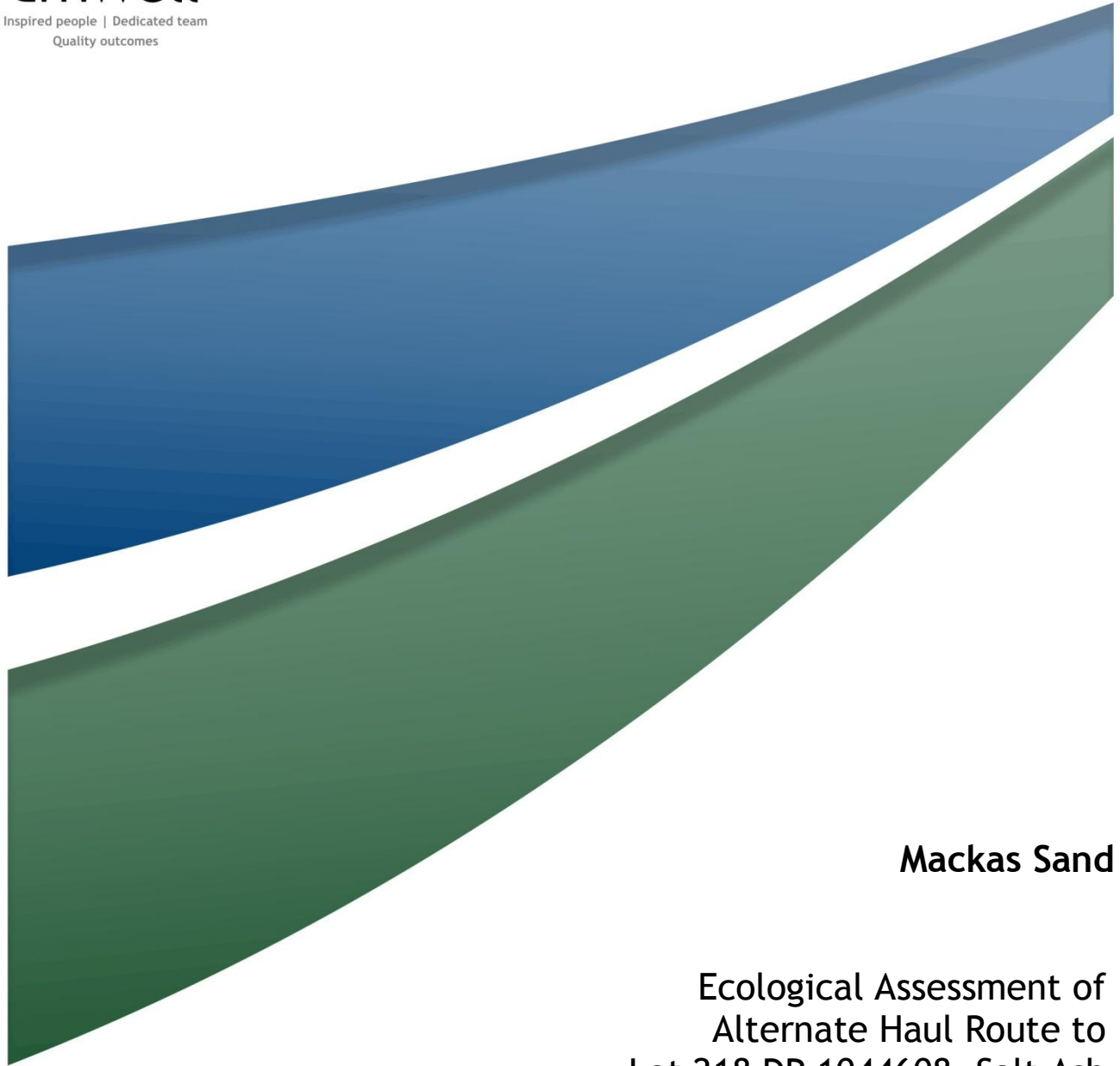


APPENDIX 3

Ecological Assessment



Mackas Sand

Ecological Assessment of Alternate Haul Route to Lot 218 DP 1044608, Salt Ash

October 2012



Ecological Assessment of Alternate Haul Route to Lot 218 DP 1044608, Salt Ash

October 2012

Prepared by
Umwelt (Australia) Pty Limited

on behalf of
Mackas Sand

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Report No:	1646/R38/Final
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1.0 Introduction

In 2009, Mackas Sand was granted development consent (Major Project Approval 08_0142) to extract industrial grade and construction sand resources from Lot 218 and Lot 220, Salt Ash, New South Wales (NSW) (**Figure 1.1**). The approval includes provision for Mackas Sand to access Lot 218 via an existing public road off Lavis Lane and then via a private haul route through the Quality Sands and Ceramics sand quarry and Lot 227 DP 1097995. The Ecological Assessment for that development application was prepared by Umwelt (2009a). Mackas Sand sought approval for modification of Major Project Approval 08_0142 to establish an alternate haul road route to Lot 218 around the Quality Sands and Ceramics sand quarry site in January 2012 (Umwelt 2012a). The alternate route proposal as assessed in (Umwelt 2012a) is now considered unfeasible. A new alternate haul road route has been proposed and is the subject of this assessment. The currently proposed alternate haul route connects Lot 218 directly with Nelson Bay Road and is shown in **Figure 1.2**.

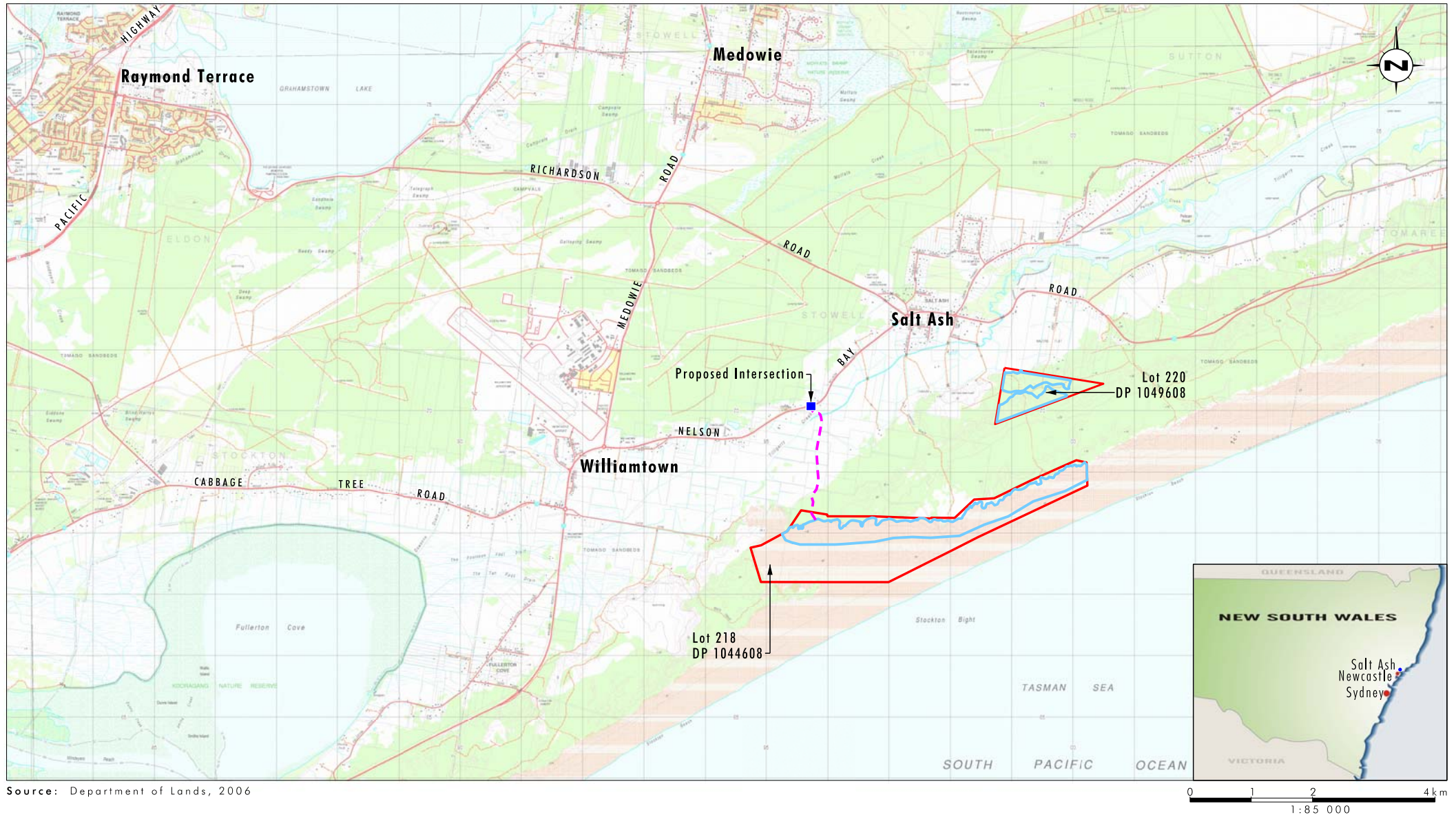
Mackas Sand now seeks approval for modification of Major Project Approval 08_0142 to establish this new alternate haul route to Lot 218 via a new access off Nelson Bay Road. Umwelt (Australia) Pty Limited (Umwelt) has been engaged by Mackas Sand to prepare the necessary environmental assessments for the proposed modification (the 'alternate haul route'), including this Ecological Assessment.

1.1 Legislative Context

The original proposal satisfied the definition of a Major Project under the State Environmental Planning Policy (Major Development) 2005 and approval was given in accordance with the requirements of the now repealed Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Modifications to projects approved under Part 3A that are outside the scope of the original approval are permitted with consent under Section 75W of the EP&A Act. The Minister for Planning and Infrastructure is the determining authority for modifications under Section 75W of the EP&A Act.

In addition, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires any action that has, or is likely to have, a significant impact on Commonwealth land or Matters of National Environmental Significance (MNES) to obtain approval of the Commonwealth Minister for the Environment.

A search of the Commonwealth Government's Protected Matters Search Tool was undertaken on 10 October 2012 and did not identify any MNES in relation to the proposal. The proposal will not affect any Commonwealth lands. A discussion of impacts to actual and potential EPBC listed flora and fauna is included in **Section 5.1.7**. The proposed modification has been referred under the EPBC Act to Department of Sustainability, Environment, Water, Population and Communities (DSEWPC).



- Legend**
- Lot Boundaries
 - Approval Areas
 - Proposed Alternate Access Route
 - Proposed Intersection Location

FIGURE 1.1

Locality Plan



Source: Google Earth (2009)

0 250 500 750 m
1:15 000

Legend

- Lot Boundary (218)
- Approved Operational Area
- - - Proposed Alternate Haul Route
- Approved Access Route
- Proposed Intersection Location

FIGURE 1.2

Proposed Alternate Haul Route

1.2 Description of the Alternate Haul Route

The modification sought is to construct and utilise an alternate route to access the approved sand extraction area on Lot 218 in DP 1044608 (Lot 218), Salt Ash.

The approved access to Lot 218 extraction area is via a public road reserve (Stockton Bight Track) that passes through Pt 76 and part of Pt 101 from where it leaves Stockton Bight Track and traverses across Pt 101 and Pt 13 of DP 753192 to Lot 227 DP 1097995 (Lot 227) which provides access to Lot 218. Pt 101 and Pt 13 in DP 753192 are owned by members of the Towers family and Lot 227 is owned by Worimi Local Aboriginal Land Council (LALC).

The alternate access to the Lot 218 extraction area is via a new road connecting Lot 218 to Nelson Bay Road in the north. The proposed alternate haul route is approximately 2 kilometres in length and passes through Lot 4 DP1121457, Lot 1 DP177679, Lot 810 DP1008279, Lot 58 DP753192, and Lot 122 DP753192 (refer to **Figure 1.2**). Right of way has been obtained by Mackas Sand for the development of the alternate access. The section of track located within Lot 218 has been assessed within (Umwelt 2012a) and was not reassessed as part of the current assessment.

Approximately 500 metres of the alternate Nelson Bay Road haul route follows an existing track. Approximately 1180 metres of the alignment of the alternate haul road route is to be constructed over disturbed grassland with the remaining 320 metres to be constructed through Coastal Sand Apple – Blackbutt Forest.

The alternate haul route easement will be a gravelled surface disturbance approximately 8 metres in width however for the purpose of this assessment a maximum width of 10 metres was assessed. In total, the preferred alternate haul route would disturb an area of approximately 2.03 hectares of which approximately 0.48 hectares is unvegetated (existing track), 1.18 hectares is disturbed grassland and the remaining 0.37 hectares is Coastal Sand Apple – Blackbutt Forest.

1.3 Objectives

This Ecological Assessment was prepared by Umwelt to assess the potential impact of the alternate Nelson Bay Road haul route on native flora and fauna species, populations and ecological communities occurring within or in the vicinity of the alternate haul road route. The total disturbance footprint of the alternate haul route is approximately 2.03 hectares.

The objectives of the Ecological Assessment were to:

- record the flora and fauna species/communities present in the habitats of the alternate haul route;
- identify any threatened or migratory species, endangered populations, threatened ecological communities (TECs), or their habitats, listed under the *Threatened Species Conservation Act 1995* (TSC Act), the *Fisheries Management Act 1994* (FM Act) or the EPBC Act;
- assess the impact that the alternate haul route would have on any threatened flora and fauna species, endangered populations, TECs, or their habitats, recorded, or with the potential to occur within the alternate haul route; and
- provide management recommendations to mitigate ecological impacts associated with the alternate haul route.

2.0 Methods

2.1 Literature Review

A review of previous documents and reports relevant to the Project was undertaken. This included regional and sub-regional vegetation mapping reports, site-specific surveys completed within the alternate haul route, ecological surveys undertaken in the vicinity of the alternate haul route and also relevant ecological database searches. The information obtained was used to inform survey design, and was also used to assist in the assessment of potentially occurring threatened and migratory species, endangered populations and TECs. Relevant documents are discussed below, focussing on the key findings of each assessment.

2.1.1 Vegetation of the Tomago and Tomaree Sandbeds, Port Stephens NSW (Driscoll and Bell 2006)

Vegetation of the Tomago and Tomaree Sandbeds, Port Stephens, New South Wales (Driscoll and Bell 2006) was commissioned by the Hunter Water Corporation (HWC). The aim of the report was to identify and map groundwater-dependent ecosystems (GDEs) on the Tomago and Tomaree sandbeds to assist in the management of water extraction from aquifers.

Driscoll and Bell (2006) provide the most comprehensive vegetation mapping in the local area. The alternate haul route is located to the south-east of the Driscoll and Bell (2006) study area, however some mapped vegetation communities extend as far south as the alternate haul route. The characteristics of the vegetation communities in the alternate haul route were compared to vegetation community descriptions from Driscoll and Bell (2006). Based on this, the vegetation communities along the forested section of the alternate haul route broadly align with two community descriptions, being Tomago Blackbutt – Apple – Bloodwood Forest and Anna Bay Blackbutt – Apple – Bloodwood Forest.

2.1.2 Lower Hunter and Central Coast Regional Environmental Management Strategy Vegetation Mapping

Lower Hunter and Central Coast Regional Environmental Management Strategy (LHCCREMS) Vegetation Mapping (NPWS 2000 and House 2003) is a broad-based vegetation mapping system for the Lower Hunter and Central Coast regions incorporating seven local government areas (LGAs), from Port Stephens to Gosford and west to Cessnock. The aim of this report was to provide cross tenure maps of the distribution of vascular plant communities in the Lower Hunter and Central Coast regions.

Characteristics of the vegetation communities along the alternate haul route were compared to the LHCCREMS vegetation map units and where appropriate, were mapped using the same map unit names.

2.1.3 Draft Flora and Fauna Assessment for Proposed Rezoning of Lot 218, Stockton Bight (Umwelt 2004)

The Draft Flora and Fauna Assessment for Proposed Rezoning of Lot 218 at Stockton Bight report (Umwelt 2004) was prepared to meet the flora and fauna assessment requirements for Port Stephens Council as a component of a rezoning application of the site.

Surveys undertaken identified 39 fauna species, including the koala (*Phascolarctos cinereus*), squirrel glider (*Petaurus norfolcensis*), eastern pygmy possum (*Cercartetus nanus*), powerful owl (*Ninox strenua*), Gould's wattled bat (*Chalinolobus gouldii*) and little forest bat (*Vespadelus vulturus*). A total of 25 flora species were recorded within the Coastal Sands Apple – Blackbutt Forest and Swamp Mahogany Paperbark Forest communities which were mapped outside the approved sand extraction area of Lot 218.

2.1.4 Ecological Assessment of Sand Extraction Operations from Lot 218 and Lot 220, Salt Ash (Umwelt 2009a)

Umwelt was engaged by Mackas Sand to undertake the environmental assessments associated with sand extraction on Lots 218 and 220 at Salt Ash. The vegetated disturbance area for the sand extraction development on Lot 220 was 48 hectares. The approved Lot 218 extraction area comprises unvegetated mobile sand dune. Although the assessment covered both Lots 218 and 220, as the disturbance area of Lot 218 is unvegetated, all detailed surveys were undertaken within Lot 220. The 2009 survey area overlapped the alternate haul route and included similar vegetation communities.

The report drew on the previous ecological surveys undertaken in 2003 and 2004 (see Umwelt 2004) with additional ecological surveys including targeted flora and fauna surveys, ground-truthing existing vegetation community mapping, threatened flora species survey, an assessment of the current condition of the project area and an updated fauna survey and habitat assessment.

No threatened flora species, endangered populations or TECs were recorded in Lots 220 or 218. Four threatened fauna species were recorded during surveys specifically for this project, being the squirrel glider (*Petaurus norfolcensis*), grey-headed flying-fox (*Pteropus poliocephalus*), greater broad-nosed bat (*Scoteanax rueppellii*) and the eastern bentwing-bat (*Miniopterus schreibersii oceanensis*).

2.1.5 Modification to Environmental Assessment of Sand Extraction Operations from Lot 218 and Lot 220, Salt Ash (Umwelt 2012a)

Umwelt was engaged by Mackas Sand to undertake the environmental assessments associated with an alternate haul road to allow access to Lot 218 at Salt Ash. *Modification to Environmental Assessment of Sand Extraction Operations from Lot 218 and Lot 220, Salt Ash* (Umwelt 2012a) was put on public exhibition from 18 January 2012 to 17 February 2012. The report drew on the previous ecological surveys undertaken in 2003, 2004 and 2009 with additional ecological surveys including targeted flora and fauna surveys, ground-truthing the vegetation community mapping, threatened flora species survey, an assessment of the current condition of the project area and an updated fauna survey and habitat assessment conducted.

Three threatened flora species were identified within the proposed haul road route being *Diuris arenaria* (sand doubletail), *Diuris praecox* (Newcastle doubletail) and a hybrid *Angophora inopina* (Charmhaven apple). Three threatened bat species were recorded during the assessment including grey-headed flying fox (*Pteropus poliocephalus*), little bent-wing bat (*Miniopterus australis*) and greater broad-nosed bat (*Scoteanax ruppellii*).

No endangered populations or TEC's were recorded.

2.1.6 Ecological Database Searches

A search of the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife database was undertaken to identify threatened species, endangered populations and TECs that have been previously recorded within a 10 kilometre radius of the alternate haul route. Similarly, the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) Protected Matters database was searched to identify Commonwealth listed threatened and migratory flora and fauna species and ecological communities whose range falls within the bounds of the alternate haul route and/or have been previously recorded or are predicted to occur within a 10 kilometre radius. The data obtained from these two database searches were used to compile a list of threatened species, populations and TECs potentially occurring within the alternate haul route. A comparison between habitat requirements for each of these species and the habitat types present within the alternate haul route was undertaken to determine the likelihood of TSC Act and EPBC Act listed flora and fauna species occurring.

2.2 Field Surveys

Ecological surveys undertaken as part of this assessment were conducted by Umwelt on 24 July, 6 September, 20 September and 12 October 2012. The survey effort is described in **Sections 2.2.1** below. The aims of the field surveys within the alternate haul route were to:

- describe the vegetation communities and fauna habitat types present;
- describe the health and condition of the vegetation and habitats;
- obtain information on the general floristics and fauna species diversity;
- identify threatened flora and fauna species, migratory species and populations or TECs or their habitats occurring within or having potential to occur; and
- collate sufficient information to enable an accurate assessment of the impacts of the proposed development on the ecological values.

2.2.1 Flora Survey

Detailed flora surveys have been undertaken previously within Lot 218 and 220 to inform ecological impact assessments (Umwelt 2004, 2009a and 2012a) and the results of these surveys have been taken into consideration during the development of the survey methodology for the current assessment.

Three rapid assessment plots were sampled in selected areas within the alternate haul route (see **Figure 2.1**). At each rapid assessment plot, a period of 15 to 20 minutes was spent searching for the dominant vascular flora species present within the plot. Species within the plot were assigned a cover-abundance value to reflect their relative cover and abundance. A modified Braun-Blanquet 6-point scale (Braun-Blanquet 1927, with selected modifications sourced from Poore 1955 and Austin et al. 2000) was used to estimate cover-abundances of all plant species recorded within each quadrat and plot. **Table 2.1** shows the cover-abundance categories used.

Table 2.1 - Modified Braun-Blanquet Crown Cover-Abundance Scale

Class	Cover-Abundance*	Notes
1	Few individuals (less than 5% cover)	Herbs, sedges and grasses: <5 individuals Shrubs and small trees: <5 individuals
2	Many individuals (less than 5% cover)	Herbs, sedges and grasses: 5 or more individuals Shrubs and small trees: 5 or more individuals Medium-large overhanging tree
3	5 – less than 20% cover	-
4	20 – less than 50% cover	-
5	50 – less than 75% cover	-
6	75 – 100% cover	-

Note:* Modified Braun-Blanquet scale (Poore 1955; Austin et al. 2000).

