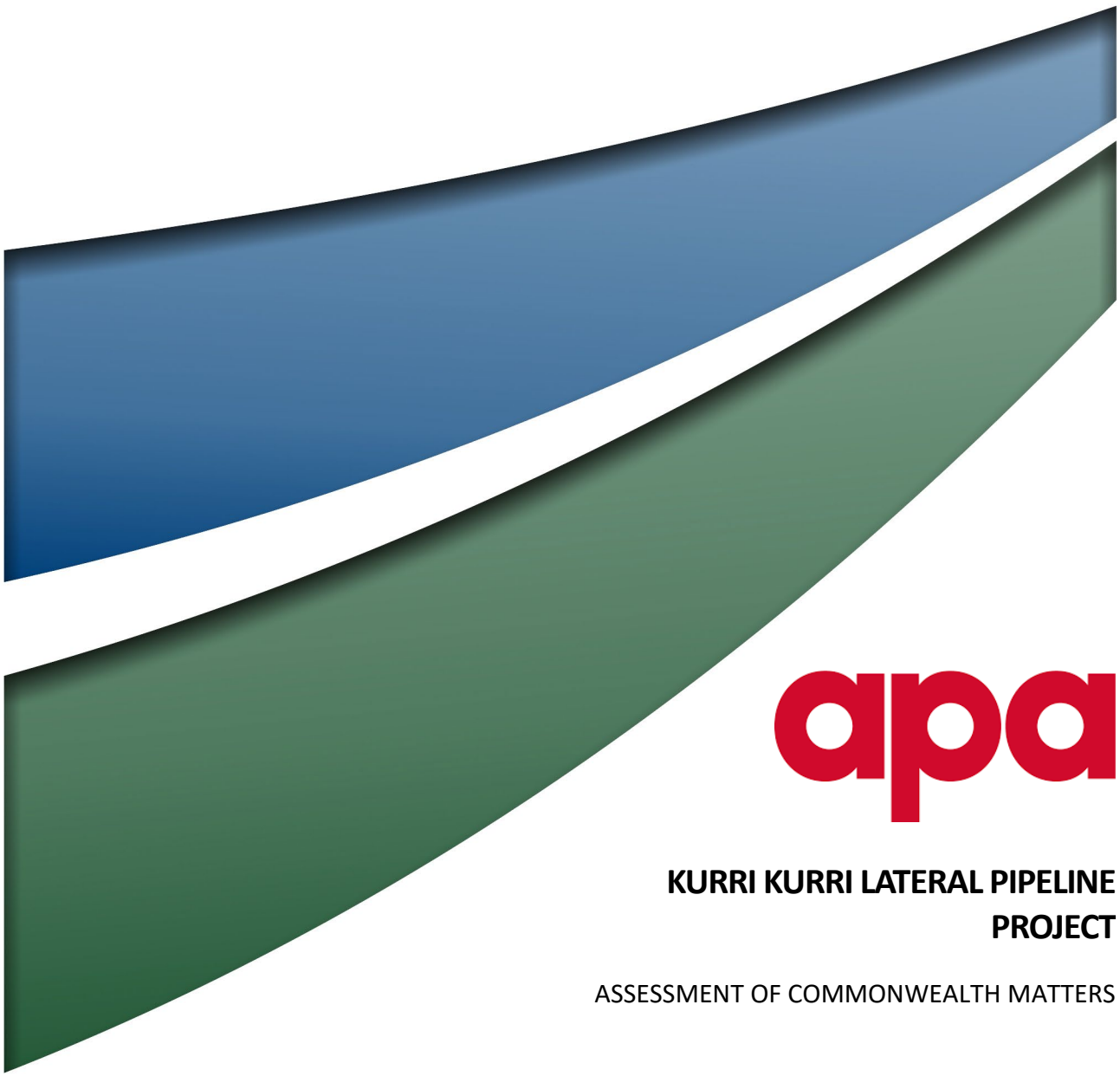
APPENDIX 15

MNES Report

umwelt
Environmental & Social Consultants



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KURRI KURRI LATERAL PIPELINE PROJECT

