Appendix A - Information checklist (completed)

STEP 1: REQUIRED FOR ALL PROPOSALS

(under s55(a)-(e) of the EP&A Act)

- Objectives and intended outcome
- Mapping (including current and proposed zones)
- Community consultation (agencies to be consulted)
- Explanation of provisions
- Justification and process for implementation (including compliance assessment against relevant section 117 direction/s)

STEP 2: MATTERS CONSIDERED ON A CASE BY CASE BASIS

(Depending on complexity of planning proposal and nature of issues)

Planning matters or issues	To be considered	N/A
Strategic Planning Context		
Consistent with the relevant regional plan, district plan, or corridor/precinct plans applying to the site, including any draft regional district or corridor/precinct plans released for public comment; or	☒	☐
Consistent with a relevant local council strategy that has been endorsed by the Department; or	☒	☐
Responding to a change in circumstances, such as the investment in new infrastructure or changing demographic trends that have not been recognised by existing planning controls, or	☒	☐
Seeking to update the current planning controls if they have not been amended in the last 5 years.	☐	☒
Site Description/Context		
Aerial photographs	☒	☐
Site photos/photomantage	☒	☐
Traffic and Transport Considerations		
Local traffic and transport	☒	☐
Public transport	☒	☐
Cycle and pedestrian movement	☒	☐
Environmental Considerations		
Bushfire hazard	☒	☐
Acid Sulphate Soil	☒	☐
Noise impact	☐	☒
Flora and/or fauna	☒	☐
Soil stability, erosion, sediment, landslip assessment and subsidence	☒	☐

Planning Matters or issues	To be considered	N/A
Water quality	☒	☐
Stormwater management	☒	☐
Flooding	☐	☒
Land/site contamination (SEPP 55)	☒	☐
Resources (including drinking water, minerals, oysters, agricultural lands, fisheries, mining)	☒	☐
Sea level rise	☒	☐
Urban Design Considerations		
Existing site plan (buildings vegetation, roads, etc)	☒	☐
Building mass/block diagram study (changes in building height and DSR)	☒	☐
Lighting impact	☐	☒
Development yield analysis (potential) yield of lots, houses, employment generation)	☒	☐
Economic Considerations		
Economic impact assessment	☐	☒
Retail centres hierarchy	☐	☒
Employment land	☐	☒
Social and Cultural Considerations		
Heritage impact	☒	☐
Aboriginal archaeology	☒	☐
Open space management	☒	☐
European archaeology	☒	☐
Social and cultural impacts	☒	☐
Stakeholder engagment	☒	☐
Infrastructure Considerations		
Infrastructure servicing and potential funding arrangements	☐	☒
Miscellaneous/Additonal Considerations		
List any additional studies that should be undertaken post Gateway determination	☐	☒

Meeting date: April 2017

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DHA

FORT WALLACE
DEFENCE HOUSING PROJECT

Ecological Assessment Report

October 2017

FORT WALLACE
DEFENCE HOUSING PROJECT

Ecological Assessment Report

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Defence Housing Australia

Project Director:	Rebecca Vere
Project Manager:	Kate Connolly
Report No.	3764/R01/V3
Date:	October 2017

Newcastle

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This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Executive Summary

Umwelt (Australia) Pty Limited (Umwelt) has been commissioned by Defence Housing Australia (DHA) to prepare an Ecological Assessment for a rezoning application for the land known as Fort Wallace, the boundary of which is Lots 100 and 101 DP1152115 (the Study Area) in Stockton, NSW. It is proposed to rezone the Study Area from the current Infrastructure (SP2 Defence) to Low Density Residential under the Newcastle Local Environmental Plan (LEP) 2012 to allow for a residential subdivision.

DHA has an ongoing requirement for additional housing in the Newcastle area to cater for Newcastle-based Defence members and their families and to replace existing DHA dwellings that do not meet current standards. In response to this, DHA have recently purchased two sites: Fort Wallace, Stockton, NSW and the Rifle Range, Fern Bay, NSW. DHA intends to obtain the necessary planning approvals to develop these sites for residential use with a mix of housing suitable for both Australian Defence Force (ADF) personnel and the private market.

The proposed Master Plan for the Fort Wallace site includes a mix of residential typologies including townhouses, dune apartments, coastal cluster houses, courtyard homes and single eco-homes primarily placed within the former Fort Wallace footprint. The Master Plan has sought to retain the Fort Wallace landscape and focus development within the previously disturbed areas of the site.

This Ecological Assessment was prepared to be appended to the Planning Proposal to rezone the Fort Wallace site.

The Fort Wallace site contains three native vegetation communities and one exotic vegetation community being Frontal Dune Blackbutt-Apple Forest, Coastal Tea-tree – Banksia Scrub, Bitou bush-dominated Scrub and Foredune Spinifex. A wide range of flora and fauna species have been recorded within and surrounding the Study Area as part of previous ecological surveys. Generally, the habitats in the Fort Wallace site are moderately to highly disturbed and degraded as a result of previous disturbances and weed invasion.

Three threatened species listed under the TSC Act and/or EPBC Act have been recorded on the site being pied oystercatcher (*Haematopus longirostris*), grey-headed flying-fox (*Pteropus poliocephalus*) and east coast freetail-bat (*Mormopterus norfolkensis*).

As the proposed rezoning has focused on the retention of as much intact vegetation and important ecological features as possible, the impacts to local biodiversity and threatened species are very minimal. Based on the current Master Plan, it is considered unlikely that the potential redevelopment of the site for residential uses would result in a significant impact on threatened species occurring or with the potential to occur on the site.

A range of mitigation and management measures are proposed to minimise the adverse impacts of the rezoning on local biodiversity. The rezoning aims to protect approximately 23 hectares of the site, via a proposed rezoning to E3 Environmental Management.

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List of Abbreviations and Acronyms

Abbreviation/ Acronym	Definition
ADF	Australian Defence Force
APZ	Asset Protection Zone
BC Act	*Biodiversity Conservation Act 2016*
BVT	Biometric Vegetation Type
DHA	Defence Housing Australia
DoEE	Commonwealth Department of the Environment and Energy (formerly DoE)
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environmental Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NCC	Newcastle City Council
NPWS	National Parks and Wildlife Service
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
RAAF	Royal Australian Air Force
SAT	Spot Assessment Technique
TEC	Threatened Ecological Community
TSC Act	*Threatened Species Conservation Act 1995*
VIS	Vegetation Information System

1.0 Introduction

Umwelt (Australia) Pty Limited (Umwelt) has been commissioned by Defence Housing Australia (DHA) to prepare an Ecological Assessment for a rezoning application for the land known as Fort Wallace, the boundary of which is Lots 100 and 101 DP1152115 (the Study Area) in Stockton, NSW (refer to **Figure 1.1**). It is proposed to rezone the Study Area from the current Infrastructure (SP2 Defence) to Low Density Residential under the Newcastle Local Environmental Plan (LEP) 2012 to allow for a residential subdivision.

The Study Area has been subject to ongoing investigations (including ecological survey) as a potential development site since 2008. The ecological features identified as part of such investigations (including current and previous field survey) have been used to guide the design of an appropriate Master Plan that informs the planning proposal, with the aim of providing a development approach which balances the economic potential of the study area with appropriate biodiversity conservation outcomes for the broader Stockton area.

1.1 Project Description

DHA has an ongoing requirement for additional housing in the Newcastle area to cater for Newcastle-based Defence members and their families and to replace existing DHA dwellings that do not meet current standards. In response to this, DHA have recently purchased two sites: Fort Wallace, Stockton, NSW and the Rifle Range, Fern Bay, NSW. DHA intends to obtain the necessary planning approvals to develop these sites for residential use with a mix of housing suitable for both Australian Defence Force (ADF) personnel and the private market.

The two sites are located close to the Royal Australian Air Force (RAAF) Base Williamtown which lies 11 to 12 kilometres to the north of the sites. The Newcastle central business district lies a few kilometres to the south across the Hunter River.

1.1.1 Proposed Master Plan – Fort Wallace

The proposed Master Plan for the Fort Wallace site includes a mix of residential typologies primarily placed within the former Fort Wallace clearance footprint (refer to **Figure 1.2**). The Master Plan has sought to retain the Fort Wallace landscape and focus development within the previously disturbed areas of the site. The residential typologies for the Fort Wallace include the following:

- ***Townhouses*** – up to 30 attached 1-3 storey dwellings with a lightweight design that facilitates layouts that are responsive to site features and context.
- ***Dune apartments*** – up to 42 designed to minimise the overall building footprint and bulk and maximise visual connections with the surrounding landscape.
- ***Coastal cluster houses*** – up to 21 townhouse style dwellings set within natural landscape areas. Private open space is limited to decks and immediate terrace areas attached to each dwelling.
- ***Courtyard homes*** – up to 3 large courtyard family homes including 4 bedrooms, 3 bathrooms, open plan living space, single garage and an ample rear garden.
- ***Single eco-homes*** – up to 7 lightweight, climate responsive individual homes set within generous lots.

Image Source: Nearmap (May2016)
Data Source: LPI NSW (2009)

0 1.0 2.0 2.5km
1:50 000

Legend

- Site Boundary
- National Park
- State Conservation Area
- Regional Park
- Hunter Estuary Wetlands Ramsar Site

FIGURE 1.1

Locality Map

Image Source: Nearmap (May2016)
Data Source: LPI NSW (2009), Architectus (2017)

0 100 200 250m
1:5000

Legend

- Site Boundary
- Asset Protection Zone
- Heritage Item
- Heritage Item (Subterranian)
- Heritage Buffer (Council LEP)
- Stormwater Detention Basin (Subject to design resolution)
- Dune Apartment
- Townhouse
- Courtyard Home
- Cluster Home
- Single Eco Home
- Trees

FIGURE 1.2

Proposed Master Plan

File Name (A4): R01/3764_008.dgn
20171023 13.13

1.1.2 Guiding Principles

It is envisaged that a residential development at the Fort Wallace would develop the site and the areas of Stockton and Fern Bay as unique coastal communities with strong links to Newcastle and the growing Hunter region. The rezoning aims to provide residential housing while balancing the natural coastal environment and cultural heritage assets of the site.

Guiding principles for the rezoning of Fort Wallace, which have shaped the design considerations of the Master Plan, include the following:

- ***Touch lightly on the land*** – raised building (no slabs), working with the existing natural topography to minimise earthworks.
- ***Embrace the coastal ecology*** – minimisation of private open space and boundary fencing, native endemic planting only, maximise views to the ocean, dunes, river and bushland.
- ***Celebrate history and cultural heritage*** – retain heritage structures, connect with the history of the site.
- ***Create a diverse community*** – mix of building typologies for defence, private and affordable housing needs, recreational opportunities for visitors.
- ***Open the gates to the public*** – provide public access via the local road, pedestrian and cycle networks, controlled access to the beach and dunes.
- ***Utilise interesting architectural forms*** – staggered building heights, natural materials and finishes, varied street setbacks.

1.2 Approval Pathway

This ecological assessment is part of a suite of specialist assessments of the site that have informed consideration of the site's potential for redevelopment. These assessments have been used as the basis of master plan options and the development of a recommended master plan, which has subsequently informed proposed revised planning controls for the site with respect to land use, height of buildings, and heritage.

It is intended that a planning proposal will be lodged with Newcastle City Council, seeking support of the strategic merit of the proposal to proceed to a Gateway Determination by the Department of Planning and Environment (DPE). It is intended that the planning proposal, if supported by both Council and DPE, would then proceed to public exhibition and finalisation through an amendment to the LEP. Key outcomes of the master plan may be established in a site specific Development Control Plan or Stage 1 Development Application. Appropriate approvals will then be sought for the subdivision and development of the site under the amended planning controls.

The Master Plan has been used as a demonstration of how the site could appropriately accommodate residential uses in response to best practice urban design and planning principles. Where appropriate, this report has considered the likely impacts of the Master Plan on the ecology of the site to enable as detailed an assessment as possible. However, it is acknowledged that further detailed work will be undertaken and consideration given to potential ecological impacts at the subdivision and detailed design stage.

1.3 Objectives of the Ecological Assessment

This Ecological Assessment will be appended to the Planning Proposal to rezone Fort Wallace. Specifically, the objectives of the Ecological Assessment are to:

- describe the flora and fauna species and other important ecological features recorded within the Study Area and locality from previous studies on the site, local studies and ecological database searches
- identify any threatened species, endangered populations, threatened ecological communities (TECs), or their habitats listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act), NSW *Fisheries Management Act 1994* (FM Act), and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), that may be adversely affected as a result of the proposal
- assess the potential impact of the proposal in relation to identified and potential important ecological features, according to the requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the EPBC Act and
- develop impact mitigation measures (including consideration of offsetting opportunities) to avoid or reduce any potential significant impacts of the proposal on the important ecological values of the Study Area.

The *Biodiversity Conservation Act 2016* was implemented on 25 August 2017, repealing the TSC Act. It should be noted that this Ecological Assessment was prepared and submitted to Council prior to the repeal of the TSC Act (February 2017). This report (Version 3) has been updated to reflect the changes requested following Council's review of the Planning Proposal in relation to building heights, zoning amendments and heritage considerations.

The assessments in this report have not been updated to reflect the minor changes in relation to the replacement of the TSC Act by the BC Act. It is understood that threatened entities previously listed under the TSC Act were automatically transferred to be listed under the BC Act and the amended Assessment of Significance Test (now outlined in Section 7.3 of the BC Act) does not materially change the assessment outcome. Consideration of the BC Act and its implications on the Project will be addressed at the DA phase of the project, as required.

1.4 Document Outline

The Ecological Assessment includes the following sections:

- Section 1 – provides the introduction to the report
- Section 2 – outlines the methods used in the ecological assessment
- Section 3 - describes the ecological features of the Study Area
- Section 4 – assesses the likely impacts on important ecological features
- Section 5 – describes impact avoidance, mitigation and offsetting opportunities
- Section 6 – outlines recommendations for additional ecological investigations during the development application phase of the project
- Section 7 - provides a list of references used throughout the report and analysis.

2.0 Methods

The methods employed as part of the desktop and field components of the Ecological Assessment are discussed in the following sections, including those of the current and previous surveys within the Study Area.

2.1 Literature Review

A review of all relevant and available literature was undertaken in order to gain a holistic understanding of the ecological values of the Study Area. Documents reviewed included regional vegetation mapping reports, site-specific monitoring surveys, ecological surveys undertaken in the vicinity of the Study Area and also relevant ecological database searches.

The following key documents were reviewed during the preparation of this Ecological Assessment:

- Ecological Constraints Assessment – Fort Wallace, Stockton Peninsula (Kleinfelder 2015)
- Ecological Constraints Report, Fort Wallace, Stockton, NSW (SMEC 2008)
- Vegetation of the Worimi Conservation Lands Port Stephens, NSW: Worimi NP, Worimi SCA and Worimi RP (Bell and Driscoll 2010)
- Greater Hunter Native Vegetation Mapping (Sivertsen *et al.* 2011).

2.2 Database Searches

In order to identify threatened species, endangered populations and TECs with the potential to occur in the Study Area, a review of relevant ecological databases was completed. These database sources comprised:

- Office of Environment and Heritage (OEH) Threatened Species Profile Database for known/predicted threatened species and TECs in the Hunter Interim Biogeographic Regionalisation for Australia (IBRA) subregion, accessed September 2016
- OEH BioNet Atlas of NSW Wildlife database and mapping tool (OEH 2016), accessed in September 2016
- PlantNET (Royal Botanic Gardens Sydney) database search for Rare or Threatened Australian Plant species within the Newcastle LGA, accessed September 2016
- Department of Environment and Energy (DoEE) Protected Matters Search Tool for known/predicted EPBC Act-listed TECs, accessed September 2016
- VIS Classification Database (OEH 2016), accessed September 2016.

2.3 Field Surveys

2.3.1 Previous Field Surveys

Ecological field surveys have been carried out in the Study Area over many years and seasons including in April 2007 (SMEC 2008) and September 2015 (Kleinfelder 2015). Throughout these surveys, the following has been undertaken:

- Flora surveys including four 20m x 20m quadrats
- Diurnal fauna observations including signs of presence surveys and targeted bird surveys
- Habitat assessments
- Nocturnal spotlighting, call playback and Anabat surveys and
- Reconnaissance vegetation mapping and weed mapping.

The results of these surveys have been reviewed as part of the literature review outlined in **Section 2.1**.

2.3.2 Ecological Site Inspection

A site inspection was undertaken by Umwelt ecologists on 25 May 2016 in order to complete ground-truthing of previous surveys and identification of any important ecological features. This included:

- Rapid vegetation mapping reconnaissance
- Recording dominant weed species and infestations
- Habitat assessments for threatened species
- Diurnal bird surveys
- Spot Assessment Technique (SAT) surveys for koala (*Phascolarctos cinereus*) as per Phillips and Callaghan (1995)
- Call playback for masked owl (*Tyto novaehollandiae*), powerful owl (*Ninox strenua*), squirrel glider (*Petaurus norfolcensis*) and koala
- Spotlighting searches for nocturnal threatened fauna
- One remote camera survey location over seven nights targeting ground-dwelling threatened mammal species
- One Anabat survey location over seven nights targeted threatened micro-bat species and
- Opportunistic observations throughout the site inspection.