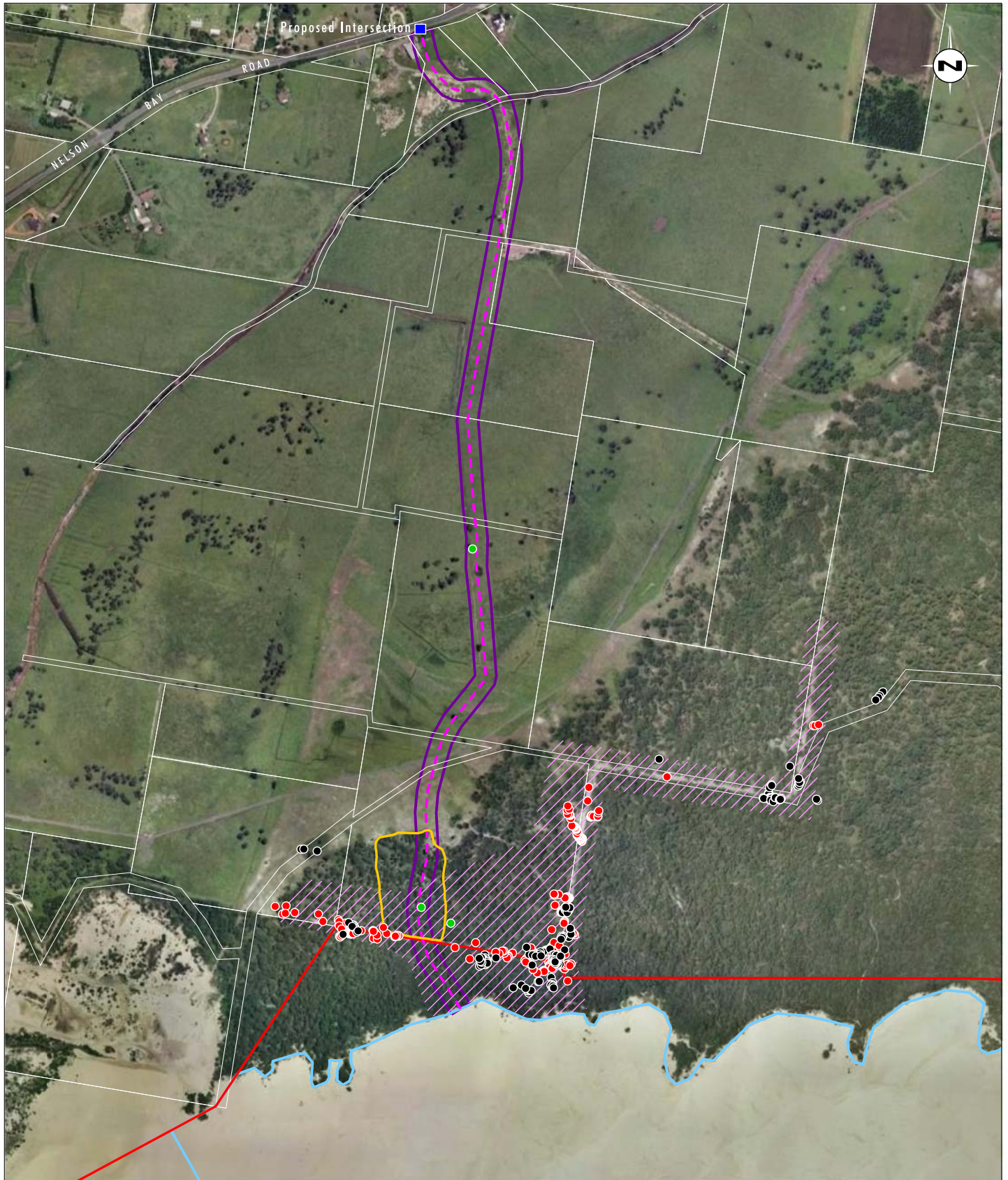
At each of the rapid assessment plots, information was gathered regarding the condition of vegetation. Additionally, features indicating the general health of the vegetation at each quadrat were recorded, including: evidence of natural regeneration; occurrence and abundance of weeds; and evidence of disturbance and feral animals.

In addition to rapid assessment plot sampling, ground-truthing of vegetation mapping was undertaken across the extent of the alternate haul route, and all species observed opportunistically were recorded.

2.2.2 Plant Identification and Taxonomic Review

All vascular plants recorded or collected were identified using keys and nomenclature from Harden (1992, 1993, 2000 and 2002) and Wheeler et al. (2002). Recent changes to nomenclature and classification were incorporated into the results, as derived from *PlantNET* (Botanic Gardens Trust 2012), the on-line plant name database maintained by the National Herbarium of NSW.

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 common names. Where the identity of a specimen was unknown or uncertain, it was lodged with the National Herbarium of New South Wales at the Royal Botanic Gardens Sydney.



Source: Aerial: Google Earth (2008)

0 100 250 500 m
1:10 000

Legend

- Lot 218 Boundary
- Lot 218 Approved Extraction Area
- Proposed Alternate Haul Route
- Proposed Intersection Location
- Flora Rapid Assessment and Fauna Habitat Assessment
- Proposed Alternate Haul Route Survey Area
- Targeted 2012 Orchid Survey Area

- Targeted 2011 Orchid Survey Area
- *Diuris arenaria*
- *Diuris praecox*

FIGURE 2.1

Alternate Haul Route Survey Locations

2.2.3 Targeted Orchid Surveys

Orchid surveys specifically targeting sand doubletail (*Diuris arenaria*) and Newcastle doubletail (*Diuris praecox*) were undertaken by an Umwelt ecologist on 6 and 20 September and 12 October 2012. This survey focused on areas considered to represent potential habitat along the alternate haul route and consisted of parallel transect approximately 5 metres apart being walked throughout the areas of potential habitat. A total area of 2.4 hectares was searched during the survey (refer to **Figure 2.1**). Any individuals identified during the surveys were counted and recorded with a hand held Global Positioning System (GPS).

Prior to the commencement of the surveys, areas known to contain both species of orchid were surveyed to ensure the species were flowering and detectable. Areas known to contain both species of orchids were identified during targeted orchid surveys during 2011 (see **Section 2.1.5**). The location of previous orchid survey and known orchid locations are shown on **Figure 2.1**.

2.2.4 Fauna Survey

Detailed fauna surveys have been undertaken previously within Lots 218 and 220 to inform ecological impact assessments (Umwelt 2004, 2009a and 2012a) and the results of these surveys have been taken into consideration during the development of the survey methodology for this assessment.

The fauna survey consisted of an assessment of habitat within each of the different fauna habitats and opportunistic sightings of fauna species. A total of three fauna habitat assessment sites were assessed during the field survey (refer to **Figure 2.1**).

Observations of the following habitat features were made throughout the alternate haul route:

- evidence of fire;
- nature of and extent of erosion;
- extent of weed species;
- presence of feral animals;
- type of ground cover (e.g. litter, rock, soil);
- ground fauna resources;
- wet soaks/drainage lines;
- degree of dieback;
- presence of mistletoe;
- number of habitat trees;
- structure and floristics of vegetation cover; and
- koala habitat.

As part of the habitat assessment, all habitat trees (those with hollows, nests or dreys) were marked and recorded using a GPS.

3.0 Flora Survey Results

3.1 Vegetation Communities

Two vegetation communities were recorded within the alternate haul route, being: Coastal Sand Apple – Blackbutt Forest and Previously Disturbed Grassland. The distribution of these communities within the alternate haul route is shown in **Figure 3.1** (see **Plates 1 to 3**). A third community, Swamp Mahogany – Paperbark Forest is adjacent to the eastern edge of the alternate haul route and has therefore also been described below. Flora Species List is included as **Appendix A**.

3.1.1 Coastal Sand Apple – Blackbutt Forest

The Coastal Sand Apple – Blackbutt Forest (nomenclature following LHCCREMS vegetation classification (NPWS 2000)), occurs in the southern part of the proposed alternate haul route and covers an area of approximately 0.37 hectares within the alternative haul route alignment and extends into the adjoining Worimi Conservation Lands. This community is characterised by a canopy stratum to 30 per cent cover, up to 16 metres in height that is dominated by blackbutt (*Eucalyptus pilularis*) and smooth-barked apple (*Angophora costata*). A sub-canopy layer is present and is dominated by old man banksia (*Banksia serrata*) and broom-heath (*Monotoca elliptica*). The sub-canopy typically has a canopy cover of 10 per cent and a height of up to 10 metres.

The understorey stratum is mostly open (5 per cent canopy cover) and dominated by Sydney golden wattle (*Acacia longifolia*), prickly Moses (*Acacia ulicifolia*), bossiaea (*Bossiaea rhombifolia*) and *Platysace lanceolata*. The ground cover is generally dense (to 50 per cent canopy cover) consisting of common bracken fern (*Pteridium esculentum*), kangaroo grass (*Themeda australis*), blady grass (*Imperata cylindrica* var. *major*), raspwort (*Gonocarpus teucrioides*) and flax lily (*Dianella caerulea* var. *producta*). This community generally consists of a good succession of species in all strata.

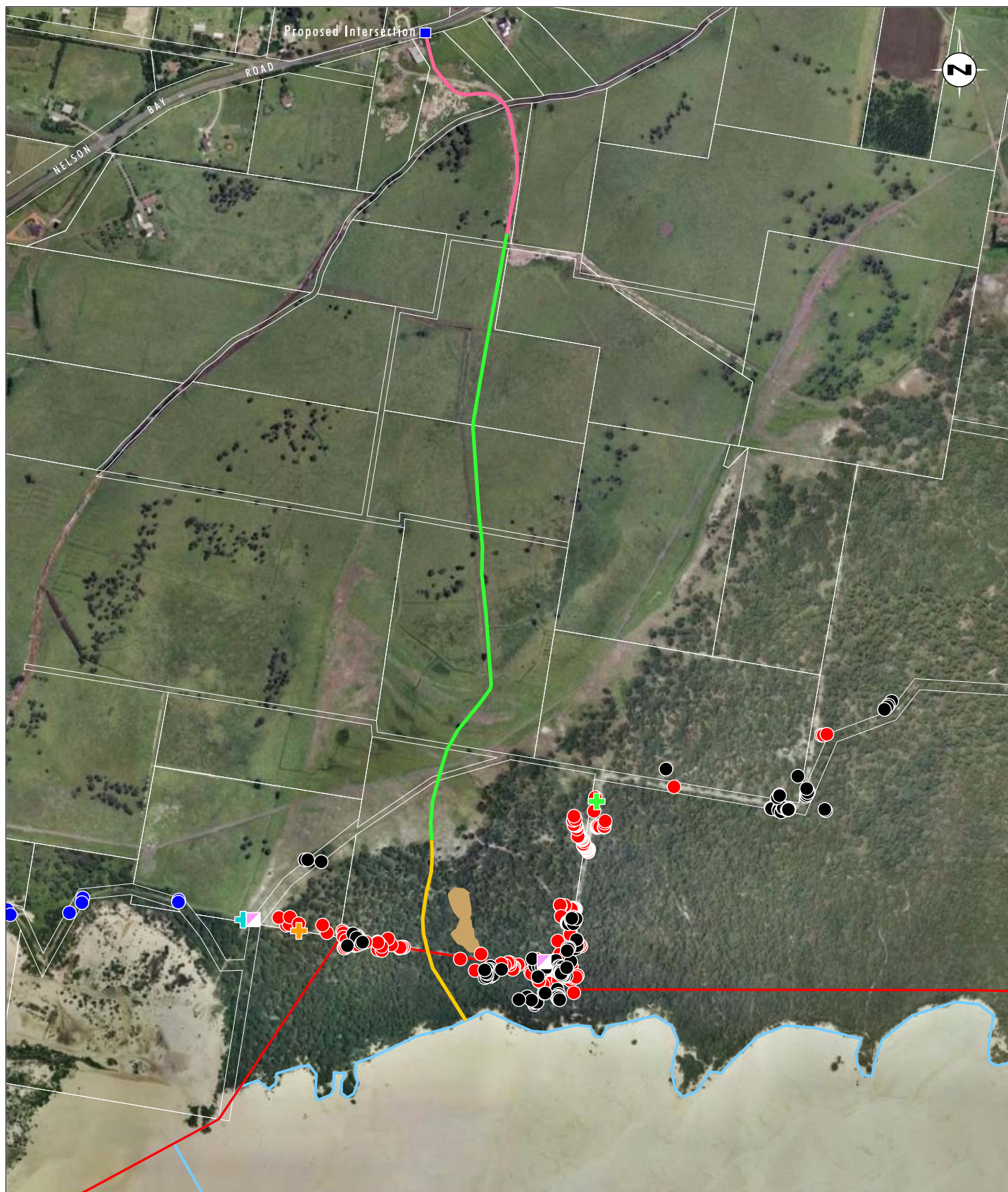
The Coastal Sand Apple - Blackbutt Forest extends into the adjoining Worimi Conservation Lands. The 4438 hectares of Worimi Conservation Lands include the 524 hectare Worimi National Park and contains a significant tract of Coastal Sand Apple - Blackbutt Forest and pockets of Swamp Mahogany – Paperbark Forest (described in **Section 3.1.3**).

3.1.2 Previously Disturbed Grassland

A significant proportion of the northern section of the alternate haul route comprises previously disturbed areas such as existing dirt roads and 1.18 hectares of previously disturbed grassland within the proposed alternate haul route alignment. In the disturbed grassland, vegetation has been cleared for agricultural purposes, leaving only ground cover vegetation, typically less than 0.5 metre in height.

The disturbed grassland in most cases is dominated by introduced grasses such as paspalum (*Paspalum dilatatum*), kikuyu (*Pennisetum clandestinum*) and red Natal grass (*Melinis repens*). Introduced herbs were also common, including fireweed (*Senecio madagascariensis*), white clover (*Trifolium repens*), Paddy's lucerne (*Sida rhombifolia*) and cobbler's pegs (*Bidens pilosa*).

Native species were also recorded in the grassland however these make up approximately 5 per cent of the groundcover species within this community. The native species recorded in the grassland include common couch (*Cynodon dactylon*) and slender rat's tail grass (*Sporobolus creber*). In areas subject to inundation native species included *Juncus* sp.,



Source: Aerial: Google Earth (2008)

0 100 250 500 m
1:10 000

Legend

- | | | |
|--|---|---|
| Lot 218 Boundary | ● <i>Angophora floribunda/inopina</i> | + Grey-crowned Babbler |
| Lot 218 Approved Extraction Area | ● <i>Diuris arenaria</i> | |
| ■ Proposed Intersection Location | ● <i>Diuris praecox</i> | |
| Coastal Sand Apple - Blackbutt Forest | + Grey-headed Flying-fox | |
| Disturbed Grassland | + Little Bentwing-bat | |
| Existing Tracks/Disturbed Grassland | Greater Broad-nosed Bat | |
| Swamp Mahogany Paperbark Forest | | |

File Name (A4): R38_V1/1646_335.dgn

FIGURE 3.1

Alternate Haul Route Vegetation Communities
and Threatened Species Locations



PLATE 1
Coastal Sands Apple - Blackbutt Forest



PLATE 2
Disturbed Grassland



PLATE 3
Swamp Mahogany - Paperbark Forest

common reed (*Phragmites australis*) and broadleaf cumbungi (*Typha orientalis*) were recorded.

3.1.3 Swamp Mahogany – Paperbark Forest

Swamp Mahogany – Paperbark Forest (nomenclature following LHCCREMS vegetation classification), occurs in a moist depression along the eastern border of the alternate haul route, adjacent to Coastal Sand Apple – Blackbutt Forest and occupies an area of approximately 0.42 hectares. As shown on **Figure 3.1**, this community is located outside of the proposed haul road disturbance footprint. This vegetation community is characterised by a canopy stratum to 30 per cent cover and 15 metres in height that is dominated by swamp mahogany (*Eucalyptus robusta*), broad-leaved paperbark (*Melaleuca quinquenervia*) and blackbutt (*Eucalyptus pilularis*).

The understorey is open (10-15 per cent cover), to 8 metres in height, consisting of prickly tea-tree (*Leptospermum juniperinum*) and lemon-scented tea-tree (*Leptospermum polygalifolium*). The groundcover stratum is typically dense (60 per cent canopy cover), and is dominated by *Juncus* spp., saw-sedge (*Gahnia clarkei*) and swamp water fern (*Blechnum indicum*).

3.2 Threatened Flora Species and Endangered Populations

No threatened flora species or endangered flora populations were recorded along the proposed haul route during this assessment.

Previous surveys have identified three threatened species occurring within the vicinity of the proposed haul route including Charmhaven apple (*Angophora inopina*) which is listed as vulnerable under the TSC and EPBC Acts and two cryptic orchid species, sand doubletail (*Diuris arenaria*) which is listed as endangered under the TSC Act and Newcastle doubletail (*Diuris praecox*) which is listed as vulnerable under the TSC and EPBC Acts (Refer to **Figure 3.1**).

Targeted orchid surveys identified sand doubletail (*Diuris arenaria*) occurring in the previously recorded location (adjacent to the alternate haul route) but not within the alternate haul route. The other orchid species, Newcastle doubletail (*Diuris praecox*) was not detected during the targeted orchid surveys. An additional inspection undertaken on 20 September and 12 October 2012 also failed to locate any Newcastle doubletail (*Diuris praecox*) flowering.

The leafless tongue-orchid (*Cryptostylis hunteriana*), was an additional threatened flora species that was identified as having the potential to occur within the alternate haul route (based on database searches and literature review) and this, and the other three species listed above, are assessed further in **Appendix B**.

3.3 Threatened Ecological Communities

All TECs occurring in the Sydney Basin Bioregion were considered for their potential to occur in the alternate haul route, and this list was narrowed down to the following TECs that were considered to have potential to occur:

- Swamp Sclerophyll Forest in the NSW North Coast, Sydney Basin and South-East Corner Bioregions;
- Littoral Rainforest in the NSW North Coast, Sydney Basin and South-East Corner Bioregions;
- Freshwater Wetlands in the NSW North Coast, Sydney Basin and South-East Corner Bioregions; and
- Swamp Oak Floodplain Forest in the NSW North Coast, Sydney Basin and South-East Corner Bioregions.

The characteristics of the vegetation communities recorded along the proposed haul route were compared with the characteristics of the above TECs. No TECs were found to be consistent with the vegetation communities within the alternate haul route.

While the Swamp Mahogany – Paperbark Forest recorded shares some floristic and structural characteristics with the Swamp Sclerophyll Forest on Coastal Floodplain TEC, the community does not occur on a floodplain, is not associated with any floodplain, and therefore is not consistent with the description provided in the final determination for the listing of the community under the TSC Act (NSW Scientific Committee 2004). This community will not be disturbed by the proposed development.

The disturbed grassland community identified within the alternate haul route does occur within a coastal floodplain, however prolonged use of the area for cattle grazing has resulted in a highly modified environment which is almost completely dominated by pasture grasses such as kikuyu (*Pennisetum clandestina*) and other introduced herbs such as fireweed (*Senecio madagascariensis*). Swamp oak (*Casuarina glauca*) and broad-leaf paperbark (*Melaleuca quinquenervia*) do occur occasionally throughout the grassland however the occurrence of these elements alone within the disturbed grassland is not sufficient for this vegetation community to meet the description of Swamp Oak Floodplain Forest TEC according to the scientific committee's final determination (NSW Scientific Committee 2004). Based on the condition of the understorey and the highly disturbed nature of the floodplain, no coastal floodplain TEC's are considered to occur within the alternate haul route.

4.0 Fauna Survey Results

4.1 Fauna Habitat

The alternate haul route provides foraging, roosting and nesting habitats for a variety of fauna species. Two broad habitat types were identified along the alternate haul route: open forest and previously disturbed/grassland. While the previously disturbed/grassland areas provide mostly foraging habitat, the open forest areas provide a range of habitat niches for fauna species.

The canopy in the open forest habitat is dominated by smooth-barked apple (*Angophora costata*) and blackbutt (*Eucalyptus pilularis*) which support a moderate abundance of tree hollows providing important habitat for hollow-dependent fauna. A total of two habitat trees were recorded and marked within a 20 metre buffer of the proposed alternate haul route.

The canopy trees also provide foraging resources such as insects, nectar and foliage, for a wide variety of fauna including small and medium sized arboreal mammals, birds and reptiles. Swamp mahogany (*Eucalyptus robusta*) provides an important winter foraging resource for a wide range of species, in particular migratory birds.

The open, mid-stratum of the open forest habitat supports tea-trees and paperbarks, providing a good nectar resource for birds and arboreal mammals. These shrubs, combined with the dense ground stratum of grasses and sedges also provide important cover and refuge for reptiles, small mammals and birds.

Narrow artificial drainage channels occur throughout the disturbed grassland and these, in conjunction with slow draining depressions, provide the only local surface water resources for fauna species, however these are not permanent.