ASSESSMENT OF COMMONWEALTH MATTERS

FINAL

March 2022

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Prepared by

Umwelt (Australia) Pty Limited

on behalf of

APA Group

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Report No. R11
Date: March 2022

Environmental & Social Consultants

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Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
1	Allison Riley	9/03/2022	Allison Riley	9/03/2022

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1.0 Introduction

On 8 February 2022, the Department of Agriculture, Water and Environment (DAWE) confirmed the Kurri Kurri Lateral Pipeline Project (the Project) constitutes a controlled action under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions under the EPBC Act for the proposed action are:

- Listed threatened species and communities (sections 18 and 18A).

Specifically, DAWE considered the Project is likely to have a significant impact on:

- *River-flat Eucalypt Forest on Coastal Floodplains of southern New South Wales and eastern Victoria Critically Endangered Ecological Community* (CEEC)
- regent honeyeater (*Anthochaera phrygia*)
- swift parrot (*Lathamus discolor*)
- koala (*Phascolarctos cinereus*)
- grey-headed flying fox (*Pteropus poliocephalus*).

The assessment path for the Project is in accordance with the *Amending Agreement No. 1 to the Bilateral Agreement* under Section 45 of the EPBC Act relating to environmental assessment between the Commonwealth and NSW Governments. DAWE has issued its assessment requirements which have been incorporated into the SEARs for the Project (refer to Appendix 1 of the EIS) which state:

> "*The amending agreement sets out the information requirements for the Department to appropriately undertake the assessment under the amended bilateral. In particular, please note sufficient information will need to be included in the EIS to inform the Department's assessment as required under the following:*
>
> *Section 6 – Assessment: including for example significance assessment on Matters of National Environmental Significance; and*
>
> *Section 7 – Relevant plans, policies and other instruments: including for example sufficient information to demonstrate that the action is not inconsistent with these relevant plans including threat abatements plans, recovery plans, and consideration of relevant polices and guidelines for example bioregional plans"*

This report provides a summary of the key MNES assessment findings including the additional information outlined above and should be read in conjunction with the EIS and specifically the following specialist report:

- The Biodiversity Development Assessment Report (BDAR) prepared by Umwelt (Umwelt 2022)

It is noted that DAWE refers to the Project as the 'action'. For ease of response to the DAWE assessment requirements this section uses the terms 'action' and 'Project' interchangeably.

1.1 Project Overview

APA Group (APA) is seeking approval for the State Significant Development (SSD) application of a transmission pipeline to supply gas for the HPP from the existing Sydney to Newcastle Pipeline (SNP - formally referred to as the Jemena Gas Networks (JGN) Northern Trunk), hereafter referred to as the Project.

The Project has been declared Critical State Significant Infrastructure (CSSI) under Section 5.13 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project would involve the construction, operation and maintenance of a medium pressure transmission pipeline, compressor station, high pressure storage pipeline, delivery station, and other ancillary surface facilities.

The Project comprises the following primary components:

- A buried, steel, medium diameter (outer diameter of 355.6 mm), medium pressure (up to 6.9 megapascal (MPag)) transmission pipeline of approximately 20.1 km in length to provide a gas supply from the existing Sydney to Newcastle Pipeline (SNP), via offtake and delivery facilities, to the HPP site.

- A compressor station at the termination of the transmission pipeline to boost gas pressure prior to transfer to a storage pipeline.

- A buried, steel, medium diameter (outer diameter of 355.6 mm), high pressure (up to 15.3 MPag) interconnect pipeline of approximately 1.3 km in total length, providing an interface between the compressor station, storage pipeline and delivery station.