The remote camera and the Anabat were set up on 25 May 2016 and collected after seven nights on 1 June 2016.

2.3.3 Targeted Orchid Surveys

Site walkovers of the Study Area were undertaken by two Umwelt ecologists on 8 September 2016 to determine the presence or otherwise of sand doubletail (*Diuris arenaria*) and rough doubletail (*Diuris praecox*) within suitable habitats within the Study Area. Both species are known to occur along the Tomaree peninsula in sandy soils in associated with sclerophyll forest and disturbed habitat margins.

The timing of these surveys was dependent on the known flowering times of these species within the Port Stephens area. Furthermore, known records of the threatened orchids (control sites) were visited prior to the surveys to confirm the flowering of the species in the local area. Survey was undertaken in early September 2016 to cover the beginning of the sand doubletail flowering period and the end of the rough doubletail flowering period as per the flowering times outlined in **Table 2.1**.

Table 2.1 Threatened Orchid Species Known Flowering Period in Port Stephens

Targeted Orchid Species	Flowering Period
sand doubletail (*Diuris arenaria*)	August to September
rough doubletail (*Diuris praecox*)	July to September

3.0 Results

3.1 Ecological Local Context

Fort Wallace (the Study Area) is situated on a sand peninsula that occurs between the Hunter River and Stockton Beach, east of Newcastle, NSW. The Study Area is located within the Newcastle City Council Local Government Area (LGA) and in the Sydney Basin Bioregion and the Hunter subregion.

Table 3.1 Study Area Location in the Landscape

Fort Wallace	
IBRA Bioregion	Sydney Basin
IBRA Subregion	Hunter
Major Catchment Area	Hunter/Central Rivers
Mitchell Landscape	Sydney – Newcastle Barriers and Beaches
LGA	Newcastle City Council
Lot and DP	Lot 100 DP1152115 Lot 101 DP1152115

The Study Area is approximately 32 hectares in size and is broadly located between Fullerton Street, Stockton, and the high water mark at Stockton Beach, south of the Stockton Bridge. The land is currently zoned as SP2 Infrastructure (Defence) under the Newcastle City Council Local Environmental Plan (LEP) 2012.

The Study Area is surrounded by residential development to the north, the Pacific Ocean, waste water facilities to the south and the northern arm of the Hunter River to the west. The Study Area provides minimal connectivity to higher quality habitats in the north of Stockton being Worimi Conservation Lands, which provides an important habitat link within a broader wildlife corridor from the Hunter Wetlands National Park in the northwest, Tomaree National Park and Tilligerry State Conservation Area in the north.

Vegetation in the Study Area has been subjected to several human disturbances including activities during the active use of the site in World War II and defence training activities and vehicle recreation. These disturbances have led to a reduction in vegetation condition, particularly within the dune system. Retained vegetation in the northern and southern portion of the Study Area represents an isolated and fragmented area of lower quality habitat. Fauna habitats in the locality include disturbed forests, coastal sand scrub and sand dunes.

3.2 Flora and Native Vegetation

A total of 46 flora species have been recorded in the Study Area following floristic surveys undertaken by SMEC (2008), Kleinfelder (2015) and Umwelt. A full list of the flora species recorded during surveys of the Study Area is presented in **Appendix A**.

Three native vegetation community types have been mapped within the Study Area, being:

- Frontal Dune Blackbutt-Apple Forest
- Coastal Tea-tree – Banksia Scrub
- Foredune Spinifex.

One exotic vegetation community type has been mapped within the Study Area, being:

- Bitou Bush-dominated Scrub.

These communities have been aligned with the Vegetation of the Worimi Conservation Lands (Bell and Driscoll 2010) and assigned (where possible) to Plant Community Types (PCTs) and Biometric Vegetation Types (BVTs) as per the Vegetation Information System (VIS).

Table 3.2 outlines the native vegetation community types within the Study Area. **Figure 3.1** shows vegetation mapping of the Study Area.

Table 3.2 Vegetation Communities in the Study Area

Vegetation Community (Bell and Driscoll 2010)	Likely Associated PCT/BVT	Area within the Study Area (ha)
Frontal Dune Blackbutt-Apple Forest	PCT1646/HU860 – Smooth-barked Apple – Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast	4.1
Coastal Tea-tree – Banksia Scrub	PCT1646/HU860 – Smooth-barked Apple – Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast	5.0
Bitou Bush-dominated Scrub	No equivalent PCT or BVT	8.9
Foredune Spinifex	PCT1204/(no equivalent BVT) – Spinifex beach strand grassland, Sydney Basin Bioregion and South East Corner Bioregion	2.3
Cleared land/sand dunes	No equivalent PCT or BVT	11.6
Total		**31.9**

Image Source: Nearmap (May2016)
Data Source: LPI NSW (2009)

0 100 200 250m
1:5000

Legend

- Site Boundary
- Frontal Dune Blackbutt-Apple Forest
- Coastal Tea-tree - Banksia Scrub
- Bitou Bush dominated Scrub
- Foredune Spinifex
- Cleared Land/Sand Dunes

FIGURE 3.1

Preliminary Vegetation Community Mapping

File Name (A4): R01/3764_005.dgn
20160926 14.59

3.2.1 Vegetation Community Descriptions

Tables 3.3 to **3.6** below describe the vegetation communities occurring in the Study Area.

Table 3.3 Frontal Dune Blackbutt-Apple Forest

Community Name	Frontal Dune Blackbutt-Apple Forest	
Likely Plant Community Type (PCT)	PCT1646/HU860 – Smooth-barked Apple – Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast	
Vegetation Formation	Dry Sclerophyll Forests (Shrubby sub-formation)	
Vegetation Class	Coastal Dune Dry Sclerophyll Forests	
Total Area in Study Area (ha)	4.1	
General Description	This vegetation community occurs on the Holocene sands along the Stockton Bight coastline where there is protection from direct coastal winds. This vegetation community condition class is located primarily to the north of the Study Area. This community also occurs in two smaller patches in the south of the Study Area.	
Floristic Description	This community is a moderately open forest with a shrubby understorey. The canopy is dominated by smooth-barked apple (*Angophora costata*) and blackbutt (*Eucalyptus pilularis*) with occasional occurrences swamp mahogany (*Eucalyptus robusta*). The midstorey was dominated by old man banksia (*Banksia serrata*), Sydney golden wattle (*Acacia longifolia*) and coastal tea-tree (*Leptospermum laevigatum*), with occasional coast banksia (*B. integrifolia*). The ground cover consisted primarily of bracken fern (*Pteridium esculentum*) with raspwort (*Gonocarpus teucrioides*), blady grass (*Imperata cylindrica*) and kangaroo grass (*Themeda triandra*) also present. The exotic bitou bush (*Chrysanthemoides monilifera*) and lantana (*Lantana camara*) also occur in this community.	
TSC Act Status	This vegetation zone does not conform to a TEC listed under the TSC Act.	
EPBC Act Status	This vegetation zone does not conform to a TEC listed under the EPBC Act.	

Table 3.4 Coastal Tea-tree – Banksia Scrub

Community Name	Coastal Tea-tree – Banksia Scrub	
Likely Plant Community Type (PCT)	PCT1646/HU860 – Smooth-barked Apple – Blackbutt – Old Man Banksia woodland on coastal sands of the Central and Lower North Coast	
Vegetation Formation	Dry Sclerophyll Forests (Shrubby sub-formation)	
Vegetation Class	Coastal Dune Dry Sclerophyll Forests	
Total Area in Study Area (ha)	5.0	
General Description	This vegetation community occurs on the Holocene sands along the Stockton Bight coastline where there is protection from direct coastal winds. This vegetation community condition class is likely to be derived from the Frontal Dune Blackbutt-Apple Forest occurring in the north and south of the Study Area. Historical disturbances from the former use of Fort Wallace have modified this community with groundcovers and shrubs now dominating. This community occurs in the central portion of the Study Area associated with the edges of the Fort Wallace existing disturbed areas.	
Floristic Description	This community occurs as a shrubland and is primarily dominated by coastal tea-tree (*Leptospermum laevigatum*) with occurrences of coastal wattle (*Acacia longifolia* subsp. *sophorae*) and coast banksia (*Banksia integrifolia*). The native groundcover consisted primarily of pig face (*Carpobrotus glaucescens*), spiny-headed mat-rush (*Lomandra longifolia*) and dune fan flower (*Scaevola calendulacea*). The exotic bitou bush (*Chrysanthemoides monilifera*) and lantana (*Lantana camara*) also occur in this community. Disturbance of this community is varied with some areas recently cleared with sparse vegetation cover and other areas presenting dense coastal tea-tree stands. This community also extends to the dune margins to the east of the Study Area where it is dominated by bitou bush (*Chrysanthemoides monilifera*) with occurrences of pig face (*Carpobrotus glaucescens*).	
TSC Act Status	This vegetation zone does not conform to a TEC listed under the TSC Act.	
EPBC Act Status	This vegetation zone does not conform to a TEC listed under the EPBC Act.	

Table 3.5 Bitou Bush-dominated Scrub

Community Name	Bitou Bush-dominated Scrub	
Likely Plant Community Type (PCT)	No equivalent PCT	
Vegetation Formation	N/A	
Vegetation Class	N/A	
Total Area in Study Area (ha)	8.9	
General Description	This vegetation community occurs on the sand dunes on the eastern sections of the Study Area, where Coastal Tea-tree – Banksia Scrub has been overtaken by a monoculture stand of bitou bush.	
Floristic Description	The dominant species in this community is bitou bush (*Chrysanthemoides monilifera*) with occasional instances of coastal wattle (*Acacia longifolia* subsp. *sophorae*) and coast banksia (*Banksia integrifolia*).	
TSC Act Status	This vegetation zone does not conform to a TEC listed under the TSC Act.	
EPBC Act Status	This vegetation zone does not conform to a TEC listed under the EPBC Act.	

Table 3.6 Foredune Spinifex

Community Name	Foredune Spinifex	
Likely Plant Community Type (PCT)	PCT1204/(no equivalent BVT) – Spinifex beach strand grassland, Sydney Basin Bioregion and South East Corner Bioregion	
Vegetation Formation	Grasslands	
Vegetation Class	Maritime Grasslands	
Total Area in Study Area (ha)	2.3	
General Description	This vegetation community occurs on the incipient foredunes on the far eastern sections of the Study Area. This community occurs sporadically along the mobile sands of Stockton Bight, and is characterised by the colonising, sand-stabilising grass *Spinifex sericeus*. These are often temporary communities found growing on mobile sand deposits such as beach foredunes and dune blowouts. Beach spinifex grassland is found across beach strands in New South Wales.	
Floristic Description	The dominant species in this community is hairy spinifex (*Spinifex sericeus*) with patches of bitou bush (*Chrysanthemoides monilifera*). In some patches, bitou bush appears to be threatening the persistence of the spinifex community.	
TSC Act Status	This vegetation zone does not conform to a TEC listed under the TSC Act.	
EPBC Act Status	This vegetation zone does not conform to a TEC listed under the EPBC Act.	

3.3 Fauna and Fauna Habitats

3.3.1 Fauna Species

A wide range of fauna species have been recorded within and surrounding the Study Area as part of previous ecological surveys.

Thirty four bird, six mammal, two reptile and two amphibian species have been previously recorded in the Study Area utilising a wide range of habitats. Of these, three threatened species listed under the TSC Act and/or EPBC Act have been recorded. These are further discussed in **Section 3.4**.

Commonly recorded species observed in the forest and shrubland habitats include Australian raven (*Corvus coronoides*), magpie lark (*Grallina cyanoleuca*), red-browed finch (*Neochmia temporalis*), red wattlebird (*Anthochaera carunculata*) and swamp wallaby (*Wallabia bicolor*). Introduced fauna species observed within the Study Area include red fox (*Vulpes vulpes*) and the European rabbit (*Oryctolagus cuniculus*). A full fauna list for the Study Area is included in **Appendix B**.

3.3.2 Fauna Habitats

Several general fauna habitat types occur in the Study Area. Each of these broad habitat types has a range of characteristics which influence the habitat value, and the range of fauna species that are likely to be identified within each type. The broad habitat types within the Study Area consist of forest, shrubland and dune spinifex habitat. Generally, the habitats in the Study Area are moderately to highly disturbed and degraded as a result of previous disturbances and weed invasion.

Forested habitats of the Study Area are dominated by eucalypts species which are likely to provide a seasonally prolific nectar resource for birds such as honeyeaters and lorikeets. The forested habitats of the Study Area contain low hollow resources due a general lack of mature and old growth trees. The forest understorey provides potential foraging habitat for micro-bats, macropods, birds and some limited nesting potential in protected areas for small woodland birds. The ground cover is dense providing foraging and refuge resources for reptiles and small terrestrial mammals.

The shrubland habitat in the central portion of the Study Area may provide habitat resources for a wide range of nectarivorous species. This habitat is considered to be derived from the surrounding forest habitat, with the community likely a result of ground disturbance in this area. Small birds such as the superb fairy wren (*Malurus cyaneus*) and red-browed finch (*Neochmia temporalis*), and reptiles such as the eastern striped skink (*Ctenotus robustus*) are provided foraging habitat as well as refuge habitat within the dense shrub layers.

The dune spinifex and wetland habitat in the Study Area is subject to coastal winds with minimal vegetation and no fauna species were recorded at the time of the surveys. Despite this, it is likely that sea birds such as gulls and terns would occasionally utilise these areas for foraging or roosting. Common species such as silver gull (*Chroicocephalus novaehollandiae*), crested tern (*Thalasseus bergii*) and red-capped plovers (*Charadrius ruficapillus*) are likely to occur in these habitats. There is potential for migratory wader birds to forage along the tideline or nest on sandflats between the dunes immediately behind the beach.

3.3.3 Koala Habitat

Koalas feed on the foliage of eucalypt tree species and in some areas exhibit extremely strong preferences for particular eucalypt species. State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) lists preferred koala feed trees as does the Approved Recovery Plan for the Koala (DECC 2008). One of these feed species, swamp mahogany (*Eucalyptus robusta*), is known to occur in the Study Area within the Frontal Dune Blackbutt-Apple Forest.

An assessment under SEPP 44 is based on an initial determination of whether the land constitutes potential koala (*Phascolarctos cinereus*) habitat. This is determined by assessing whether the eucalypt species present in Schedule 2 of the policy constitute 15 per cent or more of the total number of trees in the upper or lower strata of the tree component. Swamp mahogany (*Eucalyptus robusta*) did not constitute more than 15 per cent of total number of trees in the Frontal Dune Blackbutt-Apple Forest. Furthermore, according to the Koala Habitat Assessment Tool in the EPBC Act Referral Guidelines for the Vulnerable Koala (DoE 2014), the habitats within the Study Area are not considered to contain habitat critical to the survival of the species (DoE 2014).

The koala was targeted during surveys undertaken in May 2016 including SAT, call playback and spotlighting surveys (refer to **Section 2.3.2**). No evidence (scats, scratches, etc) of koala occupation was recorded in the Study Area. While the koala has not been specifically recorded within the Study Area, the species has been recorded as recently as 2015 in habitats associated with Fern Bay approximately 1.5km north of the Study Area.

3.4 Important Ecological Features

3.4.1 Threatened Species, Populations and Communities

Threatened species relevant to the Study Area are discussed in the sections below and shown in **Figure 3.2**.

3.4.1.1 Threatened Flora Species

No threatened flora species listed under the TSC or EPBC Acts have been previously recorded within the Study Area.

A range of threatened flora species have been previously recorded in the wider locality in similar habitats. **Table 3.7** below outlines the threatened flora species that have been recorded in the Study Area or are likely to occur in the Study Area due to local records and the availability of suitable habitat. A full list and assessment of the threatened species previously recorded within 10km of the Study Area is provided in **Appendix C.**

Table 3.7 Threatened Flora Species Recorded or Likely to Occur in the Study Area

Species Name	TSC Act	EPBC Act	Records and Further Information
coast groundsel *Senecio spathulatus*	E	-	Not recorded within the Study Area. Has been previously recorded on the Stockton sand dunes approximately 10km northeast of the Study Area (Bell and Driscoll 2010). May occur on the sand dunes in the east of the Study Area.

Notes:
E endangered

Image Source: Nearmap (May2016)
Data Source: LPI NSW (2009), Atlas NSW (2016)

0 100 200 250m
1:5000

Legend

- Site Boundary
- Pied Oystercatcher
- Grey-headed Flying-fox
- Fork-tailed Swift

FIGURE 3.2

Significant Ecological Features of the Study Area

3.4.1.2 Threatened Fauna Species

Three threatened fauna species listed under the TSC or EPBC Acts have been previously recorded within the Study Area being:

- pied oystercatcher (*Haematopus longirostris*), listed as endangered under the TSC Act
- grey-headed flying-fox (*Pteropus poliocephalus*), listed as vulnerable under the TSC and EPBC Acts and
- east coast freetail-bat (*Mormopterus norfolkensis*), listed as vulnerable under the TSC Act.