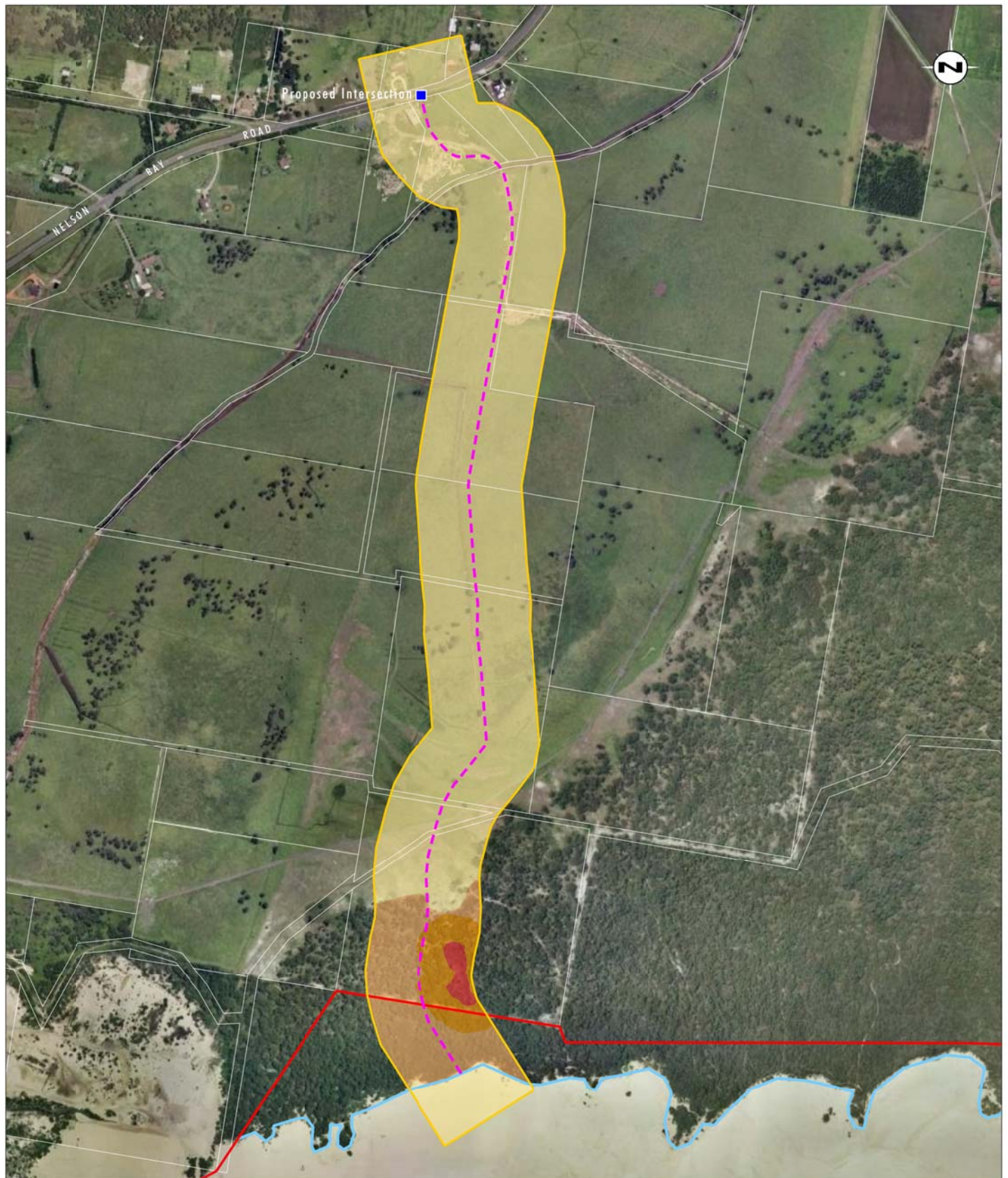
4.2 Koala Habitat Assessment

The vegetation communities of the alternate haul route were assessed according to the Port Stephens Comprehensive Koala Plan of Management (CKPoM). One tree species listed as a core koala feed tree in the CKPoM, swamp mahogany (*Eucalyptus robusta*), was found to occur in the vicinity of the alternate haul route. This species occurs in the Swamp Mahogany – Paperbark Forest (refer to **Figure 4.1**).

The proposed alternate haul route will pass through a small area of Coastal Sand Apple – Blackbutt Forest which is classified as Supplementary Koala Habitat (SKH) according to the CKPoM. However given its proximity to the Swamp Mahogany – Paperbark Forest (less than 50 metres away) which is identified as Preferred Koala Habitat (PKH) some is reclassified as Habitat Buffer over SKH.

The alternate haul route will result in the removal of all vegetation within the 10 metre road wide road alignment which will comprise of approximately 0.26 hectares of SKH and 0.11 hectares of Buffer over SKH.

An assessment of the alternate haul route in accordance with Appendix 4 of the CKPoM has been prepared and detailed in **Section 5.7**.



Source: Aerial: Google Earth (2008)

0 100 250 500m
1:10 000

Legend

- Lot 218 Boundary
- Lot 218 Approved Extraction Area
- Proposed Alternate Haul Route
- Proposed Intersection Location
- Preferred Koala Habitat
- Habitat Buffer over Supplementary Koala Habitat
- Supplementary Koala Habitat
- Mainly Cleared

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FIGURE 4.1

Alternate Haul Route Koala Habitat

4.3 Fauna Species Recorded

A total of 36 fauna species were recorded during fauna surveys of the alternate haul route, including 30 bird species, one mammal species, two reptile species and three amphibian species. A list of all species recorded in the alternate haul route is provided in **Appendix C**.

One threatened species was recorded during the current surveys; being the grey-crowned babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) which is listed as vulnerable under the TSC Act. A group of seven of these birds were identified to the east of the alternate haul route. Previous surveys have identified three threatened species adjacent to the alternate haul route (refer to **Figure 3.1**) and a further seven species are known to occur in the vicinity. Threatened species recorded during 2003 2008, 2011 and current surveys include:

- grey-crowned babbler (eastern subsp.) (*Pomatostomus temporalis temporalis*);
- grey-headed flying-fox (*Pteropus poliocephalus*);
- little bentwing-bat (*Miniopterus australis*); and
- greater broad-nosed bat (*Scoteanax rueppellii*).

The following list of threatened fauna species have been previously recorded in the local area in habitats comparable to those identified within the alternate haul route:

- squirrel glider (*Petaurus norfolcensis*);
- koala (*Phascolarctos cinereus*);
- eastern pygmy possum (*Cercartetus nanus*);
- new holland mouse (*Pseudomys novaehollandiae*);
- eastern bentwing-bat (*Miniopterus schreibersii oceanensis*);
- masked owl (*Tyto novaehollandiae*); and
- powerful owl (*Ninox strenua*).

A further 10 threatened fauna species were identified as having the potential to occur within the alternate haul route (based on database searches and literature review) and identified in **Appendix B**.

5.0 Impact Assessment

The following sections provide an assessment of the impacts of the proposed alternate haul route (as described in **Section 1.2**), taking into consideration the proposed mitigation measures detailed in **Section 6.0** that will be adhered to for the project.

5.1.1 Summary of Impacts

The proposed haul route will result in the removal of approximately 0.37 hectares of native vegetation that comprises Coastal Apple – Blackbutt Forest. The remainder of the proposed haul route will result in the modification of 1.66 hectares of disturbed land and predominately exotic grassland currently being grazed by cattle.

5.1.2 Threatened Flora Species

An intergrade of *Angophora floribunda* and *Angophora inopina* was identified in 2011 (Umwelt 2012a) along the previously proposed haul road route to the south-west of the currently proposed alternate haul route. This species was located approximately 500 metres west of the currently proposed haul route and were not recorded during the current survey and as such, will not be impacted upon by the proposed haul road (see **Figure 3.1**).

Approximately 250 individuals of the threatened orchid species Newcastle doubletail (*Diuris praecox*) were recorded adjacent to the habitats of the alternate haul route in 2011 (refer to **Figure 3.1**). In addition, 50 sand doubletail (*Diuris arenaria*) were also recorded in areas adjacent to the alternate haul route at this time. Neither species have been recorded within the alternate haul route, however only sand doubletail (*Diuris arenaria*) was identifiable during the targeted survey which included areas where the sand doubletail (*Diuris arenaria*) was previously identified.

Charmhaven apple (*Angophora inopina*), leafless tongue orchid (*Cryptostylis hunteriana*) and Newcastle doubletail (*Diuris praecox*) are listed as vulnerable species under the TSC Act and sand doubletail (*Diuris arenaria*) is listed as an endangered species under the TSC Act. Assessments of significance (in accordance with the EP&A Act) prepared for Charmhaven apple, leafless tongue orchid, Newcastle doubletail and sand doubletail (**Appendix D**) determined that the proposed alternate haul route would not be likely to have a significant impact on any of these species.

Although the impact associated with the development of the alternate haul route on these threatened flora species will be low, a number of impact mitigation measures (refer to **Section 6.0**) have been developed to further reduce the impacts.

5.1.3 Threatened Ecological Communities

No TECs will be impacted as a result of the alternate haul route.

5.1.4 Endangered Populations

No endangered populations will be impacted as a result of the alternate haul.

5.1.5 Threatened Fauna Species

No threatened fauna species have been recorded within the alternate haul route, however 11 threatened species are known to occur in adjacent, contiguous habitats (refer to **Section 4.3**) and the alternate haul route provides potential habitat for a further nine threatened fauna species.

Assessments of significance (in accordance with the EP&A Act) prepared for the threatened fauna species previously recorded within the vicinity and those deemed to have the potential to occur within the alternate haul route (**Appendix D**) determined that the proposed development would not have a significant impact on any threatened fauna species based on the small area of impact to potential fauna habitat (0.37 hectares) and the large areas of similar and contiguous habitat in the vicinity of the alternate haul route.

5.1.6 Koala Assessment

An assessment of potential impacts on the koala under the Port Stephens CKPoM has been undertaken and is included in **Appendix E**. Koala habitat delineation in line with the CKPoM identified the native vegetation within the alternate haul route as being SKH (0.26 hectares) and Buffer over SKH (0.11 hectares) as a result of PKH occurring directly to the east of the alternate haul route. The remainder of the haul route is considered to represent Mainly Cleared areas. The loss of 0.26 hectares of SKH and 0.11 hectares of Buffer over SKH is not expected to represent a significant loss of habitat for the Koala in the local area and is not expected to result in an adverse affect on the persistence of the Koala in the local area or region.

5.1.7 Matters of National Environmental Significance (EPBC Act)

Under the Commonwealth EPBC Act, the approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on Matters 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; and
- Nuclear actions.

Below is a summary of the key MNES that apply to the alternate haul route, with further assessment provided in **Appendix F**.

The previous alternate haul route assessed in 2011 (Umwelt 2012a) was referred to the DSEWPC and assessments of particular threatened species was made at that time (Umwelt 2012b). It was determined that there was no or negligible potential for significant impact to the assessed species and accordingly no further assessment is provided here. Species included;

- eastern bristlebird (*Dasyornis brachypterus*);
- dwarf kerrawang (*Rulingia prostrata*); and
- new holland mouse (*Pseudomys novaehollandiae*).

Threatened Flora Species

The Charmhaven apple (*Angophora inopina*), leafless tongue orchid (*Cryptostylis hunteriana*) and Newcastle doubletail (*Diuris praecox*) are listed under the EPBC Act. Charmhaven apple (*Angophora inopina*) and Newcastle doubletail (*Diuris praecox*) are known to occur in the vicinity of the alternate haul route and potential habitat was identified for the leafless tongue orchid (*Cryptostylis hunteriana*) within the alternate haul route.

Threatened Fauna Species

Eight threatened fauna species were identified as potentially occurring within either the alternate haul route, being:

- regent honeyeater (*Anthochaera phrygia*);
- swift parrot (*Lathamus discolor*);
- spotted-tailed quoll (*Dasyurus maculatus*);
- long-nosed potoroo (*Potorous tridactylus*);
- New Holland mouse (*Pseudomys novaehollandiae*);
- koala (*Phascolarctos cinereus*);
- grey-headed flying-fox (*Pteropus poliocephalus*); and
- large-eared pied-bat (*Chalinolobus dwyeri*).

Migratory Species

A total of 12 migratory and/or marine fauna species were identified as occurring or having the potential to occur in the alternate haul route based on the results of an EPBC Protected Matters search (SEWPC 2012) and habitat availability within these areas.

The EPBC Act set out criteria which are used to determine whether an action is likely to have a significant impact on MNES. These criteria are addressed in the Assessment of Significance provided in **Appendix F** for each of the recorded and potentially occurring species listed as threatened or migratory under the EPBC Act. The assessments of significance conclude that the project will not result in a significant impact on any listed threatened species and communities or migratory species listed under the Schedules of the EPBC Act based on the small area of impact (approximately 2.03 hectares) and the large areas of similar and contiguous habitat in the vicinity of the alternate haul route within the Worimi Conservation Lands as described in **Section 3.1.1**).

5.1.8 Key Threatening Processes

A number of Key Threatening Processes (KTP) listed under the Schedules of TSC Act and EPBC Act, are relevant to the proposed development. A discussion of the implications of the relevant KTP under each Act is detailed below.

5.1.9 Threatened Species Conservation Act KTPs

a) Invasion of native plant communities by bitou bush and boneseed

The invasion of native plant communities by bitou bush and boneseed contributes greatly to the loss of biodiversity along the NSW coast. The rapid colonisation of this species poses potential risk if disturbed areas are not monitored and maintained.

The development of the alternate haul route has potential to cause some localised outbreaks of bitou bush, particularly along the track edge. Weed management commitments as articulated within the Landscape Management Plan (Umwelt 2009b) will apply along the proposed alternate haul route alignment to ensure ongoing monitoring and management of any weed outbreaks that may occur.

b) Invasion, establishment and spread of *Lantana camara*

The invasion, establishment and spread of lantana (*Lantana camara*) contributes greatly to the loss of biodiversity throughout NSW coast and ranges. The rapid colonisation of this species poses potential risk if disturbed areas are not monitored and maintained.

The development of the alternate haul route has potential to cause some localised outbreaks of lantana (already present along the proposed alternate haul route), particularly along the track edge. Weed management commitments as articulated within the Landscape Management Plan (Umwelt 2009b) will apply along the proposed alternate haul route alignment to ensure ongoing monitoring and management of any weed outbreaks that may occur.

c) Clearing of native vegetation

The clearing of native vegetation is listed as a major factor contributing to the loss of biological diversity. The proposed development will involve the clearing of less than 0.37 hectares of native vegetation. Relative to the distribution of vegetation and habitats within the local area, the disturbance of 0.37 hectares is not regarded as a significant loss of native vegetation.

d) Loss of hollow-bearing trees

The loss of hollow-bearing trees is a major threat to native vertebrate fauna, in particular threatened species, throughout NSW. Hollow bearing trees provide nesting, roosting and foraging resources for a range of native fauna. Many fauna species are known to select hollows with specific characteristics highlighting the value of a range of hollow-bearing trees in an area.

The alternate haul route supports a number of hollow-bearing trees, providing potential habitats for hollow-dependent species such as the threatened squirrel glider (*Petaurus norfolcensis*). Two habitat trees were marked within a 20 metre alignment of the proposed haul route. To reduce the impacts on any hollow-dependent species in the alternate haul route, hollow bearing trees will be avoided, where possible, or where this is not possible an ecologically appropriate tree-clearing procedure (as set out in the Landscape Management Plan (Umwelt 2009b)) will be followed for all clearing works.

e) Removal of dead wood and dead trees

Dead wood and dead trees provide valuable nesting, roosting and foraging resources for a range of native fauna. The removal of dead wood and dead trees results in a loss of habitat for native fauna. The proposed development will involve the clearing of 0.37 hectares of native vegetation which would support such habitats for native fauna. The alternate haul route is connected with large expanses of similar native vegetation, and as such the removal of 0.37 hectares does not comprise a significant loss of habitat in the local region.

5.1.10 Environment Protection and Biodiversity Conservation Act KTPs.

a) Land clearance

The clearing of native vegetation is listed as a major factor contributing to the loss of biological diversity. The proposed development will involve the clearing of 0.37 hectares of native vegetation. Relative to the distribution of vegetation and habitats within the local area, the disturbance of 0.37 hectares is not regarded as a significant loss of native vegetation.

5.1.11 Critical Habitat

No critical habitat listed under the TSC Act or EPBC Act was identified in the alternate haul route.

6.0 Proposed Mitigation Measures

The following mitigation measures for the alternate haul route are based on and consistent with those developed for the existing approved sand quarry as outlined in Umwelt (2009a and 2009b) and Major Project Approval 08_142. The following sections describe the relevant mitigation measures, how they relate to the proposed development and how they should be integrated with the ecological management of the approved sand extraction operations.

6.1 Protection and Management of Arboreal Habitat (Clearing Procedure)

An approved vegetation clearing procedure was developed for the sand extraction proposal (Umwelt 2009b). All vegetation clearing in relation to the proposed alternate haul route will be undertaken in accordance with this procedure. The clearing procedure is aimed to minimise the impacts of the proposed developments on arboreal fauna species and habitat. In particular a number of hollow-bearing trees occur which provide potential habitat for threatened species recorded or potentially occurring in the alternate haul route such as the greater broad-nosed bat (*Scoteanax rueppellii*) and squirrel glider (*Petaurus norfolcensis*).

The vegetation clearing procedure detailed in Umwelt (2009b) is provided below.

Vegetation Clearing Procedure

Trees will be cleared in accordance with the procedure described below. The identification of tree hollows is to be undertaken by an appropriately qualified and experienced ecologist during pre-clearance inspections.

- Within the area of clearing, hollow-bearing trees and other habitat structures such as stags, logs and stumps will be clearly marked by an appropriately qualified and experienced ecologist to prevent accidental clearing.
- Vegetation surrounding the marked habitat structures will be cleared and the marked structures left undisturbed for a period of 24 hours.
- Marked hollow-bearing trees will be shaken prior to felling using a bulldozer and then left for a short period to allow any fauna using the hollows to be observed.
- Hollow-bearing trees will be slowly pushed over using a bulldozer, with care taken to avoid damage to hollows.
- Immediately following tree felling each of the identified hollows will be examined for fauna by a suitably qualified and experienced ecologist.
- Where practical, felled trees will be left for a 24-hour period prior to removal in order to allow species to move in to adjoining vegetation of their own volition.
- Nocturnal species which do not immediately move into adjoining vegetation will be captured and kept in a warm, dark and quiet place prior to release within the same vegetation community from which it was captured at night.
- Captured nocturnal animals will be released on the evening of capture and will not be held for extended periods of time.
- In the event that injured fauna are identified, species will be immediately taken to the nearest veterinarian or certified wildlife carer for treatment.

The timing of clearing operations will be designed to reduce the potential impact on breeding species, particularly the squirrel glider and threatened micro-bats. Clearing will (where possible) avoid the winter months when micro-bats and the eastern pygmy possum are in a state of torpor and squirrel gliders begin to breed.

6.2 Road Usage Rules for the Protection of Ecological Values

A number of threatened fauna species have potential to be injured or killed as a result of traffic on the alternate haul route. The koala (*Phascolarctos cinereus*), brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*) and the eastern pygmy possum (*Cercartetus nanus*) are examples of species that have potential to pass over the alternate haul route on the ground. Other fauna species such as kangaroos, wallabies and possums also have potential to be injured crossing this road.

Due to the potential risk of injury/death to fauna crossing the alternate haul route, it is appropriate to have road usage rules to minimise potential impacts on native fauna. The following road usage rules are proposed:

- enforce a maximum 40 kilometre/hour speed limit on the alternate haul route for all quarry traffic;
- minimise night traffic where possible (most fauna collisions are likely to occur at night time, in particular dusk and dawn);
- erect signage at either end of the alternate haul route to inform drivers of the ecological values of the habitats through which it passes and therefore the need to drive with caution; and
- leave tree canopies overhanging the track where safe and appropriate as this will allow some gliding species to cross without coming to the ground.

6.3 Rehabilitation

On completion of sand extraction works, if the alternate haul route is no longer required for other purposes such as fire fighting, rehabilitation of the road should be integrated with that of the quarry, in accordance with the rehabilitation principles outlined in the Landscape Management Plan (Umwelt 2009b).

Broadly, rehabilitation of the alternate haul route will aim to re-establish the native vegetation communities that existed prior to clearing for its construction. Revegetation of disturbed areas will utilise locally occurring plant species in a composition that closely resembles that of the pre-development vegetation communities. Monitoring of any revegetated areas along the road access should be integrated with any monitoring program for the sand extraction areas as described in **Section 7.0** of the Landscape Management Plan (Umwelt 2009b).

6.4 Biodiversity Offsetting Considerations

The vegetation present along the alternate haul route supports known and potential habitat for a number of threatened flora and fauna species. Although there are threatened species habitats present, the area of impact of the proposed development is small (0.3 hectare of native vegetation and fauna habitat) and it adjoins a very large remnant of vegetation which offers similar or higher quality habitats for the same threatened species, which is conserved in Worimi Conservation Lands and National Park. The alternate haul route does not comprise unique values or areas that are dissimilar to the surrounding coastal dune system. The alternate haul route will have very little impact on threatened species habitats in the locality and as such is not regarded to warrant the negotiation of any biodiversity offsetting areas.