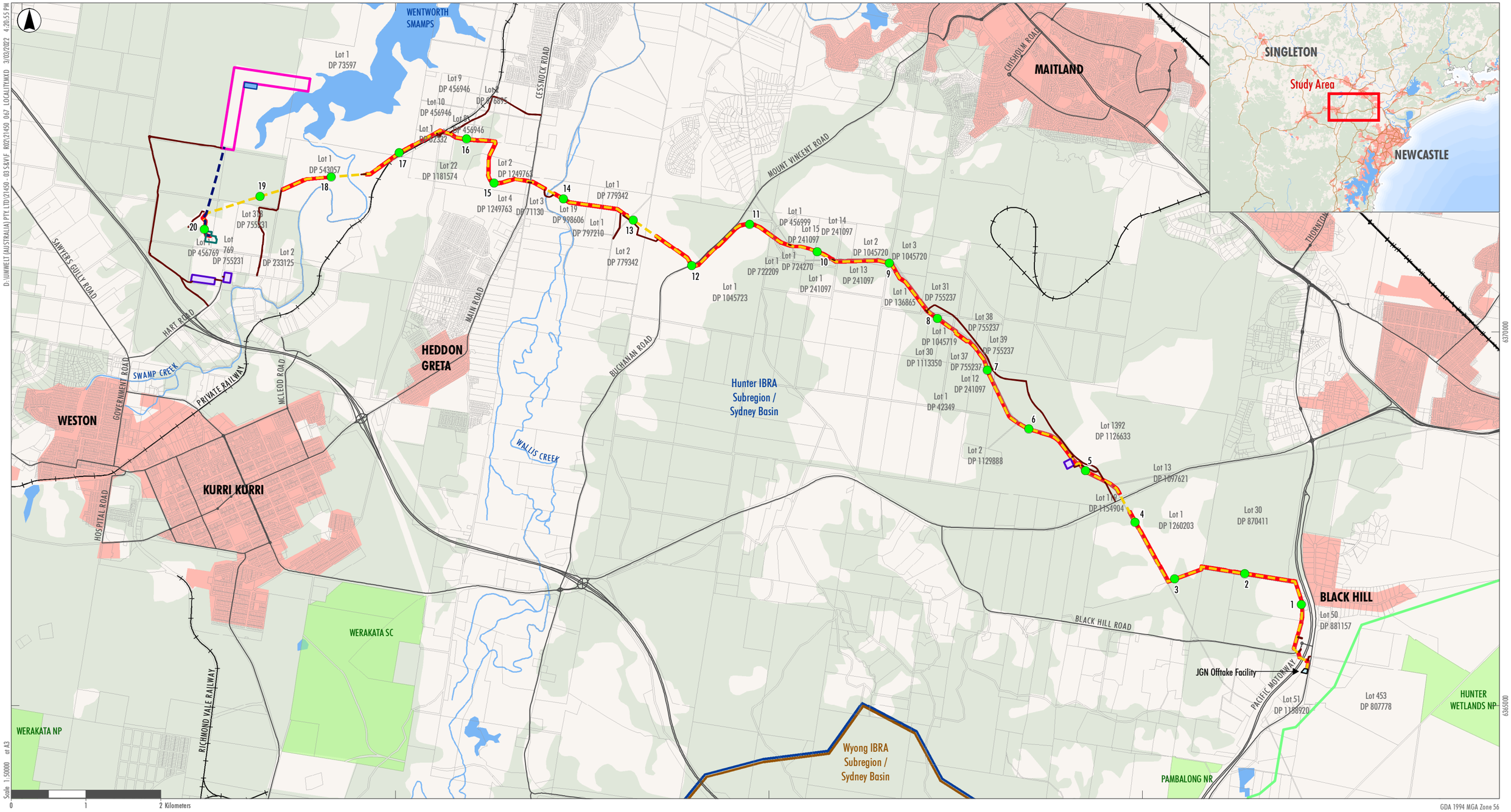
- A buried, steel, large diameter (outer diameter of 1067mm), high pressure (up to 15.3 MPag) storage pipeline of approximately 24 km in total length downstream of the compressor station with approximately 70 terajoules (TJ) of useable gas storage ready to supply the HPP.

- A delivery station to receive gas from the storage pipeline and control temperature, pressure and flow rate prior to delivery of gas to the HPP.

