eucalypt forest with a grassy understorey on clay soil. This species is known only from the Tomaree Peninsula, occurring in power line easements on the Tomago Sandbeds in regularly slashed sandy heaths.	The targeted flora surveys were conducted outside of flowering period for this cryptic species, however Atlas records within the locality are restricted to areas around Salt Ash to the south of the site. Given the site occurs to the north of known distribution of the species within the Tomaree Peninsula, it is considered **unlikely** to occur.	Given that the species is unlikely to occur on the site, an AoS for this species is not considered necessary.
Diuris praecox Rough Doubletail	V	V	Grows on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey. Exists as subterranean tubers most of the year. It produces leaves and flowering stems in winter.	The targeted flora surveys were conducted outside of flowering period for this cryptic species, however the few Atlas records within the locality are restricted to areas around Williamtown and Salt Ash to the south of the site. Given the topography required for the species does not occur within the site, it is considered **unlikely** to occur.	Given that the species is unlikely to occur on the site, an AoS for this species is not considered necessary.
Eucalyptus camfieldii Camfield's Stringybark	V	V	This tree is typically a mallee or straggly tree from 4 to 9m tall, occurring within shallow sandy soils near the boundary of tall coastal heaths and low open woodland. The most northerly distribution of the species centres around Raymond Terrace, with the species extending south to Waterfall.	The species was not detected on site during current or previous surveys, and the tall heath/low woodland habitat required for the species does not occur. It is considered **unlikely** to occur therein.	Given that the species is unlikely to occur on the site, an AoS for this species is not considered necessary.
Eucalyptus parramattensis subsp. *decadens* Earp's Gum	V	V	Red Gum species that grows in dry sclerophyll woodland on sandy soils, often in low damp sites. Locally this species occurs almost exclusively in association with Kurri Sand Swamp Woodland (KSSW) and ecotonal areas. Extensive records for the species within 10km of the site occur in a band south of Raymond Terrace running east through Williamtown and Salt Ash.	This species was not detected on-site, however the swamp sclerophyll forest predominantly found within the conservation lands of the site contains suitable habitat for this species. Therefore, it has **potential** to occur.	Despite having limited potential to occur on-site, this species is most likely to occur in the damp, sheltered areas of the conservation lands. The limited potential for the species to occur within the development lands has determined that an AoS for this species is not considered necessary.
Grevillea parviflora subsp. parviflora Small-flower Grevillea	V	V	A low open to erect shrub. Occurs in light, clayey soils in woodlands. Relatively widespread within the Cessnock LGA, and is also known from areas from Putty to Wyong and Lake Macquarie on the Central Coast. Sporadic records exist for the species within the Port Stephens LGA (NSW Wildlife Atlas data).	This species was not detected on-site during recent or previous surveys, however records do exist within 10 kilometres of the Site. The wooded habitats of the site represent potential habitat for the species, therefore it has **potential** to occur.	Despite the fact that this species has potential to occur on-site, the conspicuous species was not recorded during extensive searches and is therefore unlikely to exist in significant numbers. Given potential habitat for the species will also be retained within conservation lands, an AoS for this species is not considered necessary.
Maundia triglochinoides	V	-	This aquatic plant grows in swamps, lagoons, dams and other shallow freshwater on heavy clay, with low nutrients. It extends up the coast of NSW from as far south as Wyong and local records exist within Campvale Drain and Moffats Swamp at Medowie (NSW Wildlife Atlas data).	The species was not detected on site during recent or previous surveys, however local records exist and suitable habitat does exist within the dams and swampy habitat on site. It has **potential** to occur.	Despite the species having potential to occur on the site, targeted surveys of the dams within the residential lands failed to identify the species and the swamp habitats suitable for the species are largely confined to the conservation lands. As a result, an AoS for this species is not considered necessary.
Melaleuca biconvexa Biconvex Paperbark	V	V	A shrub to small tree, which grows in poorly drained areas on the Central Coast with outlying populations at Jervis Bay and Port Macquarie. Records in the Hunter Region are confined to western Lake Macquarie (Atlas of NSW Wildlife data). It may occur in dense stands adjacent to watercourses, in association with other *Melaleuca* species or as an understorey species in wet forest.	This species was not detected on-site and limited records exist within 10 kilometres of the Site (NSW Wildlife Atlas data). However, suitable habitat exists within the site, primarily within the wet forest vegetation of the conservation lands. Therefore, it has **potential** to occur.	Despite having potential to occur on-site, the preferred habitat of this species is found within the conservation area and comprehensive searches failed to detect the species within the small areas of suitable habitat of the development lands. Thus, this species is unlikely to be affected by the proposed activities; Therefore, an AoS for this species is not considered necessary.
Melaleuca groveana Grove's Paperbark	V	-	Widespread, scattered populations in coastal districts north of Port Stephens to southeast Queensland. They prefer to grow in heath and shrubland, often in exposed sites, at high elevations, on rocky outcrops and cliffs.	This species was not detected onsite, however, one records exist within 10 kilometres of the Site. The preferred habitat of heath and shrubland does not occur on-site. Therefore, it is considered **unlikely** to occur within the site.	No suitable habitat for this species occurs on-site, thus this species is unlikely to be affected by the proposed activities, and, therefore, an AoS for this species is not considered necessary.
Persicaria elatior Knotweed	V	V	This species normally grows in damp areas including beside streams and lakes, and occasionally in swamp forest. It is known from Raymond Terrace in Port Stephens.	This species was not detected on site, and no records exist for the species within 10km of the site. However, suitable habitat exists within the site, primarily within the wet forest vegetation of the conservation lands. There is limited **potential** for the species to occur.	Despite having potential to occur on-site, the preferred habitat of this species is predominantly found within the conservation area and comprehensive searches failed to detect the species within the small areas of suitable habitat of the development lands. Thus, this species is unlikely to be affected by the proposed activities and an AoS for this species is not considered necessary.
Phaius australis Lesser Swamp-orchid	E	E	Grows in *Melaleuca quinquenervia* swamps and in sclerophyll forest, on the coast, at or near sea level; reported north from	The targeted flora surveys were conducted outside of flowering period for this cryptic species, however no	Despite having potential to occur on-site, this cryptic species is most likely to occur in *Melaleuca quinquinerva* swamps that

Species/Community	TSC Act	EPBC Act	Habitat Description	Likelihood of Occurrence	Potential Impact
			Lake Cathie, but chiefly north from the Evans Head district.	records exist within 10 kilometres of the Site and *Melaleuca quinquinerva* swamps are absent from the development lands on the site. Despite this, given the patchy occurrence of preferred habitat within the conservation lands on the site, it is considered to have limited **potential** to occur.	are absent from the development lands. Therefore, it only has potential to occur within conservation areas and is unlikely to be affected by the proposed activities. An AoS for this species is not considered necessary.
Pterostylis chaetophora	V	-	This orchid is known from scattered locations in NSW across a relatively small area between Taree and Kurri Kurri. The cryptic species occurs within seasonally moist, dry sclerophyll forest.	Targeted flora surveys were conducted outside of flowering period for this cryptic species. One Atlas record exists for the species close to Grahamstown Lake (NSW Wildlife Atlas data), and this population was estimated to include hundreds of individuals within one 100 meter square area (NSW Scientific Committee Preliminary Determination). No other records exist close to the site, however habitat does exist for the species and it therefore has **potential** to occur.	Despite limited potential for the species to occur on the site, the highly restricted nature of the species in the sites' locality and conservation of potential habitat within conservation lands has determined that the proposal is unlikely to impact upon this species whereby an AoS for the species would be considered necessary.
Streblus pendulinus Siah's Backbone	-	E	This tall shrub or tree that inhabits warmer rainforests along watercourses north from Milton, NSW.	This species was not detected on-site and no records exist within 10 kilometres of the Site. No rainforests occur on-site in which this species inhabits. It is considered **unlikely** to occur.	No suitable habitat for this species occurs on-site, thus this species is unlikely to be affected by the proposed activities, and, therefore, an AoS for this species is not considered necessary.
Tetratheca juncea Black-eyed Susan	V	V	Occurs in a variety of forested and heathy habitats. Locally found in Open Forests and Woodlands with dense, undisturbed understorey, often in association with *A. costata* / *C. gummifera* on slopes with south-easterly aspects.	The targeted flora surveys were conducted outside of flowering period for this cryptic species and several records exist within 10 kilometres of the Site. The associated Eucalypt species do occur on the site, however the topography of the site renders the site as sub-optimal habitat for the species. Despite this, the species has some **potential** to occur.	Despite having potential to occur on-site, the site only represents sub-optimal habitat for the species. Given the conservation of nearly 70 hectares of this habitat within the conservation lands, it is unlikely to be affected by the proposed activities. An AoS for this species is not considered necessary.
Amphibians					
Crinia tinnula Wallum Froglet	V	-	Occurs in coastal, low-lying acid Paperbark forest, within the 'wallum country' (often on sandy soils) coastal heaths and wetlands. Local records exist to the south of the site close to Williamtown RAAF base and close to Grahamstown Lake.	The acid Paperbark swamps do not occur within the site, and the species has not been recorded on the site during current or previous surveys. It is considered **unlikely** to occur.	No suitable habitat for this species occurs on-site, thus this species is unlikely to be affected by the proposed activities, and, therefore, an AoS for this species is not considered necessary.
Litoria aurea Green and Golden Bell Frog	E	V	Inhabits swamps, lagoons, streams and ponds as well as dams, drains and storm water basins. Thought to be displaced from more established sites by other frog species, thus explaining its existence on disturbed sites. Previously widespread within the region, but now sparsely distributed within the Lower Hunter and Central Coast areas. A relatively stable population occurs on Kooragang Island.	This species was not detected on site during surveys and no records within 10 kilometres of the site exist. Given a lack of records within the vicinity of the site, it is considered **unlikely** to occur.	Given that this species is considered unlikely to occur, an AoS for the species is not considered necessary.
Mixophyes balbus Stuttering Frog	E	V	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Breeds in streams during summer after heavy rain, outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor.	This species has not been recorded on-site or within 10 kilometres of the site. No suitable rainforest persist on-site in which this species would occur. Therefore, it is **unlikely** to occur.	This species was not recorded on-site and no preferred habitat exists, thus this species is unlikely to be affected by the proposed activities. An AoS for this species is not considered necessary.
Birds					
Anthochaera Phrygia Regent Honeyeater	CE	E, M	A nomadic Honeyeater that disperses to non-breeding areas, including the coast, in winter, where flowering trees are sought. Within the region, mostly recorded in Box-Ironbark Eucalypt associations along creek flats, river valleys and foothills. Coastal swamp forests in Lower Hunter are used when more western resources fail. The main feed tree for coastal areas is *E. robusta* (Swamp Mahogany). Hunter records are more common in near coastal areas such as Cessnock LGA. Feed trees in this region are *C. maculata* (Spotted Gum), *E. fibrosa* (Broad-leaved Ironbark), *E. crebra* (Narrow-leaved Ironbark) and various stringybark sp. Nests mainly west of the divide, although local breeding attempts have occurred at Quorrobolong.	This species was not detected on-site and a lone record exists for the species within 10 kilometres of the site. *E. robusta* only occurs sporadically within the swamp forest on the site, and was only recorded within the conservation lands on site. Although records in the locality are low the available habitat could be utilised by this species. It is considered as having **potential** to occur.	Despite having potential to occur on-site, this species' preferred habitat only occurs in the lands that are to be conserved as part of the proposal. However, indirect impacts may occur in these areas and, as a result, an AoS for this species is included in **Appendix 1**. An AoS (EPBC Act) has also been prepared in **Appendix 2**.
Botaurus poiciloptilus Australasian Bittern	E	E	The distribution of this species ranges from south-east Queensland to south-east South Australia, Tasmania and	This species was not detected on-site, and no records exist within 10 kilometres. The small dams on site only	This species was not recorded on the site and suboptimal habitat exists, thus this species is unlikely to be affected by

Species/Community	TSC Act	EPBC Act	Habitat Description	Likelihood of Occurrence	Potential Impact
			south-west of Western Australia. Preferred habitat includes permanent and seasonal freshwater habitats. It forages in shallow water in wetlands with tall dense vegetation.	provide sub-optimal habitat for the species, and the species is considered **unlikely** to occur.	the proposed activities. As a result, an AoS for this species is not considered necessary.
Burhinus grallarius Bush Stone-curlew	E	-	Prefers open woodland, dry watercourses with fallen branches, leaf litter and sparse grass. Also occurs in coastal scrub, mangrove fringes, golf courses, rail reserves, wooded remnants on roadsides, orchards and plantations. Breeding pairs observed in near shore habitats in south-western Port Stephens and Brisbane Waters.	This species was not detected on-site, however records do exist for the species at Karuah and Swan Bay to the east. The site provides some sub-optimal habitat. Therefore, this species has **potential** to occur.	Potential habitat for this mobile species does occur on the site, including within the development lands, and records exist for the species within the locality. The species may therefore be impacted upon by the proposal and a 7-part test of significance has been applied (**Appendix 1**).
Calyptorhynchus lathami Glossy Black-Cockatoo	V	-	Occurs in forests and woodlands where it forages predominantly on *Allocasuarina* cones. Requires large Eucalypt tree hollows for nesting. Sparse occurrences on the valley floor, but resident in ranges and adjacent areas surrounding the Hunter Valley.	Evidence of the species occurring on the site has been recorded in previous surveys (Umwelt 2009) and potential habitat in the form of *Allocasuarina* spp. occurs throughout the site. It is **known** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Circus assimilis Spotted Harrier	V	-	This species utilises open and wooded habitat, preferencing grasslands (natural or cleared) or open woodlands that allow for the ground to be visible from above. Occasionally hunt over open water and swamps. Less common east of the Great Divide in NSW.	The species has not been recorded on the site during current or previous surveys, and only a couple of dated records (1987) exist within the locality around Richardson's Swamp at Raymond Terrace (NSW Wildlife Atlas data). Despite this, habitat does exist for the species on the site and it has the **potential** to occur.	Despite the potential for the species to occur on the site, the widespread distribution of the species and the lack of records for the species within the locality have determined that the species is unlikely to be impacted upon by the proposed activities. An AoS is not considered necessary.
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	V	-	Inhabits forests and woodlands predominantly west of the Great Divide, but do also occur on coastal plains and ranges. Predominantly in grassy woodlands of stringybarks and other rough-barked eucalypts, however may also occur in River Red Gum woodlands bordering wetlands.	The species has not been recorded on the site during recent or previous surveys, however records do exist within the sites locality and potential habitat occurs. There is limited **potential** for the species to occur.	Despite potential habitat for the species occurring on the site, the low occurrence of the species in coastal regions has determined that the likelihood of the species occurring is low and therefore it is unlikely to be impacted upon by the proposed activities. An AoS is not considered necessary.
Daphoenositta chrysoptera Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	This species has been recorded on site during previous surveys (Umwelt 2009). It is **known** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Dasyornis brachypterus Eastern Bristlebird	E	E	The Eastern Bristlebird occurs in three separate populations; one in south-east Queensland and north-east NSW and the other two south of Wollongong (NSW). It inhabits a wide range of habitats including sedgeland, heathland, schlerophyll forest, woodland and rainforest.	This species was not detected on-site or within 10 kilometres of the site. The distribution of this species persists as three disjunct populations, the closest one being on the Central Coast of NSW. Based on this distribution and lack of records it is considered **unlikely** to occur.	This species was not recorded on site and it is outside the known distribution of the species. As a result, the species is unlikely to be affected by the proposed activities and an AoS for this species is not considered necessary.
Dromaius novaehollandiae Emu (population in the New South Wales North Coast Bioregion and Port Stephens local government area)	E2	-	The species was formerly widespread in north-eastern NSW, but that population is now isolated and largely restricted to coastal and near-coastal areas between Ballina – Evans Head and Red Rock, extending west to the Bungawalbin area. There have also been some records from the Port Stephens area, however recent evidence of the persistence of this population is lacking and it is now considered to have disappeared (NPWS). On the NSW north coast, Emus occur in a range of predominantly open lowland habitats, including grasslands, heathland, shrubland, open and shrubby woodlands, forest, and swamp and sedgeland communities, as well as the ecotones between these habitats. They also occur in plantations of tea-tree and open farmland, and occasionally in littoral rainforest.	This species was not recorded on-site, and records from the endangered Port Stephens population in the locality are dated (1992). Given the local population of the species is considered to be extinct, it is **unlikely** to occur.	Despite potential habitat for the species occurring on the site, the species is unlikely to occur on the site given the lack of recent evidence for the population persisting in the area. An AoS is not considered necessary.
Ephippiorhynchus asiaticus Black-necked Stork	E	-	Inhabits swamps associated with river systems and large permanent pools but sometimes appears on the coast or in estuaries. It has also been recorded on farm dams and sewage treatment ponds. Within the Hunter Region it occurs spasmodically on freshwater or estuarine wetlands, along coastal and near coastal environments such as Gloucester.	This species was not detected on-site, however multiple records exist for the species within the locality at Grahamstown Lake and within the bays and estuaries of Port Stephens. The dams and small watercourses on site present some habitat for the species. Therefore, it is considered as having **potential** to occur.	Despite potential for this species to occur on the site, the dams and small watercourses that occur within the development lands only represent sub-optimal habitat for the species. Given records for the species in the locality are restricted to much larger waterbodies, the potential for the species to occur is considered low and is therefore unlikely to be impacted upon by proposed activities. An AoS is not considered necessary.
Epthianura albifrons White-fronted Chat	V	-	This species is found in damp open habitats, particularly estuarine and marshy grounds, as well as wetlands containing saltmarsh, bordered by open grasslands or lightly timbered lands. The species is also observed in open grasslands and	This species was not detected onsite, however records exist for the species within Worimi Nature Reserve at Swan Bay to the east. The open, grassy woodland within the development lands and wetland areas represent	Despite the potential for the species to occur, the habitat on site is only considered marginal habitat, and the sensitivity of the species to human populations diminishes the potential for the species to occur within the development lands in the