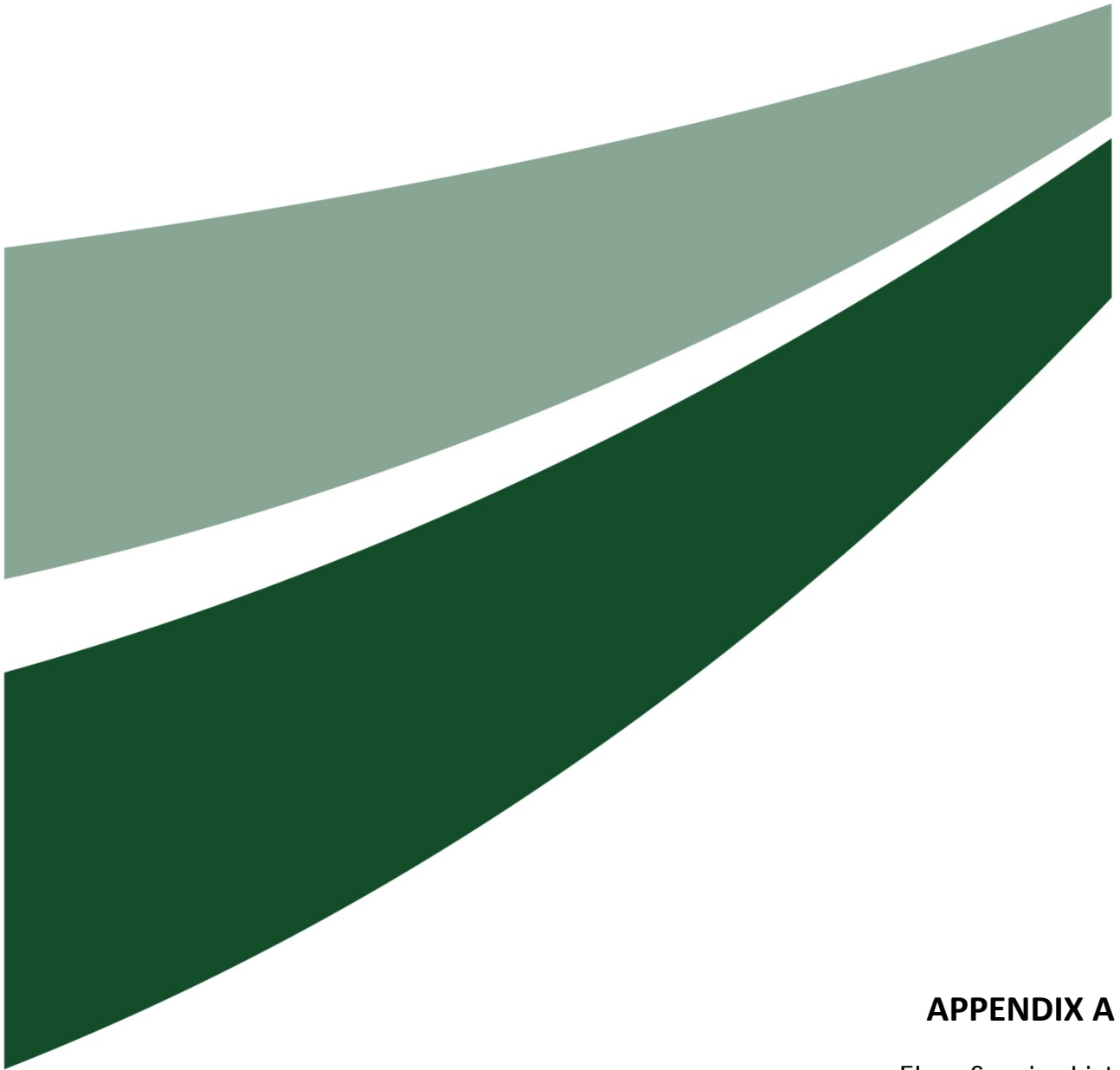
Further to this, the Worimi LALC owns a significant area (4438 hectares) of native vegetation along the Stockton dune system which is managed for its conservation values. The Conservation Land includes the 524 hectare Worimi National Park. The dedication of the Conservation Land was part of an agreement to allow some parts of the Stockton sand dune system to be developed (including for sand extraction) while dedicating other areas to conservation – in effect, the Worimi Conservation Land was a pre-emptive biodiversity offsetting agreement.

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APPENDIX A

Flora Species List

Appendix A – Flora Species List

The following list was developed from flora surveys undertaken as part of the proposed alternate haul route modification to Major Project 08_0142, located at Salt Ash, New South Wales (NSW). It includes all species of vascular plants observed along the alternate haul route during field surveys. Not all species are readily detected at any one time of the year, and the list will not necessarily include all plant species likely to occur in the project area. 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 indigenous to the study area;

Bold species indicated in bold text are indicative of threatened species or hybrids of threatened species;

subsp. subspecies; and

var. variety.

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 2012), the on-line plant name database maintained by the National Herbarium of New South Wales.

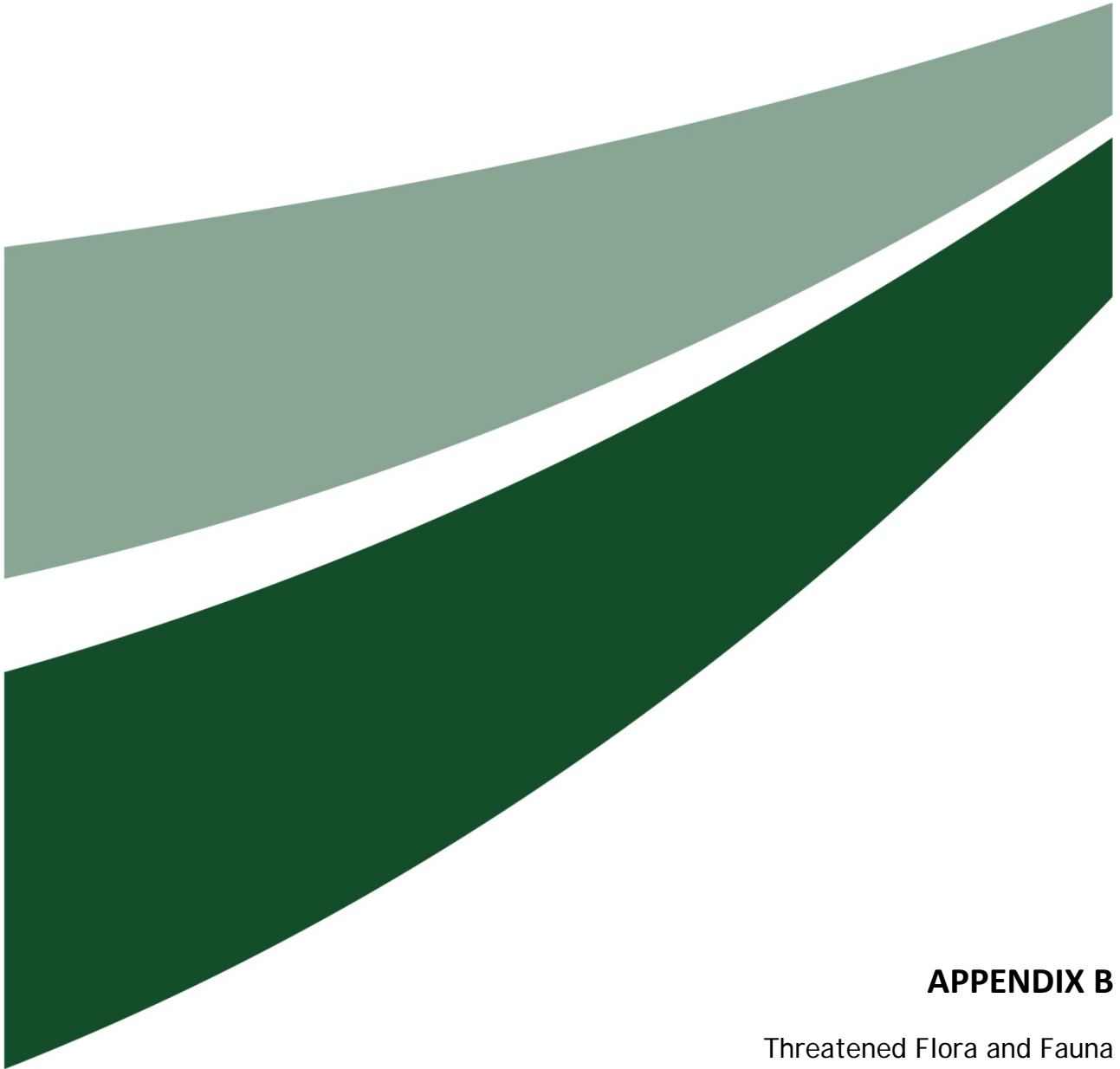
Common names used follow Harden (1992, 1993, 2000 and 2002) where available, and draw on other sources such as local names where these references do not provide a common name.

Table 1 – Flora Species List

Family	Scientific Name	Common Name
Cycadopsida (Cycads)		
Zamiaceae	<i>Macrozamia communis</i>	burrawang
Filicopsida (Ferns)		
Blechnaceae	<i>Blechnum indicum</i>	swamp water fern
Dennstaedtiaceae	<i>Pteridium esculentum</i>	bracken
Magnoliopsida (Flowering Plants) – Liliidae (Monocots)		
Cyperaceae	<i>Cyperus</i> sp.	
Cyperaceae	<i>Gahnia sieberiana</i>	red-fruit saw-sedge
Cyperaceae	<i>Schoenus melanostachys</i>	black bog-rush
Juncaceae	<i>Juncus</i> sp.	
Lomandraceae	<i>Lomandra longifolia</i>	spiny-headed mat-rush
Orchidaceae	<i>Acianthus fornicatus</i>	pixy caps
Orchidaceae	<i>Caladenia catenata</i>	lady fingers
Phormiaceae	<i>Dianella caerulea</i> var. <i>producta</i>	
Poaceae	* <i>Andropogon virginicus</i>	whisky grass
Poaceae	* <i>Axonopus compressus</i>	broad-leaved carpet grass
Poaceae	<i>Cynodon dactylon</i>	common couch
Poaceae	<i>Imperata cylindrica</i> var. <i>major</i>	blady grass
Poaceae	* <i>Paspalum dilatatum</i>	paspalum
Poaceae	* <i>Pennisetum clandestinum</i>	kikuyu grass
Poaceae	<i>Phragmites australis</i>	common reed
Poaceae	<i>Sporobolus creber</i>	slender rat's tail grass
Poaceae	<i>Themeda australis</i>	kangaroo grass
Restionaceae	<i>Baloskion tetraphyllum</i> subsp. <i>meiostachyum</i>	
Typhaceae	<i>Typha orientalis</i>	broadleaf cumbungi
Magnoliopsida (Flowering Plants) – Magnoliidae (Dicots)		
Apiaceae	* <i>Hydrocotyle bonariensis</i>	pennywort
Asteraceae	* <i>Conyza bonariensis</i>	flaxleaf fleabane
Asteraceae	* <i>Hypochaeris radicata</i>	catsear
Asteraceae	* <i>Senecio madagascariensis</i>	fireweed
Casuarinaceae	<i>Casuarina glauca</i>	swamp oak
Epacridaceae	<i>Leucopogon ericoides</i>	pink beard-heath
Epacridaceae	<i>Monotoca elliptica</i>	tree broom-heath
Fabaceae (Faboideae)	<i>Desmodium gunnii</i>	slender tick trefoil
Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	false sarsaparilla
Fabaceae (Faboideae)	* <i>Trifolium repens</i>	white clover
Fabaceae (Mimosoideae)	<i>Acacia irrorata</i> subsp. <i>irrorata</i>	green wattle
Haloragaceae	<i>Gonocarpus teucrioides</i>	raspwort
Myrtaceae	<i>Angophora costata</i>	smooth-barked apple
Myrtaceae	<i>Eucalyptus pilularis</i>	blackbutt

Table 1 – Flora Species List (cont.)

Family	Scientific Name	Common Name
Myrtaceae	<i>Eucalyptus robusta</i>	swamp mahogany
Myrtaceae	<i>Leptospermum polygalifolium</i>	lemon-scented tea-tree
Myrtaceae	<i>Melaleuca quinquenervia</i>	broad-leaved paperbark
Polygonaceae	<i>Rumex</i> sp.	dock
Proteaceae	<i>Banksia serrata</i>	old-man banksia
Thymelaeaceae	<i>Pimelea linifolia</i>	slender rice flower
Verbenaceae	* <i>Lantana camara</i>	lantana
Verbenaceae	* <i>Verbena bonariensis</i>	purpletop



APPENDIX B

Threatened Flora and Fauna
Species, Endangered
Populations and TECs
recorded or with Potential
to Occur

Appendix B – Threatened Flora and Fauna Species, Endangered Populations and TECs recorded or with Potential to Occur

Threatened species, endangered populations and threatened ecological communities (TECs) recorded during surveys and known to occur in the local area are listed in **Tables 1, 2 and 3** below. The results of the searches of the OEH Atlas of NSW Wildlife and the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) Protected Matters Database are also included. These database searches provided lists of species, populations or TECs previously recorded within a 10 kilometre radius of the alternate haul route, or with potential habitat within that radius except for marine or pelagic species for which the project area does not provide habitat.

Tables 1, 2 and 3 provide information on each threatened species (including specific habitat, distribution and reservation) which has contributed to determine their likelihood of occurring within the alternate access route, as well as the likelihood of being impacted as a result of the proposed development. Where indicated in the tables, species with potential to occur and potential to be impacted have been further assessed in **Appendices D and F**.

Table 1 – Threatened Flora Assessment

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
THREATENED FLORA SPECIES						
Netted bottle brush <i>Callistemon linearifolius</i>	V (TSC)	This species typically grows in dry sclerophyll forest on the coast and adjacent ranges.	Occurs chiefly from the Georges River to the Hawkesbury River.	Karuah NR.	The alternate haul is unlikely to provide potential habitat for this species and the species was not recorded during flora surveys. There is no potential for a significant impact on this species.	No
<i>Eucalyptus parramattensis</i> subsp. <i>decadens</i>	V (TSC) V (EPBC)	Generally occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant.	There are two separate meta-populations of this species. The Tomago Sandbeds meta-population is bounded by Salt Ash and Tanilba Bay in the north and Williamtown and Tomago in the south. The Kurri Kurri meta-population is bordered by Cessnock —Kurri Kurri in the north and Mulbring —Aberdare in the south. Large aggregations of the sub-species are located in the Tomalpin area.	This species is not known from any reservation areas in the region.	This species was not recorded during flora surveys undertaken in potential habitat for the species. This species is not expected to occur. There is no potential for a significant impact on this species.	No

Table 1 – Threatened Flora Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Charmhaven apple <i>Angophora inopina</i>	V (TSC) V (EPBC)	Habitat for this species typically occurs on the shallow sandy soils of the Narrabeen Group, on exposed ridges and slopes with westerly or northerly aspect. It has also been recorded on shallow alluvial soils in upper catchments and in embedded clay soil lenses with sandstone. This species is known to naturally hybridise with <i>A. floribunda</i> , particularly around major drainage lines.	This species has a restricted distribution, being confined to the Wyong, Lake Macquarie and Port Stephens Shires of NSW. Pure forms of this species have been recorded from the Wallarah catchment in the south and north to the Toronto area. Disjunct populations have been identified at Karuah.	Medowie SCA.	An intergrade of <i>Angophora floribunda</i> and <i>Angophora inopina</i> was recorded in the vicinity of the alternate haul route. Although this species was not recorded during field surveys, there is still some potential for impact.	Yes
Leafless tongue-orchid <i>Cryptostylis hunteriana</i>	V (TSC) V (EPBC)	This species appears to favour moist soils on the flat coastal plains. Occupies swamp heath, but also sclerophyll forest and woodland, often on sandy soils. Typically found in communities containing <i>Eucalyptus haemastoma</i> , <i>E. capitellata</i> and <i>Corymbia gummifera</i> .	This species is known to occur in the Karuah Manning and Wyong CMA sub-regions in the Hunter Central Rivers region.	This species is not known from any reservation areas in the region.	This species was not recorded during flora surveys, however potential habitat was identified within the alternate haul route.	Yes

Table 1 – Threatened Flora Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Sand doubletail <i>Diuris arenaria</i>	E (TSC)	This species occurs in coastal heath and dry grassy eucalypt forest on sandy flats. Grows in gently undulating country in eucalypt forest with a grassy understorey on clay soil.	This species is known to occur in the Karuah Manning sub-region of the Hunter/Central Rivers Catchment.	Tomaree NP.	This species was recorded during targeted orchid surveys adjacent to the alternate haul route in 2011. No individuals were recorded within the alternate haul route. Given the cryptic nature of this species and its perceived association with disturbance, there is potential for impact on this species.	Yes
Newcastle doubletail <i>Diuris praecox</i>	V (TSC) V (EPBC)	Grows on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey.	Occurs between Ourimbah and Nelson Bay.	Glenrock SCA.	This species was recorded during targeted orchid surveys adjacent to the alternate haul route in 2011. This species was not recorded within the alternate haul route however it was not flowering during the 2012 survey. There is potential for impact on this species.	Yes

Table 1 – Threatened Flora Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Camfields stringybark <i>Eucalyptus camfieldii</i>	V (TSC) v (EPBC)	Occurs in poor coastal country in shallow sandy soils and coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas.	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace Area south to Waterfall. Localised and scattered distribution includes sites at Norah Head, Peats Ridge, Mt Colah, Elvina Bay Trail, Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park.	This species is not known from any reservation areas in the region.	This species was not recorded during flora surveys undertaken in potential habitat for the species. This species is not expected to occur and further assessment is not required.	No

Table 1 – Threatened Flora Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Knotweed <i>Persicaria elatior</i>	V (TSC) V (EPBC)	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	This species has been recorded in south-eastern and northern NSW. In the north it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). This species also occurs in Queensland.	This species is not known from any reservation areas in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. This species is not expected to occur and further assessment is not required.	No
Dwarf kerrawang <i>Rulingia prostrata</i>	E (TSC) E (EPBC)	Occurs on sandy, sometimes peaty soils in a wide variety of habitats. Chiefly in gullies along the escarpment south from Picton.	This species is known to occur in the Karuah Manning sub-region of the Hunter/Central Rivers Catchment and a disjunct population occurs on Swamp Mahogany ecotonal forest at Tomago.	This species is not known from any reservation areas in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. This species is not expected to occur and further assessment is not required.	No
Dwarf heath casuarina <i>Allocasuarina defungens</i>	E (TSC) E (EPBC)	Grows mainly in tall heath on sand, but can also occur on clay soils and sandstone or exposed nearby-coastal hills/headlands adjacent to sandplains.	Occurs only in NSW from the Napiac area, north-west of Forster, to Byron Bay on the NSW north coast.	This species is not known from any reservation areas in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. This species is not expected to occur and further assessment is not required.	No

Table 1 – Threatened Flora Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Biconvex paperbark <i>Melaleuca biconvexa</i>	V (TSC) V (EPBC)	Biconvex paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Scattered and dispersed populations of this species are known to occur in the Karuah Manning and Wyong sub-regions of the Hunter/Central Rivers Catchment.	Tilligery SCA.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. This species is not expected to occur and further assessment is not required.	No
Black-eyed Susan <i>Tetradlea juncea</i>	V (TSC) V (EPBC)	Usually found in low open forest or woodland with a shrub understorey and grass groundcover on low nutrient soils, however it and has also been found in heathland and moist forest. This species generally prefers well-drained sites and ridges, although it also found on upper and mid-slopes.	This species is confined to the Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock LGAs.	Glenrock SCA, Snapper Island NR, Wallaroo NP, Wallaroo SF.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. This species is not expected to occur and further assessment is not required.	No

Table 1 – Threatened Flora Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Siah's backbone <i>Streblus pendulinus</i>	E (EPBC)	On the Australian mainland, the species is found in warmer rainforests, chiefly along watercourses. The altitudinal range is from near sea level to 800 metres above sea level. The species grows in well developed rainforest, gallery forest and drier, more seasonal rainforest.	Siah's Backbone occurs from Cape York Peninsula to Milton, south-east New South Wales (NSW), as well as Norfolk Island. Outside of Australia, the species is found in Papua New Guinea, Micronesia, Vanuatu, New Caledonia, Fiji, Rapa and Hawaii.	Hunter Wetlands NP.	This species has not been recorded within the project area or its surrounds. The site does not provide suitable habitat for this species. There is no potential for a significant impact on this species as a result of the construction of the alternate haul route.	No

Key: TSC = *Threatened Species Conservation Act* 1995;
 EPBC Act = *Environment Protection and Biodiversity Conservation Act* 1999;
 E = Endangered;
 V = Vulnerable;
 PD = Preliminary Determination;
 EEC = Endangered Ecological Community;
 CEEC = Critically Endangered Ecological Community;
 EP = Endangered Population;
 SCA = State Conservation Area; and
 NP = National Park.