- A compressor station and storage pipeline are required as part of the Project as the SNP does not provide sufficient gas volumes or pressure to meet the supply requirements of the HPP. As such, a direct pipeline connection between the SNP and the HPP is not a viable solution for gas supply to the HPP.

The alignment of the transmission pipeline is approximately 20.1 km in length, extending from the proposed JGN offtake facility to the compressor station. The construction ROW for the transmission pipeline would generally be 25 m wide, with additional workspaces required for truck turnarounds, storage of cleared vegetation, HDD entry and exit locations, horizontal bore entry and exit locations, watercourse crossing workspaces and line pipe storage areas.

The Project is described in further detail in Section 2.0 of the EIS and **Figure 1.1** illustrates the Project location.



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GDA 1994 MGA Zone 56

Legend

- Transmission Pipeline Construction Footprint
- Transmission Pipeline Alignment
- Interconnect Pipeline
- Sydney to Newcastle Pipeline (JGN Northern Trunk)
- Kilometre Point
- Compressor and Delivery Station
- Pipe Laydown Areas
- Storage Pipeline
- Turkey Nest Dam
- JGN Offtake Facility
- Access Tracks
- Property Boundaries
- NPWS Reserves
- Native Vegetation
- Urban Area
- Railway
- Roads
- Watercourses

IBRA Subregion / Region

- Hunter IBRA Subregion / Sydney Basin
- Wyong IBRA Subregion / Sydney Basin

FIGURE 1.1

Locality Plan

Image Source: ESRI Basemap (2021) Data source: Umwelt (2021)

2.0 MNES Biodiversity Assessment

2.1 Biodiversity Surveys for Listed Threatened Species and Communities

Ecological surveys have been completed as part of the Project. A description of the surveys undertaken within the Project area as they relate to impacted or potentially impacted MNES are provided in the Sections below.

Surveys completed within the Project area include targeted threatened species searches, nocturnal spotlighting and call playback surveys, habitat assessment and opportunistic observation. Threatened species, vegetation communities and Threatened Ecological Communities (TECs) considered likely to occur within the local area were targeted as part of these surveys utilising meander transect surveys and semi-quantitative plot-based survey in accordance with the NSW Framework for Biodiversity Assessment methodology and relevant NSW and Commonwealth survey guidelines.

Field surveys are considered adequate to have identified the extent of MNES species or habitat occurring in the Project Area and were conducted in accordance or with consideration of the following survey guidelines, policy statements or recovery plans:

- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DEC 2004)
- Surveying Threatened Plants and Their Habitats (DPIE 2020b)
- Draft Survey Guidelines for Australia's Threatened Orchids (DoEE 2013)
- Species credit threatened bats and their habitats (OEH 2018)
- Hygiene protocol for the control of disease in frogs (DECC 2008)
- NSW Survey Guideline for Threatened Frogs (DPIE 2020c)
- Survey Guidelines for Australia's threatened bats (DEWHA 2010a)
- Survey Guidelines for Australia's threatened birds (DEWHA 2010b)
- Survey guidelines for Australia's threatened mammals (DSEWPC 2011)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities –Working Draft (DEC 2004)
- Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (DAWE 2020)
- Commonwealth Listing Advice on River-flat Eucalypt Forest on coastal floodplains of southern New South Wales and eastern Victoria CEEC (TSSC 2020)

- National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (Commonwealth of Australia (CoA) 2016)
- National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus* (CoA 2021).

2.1.1 River-flat Eucalypt Forest CEEC

A total of 36 floristic plots and 70 semi-quantitative rapid assessments were conducted across and in the vicinity of the Project area as part of the biodiversity survey with the survey effort shown on Figures 2.1A to 2.1H of the BDAR.