Species/Community	TSC Act	EPBC Act	Habitat Description	Likelihood of Occurrence	Potential Impact
			sometimes in low shrubs bordering wetland areas. The species is sensitive to human disturbance and is not found in densely populated areas.	marginal habitat for the species. There is **potential** for the species to occur.	south of the site. It is therefore unlikely to be impacted upon by the proposal and an AoS is considered unnecessary.
Glossopsitta pusilla Little Lorikeet	V	-	*Glossopsitta pusilla* extends from Cairns to Adelaide coastally and to inland locations. Commonly found in dry, open eucalypt forests and woodlands. Can be found in roadside vegetation to woodland remnants. *G. pusilla* feeds on abundant flowering Eucalypts, but will also take nectar from *Melaleuca* sp and *Mistletoe* sp. Favoured food sources in coastal areas include *C. maculata* (Spotted Gum), *E. fibrosa* (Broad-leaved Ironbark), *E. robusta* (Swamp Mahogany) and *E. pilularis* (Blackbutt). Nesting takes place in hollow bearing trees.	This species was observed flying across the site during recent surveys. It is **known** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Ixobrychus flavicollis Black Bittern	V	-	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	This species has not been recorded on the site during recent or previous surveys, and a lone record exists for the species south of Medowie from 1998 (NSW Wildlife Atlas data). However, given the availability of potential habitat for the species, there is limited **potential** for the species to occur.	Despite the potential for the species to occur, the habitat on site is only considered marginal habitat, particularly the drier habitat of the development lands. It is therefore unlikely to be impacted upon by the proposal and an AoS is considered unnecessary.
Lathamus discolour Swift Parrot	E	E	On the mainland, this species frequents Eucalypt forests and woodlands with large trees having high nectar production during winter. Mainland winter foraging sites often vary from year to year. Nests only in Tasmania, but regularly visits the Hunter Region in winter when food sources are abundant or food sources are lacking in other areas. Food sources include *E. robusta* (Swamp Mahogany) and *C. maculata* (Spotted Gum), *E. fibrosa* (Broad-leaved Ironbark) and *E. crebra* (Narrow-leaved Ironbark).	This species was not detected on the site, however records exist within 10 kilometres. *E. robusta* occurs sporadically within the swamp forest on the site, and was recorded within the conservation lands. It is considered as having **potential** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.** An AoS (EPBC Act) has also been prepared in **Appendix 2**.
Lophoictinia isura Square-tailed Kite	V	-	The species ranges along coastal and subcoastal areas, inhabiting timbered areas including dry woodlands and open forests. Appears to occupy large huntering ranges of more than 100km^2.	Records for the species within the locality occur occur at Medowie to the south of the site, and potential habitat exists. The species has **potential** to occur.	Despite the potential for the species to occur on the site, the large home range of the species coupled with the retention of potential habitat within conservation lands on the site diminishes the likelihood of a potential impact occurring. An AoS is not considered necessary.
Neophema pulchella Turquoise Parrot	V	-	The Turquoise Parrot inhabits the edges of eucalypt woodlands, timbered ridges and creeks in farmland. It occurs throughout the coastal plains and western slopes of NSW.	The species was not recorded on site during recent or previous surveys, but habitat is available for the species. Considering the wide distribution of the species and some records within the locality, there is **potential** for the species to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Ninox strenua Powerful Owl	V	-	Occurs in wet or dry sclerophyll forests and woodlands where suitable prey species occur (being predominantly arboreal mammals). Requires large hollows, usually in Eucalypt trees, for nesting. Roosts in dense vegetation within such areas.	The species was observed on the site during recent surveys. It is **known** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Oxyura australis Blue-billed Duck	V	-	This species prefers deep water in large, permanent wetlands and swamps with dense vegetation. It is completely aquatic, keeping close to edge of dense cover.	The species has not been recorded in current or previous surveys, and no large wetlands or swamps have been recorded on site, with the lone record in the locality occurring at Grahamstown Lake to the west (NSW Wildlife Atlas data). It is considered **unlikely** to occur.	Given the species is considered unlikely to occur on the site, it is unlikely to be impacted by the proposed activities and an AoS is not considered necessary.
Pandion cristatus Eastern Osprey	V	M	Ospreys are found right around the Australia coast line, except for Victoria and Tasmania. They are common around the northern NSW coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south eastern Australia. There are few records from inland areas.	This species was not detected on-site, and the record for the species within the locality occurs within the marine areas of Port Stephens to the east. Given Ospreys are coastline specialists focusing on reefs, shorelines and islands, it is considered **unlikely** to occur.	This species was not recorded on-site and suitable habitat does not exist on-site, thus this species is unlikely to be affected by the proposed activities. An AoS for this species is not considered necessary.
Petroica boodang Scarlet Robin	V	-	This species is found in dry eucalypt forests and woodlands, typically with an open and grassy understorey. It occupies both mature and regrowth vegetation, occasionally occupying wetlands and tea-tree swamps.	The species has not been recorded on site, but records exist in the locality and habitat is available. There is **potential** for the species to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Rostratula australis Australian Painted Snipe	E	V, M	This species has a widespread distribution along the east coast of Australia. Preferred habitats include shallow freshwater wetlands, swamps and inundated grassland.	This species was not detected on or within 10 kilometres of the site. However, suitable habitat does exist on the site. Therefore, it is considered as having **potential** to occur.	Despite the potential occurrence of the species on site, the lack of records in the locality and the retention of the majority of available habitat within the conservation lands limits the

Species/Community	TSC Act	EPBC Act	Habitat Description	Likelihood of Occurrence	Potential Impact
Syn. *Rostratula benghalensis* Painted Snipe					potential for impact to this species. An AoS is not considered necessary.
Pomatostomus temporalis temporalis Grey-crowned Babbler (eastern subspecies)	V	-	The species inhabits Box woodlands and Box-Cypress-pine woodlands on the coastal and alluvial plains. It occupies woodlands in the Hunter Valley, with records occurring in the Port Stephens LGA at Raymond Terrace (NSW Wildlife Atlas data).	The species was not detected on site, and the habitat available is considered marginal. However, records exist within the locality and the species has **potential** to occur intermittently on the site.	Given the habitat on site is limited and the species is only considered to have limited potential to occur, it is unlikely to be impacted upon by the proposal and an AoS is not considered necessary.
Stictonetta naevosa Freckled Duck	V	-	This species prefers freshwater swamps and creeks with dense growth of Cumbungi, Lignum or Tea-tree, inhabiting ephemeral breeding swamps and permanent waters such as lakes and farm dams during drier periods.	The species was not recorded on site during recent or previous surveys, and limited habitat exists. However, there is limited **potential** for it to occur on the site.	The site represents low quality habitat for the species, and records are scarce in the locality (NSW Wildlife Atlas data). The species is therefore unlikely to be impacted upon by the development and an AoS is not considered necessary.
Tyto novaehollandiae Masked Owl	V	-	Found in a range of habitats, locally within sclerophyll forests and woodlands where appropriate/preferred prey species occur (being predominantly terrestrial mammals). Requires large eucalypt hollows for nesting and prefers to roost in these hollows as well.	This species has been recorded on the site during previous surveys. It is **known** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Mammals					
Cercartetus nanus Eastern Pygmy-possum	V	-	This species is found in a broad range of habitats, but prefers woodlands and heath. They largely feed on the nextar and pollen of banksias, eucalypts and bottlebrushes, sheltering in tree hollows, rotten stumps, abandoned nests or dreys and vegetation thickets.	The species has not been recorded on site during recent or previous surveys and Atlas records are scarce in the locality. However, suitable habitat does exist for the species and, as a result, there is **potential** for the species to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Chalinolobus dwyeri Large-eared Pied Bat	V	V	This species forages in tall open forests and the edges of rainforest. It roosts in mine shafts and similar structures, frequenting low to mid-elevation dry open forest and woodland close to these features. Hunter Region records for this species are largely confined to the Watagan Mountains, but it has been recorded on the southern side of Port Stephens .	The species has been recorded within the site during previous surveys (Orogen 2006). It is **known** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.** An AoS (EPBC Act) has also been prepared in **Appendix 2**.
Dasyurus maculatus maculatus Spotted-tailed Quoll (SE Mainland Pop)	V	E	Found in a variety of forested habitats. This species creates a den in fallen hollow logs or among rocky outcrops. Generally does not occur in otherwise suitable habitats that are in close proximity to urban development.	This species was not detected on site, however multiple records exist for the species within the locality. The site supports potential foraging habitat for this species, however its close proximity to human habitation may limit the potential for the species to occur. However, it is considered as having **potential** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.** An AoS (EPBC Act) has also been prepared in **Appendix 2**.
Falsistrellus tasmaniensis Eastern False Pipistrelle	V	-	This species is found in a variety of forest types, such as open forests, woodlands and wetter sclerophyll forests (usually with trees >20 m). This species roosts in tree hollows and caves. Appears to locally favour upland habitats. A limited number of records occur on the central coast and the Lower Hunter Region.	This species was not positively identified on the site during recent or previous surveys, however foraging and roosting habitat exists and local records do occur. Therefore, it is considered as having **potential** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Miniopterus australis Little Bentwing Bat	V	-	Prefers to forage in well-vegetated areas, such as within wet and dry sclerophyll forests and rainforests. Requires caves or similar structures for roosting habitat. Largely confined to more coastal areas in the Lower Hunter Region.	This species was recorded on-site during current and previous surveys. It is **known** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Miniopterus schreibersii oceanensis Eastern Bentwing Bat	V	-	This species utilises a range of habitats for foraging, including rainforest, wet and dry sclerophyll forests, woodlands and open grasslands. Requires caves or similar structures for roosting habitat. Widely distributed across the Lower Hunter Region.	This species was recorded on-site during current and previous surveys. It is **known** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Mormopterus norfolkensis East Coast Free-tailed Bat	V	-	This species is distributed south of Sydney extending north into south-eastern Queensland. There are no records west of the Great Dividing Range. Most records of this species have been reported from dry Eucalypt forest and woodland. It is expected that open forested areas and the cleared land adjacent to bushland, constitutes important habitat for this species. It is a predominantly tree-dwelling species, roosting in hollows or behind loose bark in mature Eucalypts. Widely	This species was recorded on-site during current and previous surveys. It is **known** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part test of significance (TSC Act) has been applied to this species in **Appendix 1.**

Species/Community	TSC Act	EPBC Act	Habitat Description	Likelihood of Occurrence	Potential Impact
			distributed across the Lower Hunter Region.		
Myotis macropus Southern Myotis	V	-	Usually found near bodies of water, including estuaries, lakes, reservoirs, rivers and large streams, often in close proximity to their roost site. Although usually recorded foraging over wet areas, it also utilises a variety of wooded habitats adjacent to such areas including rainforest, wet and dry sclerophyll forest, woodland, and swamp forest. Roosts in small colonies of between 15 and several hundred individuals in caves, mines and disused railway tunnels. A number of records from the Central Coast, with fewer numbers in the Lower Hunter Region and Central Hunter Region.	This species was not positively identified on-site during recent or previous surveys, however records exist within 10 kilometres of the site and potential habitat occurs. Therefore, it is considered as having **potential** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Petaurus australis Yellow-bellied Glider	V	-	Occurs in tall, mature eucalypt forest in areas of high rainfall and nutrient rich soils. A very mobile species that occupies large home ranges between 20 to 85ha.	This species has not been identified on the site during recent or previous surveys, but local records exist in habitat predominantly contiguous with vegetation on the site. It therefore has **potential** to occur.	Despite having potential to occur on the site, the preferred habitat for this species is limited, particularly within the development lands. As a result, there is unlikely to be an impact upon this species by the proposed activities, and an AoS is not considered necessary.
Petaurus norfolcensis Squirrel Glider	V	-	Occurs in eucalypt forests and woodlands where it feeds on sap exudates and blossoms. In these areas tree hollows are utilised for nesting sites. This species also requires winter foraging resources when the availability of normal food resources may be limited, such as winter-flowering shrub and small tree species. Widely distributed across the Lower Hunter region.	This species was **recorded** on-site during previous surveys (Umwelt 2009).	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Petrogale penicillata Brush-tailed Rock Wallaby	E	V	This species occupies rocky escarpments and cliffs along the Great Dividing Range and western slopes, browsing on vegetation in adjacent areas at night and sheltering in associated caves during the heat of the day.	No records exist for the species within the sites' locality and suitable habitat is lacking. It is considered **unlikely** to occur.	This species was not recorded on-site and suitable habitat does not exist on-site, thus this species is unlikely to be affected by the proposed activities. An AoS for this species is not considered necessary.
Phascogale tapoatafa Brush-tailed Phascogale	V	-	The Brush-tailed Phascogale is a tree hollow dependant marsupial associated with dry, forested habitats in south-eastern Australia. However, individuals have also been recorded in heath, swamps, rainforest and wet sclerophyll forest. Brush-tailed Phascogales prefer eucalypt woodland with high densities of hollows, as a single individual may use up to 20 nesting sites within a single year. Nesting sites can include hollow tree limbs, rotten stumps and disused bird nests.	This species was not detected on-site, however multiple records exist for the species in the locality. Given the availability of potential habitat, the species has **potential** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1**.
Phascolarctos cinereus Koala (Qld, NSW, Vic and ACT Populations)	V	V	Occurs in forests and woodlands where it requires suitable feed trees (particularly *Eucalyptus* spp.) and habitat linkages. Will occasionally cross open areas, although it becomes more vulnerable to predator attack and road mortality during these excursions. Records from the Lower Hunter Region are largely confined to the greater Port Stephens area, the Lake Macquarie hinterland and the Watagan Mountains, with a small number of records from Cessnock LGA.	Scats of this species were **recorded** on-site during current surveys. This species was also **recorded** on-site during previous surveys (Umwelt 2009).	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.** An AoS (EPBC Act) has also been prepared in **Appendix 2**.
Potorous tridactylus tridactylus Long-nosed Potoroo	V	V	Prefers cool rainforest, wet sclerophyll forest and heathland. Sleeps by day in a nest on the ground, and digs for succulent roots, tubers, fungi and subterranean insects. Some diggings seemingly attributable to this species may belong to *Isoodon macrourus* (Northern Brown Bandicoot). Records exist from the Karuah vicinity and the Gosford LGA.	This species was not detected on the site and no records exist within the locality. None of the preferred habitats occur on site for this species. Therefore, it is considered **unlikely** to occur.	This species was not recorded on-site and no preferred habitat exists. The species is therefore unlikely to be affected by the proposed activities, and an AoS for this species is not considered necessary.
Pseudonomys novaehollandiae New Holland Mouse	-	V	This species has a patchy distribution within open woodlands, heathlands and in hind dune vegetation throughout Eastern Australia. In the Hunter Region, the species stronghold is in the Myall Lakes region.	This species was not detected on the site, however multiple records exist within the locality. Despite this, suitable heathland and dune vegetation does not exist on site and the species is considered **unlikely** to occur.	This species was not recorded on-site and no preferred habitat exists. The species is therefore unlikely to be affected by the proposed activities, and an AoS for this species is not considered necessary.
Pteropus poliocephalus Grey-headed Flying-fox	V	V	This species forages over a large area for nectar/fruits. Seasonally roosts in communal base camps situated within wet sclerophyll forests or rainforests. Frequently observed to forage in flowering Eucalypts. May occur anywhere within the	This species was **recorded** on-site during current and previous surveys.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.** An AoS (EPBC

Species/Community	TSC Act	EPBC Act	Habitat Description	Likelihood of Occurrence	Potential Impact
			Hunter Region where food or roosting resources are available.		Act) has also been prepared in **Appendix 2**.
Scoteanax rueppellii Greater Broad-nosed Bat	V	-	Forages in moister gullies and wet sclerophyll forests as well as in lightly wooded areas and open spaces/ecotones. This species roosts in tree hollows and is relatively widespread within the Lower Hunter Region.	The species was not positively identified on the site during surveys, however Atlas records exist within close proximity to the site and potential habitat is available. The species is therefore **likely** to occur.	This species has the potential to be impacted upon as a result of the proposal. A 7-part Test of significance (TSC Act) has been applied to this species in **Appendix 1.**
Vegetation Communities					
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (TSC Act) Subtropical and Temperate Coastal Saltmarsh (EPBC Act)	E	V	Coastal Saltmarsh occurs in 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*, *Juncus krausii* subsp. *australiensis* (Sea Rush), *Sarcocornia quinqueflora* subsp. *quinqueflora* (Samphire), *Sporobolus virginicus* (Marine Couch), *Triglochin striata* (Streaked Arrowgrass), *Ficinia nodosa* (Knobby Club-rush), *Samolus repens* (Creeping Brookweed), *Selliera radicans* (Swamp Weed), *Suaeda* australis (Seablite) and *Zoysia macrantha* (Prickly Couch). Occasionally mangroves are scattered through the saltmarsh. Tall reeds may also occur, as well as salt pans.	Floristic surveys used to determine the composition of vegetation communities on the site determined that this community does not occur.	Due to it not occurring on-site, it is considered that this vegetation community is **unlikely** to be impacted on by the proposal. No further assessment is required.
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally occur below 20 m elevation on level areas. They are dominated by herbaceous plants and have very few woody species. The structure and composition of the community varies both spatially and temporally depending on the water regime.	Floristic surveys used to determine the composition of vegetation communities on the site determined that this community does not occur.	Due to it not occurring on-site, it is considered that this vegetation community is **unlikely** to be impacted on by the proposal. No further assessment is required.
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	E	-	Hunter Lowland Redgum Forest is an open forest where the most common canopy tree species are *Eucalyptus tereticornis* (Forest Red Gum) and *E. punctata* (Grey Gum). Other frequently occurring canopy species are *Angophora floribunda* (Rough-barked Apple), *E. crebra* (Narrow-leaved Ironbark), *E. moluccana* (Grey Box) and *Corymbia maculata* (Spotted Gum). The shrub layer is open and common shrub species include *Breynia oblongifolia* (Coffee Bush), *Leucopogon juniperinus* (Prickly Beard-heath), *Daviesia ulicifolia* (Gorse Bitter Pea) and *Jacksonia scoparia* (Dogwood). The ground cover typically comprises grasses and herbs with common species being *Microlaena stipoides* var. *stipoides* (Forest Weeping Grass), *Pratia purpurascens* (Whiteroot), *Lomandra multiflora* (Many-flowered Mat-rush), *Cymbopogon refractus* (Barbed Wire Grass), *Cheilanthes sieberi* (Poison Rock Fern) and *Dichondra repens* (Kidney Weed).	Floristic surveys used to determine the composition of vegetation communities on the site determined that this community does not occur.	Due to it not occurring on-site, it is considered that this vegetation community is **unlikely** to be impacted on by the proposal. No further assessment is required.
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (EPBC Act) Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (TSC Act)	E	CE	Littoral Rainforest is generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean. The plant species of this community are predominantly rainforest species. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as *Angophora costata*, *Banksia integrifolia*, *Eucalyptus botryoides* and *Eucalyptus tereticornis* occur in many stands. There is considerable floristic variation between stands and in particular areas, localised variants may be recognised.	Floristic surveys used to determine the composition of vegetation communities on the site determined that this community does not occur.	Due to it not occurring on-site, it is considered that this vegetation community is **unlikely** to be impacted on by the proposal. No further assessment is required.
Lowland Rainforest of Subtropical Australia	E	CE	This community occurs on basalt and alluvial soils, including sand and old elevated alluvial soils. Generally occurs <300 m above sea level. This community typically occurs in areas with	Floristic surveys used to determine the composition of vegetation communities on the site determined that this community does not occur.	Due to it not occurring on site, it is considered that this vegetation community is **unlikely** to be impacted on by the proposal. No further assessment is required.