Table 2 – Threatened Ecological Communities

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC (TSC)	Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally occur below 20 metres elevation on level areas.	Known from along the majority of the NSW coast. There is less than 150 ha remaining on the Tweed lowlands (estimate in 1985); about 10,600 ha on the lower Clarence floodplain (in 1982); about 11,200 ha on the lower Macleay floodplain (in 1983); about 3500 ha in the lower Hunter – Central Hunter region (in 1990s); less than 2700 ha on the NSW south coast from Sydney to Moruya (in the mid 1990s), including about 660 ha on the Cumberland Plain (in 1998) and about 100 ha on the Illawarra Plain (in 2001); and less than 1000 ha in the Eden region (in 1990).	Hunter Estuary NP Pambalong NR.	This endangered ecological community (EEC) is not present within the alternate haul route and as such there is no potential for a significant impact on this EEC.	No

Table 2 – Threatened Ecological Communities (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC (TSC)	Associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Generally occurs below 20 metres (rarely above 10 metres) elevation.	Known from parts of the LGAs Greater Taree, Great Lakes, Port Stephens, Maitland, Newcastle, Cessnock, Lake Macquarie.	Pambalong NR.	No vegetation community within the alternate haul route meets the requirements of this EEC as specified in the Final Determination. As such, there is no potential for this TEC to occur.	No

Table 2 – Threatened Ecological Communities (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	EEC (TSC)	Associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Generally occurs below 20 metres (though sometimes up to 50 metres) elevation. The composition of the community is primarily determined by the frequency and duration of water logging and the texture, salinity nutrient and moisture content of the soil, and latitude.	This community is known to occur in numerous LGAs, but is believed to be restricted to the areas of coastal NSW; no further south than the Shoalhaven LGA and as far north as the NSW -Queensland border, but no further west than Bathurst.	This EEC is not known to occur in reserves in the region.	Swamp Mahogany – Parperbark Forest was identified adjacent to the alternate haul route however the location of this community is not on or associated with a coastal floodplain, as specified in the Final Determination for this EEC.	No

Table 2 – Threatened Ecological Communities (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions	EEC (TSC)	Occurs on sand dunes and on soil derived from underlying rocks. Stands on headlands exposed to strong wind-action may take the form of dense, wind-pruned thickets. Stands are generally taller in sheltered sites such as hind dunes, although wind-pruning may still occur on their windward sides. Most stands occur within 2 kilometres of the sea, though are occasionally found further inland within reach of the maritime influence.	Littoral Rainforest occurs only on the coast and is found at locations in the NSW North Coast Bioregion, Sydney Basin Bioregion and South East Corner Bioregion.	Glenrock SCA.	This EEC is not present within the alternate haul route and as such there is no potential for a significant impact on this EEC.	No

Key: TSC = *Threatened Species Conservation Act 1995*;
 EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*;
 E = Endangered;
 V = Vulnerable;
 PD = Preliminary Determination;
 EEC = Endangered Ecological Community;
 CEEC = Critically Endangered Ecological Community;
 EP = Endangered Population;
 SCA = State Conservation Area; and
 NP = National Park.

Table 3 – Threatened Fauna Assessment

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
AMPHIBIANS						
Wallum froglet <i>Crinia tinnula</i>	V (TSC)	Wallum Froglets are found only in acid paperbark swamps and sedge swamps of the coastal 'wallum' country.	This species is known to occur in the Hunter, Karuah Manning, Wyong and Macleay Hastings subregions of the Hunter/Central Rivers Catchment.	Tomaree NP.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No
Stuttering barred frog <i>Mixophyes balbus</i>	E (TSC) V (EPBC)	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	Occur along the east coast of Australia from southern Queensland to the north-eastern Victoria.	Killarney NR, Watagans NP.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No
Green and golden bell frog <i>Litoria aurea</i>	E (TSC) V (EPBC)	Occurs amongst emergent aquatic or riparian vegetation and amongst vegetation, fallen timber, including grassland, cropland and modified pastures. Breeds in still or slow flowing waterbodies with some vegetation such as <i>Typha</i> spp. and <i>Eleocharis</i> spp.	NSW North Coast near Brunswick Heads, southwards along the NSW Coast to Victoria where it extends into east Gippsland.	This species is not known from any conservation reserves in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Giant barred frog <i>Mixophyes iteratus</i>	E (EPBC) E (TSC)	This species forages and lives amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1,000 metres. They breed around shallow, flowing rocky streams.	Coast and ranges from south-eastern Queensland to the Hawkesbury River in NSW. North-eastern NSW, particularly the Coffs Harbour-Dorrigo area, is now a stronghold.	This species is not known to occur in any reserves in the region.	This species has not been recorded within the project area or its surrounds. The site does not provide suitable habitat for this species. There is no potential for a significant impact on this species as a result of the construction of the alternate haul route.	No
BIRDS						
Little lorikeet <i>Glossopsitta pusilla</i>	V (TSC)	This species can be found in dry-open eucalypt forests and woodlands, and have been identified in remnant vegetation, old growth vegetation, logged forests, and roadside vegetation. The little lorikeet usually forages in small flocks, not always with birds of their own species. They nest in hollows, mostly in living smooth-barked apples.	This species is distributed from just north of Cairns, around the east coast of Australia down to Adelaide. In NSW this species is found from the coast to the western slopes of the Great Dividing Range, extending as far west as Albury, Dubbo, Parkes and Narrabri.	Glenrock SCA, Joe Redman Reserve, Wallaroo NP, Worimi NR, Wallaroo SF.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Spotted harrier <i>Circus assimilis</i>	V (TSC)	<p>Their habitat of choice is open grassy woodland, grassland, inland riparian woodland and shrub steppe. Although mostly associated with native grasslands it has also been identified in agricultural farmland. Their nest is made in a tree and composed of sticks.</p> <p>Individuals of this species are sparsely distributed throughout Australia and occur as a single population.</p>	The spotted harrier can be found throughout mainland Australia except for areas of dense forest on the coast, escarpments and ranges and rarely ever in Tasmania.	This species is not known to occur in any reserves in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No
Red goshawk <i>Erythrorhynchus radiatus</i>	CE (TSC) V (EPBC)	<p>This species is known to inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.</p>	This species is distributed sparsely through northern and eastern Australia although very rare in NSW. Formerly, it was at least occasionally reported as far south as Port Stephens.	This species is not known to occur in any reserves in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Flame robin <i>Petroica phoenicea</i>	V (TSC)	This species is known to breed in moist eucalypt forests and woodlands. It can usually be seen on ridges and slopes in areas where there is an open understorey layer. This species migrates during the winter to more lowland areas such as grasslands where there are scattered trees, as well as open woodland of the inland slopes and plains.	This robin is located in south-eastern Australia from the Queensland border to Tasmania and into Victoria as well as south-east SA.	This species is not known to occur in any reserves in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No
Scarlet robin <i>Petroica boodang</i>	V (TSC)	This robin can be found in woodlands and open forests from the coast through to inland slopes. The birds can sometimes be found on the eastern fringe of the inland plains in the colder months of the year. Woody debris and logs are both important structural elements of its habitat. It forages from low perches on invertebrates either on the ground or in woody debris or tree trunks.	The scarlet robin can be found in south-eastern Australia, from Tasmania to the southern end of Queensland, to western Victoria and south SA.	Worimi NP.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Varied sittella <i>Daphoenositta chrysoptera</i>	V (TSC)	The varied sittella can typically be found in eucalypt forests and woodlands, especially of rough-barked species and mature smooth-barked gums with dead branches, it can also be identified in mallee and acacia woodlands. This species builds a cup shaped nest made of plant fibres and spiders webs which is placed at the canopy level in the fork of a living tree.	The varied sittella is a sedentary species that inhabits the majority of mainland Australia with the exception of the treeless deserts and open grasslands. Its NSW distribution is basically continuous from the coast to the far west.	Medowie SF, Worimi SF.	This species was not recorded however there is potential habitat and it has been recorded in habitats nearby. There is potential for a significant impact on this species.	Yes
Australasian bittern <i>Botaurus poiciloptilus</i>	V (TSC) E (EPBC)	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.).	This species may be found over most of the state except for the far north-west.	Limeburners Creek NR, Lake Innes NR.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No
Black bittern <i>Ixobrychus flavicollis</i>	V (TSC)	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	Records of the species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland.	This species is not known from any reservation areas in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Australian painted snipe <i>Rostratula australis</i>	E (TSC) V (EPBC)	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowal, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin.	Pambalong NR.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No
Black-necked stork <i>Ephippiorhynchus asiaticus</i>	E (TSC)	Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters, and adjacent grasslands and savannah woodlands; can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries.	This species is widespread across coastal northern and eastern Australia, becoming uncommon further south into NSW, and rarely found south of Sydney.	Limeburners Creek NR, Lake Innes NR, Crowdy Bay NP, Myall Lakes NP, Booti Booti NP.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Osprey <i>Pandion haliaetus</i>	V (TSC)	Habitat for this species includes inshore coastal and estuarine waters, and occasionally inland rivers and lakes (Debus 2001). This species feeds mainly on fish, however also takes crustaceans, reptiles, small mammals or birds (Debus 2001). Breeding occurs from July to September and nests are often in dead trees and on headlands and rocky islands (Hollands 2003). Nests are re-used for many years (Hollands 2003), and are usually within 1 kilometre of the ocean (DECC 2008).	The osprey has a distribution along the majority of the eastern coastline, however is absent from Tasmania and rare in Victoria (Debus 2001). It is common around the northern coast, especially on rocky shorelines, islands and reefs (DECC 2008). The species is uncommon to rare or absent from closely settled parts of south-eastern Australia.	This species is not known from any conservation reserves in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No
Pied oystercatcher <i>Haematopus longirostris</i>	V (TSC)	Favours intertidal flats of inlets and bays, open beaches and sandbanks.	This species is thinly scattered along the entire coast of NSW.	Limeburners Creek NR, Crowdy Bay NP, Myall Lakes NP, Darawank NR, Booti Booti NP.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Glossy black-cockatoo <i>Calyptorhynchus lathami</i>	V (TSC)	Habitat for this species includes forests on low-nutrient soils, specifically those containing key <i>Allocasuarina</i> feed species. They will also eat seeds from eucalypts, angophoras, acacias, cypress pine and hakeas. Breeding occurs in autumn and winter, with large hollows required.	The glossy black-cockatoo has a sparse distribution along the east coast and adjacent inland areas from western Victoria to Rockhampton in Queensland. In NSW, it has been recorded as far inland as Cobar and Griffith.	This species is known to occur in Goulburn River NP, Wollemi NP, Yengo NP, Barrington Tops NP, and Mount Royal NP.	This species was not recorded during surveys. Potential nesting and roosting trees for this species are present, as are scattered preferred feeding trees (<i>Allocasuarina littoralis</i>). There is potential for a significant impact on this species.	Yes
Grey-crowned babbler (eastern subsp.) <i>Pomatostomus temporalis temporalis</i>	V (TSC)	Open box-gum woodlands on the slopes. Box-cypress-pine and open box woodlands on alluvial plains. Also found in acacia shrubland and adjoining areas. Feeds on invertebrates; forage on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses (DECC 2008). Occupy territories from 1 to 50 ha.	Occurs throughout northern and south-eastern Australia. In NSW, this species occurs on the western slopes of the Great Dividing Range and on the western plains reaching as far west as Louth and Hay. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW.	This species is known to occur in Goulburn River NP, Wollemi NP, Yengo NP and it is also known to occur in Belford NP.	This species was recorded during the current surveys. This species was not recorded within the alternate haul route and no nests were observed. There is potential for an impact on this species.	Yes

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Eastern Bristlebird <i>Dasyornis brachypterus</i>	E (TSC) E (EPBC)	Dense, low vegetation including heath and open woodland with a heathy understorey; in northern NSW occurs in open forest with tussocky grass understorey; all of these vegetation types are fire prone.	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia: southern Queensland/ northern NSW, the Illawarra Region and in the vicinity of the NSW/Victorian border.	This species is not known from any conservation reserves in the region.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No
Brown treecreeper (eastern subsp.) <i>Climacteris picumnus victoriae</i>	V (TSC)	Typical habitat for this species includes drier forests, woodlands and scrubs with fallen branches; river red gums on watercourses and around lake-shores; paddocks with standing dead timber; and margins of denser wooded areas. This species prefers areas without a dense understorey.	This species occurs over central NSW, west of the Great Dividing Range and sparsely scattered to the east of the divide in drier areas such as the Cumberland Plain of Western Sydney, and in parts of the Hunter, Clarence, Richmond and Snowy River valleys.	This species is known to occur in Goulburn River NP, Wollemi NP and Yengo NP.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species. There is no potential for a significant impact on this species.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Swift parrot <i>Lathamus discolor</i>	E (TSC) E (EPBC)	This species often visits box-ironbark forests, feeding on nectar and lerps. This species occupy areas where winter-flowering eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Preferred winter-flowering resources include swamp mahogany (<i>Eucalyptus robusta</i>), spotted gum (<i>Corymbia maculata</i>), red bloodwood (<i>C. gummifera</i>), Mugga ironbark (<i>E. sideroxylon</i>), and white box (<i>E. albens</i>).	In NSW this species has been recorded from the western slopes region along the inland slopes of the Great Dividing Range, as well as forests along the coastal plains from southern to northern NSW.	This species is known to occur in Wollemi NP.	This species was not recorded during surveys. Potential winter foraging resources (<i>Eucalyptus robusta</i>) are present adjacent to the alternate haul route and may attract this migratory species. There is potential for a significant impact on this species.	Yes

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Regent honeyeater <i>Anthochaera phrygia</i>	CE (TSC) E (EPBC)	Generally occurs in temperate eucalypt woodlands and open forests of south eastern Australia. It is commonly recorded from box-ironbark eucalypt associations, wet lowland coastal forests dominated by swamp mahogany, spotted gum and riverine casuarina woodlands. Key foraging species (typically winter-flowering species in the Hunter Valley) include mugga ironbark (<i>Eucalyptus sideroxylon</i>), yellow box (<i>E. melliodora</i>), Blakelys red gum (<i>Eucalyptus blakelyi</i>), white box (<i>E. albens</i>) and swamp mahogany (<i>E. robusta</i>).	Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland.	This species is known to occur in Goulburn River NP, Wollemi NP and Yengo NP.	This species was not recorded during surveys. Potential winter foraging resources (<i>Eucalyptus robusta</i>) are present adjacent to the alternate haul route and may attract this migratory species. There is potential for a significant impact on this species.	Yes
Masked owl <i>Tyto novaehollandiae</i>	V (TSC)	This species is generally recorded from open forest habitat with sparse mid-storey but patches of dense, low ground cover. It is also recorded from ecotones between wet and dry eucalypt forest, along minor drainage lines and near boundaries between forest and cleared land.	The masked owl occurs sparsely throughout the continent and nearby islands, including Tasmania and New Guinea.	This species is known to occur in Goulburn River NP, Wollemi NP, Yengo NP, Barrington Tops NP and Mount Royal NP.	This species was not recorded during surveys, however the masked owl is known to occur in nearby, similar habitats (Umwelt 2004). There is potential for a significant impact on this species.	Yes

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Powerful owl <i>Ninox strenua</i>	V (TSC)	The powerful owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. It generally requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation.	The powerful owl occurs in eastern Australia, mostly on the coastal side of the Great Dividing Range, from south western Victoria to Bowen in Queensland.	This species is known to occur in Goulburn River NP, Wollemi NP, Yengo NP, Barrington Tops NP and Mount Royal NP.	This species was not recorded during surveys. The species has been tentatively recorded in adjacent habitats (Umwelt 2004). There is potential for a significant impact on this species.	Yes
MAMMALS						
Spotted-tailed quoll <i>Dasyurus maculatus</i>	V (TSC) E (EPBC)	Habitat for this species is highly varied, ranging from sclerophyll forest, woodlands, coastal heathlands and rainforests. Records exist from open country, grazing lands and rocky outcrops. Suitable den sites including hollow logs, tree hollows, rocky outcrops or caves.	In NSW the spotted-tailed quoll occurs on both sides of the Great Dividing Range, with the highest densities occurring in the north east of the state. It occurs from the coast to the snowline and inland to the Murray River.	This species is known to occur in Wollemi NP, Yengo NP, Barrington Tops NP and Mount Royal NP.	This species was not recorded within the project however, the open forest habitats provide potential habitat for this species. There is potential for a significant impact on this species.	Yes

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Brush-tailed phascogale <i>Phascogale tapoatafa</i>	V (TSC)	Prefers dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest.	This species has a patchy distribution around the coast of Australia. In NSW it is more frequently found in forest on the Great Dividing Range in the north-east and south-east of the State. There are also a few records from central NSW.	Cotton-Bimbang NP Limeburners Creek NR Werrikimbe NP Talawahl NR Khappinghat NR.	This species was not recorded during surveys however potential nesting and roosting resources for this species are present. There is potential for a significant impact on this species.	Yes
Koala <i>Phascolarctos cinereus</i>	V (TSC) V (EPBC)	This species inhabits eucalypt forest and woodland, with suitability influenced by tree species and age, soil fertility, climate, rainfall and fragmentation patterns. The species is known to feed on a large number of eucalypt and non-eucalypt species, however it tends to specialise on a small number in different areas. <i>Eucalyptus tereticornis</i> , <i>E. punctata</i> , <i>E. cypellocarpa</i> , <i>E. viminalis</i> , <i>E. microcorys</i> , <i>E. robusta</i> , <i>E. albens</i> , <i>E. camaldulensis</i> and <i>E. populnea</i> are some preferred species.	The koala has a fragmented distribution throughout eastern Australia, with the majority of records from NSW occurring on the central and north coasts, as well as some areas further west. It is known to occur along inland rivers on the western side of the Great Dividing Range.	This species is known to occur in Goulburn River NP, Wollemi NP, Yengo NP, Barrington Tops NP and Mount Royal NP.	This species was not recorded but has been previously recorded nearby in similar habitats (Umwelt 2004). There is potential for a significant impact on this species.	Yes

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Eastern pygmy possum (<i>Cercartetus nanus</i>)	V (TSC)	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest.	This species is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pillaga, Dubbo, Parkes and Wagga Wagga on the western slopes.	This species is not known from any reservation areas in the region.	This species was not recorded during surveys, however the eastern pygmy possum is known to occur in nearby, similar habitats (Umwelt 2004). There is potential for a significant impact on this species.	Yes
Squirrel glider <i>Petaurus norfolcensis</i>	V (TSC)	Inhabits a variety of mature or old growth habitats, including box, box-ironbark woodlands, river red gum forest, and blackbutt-bloodwood forest with heath understorey. It prefers mixed species stands with a shrub or acacia mid-storey, and requires abundant tree hollows for refuge and nest sites.	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria.	This species is known to occur in Wollemi NP, Yengo NP and Mount Royal NP.	This species was not recorded during surveys. This species was, however, recorded in Lot 220 and in proximity to the alternate haul route in previous surveys (Umwelt 2012a). There is potential for a significant impact on this species.	Yes

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Long-nosed potoroo <i>Potorous tridactylus</i>	V (TSC) V (EPBC)	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature.	This species is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range.	Cotton-Bimbang NP, Werrikimbe NP.	This species was not recorded during surveys. However, the open forest habitats provide potential habitat for this species. There is potential for a significant impact on this species.	Yes
New Holland mouse <i>Pseudomys novaehollandiae</i>	V (EPBC)	This species inhabits a range of habitats from open heathlands, open woodlands with a heath understorey, as well as vegetated dunes. The New Holland mouse lives in a burrow which is shared with other individuals.	This species has a disjunct distribution across Tasmania, Victoria, Queensland and NSW	This species is not known to occur in any reserves in the region.	This species was not recorded during surveys. This species was however recorded in Lot 220 in previous surveys (Umwelt 2012a). There is potential for a significant impact on this species.	Yes

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Grey-headed flying-fox <i>Pteropus poliocephalus</i>	V (TSC) V (EPBC)	This species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Grey-headed flying-foxes are found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria.	This species is known to occur in Wollemi NP, Yengo NP and Barrington Tops NP.	This species was not recorded during surveys. This species was however recorded in Lot 220 and in proximity to the alternate haul route in previous surveys (Umwelt 2012a). There is potential for a significant impact on this species.	Yes
Eastern freetail-bat <i>Mormopterus norfolkensis</i>	V (TSC)	This species occurs in dry sclerophyll forest and woodland east of the Great Dividing Range. It roosts mainly in tree hollows but will also roost under bark or in man-made structures.	The eastern freetail-bat is found along the east coast from south Queensland to southern NSW.	This species is known to occur in Wollemi NP, Yengo NP and Barrington Tops NP.	This species was not recorded during surveys. However, the open forest habitats provide foraging resources for this species. There is potential for a significant impact on this species.	Yes
Little bentwing-bat <i>Miniopterus australis</i>	V (TSC)	Prefers moist eucalypt forest, rainforest or dense coastal banksia scrub. This species roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	Occurs in coastal north-eastern NSW and eastern Queensland.	Medowie SCA.	This species was not recorded during surveys. This species was however recorded in Lot 220 and in proximity to the alternate haul route in previous surveys (Umwelt 2012a). There is potential for a significant impact on this species.	Yes

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Eastern bentwing-bat <i>Miniopterus schreibersii oceanensis</i>	V (TSC)	This species hunts in forested areas and uses caves as the primary roosting habitat, but also uses derelict mines, storm-water tunnels, buildings and other man-made structures. It forms discrete populations centered on a maternity cave that is used annually in spring and summer for the birth and rearing of young.	Eastern bentwing-bats occur along the east and north-west coasts of Australia.	This species is known to occur in Goulburn River NP, Wollemi NP, Yengo NP, Barrington Tops NP and Mount Royal NP.	This species was not recorded during surveys. However, the open forest habitats provide foraging resources for this species. There is potential for a significant impact on this species.	Yes
Greater broad-nosed bat <i>Scoteanax rueppellii</i>	V (TSC)	The greater broad-nosed bat appears to prefer moist environments such as moist gullies in coastal forests, or rainforest. They have also been found in gullies associated with wet and dry sclerophyll forests and open woodland. It roosts in hollows in tree trunks and branches and has also been found to roost in the roofs of old buildings.	The greater broad-nosed bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however it does not occur at altitudes above 500 m.	The species is known to occur in Wollemi NP, Yengo NP and Barrington Tops NP.	This species was not recorded during surveys. This species was however recorded in proximity to the project area in previous surveys (Umwelt 2012). There is potential for a significant impact on this species.	Yes

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Yellow-bellied sheath-tail-bat <i>Saccolaimus flaviventris</i>	V (TSC)	This species forages for insects, flies high and fast over the forest canopy, but lower in more open country. It forages in most habitats across its very wide range, with and without trees; and appears to defend an aerial territory. It roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to use mammal burrows.	The yellow-bellied sheath-tail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes.	The species is known to occur in Wollemi NP.	This species was not recorded during surveys. However, the open forest habitats provide potential foraging resources for this species. There is potential for a significant impact on this species.	Yes
Large-footed myotis <i>Myotis macropus</i>	V (TSC)	This species generally roosts in groups of 10-15 close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage. It forages over streams and pools catching insects and small fish by raking its feet across the water surface.	The large-footed myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers.	The species is known to occur in Wollemi NP.	There are no potential foraging habitats for this species (i.e. streams and pools). As such, there is no potential for a significant impact on this species.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
Large-eared pied bat <i>Chalinolobus dwyeri</i>	V (EPBC) V (TSC)	The large-eared pied bat is generally found in a variety of drier habitats, including dry sclerophyll forests and woodlands, however, it probably tolerates a wide range of habitats. It tends to roost in the twilight zones of mines and caves, generally in colonies or common groups.	This species has a distribution from south western Queensland to NSW from the coast to the western slopes of the Great Dividing Range.	The species is known to occur in Goulburn River NP, Wollemi NP and Yengo NP.	This species was not recorded during surveys. However, the open forest habitats provide potential foraging resources for this species. There is potential for a significant impact on this species.	Yes
Brush-tailed rock-wallaby <i>Petrogale penicillata</i>	E (TSC) V (EPBC)	This species occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. It browses on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. This species shelters or basks during the day in rock crevices, caves and overhangs and is most active at night.	The brush-tailed rock-wallaby was once abundant and ubiquitous throughout the mountainous country of south-eastern Australia. Its distribution roughly followed the Great Dividing Range for 2500 km from the Grampians in West Victoria to Nanango in south-east Queensland, with outlying populations in coastal valleys and ranges to the east of the divide, and the slopes and plains as far west as Cobar in NSW and Injune (500 km north-west of Brisbane) in Queensland.	This species is not known to occur in any reserves in the region.	This species has not been recorded within the project area or its surrounds. The site does not provide suitable habitat for this species. There is no potential for a significant impact on this species as a result of the construction of the alternate haul route.	No

Table 3 – Threatened Fauna Assessment (cont.)