Table 3.8 below outlines the threatened fauna species that have been recorded in the Study Area or are likely to occur in the Study Area due to local records and the availability of suitable habitat. A full list and assessment of the threatened species previously recorded within 10km of the Study Area is provided in **Appendix C**.

Table 3.8 Threatened Fauna Species Recorded or Likely to Occur in the Study Area

Species Name	TSC Act	EPBC Act	Records and Further Information
Birds			
white-bellied sea eagle *Haliaeetus leucogaster*	V	-	Not recorded within the Study Area. The Study Area is likely to provide suitable foraging habitat and potential nesting habitat for the species, however no nests have been recorded in the Study Area.
pied oystercatcher *Haematopus longirostris*	E	-	**Recorded** within the Study Area (OEH 2016). Pied oystercatcher was recorded on Stockton Beach in January 2002. The sand dune habitat is likely to provide suitable foraging habitat for the species.
Mammals			
grey-headed flying-fox *Pteropus poliocephalus*	V	V	**Recorded** within the Study Area. Up to two individuals were observed foraging in coastal banksia (*Banksia integrifolia*) in the north of the site in May 2016. No flying-fox camps have been recorded in the Study Area. The Study Area is likely to provide suitable foraging habitat for the species.
little bentwing-bat *Miniopterus australis*	V	-	Not recorded within the Study Area. Detected north of the site near the Worimi Conservation Lands in May 2016. The Study Area is likely to provide suitable foraging habitat for the species.
eastern bentwing-bat *Miniopterus schreibersii oceanensis*	V	-	Not recorded within the Study Area. Detected north of the site near the Worimi Conservation Lands in May 2016. The Study Area is likely to provide suitable foraging habitat for the species.

Species Name	TSC Act	EPBC Act	Records and Further Information
east coast freetail-bat *Mormopterus norfolkensis*	V	-	**Recorded** in the Study Area. Detected in the site using an Anabat detector in April 2007 (SMEC 2008) in the forested habitats in the Study Area. The Study Area is likely to provide suitable foraging habitat for the species.
greater broad-nosed bat *Scoteanax rueppellii*	V	-	Not recorded within the Study Area. Previously recorded in Fern Bay within 2km to the northeast of the Study Area in similar habitats. The Study Area is likely to provide suitable foraging habitat for the species.

Notes:
V vulnerable
E endangered
PD preliminary determination

3.4.1.3 Endangered Populations

No endangered populations listed under the TSC or EPBC Acts have been previously recorded within the Study Area and none are likely to occur.

3.4.1.4 Threatened Ecological Communities

No threatened ecological communities listed under the TSC or EPBC Acts have been recorded within the Study Area. **Table 3.9** below outlines the TECs that have the potential to occur in the Study Area due to local records and the availability of suitable habitat. A full list of the TECs previously recorded within 10km of the Study Area is provided in **Appendix C**.

Table 3.9 Threatened Ecological Communities with the Potential to Occur in the Study Area

Species Name	TSC Act	EPBC Act	Records and Further Information
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	EEC	-	No beach wetlands were recorded in the Study Area at the time of survey. It is acknowledged that these communities are dynamic and respond to seasonal conditions. This community is restricted to freshwater swamps in swales and depressions on sand dunes and low nutrient sandplain sites in coastal areas (NSWSC 2000) and does not currently occur within the Study Area.

Notes:
EEC endangered ecological community

3.4.2 Matters of National Environmental Significance

Under the Commonwealth EPBC Act, the approval of the Commonwealth Minister for DoEE is required for any action that may have a significant impact on matters of national environmental significance (MNES). These matters are:

- listed threatened species and communities
- migratory species protected under international agreements
- Ramsar wetlands of international importance
- the Commonwealth marine environment
- the Great Barrier Reef Marine Park
- World Heritage properties
- National Heritage places
- nuclear actions
- a water resource, in relation to coal seam gas development and large coal mining development.

One MNES has been recorded within the Study Area, being:

- grey-headed flying-fox (*Pteropus poliocephalus*), listed as vulnerable under the EPBC Act.

Grey-headed flying-fox was recorded in April 2007 feeding within the Frontal Dune Blackbutt-Apple Forest in the north of the Study Area. In accordance with the draft National Recovery Plan for the species (DECCW 2009), all foraging habitat has the potential to be productive during general food shortages and to therefore provide a resource critical to survival for the species.

The following MNES are considered to have the potential to occur within the Study Area due to local records and the availability of suitable habitat:

- swift parrot (*Lathamus discolor*), critically endangered under the EPBC Act
- regent honeyeater (*Anthochaera phrygia*) critically endangered under the EPBC Act
- little tern (*Sternula albifrons*), migratory under the Bonn Convention, China –Australia Migratory Bird Agreement (CAMBA), Japan- Australia Migratory Bird Agreement (JAMBA) and Republic of Korea – Australia Migratory Bird Agreement (ROKAMBA)
- crested tern (*Thalasseus bergii*), migratory under JAMBA
- white-throated needletail (*Hirundapus caudacutus*), migratory under the CAMBA, JAMBA and ROKAMBA
- fork-tailed swift (*Apus pacificus*), migratory under the CAMBA, JAMBA and ROKAMBA
- eastern osprey (*Pandion cristatus*), migratory under the Bonn Convention.

A wide range of threatened and migratory shorebird species, listed under the EPBC Act, are known to occupy the Stockton Sandspit located approximately 300 metres to the northwest of the Study Area. The Stockton Sandspit foreshore is one of the most important high tide roosts for shorebirds in the Hunter Estuary (Herbert 2007) containing saltmarsh, mudflats and lagoon areas suitable as foraging and roosting habitat. Species such as black-tailed godwit (*Limosa limosa*), eastern curlew (*Numenius madagascariensis*), marsh sandpiper (*Tringa stagnatilis*), great knot (*Calidris tenuirostris*), sharp-tailed sandpiper (*Calidris acuminata*) and curlew sandpiper (*Calidris ferruginea*) are regularly recorded in the summer months.

Furthermore, the Hunter Estuary Wetlands Ramsar Wetland of International Importance occurs within 300 metres to the northwest of the Study Area, mapped along the edges of the northern arm of the Hunter River, north of the Stockton Bridge. The Hunter Estuary Wetlands are listed internationally under the Ramsar Convention due to their unique mix of wetland types, importance for maintaining biological diversity and conservation of migratory shorebirds, including regularly supporting between 2 per cent and 5 per cent of the East Asian–Australasian Flyway population of eastern curlew (*Numenius madagascariensis*) (Australian Wetlands Database 2016).

3.4.3 Corridors and Connectivity

The Study Area occurs within an existing fragmented landscape north of the Stockton residential area and south of Fern Bay. Extensive areas of forested habitat occur approximately 1.7 km to the north in the Worimi Conservation Lands, which provide connectivity and movement corridors for a wide range of flora and fauna species from Stockton in the south to Tomaree and Nelson Bay in the north. The Study Area has minimal connectivity to this area due to existing cleared land associated with the Stockton Centre to the north. Connectivity from the south of the site to Stockton is currently highly fragmented as a result of previous residential and urban development.

Dune habitat along the eastern portion of the Study Area contains minimal and sparse vegetation, however is part of a large coastal dune system reaching from Stockton to Nelson Bay. Consequently the dune system provides an important corridor along the length of the Stockton Bight.

4.0 Assessment of Impacts

4.1 Avoidance Measures

DHA undertook a detailed constraints study to guide the design of the Master Plan. Through this process, different development concepts were considered and DHA has sought to minimise the biodiversity impacts associated with the proposed rezoning. Key factors in selecting the location of the disturbance footprints included the likely impacts on important ecological features, including threatened species, TECs and/or their habitats.

Ecological site inspections were undertaken in May 2016 within the Study Area to provide information on the early design phase of the Master Plan. The final layout of the Master Plan was determined in consideration of the biodiversity and heritage values of the Study Area. It was found that the vegetated areas to the north and south of the Study Area contained higher value vegetation and fauna habitat in structured woodland areas than the lower quality scattered woodland trees and exotic groundcovers dominating the central portion of the Study Area and therefore the disturbance area for the development was focused in the areas of lower ecological value.

In addition to avoiding areas of high conservation value, the proposed rezoning includes provision for large lots with minimal building envelopes to retain as much vegetation surrounding and within the residential buildings as possible. This was considered to provide an important mechanism particularly for the movement of species may occur in the habitats surrounding the Study Area, and also allows for the targeted selected retention of important habitat features such as hollow-bearing trees or key foraging tree species.

4.2 Assessment of the Master Plan

The proposed rezoning has been designed with the aim of providing a development approach which balances the economic potential of the Study Area with appropriate biodiversity conservation outcomes for the broader Stockton area. In order to achieve this outcome, focus has been paid to the retention of as much intact vegetation as practical as well as the retention and protection of identified important ecological features of the Study Area.

The current Master Plan indicates a maximum disturbance of 7.2 hectares (approximately 23 per cent) within the Study Area. It is notable that this is a maximum potential impact, and does not take into account the existing disturbed nature of a substantial part of the vegetation in the area to be developed, nor vegetation that will be able to be retained within the larger lots. Impacts are inclusive of Asset Protection Zones (APZs) that will require maintenance and thinning activities to provide suitable fire protection to residential buildings across the development.

The majority of the area to be impacted comprises the existing cleared land and the Coastal Tea-tree – Banksia Scrub.

Section 4.2.1 describes the likely direct impacts and **Section 4.2.2** describes the likely indirect impacts associated the proposed rezoning.

4.2.1 Direct Impacts

The construction and operation of the proposed rezoning may result in a range of direct impacts on biodiversity values within the Study Area. Direct impacts include the loss of native vegetation and fauna habitats as a result of direct vegetation clearance for the construction of residential buildings, roads, gardens and parklands. Key ecological impacts include:

- the loss of native vegetation communities and fauna habitats
- reduction in known threatened species habitat, including:
    - known foraging habitat for the grey-headed flying-fox (*Pteropus poliocephalus*)
    - likely foraging habitat for threatened micro-bat species.

Table 4.1 summarises the area of each vegetation community that may be impacted by the current Master Plan. It should be noted that the current Master Plan provides an indicative impact area and will likely be refined and finalised in the future development application.

A range of impact mitigation measures have been formulated to minimise the impact of vegetation loss, as discussed in **Section 5.0**.

Table 4.1 Vegetation Community Impacts as a Result of the Proposed Rezoning

Vegetation Community	Area within the Study Area (ha)	Indicative Area to be Impacted by the current Master Plan (ha)^
Frontal Dune Blackbutt-Apple Forest	4.1	1.0
Coastal Tea-tree – Banksia Scrub	5.0	0.2
Bitou Bush-dominated Scrub	8.9	0.1
Foredune Spinifex	2.3	0.0
Cleared land/sand dunes	11.6	5.9
Total	**31.9**	**7.2**

^ to be refined and finalised for the development application

4.2.2 Indirect Impacts

The proposed rezoning is not expected to result in any substantial indirect impacts on the biodiversity values of surrounding lands during the construction or operational phases of the proposed rezoning. However, the following minor indirect impacts may occur during the construction and operational phases of the proposed rezoning:

- Edge effects resulting in increased weed species could invade naturally through removal of native vegetation.
- Increases in the occurrence of feral fauna species such as foxes, rabbits, pigs, dogs and cats resulting from disturbances.

- Noise impacts have the potential to adversely impact native species such as disturbing the roosting and foraging behaviour of fauna species and reducing the occupancy of areas of suitable habitat.

- Dust impacts have the potential to adversely impact native species during construction. Potential impacts include dust covering vegetation thereby reducing vegetation health and growth.

- Vehicle strike impacts on ground-dwelling fauna species with increase vehicle movements in the post-construction landscape.

Mitigation measures outlined in **Section 5.0** will minimise the potential for these indirect impacts occurring as a result of the proposed rezoning. These impacts and mitigation measures will be further detailed at the Development Application stage.

4.3 Preliminary Seven Part Tests of Significance under the EP&A Act

The potential level of impact on threatened species listed under the TSC Act was assessed using a preliminary 'Seven Part Test of Significance' as detailed in Section 5A of the EP&A Act and the Threatened Species Assessment Guidelines (DECC 2007). As outlined in **Section 1.3**, the assessments in this report have not been updated to reflect the minor changes in relation to the replacement of the TSC Act by the BC Act. Threatened entities previously listed under the TSC Act were automatically transferred to be listed under the BC Act and the amended Assessment of Significance Test (now outlined in Section 7.3 of the BC Act) does not materially change the assessment outcome.

The Seven Part Tests of Significance were undertaken following an initial screening process to identify species that have a reasonable likelihood to be impacted by the proposed rezoning (refer to **Appendix C**). Preliminary assessments were undertaken for a range of species to determine the likelihood of significant impacts occurring on listed species and communities as a result of the rezoning proposal. It is expected that these assessments will be reviewed and revised following the finalisation of the Master Plan and impact boundaries as part of the future development application.

The Seven Part Tests of Significance do not take into account the full range of impact mitigation strategies and offsets proposed for the development, rather they consider the impacts of the proposed rezoning without any mitigation or offsetting, consistent with the requirements of the Threatened Species Assessment Guidelines (DECC 2007). Seven Part Tests of Significance were undertaken in consideration of the following threatened species and communities listed under the TSC Act:

Threatened Flora Species

- coast groundsel (*Senecio spathulatus*).

Threatened Fauna Species

- pied oystercatcher (*Haematopus longirostris*)

- little tern (*Sternula albifrons*)

- regent honeyeater (*Anthochaera phrygia*)

- swift parrot (*Lathamus discolor*)

- white-bellied sea eagle (*Haliaeetus leucogaster*)

- eastern osprey (*Pandion cristatus*)
- grey-headed flying-fox (*Pteropus poliocephalus*)
- eastern false pipistrelle (*Falsistrellus tasmaniensis*)
- little bentwing-bat (*Miniopterus australis*)
- eastern bentwing-bat (*Miniopterus schreibersii oceanensis*)
- east coast freetail-bat (*Mormopterus norfolkensis*)
- hoary wattled bat (*Chalinolobus nigrogriseus*)
- greater broad-nosed bat (*Scoteanax rueppellii*)
- yellow-bellied sheathtail-bat (*Saccolaimus flaviventris*)
- southern myotis (*Myotis macropus*).

The Seven Part Tests of Significance concluded that, based on the current Master Plan, the proposed rezoning was unlikely to result in a significant impact on threatened species or communities occurring or potentially occurring in the Study Area. Any changes to the Master Plan following this assessment, as part of a future development application, will require a revised Seven Part Test of Significance under the EP&A Act.

4.4 Preliminary Assessments of Significance under the EPBC Act

The potential level of impact on threatened species listed under the EPBC Act was assessed using the 'Assessments of Significance' as detailed in the Significant Impact Guidelines 1.1 (DoE 2013). The assessments of significance were undertaken following an initial screening process to identify species that have a reasonable likelihood to be impacted by the proposed rezoning (refer to **Appendix C**). Preliminary assessments were undertaken for a range of species to determine the likelihood of significant impacts occurring on listed species and communities as a result of the rezoning proposal. It is expected that these assessments will be reviewed and revised following the finalisation of the Master Plan and impact boundaries as part of the future development application.

As per the assessments under the EP&A Act (refer to **Section 4.3**), the assessments of significance do not take into account the full range of impact mitigation strategies and offsets proposed for the development, rather they consider the impacts of the proposed rezoning without any mitigation or offsetting.

Assessments of Significance were undertaken in consideration of the following threatened and migratory species listed under the EPBC Act:

Endangered and Critically Endangered Species

- swift parrot (*Lathamus discolor*)
- regent honeyeater (*Anthochaera phrygia*)

Vulnerable Species

- grey-headed flying-fox (*Pteropus poliocephalus*).

Migratory Species under International Conventions

- little tern (*Sternula albifrons*)
- crested tern (*Thalasseus bergii*)
- white-throated needletail (*Hirundapus caudacutus*)
- fork-tailed swift (*Apus pacificus*)
- eastern osprey (*Pandion cristatus*).

The Assessments of Significance concluded that, based on the current Master Plan, the proposed rezoning was unlikely to result in a significant impact on threatened species occurring or potentially occurring in the Study Area. Furthermore, due to the nature of the proposed rezoning and that no direct or indirect impacts are likely to occur on surrounding lands, it is unlikely that the proposed rezoning would impact the Hunter Estuary Wetlands Ramsar Site or Stockton Sandspit known to provide habitat for EPBC Act-listed threatened and migratory species.

Any changes to the Master Plan following this assessment, as part of a future development application, will require a revised Assessment of Significance under the EPBC Act.