Species/Community	TSC Act	EPBC Act	Habitat Description	Likelihood of Occurrence	Potential Impact
			high annual rainfall (>1300 mm). This community is generally a tall closed forest with a relatively low abundance of species from the genera *Eucalyptus*, *Melaleuca* and *Casuarina*. Has an incredibly diverse tree flora composition and the canopy varies between stands. Has high species richness.		
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	As the name suggests, this EEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (forest red gum), *E. amplifolia* (cabbage gum), *Angophora floribunda* (rough-barked apple) and *A. subvelutina* (broad-leaved apple). *Eucalyptus baueriana* (blue box), *E. botryoides* (bangalay).	Floristic surveys used to determine the composition of vegetation communities on the site determined that this community does not occur.	Due to it not occurring on-site, it is considered that this vegetation community is **unlikely** to be impacted on by the proposal. No further assessment is required.
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species. Other trees including *Acmena smithii* (lilly pilly), *Glochidion spp. (*cheese trees) and *Melaleuca spp.* (paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and *Melaleuca ericifolia* is the only abundant tree in this community south of Bermagui.	Floristic surveys used to determine the composition of vegetation communities on the site determined that this community does not occur.	Due to it not occurring on-site, it is considered that this vegetation community is **unlikely** to be impacted on by the proposal. No further assessment is required.
Swamp Sclerophyll Forest on coastal floodplains of the NSW north coast, Sydney Basin bioregion and South East Corner bioregions	E	-	This community occurs on humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Occurs below 20 m elevation (sometimes up to 50 m). Generally an open forest, but may consist of a reduced canopy in parts. The community is primarily determined by the frequency and duration of waterlogging and the texture, salinity nutrient and moisture content of the soil. Composition varies with latitude.	Floristic surveys used to determine the composition of vegetation communities on-site delineated this EEC as **occurring** on-site.	As this community occurs on-site, it has the potential to be impacted upon as a result of the proposal. Therefore, a 7-part Test of significance (TSC Act) has been applied to this community in **Appendix 1**.

Notes:

V = Vulnerable CE = Critically Endangered
E = Endangered M = Migratory species
E2 = Endangered Population

Section 5A of the EP&A Act lists seven factors that must be taken into account in the determination of the significance of potential impacts on 'threatened species, populations or ecological communities (or their habitats)' listed under the TSC Act. The Assessment of Significance (7-part Test) is used to determine whether there is likely to be a significant impact on threatened species, populations, ecological communities or their habitats and, thus, whether a Species Impact Statement (SIS) is required. **Section 4.2** identified the following species as requiring assessment via 7-part Tests under the TSC Act.

Table 6 TSC Act listed species to be assessed.

TSC Act Listed Species	
Critically Endangered Species	
Regent Honeyeater	
Endangered Species	
Bush Stone-curlew	Swift Parrot
Vulnerable Species	
Little Lorikeet	Eastern Bentwing Bat
Glossy-black Cockatoo	Little Bentwing Bat
Varied Sittella	Southern Myotis
Turquoise Parrot	Large-eared Pied Bat
Powerful Owl	Eastern False Pipistrelle
Masked Owl	East Coast Free-tailed Bat
Scarlet Robin	Greater Broad-nosed Bat
Grey-headed Flying-fox	Spotted-tailed Quoll
Squirrel Glider	Koala
Threatened Ecological Communities	
Swamp Sclerophyll Forest on coastal floodplains of the NSW north coast, Sydney Basin bioregion and South East Corner bioregions	

The application of the 7-part Test to each species concluded that there is not likely to be a significant effect on threatened species, populations or ecological communities, or their habitats arising from the proposed activities. For further details with regards to the detailed application of the 7-part Test refer to **Appendix 1**.

5.0 EPBC Act Assessment of Significance

Matters of National Environmental Significance (MNES) are identified by the Protected Matters Report generated by the Protected Matters Search (**Appendix 5**). The following MNES are considered in this assessment.

5.1.1 World Heritage Properties:

The site is not a World Heritage area, and is not in close proximity to any such area.

5.1.2 National Heritage Places:

The site is not a National Heritage area, and is not in close proximity to any such area.

5.1.3 Wetlands of International Significance (declared Ramsar wetlands):

The site does not include or is not of any influence to any listed Wetlands of International Significance.

5.1.4 Great Barrier Reef Marine Parks:

The site is not part of or within close proximity to any Great Barrier Reef Marine Park.

5.1.5 Commonwealth Marine Areas:

The site does not include or is not of any influence to any Commonwealth Marine Area.

5.1.6 Threatened Ecological Communities;

No vegetation communities identified on the site are listed as Threatened Ecological Communities under the EPBC Act

5.1.7 Threatened Species

The Likelihood of Occurrence Assessment (**Table 6**) determined that six species listed under the EPBC Act have potential to be impacted upon as part of the proposal. The species are as follows:

Endangered Species

- Regent Honeyeater;
- Swift Parrot; and
- Spotted-tailed Quoll.

Vulnerable Species

- Large-eared Pied Bat;
- Koala; and
- Grey-headed Flying-fox.

Under the EPBC Act, an action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a population of a species;
- Reduce the area of occupancy of a population;
- Fragment an existing important population into two or more populations;

- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere substantially with the recovery of the species.

Similarly, for a significant impact to occur upon a vulnerable species, there must be a real chance or possibility that the action will:

- Lead to a long-term decrease in the size of an important population of a species;
- Reduce the area of occupancy of an important population;
- Fragment an existing important population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of an important population;
- Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere substantially with the recovery of the species.

The proposal is expected to have some impacts on the above listed species. However, the level of impact is unlikely to be significant on these MNES based on the prescribed criteria above when considering the degree of impact, the surrounding available habitats and vegetation being retained on site. For further details with regards to the detailed EPBC Act Assessment of Significance refer to **Appendix 2**.

5.1.8 Migratory Species

A total of 66 migratory species nationally listed under the EPBC Act have been recorded or have potential habitat within a 10 kilometres radius of the site (see **Appendix 5**). Migratory species identified on the site during current and previous surveys include:

- White-throated Needletail
- Rufous Fantail; and
- Cattle Egret.

Under the EPBC Act, an action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or

- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

The proposed activity is expected to have some minor impacts on available habitat of the above listed migratory species. However, the level of impact is unlikely to be significant on these species based on the surrounding available habitats and vegetation being retained on the site. As a result, no further assessment of migratory species is required.

6.0 Impact Mitigation and Recommendations

The following recommendations are provided to mitigate potential impacts of the proposed development on all biodiversity values on the site, with a focus on any species, population or ecological community listed under the TSC Act and/or EPBC Act.

Port Stephens CKPoM (2002)

Specific mitigation actions are included within the CKPoM that aim to minimise the impacts of development upon the local Koala population. Those that directly apply to the proposal are provided below:

- Minimise the removal of vegetation within areas of 'Preferred Koala Habitat' on site (i.e. the Forest Red Gum/Red Mahogany community), particularly the removal of any *Eucalyptus tereticornis* (Forest Red Gum) 'Preferred Koala Feed Trees';
- Make provision for the retention of habitat within areas surrounding the 'Preferred Koala Habitat' on site to act as a 'Habitat Buffer';
- Maximise retention of trees between the areas of 'Preferred Koala Habitat' within the proposed subdivision and those in conservation lands to the north. This will provide a 'Habitat Linking Area' that facilitates safe movement of Koalas through the site;
- Installation of Koala-friendly fencing in areas likely to be utilised by Koalas;
- Restrictions upon dog ownership should be applied for those residents that occupy lots within close proximity to 'Preferred Koala Habitat' and associated buffers and linking areas, and designation of 'no-go zones' for dogs in these areas;
- Education of residents should be conducted through information brochures and signage regarding responsible pet ownership and the potential impacts of unregulated pets upon the local wildlife, particularly dogs and their potential conflicts with Koalas;
- Erection of appropriate signage such as 'Koala Warning' and 'Injured Native Wildlife' signs with an associated reduction in speed limits at identified black spots such as areas surrounding 'Preferred Koala Habitat' and associated buffers and linking areas; and
- The enhancement of Preferred Koala Habitat within the site can be achieved through supplementary planting of Koala feed trees within suitable habitat, particularly *Eucalyptus tereticornis* and *Eucalyptus robusta* (Swamp Mahogany) within the Riparian Melaleuca Swamp Woodland.

Forest Owl Impact Mitigation

Mitigation actions developed to ensure the proposal does not have an impact upon any resident Forest Owls include:

- The clearance of any potential owl nest/roost tree and associated 50m buffer is to be prohibited between April and August to avoid any potential breeding / fledgling period;
- Potential nest/roost trees are to be subject to stagwatching and/or cavity inspection by a qualified ecologist no earlier than 5 days prior to felling;
- If owl occupation of tree(s) is confirmed, the tree is to be cordoned off from surrounding clearing works. Clearing can occur around the tree, which will remove all surrounding vegetation and elicit the owl to evacuate the area of its own accord; and
- Any felling of potential nest/roost trees is to be supervised by a qualified ecologist.

General Mitigation Strategies

Actions to mitigate direct and indirect ecological impacts on the site include:

- Clearance of native vegetation should be minimised as far as is practicable;
- Installation of nest boxes should be conducted within conservation lands at a ratio of 1 box per hollow-bearing tree in accordance with Port Stephens Council's Draft *Technical Specification Nest Boxes* guidelines (2014) to minimise the impacts of the development upon hollow-dependent fauna;
- Attempts should be made to relocate hollow logs and felled trees containing hollows into adjacent habitats to provide further habitat resources for native fauna;
- Appropriate landscaping within the development footprint should be done with native endemic species to enhance the retained vegetation, habitat corridors, and to provide seasonal foraging resources for local and migratory faunal species.
- The creation of water sensitive urban design infrastructure, such as the proposed detention basin, to minimise downstream impacts upon the Riparian Melaleuca Swamp Woodland GDE;
- Weed management procedures are to be implemented to prevent the spread of weeds both on and off–site. Ongoing weed monitoring to be implemented and potential weed infestations appropriately managed to minimise the spread of weeds on the site. Management of noxious weeds are to be undertaken in accordance with the *Noxious Weeds Act* 1993;
- Plant and machinery will be cleaned of any foreign soil and propagative material prior to being transported to the site to prevent the spread of weeds and importation of *Phytophthora*;
- The development footprint will be appropriately demarcated to ensure machinery is limited to the designated disturbance area. Machinery will not be stored in areas of adjacent habitat. Demarcation will also ensure that all adjacent canopy trees are appropriately protected throughout construction works;
- Any clearing should be supervised by a qualified ecologist to ensure previously identified habitat trees are 'soft-felled'. Felled trees must be left for a short period of time on the ground to give any fauna trapped in the trees an opportunity to escape before further processing of the trees. The ecologist is to handle any injured or displaced fauna and relocate displaced fauna were necessary;
- Site inductions during construction are to include a briefing regarding the local fauna of the site and identification of protocols to be undertaken if fauna are encountered.

7.0 Conclusion

RPS Australia East Pty Ltd (RPS) was engaged by The McCloy Group to provide a Flora and Fauna Assessment for the proposed subdivision of lands at Lots 93-96 Boundary Road, Medowie (hereafter referred to as the 'site'). The proposal involves the subdivision of lands earmarked as the North Medowie Residential Area (NMRA) under Port Stephens DCP (2013) and correspondingly zoned under the Port Stephens LEP (2013) as R5 – Large Lot Residential. The proposal also seeks to include a small area (<1 hectare) of land zoned as E2 – Environmental Conservation that occurs within the R5 lands as part of the subdivision (the 'study area').

This assessment aims to examine the likelihood of the proposal to have a significant impact on any threatened species, populations or ecological communities listed within the *Threatened Species Conservation Act 1995* (TSC Act). The report recognises the relevant requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as amended by the *Environmental Planning and Assessment Amendment Act 1997* (EP&AA Act). Assessment is also made with regard to those threatened entities listed federally under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Vegetation ground-truthing identified that the following vegetation communities will potentially impacted upon by the proposal:

- Coastal Plains Smooth-barked Apple Woodland (MU30) – 22.8 hectares
- Riparian Melaleuca Swamp Woodland (EEC) (MU42) – 3.47 hectares
- Forest Red Gum/Red Mahogany Open Forest – 1.73 hectares; and
- Derived Grassland with Scattered Canopy Trees – 20.47 hectares.

The Riparian Melaleuca Swamp Woodland corresponds to the Swamp Sclerophyll Forest Endangered Ecological Community (EEC) listed under the TSC Act.

No threatened flora species have been identified on the site, and no species were considered to require further assessment under the Assessments of Significance for the TSC Act or EPBC Act.

Site surveys, habitat assessments and database searches determined that 21 species of fauna listed as threatened under the TSC Act and/or EPBC Act were considered to be potentially impacted upon by the proposal and subsequently required further assessment. Site surveys determined that the study area provided a small area of Preferred Koala Habitat and associated Supplementary Koala Habitat under the CKPoM (PSC 2002), and also provided potential breeding habitat for the Powerful Owl and Masked Owl which are known to occur on the site and surrounds. Several species of microbat and woodland birds listed as threatened under the TSC Act and migratory species listed under the EPBC Act including the Rufus Fantail and White-throated Needletail were also observed on the site.

Despite the availability of habitat for identified and potentially occurring threatened species, particularly the Koala, Powerful Owl and Masked Owl, impact assessments concluded that the retention of similar habitat within the conservation lands of the site, and the availability of large areas of vegetation surrounding the site, will reduce the potential for impacts upon local populations of these species. Taking into account these considerations, and provided the recommendations presented in this report are adhered to, the potential impact of the proposal upon the habitat of identified and potentially occurring threatened fauna or ecological communities listed under the TSC Act and/or EPBC Act is considered unlikely to significantly impact upon these species

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Appendix 1

TSC Act 7-part Test

TSC Act Assessment of Significance (7-Part Test)

Section 5A of the EP&A Act lists seven factors that must be taken into account in the determination of the significance of potential impacts on 'threatened species, populations or ecological communities (or their habitats)' listed under the TSC Act. The Assessment of Significance (7-part Test) is used to determine whether there is likely to be a significant impact on threatened species, populations, ecological communities or their habitats and, thus, whether a Species Impact Statement (SIS) is required. **Section 4.2** identified the following species as requiring assessment via 7-part Tests under the TSC Act.

TSC Act Listed Species	
Critically Endangered Species	
Regent Honeyeater	
Endangered Species	
Bush Stone-curlew	Swift Parrot
Vulnerable Species	
Little Lorikeet	Eastern Bentwing Bat
Glossy-black Cockatoo	Little Bentwing Bat
Varied Sittella	Southern Myotis
Turquoise Parrot	Large-eared Pied Bat
Powerful Owl	Eastern False Pipistrelle
Masked Owl	East Coast Free-tailed Bat
Scarlet Robin	Greater Broad-nosed Bat
Grey-headed Flying-fox	Spotted-tailed Quoll
Squirrel Glider	Koala
Threatened Ecological Communities	
Swamp Sclerophyll Forest on coastal floodplains of the NSW north coast, Sydney Basin bioregion and South East Corner bioregions	

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Threatened Fauna

Woodland/Forest Birds

- Regent Honeyeater

The site is considered to only represent potential winter foraging habitat for this highly migratory and rare species, with winter flowering eucalypts and mistletoe the most likely targets. Within the region, the main eucalypt targeted by this species is *Eucalyptus robusta* (Swamp Mahogany), which was not identified within the study area and only occurs sporadically within the conservation lands (Umwelt 2009). In addition, the low-moderate density of mistletoe on the site is unlikely to provide substantial resources for the species, suggesting that the Regent Honeyeater would only utilise the site infrequently. Given the low potential for the species to occur and the lack of substantial foraging resources within the site, the proposal is considered unlikely to effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Swift Parrot

As is the case for the Regent Honeyeater, the site only represents potential winter foraging habitat for this migratory species, with winter flowering eucalypts and mistletoe the most likely targets. As a result, the only winter flowering eucalypt species available for the species on site is *E. robusta*, which was not identified within the study area and only occurs sporadically within the conservation lands (Umwelt 2009). In addition, the low-moderate density of mistletoe on the site is unlikely to provide substantial resources for the species, suggesting that the Swift Parrot would only utilise the site infrequently. Given the low potential for the species to occur and the lack of substantial foraging resources within the site, the proposal is considered unlikely to effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Bush Stone-curlew

The 'Derived Grasslands and Scattered Trees' community and the more open areas of Smooth-barked Apple Woodland and Forest Red Gum/Red Mahogany Open Forest on the site provide potential habitat for this species. As a result, approximately 45.0 hectares of potential habitat will be impacted upon as a result of the proposal. The entire study area and immediate surrounds is also likely to become unfavourable for the species post-development given the species' tendency to avoid urbanised areas. However, given the local population of the species occurs in a more easterly distribution around Karuah and Swan Bay, and with the availability of similar open woodland habitat in the region, the proposal is considered unlikely to effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Little Lorikeet

This species was identified flying over the site during the current survey and potential foraging and nesting habitat occurs within the vegetated areas of the site. As a result, approximately 48.47 hectares of potential habitat for the species is likely to be impacted upon by the proposal. However, given the retention of approximately 68.21 hectares of potential habitat within the conservation lands on site, and considering that large areas of contiguous habitat surround the site, it is unlikely that the proposal will affect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Glossy-black Cockatoo

Evidence of this species occurring within the study area was detected within the 'Derived Grasslands and Scattered Canopy Trees' community during previous surveys (Umwelt 2009). Chewed *Allocasuarina* cones were identified, and both *Allocasuarina torulosa* and *A. littoralis* have been recorded on the site, with both occuring at moderate densities within the Smooth-barked Apple Woodland and Riparian Melaleuca Swamp Woodland of the site. As a result, approximately 48.47 hectares of known foraging habitatfor the Glossy Black Cockatoo may be impacted upon as a result of the proposal. However, approximately 67.19 hectares of known foraging habitat occurs within the conservation lands on site that will be protected in perpetuity as a result of the proposal. Furthermore, the surrounding vegetation that includes Medowie SCA contains larger areas of suitable foraging habitat for this species. Thus, it is unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Varied Sittella

This species has been identified on the site during previous surveys, and potential woodland habitat occurs the site. As a result, approximately 48.47 hectares of potential habitat for the species is likely to be impacted upon by the proposal. However, given the retention of approximately 68.21 hectares of potential habitat within the conservation lands on site, and considering that large areas of contiguous habitat surround the site, it is unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Turqouise Parrot

Despite not being recorded within the site during current or previous surveys, the species may occur intermittently on the site given the wide distribution and availability of potential habitat. Given the species has

a preference for woodland edges and farmland, approximately 20.47 hectares of potential habitat is considered to occur within the study area in the 'Derived Grasslands with Scattered Trees' community; which is likely to be impacted upon as a result of the proposal. However, given the wide distribution of the species and availability of large areas of farmland and open woodland habitat within the region, the proposal is considered unlikely to effect the life cycle of thesspecies such that a viable local population is likely to be placed at risk of extinction.