Species	Legal Status	Specific Habitat	Distribution in Relation to Project Area	Reservation in the Region	Occurrence in Project Area and Potential for Significant Impact	Detailed Assessment of Significance Required?
ENDANGERED POPULATION						
Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	EP (TSC)	Occur in open forest, woodland, coastal heath, coastal dunes, wetland areas, tea tree plantations and open farmland, and occasionally in littoral rainforest.	Previously widespread on the NSW north coast, but now largely restricted to coastal and near coastal areas between Evans Head and Red Rock and west to the Bungawalbin area. There have also been some recent records from the Port Stephens area.	Medowie SCA.	This species was not recorded during surveys. The alternate haul route does not contain preferred habitat features for this species and there is no connectivity to known populations of this species. There is no potential for a significant impact on emu populations.	No

Key: TSC = *Threatened Species Conservation Act* 1995;

EPBC Act = *Environment Protection and Biodiversity Conservation Act* 1999;

EEC = Endangered Ecological Community;

E = Endangered;

V = Vulnerable;

NP = National Park;

EP = Endangered Population;

SCA = State Conservation Area;

NR = Nature Reserve; and

SF = State Forest.



APPENDIX C

Fauna Species List

Appendix C – Fauna Species List

The following list was compiled from fauna surveys undertaken along the alternate haul route, as shown on Figure 2.1 of the main report. It includes all vertebrate fauna species observed along the alternate haul route during field surveys.

The following abbreviations or symbols are used in the list:

V Vulnerable under Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act).

Birds recorded were identified using descriptions in Slater et al. (2003) and the scientific and common name nomenclature of Birds Australia. Reptiles recorded were identified using keys and descriptions in Cogger (2000), Swan et al. (2004), Weigel (1990) and Wilson and Swan (2003) and the scientific and common name nomenclature of Cogger (2000).

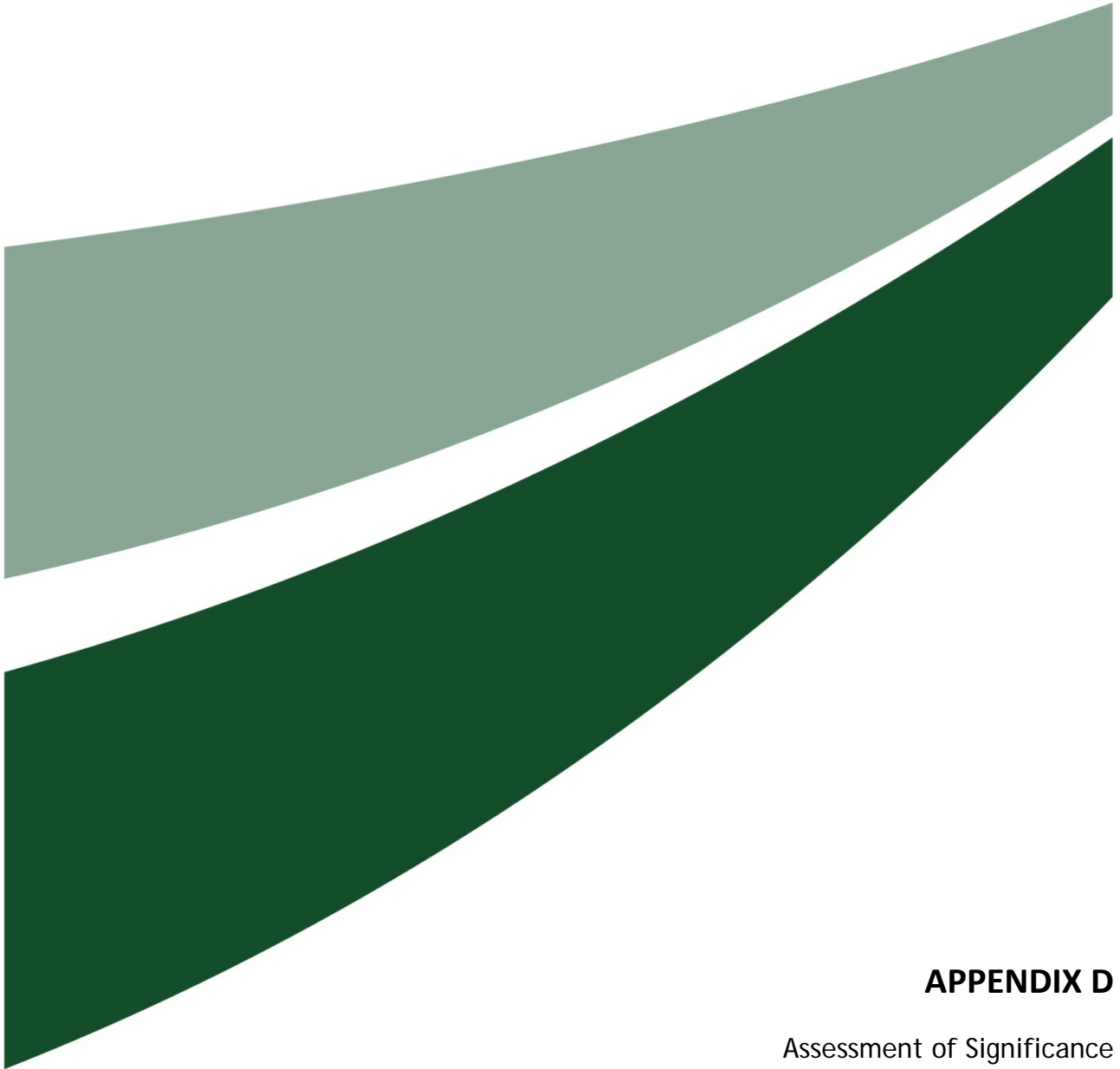
Amphibians recorded were identified using keys and descriptions in Cogger (2000), Robinson (1998), Anstis (2002) and Barker et al. (1995) and the scientific and common name nomenclature of Cogger (2000). Mammals recorded were identified using keys and descriptions in Strahan (2002), Churchill (2008) and Menkhorst and Knight (2004) and the scientific and common name nomenclature of Strahan (2002) for non-bat species and Churchill (1998) for bats.

Table 1 – Fauna Species List

Scientific Name	Common Name	Conservation Status	
		TSC Act	EPBC Act
BIRDS			
Accipitridae			
<i>Aquila audax</i>	wedge-tail eagle		
Cacatuidae			
<i>Cacatua galerita</i>	sulphur-crested cockatoo		
Columbidae			
<i>Geopelia humeralis</i>	bar-shouldered dove		
Psittacidae			
<i>Trichoglossus haematodus</i>	rainbow lorikeet		
<i>Trichoglossus chlorolepidotus</i>	scaly-breasted lorikeet		
<i>Platycercus eximius</i>	eastern rosella		
Cuculidae			
<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo		
Halcyonidae			
<i>Dacelo novaeguineae</i>	laughing kookaburra		
<i>Todiramphus sanctus</i>	sacred kingfisher		
Maluridae			
<i>Malurus lamberti</i>	variegated fairy-wren		
<i>Stipiturus malachurus</i>	southern emu-wren		
Acanthizidae			
<i>Gerygone albogularis</i>	white-throated gerygone		
<i>Acanthiza pusilla</i>	brown thornbill		
Meliphagidae			
<i>Acanthorhynchus tenuirostris</i>	eastern spinebill		
<i>Lichenostomus chrysops</i>	yellow-faced honeyeater		
<i>Manorina melanocephala</i>	noisy miner		
<i>Anthochaera chrysoptera</i>	little wattlebird		
<i>Myzomela sanguinolenta</i>	scarlet honeyeater		
Pomatostomidae			
<i>Pomatostomus temporalis temporalis</i>	grey-crowned babbler (eastern subsp.)	V	
Eupetidae			
<i>Psophodes olivaceus</i>	eastern whipbird		
Campephagidae			
<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		
Pachycephalidae			
<i>Pachycephala pectoralis</i>	golden whistler		
Artamidae			
<i>Gymnorhina tibicen</i>	Australian magpie		
Corvidae			
<i>Corvus coronoides</i>	Australian raven		
Rhipiduridae			
<i>Rhipidura leucophrys</i>	willie wagtail		

Table 1 – Fauna Species List (cont)

Scientific Name	Common Name	Conservation Status	
		TSC Act	EPBC Act
Monarchidae			
<i>Myiagra rubecula</i>	leaden flycatcher		
<i>Grallina cyanoleuca</i>	magpie-lark		
Charadriidae			
<i>Vanellus miles</i>	masked lapwing		
Petroicidae			
<i>Eopsaltria australis</i>	eastern yellow robin		
Hirundinidae			
<i>Petrocheildon ariel</i>	fairy martin		
MAMMALS			
Macropodidae			
<i>Macropus giganteus</i>	eastern grey kangaroo		
REPTILES			
Varanidae			
<i>Varanus varius</i>	lace monitor		
Elapidae			
<i>Pseudechis porphyriacus</i>	red-bellied black snake		
AMPHIBIANS			
Myobatrachidae			
<i>Crinia signifera</i>	common eastern froglet		
<i>Paracrinia haswelli</i>	Haswell's froglet		
Hylidae			
<i>Litoria fallax</i>	dwarf tree frog		



APPENDIX D

Assessment of Significance
under the Environmental
Planning and Assessment Act
1979

Appendix D – Environmental Planning and Assessment Act 1979 Assessment of Significance

Threatened species, endangered populations or threatened ecological communities (TECs) recorded during surveys and known to occur in the local area are listed in **Appendix B**, as are the results of the searches of the relevant ecological databases. These database searches provided lists of species, populations or TECs previously recorded within a 10 kilometre radius of the alternate haul route, or with potential habitat within that radius.

Appendix B provides information on each threatened species, population and TEC (including specific habitat, distribution and reservation) and provides assessments of the potential for an impact from the project. Those considered to have reasonable potential to occur within the alternate haul route (based on known distribution and habitat requirements) and with reasonable potential to be impacted by the project are addressed in more detail in the 'Assessment of Significance' included in this appendix.

Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) requires an assessment of significance be prepared relating to the potential impacts of the project on listed threatened species, endangered populations or TECs. As a formal assessment method format has not been established for the Part 3A pathway, an assessment that applies the key principles of the Part 5A assessment is used here to assess the potential for the project to impact threatened species, endangered populations or TECs within the alternate haul route.

An assessment of significance is provided below for those identified threatened species, endangered populations or TECs considered to have the potential to be impacted by the project.

Species and TECs listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requiring further assessment are considered in a separate assessment provided in **Appendix F**.

Threatened flora and fauna species included under this assessment are listed below.

Threatened Flora Species

- Charmhaven apple *Angophora inopina*;
- leafless tongue orchid *Cryptostylis hunteriana*;
- Newcastle doubletail *Diuris praecox*; and
- sand doubletail *Diuris arenaria*.

Threatened Fauna Species

- grey-crowned babbler (eastern subspecies) *Pomatostomus temporalis temporalis*;
- varied sittella *Daphoenositta chrysoptera*;
- glossy black-cockatoo *Calyptorhynchus lathami*;
- swift parrot *Lathamus discolor*;
- regent honeyeater *Anthochaera phrygia*;

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- masked owl *Tyto novaehollandiae*;
 - powerful owl *Ninox strenua*;
 - spotted-tailed quoll *Dasyurus maculatus*;
 - brush-tailed phascogale *Phascogale tapoatafa tapoatafa*;
 - koala *Phascolarctos cinereus*;
 - eastern pygmy possum *Cercartetus nanus*;
 - squirrel glider *Petaurus norfolcensis*;
 - long-nosed potoroo *Potorous tridactylus*;
 - grey-headed flying-fox *Pteropus poliocephalus*;
 - yellow-bellied sheath-tail-bat *Saccolaimus flaviventris*;
 - eastern freetail-bat *Mormopterus norfolkensis*;
 - little bentwing-bat *Miniopterus australis*;
 - eastern bentwing-bat *Miniopterus schreibersii oceanensis*;
 - large-eared pied bat *Chalinolobus dwyeri*; and
 - greater broad-nosed bat *Scoteanax rueppellii*.

Threatened Flora Species

Charmhaven Apple – *Angophora inopina*

Eleven individuals of hybrid *A. inopina* – *A. floribunda* trees were recorded adjacent to the alternate haul route in 2011 however field surveys did not record this species within the proposed disturbance area.

Leafless Tongue Orchid – *Cryptostylis hunteriana*

Although no leafless tongue orchids (*Cryptostylis hunteriana*) were identified within the alternate haul route, potential habitat for this species was identified. This species is known to occur in the Karuah-Manning and Wyong Catchment Management Areas.

Newcastle Doubletail – *Diuris praecox*

Approximately 250 individual Newcastle doubletail (*Diuris praecox*) were recorded during targeted orchid surveys conducted in the vicinity of the alternate haul route in September 2011. Targeted searches were undertaken again in 2012 however this species was not detected during the survey. Further surveys undertaken on 20 September and 12 October 2012 also failed to identify this species in the alternate haul route. The species has a distributional range between Ourimbah and Nelson Bay New South Wales. No individuals have been recorded within the alternate haul route, however potential habitat was identified.

Sand Doubletail – *Diuris arenaria*

Approximately 50 individuals of sand doubletail (*Diuris arenaria*) were identified during targeted orchid surveys conducted in the vicinity of the alternate haul route in September 2011 and again during targeted surveys in 2012. This species is only known to occur along the Tomaree Peninsula near Port Stephens New South Wales. No individuals were recorded within the alternate haul route despite targeted searches. Although no individuals were recorded within the alternate haul route, given the cryptic nature of this species and its perceived association with areas of disturbance, the presence of this species within the alternate haul route cannot be completely discounted.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

Charmhaven apple (*Angophora inopina*) was not recorded within the alternate haul route. As such, the life cycle of the species is unlikely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction.

The project will require the removal of approximately 0.37 hectare of potential habitat for the leafless tongue orchid (*Cryptostylis hunteriana*). Given the small combined area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality it is considered unlikely that the lifecycle of the leafless tongue orchid (*Cryptostylis hunteriana*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

Newcastle doubletail (*Diuris praecox*) has been recorded in significant numbers (approximately 250 individuals) adjacent to the alternate haul route. The species has been previously recorded scattered on hills and slopes along the coastal areas of Port Stephens. The records adjacent to the alternate haul route are highly concentrated and would constitute part of a local viable population of the species. No known Newcastle doubletail (*Diuris praecox*) will be disturbed by the development of the alternate haul route. The alternate haul route is located amongst a large, continuous vegetation remnant that spans the south-east coast of Port Stephens from Salt Ash to Anna Bay, which includes 4438 hectares of Worimi Conservation Lands. The Newcastle doubletail (*Diuris praecox*) is known to occur in parts of this large vegetation remnant, and elsewhere throughout Port Stephens, where important habitats for it exist.

Approximately 0.37 hectare of potential habitat for the Newcastle doubletail (*Diuris praecox*) will be disturbed as part of the proposed action and given the presence of higher quality habitat for this species in the locality, the proposed action is not likely to disrupt the lifecycle of the species such that a local population would be at risk of extinction.

No sand doubletail (*Diuris arenaria*) was identified within the alternate haul route during targeted surveys in suitable flowering conditions in 2012 however approximately 50 individuals were recorded surrounding the alternate haul route in 2011. No known sand doubletail (*Diuris arenaria*) will be disturbed by the development of the alternate haul route. This species is only known to occur along the Tomaree Peninsula near Port Stephens New South Wales. The alternate haul route is part of a large, continuous vegetation remnant that spans the south-east coast of Port Stephens from Salt Ash to Anna Bay, which includes 4438 hectares of Worimi Conservation Lands. The sand doubletail (*Diuris arenaria*) is known to occur in parts of this large vegetation remnant, and elsewhere throughout Port Stephens, where important habitats for it exist.

Approximately 0.37 hectare of potential habitat for the sand doubletail (*Diuris arenaria*) will be disturbed as part of the proposed action and given the presence of higher quality habitat for this species in the locality, the proposed action is not likely to disrupt the lifecycle of the species such that a local population would be at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, some of which is included in the 4438 hectares Worimi Conservation Lands. There is an abundance of additional suitable habitat throughout this larger remnant for the range of threatened flora species for which the proposed alternate haul route provides potential habitat.

Conclusion – Given the small area of potential habitat to be removed (0.37 hectare) compared to the vast areas of comparative habitat nearby and the absence of known records of any of the potentially occurring threatened flora species within the alternate haul route, it is considered that the proposed development will not have a significant impact on the Charmhaven apple (*Angophora inopina*), leafless tongue orchid (*Cryptostylis hunteriana*), Newcastle doubletail (*Diuris praecox*) or sand doubletail (*Diuris arenaria*).

Threatened Fauna Species

Grey-crowned babbler (eastern subspecies) – *Pomatostomus temporalis temporalis*

The grey-crowned babbler (*Pomatostomus temporalis temporalis*) was not recorded in the alternate haul route, however it was recorded in proximity. No evidence was observed that suggested this species was nesting within the alternate haul route, as evidenced by the conspicuous nests of the species. The grey-crowned babbler is more common in the western parts of New South Wales however the Office of the Environment and Heritage (OEH) Atlas of New South Wales Wildlife shows a small number of records of this species in nearby habitats of a similar nature.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The project will require the removal of approximately 0.37 hectare of potential habitat for this species. The alternate haul route supports both potential foraging and potential nesting habitat for the grey-crowned babbler (*Pomatostomus temporalis temporalis*).

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, some of which is included in the 4438 hectares Worimi Conservation Lands. While the grey-crowned babbler (*Pomatostomus temporalis temporalis*) is a sedentary bird with a small home range, there is an abundance of suitable habitat throughout this larger remnant.

Given the small area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality, it is unlikely that the lifecycle of the grey-crowned babbler (*Pomatostomus temporalis temporalis*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The alternate haul route will disturb a small area (0.37 hectare) of potential habitat for the grey-crowned babbler (*Pomatostomus temporalis temporalis*). While this species is a sedentary bird and therefore sensitive to fragmentation, it is considered unlikely that the development of the alternate haul route will isolate any known populations of this species.

Conclusion

The development of the alternate haul route will not have a significant impact on the grey-crowned babbler (*Pomatostomus temporalis temporalis*).

Varied Sittella – *Daphoenositta chrysoptera*

The varied sittella (*Daphoenositta chrysoptera*) was not recorded in the alternate haul route, however it is regarded to have potential to occur. The OEH Atlas of New South Wales Wildlife shows a small number of records of this species in nearby, adjacent habitats of a similar nature.

c) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The project will require the removal of approximately 0.37 hectare of potential habitat for this species. The alternate haul route supports both potential foraging and potential nesting habitat for the varied sittella (*Daphoenositta chrysoptera*).

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, some of which is included in the 4438 hectares Worimi Conservation Lands. While the varied sittella (*Daphoenositta chrysoptera*) is a fairly sedentary bird with a small home range, there is an abundance of suitable habitat throughout this larger remnant.

Given the small area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality, it is unlikely that the lifecycle of the varied sittella (*Daphoenositta chrysoptera*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

d) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The alternate haul route will disturb a small area (0.37 hectare) of potential habitat for the varied sittella (*Daphoenositta chrysoptera*). While this species is a sedentary bird and therefore sensitive to fragmentation, it is considered unlikely that the development of the alternate haul route will isolate any known populations of this species.

Conclusion

The development of the alternate haul route will not have a significant impact on the varied sittella (*Daphoenositta chrysoptera*).

Glossy Black-cockatoo – *Calyptorhynchus lathami*

The glossy black-cockatoo (*Calyptorhynchus lathami*) was not identified within the alternate haul route during the surveys, however *Allocasuarina littoralis*, a known food resource for the species, was previously recorded (albeit in low abundance) within adjoining vegetation, offering potential foraging habitat.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The project will require the removal of approximately 0.37 hectare of potential habitat for this species. The suitability of these habitats is only marginal as there is a low abundance of food resources (in particular *Allocasuarina littoralis*).