These surveys were undertaken during the following survey periods:

- August 2021
    - 2 to 6 August 2021
- October 2021
    - 13 October 2021
    - 18 to 22 October 2021
    - 28 October 2021
- December 2021
    - 2 to 3 December 2021
    - 8 December 2021
- February 2022
    - 2 February 2022

Vegetation communities identified in the Project area were compared to TECs listed under the Commonwealth EPBC Act and an assessment of similarity with the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice. The following approach was used:

- full-floristic quadrat assessment, rapid assessments and meandering survey to determine floristic composition and structure of each ecological community (including specific 20 x 50m plot sampling for River-flat Eucalypt Forest CEEC)
- comparison with published species lists, including lists of 'important species' as identified on the listing advice provided by the Commonwealth Threatened Species Scientific Committee
- comparison with habitat descriptions and distributions for listed TECs
- assessment using guidelines and recovery plans published by the Commonwealth DAWE
- assessment against diagnostic and condition criteria, where relevant, and
- comparison with other assessments of TECs in the region.

Detailed assessment of the vegetation communities described and mapped within the Project area was undertaken to determine whether the vegetation present met the condition class thresholds identified in Commonwealth Conservation and/or Listing Advice for River-flat Eucalypt Forest CEEC (TSSC 2020).

PCT 1594 in the Project area was identified as potentially conforming to the River-flat Eucalypt Forest CEEC. This PCT consists of 4.41 ha within the Project area, however only 1.1 ha of this PCT met the condition class requirements based on patch size, proportion of native canopy cover and groundcover species richness (TSSC 2020) for mapping as consistent with the CEEC.

The plot/transect surveys undertaken as part of the Project are considered to be consistent with the relevant published survey guidelines and policy statements.

2.1.2 Koala

Nocturnal spotlighting searches for the koala were undertaken over two nights in August 2021 in suitable habitat areas (refer to Figures 2.1A to 2.1H of the BDAR). Surveys were conducted between sunset and midnight using Led Lenser head torches (rated at 850 lumens). A total of 16 person hours of survey were conducted across the Project area, however due to property restrictions, nocturnal surveys were limited to the large area of the Project area in the north-west referred to as the proposed storage pipeline area.

Further surveys for the koala are proposed to be completed in March 2022 which will include Spot Assessment Technique (SAT) and nocturnal spotlighting and call playback where property access is achieved. The BDAR will be revised to include the outcomes of these surveys.

2.1.3 Grey-headed Flying-fox Surveys

Spotlighting surveys targeting the grey-headed flying fox were undertaken in areas of appropriate habitat between the hours of 8 pm and midnight using Led Lenser head torches (rated at 850 lumens). The surveys were undertaken over two nights in August 2021, with approximately eight person hours completed each night. Areas targeted for spotlighting primarily comprised woodland patches dominated by eucalypt species favoured by the grey-headed flying fox. Due to property restrictions, nocturnal surveys were limited to the large area of the Project area in the north-west referred to as the proposed storage pipeline area.

An assessment for the presence of breeding camps was also undertaken as part of the general biodiversity surveys undertaken across the Project area and surrounding habitats since the commencement of surveys in 2021. Particular focus was paid to drainage line communities which the species is known to favour in the Hunter Valley and elsewhere across its range. No breeding camp sites were identified.

The targeted surveys undertaken as part of the Project are considered to be consistent with the relevant published survey guidelines and policy statements for the grey-headed flying fox. Further surveys for the grey-headed flying-fox are proposed to be completed in March 2022 which will include nocturnal spotlighting where property access is achieved. The BDAR will be revised to include the outcomes of these surveys.

2.1.4 Regent honeyeater and swift parrot

The regent honeyeater (*Anthochaera phrygia*) and the swift parrot (*Lathamus discolor*), both listed as critically endangered under the EPBC Act, have been recorded in the region but they have not been recorded within the Project area. The Project area contains low to moderate quality potential foraging habitat for these species.

For the regent honeyeater, the Project area contains one key tree species identified in the National Recovery Plan, being spotted gum (*Corymbia maculata*), and also contains tree species identified in the plan as being regionally important, including broad-leaved ironbark (*Eucalyptus fibrosa*). In addition, a small area (0.46 ha) of important habitat mapping for the regent honeyeater (*Anthochaera phrygia*) occurs in the Project Area. However, this mapping has been completed at a broad scale using regional vegetation mapping products and does not reflect the habitat on ground. Surveys completed in the area identified the mapped important habitat as a small area of PCT 1600 - Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter, which is surrounded by a larger area of thinned/disturbed condition of this PCT. This PCT could provide winter foraging habitat when the eucalypts are in flower.