- Scarlet Robin

Despite not being recorded within the site during current or previous surveys, the species may occur intermittently on the site given the species does occur in the area and potential habitat is available. The vegetated areas of the site represent potential habitat for the species, therefore approximately 48.47 hectares of potential habitat is likely to be impacted upon as a result of the proposal. However, given the retention of approximately 68.21 hectares of potential habitat within the conservation lands on site, and considering that large areas of contiguous habitat surround the site, it is unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

Forest Owls

- Powerful Owl

A female Powerful Owl was observed within the Smooth-barked Apple Woodland of the study area, and a male was heard calling from forested areas to the north of the site within Medowie SCA. Favoured prey items of the species including possums and gliders are also known to inhabit the study area. Potential breeding habitat was also observed, with a large hollow-bearing tree potentially utilised by the species as a roost and nesting tree discovered with an owl regurgitation pellet that included the remains of a Common Ringtail Possum (*Pseudocheirus peregrinus*) underneath. Given the species will utilise open habitats for foraging but prefers closed forests for roosting and breeding, approximately 48.47 hectares of potential foraging habitat and 26.27 hectares of potential roosting habitat occurs within the study area and are likely to be impacted upon by the proposal. However, 68.21 hectares of foraging and 67.19 hectares of potential breeding habitat will be conserved in the site as part of the proposal, and vast tracts of contiguous habitats exist for the species in surrounding lands that include the Medowie SCA. Given the widespread distribution of the species within the region, and provided that the mitigation measures detailed in this report are adhered to, it is unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Masked Owl

This species and a 'Probable' roost/nest tree were recorded within the far northeastern part of the site (Umwelt 2009) that will be conserved as part of the proposal, and the species may be responsible for the regurgitation pellet that was discovered within the study area. Regardless, the study area does provide potential foraging and roosting habitat for the species, with approximately 48.47 hectares of potential foraging habitat and 26.27 hectares of potential roosting habitat occurring within the study area that is likely to be impacted upon by the proposal. However, 68.21 hectares of foraging and 67.19 hectares of potential breeding habitat will be conserved in the site as part of the proposal, and vast tracts of contiguous habitats exist for the species in surrounding lands that include the Medowie SCA. Given the widespread distribution of the species within the region, and provided that the mitigation measures detailed in this report are adhered to, it is unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

Mammals

- Squirrel Glider (*Petaurus norfolcensis*)

The Squirrel Glider has been recorded by Umwelt (2009) in woodland adjacent to the powerline easement in

the east of the site (Umwelt 2009) that will be conserved as a result of the proposal. The species is known to utilise both closed and open forests and will traverse through scattered trees and open parklands to access adjoining vegetation. As a result, approximately 48.47 hectares of potential habitat for the species will be impacted upon by the proposal. However, 68.21 hectares of potential habitat will be conserved in the site as part of the proposal, and vast tracts of contiguous habitats exist for the species in surrounding lands that include the Medowie SCA. Given the widespread distribution of the species within the region, it is unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Grey-headed Flying-fox (*Pteropus poliocephalus*)

Grey-headed Flying-foxes were observed in high numbers (over 100 individuals) flying over the site, and the site represents intermittent foraging habitat for the species depending upon flowering periods of favoured flora species. Approximately 48.47 hectares of potential habitat for the species will be impacted upon by the proposal. However, 68.21 hectares of potential habitat will be conserved in the site as part of the proposal, and vast tracts of contiguous habitats exist for the species in surrounding lands that include the Medowie SCA. Given the widespread distribution of the species within the region, it is unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Koala (Phascolarctos cinereus)

Section 3.4.2 details the results of Koala habitat assessments conducted within the study area that concluded approximately 2.53 hectares of 'Preferred Koala Habitat' occurs therein, including 1.73 hectares within the proposed development lands and 0.80 hectares to be conserved within the E2 lands in the centre of the study area. Despite the conservation of habitat within this area, it is considered that the development of surrounding areas will indirectly impact upon the viability of this habitat as Koala habitat, and subsequently it is determined that the entire 2.53 hectares of preferred habitat for the Koala that occurs within the study area may be impacted upon as a result of the proposal. In addition, the surrounding forested areas of the study area that include the Smooth-barked Apple Woodland, fringes of Riparian Melaleuca Swamp Woodland and other scattered trees include species listed under Appendix 8 of the CKPoM as potentially important to the local Koala population, and SATs conducted in this area identified Koala scats, confirming the area provides supplementary habitat for the species. The proposal will therefore impact upon 2.53 hectares of preferred habitat and 46.74 hectares of supplementary/secondary habitat for the Koala.

Koala habitat mapping by both PSC (2006) and the AKF include a large area of 'Preferred Koala Habitat' within the core areas of Riparian Melaleuca Swamp Woodland within the conservation lands of the site, and opportunistic records of *Eucalyptus tereticornis* were collected in this area during the recent survey. This area totals approximately 7.1 hectares, with the remaining 60.09 hectares of forested habitat within the conservation lands considered to provide supplementary/secondary habitat for the Koala that will be conserved in perpetuity as a result of the proposal.

The 'Preferred Koala Habitat' found within the study area occurs as an outlier from other areas of similar quality habitat, with the closest areas of preferred habitat existing outside the site occurring approximately 500 metres to the east (see PSC 2006). An analysis of regional records also shows that the majority of Koala records for the region occupy a narrow band (~5 kilometres wide) running east from Tomago and Raymond Terrace to Nelson Bay and Lemon Tree Passage, incorporating conservation lands that include Tomaree National Park, Tilligerry Nature Reserve, Tilligerry SCA and Worimi National Park (NSW Wildlife Atlas data 2015). The site is considered to occupy the far northern extent of this clump of records, with the link between the site and the band of records to the south now compromised by the urban development of Medowie. Records are also scant within areas east of the site within the Medowie SCA and beyond, suggesting the habitat of the area that includes the site is only utilised intermittently by the Koala, which is supported by the low density of scats collected on the site, the majority of which were considered several seasons old. Considering the location and relatively small numbers of records for the Koala in areas on and around the site, the small area of habitat that will be indirectly impacted upon, the retention of suitable habitat within

conservation lands and the wide distribution of the species in the region, it is considered unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Spotted-tailed Quoll

The more densely forested areas of the site provide potential habitat for this secretive species, suggesting that up to 26.27 hectares of potential habitat for this species will be impacted upon by this proposal, although much of this habitat is likely to be unsuitable given its close proximity to human habitation. Similarly, approximately 67.19 hectares of potential habitat will be retained as conservation lands as a result of the proposal, however areas within close proximity of the development will become unfavourable when the development commences. However, given the availability of vast areas of contiguous habitat in areas surrounding the site that are more favourable to the species, it is considered unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Eastern Pygmy Possum

The forested areas of the site provide potential habitat for this species, with up to 26.27 hectares of potential habitat for this species to be impacted upon by this proposal. Approximately 67.19 hectares of potential habitat will be retained as conservation lands as a result of the proposal. Given the availability of vast areas of contiguous habitat in areas surrounding the site and retention of favourable habitat on site, it is considered unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

Cave-roosting bats

- Little Bentwing Bat
- Eastern Bentwing Bat

These insectivorous bats commonly inhabit wet and dry sclerophyll forests as well as rainforests, and both require caves or similar structures with specific characteristics for roosting purposes and have been known to occupy communal roosts comprising both species. Both species have been recorded on site, however no caves exist. There is limited potential however for the artificial structures that include the houses in the south of the study area to be utilised by these species for roosting, and the Little Bentwing Bat can also utilise tree hollows for roosting. Given these species can utilise open areas close to houses for foraging, the entire study area is considered to provide potential foraging habitat for these species, with approximately 57.12 hectares potentially impacted upon by the proposal, although some areas are likely to remain as potential foraging habitat for these species. Roosting habitat for the Little Bentwing Bat that is likely to be impacted by the proposal totals approximately 48.47 hectares. However, with the retention of 67.19 hectares of foraging habitat and potential roosting habitat for the Little Bentwing Bat being conserved as part of the proposal, and with vast areas of potential habitat surrounding the site, it is considered unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

- Large-eared Pied Bat

This species has been recorded on the site and potential foraging habitat exists for the species, however no roosting habitat was discovered. Approximately 48.47 hectares of potential foraging habitat will subsequently be impacted upon by the proposal, however approximately 68.21 hectares of potential habitat will be conserved on the site. With the availability of large amounts of habitat in surrounding lands it is considered unlikely that the proposal will effect the life cycle of this species of hollow-roosting bat such that a viable local population of the species is likely to be placed at risk of extinction.

- Southern Myotis

This species was not detected on the site during recent or previous surveys, however approximately 0.68 hectares of permanent foraging habitat around established watercourses and a small amount of ephemeral habitat along temporary ponds and streams is likely to be impacted upon as a result of the proposal. However, this habitat is considered sub-optimal given the lack of available roosting habitat nearby and large amounts of similar habitat will be retained on site within conservation lands and outside the site within the Medowie SCA and beyond. It is therefore considered unlikely that the proposal will effect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

Hollow-roosting Bats

- Eastern False Pipistrelle

This species was not recorded on site during current or previous surveys, however approximately 48.47 hectares of potential foraging and roosting habitat may be impacted upon as a result of the proposal. However, approximately 68.21 hectares of potential habitat will be conserved on the site, and with the availability of large amounts of habitat in surrounding lands it is considered unlikely that the proposal will effect the life cycle of this species of hollow-roosting bat such that a viable local population of the species is likely to be placed at risk of extinction.

- East Coast Free-tailed Bat

This species has been recorded on the site, and approximately 57.12 hectares of foraging and 48.47 hectares of roosting habitat potentially impacted upon by the proposal. However, approximately 68.21 hectares of potential habitat will be conserved on the site, and with the availability of large amounts of habitat in surrounding lands it is considered unlikely that the proposal will effect the life cycle of this species of hollow-roosting bat such that a viable local population of the species is likely to be placed at risk of extinction.

- Greater Broad-nosed Bat

The species was not discovered on site during recent or previous surveys, however a local population does exist and potential foraging and roosting habitat occurs on the site. Approximately 56.44 hectares of habitat may be impacted upon by the proposal, however 70.60 hectares of habitat will be conserved as part of the proposal and with vast amounts of potential habitat remaining in areas surrounding the site, it is considered unlikely that the proposal will affect the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No endangered populations were considered to be of risk of extinction as a result of the proposal.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) **is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

(ii) **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

The Riparian Melaleuca Swamp Woodland (MU 42) on site has been determined to be commensurate with 'Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions' which is listed as Endangered under the TSC Act. Approximately 3.47 hectares of this community is likely to be directly impacted upon as a result of the

proposal, with an additional 31.67 hectares potentially impacted upon indirectly as a result of an alteration to flow regimes and water quality entering the community from development areas nearby and the creation of edge effects such as weed invasion and rubbish dumping.

According to regional mapping, approximately 1,262.12 hectares of Riparian Melaleuca Swamp Woodland occurs within the locality of the site (NPWS 2002), and an additional 729.61 hectares of Swamp Mahogany – Paperbark Forest also occurs, totalling approximately 1,991.73 hectares of vegetation commensurate with the Swamp Sclerophyll Forest GDE within the locality, much of which occurs within the conservation lands of the surrounding Medowie SCA. Given the proposal will conserve 31.67 hectares of the community and large areas of the community exists within other conservation reserves in the region, the proposal is not considered likely to have an adverse effect on the extent of adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Please see section (a) and (c) above for all assessed species and ecological communities regarding details of the extent to which habitat is likely to be removed or modified as a result of the proposal.

(ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

Considering the location of the proposal within the site, the likelihood of fragmentation or isolation of areas of habitat is minimised. A small area (~3.5 hectares) of R5 zoned lands to the immediate southwest of the site is likely to be partially isolated from areas of vegetation within the Medowie SCA to the northwest however this land can be considered likely to be developed in the future given the current zoning. Within the site, the partial isolation of the E2 zoned lands within the surrounding development footprint is likely to occur as a result of the proposal, however this may be mitigated by appropriate retention of habitat between these lands and the nearby conservation lands that are to be conserved under the proposal.

(iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Fauna

Woodland/Forest Birds

- Regent Honeyeater

The habitat on site provides only intermittent foraging habitat for this species that is not considered of any importance to the long-term survival of the species.

- Swift Parrot

The habitat on site provides only intermittent foraging habitat for this species that is not considered of any importance to the long-term survival of the species.

- Bush Stone-curlew

The sub-optimal habitat that occurs within close proximity to human habitation is not considered of any importance to the long-term survival of this species.

- Little Lorikeets

The site provides potential foraging habitat for this species but given its widespread distribution and availability of large areas of habitat in surrounding areas the habitat to be impacted is not considered of any importance to the long-term survival of this species.

- Glossy-black Cockatoo

Despite the moderate density of feed trees for this species, the widespread distribution and availability of large areas of habitat in surrounding areas suggests that the habitat to be impacted is not considered of any importance to the long-term survival of this species.

- Varied Sittella

The site provides potential foraging habitat for this species but given its widespread distribution and availability of large areas of habitat in surrounding areas the habitat to be impacted is not considered of any importance to the long-term survival of this species.

- Turqouise Parrot

The site provides potential foraging habitat for this species but given its widespread distribution and availability of large areas of habitat in surrounding areas the habitat to be impacted is not considered of any importance to the long-term survival of this species.

- Scarlet Robin

The site provides potential foraging habitat for this species but given its widespread distribution and availability of large areas of habitat in surrounding areas the habitat to be impacted is not considered of any importance to the long-term survival of this species.

Forest Owls

- Powerful Owl

The foraging habitat to be impacted upon on the site represents a small fraction of potential habitat within the region and is therefore of no real importance to the species. The availability of potential nesting trees within the study area increases the importance of this habitat marginally, and the mitigation measures provided within this report have been developed to mitigate impacts upon any resident owl species potentially utilising the site for breeding purposes. Despite this, more favourable trees are likely to occur in the forested gullys of the surrounding vegetation that includes Medowie SCA, and the habitat within the study area to be impacted upon is unlikely to be of importance to the long-term survival of the species in the locality.

- Masked Owl

The foraging habitat to be impacted upon on the site represents a small fraction of potential habitat within the region and is therefore of no real importance to the species. The availability of potential nesting trees within the study area increases the importance of this habitat marginally, and the mitigation measures provided within this report have been developed to mitigate impacts upon any resident owl species potentially utilising the site for breeding purposes. Despite this, more favourable trees are likely to occur in the forested gullys of the surrounding vegetation that includes Medowie SCA, and the habitat within the study area to be impacted upon is unlikely to be of importance to the long-term survival of the species in the locality.

Mammals

- Squirrel Glider

The site provides potential foraging and roosting habitat for this species but given its widespread distribution and availability of large areas of habitat in surrounding areas the habitat to be impacted is not considered of any importance to the long-term survival of this species.

- Grey-headed Flying-fox

The habitat on site provides only intermittent foraging habitat for this species that is not considered of any importance to the long-term survival of the species.

- Koala

Considering the assessment of Koala habitat on the site and surrounding areas detailed in (a) above, the habitat to be removed or isolated on site is not considered to be significant for the long-term survival of this species in the locality.

- Spotted-tailed Quoll

The sub-optimal habitat that occurs within close proximity to human habitation is not considered of any importance to the long-term survival of this species.

- Eastern Pygmy Possum

The site provides potential foraging and breeding habitat for this species but given its widespread distribution and availability of large areas of habitat in surrounding areas the habitat to be impacted is not considered of any importance to the long-term survival of this species.

Cave-roosting Bats

- Eastern Bentwing Bat
- Little Bentwing Bat
- Large-eared Pied Bat
- Southern Myotis

The foraging habitat to be removed on-site is not considered to be significance for the long-term survival of this species in the locality.

Hollow-roosting Bats

- Eastern Freetail Bat
- Eastern False Pipistrelle
- Greater Broad-nosed Bat

The foraging and roosting habitat to be removed on site is not considered to be significant for the long-term survival of this species in the locality.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

No areas of critical habitat occur within the site.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Fauna

Woodland/Forest Birds

- Regent Honeyeater

The proposal is considered to be consistent with the objectives and actions within the Regent Honeyeater Recovery Plan (NRE 1999).

- Swift Parrot

The proposal is considered to be consistent with the objectives listed within the Swift Parrot Recovery Plan (Saunders and Tzaros 2011).

- Bush Stone-curlew

The proposal is considered to be consistent with the objectives listed within the Bush Stone-curlew Recovery Plan (DEC 2006a).

- Little Lorikeet
- Glossy-black Cockatoo
- Varied Sittella
- Turqouise Parrot
- Scarlet Robin

No recovery or threat abatement plans have been developed for the above species at this stage.

Forest Owls

- Powerful Owl
- Masked Owl

The proposal is considered to be inconsistent with Objective 5 of the Large Forest Owl Recovery Plan (DEC 2006b) that includes these species. The removal of potential habitat for these species including potential roosting/nesting habitat is considered inconsistent with this objective that seeks to: '*Minimise further loss and fragmentation of habitat by protection and more informed management of significant owl habitat (including protection of individual nest sites)*'.

Mammals

- Squirrel Glider

No recovery or threat abatement plans have been developed for the Squirrel Glider at this stage.

- Grey-headed Flying-fox (*Pteropus poliocephalus*)

Given the site is not considered to provide critical habitat for the species or provide important key winter and spring foraging habitat for the species, the proposal is considered to be consistent with the Grey-headed Flying Fox Recovery Plan (DECCW 2009a).

- Koala (*Phascolarctos cinereus*)

Considering the proposal is likely to result in indirect impacts upon 'Preferred Koala Habitat' within the study area, and the site is known to provide habitat for the species, the proposal is likely to be inconsistent with Objective 1 of the Koala Recovery Plan (DEC 2008) that seeks to: '*conserve Koalas in their existing habitat*'.

- Spotted-tailed Quoll

Given the proposal will impact upon potential habitat for the species, albeit suboptimal in quality, it is

subsequently considered to be inconsistent with Objective 3 of the Spotted-tailed Quoll (Long and Nelson 1998) that seeks to: '*Reduce the rate of habitat loss and fragmentation on private land*'.

- Eastern Pygmy Possum

No recovery or threat abatement plans have been developed for the Eastern Pygmy Possum at this stage.

Cave-roosting Bats

- Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*);
- Little Bentwing Bat (*Miniopterus australis*)
- Southern Myotis (*Myotis macropus*.

No recovery or threat abatement plans have been developed for the Eastern Bentwing Bat, Little Bentwing Bat or Southern Myotis at this stage.

- Large-eared Pied Bat

The proposal is considered to be consistent with the objectives detailed within the Large-eared Pied Bat Recovery Plan (DERM 2011).