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, some of which is included in the 4438 hectares Worimi Conservation Lands. If the glossy black-cockatoo (*Calyptorhynchus lathamii*) occurs in the locality, it likely forages widely through this broader remnant, and therefore the loss of approximately 0.37 hectare of foraging resources in the alternate haul route is unlikely to be significant.

A tree-clearing procedure has been designed for the project to minimise impacts on any potentially occurring hollow-roosting species such as the glossy black-cockatoo (*Calyptorhynchus lathamii*).

Given that only marginal habitats exist in the alternate haul route relative to the available habitats in the wider locality, and an approved tree-clearing procedure is in place, it is unlikely that the lifecycle of the glossy black-cockatoo (*Calyptorhynchus lathamii*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area (0.37 hectare) of marginal potential habitat for the highly mobile glossy black-cockatoo (*Calyptorhynchus lathamii*). It is unlikely that the project will result in the isolation of any known populations of this species.

The proposed development within the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the glossy black-cockatoo (*Calyptorhynchus lathamii*).

Conclusion

The proposed development within the alternate haul route will not have a significant impact on the glossy black-cockatoo (*Calyptorhynchus lathamii*).

Swift Parrot – *Lathamus discolor*

The swift parrot (*Lathamus discolor*) was not identified within the alternate haul route during surveys. Winter flowering swamp mahogany (*Eucalyptus robusta*) occurs in vegetation adjoining the alternate haul route and provides a potential foraging resource for this migratory species. Winter flowering foraging resources were not identified in the alternate haul route.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of potential foraging habitat for the swift parrot (*Lathamus discolor*). This is a highly mobile, migratory species, which is likely to make use of habitat within a number of vegetated areas within the region, depending on the availability of winter flowering resources. The species has potential to opportunistically forage on trees within the alternate haul route, however given there is approximately 0.37 hectare of habitat, this species would not be dependent on these resources during migrations. Adjacent forested habitats, 4438 hectares of which are protected in the Worimi Conservation Lands, potentially provide an important resource.

Given the small area of disturbance to possible foraging habitat for the swift parrot (*Lathamus discolor*), the life cycle of this species is unlikely to be disrupted such that a local viable population would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of marginal potential habitat for the swift parrot (*Lathamus discolor*), however will not cause the isolation of any known areas of important habitat for this species. The swift parrot is a highly mobile, migratory species.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the swift parrot (*Lathamus discolor*).

Conclusion

The development of the alternate haul route will not have a significant impact on the swift parrot (*Lathamus discolor*).

Regent Honeyeater – *Anthochaera phrygia*

The regent honeyeater (*Anthochaera phrygia*) was not identified within the alternate haul route during surveys. Winter flowering swamp mahogany (*Eucalyptus robusta*) occurs in vegetation adjoining the alternate haul route, providing a potential foraging resource for this migratory species. Winter flowering foraging resources were not identified in the alternate haul route.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of potential foraging habitat for the regent honeyeater (*Anthochaera phrygia*). This is a highly mobile, migratory species, which is likely to make use of habitat within a number of vegetated areas within the region, depending on the availability of winter flowering resources. The species has potential to opportunistically forage on trees within the alternate haul route, however given there is approximately 0.37 hectare of habitat, this species would not be dependent on these resources during migrations. Adjacent forested habitats, 4438 hectares of which are protected in the Worimi Conservation Lands, potentially collectively provide an important resource.

Given the small area of disturbance to possible foraging habitat for the regent honeyeater (*Anthochaera phrygia*), the life cycle of this species is unlikely to be disrupted such that a local viable population would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of marginal potential foraging habitat for the regent honeyeater (*Anthochaera phrygia*), however will not cause the isolation of any known areas of important habitat for this species. The regent honeyeater is a highly mobile, migratory species.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the regent honeyeater (*Anthochaera phrygia*).

Conclusion

The development of the alternate haul route will not have a significant impact on the regent honeyeater (*Anthochaera phrygia*).

Powerful Owl – *Ninox strenua*

The powerful owl (*Ninox strenua*) was not identified within the alternate haul route during surveys however was recorded in nearby similar habitats during previous surveys (Umwelt 2004). This species is known to occur in adjacent habitats and the alternate haul route supports potential foraging habitat for this species.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of potential habitat for this species. The adjacent habitats, which are similar in characteristics to those of the alternate haul route, are known habitats for the powerful owl (*Ninox strenua*).

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. The powerful owl (*Ninox strenua*) would forage widely through this broader remnant, and therefore the loss of approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of the home range of the species in the local area.

An approved tree-clearing procedure has been designed as part of the Mackas Landscape Management Plan (Umwelt 2009b) to minimise impacts on any potentially occurring hollow-roosting species such as the powerful owl (*Ninox strenua*).

Given that the development of the alternate haul route will disturb a small area of potential habitat relative to the available habitats in the wider locality, and an approved tree-clearing procedure is in place, it is unlikely that the lifecycle of the powerful owl (*Ninox strenua*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of potential habitat for the powerful owl (*Ninox strenua*) and will not cause the isolation of any known populations of this species.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the powerful owl (*Ninox strenua*).

Conclusion

The development of the alternate haul route will not have a significant impact on the powerful owl (*Ninox strenua*).

Masked Owl – *Tyto novaehollandiae*

The masked owl (*Tyto novaehollandiae*) was not identified within the alternate haul route during surveys. Surveys undertaken in 2002 (ERM 2002) in nearby, similar habitats identified a pair of masked owls. The alternate haul route provides marginal foraging habitat for the species.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectares of potential habitat for this species. The adjacent habitats, which are similar in characteristics to those of the alternate haul route, are known habitats for the masked owl (*Tyto novaehollandiae*).

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. The masked owl (*Tyto novaehollandiae*) is likely to forage widely through this broader remnant, and therefore the removal of approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of the home range of the species.

An approved tree-clearing procedure has been designed as part of the Mackas Landscape Management Plan (Umwelt 2009b) to minimise impacts on any potentially occurring hollow-roosting species such as the masked owl (*Tyto novaehollandiae*).

Given that the development of the alternate haul route will disturb only a small area of potential habitat relative to the available habitats in the wider locality, and an approved tree-clearing procedure is in place, it is unlikely that the lifecycle of the masked owl (*Tyto novaehollandiae*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of potential habitat for the masked owl (*Tyto novaehollandiae*) and will not cause the isolation of any known populations of this species.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the masked owl (*Tyto novaehollandiae*).

Conclusion

The development of the alternate haul route will not have a significant impact on the masked owl (*Tyto novaehollandiae*).

Spotted-Tailed Quoll – *Dasyurus maculatus*

The spotted tailed-quoll (*Dasyurus maculatus*) was not identified within the alternate haul route during surveys, however suitable potential habitat was identified.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of potential habitat for this species. The adjacent habitats, which are similar in characteristics to those of the alternate haul route, provide better quality habitat for the spotted-tailed quoll (*Dasyurus maculatus*).

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectare Worimi Conservation Lands. The spotted-tailed quoll (*Dasyurus maculatus*) if present would forage widely through this broader remnant, and therefore the loss of approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of the home range of the species.

Given that the development of the alternate haul route will disturb only a small area of potential habitat relative to the available habitats in the wider locality, it is unlikely that the lifecycle of the spotted-tailed quoll (*Dasyurus maculatus*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of potential habitat for the spotted-tailed quoll (*Dasyurus maculatus*) and will not cause the isolation of any known populations of this species.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the spotted-tailed quoll (*Dasyurus maculatus*).

Conclusion

The development of the alternate haul route will not have a significant impact on the spotted-tailed quoll (*Dasyurus maculatus*).

Brush-tailed Phascogale – *Phascogale tapoatafa tapoatafa*

The brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*) was not identified within the alternate haul route during the surveys however potential habitat was identified.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of potential habitat for this species.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. Much of this remnant also offers suitable habitat for the brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*). The approximately 0.37 hectare of resources in the alternate haul route is likely to be relatively insignificant relative to the local availability of habitats.

An approved tree-clearing procedure has been designed as part of the Mackas Landscape Management Plan (Umwelt 2009b) to minimise impacts on any potentially occurring hollow-roosting species such as the brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*).

Given that the development of the alternate haul route will disturb only a small area of potential habitat relative to the available habitats in the wider locality, and an approved tree-clearing procedure is in place, it is unlikely that the lifecycle of the brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb only a small area of potential habitat for the brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*) and will not cause the isolation of any known populations of this species.

The easement for the haul route is 10 metres in width. The brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*) would possibly need to cross this track when moving between the bushland on the north and south of the track, as there are no other corridors. Mitigation measures relating to the sensitive use of this road by vehicles have been developed to minimise any impacts on species such as the brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*). Even with these mitigation measures in place, there is potential for individuals of this species to be injured or killed while attempting to cross the access track.

The proposed development of the alternate haul route will create a minor barrier to movement for the brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*) passing between habitats to the north and south of the proposed access track. However, the extent of this is not such that a significant area of known habitat will be modified, removed or isolated from currently interconnecting or proximate areas.

Conclusion

The development of the alternate haul route will not have a significant impact on the brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*).

Koala – *Phascolarctos cinereus*

The koala (*Phascolarctos cinereus*) was not recorded in the alternate haul route, however has been recorded previously in adjacent, similar habitats. The alternate haul route is considered to provide mainly supplementary habitat and connectivity between preferred habitats.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The alternate haul route will require the removal of less than 0.37 hectare of habitat for the koala (*Phascolarctos cinereus*) comprising approximately 0.26 hectare of supplementary koala habitat and 0.1 hectare of buffer over supplementary as defined by the Port Stephens Comprehensive koala plan of management (CKPoM).

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which spans the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. The koala (*Phascolarctos cinereus*) would utilise the resources of the alternate haul route opportunistically as part of a much wider foraging range throughout this adjacent bushland. The less than 0.37 hectare of koala habitat in the alternate haul route is expected to be a relatively insignificant component of any home range of the species in the locality.

Given that the development of the alternate haul route will disturb only a small area of potential habitat relative to the available habitats in the wider locality, it is unlikely that the lifecycle of koala (*Phascolarctos cinereus*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area (0.37 hectare) of potential habitat for the koala (*Phascolarctos cinereus*).

The easement for the alternate haul route is 10 metres in width. The koala (*Phascolarctos cinereus*) would need to cross this track on foot when moving between the bushland on the north and south of the track, as there are no other corridors. Mitigation measures relating to the sensitive use of this road by vehicles have been developed to minimise any impacts on species such as the koala (*Phascolarctos cinereus*). Even with these mitigation measures in place, there is potential for a small number of individuals of this species to be injured or killed while attempting to cross the access track.

The alternate haul route will create a minor barrier to movement for the koala (*Phascolarctos cinereus*) passing between habitats to the north and south of the proposed access track. However, the extent is such that a significant area of known habitat is unlikely to be modified, removed or isolated from currently interconnecting or proximate areas.

Conclusion

The development of the alternate haul route will not have a significant impact on the koala (*Phascolarctos cinereus*).

Eastern Pygmy Possum – *Cercartetus nanus*

The eastern pygmy possum (*Cercartetus nanus*) was not recorded in the alternate haul route, however was recorded in nearby, similar habitats in 2004 (Umwelt 2004). The open woodland habitats of the alternate haul route supports potential foraging and nesting habitat for this species.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of potential habitat for this species. Adjacent habitats, which are similar in characteristics to those of the alternate haul route, are known habitats for the eastern pygmy possum (*Cercartetus nanus*).

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. Much of this remnant offers suitable habitat for the eastern pygmy possum (*Cercartetus nanus*). The 0.37 hectare of resources in the alternate haul route is unlikely to be significant, relative to the local availability of habitats.

An approved tree-clearing procedure has been designed as part of the Mackas Landscape Management Plan (Umwelt 2009b) to minimise impacts on any potentially occurring hollow-roosting species such as the eastern pygmy possum (*Cercartetus nanus*).

Given that the development of the alternate haul route will disturb only a small area of potential habitat relative to the available habitats in the wider locality, and an approved tree-clearing procedure is in place, it is unlikely that the lifecycle of the eastern pygmy possum (*Cercartetus nanus*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of potential habitat for the eastern pygmy possum (*Cercartetus nanus*) and will not cause the isolation of any known populations of this species.

The alternate haul route will be 10 metres in width. The eastern pygmy possum (*Cercartetus nanus*) would possibly need to cross this track when moving between the bushland on the north and south of the track, as there are no other corridors. It is likely that this species can glide across that distance, in particular if there are overhanging canopies across the track. However, an individual of this species may be forced to cross the track on the ground. Mitigation measures relating to the sensitive use of this road by vehicles have been developed to minimise any impacts on species such as the eastern pygmy possum (*Cercartetus nanus*). Even with these mitigation measures in place, there is potential for individuals of this species to be injured or killed while attempting to cross the access track.

The alternate haul route will create a minor barrier to movement for the eastern pygmy possum (*Cercartetus nanus*) passing between habitats to the north and south of the proposed access track. However, the extent of this is not such that a significant area of known habitat will be modified, removed or isolated from currently interconnecting or proximate areas.

Conclusion

The development of the alternate haul route will not have a significant impact on the eastern pygmy possum (*Cercartetus nanus*).

Squirrel Glider (*Petaurus norfolcensis*)

The squirrel glider (*Petaurus norfolcensis*) was not recorded in the alternate haul route, however the open woodland habitats provide potential foraging and nesting resources for this species. This species has previously been recorded in nearby similar habitats (Umwelt 2004 and 2009a).

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of potential habitat for this species.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. Much of this remnant offers suitable habitat for the squirrel glider (*Petaurus norfolcensis*). The 0.37 hectare of resources in the alternate haul route is unlikely to be relatively significant relative to the local availability of habitats.

A tree-clearing procedure has been designed for the project to minimise impacts on any potentially occurring hollow-roosting species such as the squirrel glider (*Petaurus norfolcensis*).

Given that the development of the alternate haul route will disturb only a small area of potential habitat relative to the available habitats in the wider locality, and an approved tree-clearing procedure is in place, it is unlikely that the lifecycle of the squirrel glider (*Petaurus norfolcensis*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The easement for the alternate haul route is 10 metres in width. The squirrel glider (*Petaurus norfolcensis*) would possibly need to cross this track when moving between the bushland on the north and south of the track, as there are no other corridors. It is most likely that this species can glide across that distance, in particular if there are overhanging canopies across the track. Mitigation measures relating to the sensitive use of this road by vehicles have been developed to minimise any impacts on species such as the squirrel glider (*Petaurus norfolcensis*). Even with these mitigation measures in place, there is potential for individuals of this species to be injured or killed while attempting to cross the access track.

The development of the alternate haul route will create a minor barrier to movement for the squirrel glider (*Petaurus norfolcensis*) passing between habitats to the north and south of the proposed access track. However, the extent of this is not such that a significant area of known habitat will be modified, removed or isolated from currently interconnecting or proximate areas.

Conclusion

The development of the alternate haul route will not have a significant impact on the squirrel glider (*Petaurus norfolcensis*).

Long-nosed Potoroo – *Potorous tridactylus*

The long-nosed potoroo (*Potorous tridactylus*) was not recorded in the alternate haul route, however the habitat provided by the alternate haul route is considered to provide suitable habitat for this species.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of potential habitat for this species. The adjacent habitats, which are similar in characteristics to those of the alternate haul route, similarly provide potential habitat for the long-nosed potoroo (*Potorous tridactylus*).

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. Much of this remnant offers suitable habitat for the long-nosed potoroo (*Potorous tridactylus*). The 0.37 hectare of resources in the alternate haul route is likely to be relatively insignificant relative to the local availability of habitats.

Given that the development of the alternate haul route will disturb only a small area of potential habitat relative to the available habitats in the wider locality, it is considered unlikely that the lifecycle of the long-nosed potoroo (*Potorous tridactylus*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The easement for the alternate haul route is 10 metres in width. The long-nosed potoroo (*Potorous tridactylus*) would possibly need to cross this track when moving between bushland on the north and south of the track, as there are no other corridors. Mitigation measures relating to the sensitive use of this road by vehicles have been developed to minimise any impacts on species such as the long-nosed potoroo (*Potorous tridactylus*) that would need to cross the track. Even with these mitigation measures in place, there is potential for individuals of this species to be injured or killed while attempting to cross the alternate haul route.

The development of the alternate haul route will create a minor barrier to movement of potentially present long-nosed potoroo (*Potorous tridactylus*) passing between habitats to the north and south of the alternate haul route. However, the extent of habitat removal is not such that a significant area of known habitat will be modified, removed or isolated from currently interconnecting or proximate areas.

Conclusion

The development of the alternate haul route will not have a significant impact on the long-nosed potoroo (*Potorous tridactylus*).

Grey-headed Flying-fox – *Pteropus poliocephalus*

The grey-headed flying-fox (*Pteropus poliocephalus*) was not recorded within the alternate haul route during current surveys but has been recorded widely in nearby, connected habitats previously (Umwelt 2004, 2009 and 2012a).

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The project will require the removal of approximately 0.37 hectares of known habitat for this species. The alternate haul route supports foraging habitat for the grey-headed flying-fox (*Pteropus poliocephalus*), however there are no roost sites.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. The grey-headed flying-fox (*Pteropus poliocephalus*) would forage widely through this broader remnant, and therefore the loss of approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of home range of the species.

Given the small area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality, it is unlikely that the lifecycle of the grey-headed flying-fox (*Pteropus poliocephalus*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The alternate haul route will disturb a small area of potential foraging habitat for the grey-headed flying-fox (*Pteropus poliocephalus*) and will not cause the isolation of any known populations of this species. The proposed 10 metre width of road easement is unlikely to be sufficient to fragment habitats for this highly mobile bat species which has a very wide foraging range.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the grey-headed flying-fox (*Pteropus poliocephalus*).

Conclusion

The development of the alternate haul route will not have a significant impact on the grey-headed flying-fox (*Pteropus poliocephalus*).

Yellow-bellied Sheathtail Bat – *Saccolaimus flaviventris*

The yellow-bellied sheathtail bat (*Saccolaimus flaviventris*) was not recorded within the alternate haul route. The open forest habitats of the alternate haul route provide potential foraging and roosting resources for this species.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The project will require the removal of approximately 0.37 hectare of potential habitat for the yellow-bellied sheathtail bat (*Saccolaimus flaviventris*). The alternate haul route supports both foraging habitat and potential roosting habitat for this hollow-roosting species.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. Any locally occurring population of the yellow-bellied sheathtail bat (*Saccolaimus flaviventris*) would forage widely through this broader remnant, and therefore the loss of approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of the home range of the species.

An approved tree-clearing procedure has been designed as part of the Mackas Landscape Management Plan (Umwelt 2009b) to minimise impacts on any potentially occurring hollow-roosting species such as the yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*). Given the small area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality, and an approved tree-clearing procedure is in place, it is unlikely that the lifecycle of the yellow-bellied sheathtail bat (*Saccolaimus flaviventris*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the yellow-bellied sheathtail bat (*Saccolaimus flaviventris*).

Conclusion: The development of the alternate haul route will not have a significant impact on the yellow-bellied sheathtail bat (*Saccolaimus flaviventris*).

Eastern Freetail-bat – *Mormopterus norfolkensis*

The eastern freetail-bat (*Mormopterus norfolkensis*) was not recorded within the alternate haul route. The open forest habitats of the alternate haul route provide potential foraging and roosting resources for this species.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The project will require the removal of approximately 0.37 hectare of potential habitat for the eastern freetail-bat (*Mormopterus norfolkensis*). The alternate haul route supports both foraging habitat and roosting habitat for this hollow-roosting species.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. Any locally occurring population of the eastern freetail-bat (*Mormopterus norfolkensis*) would forage widely through this broader remnant, and therefore the loss of approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of the home range of the species.

An approved tree-clearing procedure has been designed as part of the Mackas Landscape Management Plan (Umwelt 2009b) to minimise impacts on any potentially occurring hollow-roosting species such as the eastern freetail-bat (*Mormopterus norfolkensis*).

Given the small area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality, and an approved tree-clearing procedure is in place, it is unlikely that the lifecycle of the eastern freetail-bat (*Mormopterus norfolkensis*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the eastern freetail-bat (*Mormopterus norfolkensis*).

Conclusion

The development of the alternate haul route will not have a significant impact on the eastern freetail-bat (*Mormopterus norfolkensis*).

Little Bentwing-bat – *Miniopterus australis*

The little bentwing-bat (*Miniopterus australis*) was not recorded within the alternate haul route. This species was recorded within the vicinity of the alternate haul route during previous surveys. The open forest habitats of the alternate haul route provide foraging resources for this species and as the species occasionally roosts in tree hollows, potential roosting habitat for this species was also identified.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of known habitat for the little bentwing-bat (*Miniopterus australis*). The alternate haul route supports foraging habitat and potential roosting habitat for this occasional hollow-roosting species.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. The little bentwing-bat (*Miniopterus australis*) would forage widely through this broader remnant, and therefore the removal of approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of the home range of the species.

An approved tree-clearing procedure has been designed as part of the Mackas Landscape Management Plan (Umwelt 2009b) to minimise impacts on any potentially occurring hollow-roosting species such as the little bentwing-bat (*Miniopterus australis*).

Given the small area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality, and an approved tree-clearing procedure is in place, it is unlikely that the lifecycle of the little bentwing-bat (*Miniopterus australis*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of known habitat for little bentwing-bat (*Miniopterus australis*), however will not cause the isolation of any known populations of this species.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the little bentwing-bat (*Miniopterus australis*).