5.0 Mitigation and Management

5.1 Mitigation Strategy

DHA has sought to avoid and minimise potential impacts on the ecological values of the Study Area throughout the design and planning process. This has included avoidance and minimisation of disturbance of key vegetation communities and fauna habitats. These avoidance measures are described in detail in **Section 4.1**.

DHA is committed to the design and implementation of a comprehensive strategy to mitigate the adverse impacts of the proposed rezoning. This section details the mitigation strategies that are designed to minimise impacts on important ecological features known to occur in the areas to be disturbed as part of any residential development that would result from the rezoning.

5.1.1 Pre-clearance Surveys and Clearance Supervision

A robust tree felling procedure will be implemented to minimise the potential for impacts on native fauna species (focusing on threatened species) as a result of the clearing of habitat trees. The tree felling procedure is designed to minimise impacts to hollow-dependent fauna such as hollow-dependent micro-bats.

5.1.1.1 Pre-clearance Surveys

Pre-clearance surveys will be required within areas of woody native vegetation that are to be cleared. Pre-clearance surveys will be undertaken by suitably qualified and experienced ecologist and involve the following:

- the demarcation of areas approved for clearing to reduce risk of accidental clearing
- habitat resources and habitat trees should be identified and marked (note: habitat trees are those containing hollows, cracks or fissures and spouts, active nests, dreys or other signs of recent fauna usage. Other habitat features to be identified include fallen timber/hollow logs, burrows and boulder piles)
- the potential presence of threatened flora and fauna species, endangered populations and TECs should be identified
- the identification of species or habitat features that are suitable for translocation or salvage
- the presence of weed species and vertebrate pest species should be assessed, if relevant and
- disturbance activities should be targeted for specific times of the year to minimise impacts to target species usage of habitat features for breeding and roosting, where practicable.

5.1.1.2 Clearance Supervision

Tree clearing will be completed as close to the completion of pre-clearance surveys as practicable to limit the potential for new issues to arise (such as new active nests being built). Tree felling supervision will be undertaken by an appropriately qualified and experienced ecologist after pre-clearance surveys have identified potential threatened species habitat. The supervising ecologist will be licensed by the relevant field survey and ethics authorities to allow for capture, housing, transport and possibly ethical euthanizing of injured fauna. The tree-felling procedure will include the following:

- Prior to clearing identified habitat trees, the felling of non-habitat trees will be completed as close to the felling of habitat trees as possible, with all surrounding habitat trees to be vigorously shaken with heavy machinery.
- On the day of habitat tree felling, the following is to be undertaken:
    - all habitat trees will be subject to a visual inspection to survey for threatened species
    - trees previously identified as containing fauna will be shaken and then felled, providing no threatened species are identified
    - all reasonable attempts will be made to reduce the impact of felling on all fauna species. This may include delaying felling trees with fauna present or felling in sections to reduce potential for injury
    - the lowering of hollow-bearing trees will be done as gently as possible with heavy machinery
    - if a threatened species is identified in a habitat tree on the day of felling, the supervising person is to advise the most appropriate method to minimise potential harm. This may include leaving the tree overnight, further shaking to encourage the animal to vacate the tree, gradual removal of branches to discourage ongoing use, soft-felling of the tree with the animal in the tree, or measures to capture and relocate the animal to secure habitats
    - uninjured animals should be released on the day of capture into nearby suitable secure habitat and should not be held for extended periods of time, and
    - injured animals will be taken to the nearest veterinary clinic or wildlife carer as soon as possible for assessment and treatment. If required, the supervising person may ethically euthanize fauna
- Following felling, habitat trees will be inspected for remaining or injured fauna species and to ensure that no hollows are blocked against the ground. This may require the tree to be rolled to ensure adequate access
- All felled habitat trees should remain in place for a least one night to allow any fauna still present to move on
- Habitat features identified for translocation or salvage operations should be extracted and stored appropriately, and
- Detailed records should be maintained regarding the type and number of habitat features cleared, the type and number of fauna encountered and their fate. This will assist in informing mitigation programs such as nest boxes and habitat augmentation programs.

5.1.2 Weed Control

Weed species could be inadvertently brought into the Study Area with imported materials, or could invade naturally through removal of native vegetation. The increased presence of weed species within the Study Area has the potential to decrease the value of extant vegetation to native species, particularly threatened species.

The following management measures will be undertaken to minimise the potential impacts and spread of weeds during the construction of the proposed rezoning:

- Any vehicles or equipment being brought onto the Study Area to be involved in ground disturbance activities and/or travelling around the site must be inspected and cleaned prior to commencing work to limit the spread of seeds and plant material between sites.
- The limits of ground disturbance will be clearly demarcated and no unnecessary disturbance will be undertaken outside of these areas.
- Regular inspections will be undertaken in the Study Area to monitor the spread of weed species.
- Training of environmental personnel on the identification of target weed species.

Any outbreak of noxious weeds will be controlled and eradicated as required under the *Noxious Weeds Act 1993*, and as required by the Local Land Services and other relevant authorities. Weed control and eradication techniques may include:

- spraying with herbicides
- physical removal e.g. chipping, or
- minimisation of area available for weed infestation, through prompt revegetation of bare areas.

5.2 Site Management

5.2.1 Flora and Fauna Protection

DHA has sought to avoid areas of higher quality fauna and flora habitat in the Study Area. The following management measures are proposed to minimise the impacts on the local flora and fauna as a result of the proposed rezoning:

- Traffic control measures including 40 km/h speed limits and speed bumps installed in suitable locations.
- Signage within the development to minimise fauna injury/road kills, as much as possible.
- Minimisation of fencing between properties to reduce impacts on wildlife movement through the development.
- Where fencing is required, fauna-friendly fencing is to be used to allow for dispersal and safe fauna movement throughout the Study Area.
- Dog and cat ownership policies, such as requiring on-lead dogs and inside cats.
- Restricted vehicle and controlled pedestrian access along frontal dune system.

5.2.2 Vegetation and Dune Rehabilitation

The aim of the dune rehabilitation will be to remove current weed infestations (particularly the areas within the Bitou Bush-dominated Scrub) to establish and improve native coastal vegetation communities and fauna habitats occurring in the Study Area. Rehabilitation biodiversity objectives will be used in future rehabilitation planning as appropriate according to coastal hazard recommendations and should:

- aim to create a sustainable and stabilising vegetation community on the fore dunes, where suitable
- focus on the planting of endemic coastal flora species
- aim to provide fauna movement habitat between the northern and southern boundaries of the site and
- encourage ecological stewardship by promoting community planting days and wildlife watching.

Dune rehabilitation should consist of stabilising and returning the fore dune landscape to a condition characteristic of the natural coastal environment. Dune rehabilitation and landscaping between the development footprints should be conducted progressively during the construction and establishment of the development to self-sustaining native and coastal vegetation communities in line with the proposed vision of the Master Plan and coastal hazard mitigation recommendations. Any rehabilitation works will use local provenance endemic species (for native communities), including the consideration of seed availability.

5.3 Biodiversity Buffers

This report has identified the numerous measures that have been undertaken as part of the planning and design of the Master Plan to avoid, minimise and then mitigate/offset the potential impacts of the proposed rezoning on the ecologically significant features of the Study Area. The implementation of these measures has resulted in a Master Plan that is likely to result in minimal residual impact on important ecological features.

The Master Plan also indicates the retention of up to approximately 23 hectares within the Study Area, via rezoning to E3 Environmental Management. This area includes the important dune habitats in the Study Area. A range of options are being considered to ensure the ongoing protection, management and long-term security of these lands, including potential to dedicate lands to Council.

6.0 Recommendations

It is recommended that the following is undertaken for the future development application phase of the project:

- Detailed floristic surveys, including systematic plots and transects in order to refine and finalise vegetation mapping.

- Collection of vegetation integrity data and targeted species-credit species surveys for inclusion in a Biodiversity Development Assessment Report (BDAR) under the Biodiversity Assessment Method (BAM) under the BC Act, if applicable.

- If an assessment under the BAM is not applicable at the time of preparing the development application, the Seven Part Tests of Significance under the EP&A Act should be revised and updated as per the final disturbance footprint and be undertaken in accordance with Section 7.3 of the BC Act. Similarity, the Assessments of Significance under the EPBC Act should also be updated following the finalisation of the impact boundaries.

This assessment concludes that the proposed rezoning and use of the land for residential purposes could facilitate and acceptable ecological outcome on the site, subject to future detailed design and approvals.

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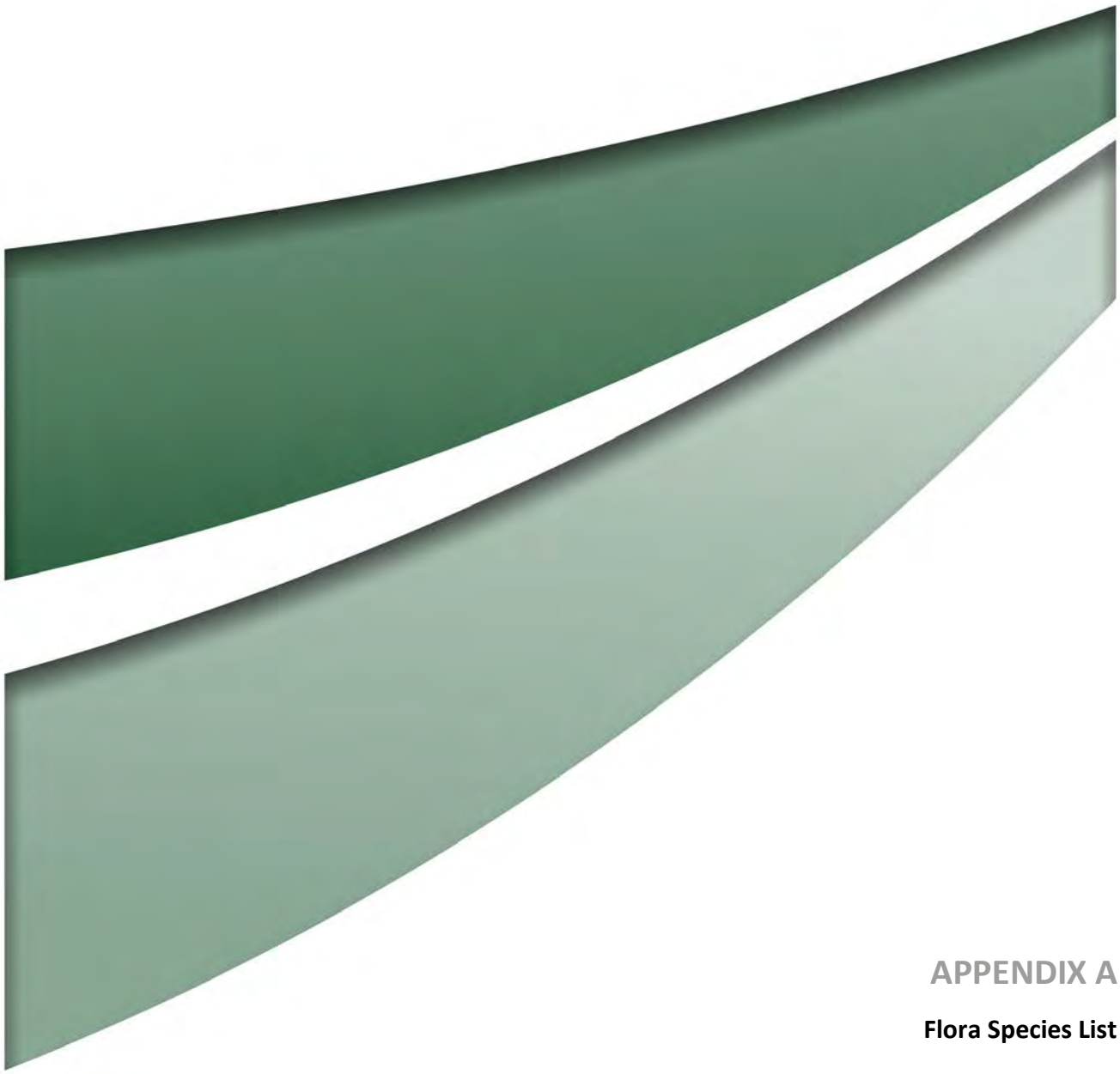


APPENDIX A

Flora Species List

Appendix A – Flora Species List

The following flora list was developed from surveys of the Study Area by SMEC (2008) Kleinfelder (2015) and Umwelt (2016). The list will not be comprehensive, because not all species are readily detected at any one time of the year. Many species flower only during restricted periods of the year, and some flower only once in several years. In the absence of flowering material, many of these species cannot be identified, or even detected.

Names of classes and families follow a modified Cronquist (1981) System.

Any species that could not be identified to the lowest taxonomic level are denoted in the following manner:

sp. specimens that are identified to genus level only

The following abbreviations or symbols are used in the list:

asterisk (*) denotes species not native to the Study Area

subsp. subspecies

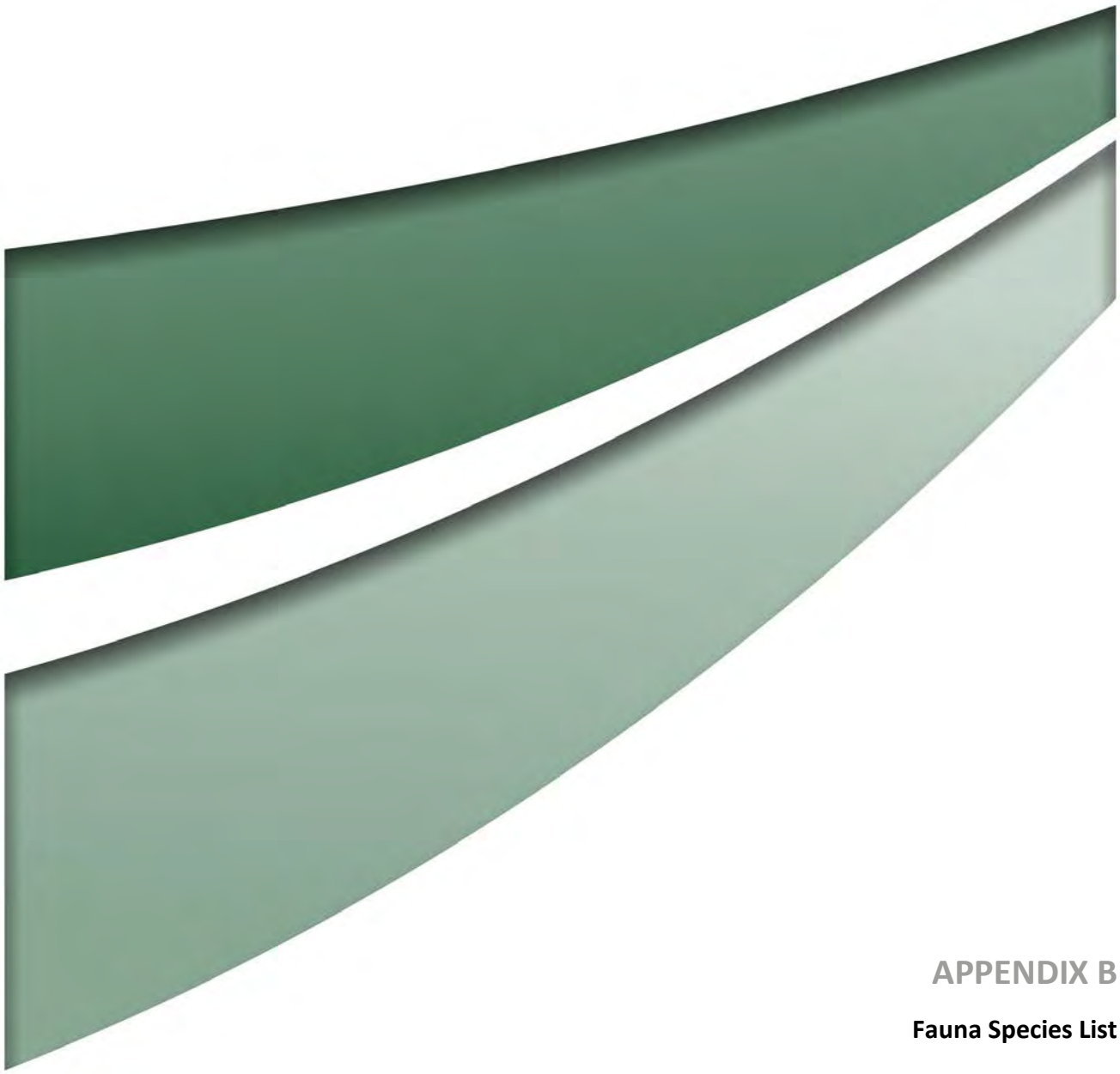
All vascular plants recorded or collected were identified using keys and nomenclature in Harden (1992, 1993, 2000 and 2002) and Wheeler *et al*. (2002). Where known, changes to nomenclature and classification have been incorporated into the results, as derived from PlantNET (Botanic Gardens Trust 2016), the on-line plant name database maintained by the National Herbarium of New South Wales.