Hollow-roosting Bats

- Eastern Freetail Bat (*Mormopterus norfolkensis*);
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*); and
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).

No recovery or threat abatement plans have been developed for any of the above listed species at this stage.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key Threatening Processes (KTPs) are listed under Schedule 3 of the TSC Act 1995. There are eight KTPs that have the potential to affect the site as a consequence of the proposal, being:

- Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners *Manorina melanocephala*

The proposal will increase the extent of woodland/grassland edge habitat favourable for the Noisy Miner and is therefore likely to facilitate the increase in impact of this KTP.

- Anthropogenic climate change.

Potential changes to land use as a result of the proposal will result in the removal of vegetation as carbon sinks and an increase in human activity or changes to ground cover and is likely to increase the rate of anthropogenic climatic change, albeit by a very small amount.

- Clearing of native vegetation

Up to 48.47 hectares of native vegetation will be removed as a result of the proposal. The proposal will therefore contribute to this KTP.

- Infection of native plants by *Phytophthora cinnamomi*;

The proposal has the potential to contribute to this KTP due to the regular occurrence of vehicles on the site during construction that could be carrying and spreading the fungus. Appropriate mitigation measures involving vehicles on-site will provide an opportunity to negate the impact of the proposal on this KTP.

- Invasion, establishment and spread of *Lantana camara*

The proposal has potential to contribute to this KTP considering the likely increase in favoured habitat along disturbed edges of the construction footprint and exposure of previously protected habitat, and the presence of this species within previously disturbed areas of the study area. The implementation of an effective weed control program would provide an opportunity to negate the impact of the proposal on this KTP.

- Invasion of native plant communities by exotic perennial grasses

The proposal has potential to contribute to this KTP considering the likely increase in favoured habitat along disturbed edges of the construction footprint and exposure of previously protected habitat, and the presence of exotic grasses within previously disturbed areas of the study area. The implementation of an effective weed control program would provide an opportunity to negate the impact of the proposal on this KTP.

- Loss of hollow-bearing trees

The proposal will require the removal of hollow-bearing trees and will therefore contribute to the impacts of this KTP, however the installation of nest boxes within retained areas will partially mitigate the impacts of this KTP upon resident fauna.

- Removal of dead wood and dead trees

Potential exists for removal of dead standing and fallen timber within the proposed development, however the nature of the large lot developments may allow for many areas that include this habitat feature to be conserved.

Appendix 2

EPBC Act Assessment of Significance

Significant Impact Assessment

Potential impacts on Matters of National Environmental Significance must be considered in accordance with *EPBC Act Policy Statement 1.1 Significant Impact Criteria.* Endangered, Vulnerable and Migratory species are assessed in accordance with significant impact criteria specific to their listing under the EPBC Act.

Endangered Species

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere substantially with the recovery of the species.

Regent Honeyeater

Lead to a long-term decrease in the size of a population of a species

The site is considered to only represent potential winter foraging habitat for this highly migratory and rare species, with winter flowering eucalypts and mistletoe the most likely targets. Within the region, the main eucalypt targeted by this species is *Eucalyptus robusta* (Swamp Mahogany), which was not identified within the study area and only occurs sporadically within the conservation lands (Umwelt 2009). In addition, the low-moderate density of mistletoe on the site is unlikely to provide substantial resources for the species, suggesting that the Regent Honeyeater would only utilise the site infrequently. Given the low potential for the species to occur and the lack of substantial foraging resources within the site, the proposal is considered unlikely to lead to a long-term decrease in the size of a population of this species.

Reduce the area of occupancy of a population

Given the highly mobile and wide-ranging nature of the species, it is unlikely that the proposal will reduce the area of occupancy for a population of Regent Honeyeater.

Fragment an existing population into two or more populations

Given the highly mobile and wide-ranging nature of the species, it is unlikely that the proposal will fragment an existing population of Regent Honeyeater.

Adversely affect habitat critical to the survival of a species

The sub-optimal habitat on the site is not considered critical to the survival of the species.

Disrupt the breeding cycle of a population

The site is not included within known breeding habitat for the Regent Honeyeater, and the sub-optimal habitat on site is not considered important to the breeding cycle of the species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The sub-optimal habitat on the site is not considered important for the species such that its removal or modification will lead to a decline of the species.

Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat

The proposal is not considered likely to result in the establishment of an invasive species within potential Regent Honeyeater habitat that is harmful to the species.

Introduce disease that may cause the species to decline, or

The impacts that may occur upon the habitat within the site are unlikely to result in the introduction of disease that may cause the species to decline.

Interfere substantially with the recovery of the species

The impacts of the proposal upon sub-optimal habitat are not considered likely to substantially interfere with the recovery of the species.

Swift Parrot

Lead to a long-term decrease in the size of a population of a species

As is the case for the Regent Honeyeater, the site only represents potential winter foraging habitat for this migratory species, with winter flowering eucalypts and mistletoe the most likely targets. As a result, the only winter flowering eucalypt species available for the species on site is *E. robusta*, which was not identified within the study area and only occurs sporadically within the conservation lands (Umwelt 2009). In addition, the low-moderate density of mistletoe on the site is unlikely to provide substantial resources for the species, suggesting that the Swift Parrot would only utilise the site infrequently. Given the low potential for the species to occur and the lack of substantial foraging resources within the site, the proposal is considered unlikely to lead to a long-term decrease in the size of a population of this species.

Reduce the area of occupancy of a population

Given the highly mobile and wide-ranging nature of the species, it is unlikely that the proposal will reduce the area of occupancy for a population of Swift Parrot.

Fragment an existing population into two or more populations

Given the highly mobile and wide-ranging nature of the species, it is unlikely that the proposal will fragment an existing population of Swift Parrot.

Adversely affect habitat critical to the survival of a species

The sub-optimal habitat on the site is not considered critical to the survival of the species.

Disrupt the breeding cycle of a population

Given the Swift Parrot is only known to breed within Tasmania, the site is not considered important to the breeding cycle of the species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The sub-optimal habitat on the site is not considered important for the species such that its removal or modification will lead to a decline of the species.

Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat

The proposal is not considered likely to result in the establishment of an invasive species within potential Swift Parrot habitat that is harmful to the species.

Introduce disease that may cause the species to decline, or

The impacts that may occur upon the habitat within the site are unlikely to result in the introduction of disease that may cause the species to decline.

Interfere substantially with the recovery of the species

The impacts of the proposal upon sub-optimal habitat are not considered likely to substantially interfere with the recovery of the species.

Spotted-tailed Quoll

Lead to a long-term decrease in the size of a population of a species

The more densely forested areas of the site provide potential habitat for this secretive species, suggesting that up to 26.27 hectares of potential habitat for this species will be impacted upon by this proposal, although much of this habitat is likely to be unsuitable given its close proximity to human habitation. Similarly, approximately 67.19 hectares of potential habitat will be retained as conservation lands as a result of the proposal, however areas within close proximity of the development will become unfavourable when the development commences. However, given the availability of vast areas of contiguous habitat in areas surrounding the site that are more favourable to the species, it is considered unlikely that the proposal will lead to a long-term decrease in a size of a population of the species.

Reduce the area of occupancy of a population

Although the site has potential to be utilised by this species, the existence of sub-optimal habitat within the study area and conservation of higher quality habitat within the conservation lands and surrounding Medowie SCA has determined that the proposal is unlikely to reduce the area of occupancy of a population of Spotted-tailed Quolls.

Fragment an existing population into two or more populations

The proposal will not fragment habitat for the Spotted-tailed Quoll, and therefore will not fragment an existing population of the species.

Adversely affect habitat critical to the survival of a species

The site is not considered to be of critical habitat to the survival of the species.

Disrupt the breeding cycle of a population

The site is not considered to provide habitat necessary to the breeding cycle of the species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The sub-optimal habitat on the site is not considered important for the species such that its removal or modification will lead to a decline of the species.

Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat

The proposal is not considered likely to result in the establishment of an invasive species within potential habitat that is harmful to the species.

Introduce disease that may cause the species to decline, or

The impacts that may occur upon the habitat within the site are unlikely to result in the introduction of disease that may cause the species to decline.

Interfere substantially with the recovery of the species

The impacts of the proposal upon sub-optimal habitat are not considered likely to substantially interfere with the recovery of the species.

Vulnerable Species

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- Lead to a long-term decrease in the size of an important population of a species;
- Reduce the area of occupancy of an important population;
- Fragment an existing important population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of an important population;
- Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- Introduce disease that may cause the species to decline; or
- Interfere substantially with the recovery of the species.

Koala

Lead to a long-term decrease in the size of an important population of a species

Section 3.4.2 details the results of Koala habitat assessments conducted within the study area that concluded approximately 2.53 hectares of 'Preferred Koala Habitat' occurs therein, including 1.73 hectares within the proposed development lands and 0.80 hectares to be conserved within the E2 lands in the centre of the study area. Despite the conservation of habitat within this area, it is considered that the development of surrounding areas will indirectly impact upon the viability of this habitat as Koala habitat, and subsequently it is determined that the entire 2.53 hectares of preferred habitat for the Koala that occurs within the study area may be impacted upon as a result of the proposal. In addition, the surrounding forested areas of the study area that include the Smooth-barked Apple Woodland, fringes of Riparian Melaleuca Swamp Woodland and other scattered trees include species listed under Appendix 8 of the CKPoM as potentially important to the local Koala population, and SATs conducted in this area identified Koala scats, confirming the area provides supplementary habitat for the species. The proposal will therefore impact upon 2.53 hectares of preferred habitat and 46.74 hectares of supplementary/secondary habitat for the Koala.

Koala habitat mapping by both PSC (2006) and the AKF include a large area of 'Preferred Koala Habitat' within the core areas of Riparian Melaleuca Swamp Woodland within the conservation lands of the site, and opportunistic records of *Eucalyptus tereticornis* were collected in this area during the recent survey. This area totals approximately 7.1 hectares, with the remaining 60.09 hectares of forested habitat within the conservation lands considered to provide supplementary/secondary habitat for the Koala that will be conserved in perpetuity as a result of the proposal.

The 'Preferred Koala Habitat' found within the study area occurs as an outlier from other areas of similar quality habitat, with the closest areas of preferred habitat existing outside the site occurring approximately 500 metres to the east (see PSC 2006). An analysis of regional records also shows that the majority of Koala records for the region occupy a narrow band (~5 kilometres wide) running east from Tomago and Raymond Terrace to Nelson Bay and Lemon Tree Passage, incorporating conservation lands that include Tomaree National Park, Tilligerry Nature Reserve, Tilligerry SCA and Worimi National Park (NSW Wildlife Atlas data 2015). The site is considered to occupy the far northern extent of this clump of records, with the link between the site and the band of records to the south now compromised by the urban development of Medowie.

Records are also scant within areas east of the site within the Medowie SCA and beyond, suggesting the habitat of the area that includes the site is only utilised intermittently by the Koala, which is supported by the low density of scats collected on the site, the majority of which were considered several seasons old. Considering the location and relatively small numbers of records for the Koala in areas on and around the site, the small area of habitat that will be indirectly impacted upon, the retention of suitable habitat within conservation lands and the wide distribution of the species in the region, it is considered unlikely that the proposed action will lead to a long-term decrease in the size of an important population of the species.

Reduce the area of occupancy of an important population

An important population is defined under the MNES Significant impact guidelines 1.1 (DEWHA 2009) as '*a population that is necessary for a species' long term survival and recovery*'. Although the proposal may result in a reduction in the area of occupancy for the Medowie Koala population that constitutes part of the larger Port Stephens population, this population is not considered to be important for the long term survival and recovery of the species, and therefore the proposal is not considered likely to reduce the area of occupancy of an important population of Koalas.

Fragment an existing important population into two or more populations

The Koalas known to utilise the site are not considered to be included within an important population as defined within the MNES significant impact guidelines (DEWHA 2009) and therefore this consideration is not applicable.

Adversely affect habitat critical to the survival of a species

The guidelines define critical habitat as areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- To maintain genetic diversity and long term evolutionary development; or
- For the reintroduction of populations or recovery of the species or ecological community.

Although potential foraging and dispersal habitat occurs within the study area and may be impacted upon by the proposal, the area is not considered necessary for the species and is therefore not considered to be critical habitat as defined by DEWHA (2009).

Disrupt the breeding cycle of an important population

The potential impacts of the proposal upon the identified habitat within the study area are not considered likely to disrupt the breeding cycle of an important population of the Koala.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The vegetation within the study area that is to be directly impacted upon was determined to be of only secondary or supplementary habitat for the Koala, and the site is only considered to be utilised by the species intermittently. Provided the areas of primary habitat within the site are protected to facilitate ongoing Koala utilisation, the proposal is unlikely to impact upon habitat to the extent that the species is likely to decline.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Although not typically referred to as 'invasive species', the proposal is likely to increase the population of domestic animals within the site. Dogs are known to be particularly harmful to Koalas, and therefore adequate protection of the habitat retained within the site will need to be enforced to ensure they do not become established within remaining Koala habitat.

Introduce disease that may cause the species to decline, or

The impacts that may occur upon the habitat within the site are unlikely to result in the introduction of disease that may cause the species to decline.

Interfere substantially with the recovery of the species

The removal of supplementary habitat and potential indirect impacts to a small amount of primary habitat is not considered likely to substantially interfere with the recovery of the species.

Large-eared Pied Bat

Lead to a long-term decrease in the size of an important population of a species

The habitat available for the species on site is limited to approximately 48.47 hectares of foraging habitat, with no roosting habitat detected. Approximately 68.21 hectares of potential habitat will be conserved on the site, and large amounts of habitat are available in lands surrounding the site. The proposal is therefore not likely to lead to a long-term decrease in the size of an important population of the species.

Reduce the area of occupancy of an important population

The site is not considered to be within the area of occupancy for an important population of this species.

Fragment an existing important population into two or more populations

The site is not considered to include an important population of this species.

Adversely affect habitat critical to the survival of a species

Considering the definition of critical habitat under the Significant impact guidlines 1.1 for MNES (DEWHA 2009), the site is not considered to include habitat critical to the survival of this species.

Disrupt the breeding cycle of an important population

The site is not considered to include an important population of this species, and the removal of potential foraging habitat is not considered likely to interrupt the breeding cycle of this species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The habitat available for the species on site is limited to approximately 48.47 hectares of foraging habitat, with no roosting habitat detected. Approximately 68.21 hectares of potential habitat will be conserved on the site, and large amounts of habitat are available in lands surrounding the site. The proposal is therefore not likely to lead to impact upon habitat to the extent that the species is likely to decline.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The proposal is not considered likely to result in the introduction of harmful invasive species into potential habitat for the Large-eared Pied Bat.

Introduce disease that may cause the species to decline

The proposal is not considered likely to result in the introduction of disease that may cause the decline of the Large-eared Pied Bat.

Interfere substantially with the recovery of the species

Given the large amounts of habitat conserved on site and existing within the surrounds, the impacts upon habitat within the site are not considered likely to interfere substantially with the recovery of the species.

Grey-headed Flying-fox *(Pteropus poliocephalus)*

Lead to a long-term decrease in the size of an important population of a species

The habitat on site provides only intermittent foraging habitat for this species that is not considered of any importance to the long-term survival of the species and is therefore unlikely to lead to a long-term decrease in the size of an important population of this species.

Reduce the area of occupancy of an important population

The widespread distribution of the species and potential impacts to relatively small areas of intermittent habitat has determined that the proposal is unlikely to reduce the area of occupancy for an important population of this species.

Fragment an existing important population into two or more populations

The high mobility and large home range of this species has determined that the proposal is unlikely to fragment an important population of this species.

Adversely affect habitat critical to the survival of a species

Habitat considered critical to the survival of the Grey-headed Flying-fox has been defined within the Draft National Recovery Plan (DECCW 2009). The recovery plan provides five criteria by which potential foraging habitat can be defined as critical to the survival of the species:

- Productive during winter and spring, when food bottlenecks have been identified;
- Known to support populations of > 30 000 individuals within an area of 50 kilometres radius (the maximum foraging distance of an adult);
- Productive during the final weeks of gestation, and during the weeks of birth, lactation and conception (September to May);
- Productive during the final stages of fruit development and ripening in commercial crops affected by Grey-headed Flying-foxes (months vary between regions); or
- Known to support a continuously occupied camp.

The potential foraging habitat in the study area does not meet these five criteria in the recovery plan for habitat critical to the survival of the Grey-headed Flying-fox. Therefore, the proposal is unlikely to adversely affect habitat critical to the Grey-headed Flying-fox.

Disrupt the breeding cycle of an important population

The nearest known permanent maternity colony of the species is approximately 35 kilometres south-west of the site at Blackbutt Reserve, Newcastle. The proposal is unlikely to disrupt the breeding cycle of an important population.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

No known potential foraging or roosting habitat available to the species in the locality will be removed or isolated to an extent whereby the species is likely to decline.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The proposal is unlikely to result in the establishment of an invasive species that is harmful to the Grey-Headed Flying-fox or that may cause the Grey-Headed Flying-fox to decline.

Introduce disease that may cause the species to decline

The action is unlikely to introduce disease that is harmful to the Grey-Headed Flying-fox or that may cause the Grey-Headed Flying-fox to decline.

Interfere substantially with the recovery of the species

Given the large amounts of habitat conserved on site and existing within the surrounds, the impacts upon habitat within the site are not considered likely to interfere substantially with the recovery of the species.