Conclusion

The development of the alternate haul route will not have a significant impact on the little bentwing-bat (*Miniopterus australis*).

Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

The eastern bentwing-bat (*Miniopterus schreibersii oceanensis*) was not recorded within the alternate haul route during current surveys. This species was recorded during previous surveys in adjacent habitats. The open forest habitats of the alternate haul route provide suitable foraging resources, however suitable roosting habitats were not identified.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of potential habitat for this species. The alternate haul route supports potential foraging habitat for the eastern bentwing-bat (*Miniopterus schreibersii oceanensis*), however there are suitable roost sites were not identified.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. Any locally occurring populations of the eastern bentwing-bat (*Miniopterus schreibersii oceanensis*) would forage widely through this broader remnant, and therefore the loss of approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of the home range of the species.

Given the small area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality, it is unlikely that the lifecycle of the eastern bentwing-bat (*Miniopterus schreibersii oceanensis*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of potential habitat for the eastern bentwing-bat (*Miniopterus schreibersii oceanensis*) and will not cause the isolation of any known populations of this species.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the eastern bentwing-bat (*Miniopterus schreibersii oceanensis*).

Conclusion

The development of the alternate haul route will not have a significant impact on the eastern bentwing-bat (*Miniopterus schreibersii oceanensis*).

Large-eared Pied bat – *Chalinolobus dwyeri*

The large-eared pied bat (*Chalinolobus dwyeri*) was not recorded within the alternate haul route during current surveys. The open forest habitats of the alternate haul route provide suitable foraging resources, however no suitable roosting habitats were identified.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The project will require the removal of approximately 0.37 hectare of potential habitat for this species. The alternate haul route supports foraging habitat for the large-eared pied bat (*Chalinolobus dwyeri*), however suitable roost sites were not identified.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. Any locally occurring populations of the large-eared pied bat (*Chalinolobus dwyeri*) would forage widely through this broader remnant, and therefore the loss of approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of the home range of the species.

Given the small area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality, it is unlikely that the lifecycle of the large-eared pied bat (*Chalinolobus dwyeri*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of potential habitat for the large-eared pied bat (*Chalinolobus dwyeri*) and will not cause the isolation of any known populations of this species.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the large-eared pied bat (*Chalinolobus dwyeri*).

Conclusion

The development of the alternate haul route will not have a significant impact on the large-eared pied bat (*Chalinolobus dwyeri*).

Greater Broad-nosed Bat – *Scoteanax rueppellii*

The greater broad-nosed bat (*Scoteanax rueppellii*) was not recorded within the alternate haul route however the species is known to occur in the local area. The open forest vegetation of the alternate haul route provides foraging and roosting habitats for this species.

a) *Whether the life cycle of the species is likely to be disrupted such that a local viable population of the species is likely to be placed at risk of extinction*

The development of the alternate haul route will require the removal of approximately 0.37 hectare of known habitat for the broad-nosed bat (*Scoteanax rueppellii*). The alternate haul route supports foraging habitat and potential roosting habitat for this hollow-roosting species.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which occurs along the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. The broad-nosed bat (*Scoteanax rueppellii*) would forage widely through this broader remnant, and therefore the approximately 0.37 hectare of resources in the alternate haul route would be a relatively insignificant component of the home range of the species.

An approved tree-clearing procedure has been designed as part of the Mackas Landscape Management Plan (Umwelt 2009b) to minimise impacts on any potentially occurring hollow-roosting species such as the broad-nosed bat (*Scoteanax rueppellii*).

Given the small area of disturbance (0.37 hectare) relative to the availability of habitats in the broader locality, and an approved tree-clearing procedure is provided, it is unlikely that the lifecycle of the broad-nosed bat (*Scoteanax rueppellii*) would be disrupted such that a local viable population of the species would be placed at risk of extinction.

b) *In relation to the regional distribution of the habitat of the threatened species, whether a significant area of known habitat is to be modified or removed, or isolated from currently interconnecting or proximate areas*

The development of the alternate haul route will disturb a small area of habitat for broad-nosed bat (*Scoteanax rueppellii*) and will not cause the isolation of any known populations of this species.

The development of the alternate haul route will not result in the fragmentation, modification or removal of a significant area of known habitat for the broad-nosed bat (*Scoteanax rueppellii*).

Conclusion

The development of the alternate haul route will not have a significant impact on the bat broad-nosed bat (*Scoteanax rueppellii*).

Significance Assessment Conclusion

The development of the alternate haul route will not result in a significant impact on any Threatened Species Conservation Act 1995 (TSC Act) listed threatened species, endangered populations or endangered ecological communities.



APPENDIX E

Assessment under the Port
Stephens Comprehensive
Koala Plan of Management

Appendix E – Assessment of Impact on Koala Habitat under the Port Stephens Comprehensive Koala Plan of Management

The alternate haul route lies within the Port Stephens Local Government Area (LGA) and as such the provisions of the State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44) are superseded by the Port Stephens Comprehensive Koala Plan of Management (CKPoM).

The CKPoM (Port Stephens Council 2002) provides recommended performance criteria for development applications in order to protect and effectively manage koala habitat in the Port Stephens LGA. These criteria are reproduced in **Table 1**, and are to apply to all developments proposed on sites that contain or are adjacent to preferred or supplementary habitat, Habitat Buffers or habitat linking areas. The proposed haul route traverses through a 50 metre buffer over Supplementary Koala Habitat as a result of referred koala habitat being identified immediately east of the alternate haul route (see Figure 4.1 of main text). An assessment of the alternate haul route against the specific criteria described in the CKPoM is provided in **Table 1**.

Table 1 - Performance Criteria from CKPoM

Performance Criteria from CKPoM	Proposed Alternate Haul Route
a) Minimise the removal or degradation of native vegetation within Preferred Koala Habitat or Habitat Buffers.	No Preferred Koala Habitat removed. Removal of small area (approximately 0.11 hectare) of Habitat Buffer over Supplementary Koala Habitat.
b) Maximise retention and minimise degradation of native vegetation within Supplementary Koala Habitat and Habitat Linking Areas.	Removal of small area (approximately 0.26 hectare) of Supplementary Koala Habitat. Large areas (>4000 hectares) of similar or higher quality contiguous habitat retained adjacent to the alternate haul route in Worimi Conservation Area.
c) Minimise the removal of any individuals of preferred koala food trees, where ever they occur on a developed site. In the Port Stephens LGA these tree species are Swamp Mahogany (<i>Eucalyptus robusta</i>), Parramatta Red Gum (<i>E. parramattensis</i>) and Forest Red Gum (<i>E. tereticornis</i>).	Alternate haul route avoids all recorded preferred koala food trees.
d) Make provision, where appropriate, for restoration or rehabilitation of areas identified as Koala Habitat, including Habitat Buffers and Habitat Linking Areas over Mainly Cleared Land.	No rehabilitation will be appropriate for the proposed haul route.
e) Make provision for long term management and protection of koala habitat including both existing and restored habitat.	The areas of koala habitat adjoining the alternate haul route will remain intact and unmodified. No formal management or protection measures are considered to be required.

Table 1 - Performance Criteria from CKPoM (cont)

Performance Criteria from CKPoM	Proposed Alternate Haul Route
<p>f) Not compromise the potential for safe movement of koalas across the site. This should include maximising tree retention generally and minimising the likelihood that the proposal would result in the creation of barriers to koala movement, such as would be imposed by certain types of fencing. The preferred option for minimising restrictions to safe koala movement is that there be no fencing (of a sort that would prelude koalas) associated with dog free developments within or adjacent to Preferred or Supplementary Koala Habitat, Habitat Buffers or Habitat Linking Areas. Suitable fencing for such areas could include:</p> <ul style="list-style-type: none"> • Fences where the bottom of the fence is a minimum of 200 millimetres above ground level that would allow koalas to move underneath; • Fences that facilitate easy climbing by koalas; for example, sturdy chain mesh fences, or solid style fences with timber posts on both sides at regular intervals of approximately 20 metres; or • Open post and rail or post and wires (not barbed wire on the bottom strand). 	<ul style="list-style-type: none"> • Tree removal will be minimised where possible and an overhead canopy connection is encouraged where appropriate. • No fences, other than those already existing between Lot boundaries, will be erected for the alternate haul route.
<p>g) Be restricted to identified envelopes which contain all buildings and infrastructure and fire fuel reduction zone. Generally there will be no clearing on the site outside these envelopes. In the case of applications for subdivision, such envelopes should be registered as a restriction on the title, pursuant to the <i>Conveyancing Act</i> 1919.</p>	<ul style="list-style-type: none"> • The alternate haul route will be restricted to a maximum width of 10 metres within the koala habitat areas.

Table 1 - Performance Criteria from CKPoM (cont)

Performance Criteria from CKPoM	Proposed Alternate Haul Route
<p>h) Include measures to effectively minimise the threat posed to koalas by dogs, motor vehicles and swimming pools by adopting the following minimum standards:</p> <ul style="list-style-type: none"> • The development must include measures that effectively abate the threat posed to koalas by dogs through prohibitions or restrictions on dog ownership. Restrictions on title may be appropriate; • The development must include measures that effectively minimise the threat posed to koalas from traffic by restricting motor vehicle speeds, where appropriate, to 40 kilometres per hour or less; and • The development must reduce the risk of koala mortality by drowning in backyard swimming pools. Appropriate measures could include: trailing a length of stout rope (minimum diameter of 50 millimetres), which is secured to a stable poolside fixture, in the swimming pool at all times; designing the pool in such a way that koalas can readily escape; or enclosing the pool with a fence that precludes koalas. The last option should include locating the fence away from any trees which koalas could use to cross the fence. 	<ul style="list-style-type: none"> • A maximum speed limit of 40 kilometres per hour will apply to the entire length of the alternate haul route • Signage will be erected at either end of the alternate haul route warning haul vehicles of koala presence. • Night driving will be reduced where possible to minimise driving during periods of higher koala activity.

Conclusion

Approximately 0.37 hectare of koala habitat will be removed or modified during the development of the alternate haul route.

The alternate haul route comprises a very small area of a much larger remnant of vegetation, of similar or better condition, which spans the south-east coast of Port Stephens from Salt Ash to Anna Bay, much of which is included in the 4438 hectares Worimi Conservation Lands. The koala (*Phascolarctos cinereus*) would utilise the resources of the alternate haul route opportunistically as part of a much wider foraging range throughout this adjacent bushland.

The 0.37 hectare of koala habitat in the alternate haul route is expected to be a relatively insignificant component of the home range of the species in the locality and as such it is considered that the development of the alternate haul route is unlikely to have a significant impact on koala habitat in the locality.



APPENDIX F

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

Appendix F – Assessment of Significance under the Environment Protection and Biodiversity Conservation Act 1999

A search of the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) Protected Matters Database identified (discounting fishes and marine species) 11 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) listed threatened species and 12 migratory species known to occur or considered likely to occur, on the basis of habitat modelling, within a 10 kilometre radius of the alternate haul route.

The EPBC Act listed species recorded or with potential to occur in the alternate haul route, and therefore covered under this assessment are listed in **Table 1** below.

**Table 1 – EPBC Act Listed Threatened and Migratory Species Included in this
Assessment of Significance for the Proposed Development**

Species	EPBC Act Status	Recorded/Potential to Occur
Endangered Species		
Swift parrot <i>Lathamus discolor</i>	endangered	potential
Regent honeyeater <i>Anthochaera phrygia</i>	endangered	potential
Vulnerable Species		
Newcastle doubletail <i>Diuris praecox</i>	vulnerable	potential
Leafless tongue-orchid <i>Cryptostylis hunteriana</i>	vulnerable	potential
Charmhaven apple <i>Angophora inopina</i>	vulnerable	potential
Grey-headed flying-fox <i>Pteropus poliocephalus</i>	vulnerable	potential
Large-eared pied-bat <i>Chalinolobus dwyeri</i>	vulnerable	potential
New Holland mouse <i>Pseudomys novaehollandiae</i>	vulnerable	potential
Koala <i>Phascolarctos cinereus</i>	vulnerable	potential
Spotted-tailed quoll <i>Dasyurus maculatus maculatus</i>	endangered	potential
Long-nosed potoroo <i>Potorous tridactylus</i>	vulnerable	potential
Migratory Species		
White-throated needletail <i>Hirundapus caudacutus</i>	migratory	potential
Rainbow bee-eater <i>Merops ornatus</i>	migratory	potential
Rufous fantail <i>Rhipidura rufifrons</i>	migratory	potential
Fork-tailed swift <i>Apus pacificus</i>	migratory	potential

Table 1 – EPBC Act Listed Threatened and Migratory Species Included in this Assessment of Significance for the Proposed Development (cont.)

Species	EPBC Act Status	Recorded/Potential to Occur
White-bellied sea-eagle <i>Haliaeetus leucogaster</i>	migratory	potential
Satin flycatcher <i>Myiagra cyanoleuca</i>	migratory	potential
Regent honeyeater <i>Anthochaera phrygia</i>	migratory	potential
Black-faced monarch <i>Monarcha melanopsis</i>	migratory	potential
Cattle egret <i>Ardea ibis</i>	migratory	potential
Great egret <i>Ardea alba</i>	migratory	potential
Latham's snipe <i>Gallinago hardwickii</i>	migratory	potential
Painted snipe <i>Rostratula australis</i>	migratory	potential

An assessment of the potential impacts of the alternate haul route is provided below for each threatened and migratory species listed in **Table 1** above. The assessment is based on the removal of approximately 0.37 hectare of native vegetation and assuming the impact mitigation measures identified in Section 6 of the main report are adhered to.

The aim of this assessment is to determine whether the development of the alternate haul route is likely to have a significant impact on any EPBC Act Matters of National Environmental Significance (MNES). In this instance, MNES with potential to occur within the alternate haul route include:

- listed threatened species (including endangered and vulnerable species); and
- listed migratory species.

Each category is addressed separately below.

Endangered Species

The following EPBC Act listed endangered species are considered in this assessment:

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

An assessment in accordance with the DSEWPC principal significant impact guidelines is provided below for these species.

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 two species listed above were not recorded within the alternate haul route, however have potential to occur. The species are known to occur in the locality seasonally, opportunistically foraging on available winter-flowering vegetation. The alternate haul route does not contain a geographically distinct regional population, or collection of local populations of these species and does not contain a regional population, or collection of local populations of this species that occur within the New South Wales North Coast Bioregion. Therefore, the alternate haul route does not provide habitat for a population of an EPBC Act listed endangered species.

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 swift parrot (*Lathamus discolor*) or regent honeyeater (*Anthochaera phrygia*) were recorded within the alternate haul route. The proposed development of the alternate haul route will not lead to a decrease in the size of a *population* (as defined above) of an endangered species.

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

No populations of swift parrot (*Lathamus discolor*) or regent honeyeater (*Anthochaera phrygia*) were recorded within the alternate haul route. Approximately 0.37 hectare of marginal potential foraging habitat will be disturbed as a result of the proposed development. Substantial areas of similar potential habitats for these species are protected within a large expanse of continuous vegetation adjacent to the alternate haul route, some of which is protected within the Worimi Conservation Lands.

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

No populations of swift parrot (*Lathamus discolor*) or regent honeyeater (*Anthochaera phrygia*) were recorded within the alternate haul route. Given the small scale of disturbance associated with the development of the alternate haul route (0.37 hectare) and the mobile nature of the above species, the development of the alternate haul route will not fragment an existing population of either species into two or more populations.

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

No populations of swift parrot (*Lathamus discolor*) or regent honeyeater (*Anthochaera phrygia*) were recorded within the alternate haul route. The alternate haul route does not contain habitat critical to the survival of these endangered species, and therefore such habitats will not be affected as a result of the development of the alternate haul route.

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

No populations of swift parrot (*Lathamus discolor*) or regent honeyeater (*Anthochaera phrygia*) were recorded within the alternate haul route. Breeding habitat for either species does not occur within the alternate haul route. The development of the alternate haul route will not disrupt the breeding cycle of a population of an endangered species.

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

The habitats within the alternate haul route provide only marginal foraging habitat for the swift parrot (*Lathamus discolor*) and regent honeyeater (*Anthochaera phrygia*), and less than 0.37 hectare of such habitats will be disturbed as a result of the proposed development. The development of the alternate haul route will not modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that an endangered species is likely to 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; or**

The alternate haul route currently supports introduced plant and animal species in a low to moderate abundance that is unlikely to be harmful to the swift parrot (*Lathamus discolor*) or regent honeyeater (*Anthochaera phrygia*). The development of the alternate haul route will not result in a significant increase in invasive species that are harmful to the swift parrot (*Lathamus discolor*) or regent honeyeater (*Anthochaera phrygia*).

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

Given the small area of potential, marginal foraging habitat to be disturbed, the proposed development of the alternate haul route will not interfere with the recovery of the swift parrot (*Lathamus discolor*) or regent honeyeater (*Anthochaera phrygia*).

Vulnerable Species

The following EPBC Act listed vulnerable species are considered in this assessment:

- New Holland mouse (*Pseudomys novaehollandiae*);
- spotted-tailed quoll (*Dasyurus maculates maculatus*);
- long-nosed potoroo (*Potorous tridactylus*);
- koala (*Phascolarctos cinereus*);
- large-eared pied bat (*Chalinolobus dwyeri*);

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- grey-headed flying-fox (*Pteropus poliocephalus*);
 - Charmhaven apple (*Angophora inopina*);
 - Newcastle doubletail (*Diuris praecox*); and
 - leafless tongue-orchid (*Cryptostylis hunteriana*).

An assessment in accordance with the DSEWPC principal significant impact guidelines is provided below for these species.

In this case, 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.**

There are no species for which the alternate haul route supports an important population based on the DSEWPC definition.

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

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

The development of the alternate haul route will not result in a long-term decrease in an important population of a vulnerable species.

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

The development of the alternate haul route will not result in the reduction in the area of occupancy of an important population of a vulnerable species.

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

The development of the alternate haul route will not 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**

The alternate haul route does not contain habitat critical to the survival of New Holland mouse (*Pseudomys novaehollandiae*), spotted-tailed quoll (*Dasyurus maculatus*), long-nosed potoroo (*Potorous tridactylus*), koala (*Phascolarctos cinereus*), large-eared pied bat (*Chalinolobus dwyeri*), grey-headed flying-fox (*Pteropus poliocephalus*), Charmhaven apple (*Angophora inopina*), leafless tongue-orchid (*Cryptostylis hunteriana*) or Newcastle doubletail (*Diuris praecox*). The development of the alternate haul route will not result in any adverse affect on habitat critical to the survival of these species.

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

The development of the alternate haul route will not disrupt the breeding cycle of an important population of a vulnerable species.

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

The development of the alternate haul route involves the disturbance to approximately 0.37 hectare of potential habitat for New Holland mouse (*Pseudomys novaehollandiae*), spotted-tailed quoll (*Dasyurus maculatus*), long-nosed potoroo (*Potorous tridactylus*), koala (*Phascolarctos cinereus*), large-eared pied bat (*Chalinolobus dwyeri*), grey-headed flying-fox (*Pteropus poliocephalus*), Charmhaven apple (*Angophora inopina*), leafless tongue-orchid (*Cryptostylis hunteriana*) and Newcastle doubletail (*Diuris praecox*). However, it is unlikely that this loss would cause a vulnerable species to decline.

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

The alternate haul route currently supports introduced plant and animal species in a low to moderate abundance. It is considered unlikely that the development of the alternate haul route will result in the introduction of an invasive species that is harmful to the New Holland mouse (*Pseudomys novaehollandiae*), spotted-tailed quoll (*Dasyurus maculatus*), long-nosed potoroo (*Potorous tridactylus*), koala (*Phascolarctos cinereus*), large-eared pied bat (*Chalinolobus dwyeri*), grey-headed flying-fox (*Pteropus poliocephalus*), Charmhaven apple (*Angophora inopina*), leafless tongue-orchid (*Cryptostylis hunteriana*) or Newcastle doubletail (*Diuris praecox*). The development of the alternate haul route will not result in a significant increase in invasive species that are harmful to a vulnerable species.

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

The development of the alternate haul route will involve the disturbance to approximately 0.37 hectare of potential habitat for New Holland mouse (*Pseudomys novaehollandiae*), spotted-tailed quoll (*Dasyurus maculatus*), long-nosed potoroo (*Potorous tridactylus*), koala (*Phascolarctos cinereus*), large-eared pied bat (*Chalinolobus dwyeri*), grey-headed flying-fox (*Pteropus poliocephalus*), Charmhaven apple (*Angophora inopina*), leafless tongue-orchid (*Cryptostylis hunteriana*) and Newcastle doubletail (*Diuris praecox*). Significant areas of similar habitats occur within the local area. The habitats of the alternate haul route are not vital for these species. The development of the alternate haul route will not interfere substantially with the recovery of these species.

Migratory Species

The 12 EPBC Act migratory species listed in **Table 1**, recorded or found to have potential to occur in the alternate haul route are considered in this assessment.

A proposed development is regarded to have a significant impact if it affects an area of important habitat for any migratory species. Under the definition of the EPBC Act, 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;**
- **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 alternate haul route is not considered to comprise important habitat for any of the listed migratory species, based on the DSEWPC criteria described above. As such, no further assessment is required for any EPBC Act listed vulnerable species recorded or potentially occurring in the alternate haul route. The development of the alternate haul route will not impact on an important population of any EPBC Act listed vulnerable species.

Conclusion

The proposed development of the alternate haul route will not result in a significant impact on any EPBC Act listed threatened, vulnerable or migratory species.