Common names used follow Harden (1992, 1993, 2000 and 2002) where available, and draw on other sources such as local names where these references do not provide a common name.

Family	*Scientific Name*	Common Name	TSC Act Status	EPBC Act Status
FILICOPSIDA (FERNS)				
Blechnaceae	*Blechnum cartilagineum*	gristle fern	-	-
Blechnaceae	*Doodia aspera*	prickly rasp fern	-	-
Dennstaedtiaceae	*Pteridium esculentum*	bracken	-	-
MAGNOLIOPSIDA (FLOWERING PLANTS) – LILLIDAE (MONOCOTS)				
Arecaceae	**Phoenix canariensis*	canary island date palm	-	-
Commelinaceae	*Commelina cyanea*	native wandering jew	-	-
Cyperaceae	**Cyperus brevifolius*		-	-
Lomandraceae	*Lomandra filiformis*		-	-
Lomandraceae	*Lomandra longifolia*	spiny-headed mat-rush	-	-
Poaceae	*Austrodanthonia fulva*	wallaby grass	-	-
Poaceae	**Cortaderia selloana*	pampas grass	-	-
Poaceae	*Digitaria divaricatissima*	umbrella grass	-	-
Poaceae	*Enneapogon nigricans*	niggerheads	-	-

Family	*Scientific Name*	Common Name	TSC Act Status	EPBC Act Status
Poaceae	**Eragrostis curvula*	African lovegrass	-	-
Poaceae	*Imperata cylindrica*	blady grass	-	-
Poaceae	**Melinis repens*	red natal grass	-	-
Poaceae	**Megathyrsus maximus* var. *maximus*	guinea grass	-	-
Poaceae	*Panicum simile*	two-colour panic	-	-
Poaceae	*Spinifex sericeus*	hairy spinifex	-	-
Poaceae	**Stenotaphrum secundatum*	buffalo grass	-	-
MAGNOLIOPSIDA (FLOWERING PLANTS) – MAGNOLIIDAE (DICOTS)				
Apiaceae	**Aegopodium podagraria*	goutweed	-	-
Asteraceae	**Chrysanthemoides monilifera*		-	-
Cactaceae	**Opuntia stricta*	common prickly pear	-	-
Euphorbiaceae	*Ricinocarpos pinifolius*	wedding bush	-	-
Fabaceae (Faboideae)	*Hardenbergia violacea*	false sarsaparilla	-	-
Fabaceae (Mimosoideae)	*Acacia longifolia* subsp. *longifolia*	Sydney golden wattle	-	-
Fabaceae (Mimosoideae)	*Acacia longifolia* subsp. *sophorae*	coastal wattle	-	-
Fabaceae (Mimosoideae)	*Acacia longifolia*		-	-
Fabaceae (Mimosoideae)	*Acacia ulicifolia*	prickly Moses	-	-
Lauraceae	*Cassytha pubescens*	downy dodder-laurel	-	-
Lauraceae	*Cryptocarya microneura*	murrogun	-	-
Myrtaceae	*Angophora costata*	smooth-barked apple	-	-
Myrtaceae	*Backhousia myrtifolia*	grey myrtle	-	-
Myrtaceae	*Eucalyptus pilularis*	blackbutt	-	-
Myrtaceae	*Eucalyptus robusta*	swamp mahogany	-	-
Myrtaceae	*Leptospermum laevigatum*	coast teatree	-	-
Myrtaceae	*Leptospermum trinervium*	slender tea-tree	-	-
Oleaceae	*Notelaea longifolia*	large mock-olive	-	-
Phyllanthaceae	*Breynia oblongifolia*	coffee bush	-	-
Plantaginaceae	*Veronica serpyllifolia*		-	-
Proteaceae	*Banksia integrifolia*	coast banksia	-	-
Proteaceae	*Banksia serrata*	old-man banksia	-	-
Rosaceae	**Rubus fruticosus* sp. agg.	blackberry complex	-	-

Family	*Scientific Name*	Common Name	TSC Act Status	EPBC Act Status
Rubiaceae	*Opercularia varia*	variable stinkweed	-	-
Sapindaceae	*Cupaniopsis anacardioides*	tuckeroo	-	-
Solanaceae	**Solanum chenopodioides*	whitetip nightshade	-	-
Verbenaceae	**Lantana camara*	lantana	-	-



APPENDIX B

Fauna Species List

Appendix B - Fauna Species List

The following fauna list was developed from surveys of the Study Area by SMEC (2008), Kleinfelder (2015) and Umwelt (2016).

The following abbreviations or symbols are used in the list:

asterisk (*)	Denotes species not indigenous to the Study Area
subsp.	Subspecies
MIG	Listed migratory species under the EPBC Act
V	Vulnerable under the TSC and/or EPBC Act
PD	Preliminary Determination

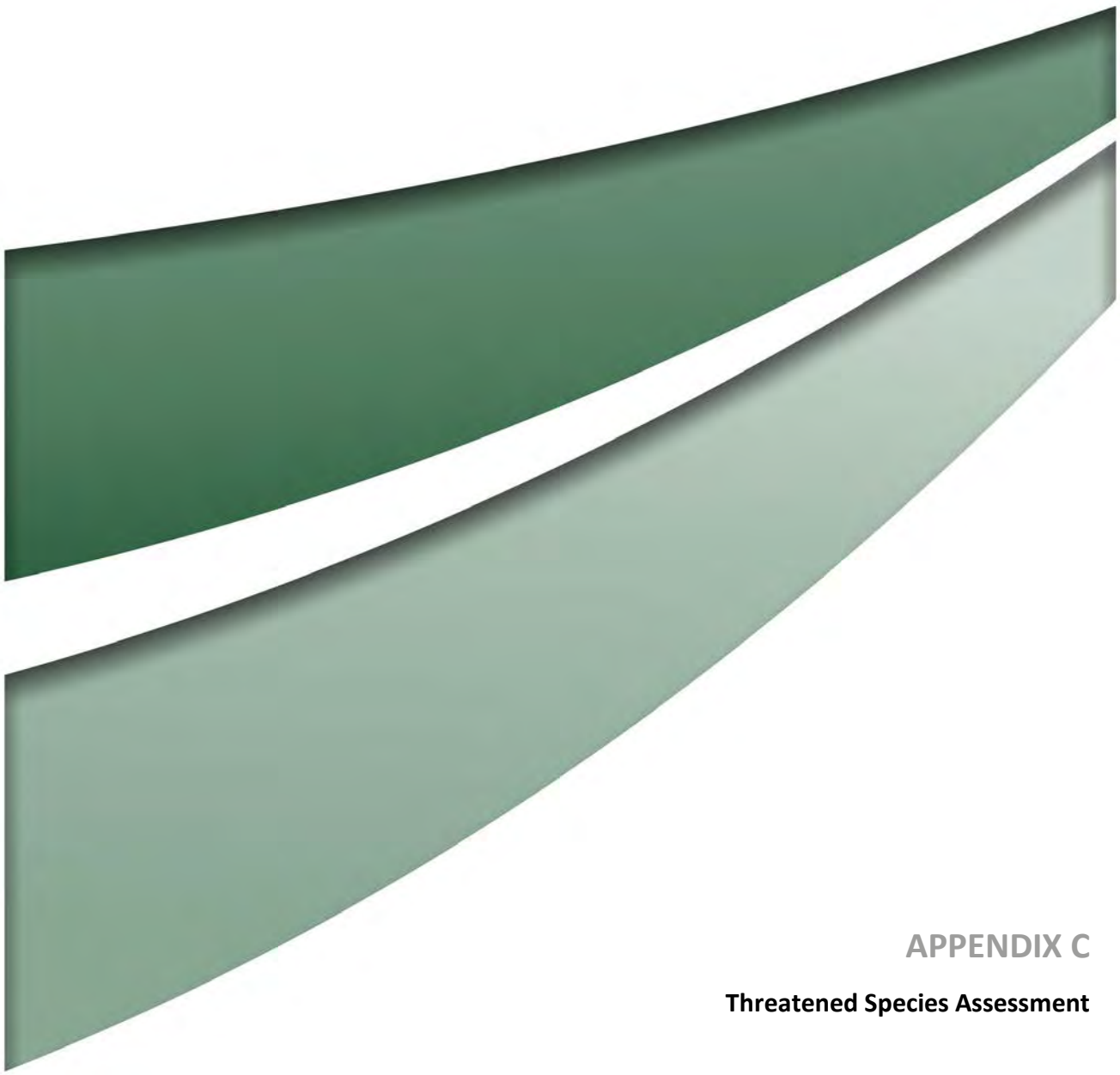
Birds recorded were identified using descriptions in Pizzey and Knight (2012) and the scientific and common name nomenclature of BirdLife International Taxonomic Checklist (2015) (formerly Birds Australia). Reptiles recorded were identified using keys and descriptions in Cogger (2000) and Wilson and Swan (2008) and the scientific and common name nomenclature of Cogger (2000).

Amphibians recorded were identified using keys and descriptions in Cogger (2000), Robinson (1998), Anstis (2002) and Barker et al. (1995) and the scientific and common name nomenclature of Cogger (2000). Mammals recorded were identified using keys and descriptions in Menkhorst and Knight (2010). Bat species recorded were identified using keys and descriptions in Churchill (1998) and ecological information was obtained from Churchill (2008).

Scientific Name	Common Name	TSC Act Status	EPBC Act Status
AMPHIBIANS			
Myobatrachidae			
Crinia signifera	brown froglet	-	-
Litoria fallax	eastern dwarf tree frog	-	-
REPTILES			
Scincidae			
Anomalopus swansoni		-	-
Ctenotus robustus	striped skink	-	-
BIRDS			
Columbidae			
*Streptopelia chinensis**	spotted dove	-	-
Apodidae			
Apus pacificus	fork-tailed swift	-	MIG
Phalacrocoracidae			
Phalacrocorax varius	pied cormorant	-	-

Scientific Name	Common Name	TSC Act Status	EPBC Act Status
Charadriidae			
Vanellus miles	masked lapwing	-	-
Haematopodidae			
Haematopus longirostris	pied oystercatcher	E	-
Laridae			
Sterna hirundo	common tern	-	-
Chroicocephalus novaehollandiae	silver gull	-	-
Cacatuidae			
Cacatua roseicapillus	galah	-	-
Psittacidae			
Trichoglossus haematodus	rainbow lorikeet	-	-
Platycercus elegans	crimson rosella	-	-
Halcyonidae			
Dacelo novaeguineae	laughing kookaburra	-	-
Maluridae			
Malurus cyaneus	superb fairy-wren	-	-
Malurus lamberti	variegated fairy-wren	-	-
Acanthizidae			
Acanthiza chrysorrhoa	yellow-rumped thornbill	-	-
Acanthiza pusilla	brown thornbill	-	-
Meliphagidae			
Acanthorhynchus tenuirostris	eastern spinebill	-	-
Lichenostomus chrysops	yellow-faced honeyeater	-	-
Lichenostomus penicillatus	white-plumed honeyeater	-	-
Manorina melanocephala	noisy miner	-	-
Anthochaera carunculata	red wattlebird	-	-
Phylidonyris novaehollandiae	New Holland honeyeater	-	-
Eupetidae			
Psophodes olivaceus	eastern whipbird	-	-
Campephagidae			
Coracina novaehollandiae	black-faced cuckoo-shrike	-	-
Artamidae			
Cracticus torquatus	grey butcherbird	-	-
Gymnorhina tibicen	Australian magpie	-	-

Scientific Name	Common Name	TSC Act Status	EPBC Act Status
Rhipiduridae			
Rhipidura albiscapa	grey fantail	-	-
Rhipidura leucophrys	willie wagtail	-	-
Corvidae			
Corvus coronoides	Australian raven	-	-
Monarchidae			
Grallina cyanoleuca	magpie-lark	-	-
Timaliidae			
Zosterops lateralis	silvereye	-	-
Hirundinidae			
Hirundo neoxena	welcome swallow	-	-
Sturnidae			
*Sturnus vulgaris**	common starling	-	-
*Sturnus tristis**	common myna	-	-
Estrildidae			
Neochmia temporalis	red-browed finch	-	-
Columbidae			
MAMMALS			
Macropodidae			
Wallabia bicolor	swamp wallaby	-	-
Pteropodidae			
Pteropus poliocephalus	grey-headed flying-fox	V	V
Molossidae			
Mormopterus norfolkensis	eastern freetail-bat	V	-
Vespertilionidae			
Vespadelus vulturnus	little forest bat	-	-
Canidae			
*Vulpes vulpes**	red fox	-	-
Leporidae			
*Oryctolagus cuniculus**	European rabbit	-	-



APPENDIX C

Threatened Species Assessment

Appendix C - Threatened Species Assessment

Threatened and migratory species, endangered populations and threatened ecological communities (TECs) listed under the *Threatened Species Conservation Act 1995* (TSC Act) and/or *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) having the potential to occur in the Study Area have been identified based on the results of the searches of the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife Database and Commonwealth Department of the Environment and Energy (DoEE) Protected Matters Database and are outlined in **Table 1**.

Additionally, migratory species listed under international agreements being the Bonn Convention (Bonn), China-Australia Migratory Bird Agreement (CAMBA), Japan-Australia Migratory Bird Agreement (JAMBA) or Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) with potential to occur in the Study Area have also been identified based on the results of the searches and are outlined in **Table 2**.

Purely marine and pelagic species have been omitted from **Table 1** and **Table 2** due to a lack of suitable habitat.

The likelihood of a community/species to occur in the Study Area is noted using the following definitions:

Recorded	Species/community has been recorded within the Study Area.
Likely	Suitable habitat is present for this species/community and/or records of the species are known to occur in the immediate locality
Potential	Suitable habitat is present for this species/community and/or however records of the species are not known to occur in the immediate locality
Unlikely	Species/community is considered unlikely to occur within the Study Area due to lack of local records and/or lack of suitable habitat.
Not present	Species/community was not recorded in the Study Area and is not expected to occur due to its distribution, habitat requirements or lack of local records.

Species/communities with a reasonable potential to be impacted by the proposed rezoning were subject to preliminary Seven Part Tests of Significance under the EP&A Act and/or Assessments of Significance under the EPBC Act. It is expected that these assessments will be reviewed and revised following the finalisation of the Master Plan and impact boundaries as part of the future development application.

Abbreviations used within **Table 1** and **Table 2** include the following:

V	Vulnerable
E	Endangered
EEC	Endangered Ecological Community
EP	Endangered Population
CE	Critically Endangered
CEEC	Critically Endangered Ecological Community
VEC	Vulnerable Ecological Community
C	CAMBA
J	JAMBA
K	ROKAMBA
B	Bonn

Table 1 - Threatened Species and TECs Recorded or with Potential to Occur within 10 kilometres of the Study Area

Species Name		Status		Likelihood to Occur within the Study Area	Reasonable Potential to be Impacted by the Proposal
Common Name	*Scientific Name*	TSC Act	EPBC Act		
Threatened Ecological 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)		EEC	VEC	Not present	No
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		EEC	-	Not present	No
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (TSC Act) *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* (EPBC Act)		EEC	CEEC	Not present	No
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (TSC Act) *Lowland Rainforest of Subtropical Australia* (EPBC Act)		EEC	CEEC	Not present	No
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		EEC	-	Not present	No
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		EEC	-	Not present	No
Sydney Freshwater Wetlands in the Sydney Basin Bioregion		EEC	-	Potential	No
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions		EEC	-	Not present	No
Threatened Flora Species					
dwarf kerrawang	*Commersonia prostrata*	E	-	Unlikely	No
leafless tongue orchid	*Cryptostylis hunteriana*	V	V	Unlikely	No
sand doubletail	*Diuris arenaria*	E	-	Unlikely	No
rough doubletail	*Diuris praecox*	V	V	Unlikely	No
Camfield's Stringybark	*Eucalyptus camfieldii*	V	V	Unlikely	No
Earp's gum	*Eucalyptus parramattensis subsp. decadens*	V	V	Unlikely	No
small-flower grevillea	*Grevillea parviflora subsp. parviflora*	V	V	Unlikely	No