Appendix 3

Flora Species List

Scientific Name	Common Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Acacia longifolia				x	x	x
Acacia myrtifolia	Red Stem Wattle				x	
Acacia terminalis	Sunshine Wattle				x	x
Acacia ulicifolia	Prickly Moses			x	x	x
Acianthus fornicatus	Pixie Caps			x	x	
Adiantum aethiopicum	Common Maidenhair			x	x	
*Ageratina adenophora**	Crofton Weed			x		
Allocasuarina littoralis	Black She-oak			x	x	x
Allocasuarina torulosa					x	x
Amyema spp.	Mistletoe			x		
*Anagallis arvensis**	Scarlet Pimpernel			x		
*Andropogon virginicus**	Whisky Grass			x	x	x
Angophora costata	Smooth-barked Apple			x	x	x
Angophora floribunda	Rough-barked Apple			x		
Anisopogon avenaceus	Oat Speargrass			x		
Aristida vagans	Three-awn Speargrass			x		
Arthrochilus prolixus	Elbow Orchid				x	
Arthropodium milleflorum	Pale Vanilla Lily			x		
Austrodanthonia spp.	A Wallaby Grass				x	
*Avena spp.**	Oats			x		
Banksia oblongifolia	Fern-leaf Banksia				x	
Banksia spinulosa var. collina	Hairpin Banksia			x	x	x
Baumea articulata	Jointed Twig-Rush			x		
Baumea juncea	-			x	x	x
*Bidens pilosa**	Cobbler's Pegs					x
Billardiera scandens	Hairy Appleberry			x	x	x
Boronia parviflora	Swamp Boronia				x	

Scientific Name	Common Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Boronia spp.				x		
Bossiaea obcordata	Spiny Bossiaea			x		
Bossiaea rhombifolia subsp. rhombifolia				x		
Bothriochloa macra	Red Grass				x	
*Briza minor**	Shivery Grass			x		
Brunoniella australis	Blue Trumpet				x	
Brunoniella pumilio	Dwarf Blue Trumpet			x		
Burchardia umbellata	Milkmaids				x	
Bursaria spinosa subsp. spinosa	Native Blackthorn			x	x	
Callistemon linearis	Narrow-leaved Bottlebrush			x	x	x
Callistemon paludosus				x		
Callistemon rigidus	Stiff Bottlebrush					x
Callistemon salignus	Willow Bottlebrush			x		
Calochilus robertsonii	Purplish Beard Orchid			x		
Calochilus spp.					x	
Calochlaena dubia	Rainbow Fern			x		
Carex appressa	Tall Sedge				x	
Cassinia spp.				x		
Cassytha glabella					x	
Cassytha pubescens	Common Devil's Twine			x	x	x
Centella asiatica	Swamp Pennywort			x	x	x
Cheilanthes sieberi	Rock Fern			x		
*Cinnamomum camphora**	Camphor Laurel			x	x	
*Conyza bonariensis**	Flax-leaf Fleabane			x		
*Conyza spp.**	A Fleabane			x		
*Conyza sumatrensis**	Tall Fleabane					x
*Cortaderia spp.**				x		

Scientific Name	Common Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Corymbia gummifera	Red Bloodwood			x	x	x
Corymbia maculata	Spotted Gum					x
Cotula australis	Common Cotula				x	
Cryptostylis erecta	Bonnet Orchid					x
Cryptostylis subulata	Large Tongue Orchid				x	
Cynodon dactylon	Common Couch			x	x	x
*Cyperus eragrostis**	Umbrella Sedge				x	
Cyperus sp.	-			x		
Daviesia ulicifolia subsp. ulicifolia				x	x	x
Desmodium rhytidophyllum				x		
Dianella caerulea var. caerulea	Flax Lily				x	
Dianella caerulea var. producta	Blue Flax Lily			x	x	x
Dianella longifolia	Blue Flax Lily			x		
Dianella revoluta	Blueberry Lily			x		
Dichelachne spp.	A Plumegrass			x		
Dichondra repens	Kidney Weed			x	x	x
Digitaria brownii	Cotton Panic Grass					x
Digitaria diffusa	Open Summer-grass				x	
*Digitaria spp.**	A Finger Grass			x		
Dillwynia retorta				x		
Dodonaea triquetra	Hop-bush			x	x	x
Drosera peltata	Sundew				x	
Echinopogon caespitosus	Bushy Hedgehog-grass			x		x
Elaeocarpus reticulatus	Blueberry Ash			x	x	
Entolasia marginata	Bordered Panic			x		x
Entolasia stricta	Wiry Panic			x	x	x
Epacris pulchella	Wallum Heath			x	x	x

Scientific Name	Common Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Epaltes australis	Spreading Nut-heads				x	
Eragrostis brownii	Brown's Lovegrass			x		x
Eragrostis leptostachya	Paddock Lovegrass					x
Eragrostis sp.	Lovegrass				x	
Eucalyptus capitellata	Brown Stringybark			x	x	x
Eucalyptus globoidea	White Stringybark			x	x	x
Eucalyptus piperita	Sydney Peppermint			x	x	x
Eucalyptus resinifera	Red Mahogany			x	x	x
Eucalyptus robusta	Swamp Mahogany			x		
Eucalyptus spp.					x	
Eucalyptus tereticornis	Forest Red Gum			x	x	x
Eucalyptus umbra	Broad-leaved White Mahogany			x		
Euchiton gymnocephalus	Cudweed			x		
Eustrephus latifolius	Wombat Berry				x	
Exocarpos cupressiformis	Native Cherry			x		
Fimbristylis dichotoma	Common Fringe-rush			x	x	
Fimbristylis spp.				x		
Gahnia clarkei	Tall Saw-sedge			x	x	x
Gahnia sieberiana	Red-fruited Saw-sedge				x	
Gahnia spp.					x	
Glochidion ferdinandii	Cheese Tree			x	x	
Glycine clandestina (broad leaf form)	Scott's Head Broad-Leaved Glycine			x	x	x
Glycine microphylla					x	
Glycine tabacina 'l' form f. 'l'				x	x	x
Glycine tomentella	Woolly Glycine				x	
Gompholobium latifolium	Broad-leaf Wedge-pea			x		
Gompholobium pinnatum	Pinnate Wedge-pea			x		

Scientific Name	Common Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Gonocarpus teucroides	Raspwort			x	x	
Goodenia heterophylla subsp. eglandulosa				x	x	x
Goodenia paniculata	Swamp Goodenia				x	x
Goodenia spp.				x	x	x
Hakea dactyloides	Broad-leaved Hakea			x		
Hardenbergia violacea	False Sarsparilla			x	x	
Hibbertia aspera subsp. aspera				x	x	x
Hibbertia vestita	Hairy Guinea Flower			x	x	
Hybanthus monopetalus	Slender Violet			x	x	
Hydrocotyle laxiflora	Stinking Pennywort				x	
Hydrocotyle peduncularis	Pennywort			x		x
Hydrocotyle tripartita	Pennywort				x	
Hypericum gramineum	Small St Johns Wort			x	x	x
*Hypochaeris radicata**	Flatweed			x		x
Hypolepis muelleri	Harsh Ground Fern			x		
Imperata cylindrica	Blady Grass			x	x	x
Isolepis inundata	Swamp Club-rush			x		
*Juncus cognatus**	-			x		x
Juncus sp.	-			x	x	
Juncus usitatus	Common Rush			x		x
Kennedia rubicunda	Dusky Coral Pea			x	x	
Kunzea spp.					x	
Lagenifera stipitata	Blue Bottle-daisy			x	x	
*Lantana camara**	Lantana			x		x
Lepidosperma filiforme	-			x		
Lepidosperma laterale	Variable Sword-sedge			x	x	x
Leptospermum continentale	Prickly Tea-tree					x

Scientific Name	Common Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Leptospermum juniperinum	Prickly Tea-tree				x	x
Leptospermum polygalifolium subsp. cismontanum	Tantoon			x	x	x
Leucopogon juniperinus	Prickly Beard-heath			x	x	x
Lindsaea linearis	Screw Fern			x		
Lindsaea microphylla	Lacy Wedge-fern			x	x	
Livistona australis	Cabbage Tree Palm			x	x	
Logania pusilla				x		
Lomandra confertifolia	Mat-rush				x	
Lomandra cylindrica	-			x		
Lomandra filiformis	Wattle Matt-rush				x	
Lomandra filiformis subsp. filiformis	Wattle Mat-rush			x		x
Lomandra glauca	Pale Mat-rush			x		x
Lomandra longifolia	Spiky-headed Mat-rush			x	x	x
Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush			x	x	x
Lomandra obliqua	Twisted Mat-rush			x	x	
Lomatia silaifolia	Crinkle Bush			x	x	
Macrozamia flexuosa	-			x	x	
*Malva spp.**	Mallow				x	
Melaleuca linariifolia	Snow in Summer			x	x	x
Melaleuca nodosa	Ball Honey Myrtle			x	x	x
Melaleuca quinquenervia	Broad-leaved Paperbark			x		x
Melaleuca sieberi	-			x	x	x
Melaleuca thymifolia	Thyme Honey Myrtle			x		
Microlaena stipoides var. stipoides	Weeping Rice Grass			x	x	x
Mirbelia rubiifolia	Heathy Mirbelia			x	x	
*Nymphaea caerulea subsp. zanzibarensis**	Cape Waterlily			x		
*Onopordum spp.**				x		

Scientific Name	Common Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Opercularia varia	Variable Stinkweed			x		
Oplismenus aemulus	Basket Grass			x	x	x
Oxalis perrenans	Yellow-flowered Wood Sorrel			x		
Oxalis sp.	-			x		x
Ozothamnus diosmifolius	Ball Everlasting			x	x	
Panicum simile	Two Colour Panic			x	x	x
Parsonsia straminea	Common Silkpod			x	x	x
*Paspalum dilatatum**	Paspalum				x	x
*Paspalum urvillei**	Vasey Grass					x
Patersonia sericea	Wild Iris			x		
*Persicaria spp.**	Knotweed				x	
Persoonia linearis	Narrow-leaved Geebung				x	x
Philydrum lanuginosum	Woolly Frogmouth			x		
Phragmites australis	Common Reed			x		
Phyllanthus hirtellus	Thyme Spurge			x	x	
Pimelea linifolia	Slender Rice Flower			x	x	x
Pittosporum undulatum	Sweet Pittosporum					x
Plectranthus parviflorus	Cockspur Flower			x		
Polymeria calycina	Bindweed			x	x	
Pratia purpurascens	Whiteroot			x	x	x
Pseuderanthemum variabile	Pastel Flower				x	
Pteridium esculentum	Bracken			x	x	x
Pterostylis acuminata	Pointed Greenhood				x	
Pterostylis longifolia	Tall Greenhood				x	
Pterostylis nutans	Nodding Greenhood			x		
Pterostylis sp.	Greenhood			x	x	
Ptilothrix deusta	-			x	x	

Scientific Name	Common Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Pultenaea daphnoides	Large-leaf Bush Pea			x		
Pultenaea echinula				x		
Pultenaea euchila					x	
Pultenaea flexilis	Graceful Bush Pea			x		
Pultenaea myrtoides				x		
Pultenaea retusa	-				x	
Pultenaea rosmarinifolia	-				x	
Pultenaea villosa	Hairy Bush-pea				x	
*Rhaphiolepis indica**	Indian Hawthorn				x	
*Richardia stellaris**	-				x	
*Rubus fruticosus sp. agg.**	Blackberry complex				x	
Rubus parvifolius	Native Raspberry			x		
*Senecio madagascariensis**	Fireweed			x	x	
*Senecio spp.**	Groundsel, Fireweed			x		
*Setaria gracilis**	Slender Pigeon Grass			x		
*Setaria pumila**	Pale Pigeon Grass					x
*Setaria spp.**				x		
*Solanum mauritianum**	Wild Tobacco				x	x
Stylidium graminifolium	Grass Trigger Plant			x		
*Taraxacum officinale**	Dandelion				x	
Tetratheca ericifolia	Black-eyed Susan				x	
Tetratheca thymifolia	Black-eyed Susan			x		
Thelionema caespitosum	Tufted Blue Lily			x		
Thelymitra pauciflora	Slender Sun Orchid			x		
Themeda australis	Kangaroo Grass			x	x	x
Trachymene incisa	Trachymene				x	
Tricoryne elatior	Yellow Rush Lily			x		

Scientific Name	Common Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Triglochin procera	Water Ribbons				x	
Triglochin spp.					x	
*Verbena bonariensis**	Purpletop					x
Vernonia cinerea				x	x	x
Veronica plebeia	Creeping Speedwell			x		
Viola hederacea	Ivy-leaved Violet			x		
Wurmbea biglandulosa				x		
Xanthorrhoea latifolia	-			x		
Xanthorrhoea spp.					x	x
Xanthosia tridentata	Rock Xanthosia			x		
Zieria laxiflora	Wallum Zieria			x		

* Exotic species

Appendix 4

Fauna Species List

Family	Common Name	Scientific Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Amphibia	Eastern Dwarf Tree Frog	*Litoria fallax*			x		x
Amphibia	Broad-palmed Frog	*Litoria latopalmata*			x	x	
Amphibia	Peron's Tree Frog	*Litoria peronii*			x	x	
Amphibia	Verreaux's Frog	*Litoria verreauxii*				x	
Amphibia	Eastern Sign-bearing Froglet	*Crinia parinsignifera*				x	
Amphibia	Common Eastern Froglet	*Crinia signifera*			x	x	x
Amphibia	Brown-striped Frog	*Limnodynastes peronii*			x		x
Amphibia	Spotted Grass Frog	*Limnodynastes tasmaniensis*					x
Amphibia	Red-backed Toadlet	*Pseudophryne coriacea*				x	x
Amphibia	Smooth Toadlet	*Uperoleia laevigata*				x	x
Aves	Yellow Thornbill	*Acanthiza nana*			x	x	
Aves	Brown Thornbill	*Acanthiza pusilla*			x	x	
Aves	Buff-rumped Thornbill	*Acanthiza reguloides*			x	x	
Aves	White-throated Gerygone	*Gerygone albogularis*					x
Aves	Whistling Kite	*Haliastur sphenurus*			x		
Aves	Australian Owlet-nightjar	*Aegotheles cristatus*			x		
Aves	Laughing Kookaburra	*Dacelo novaeguineae*				x	x
Aves	Sacred Kingfisher	*Todiramphus sanctus*			x		
Aves	Pacific Black Duck	*Anas superciliosa*			x		x
Aves	Australian Wood Duck	*Chenonetta jubata*			x	x	x
Aves	White-throated Needletail	*Hirundapus caudacutus*		M			x
Aves	Cattle Egret	*Ardea ibis*		M	x		
Aves	White-necked Heron	*Ardea pacifica*					x
Aves	White-faced Heron	*Egretta novaehollandiae*			x	x	x
Aves	Pied Butcherbird	*Cracticus nigrogularis*					x

Family	Common Name	Scientific Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Aves	Australian Magpie	*Cracticus tibicen*			x	x	x
Aves	Grey Butcherbird	*Cracticus torquatus*			x	x	x
Aves	Pied Currawong	*Strepera graculina*			x	x	x
Aves	Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*			x	x	x
Aves	Glossy Black-Cockatoo	*Calyptorhynchus lathami*	V		x		
Aves	Galah	*Eolophus roseicapillus*			x	x	
Aves	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*			x	x	x
Aves	White-winged Triller	*Lalage sueurii*			x		
Aves	Pheasant Coucal	*Centropus phasianinus*			x		
Aves	Masked Lapwing	*Vanellus miles*			x	x	x
Aves	White-throated Treecreeper	*Cormobates leucophaea*			x	x	x
Aves	Bar-shouldered Dove	*Geopelia humeralis*			x		x
Aves	Peaceful Dove	*Geopelia striata*					x
Aves	Crested Pigeon	*Ocyphaps lophotes*			x	x	x
Aves	Common Bronzewing	*Phaps chalcoptera*			x		
Aves	Dollarbird	*Eurystomus orientalis*					x
Aves	White-winged Chough	*Corcorax melanorhamphos*					x
Aves	Australian Raven	*Corvus coronoides*			x	x	x
Aves	Torresian Crow	*Corvus orru*			x		
Aves	Fan-tailed Cuckoo	*Cacomantis flabelliformis*			x	x	
Aves	Shining Bronze-Cuckoo	*Chalcites lucidus*					x
Aves	Eastern Koel	*Eudynamys orientalis*			x		
Aves	Channel-billed Cuckoo	*Scythrops novaehollandiae*			x		
Aves	Red-browed Finch	*Neochmia temporalis*			x	x	x
Aves	Welcome Swallow	*Hirundo neoxena*			x		
Aves	Superb Fairy-wren	*Malurus cyaneus*			x	x	x
Aves	Variegated Fairy-wren	*Malurus lamberti*			x		

Family	Common Name	Scientific Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Aves	Eastern Spinebill	*Acanthorhynchus tenuirostris*			x	x	x
Aves	Red Wattlebird	*Anthochaera carunculata*			x	x	x
Aves	Yellow-faced Honeyeater	*Lichenostomus chrysops*			x	x	x
Aves	Brown Honeyeater	*Lichmera indistincta*			x		
Aves	Noisy Miner	*Manorina melanocephala*			x	x	x
Aves	Brown-headed Honeyeater	*Melithreptus brevirostris*			x		
Aves	White-naped Honeyeater	*Melithreptus lunatus*				x	
Aves	Scarlet Honeyeater	*Myzomela sanguinolenta*			x	x	x
Aves	Noisy Friarbird	*Philemon corniculatus*			x	x	x
Aves	White-cheeked Honeyeater	*Phylidonyris niger*					x
Aves	Magpie-lark	*Grallina cyanoleuca*			x	x	
Aves	Leaden Flycatcher	*Myiagra rubecula*			x		
Aves	Mistletoebird	*Dicaeum hirundinaceum*			x		
Aves	Varied Sittella	*Daphoenositta chrysoptera*	V		x	x	
Aves	Olive-backed Oriole	*Oriolus sagittatus*			x		x
Aves	Grey Shrike-thrush	*Colluricincla harmonica*			x	x	x
Aves	Golden Whistler	*Pachycephala pectoralis*			x	x	
Aves	Rufous Whistler	*Pachycephala rufiventris*			x		x
Aves	Spotted Pardalote	*Pardalotus punctatus*					x
Aves	Striated Pardalote	*Pardalotus striatus*			x	x	x
Aves	Australian Pelican	*Pelecanus conspicillatus*			x	x	
Aves	Eastern Yellow Robin	*Eopsaltria australis*				x	x
Aves	Jacky Winter	*Microeca fascinans*			x		x
Aves	Rose Robin	*Petroica rosea*				x	
Aves	Little Pied Cormorant	*Microcarbo melanoleucos*					x
Aves	Little Black Cormorant	*Phalacrocorax sulcirostris*					x
Aves	Tawny Frogmouth	*Podargus strigoides*					x

Family	Common Name	Scientific Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Aves	Australasian Grebe	*Tachybaptus novaehollandiae*			x		
Aves	Musk Lorikeet	*Glossopsitta concinna*				x	
Aves	Little Lorikeet	*Glossopsitta pusilla*	V				x
Aves	Crimson Rosella	*Platycercus elegans*					x
Aves	Eastern Rosella	*Platycercus eximius*			x	x	x
Aves	Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*			x		
Aves	Rainbow Lorikeet	*Trichoglossus haematodus*			x	x	x
Aves	Eastern Whipbird	*Psophodes olivaceus*					x
Aves	Grey Fantail	*Rhipidura albiscapa*			x	x	x
Aves	Willie Wagtail	*Rhipidura leucophrys*					x
Aves	Rufous Fantail	*Rhipidura rufifrons*					x
Aves	Powerful Owl	*Ninox strenua*	V				x
Aves	Straw-necked Ibis	*Threskiornis spinicollis*				x	x
Aves	Silvereye	*Zosterops lateralis*				x	x
Aves	Masked Owl	*Tyto novaehollandiae*	V		x		
Mammalia	Brown Antechinus	*Antechinus stuartii*			x		
Mammalia	Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		x		
Mammalia	Eastern Grey Kangaroo	*Macropus giganteus*			x	x	x
Mammalia	Red-necked Wallaby	*Macropus rufogriseus*			x		
Mammalia	East Coast Freetail-bat	*Mormopterus norfolkensis*	V		x		x
Mammalia	Eastern Freetail-bat	*Mormopterus ridei*					x
Mammalia	White-striped Freetail-bat	*Tadarida australis*			x		x
Mammalia	Bush Rat	*Rattus fuscipes*			x		x
Mammalia	Swamp Rat	*Rattus lutreolus*			x		
Mammalia	Squirrel Glider	*Petaurus norfolcensis*	V			x	
Mammalia	Common Brushtail Possum	*Trichosurus vulpecula*			x	x	x
Mammalia	Koala	*Phascolarctos cinereus*	V	V	x		x