For the swift parrot, the Project area contains two of the priority feed tree species that are nominated in the Swift Parrot National Recovery Plan (Saunders and Tzaros 2011), being spotted gum (*Corymbia maculata*) and forest red gum (*Eucalyptus tereticornis*). A small area mapped as important habitat for the swift parrot occurs within the Project area however this area has been incorrectly mapped as habitat as it currently exists as a cleared area that was formerly a carpark for the Kurri Kurri aluminium smelter.

2.2 Access Limitations

Biodiversity surveys were limited at times to areas of the Project area where access was restricted by current property owners. Consequently, seasonal targeted surveys and vegetation mapping could not be completed in some areas. Areas that were not subject to any surveys and those that were partially surveyed are shown in Figure 1.4A to Figure 1.4H in the BDAR.

One area of the Project on Lot 11 DP829154 that runs parallel with the Pacific Motorway (M1) was unable to be accessed. The vegetation of this area has been mapped using the best available data from regional vegetation mapping. Vegetation surveys were also completed on the neighbouring property to the north and on the directly adjacent M1 road reserve.

All areas of the alignment except for the storage pipeline area were unable to be surveyed using call playback and nocturnal spotlighting methods to detect the koala. While it is unlikely that there is suitable habitat within the Project area for the koala to occur, we have assumed presence under the BAM for the purposes of generating offset liability despite the low likelihood of these species occurring. Opportunities to increase the survey effort for the koala and grey-headed flying-fox are proposed for March 2022.

2.3 Description and Quantification of Habitat for Impacted MNES

Table 2.1 below provides a summary of the extent of direct impact for each potentially impacted MNES in the DAWE controlled action decision. Further detail and description of the impacted habitat is provided in the sections below. Refer to Figures 3.2A to 3.2H of the BDAR for the extent of the MNES and or their potential habitat.

Table 2.1 Summary of Impact Areas for MNES

MNES	Habitat Type	Impacted area (ha)
Known Habitat (MNES recorded on site)		
River-flat Eucalypt Forest CEEC	Woodland and forest	1.1
Potential Habitat (MNES not recorded on site)		
regent honeyeater	Foraging	46.83
swift parrot	Foraging	51.81
koala	Foraging	57.72
grey-headed flying-fox	Foraging	49.33

2.3.1 *River-flat Eucalypt Forest* CEEC

River-flat eucalypt forest is listed as a CEEC under the EPBC Act. This community occurs on coastal floodplains of the eastern and southern watershed of the Great Dividing Range from central and southern New South Wales to eastern Victoria. The community occurs on alluvial soils that are generally deep (>1 m) and is generally represented by tall open forest to woodland dominated by eucalyptus species with a crown cover of 20% or more. A mid-layer of small trees such as *Melaleuca* sp. may be present and the groundcover is relatively diverse and abundant typically consisting of grasses, forbs, ferns, sedges and scramblers.

Approximately 1.1 ha of woodland that conforms to the *River-flat eucalypt forest* CEEC was identified within the Project area and will be directly impacted as a result of the Project. This area consists entirely of PCT 1594 Cabbage gum – Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter.

Detailed assessment of the vegetation community described and mapped within the Project area was undertaken to determine whether the vegetation present met the condition class thresholds identified in the Commonwealth Listing Advice (TSSC 2020). This assessment identified that the area of the CEEC within the Project area met the "moderate condition – class C2" condition class.

The Conservation Advice for the CEEC identifies habitat critical to its survival as those patches that are in the best condition, being Classes A and B as these are representative to the benchmark state of the CEEC.