Species Name		Status		Likelihood to Occur within the Study Area	Reasonable Potential to be Impacted by the Proposal
Common Name	*Scientific Name*	TSC Act	EPBC Act		
	Maundia triglochinoides	V	-	Unlikely	No
biconvex paperbark	*Melaleuca biconvexa*	V	V	Unlikely	No
tall knotweed	*Persicaria elatior*	V	V	Unlikely	No
lesser swamp-orchid	*Phaius australis*	E	E	Unlikely	No
heath wrinklewort	*Rutidosis heterogama*	V	V	Unlikely	No
coast groundsel	*Senecio spathulatus*	E	-	Likely	**Yes**
magenta lilly pilly	*Syzygium paniculatum*	E	V	Unlikely	No
black-eyed Susan	*Tetratheca juncea*	V	V	Unlikely	No
	Zannichellia palustris	E	-	Unlikely	No
Threatened Fauna Species					
Amphibians					
wallum froglet	*Crinia tinnula*	V	-	Unlikely	No
green and golden bell frog	*Litoria aurea*	E	V	Unlikely	No
little John's Tree Frog	*Litoria littlejohni*	E	V	Unlikely	No
Birds					
regent honeyeater	*Anthochaera phrygia*	CE	E	Potential	**Yes**
painted honeyeater	*Grantiella picta*	V	V	Unlikely	No
dusky woodswallow	*Artamus cyanopterus cyanopterus*	V	-	Unlikely	No
Australasian bittern	*Botaurus poiciloptilus*	E	E	Unlikely	No
bush stone-curlew	*Burhinus grallarius*	E	-	Unlikely	No
curlew sandpiper	*Calidris ferruginea*	E	CE	Unlikely	No
great knot	*Calidris tenuirostris*	V	CE	Unlikely	No
red knot	*Calidris canutus*	E	-	Unlikely	No
greater sand-plover	*Charadrius leschenaultii*	V	V	Unlikely	No
lesser sand-plover	*Charadrius mongolus*	V	E	Unlikely	No
white-fronted chat	*Epthianura albifrons*	V	-	Unlikely	No
sooty oystercatcher	*Haematopus fuliginosus*	V	-	Unlikely	No
pied oystercatcher	*Haematopus longirostris*	E	-	**Recorded**	**Yes**
little eagle	*Hieraaetus morphnoides*	V	-	Potential	No
white-bellied sea eagle	*Haliaeetus leucogaster*	V	-	Likely	**Yes**
swift parrot	*Lathamus discolor*	E	CE	Potential	**Yes**
broad-billed sandpiper	*Limicola falcinellus*	V	-	Unlikely	No

Species Name		Status		Likelihood to Occur within the Study Area	Reasonable Potential to be Impacted by the Proposal
Common Name	*Scientific Name*	TSC Act	EPBC Act		
black-tailed godwit	*Limosa limosa*	V	-	Unlikely	No
bar-tailed godwit	*Limosa lapponica baueri*	-	V	Unlikely	No
northern Siberian bar-tailed godwit	*Limosa lapponica baueri*	-	CE	Unlikely	No
eastern bristlebird	*Dasyornis brachypterus*	E	E	Unlikely	No
turquoise parrot	*Neophema pulchella*	V	-	Unlikely	No
powerful owl	*Ninox strenua*	V	-	Unlikely	No
eastern curlew	*Numenius madagascariensis*	-	CE	Unlikely	No
eastern osprey	*Pandion cristatus*	V	-	Potential	**Yes**
wompoo fruit-dove	*Ptilinopus magnificus*	V	-	Unlikely	No
Australian painted snipe	*Rostratula australis*	E	-	Unlikely	No
diamond firetail	*Stagonopleura guttata*	V	-	Unlikely	No
little tern	*Sternula albifrons*	E	-	Potential	**Yes**
eastern grass owl	*Tyto longimembris*	V	-	Unlikely	No
masked owl	*Tyto novaehollandiae*	V	-	Unlikely	No
terek sandpiper	*Xenus cinereus*	V	-	Unlikely	No
Mammals					
large-eared pied bat	*Chalinolobus dwyeri*	V	V	Unlikely	No
spotted-tailed quoll	*Dasyurus maculatus*	V	E	Unlikely	No
eastern false pipistrelle	*Falsistrellus tasmaniensis*	V	-	Potential	**Yes**
little bentwing-bat	*Miniopterus australis*	V	-	Potential	**Yes**
eastern bentwing-bat	*Miniopterus schreibersii oceanensis*	V	-	Potential	**Yes**
eastern freetail-bat	*Mormopterus norfolkensis*	V	-	**Recorded**	**Yes**
hoary wattled bat	*Chalinolobus nigrogriseus*	V	-	Potential	**Yes**
greater broad-nosed bat	*Scoteanax rueppellii*	V	-	Potential	**Yes**
yellow-bellied sheathtail-bat	*Saccolaimus flaviventris*	V	-	Potential	**Yes**
southern myotis	*Myotis macropus*	V	-	Potential	**Yes**
greater glider	*Petauroides volans*	-	V	Unlikely	No
squirrel glider	*Petaurus norfolcensis*	V	-	Unlikely	No
koala	*Phascolarctos cinereus*	V	-	Unlikely	No

Species Name		Status		Likelihood to Occur within the Study Area	Reasonable Potential to be Impacted by the Proposal
Common Name	*Scientific Name*	TSC Act	EPBC Act		
long-nosed potoroo	*Potorous tridactylus*	V	V	Unlikely	No
New Holland mouse	*Pseudomys novaehollandiae*	-	V	Unlikely	No
grey-headed flying-fox	*Pteropus poliocephalus*	V	V	**Recorded**	**Yes**
Fishes					
black rockcod	*Epinephelus daemelii*	-	V	Not present	No

Table 2 Migratory Species Recorded or with Potential to Occur within 10km of the Study Area

Common Name	*Scientific Name*	International Convention	Likelihood to Occur within Study Area	Reasonable Potential to be Impacted by the Proposal
little tern	*Sternula albifrons*	B, C, J, K	Potential	**Yes**
crested tern	*Thalasseus bergii*	J	Potential	**Yes**
common sandpiper	*Actitis hypoleucos*	B, C, J, K	Unlikely	No
ruddy turnstone	*Arenaria interpres*	B, C, J, K	Unlikely	No
sharp-tailed sandpiper	*Calidris acuminata*	B, C, J, K	Unlikely	No
red knot	*Calidris canutus*	B, C, J, K	Unlikely	No
curlew sandpiper	*Calidris ferruginea*	B, C, J, K	Unlikely	No
pectoral sandpiper	*Calidris melanotos*	B, C, K	Unlikely	No
red-necked stint	*Calidris ruficollis*	B, C, J, K	Unlikely	No
great knot	*Calidris tenuirostris*	B, C, J, K	Unlikely	No
double-banded plover	*Charadrius bicinctus*	B	Unlikely	No
greater sand-plover	*Charadrius leschenaultia*	B, C, J, K	Unlikely	No
lesser sand-plover	*Charadrius mongolus*	B, C, J, K	Unlikely	No
oriental cuckoo	*Cuculus optatus*	C, J, K	Unlikely	No
Latham's snipe	*Gallinago hardwickii*	B, J, K	Unlikely	No
Swinhoe's snipe	*Gallinago megala*	B, C, J, K	Unlikely	No
pin-tailed snipe	*Gallinago stenura*	B, C, J, K	Unlikely	No
white-throated needletail	*Hirundapus caudacutus*	C, J, K	Likely	**Yes**
fork-tailed swift	*Apus pacificus*	C, J, K	**Recorded**	**Yes**
eastern osprey	*Pandion cristatus*	B	Likely	**Yes**
broad-billed sandpiper	*Limicola falcinellus*	B, C, J, K	Unlikely	No
bar-tailed godwit	*Limosa lapponica*	B, C, J, K	Unlikely	No
black-tailed godwit	*Limosa limosa*	B, C, J, K	Unlikely	No
black-faced monarch	*Monarcha melanopsis*	B	Unlikely	No
spectacled monarch	*Monarcha trivirgatus*	B	Unlikely	No
eastern yellow wagtail	*Motacilla tschutschensis*	C, K, J	Unlikely	No
satin flycatcher	*Myiagra cyanoleuca*	B	Unlikely	No
eastern curlew	*Numenius madagascariensis*	B, C, J, K	Unlikely	No
little curlew	*Numenius minutus*	B, C, J, K	Unlikely	No
whimbrel	*Numenius phaeopus*	B, C, J, K	Unlikely	No

Common Name	*Scientific Name*	International Convention	Likelihood to Occur within Study Area	Reasonable Potential to be Impacted by the Proposal
ruff	*Philomachus pugnax*	B, C, J, K	Unlikely	No
Pacific golden plover	*Pluvialis fulva*	B, C, J, K	Unlikely	No
grey plover	*Pluvialis squatarola*	B, C, J, K	Unlikely	No
rufous fantail	*Rhipidura rufifrons*	B	Unlikely	No
grey-tailed tattler	*Tringa brevipes*	B, C, J, K	Unlikely	No
common greenshank	*Tringa nebularia*	B, C, J, K	Unlikely	No
terek sandpiper	*Xenus cinereus*	B, C, J, K	Unlikely	No

Preliminary Seven Part Tests under the *Environmental Planning and Assessment Act 1979*

Threatened species and TECs known to occur or considered to have reasonable likelihood to occur within the Study Area (based on known distribution and habitat requirements) and with reasonable potential to be impacted by the proposed rezoning are addressed in the following preliminary Seven Part Tests of Significance. These assessments have been conducted in accordance with Section 5A of the EP&A Act, based on the current Master Plan. It is expected that these assessments will be reviewed and revised following the finalisation of the Master Plan and impact boundaries as part of the future development application.

It is acknowledged that the *Biodiversity Conservation Act 2016* was implemented on 25 August 2017, repealing the TSC Act. The assessments in this report have not been updated to reflect the minor changes in relation to the replacement of the TSC Act by the BC Act. It is understood that threatened entities previously listed under the TSC Act were automatically transferred to be listed under the BC Act and the amended Assessment of Significance Test (now outlined in Section 7.3 of the BC Act) does not materially change the assessment outcome. Consideration of the BC Act and its implications on the Project will be addressed at the DA phase of the project, as required.

The following threatened species have been recorded in the Study Area, or are likely to occur and therefore have the potential to be impacted by the proposed rezoning:

Threatened Flora Species

- coast groundsel (*Senecio spathulatus*)

Threatened Fauna Species

- little tern (*Sternula albifrons*)
- regent honeyeater (*Anthochaera phrygia*)
- swift parrot (*Lathamus discolor*)
- white-bellied sea eagle (*Haliaeetus leucogaster*)
- eastern osprey (*Pandion cristatus*)
- grey-headed flying-fox (*Pteropus poliocephalus*)
- eastern false pipistrelle (*Falsistrellus tasmaniensis*)
- little bentwing-bat (*Miniopterus australis*)
- eastern bentwing-bat (*Miniopterus schreibersii oceanensis*)
- east coast freetail-bat (*Mormopterus norfolkensis*)
- hoary wattled bat (*Chalinolobus nigrogriseus*)
- greater broad-nosed bat (*Scoteanax rueppellii*)
- yellow-bellied sheathtail-bat (*Saccolaimus flaviventris*)
- southern myotis (*Myotis macropus*).

All assessments are undertaken without any consideration of impact mitigation or offsetting and are based on the current indicative Master Plan. Any changes to the indicative Master Plan following this assessment may require a revised Seven Part Test assessment under the EP&A Act.

Species descriptions are referenced from the Office of Environment and Heritage (OEH 2016) and Department of the Environment and Energy (2016) online species profiles, unless otherwise noted.

Threatened Flora Species

The following threatened flora species are considered in this assessment:

- coast groundsel (*Senecio spathulatus*)

Coast groundsel (*Senecio spathulatus*) has not been recorded within the Study Area, but has been previously recorded on the Stockton sand dunes approximately 15km northeast of the Study Area (Bell and Driscoll 2010).

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;

Coast groundsel has not been recorded in the Study Area however suitable habitat occurs on the frontal sand dunes on the far eastern portion of the Study Area. This species has been previously recorded on the Stockton sand dunes (Bell and Driscoll 2010). No development is proposed in this area, however the proposed rezoning may result in increased human access to the sand dunes.

The proposed rezoning may result in minor indirect disturbances to areas of suitable habitat for coast groundsel. It is not considered that the loss of this habitat may result in an adverse effect on the life cycle of this species such that a viable local population of this species will be 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;

Not applicable.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed;

Not applicable.

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;

The proposed rezoning may result in minor indirect impacts to suitable habitat for coast groundsel, however it is unlikely that this species depends on the habitats within the Study Area.

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

The proposed rezoning may result in minor indirect impacts to suitable habitat for coast groundsel. Consequently the level of fragmentation and isolation will increase for this species where these impacts occur.

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;

The proposed rezoning would result minor indirect impacts to suitable habitat for coast groundsel. The Study Area occurs near the southern extent of continuous dune habitat within the Worimi Conservation Lands occurring between Nelson Bay and Fern Bay to the north. The Study Area has been previously disturbed as part of the activities on the Fort Wallace and the dune habitats for this species are generally weed infested by bitou bush and subject to dune driving impacts.

It is unlikely that the habitat to be disturbed as part of the proposed rezoning would be considered important to the long-term survival of this species in the locality and the region.

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

The Study Area is not located in proximity to any areas of declared or recommended critical habitat. The proposed rezoning will not have an adverse effect on any critical habitat.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan; and

No recovery plans have been prepared for coast groundsel.

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.

The proposed rezoning will contribute to the operation of the following key threatening processes listed under the TSC Act relevant to this species:

- Invasion of native plant communities by *Chrysanthemoides monilifera*.

Conclusion

Based on the information provided above, and considering the application of the precautionary principle, the proposed rezoning is unlikely to result in a significant impact on coast groundsel due to the minor and indirect impacts on potential habitat and no impact on known individuals.

This assessment has been undertaken based on the current Master Plan. It is expected that these assessments will be reviewed and revised following the finalisation of the Master Plan and impact boundaries as part of the future development application.

Threatened Fauna Species

The following threatened fauna species are considered in this assessment:

- little tern (*Sternula albifrons*)
- regent honeyeater (*Anthochaera phrygia*)
- swift parrot (*Lathamus discolor*)
- pied oystercatcher (*Haematopus longirostris*)
- white-bellied sea eagle (*Haliaeetus leucogaster*)
- eastern osprey (*Pandion cristatus*)
- grey-headed flying-fox (*Pteropus poliocephalus*)
- eastern false pipistrelle (*Falsistrellus tasmaniensis*)
- little bentwing-bat (*Miniopterus australis*)
- eastern bentwing-bat (*Miniopterus schreibersii oceanensis*)
- east coast freetail-bat (*Mormopterus norfolkensis*)
- hoary wattled bat (*Chalinolobus nigrogriseus*)
- greater broad-nosed bat (*Scoteanax rueppellii*)
- yellow-bellied sheathtail-bat (*Saccolaimus flaviventris*)
- southern myotis (*Myotis macropus*)

Potential habitat occurs within the Study Area for woodland birds such as regent honeyeater and swift parrot, coastal birds such as little tern, eastern osprey and white-bellied sea-eagle and threatened micro-bat species being eastern false pipistrelle, hoary wattled bat, greater broad-nosed bat, yellow-bellied sheathtail bat, eastern bentwing-bat, little bentwing-bat and southern myotis.

Pied oystercatcher, grey-headed flying-fox and east coast freetail-bat have been previously recorded utilising the habitats of the Study Area.

White-bellied sea eagle is currently being assessed under a preliminary determination to be listed as vulnerable under the TSC Act (NSWSC 2016) and should be considered in any future development applications for the project.

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;

Pied oystercatcher, grey-headed flying-fox and east coast freetail-bat have been recorded utilising the habitats of the Study Area. Up to two grey-headed flying-foxes were observed foraging in coastal banksia (*Banksia integrifolia*) in the north of the Study Area in May 2016. No flying-fox camps have been recorded in the Study Area. East coast freetail-bat was detected using Anabat recorders in April 2007 (SMEC 2008). The forested areas of the Study Area are likely to provide suitable foraging habitat for these species.

Potential habitat also occurs for regent honeyeater, swift parrot, eastern osprey, white-bellied sea-eagle, eastern false pipistrelle, hoary wattled bat, greater broad-nosed bat, yellow-bellied sheathtail bat, eastern bentwing-bat, little bentwing-bat and southern myotis. Little tern has been previously recorded nesting in mined dunes along the south-western edge of the Worimi Conservation Lands and may also use the similar habitats of the Study Area. These species have not been recorded in the Study Area.

The proposed rezoning may result in the loss of approximately 1.0 hectare of potential and likely forest foraging habitat for a range of threatened species in the forested areas of the site. Hollow resources in the Study Area occur in low densities in these habitats.

It is not considered that the loss of this habitat may result in an adverse effect on the life cycle of these species such that a viable local population of these species will be 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;

Not applicable.

c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed;

Not applicable.

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;

The proposed rezoning may result in the loss of approximately 1.0 hectare of forest habitat being likely foraging habitat for a range of threatened species. Given the availability of other higher quality habitat in the Worimi Conservation Lands to the north of the site, it is unlikely that these species depend on the habitats within the Study Area.

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

The proposed rezoning would result in the loss approximately 1.0 hectare of forest habitat being likely foraging habitat for a range of threatened species. The proposed rezoning may introduce significant barriers for some of these species such that it will prevent movement of individuals between proximate areas of habitat. Highly mobile species such as grey-headed flying-fox, micro-bats and birds are unlikely to be substantially affected. The Study Area contains intact vegetation primarily along its northern and southern boundaries. While this allows some east to west fauna movement from the

coastal dune area to the Hunter River estuary, the value of this is limited due to residential areas and Fullerton Road to the west of the Study Area. Connectivity from the south of the site to Stockton is currently highly fragmented as a result of previous residential and urban development.