Family	Common Name	Scientific Name	TSC Act	EPBC Act	Orogen 2006	Umwelt 2009	RPS 2015
Mammalia	Common Ringtail Possum	*Pseudocheirus peregrinus*			x		
Mammalia	Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	x	x	x
Mammalia	Eastern Horseshoe-bat	*Rhinolophus megaphyllus*					x
Mammalia	Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	x		
Mammalia	Gould's Wattled Bat	*Chalinolobus gouldii*			x		x
Mammalia	Chocolate Wattled Bat	*Chalinolobus morio*			x		x
Mammalia	Little Bentwing-bat	*Miniopterus australis*	V		x	x	x
Mammalia	Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	V			x	x
Mammalia	long-eared bat	*Nyctophilus sp.*				x	x
Mammalia	Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		x		
Mammalia	Eastern Broad-nosed Bat	*Scotorepens orion*			x		
Mammalia	Little Forest Bat	*Vespadelus vulturnus*			x		
Reptilia	Jacky Lizard	*Amphibolurus muricatus*			x		
Reptilia	Eastern Small-eyed Snake	*Cryptophis nigrescens*			x		
Reptilia	Dark-flecked Garden Sunskink	*Lampropholis delicata*			x		
Reptilia	Lace Monitor	*Varanus varius*			x		x

V – Vulnerable
M - Migratory

Appendix 5

EPBC Protected Matters Search Report

Australian Government
Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	61
Listed Migratory Species:	66

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	5
Commonwealth Heritage Places:	1
Listed Marine Species:	87
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	9
State and Territory Reserves:	12
Regional Forest Agreements:	1
Invasive Species:	46
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR) [Resource Information]

Name	Proximity
Hunter estuary wetlands	Within 10km of Ramsar
Myall lakes	Within 10km of Ramsar

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora epomophora Southern Royal Albatross [25996]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora sanfordi Northern Royal Albatross [82331]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans antipodensis Antipodean Albatross [82269]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Diomedea exulans exulans Tristan Albatross [82337]	Endangered	Species or species habitat may occur within area
Diomedea exulans gibsoni Gibson's Albatross [82271]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta salvini Salvin's Albatross [82343]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris impavida Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Frogs		
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Allocasuarina defungens Dwarf Heath Casuarina [21924]	Endangered	Species or species habitat likely to occur within area
Angophora inopina Charmhaven Apple [64832]	Vulnerable	Species or species habitat likely to occur within area
Asperula asthenes Trailing Woodruff [14004]	Vulnerable	Species or species habitat likely to occur within area
Asterolasia elegans [56780]	Endangered	Species or species habitat may occur within area
Commersonia prostrata Dwarf Kerrawang [87152]	Endangered	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Eucalyptus camfieldii Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus parramattensis subsp. decadens Earp's Gum, Earp's Dirty Gum [56148]	Vulnerable	Species or species habitat known to occur within area
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat known to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat known to occur within area
Persicaria elatior Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Streblus pendulinus Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Tetratheca juncea Black-eyed Susan [21407]	Vulnerable	Species or species habitat known to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish	Vulnerable	Species or species

Name	Status	Type of Presence
[68442]		habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Roosting known to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]		Roosting known to occur within area
Calidris ferruginea Curlew Sandpiper [856]		Roosting known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]		Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area

Name	Threatened	Type of Presence
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]		Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Roosting known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew [847]		Roosting known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Housing Authority
Defence - RAAF BASE WILLIAMTOWN
Defence - SALTASH AIR WEAPONS RANGE

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Williamtown RAAF Base Group	NSW	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Roosting known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]		Roosting known to occur within area
Calidris ferruginea Curlew Sandpiper [856]		Roosting known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Roosting known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]		Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]		Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area

Name	Threatened	Type of Presence
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Roosting known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew [847]		Roosting known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Recurvirostra novaehollandiae		
Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri		
Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto)		
Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita		
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida		
Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa stagnatilis		
Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus		
Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura tentaculata		
Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus		
Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris		
Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna		
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus		
Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis		
Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Stenella attenuata		
Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus		
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Newcastle Bight Coastal Area	NSW	Indicative Place
Tilligerry Creek Area	NSW	Indicative Place
Moffats Swamp Nature Reserve	NSW	Registered
Port Stephens Estuary	NSW	Registered
Indigenous		
Salt Ash Weapons Range	NSW	Interim List
Williamtown RAAF Base Indigenous Sites	NSW	Interim List
Historic		
Port Stephens	NSW	Indicative Place
Silo	NSW	Indicative Place
Williamtown RAAF Base Group	NSW	Interim List

State and Territory Reserves [Resource Information]

Name	State
FMAs in BULAHDELAH	NSW
Gir-um-bit	NSW
Gir-um-bit	NSW
Karuah	NSW
LNE Special Management Zone No1	NSW
Medowie	NSW
Medowie	NSW
Moffats Swamp	NSW
Tilligerry	NSW
Tilligerry	NSW
Wallaroo	NSW
Wallaroo	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana,		Species or species

Name	Status	Type of Presence
Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Port Stephens Estuary	NSW
Salt Ash Air Weapons Range	NSW

Coordinates

-32.718 151.872

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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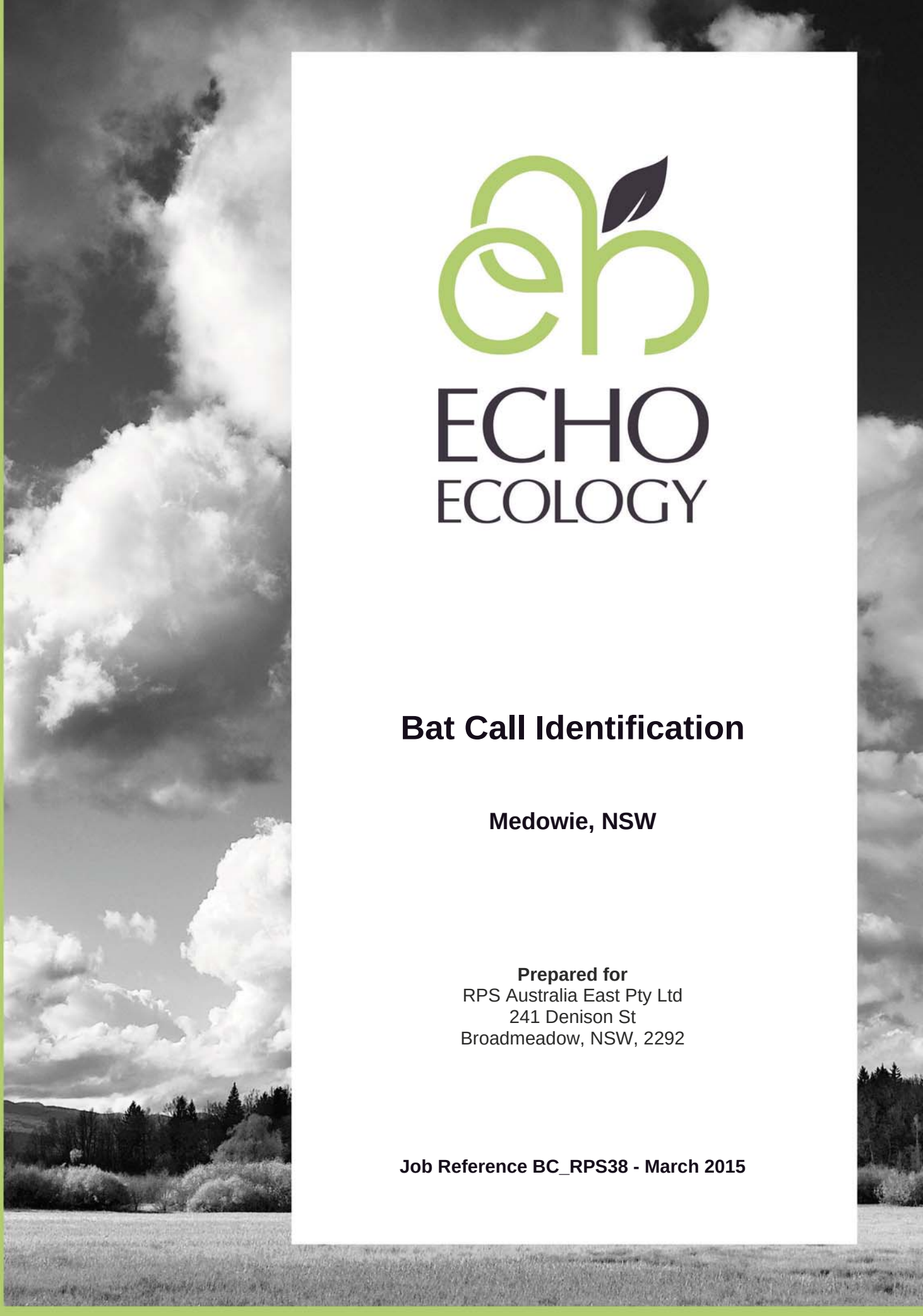
Appendix 6

Anabat Report



ECHO ECOLOGY

Bat Call Identification

Medowie, NSW

Prepared for
RPS Australia East Pty Ltd
241 Denison St
Broadmeadow, NSW, 2292

Job Reference BC_RPS38 - March 2015

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This report has been prepared to document the analysis of digital ultrasonic bat echolocation calls received from a third party. The data was not collected by the author and as such no responsibility is taken for the quality of data collection or for the suitability of its subsequent use.

This report was authored by

Dr Anna McConville
PhD, B.Env.Sc.

Contents

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1.0 INTRODUCTION

This report has been commissioned by RPS Australia East Pty Ltd to analyse bat echolocation call data (Anabat, Titley Electronics) collected from Medowie, NSW. Data was provided electronically to the author. This report documents the methods involved in analysing bat call data and the results obtained only.

2.0 METHODS

The identification of bat echolocation calls recorded during surveys was undertaken using AnalookW (Version 4.1t) software. The identification of calls was undertaken with reference to Pennay *et al*. (2004) and through the comparison of recorded reference calls from north-eastern NSW and the Sydney Basin. Reference calls were obtained from the NSW database and from the authors personal collection.

Each call sequence ('pass') was assigned to one of five categories, according to the confidence with which an identification could be made, being:

- Definite - Pass identified to species level and could not be confused with another species
- Probable - Pass identified to species level and there is a low chance of confusion with another species
- Possible - Pass identified to species level but short duration or poor quality of the pass increases the chance of confusion with another species
- Species group - Pass could not be identified to species level and could belong to one of two or more species. Occurs more frequently when passes are short or of poor quality
- Unknown - Either background 'noise' files or passes by bats which are too short and/or of poor quality to confidently identify.

Call sequences that were less than three pulses in length were not analysed and were assigned to 'Unknown' and only search phase calls were analysed. Furthermore, some species are difficult to differentiate using bat call analysis due to overlapping call frequencies and similar shape of plotted calls and in these cases calls were assigned to species groups.

The total number of passes (call sequences) per unit per night was tallied to give an index of activity.

It should be noted that the activity levels recorded at different sites may not be readily able to be compared. Such comparisons are dependent on many variables which need to be carefully controlled during data collection and statistically analysed. Influential variables include wind, rain, temperature, duration of recording, season, detector and microphone sensitivity, detector placement, weather protection devices etc.

2.1 Characteristics Used to Differentiate Species

Miniopterus australis was differentiated from *Vespadelus pumilus*, by characteristic frequency or the presence of a down-sweeping tail on pulses. Call sequences which had a majority of pulses containing an up-sweeping tail were assigned to *Vespadelus pumilus*.

Miniopterus schreibersii oceanensis was differentiated by *Vespadelus* sp. by a combination of uneven consecutive pulses and the presence of a down-sweeping tail. Long, high quality call sequences with regularly-spaced consecutive pulses, few down-sweeping tails and higher or lower characteristic frequencies were assigned to *Vespadelus darlingtoni* or *Vespadelus regulus*.

Calls from *Mormopterus* sp. were differentiated by the presence of mainly flat pulses. *Mormopterus (Micronomus) norfolkensis* was differentiated from *Mormopterus (Ozimops) ridei* in long call sequences where pulses alternated, often with a downward sloping tail.

Chalinolobus gouldii was differentiated from other species by the presence of curved, alternating call pulses.

Scotorepens orion, *Scoteanax rueppellii* and *Falsistrellus tasmaniensis* were unable to be differentiated from one another.

Nyctophilus sp. calls were identified from *Myotis macropus* by pulse intervals > 95 ms and an initial slope of < 300 OPS. *Nyctophilus geoffroyi* and *Nyctophilus gouldi* were unable to be differentiated.

Chalinolobus morio calls were differentiated from those of *Vespadelus* sp. by the presence of a down-sweeping tail on the majority of pulses.

Rhinolophus megaphyllus and *Tadarida australis* were differentiated from other bat species on the basis of characteristic frequency.

3.0 RESULTS

A total of 746 call sequences were recorded, of which 378 call sequences were able to be analysed (ie were not 'noise' files or bat calls of short length). Of the bat calls, 167 call sequences (44 %) were able to be confidently identified (those classified as either definite or probable identifications) to species level (Table 3-1). Species recorded confidently within the site include:

- *Chalinolobus gouldii* (Gould's wattled bat)
- *Chalinolobus morio* (Chocolate wattled bat)
- *Miniopterus australis* (Little bentwing bat)
- *Miniopterus schreibersii oceanensis* (Eastern bentwing bat)
- *Mormopterus (Micronomus) norfolkensis* (East coast free-tailed bat)
- *Mormopterus (Ozimops) ridei* (Eastern free-tailed bat)
- *Nyctophilus* species (*Nyctophilus gouldi* or *Nyctophilus geoffroyi*)
- *Rhinolophus megaphyllus* (Eastern horseshoe bat)
- *Tadarida australis* (White-striped free-tailed bat)

Additionally, the following bat species potentially occurred within the site, but could not be confidently identified (those calls classified as possible or as a species group):

- *Falsistrellus tasmaniensis* (Eastern falsistrelle)
- *Myotis macropus* (Large-footed myotis)
- *Scoteanax rueppellii* (Greater broad-nosed bat)
- *Scotorepens orion* (Eastern broad-nosed bat)
- *Vespadelus darlingtoni* (Large forest bat)
- *Vespadelus pumilus* (Eastern forest bat)
- *Vespadelus regulus* (Southern forest bat)
- *Vespadelus troughtoni* (Eastern cave bat)
- *Vespadelus vulturnus* (Little forest bat)

It should be noted that additional bat species may be present within the site but were not recorded by the detectors and habitat assessment should be used in conjunction with these results to determine the likelihood of occurrence of other bat species.

Table 3-1 below summarises the results of the bat call analysis.

Table 3-1: Results of bat call analysis (number of passes per site per night)

IDENTIFICATION	NW Veg Small Waterhole 2/03/2015	NW Veg Small Waterhole 3/03/2015	NW Veg Small Waterhole 4/03/2015	NW Veg Small Waterhole 5/03/2015	Powerline Easement Large Dam 2/03/2015	Powerline Easement Large Dam 3/03/2015	Powerline Easement Large Dam 4/03/2015	Powerline Easement Large Dam 5/03/2015
DEFINITE								
Chalinolobus gouldii	14	11	13	11	6	4	2	-
Chalinolobus morio	-	1	2	-	-	1	-	-
Miniopterus australis	5	7	1	3	1	10	-	-
Mormopterus (Micronomus) norfolkensis	-	-	-	1	1	-	-	-
Mormopterus (Ozimops) ridei	5	-	3	1	7	-	-	-
Rhinolophus megaphyllus	-	-	-	-	1	-	-	-
PROBABLE								
Chalinolobus gouldii	10	6	3	7	3	1	2	-
Chalinolobus morio	-	1	1	-	-	1	-	-
Miniopterus australis	-	1	-	-	1	-	-	1

IDENTIFICATION	NW Veg Small Waterhole 2/03/2015	NW Veg Small Waterhole 3/03/2015	NW Veg Small Waterhole 4/03/2015	NW Veg Small Waterhole 5/03/2015	Powerline Easement Large Dam 2/03/2015	Powerline Easement Large Dam 3/03/2015	Powerline Easement Large Dam 4/03/2015	Powerline Easement Large Dam 5/03/2015
Miniopterus schreibersii oceanensis	2	-	1	2	1	-	-	-
Mormopterus (Micronomus) norfolkensis	-	-	-	1	-	-	-	-
Mormopterus (Ozimops) ridei	3	-	2	1	3	-	-	-
Tadarida australis	-	-	2	-	-	-	-	-
SPECIES GROUPS								
Mormopterus (Micronomus) norfolkensis / Mormopterus (Ozimops) ridei	1	-	-	2	-	-	-	-
Chalinolobus gouldii / Mormopterus (Micronomus) norfolkensis / Mormopterus (Ozimops) ridei	17	25	13	12	7	1	4	3
Chalinolobus gouldii / Mormopterus (Ozimops) ridei	17	4	1	9	7	1	-	-
Chalinolobus gouldii / Scoteanax rueppellii	-	-	-	2	-	-	-	-
Chalinolobus morio / Vespadelus pumilus / Vespadelus vulturnus / Vespadelus troughtoni	-	4	13	5	4	9	5	2
Falsistrellus tasmaniensis / Scotorepens orion	-	2	-	-	-	-	-	-
Falsistrellus tasmaniensis / Scotorepens orion / Scoteanax rueppellii	-	-	-	-	3	4	-	-
Miniopterus australis / Vespadelus pumilus	-	6	5	1	1	-	-	-

IDENTIFICATION	NW Veg Small Waterhole 2/03/2015	NW Veg Small Waterhole 3/03/2015	NW Veg Small Waterhole 4/03/2015	NW Veg Small Waterhole 5/03/2015	Powerline Easement Large Dam 2/03/2015	Powerline Easement Large Dam 3/03/2015	Powerline Easement Large Dam 4/03/2015	Powerline Easement Large Dam 5/03/2015
Miniopterus schreibersii oceanensis / Vespadelus darlingtoni / Vespadelus regulus	3	-	2	1	6	2	-	1
Myotis macropus / Nyctophilus geoffroyi / Nyctophilus gouldi	-	-	1	-	1	-	-	-
Nyctophilus geoffroyi / Nyctophilus gouldi	1	-	1	-	-	-	-	-
Vespadelus pumilus / Vespadelus vulturnus / Vespadelus troughtoni	-	2	-	-	-	-	-	-
UNKNOWN								
'Noise' files	5	6	7	66	3	1	90	75
Unknown	13	26	9	16	7	10	14	20
TOTAL	**96**	**102**	**80**	**141**	**63**	**45**	**117**	**102**

4.0 SAMPLE CALLS

A sample of the calls actually identified from the site for each species is given below.