The approximately 1.1 ha which conforms to the *River-flat Eucalypt Forest* CEEC within the Project area would not be critical to the survival of the CEEC, in accordance with the Conservation Advice, as it exists as a moderate (C2) condition (TSSC 2020). While this area may still be important for the survival of the CEEC (TSSC 2020), the extent of the proposed clearing represents a small area in the context of the broader range of the community both in NSW and in Australia.

The estimated total current national extent of River-flat eucalypt forest CEEC is estimated to be approximately 20,500 ha (TSSC 2006), of which approximately 10,600 ha is known to occur in NSW. The permanent loss of approximately 1.1 ha of the CEEC as a result of the Proposed Action represents a negligible reduction in the estimated current extent of the community across its national range, estimated to be approximately 0.01% of the current extent of the community in NSW.

The DAWE has assessed the Project as having a likely significant impact on the CEEC.

APA has committed to investigating options to avoid or reduce impacts to the River-flat eucalypt forest CEEC, and implementing if feasible.

2.3.2 Koala (*Phascolarctos cinereus*)

On 12 February 2022, the threatened species status of the koala (*Phascolarctos cinereus*) was changed from vulnerable to endangered under the EPBC Act. The Project referral was submitted to the Department on 6 January 2022, prior to the changed listing status of the koala. Therefore, for the purposes of this Assessment, the koala has been assessed as vulnerable.

The species is known to occur in eucalypt woodlands and forests from the north-eastern Queensland, along the eastern coast of NSW, to the south-east corner of South Australia. The species has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range.

The koala has not been recorded within the Project area during recent surveys or from previous records. There are several sporadic records proximate to the Project area, ranging from 1980 to 2020. The most recent record includes a 2020 record adjacent to the Sugarloaf State Conservation Area, located approximately 6.5 km south of the Project area.

Koalas feed on the foliage of eucalypt tree species and in some areas exhibit extremely strong preferences for particular eucalypt species. The Approved Recovery Plan for the Koala (DECC 2008) outlines preferred feed tree species in the Central Coast Koala Management Area. The Koala SEPP defines core koala habitat as an area of highly suitable koala habitat where koalas are recorded as being present at the time or in the previous 18 years. Koala feed trees are identified for regions in NSW in the Koala SEPP and the Koala Habitat Information Base Technical Guide (DPIE, 2019). The Project area occurs within the Central Coast Koala Management Area where 42 regionally relevant koala feed tree species have been identified. These trees have been ranked in preference of use in the Koala Habitat Information Base (DPIE, 2019). Twelve species of regionally relevant koala feed tree species have been identified in the Project area (refer to **Table A3.1** in **Appendix A3**). In the absence of current records of the species within the Project area, the BDAR has assumed that PCTs 1568, 1590, 1592, 1594, 1598, 1600, 1619, 1633 and planted native vegetation support habitat for the koala.

The controlled action decision by DAWE states that the Project is likely to have a significant impact on the koala as the action involves the clearing of approximately 47.61 ha of vegetation that potentially provides foraging habitat for this species, however following refinements to the Project boundary, the area of potential habitat is now estimated to be approximately 57.72 ha (refer to **Table 2.2**). In accordance with the EPBC Act Referral Guidelines for the Vulnerable Koala (DoE 2014), the habitat assessment tool was applied, which determined that the Project area is considered to contain habitat critical to the survival of the species (DoE 2014). The habitat scored a 5 out of 10 (≥ 5 indicates habitat critical for the survival of the koala).