As some forest habitat may be removed as part of the proposed rezoning, the level of fragmentation and isolation within the Study Area will increase for these species.

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;

The proposed rezoning would result in the loss approximately 1.0 hectare of forest habitat that contains likely foraging habitat for a range of threatened species. Hollow-bearing tree resources for roosting habitat occur in low densities in the Study Area. Key foraging trees being swamp mahogany (*Eucalyptus robusta*) for species such as grey-headed flying-fox (DECCW 2009), regent honeyeater (DoE 2016) and swift parrot (Saunders 2011) occur in small discrete areas of the Study Area. Sand dune habitat in relation to the little tern, which has been recorded nesting in mined dunes along the south-western edge of the Worimi Conservation Lands, is not expected to be impacted by the proposed rezoning, however the proposed rezoning may result in increased human access to the sand dunes.

The Study Area occurs south of high quality continuous habitat within the Worimi Conservation Lands occurring between Nelson Bay and Fern Bay. It is unlikely that the habitat to be disturbed as part of the proposed rezoning would be considered important to the long-term survival of these species in the locality and the region.

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

No critical habitat has been listed within or adjacent to the Study Area for these threatened species. The proposed rezoning will not have an adverse effect on any critical habitat.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan; and

The following recovery plans have been prepared:

- National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (DoE 2016)
- National Recovery Plan for the Swift Parrot (*Lathamus discolor*) (Saunders 2011)
- Draft Recovery Plan for the Grey-headed Flying-fox (*Pteropus poliocephalus*) (DECCW 2009)
- Little tern (*Sterna albifrons*) Recovery Plan (NPWS 2003)

Any impacts to known habitat for these species in the Study Area are likely to contravene the objectives of these recovery plans.

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.

The proposed rezoning may contribute to the operation of the following key threatening processes listed under the TSC Act relevant to these species:

- Aggressive exclusion of birds by noisy miners (*Manorina melanocephala*).

- Clearing of native vegetation.
- Invasion, establishment and spread of *Lantana camara*.
- Invasion of native plant communities by *Chrysanthemoides monilifera*.
- Removal of dead wood and dead trees.

Conclusion

Based on the information provided above, and considering the application of the precautionary principle, the proposed rezoning is unlikely to result in a significant impact on little tern, regent honeyeater, swift parrot, eastern osprey, white-bellied sea-eagle, eastern false pipistrelle, hoary wattled bat, greater broad-nosed bat, yellow-bellied sheathtail bat, eastern bentwing-bat, little bentwing-bat and southern myotis due to the minor and indirect impacts on potential habitat and no impact on known individuals.

Furthermore, due to the highly mobile nature of these species and the availability of higher quality habitats in the locality, the proposed rezoning is unlikely to result in a significant impact on pied oystercatcher, grey-headed flying-fox or east coast freetail-bat, which have been recorded utilising the habitats of the Study Area. While the Study Area contains known habitat, this area is minimal and fragmented. Based on the current Master Plan, the proposed rezoning is unlikely to result in a significant impact on these species.

This assessment has been undertaken based on the current Master Plan. It is expected that these assessments will be reviewed and revised following the finalisation of the Master Plan and impact boundaries as part of the future development application.

Preliminary Assessment of Significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires an Assessment of Significance relating to the potential impacts of a project on listed matters of national environmental significance (MNES). These assessments have been conducted in accordance with the Significant Impact Guidelines 1.1 (DoE 2013), based on the current Master Plan. It is expected that these assessments will be reviewed and revised following the finalisation of the Master Plan and impact boundaries as part of the future development application.

Under the EPBC Act, the approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on MNES. These matters are:

- listed threatened species and ecological communities
- migratory species protected under international agreements
- Ramsar wetlands of international importance
- the Commonwealth marine environment
- World Heritage properties
- National Heritage places
- Great Barrier Reef Marine Park
- nuclear actions
- a water resource, in relation to coal seam gas development and large coal mining development.

A search of the Department of Environment and Energy Protected Matters Search Tool in September 2016 and collated information from literature reviews identified three threatened ecological communities, 32 threatened species and 36 terrestrial migratory species listed under the EPBC Act that are known to occur, or considered to have the potential to occur on the basis of habitat modeling within the Study Area. Each of these has been included in **Tables 1** and **2** (note that purely marine or pelagic species were excluded due to lack of habitat), together with an indication of those species that warrant further assessment by way of an Assessment of Significance.

As outlined in **Tables 1** and **2**, the following EPBC Act listed species and communities are considered to have the potential to occur or be impacted by the Project and are subject to an Assessment of Significance below:

Critically Endangered and Endangered Species

- swift parrot (*Lathamus discolor*)
- regent honeyeater (*Anthochaera phrygia*)

Vulnerable Species

- grey-headed flying-fox (*Pteropus poliocephalus*)

Migratory Species Listed under International Conventions

- little tern (*Sternula albifrons*)
- white-throated needletail (*Hirundapus caudacutus*)
- fork-tailed swift (*Apus pacificus*)
- eastern osprey (*Pandion cristatus*).

Critically Endangered and Endangered Species

The following critically endangered and endangered species are considered in this assessment:

- swift parrot (*Lathamus discolor*)
- regent honeyeater (*Anthochaera phrygia*)

Species descriptions, in the Assessments of Significance below, are referenced from the Office of Environment and Heritage (OEH 2016) and Department of the Environment and Energy (2016) online species profiles, unless otherwise noted.

In this case, a *population* means:

- a geographically distinct regional population, or collection of local populations; or
- a regional population, or collection of local populations, that occurs within a particular bioregion.

The swift parrot occurs as a single population that migrates annually from breeding grounds in Tasmania to the winter foraging grounds on the coastal plains and slope woodlands of mainland eastern Australia (Saunders 2011). Approximately 200 mature birds (10 per cent of the total estimated population) are known to over-winter in the Lower Hunter Region of New South Wales (Saunders 2002). The swift parrot has not been recorded within the Study Area however it has been recorded approximately 15 km north of the Study Area near Williamtown feeding on swamp mahogany.

Although there appears to be minor behavioural differences between regent honeyeaters in the three main areas inhabited by the species (the Bundarra-Barraba area in NSW, the Capertee Valley in NSW, and north-eastern Victoria), the direction and extent of movements, including evidence of movement between breeding sites, and a lack of discernable genetic differences between the sites suggest that the regent honeyeater occurs as a single, contiguous population (Garnett and Crowley 2000). The regent honeyeater has not been recorded within the Study Area however it has been recorded approximately 20 km north of the Study Area near Medowie.

An action is likely to have a significant impact on a critically endangered or 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; or**

No *populations* of the swift parrot or regent honeyeater have been recorded within the Study Area. The proposed rezoning may result in the loss of approximately 1.0 hectares of potential key feed tree foraging habitat in the form of swamp mahogany trees for swift parrot and regent honeyeater. The Study Area is not known as a historical or important foraging site for these species.

It is considered unlikely that the proposed rezoning will lead to a decrease in the size of a *population* of the swift parrot or regent honeyeater.

- **reduce the area of occupancy of the species; or**

The swift parrot and regent honeyeater have not been recorded within the Study Area. The proposed rezoning may result in the loss of approximately 1.0 hectares of potential foraging habitat for these species. While the proposed rezoning will remove potential habitat for these species, it is not likely to lead to a significant reduction in known habitat in the region. Substantial areas of similar habitats for these species

are protected in proximity to the Study Area, including the Worimi Conservation Lands and the Tilligerry State Conservation Area.

The proposed rezoning may result in a reduction of the potential area of occupancy for the swift parrot or regent honeyeater, however this is unlikely to substantially reduce the area of known occupancy in the locality or region.

- **fragment an existing *population* into two or more populations; or**

The swift parrot and regent honeyeater have not been recorded within the Study Area. The swift parrot and regent honeyeater are highly dispersive and it is unlikely that the proposed rezoning would create a significant change to the species' dispersal capacity or create a significant barrier the movement of the species. Connectivity from the south of the site to Stockton is currently highly fragmented as a result of previous residential and urban development and the proposed rezoning is unlikely to fragment an existing *population* of these species.

It is unlikely that the proposed rezoning would result in the fragmentation of an existing *population* into two or more *populations*.

- **adversely affect habitat critical to the survival of a species; or**

Habitat critical to the survival of the swift parrot includes those areas of priority habitat for which the species has a level of site fidelity or possess phenological characteristics likely to be of importance to the swift parrot (Saunders 2011). The Study Area contains 1.0 hectares of forest containing swamp mahogany (*Eucalyptus robusta*) being a key feed tree species for the swift parrot. The proposed rezoning is unlikely to substantially adversely affect habitat that is critical to the survival of the species.

Habitat critical to the survival of the regent honeyeater includes any breeding or foraging areas where the species is likely to occur and any newly discovered breeding for foraging locations (DoE 2016). The Study Area contains 1.0 hectares of forest containing swamp mahogany (*Eucalyptus robusta*) being a key feed tree species for the regent honeyeater. The proposed rezoning is unlikely to substantially adversely affect habitat that is critical to the survival of the species.

- **disrupt the breeding cycle of a population; or**

The swift parrot breeds and nests exclusively in Tasmania and migrates to mainland Australia during the non-breeding season. There is no potential for breeding habitat to occur in the Study Area.

The regent honeyeater mainly breeds in three key sites from the Bundarra-Barraba area NSW, the Capertee Valley in NSW, and north-eastern Victoria. Breeding has also been recorded within the Hunter Valley, with the species recorded breeding in open forest close to Kurri Kurri in 2007. Nests are usually placed in the canopy of mature trees with rough bark, e.g. ironbarks, sheoaks (*Casuarina*) and rough-barked apple (*Angophora floribunda*).The regent honeyeater has not been previously recorded in the Study Area and it is unlikely to contain breeding habitat for the species.

The proposed rezoning is not expected to disrupt the breeding cycle of *populations* of the swift parrot or regent honeyeater.

- **modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline; or**

The proposed rezoning may involve the removal of approximately 1.0 hectares of potential foraging habitat for swift parrot and regent honeyeater. The Lower Hunter and Port Stephens area supports other areas of habitat that contain suitable woodland and forest vegetation that would also provide potential habitat for these species, including the Worimi Conservation Lands and the Tilligerry State Conservation Area.

It is considered unlikely that the proposed rezoning will modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the swift parrot or regent honeyeater decline.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;**

The proposed rezoning is not expected to result in invasive species that are harmful to the swift parrot or regent honeyeater becoming established in the species' habitat.

- **introduce disease that may cause the species to decline; or**

Relevant for the swift parrot, psittacine beak and feather disease is a common and potentially deadly disease of parrots caused by a circovirus named beak and feather disease virus. The disease appears to have originated in Australia and is widespread and continuously present in wild populations of Australian parrots. Beak and feather disease affecting endangered psittacine species (parrots and related species) was listed in April 2001 as a key threatening process under the EPBC Act.

It is considered unlikely that the proposed rezoning will introduce beak and feather disease or any other disease that may cause the swift parrot or regent honeyeater to decline.

- **interfere with the recovery of the species.**

The following recovery plans have been prepared:

- National Recovery Plan for the Swift Parrot (*Lathamus discolor*) (Saunders 2011)
- National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (DoE 2016)

Any impacts to known habitat for these species in the Study Area are likely to contravene the objectives of these recovery plans. The swift parrot and regent honeyeater have not been recorded within the Study Area, however potential foraging habitat has been identified. It is considered unlikely that the proposed rezoning will interfere with the recovery of the swift parrot or regent honeyeater throughout Australia.

Conclusion

The proposed rezoning is unlikely to result in a significant impact on the populations of the swift parrot or regent honeyeater. Although the Study Area provides potential foraging habitat for these species, they have not been recorded utilising the potential habitat within the Study Area or in the immediate surrounds.

This assessment has been undertaken based on the current Master Plan. It is expected that these assessments will be reviewed and revised following the finalisation of the Master Plan and impact boundaries as part of the future development application.

Vulnerable Species

The following vulnerable species are considered in this assessment:

- grey-headed flying-fox (*Pteropus poliocephalus*)

In the case of a vulnerable species, an *important population* is a population that is necessary for a species' long-term survival and recovery. This may include populations that are:

- key source populations either for breeding or dispersal; or
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Grey-headed flying-fox (*Pteropus poliocephalus*) has been recorded within the Study Area. Up to five individuals were observed foraging in the coastal banksia (*Banksia integrifolia*) in the Study Area in May 2016. No flying-fox camps have been recorded in the Study Area. The closest active camp is located approximately 4 km to the southwest of the Study Area near Carrington (DoEE 2016). From these camps, the species can travel up to 50 km in one night in search of food where they feed on the nectar and pollen of native trees, in particular *Eucalyptus*, *Melaleuca* and *Banksia*, and fruits of rainforest trees and vines. It is likely that the species utilises the Study Area as foraging habitat. The Study Area is likely to provide suitable foraging habitat for a local population the species.

An action has, will have, or is likely to have a significant impact on threatened species if it does, will, or is likely to:

- **lead to a long-term decrease in the size of an important population of a species;**

Known habitat for grey-headed flying-fox has been recorded in the Study Area, however the Study Area is unlikely to be important for an *important population* of this species. The proposed rezoning may result in the loss of approximately 1.2 hectares of foraging habitat for grey-headed flying-fox. The Study Area is unlikely to be depended on by local grey-headed flying-fox colonies.

It is considered unlikely that the proposed rezoning will lead to a decrease in the size of an *important population* of grey-headed flying-fox.

- **reduce the area of occupancy of an important population, or;**

The proposed rezoning may result in the loss of approximately 1.2 hectares of foraging habitat for grey-headed flying-fox. Due to the small area of impact, retention of forested vegetation and existing fragmentation within the Study Area, the proposed rezoning is unlikely to reduce the area of the important population of grey-headed-flying-fox.

- **fragment an existing important population into two or more populations, or;**

The grey-headed flying fox is highly dispersive and it is unlikely that the proposed rezoning would create a significant change to the species' dispersal capacity or create a significant barrier the movement of the species.

It is unlikely that the proposed rezoning may result in the fragmentation of an existing *important population* into two or more populations.

- **adversely affect habitat critical to the survival of a species, or;**

According to the draft National Recovery Plan for the grey-headed flying-fox (DECC 2009), foraging habitat is considered critical to the survival of the species if it is productive during winter and spring and productive during the final weeks of gestation, and during the weeks of birth, lactation and conception. Forest communities containing swamp mahogany (*Eucalyptus robusta*) and shrubland containing coastal banksia (*Banksia integrifolia*) in the Study Area are productive during winter, during which food bottlenecks have been identified. The Study Area is considered to comprise an area of foraging habitat for this species but is unlikely to contain significant breeding and roosting habitat.

- **disrupt the breeding cycle of an important population, or;**

No grey-headed flying-fox breeding populations or camps have been identified in the Study Area. The proposed rezoning is not expected to disrupt the breeding cycle of an *important population* 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, or;**

The proposed rezoning may result in the loss of approximately 1.2 hectares of foraging habitat for grey-headed flying-fox an. The Study Area is unlikely to be depended on by local grey-headed flying-fox colonies.

It is considered unlikely that the proposed rezoning will modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the grey-headed flying-fox would decline.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;**

There are not any invasive species that are likely to become established as a result of the proposed rezoning that may impact upon any habitat relevant to the grey-headed flying-fox.

- **introduce disease that may cause the species to decline; or**

No diseases that may cause grey-headed flying-fox to decline are likely to be introduced as a result of the proposed rezoning.

- **interfere substantially with the recovery of the species.**

The following recovery plans have been prepared:

- Draft Recovery Plan for the Grey-headed Flying-fox (*Pteropus poliocephalus*) (DECCW 2009)

Any impacts to known habitat for grey-headed flying-fox in the Study Area are likely to contravene the objectives of this recovery plan. It is considered unlikely that the proposed rezoning will interfere with the recovery of the grey-headed flying-fox throughout Australia.

Conclusion

Based on the information provided above, and considering the application of the precautionary principle, the proposed rezoning is unlikely to result in a significant impact on grey-headed flying-fox. While the Study Area contains known habitat, this area is minimal and fragmented. Based on the current Master Plan, the proposed rezoning is unlikely to result in a significant impact on these species.

This assessment has been undertaken based on the current Master Plan. It is expected that these assessments will be reviewed and revised following the finalisation of the Master Plan and impact boundaries as part of the future development application.

Migratory Species under International Conventions

The following migratory species are considered in this assessment:

- little tern (*Sternula albifrons*)
- white-throated needletail (*Hirundapus caudacutus*)
- fork-tailed swift (*Apus pacificus*)
- eastern osprey (*Pandion cristatus*)

Fork-tailed swift has been recorded flying over the habitats of the Study Area in May 2016. Little tern, white-throated needletail and eastern osprey have not been recorded within the Study Area, however potential habitat for these species occurs in the Study Area.