Figure 4-1: *Chalinolobus gouldii* definite call

Figure 4-2: *Chalinolobus morio* definite call

Figure 4-3: *Miniopterus australis* definite call

Figure 4-4: *Miniopterus schreibersii oceanensis* probable call

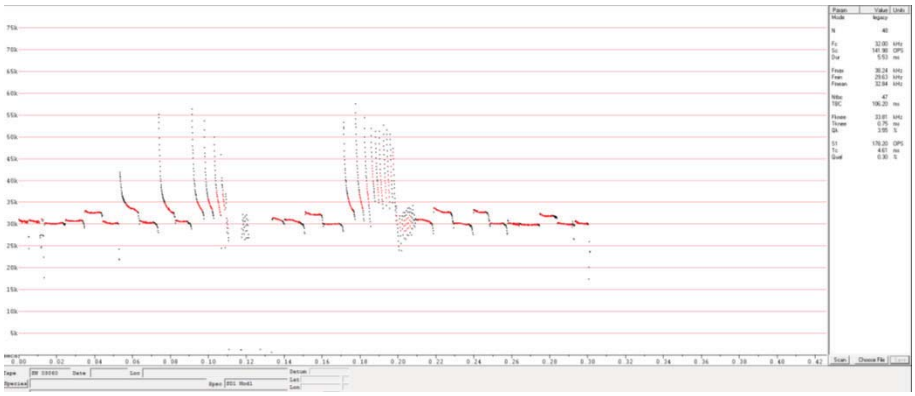

Figure 4-5: *Mormopterus (Micronomus) norfolkensis* definite call

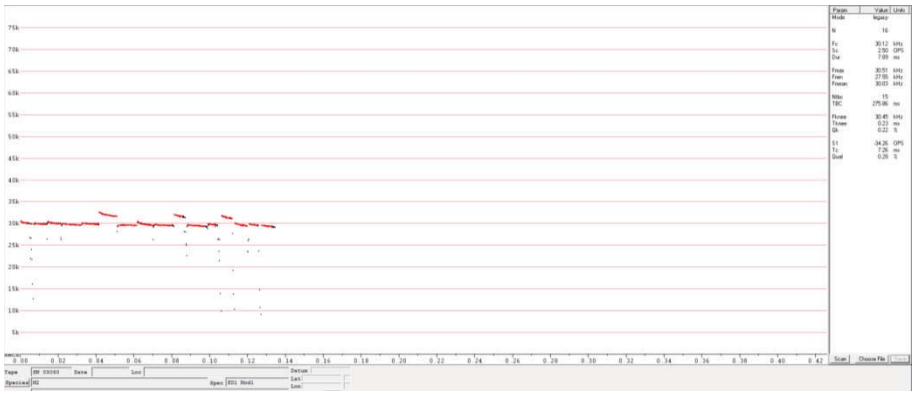

Figure 4-6: *Mormopterus (Ozimops) ridei* definite call

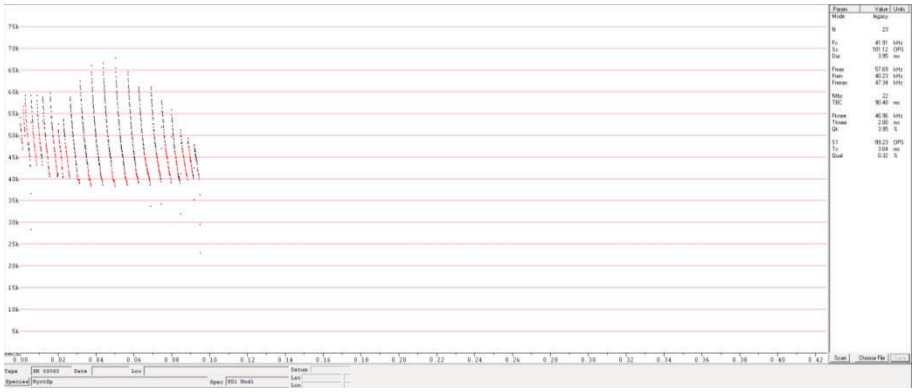

Figure 4-7: *Nyctophilus* sp. species group

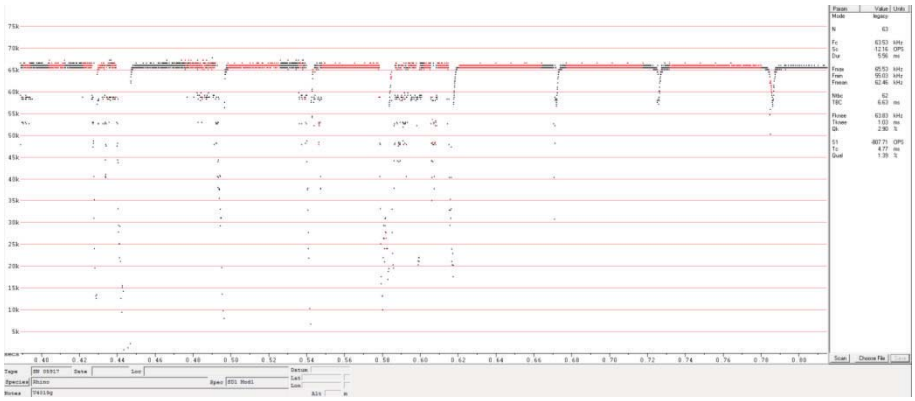

Figure 4-8: *Rhinolophus megaphyllus* definite call

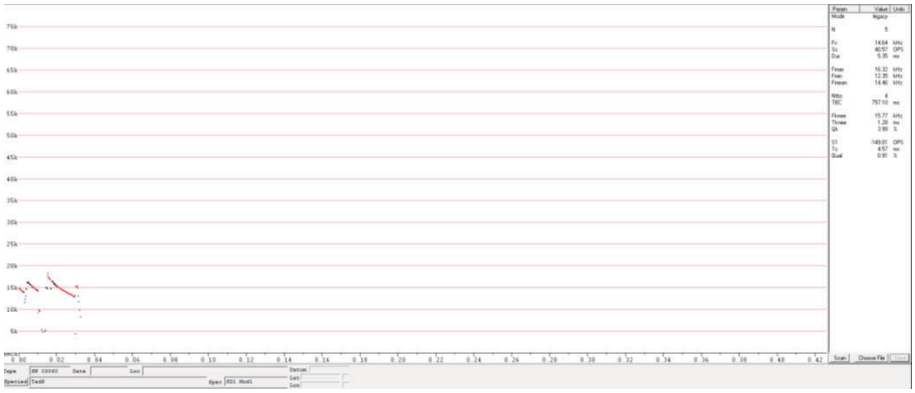

Figure 4-9: *Tadarida australis* probable call

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Appendix 7

Proposed Lot Layout

TITLE: PROPOSED SUBDIVISION OF LOT 93,94,95 AND 96 BOUNDARY ROAD MEDOWIE

McCLOY MEDOWIE

McCLOY GROUP

High Definition Design Drafting

KEVIN URANE 0412009891

Date: 18.12.14 Scale: 1:4000 A3 Designed: KU

Cad Ref: HDDD 3 r9

No	Amendment	Drawn	Date
9	AMEND LAYOUT	KU	22.04.15
8	AMEND LAYOUT	KU	19.04.15
7	AMEND LAYOUT	KU	16.04.15

Project No HD3

Drawing No HD01

Revision 9

Appendix 8

Staff Qualifications

Curriculum Vitae

ROB DWYER

Planning Manager

Newcastle, NSW

Bachelor of Science, University of Newcastle NSW, 1990

Graduate Diploma Urban and Regional Planning, University of New England NSW, 1995

AREAS OF EXPERTISE:

Rob has over 23 years experience in land use planning, policy development, strategic planning, development control and project management. He has extensive experience in managing urban release areas, major industrial and infrastructure proposals and the like. His areas of expertise include Project Management of major rezoning and major developments; including Environmental Impact Statements (EIS); development of strategic land use plans, policies and strategies; preparation of Development Control Plans (DCPs), Local Environmental Plans (LEPs), Master Plans and Local Area Plans; management and preparation of major residential, commercial and industrial projects; along with town planning with particular interest in urban form and environmentally sustainable neighbourhood design. Rob works with private entities / land owners as well as local and regional councils to deliver outstanding outcomes.

Prior to joining RPS in May 2004, Rob worked for 10 years in Senior and Manager positions within Local Government, including the role of Land Use Planning Manager at Port Stephens Council. During this period he was involved in aspects of land use planning including the LGA wide settlement strategy, development control planning and community consultation. Rob is a committee member of the Hunter Chapter of the NSW Property Council.

SELECTED PROJECT EXPERIENCE:

Planning and Development

- **Cooranbong Planning and Environmental studies** – Co-ordination of a Planning Proposal for residential subdivision at Cooranbong on behalf of private land owners;
- **Failford Road, Nabiac** – Co-ordination of a Planning Proposal and Project Management for a Large Residential Lot rezoning on behalf of Great Lakes Council;
- **Bolwarra Urban Area** – Co-ordination of a combined Planning Proposal and development application for residential development on behalf of private land owners;
- **North Shearwater Estate, Tea Gardens** – Co-ordination of a Planning Proposal and Project Management of the Urban Release Area on behalf of Great Lakes Council;
- **Williamtown Business Support lands** – Preparation of a Planning Proposal for Business Support lands in Williamtown on behalf of private land owners;
- **Speers Point and Killingworth, Lake Macquarie** - Project Director and co-ordinator for the successful delivery of local environmental studies of these key sites on behalf of Lake Macquarie City Council.
- **Freeway North Business Park** – Project Director for the successful rezoning and Part 3A concept and project apporval of a 60 hectare business park at Thornton.
- **Minmi East Development Control Plan** – Prepared a development control for the first stages of the Northern Estates Urban Release Area in accordance with the approved Part 3A Concept Plan on behalf of the land owner.

- **The Bay Resort, Anna Bay** – Engaged to project manage a major eco-tourism development with a capital investment value in excess of $280 Million. The project is designated as State Significant and will be a major draw card for international tourists to the Port Stephens region.
- **Paxton Urban Release Area** – Engaged to prepare a Planning Proposal and subsequent development application for 76 dwelling sites in Paxton. Works included negotiations with the Department of Planning with respect to State Infrastructure contributions.
- **Tuncurry Waste Transfer Station** – Engaged to prepare a Statement of Environmental Effects for the establishment of new waste transfer station to be utilised as a result of the opening of an adjacent land fill. Works included ecological impact assessment.
- **Cooranbong Local Water Centre** – Engaged to prepare an Environmental Impact Statement for the establsihment of a water recycling facility to service approximately 2,500 dwellings. The Local Water Centre will replace the need for more traditional sewage facilities which have greater environmental impacts.
- **Icon Central Apartments** – Delivered development consent, and subesequent section 96 modifciation, for a major residential proposal consisting of moderate income housing units within an 18 and 10 storey complex.
- **Soldiers Point Bowling Club Seniors Living** – Engaged to prepare a Site Capability Statement and subsequent Statement of Environmental Effects for 100 independent self care units at the rear of land held by Soliders Point Bowling Club.
- **Western Coal Services Project** – Lead consultant to ensure the successful delivery of an EIS documenting the proposed upgrade of an existing coal washery and supporting infrastructure including new haul roads and overpass.
- **Cessnock Civic, Freeway South Business Park and McDougalls Business Park** – Project Director for the rezoning of these major employement nodes.
- **Williamtown Aerospace Park** – Co-ordinator of works for the successful rezoning of a defence and airport related business park adjacent to Newcastle Airport and RAAF Base Williamtown.

PREVIOUS EXPERIENCE:

Land Use Planning Manager – Port Stephens Council **1999 - 2004**
Managed the Land Use Planning Team within Council and oversaw the preparation and implementation of LGA wide LEPs, DCPs and planning policies. Role also included the co-ordination of approvals associated with major urban land releases and the LGA wide settlement strategy.

Senior Strategic Planner – Lake Macquarie City Council **1995 - 1999**
Project managed major urban land releases through the preparation of LEPs, DCPs and the Lifestyle 2020 Project.

Senior Strategic Planner – Port Stephens Council **1991 - 1995**
Project managed a range of LEPs and DCPs and participated in the initial comprehensive Koala Plan of Management and state Government interaction.

MEMBERSHIPS & ACHIEVEMENTS:

- Member Planning Institute of Australia (MPIA)
- Member of the Hunter Chapter Committee of the Property Council Australia
- Committee Member of the Hunter Branch of the PIA (NSW)

Curriculum Vitae

JOEL STIBBARD

Ecologist

Newcastle, New South Wales

Masters of Environmental Management, University of Queensland, 2009 - Present

Bachelor of Science, University of Queensland, 2001 - 2004

AREAS OF EXPERTISE:

I have over seven years of ecological experience around the world in both aquatic and terrestrial environments. The last 4 years have been spent working as a consulting ecologist in Queensland and New South Wales, where I have gained extensive experience in project management and client liaison, flora and fauna survey methodologies and identification, GIS mapping and environmental planning and legislation.

SELECTED PROJECT EXPERIENCE:

Consultancy Sector

- **Centennial Coal Clarence Extension Project** – As Project Manager I was solely responsible for the background research, field studies and reporting that was required to produce the flora and fauna assessment for the proposed 636 hectare extension of Clarence underground mining works.
- **Centennial Coal Clarence REA VI** – I was Project Manager for this project, and was responsible for managing the ecological assessment of the proposed Reject Emplacement Area VI at Clarence Colliery. Required works included client liaison, field surveys, vegetation mapping and reporting.
- **Centennial Coal Land Holdings Strategic Assessment** – This desktop assessment involved the analysis of the potential conservation and biodiversity values of Centennial off-tenement land holdings to determine potential benefits of alternative land uses. I was directly responsible for the assessment of 258 individual lots as well as producing the associated GIS datasets, user guide and assessment report.
- **Centennial Coal Angus Place and Springvale Extension Projects** – These projects are located within the Newnes Plateau and immediate surrounds just north of Lithgow, NSW. I have been involved in the extensive flora and fauna field surveys required for these large projects, and I was responsible for all GIS requirements for the ecological works including finalised vegetation maps and EIS figures.
- **Centennial Coal Airly Extension Project** – A flora and fauna assessment was conducted for this large project over nearly 4000 hectares of remote bushland north of Capertee in NSW. I was involved in the flora and fauna surveys required for this project along with analysis GIS data and producing finalised maps for the EIS.
- **Rose Group: Gwandalan** – I have been responsible for strategic planning and installation of nest boxes as a part of the approval conditions for a residential development at Gwandalan. The project will involve ongoing nest box installations and monitoring on a biannual basis.
- **Huntlee Pty Ltd** – I have been responsible for several ecological projects as part of the Huntlee residential development at North Rothbury. Such projects include nest box planning and installations, clearing supervision, GIS and targeted threatened species surveys.
- **Hancock Coal Pty Ltd: Alpha Coal Project** – The site of a well known thermal coal deposit in the Galilee Basin of Queensland, I was involved in terrestrial and aquatic flora and fauna surveys, habitat assessments and reporting.

- **Hancock Coal Pty Ltd: Kevins Corner Project** – Situated to the north of the Alpha Coal Project, I was involved in flora and fauna surveys as well as ecological assessment reporting.

Research Sector

- **Kalahari Meerkat Project** – This project was collaboratively run by the University of Cambridge in the UK and the University of Zurich in Switzerland. I was an ecological researcher on this project in the Northern Cape of South Africa for 1.5 years, assessing the behavioural and reproductive ecology of the Meerkat *Suricatta suricatta*.
- **Great Barrier Reef Monitoring Program** – I was a Project Officer for Reef Check Australia in Townsville throughout 2009. I was primarily responsible for organising and implementing monitoring surveys, data collection and reporting to the Great Barrier Reef Marine Park Authority on the health of reefs across the entire GBR.
- **Meso-American Barrier Reef Monitoring Program** – I was a volunteer surveyor for Global Vision International in the Yucatan Peninsula of Mexico during 2008, primarily involved in dive surveys, data collection and ecotourism as a part of a long-term monitoring program.

PREVIOUS EXPERIENCE:

Ecologist – Australasian Resource Consultants **1 year**

I was employed at AARC as an ecologist at the beginning of 2011. My role primarily involved ecological field surveys, EIA reporting and GIS mapping within a consultancy role that required initiative, efficiency and innovation. A valued member of the team, I left AARC to pursue a similar role with RPS in my hometown of Newcastle.

Lab Technician – Fisheries Resource Consultants **0.5 years**

My role in the laboratory for FRC in 2010 involved the sorting and identification of macro-invertebrates as an indication of aquatic waterway health. This was a casual position that ended upon gaining employment full-time at AARC.

Ecologist – Environmental, Ground & Water Consultants **0.5 years**

I was employed at EGC whilst completing my Masters at the University of Queensland in 2010. This was a project-based role on Curtis Island off of Gladstone in Central Queensland. My role involved ecological surveys, identification of fauna habitat and assessment reporting prior to the development of the QCG LNG plant on Curtis Island.

MEMBERSHIPS & ACHIEVEMENTS:

Ecological Consultants Association – Active Member 2012 – Present

APPENDIX D

Stormwater

Ref: NE150434 L04

31 May 2016

Level 1, 54 Union Street
Cooks Hill
Newcastle
NSW 2300

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ENGINEERS
MANAGERS
INFRASTRUCTURE PLANNERS
DEVELOPMENT CONSULTANTS

McCloy Group
PO BOX 2214
Dangar NSW 2309

Attn: Mr James Goode

Dear James,

Re The Bower Subdivision, Medowie

ACOR Consultants, on behalf of McCloy Developments, have undertaken a review of the impacts of revising the lot areas for the future stages of The Bower Subdivision to the proposed detention basin sizes.

The Port Stephens Handbook of Drainage Design Criteria (February 2008), Section D5.06 Percentage Impervious and Runoff Co-efficient, shows the fraction impervious for "2a normal residential" is 60% for lot sizes ranging from 450m^2 to 2000m^2.

As the lot areas are proposed to be reduced from 1000m^2 to a minimum of 500m^2, the fraction impervious will remain the same as per Port Stephens Councils requirements.

As the fraction impervious remains the same for the proposed change in lot size the detention basin sizes specified in GCA's Stormwater Drainage Strategy will be unaffected assuming catchment areas are unchanged. The final lot layout and basin catchment areas will be confirmed and issued to Port Stephens Council as part of future approvals.

Yours faithfully
ACOR Consultants (NNSW) Pty Ltd

Joshua Rhodes
MIEAust, CPEng, NER
Associate, Senior Civil Engineer