An area of important habitat is:

- **habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; or**
- **habitat utilised by a migratory species which is at the limit of the species range; or**
- **habitat within an area where the species is declining.**

The habitats within the Study Area for migratory species listed under international conventions is not considered to meet the criteria listed above, and important habitat is not likely to occur.

The Draft Referral Guideline for 14 Birds Listed as Migratory Species under the EPBC Act (DoE 2015) defines important habitat for the white-throated needletail, fork-tailed swift and eastern osprey. Important habitat for white-throated needletail includes tree hollows in tall trees on ridge tops (DoE 2015). Otherwise the species is almost entirely aerial (DoE 2015). Important habitat for fork-tailed swift includes open plains to woodland areas, however the species is almost entirely aerial (DoE 2015). Important habitat for the eastern osprey includes Bays, estuaries, along tidal stretches of large coastal rivers, mangrove swamps, coral and rock reefs, terrestrial wetlands and coastal lands of tropical and temperate Australia and off shore islands (DoE 2015).

No guidelines are available for little tern. Little terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits, and also on exposed ocean beaches (DoE 2016). The Study Area contains suitable sand dune habitat to the east of the site. Little tern has been previously recorded nesting in mined dunes along the south-western edge of the Worimi Conservation Lands, however this has not been recorded within the Study Area.While this is not expected to be impacted by the proposed rezoning, the proposed rezoning may result in increased human access to the sand dunes.

The habitats within the Study Area for migratory species listed under international conventions is not considered to meet the criteria listed above, and *important habitat is* not likely to occur.

The proposed rezoning is considered likely to result in a significant impact on migratory species if there is a real chance or possibility that it will:

- ***substantially modify and/or destroy an area of important habitat for a migratory species;***
- ***seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species; and/or***
- ***result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species****.*

The Study Area is not considered to comprise *important habitat* for any of the identified migratory species listed above, and therefore the proposed rezoning is not likely to substantially modify or destroy important migratory species habitat. Similarly, the proposed rezoning will not seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species; or result in an invasive species that is harmful to migratory species becoming established within the Study Area.

Conclusion

The proposed rezoning is not likely to result in a significant impact on any migratory species listed under the EPBC Act or international conventions.

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Fort Wallace Bushfire Assessment

338 Fullerton Street, Stockton NSW

Ref: 97963 - 20170283

Document Log: NCA16R39083

KLEINFELDER
Bright People. Right Solutions.

12 October 2017

Prepared for:

Defence Housing Australia
Suite 2, 45D Fitzroy Street
Carrington NSW 2294

Bushfire Threat Assessment

Fort Wallace

338 Fullerton Street, Stockton NSW

Kleinfelder Job No. NCA16R39083

Please note:

This report is prepared in accordance with current accepted practice as described in the NSW Rural Fire Service Guide Planning for Bushfire Protection, 2006 – a Guide for Councils, Planners, Fire Authorities, Developers and Home Owners, AS 3959–2009 Construction of buildings in bushfire-prone areas, and the National Construction Code (NCC).

This report is not an insurance policy. Owing to the unpredictable nature of bushfires and of weather conditions at the time of a bushfire, this report cannot be taken as a warranty that the recommended bushfire mitigation measures will protect the property from damage in every possible bushfire event. Ultimately, the onus is on the land owner to accept the risks associated with development on the site in light of the identified bushfire threat.

Document Control:

Version	Date	Author	Technical Review	Peer Review
1.0	12 October 2017	Dan Pedersen	Dan Pedersen BPAD Bushfire Planning & Design Accredited Practitioner Level 3	

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EXECUTIVE SUMMARY

Report Type	Bushfire Threat Assessment
Applicant's Name	Defence Housing Australia
Applicant Contact Details	Gully.Coote@dha.gov.au
Site Address	338 Fullerton Street, Stockton NSW
Lot No.	Lot 100
Deposited Plan No.	DP 1152115
Local Government Area	Newcastle City Council
Zoning under Newcastle City Council LEP	SP2 – Infrastructure
Fire Danger Index Area Name	Greater Hunter Region, FDI 100
Bushfire Prone Land	Yes
Source methodology/s	NSW Rural Fire Service (2006), Planning for Bushfire Protection guidelines. Australian Standard 3959–2009: Construction of Buildings in Bushfire-Prone Areas.
Site visit date	20 July 2016
Document date	12 October 2017
Document number	NCA16R39083
Site plan/s attached	No
Conclusion	*This bushfire assessment provides the proponent with information regarding the assessment of the classified bushfire prone vegetation within and surrounding the subject site and the minimum performance provisions that must be addressed to comply with Chapter 4 of PBP (2006) for residential subdivisions.* *This bushfire assessment confirmed that the proposed development can achieve BAL 29 providing recommended APZ are managed. Water and access provisions are deemed suitable for the proposed development.*

1. SCOPE OF ASSESSMENT

Under the *Rural Fires and Environmental Assessment Legislation Amendment Act* 2002 (amends the *Environmental Planning and Assessment Act* 1979) local councils are required to ensure that all developments in bushfire prone lands conform to documented bushfire protection specifications.

DHA are seeking to lodge a planning proposal with Newcastle City Council to rezone the site to allow a diversity of residential uses. A master plan has been developed to demonstrate how the site would develop in accordance with best practice planning and urban design principles.

This report assesses the performance of the illustrated master plan on Lot 100 (DP 1152115), 338 Fullerton Street, Stockton NSW, against the criteria as detailed in the NSW RFS Planning for Bushfire Protection (PBP).

This report cannot be used for any other design unless authorised and amended by the author of this report. Future detailed Development Applications (DA's) will be supported by detailed bushfire assessment.

1.1 PROJECT DESCRIPTION

The proponent has engaged Kleinfelder to conduct a bushfire threat assessment to inform the planning proposal, which involves the residential uses within an existing Australian Defence Force (ADF) land holding. The subject site known as Fort Wallace covers a total area of 31 ha and was previous used by the ADF as a strategic military defence positon.

The subject site location and surrounding vegetation and landscape characteristics are shown in **Figure 1**.

1.2 SITE ASSESSMENT METHODOLOGY

The site assessment methodology used to determine the level of bushfire attack for this development has been sourced from Appendix 2 of the NSW RFS Planning for Bushfire Protection (PBP) (2006). The assessment procedure used to determine the category of bushfire attack level (BAL) is in accordance with AS3959 - 2009.

1.2.1 Integrated Development

Section 91 of the EP&A Act defines integrated development – i.e. residential subdivisions. Integrated developments require a formal approval from the NSW Rural Fire Service under s100B of the Rural Fires Act 1997.

Section 100B of the Rural Fires Act 1997 states that the NSW Rural Fire Service can issue a BFSA approval provided the development meets certain requirements and standards. A BFSA authorises development to the extent that it complies with standards regarding setbacks (to mitigate radiant heat), provision of water supply, emergency management and other matters considered by the Commissioner to be necessary to protect persons, property or the environment from danger that may arise from a bushfire. A BFSA requires a bushfire assessment to be prepared in accordance with Clause 44(1) of the Rural Fires Regulation 2013, which specifies the information requirements for consideration of a BFSA under section 100B of the RF Act.

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PROJECT REFERENCE: 20162565

DATE DRAWN: 21/10/2015 13:26 Version 1

DRAWN BY: gjoyce

DATA SOURCE:
LPI - 2015

Locality

Defence Housing Australia
Ecological Constraints Assessment
Fort Wallace Site
Stockton Peninsula, NSW 2295

FIGURE:

1

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Metres
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PROJECT REFERENCE: 20170283
DATE DRAWN: 27/10/2017 14:42 Version 1
DRAWN BY: gjoyce
DATA SOURCE:
LPI - 2015
nearmap - 2017
Architectus - 2017

Fort Wallace Site Layout

Defence Housing Australia
Bushfire Assessment
Fort Wallace
338 Fullerton Street, Stockton NSW

FIGURE:
2

L:\GIS FOLDER\00 CLIENT FILES\97963_DefenceHousingAustralia\20170283_DHA_RifleRange_FortWallace_Bushfire\Mapping\20170283_FW_Fig2_BAL_D20171027.mxd

2. BUSHFIRE THREAT ASSESSMENT

2.1 LOCATION AND SURROUNDING LAND USE

The subject site is situated on start of the Stockton Peninsula, within the Newcastle City Council LGA, positioned between the North Channel Hunter River to the west, and Stockton Beach to the east.

The subject site is currently zoned under the Newcastle City Council LEP (2013) as SP2 – Infrastructure, however the proponent intends to submit a rezoning application with Newcastle City Council to rezone the subject site to E3 – Environmental Management and a proportion of the subject site as R2 – Low Density Residential and RE2 – Private Recreation.

The surrounding land is comprised of residential park land, residential development and the Stockton Centre (Disability Services) to the north.

2.2 FIRE WEATHER

Newcastle City Council LGA is within the Greater Hunter Region and has an FDI value of 100 (Table 2.1, AS3959-2009).

2.3 ENVIRONMENTAL FEATURES

The site is located on the Stockton Sand Spit, and has considered seas level rise, dune movement, and coastal vegetation. There are no known environmental features that would be adversely impacted by the proposed development. Detailed ecology and coastal environmental reports have been prepared for the planning proposal (Umwelt 2016).

2.4 THREATENED SPECIES

No threatened species constrain the bushfire mitigation actions proposed (Umwelt, 2016).

2.5 ABORIGINAL ARTEFACTS

No heritage or artefacts would constrain the bushfire mitigation actions proposed (Umwelt, 2016).

2.6 BUSHFIRE ASSESSMENT

2.6.1 Bushfire Hazard (Vegetation Classification)

The vegetation classification is identified in all directions from the development out to a distance of 140 metres.

The area of vegetation within the subject site has been mapped by Newcastle City Council in 2004 as Category 1 bushfire prone vegetation as shown on **Figure 3**.

The predominant bushfire hazard is located in the north, east and south boundaries of the subject site. During the site inspection the bushfire prone vegetation to the north and south was identified as Coastal Sand Apple Blackbutt Forest and assessed as **forest** and the Bushfire prone vegetation to the east was identified as coastal shrubland and was assessed as **shrubland**.

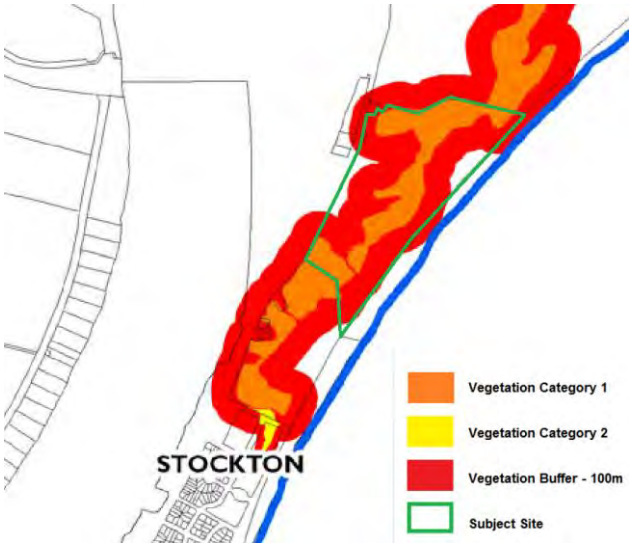

Figure 3: Newcastle Bushfire Prone Land Map 2009.

Table 1 details the vegetation classification in each direction.

2.6.2 Slope Assessment

The effective slope under the classified vegetation located to the north, east and south of the subject site has been assessed as flat to upslope.

2.6.3 Distance to Classified Vegetation (Asset Protection Zones)

The assessment will determine the required minimum setbacks from dwelling construction to the vegetation hazard type.

The vegetation hazard are either upslope or on flat terrain from the proposed development areas. The minimum setbacks to achieve bushfire attack level (BAL) BAL29, as detailed in AS3959-2009 are:

- Forest: 25m - 35m
- Scrub: 13m - 19m

For the purpose of this BAL assessment it is assumed that all setbacks (APZ) are manage in perpetuity.

2.6.4 Determine Bushfire Attack Level (Construction Standards)

The BAL is derived using the vegetation classification, setback distance and effective slope. The BAL rating is equivalent to the AS3959-2009 requirements for the construction of various elements of a Class 1, 2 and 3 buildings.

With a minimum setback of 25 metres to upslope forest vegetation to the north and south and 13 metres to upslope scrub vegetation to the east, BAL 29 is achievable (refer to **Figure 2**).

Table 1 details the vegetation classification for each direction from the proposed development and the calculated BAL rating.

Table 1: APZ and BAL summary

Aspect	Vegetation Classification	Distance (APZ)	Slope	BAL
North	Forest	Min 25m	Flat/Upslope	**BAL 29**
East	Scrub	Min 13	Flat/Upslope	**BAL 29**
South	Forest	Min 25m	Flat/Upslope	**BAL 29**
West	NA (Fullerton Road)	NA	NA	NA

2.6.5 Water Supply

The subject site is connected to the town reticulated water supply. This water supply will be extended throughout the proposed subdivision via a ring main system.

The following water supply performance measures can be achieved in later, future design stages:

- All above ground water and gas service pipes external to the building will be metal, including and up to any taps.
- All fire hydrant spacing, sizing and pressures will comply with AS 2419.1 – 2005.
- Fire hydrants will not be located within any road carriageway and provisions for parking on public roads will be met.

2.6.6 Access and Egress

2.6.6.1 Public Road & Property Access

Residential development of the site would be accessible via Fullerton Street, which is a sealed two lane public through road, suitable for evacuation and simultaneous emergency management.

All public roads and property access roads will be designed in a manner that complies with the performance criteria's outlined in Section 4.1.3 of PBP 2006.

Public roads will be a combination of perimeter road linking with an internal road system. Main thoroughfare roads will be 8m trafficable width kerb to kerb. Internal roads will be 6.5m trafficable width kerb to kerb.

The design allows for alternate access to Fullerton Street, and internal roads are through roads, thus avoiding any potential dead ends to residential areas.

All public and property access dimensions and capacity requirement can be achieved.

A fire trail access is recommended at the bushland interface between the cluster homes east and west, to provide some access for fire management purposes, and APZ maintenance.

3. COMPLIANCE SUMMARY

Table 2: Planning for Bush Fire Protection (2006) Compliance summary table.

3.1 APZ	
Intent:	**Complies with PBP (2006): YES**
This section is to provide for sufficient space for firefighting and other emergency services personnel, ensuring radiant heat levels permit operations under critical conditions of radiant heat, smoke and embers, while supporting or evacuating occupants.	The proposed development site has adequate space within the subject site, such that all required setbacks (APZ) can be established and maintained in perpetuity on site. The master plan shows that the APZ will provide adequate separation between the residential lots and the upslope forest vegetation to the north and south, and the upslope scrub vegetation to the east. All additional bushfire mitigation strategies will be managed entirely within the subject site.
3.2 Access	
Intent	**Complies with PBP (2006): YES**
This section is to provide for safe operational access for emergency services personnel in suppressing a bush fire, while residents are accessing or egressing an area.	The existing public roads and all proposed public roads will comply the minimum performance requirements of PBP 2006 (Chapter 4.1.3(1) Public Roads). All property access roads will comply the minimum performance requirements of PBP 2006 (Chapter 4.1.3(2) Property Access).
3.3 Services	
Intent	**Complies with PBP (2006): YES**
This section is to provide adequate water services for the protection of buildings during and after the passage of a bushfire, and to locate gas and electricity so as not to contribute to the risk of fire to buildings.	**Water**: Water supply to proposed development will comply with Chapter 4, of PBP (2006). The reticulated water supply will use a ring main system, and all above ground water and gas service pipes external to the building are metal, including and up to any taps. Fire hydrant spacing, sizing and pressure will comply with AS 2419.1 – 2005. Hydrants are not located within any road carriageway, and all provisions of parking on public roads are met.
	Gas: Gas services can conform to Chapter 4 of PBP (2006). Any reticulated or bottled gas must be installed and maintained in accordance with AS 1596 and the requirements of relevant authorities.

3.1 APZ	
	Electricity: Electrical services can conform to Chapter 4 of PBP (2006). Location of electricity services will not lead to ignition of surrounding grassland or the fabric of buildings or risk life from damaged electrical infrastructure. Where practical, new electrical transmission should be underground.

4. CONCLUSION

The bushfire assessment indicate that the master plan and associated design principles located at (Lot 100 , DP 1152115), 338 Fullerton Street, Stockton NSW can comply with all performance criteria's outlined for integrated (residential subdivision) development in Chapter 4 of PBP (2006).

AS 3959-2009 sets out requirements for the construction of various elements of a building in order to reduce the likelihood of ignition of the building when subject to bushfire attack. The proposed development (residential subdivision) can achieve **BAL 29** (minimum construction requirement).

The proposed design provides for suitable access and water provisions for emergency management.