Table 2.2 Potential Habitat for the Koala in the Project Area

Vegetation Zone	Justification	Area (ha)
1568 – Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast		
Moderate/Good	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being spotted gum (*Corymbia maculata*), bastard white mahogany (*Eucalyptus umbra*) and turpentine (*Syncarpia glomulifera*).	0.82
1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest		
Moderate/Good	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being spotted gum (*Corymbia maculata*) and broad-leaved ironbark (*Eucalyptus fibrosa*).	10.33
Thinned/Disturbed	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being spotted gum (*Corymbia maculata*) and broad-leaved ironbark (*Eucalyptus fibrosa*).	1.62
1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter		
Moderate/Good	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being spotted gum (*Corymbia maculata*), broad-leaved ironbark (*Eucalyptus fibrosa*) and grey gum (*E. punctata*).	1.5
Thinned/Disturbed	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being spotted gum (*Corymbia maculata*) and broad-leaved ironbark (*Eucalyptus fibrosa*).	4.34
1594 – Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter		
Thinned/Disturbed	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being cabbage gum (*Eucalyptus amblifolia*).	3.33
1598 – Forest Red Gum grassy open forest on floodplains of the lower Hunter		
Thinned/Disturbed	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being forest red gum (*Eucalyptus tereticornis*).	1.68
1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter		
Moderate/Good	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being spotted gum (*Corymbia maculata*), grey box (*Eucalyptus moluccana*), narrow-leaved ironbark (*E. crebra*) and broad-leaved ironbark (*E. fibrosa*).	3.77

Vegetation Zone	Justification	Area (ha)
Thinned/Disturbed	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being spotted gum (*Corymbia maculata*), narrow-leaved ironbark (*Eucalyptus crebra*) and broad-leaved ironbark (*E. fibrosa*), however these are scattered throughout this vegetation zone.	25.27
1619 – Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands		
Moderate/Good	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being smooth-barked apple (*Angophora costata*), broad-leaved ironbark (*Eucalyptus fibrosa*) and white stringybark (*E. globoidea*).	1.99
1633 – Parramatta Red Gum - Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area		
Thinned/Disturbed	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being *Eucalyptus parramattensis* subsp. *decadens* which occur as scattered trees within this vegetation zone.	2.48
Planted vegetation		
Mine Rehabilitation	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being spotted gum (*Corymbia maculata*), narrow-leaved ironbark (*Eucalyptus crebra*) and grey gum (*E. punctata*), however these occur as young with now mature trees present in this vegetation zone.	0.55
Planted	Contains koala use tree species listed within Central Coast management area under Schedule 2 of Koala Habitat Protection SEPP being tallowwood (*Eucalyptus microcorys*) occurring as a planted windbreak on a property boundary.	0.04
	TOTAL	**57.72**

The proposed action will result in the loss of approximately 57.72 ha of vegetation containing regionally relevant koala feed trees (refer to **Table 2.2**), however the majority of this vegetation within the Project area occurs as a thinned or disturbed state which is reflective of historic land practices including grazing, mining and urban development. Only 18.41 ha of this vegetation is assessed to be in moderate or good condition. While sporadic, and mainly historic, records of the species occur in the locality, the Project area does not provide known habitat for this species.

Based on fieldwork that considered the extent of habitat within the Project area in accordance with the regional ecology of the species within the Hunter Valley, approximately 57.72 ha of native woodland and forest habitat was identified in the Project area as potential and occasional foraging habitat for the species. Regarding the broader Central Coast koala management area, there is approximately 640,000 ha of habitat ranked > 50% suitability and 248,197 ha of habitat ranked as > 75% suitability available in the area surrounding the Project area calculated from the NSW Koala Habitat Suitability Models described in DPIE

(2019). The Project will result in the loss of approximately 0.009% of habitat ranked as being >50% suitable for the koala within the Central Coast koala management area.

The koala has not been recorded in the Project area during surveys and no records of this species occur within the Project area (DPIE 2022). Records exist within the wider area of the Project area that range from 1980 to 2020; the most recent record from 2020 occurred in and around intact habitat approximately 6.5 km south of the Project area near Sugarloaf State Conservation Area (DPIE 2022).

The recent 2019-2020 bushfires affected substantial natural areas of NSW, including koala habitat. Approximately 3.6 million ha (26%) of all moderate to very high-quality koala habitat in eastern NSW was affected by the bushfires (DPIE 2020b). Approximately 1.69 million ha (22%) was high or very high suitability koala habitat (DPIE 2020b). Of the six koala management areas, the Central Coast Koala Management Area was one of the least affected by the 2019-2020 bushfires with approximately 15.3% of high to very high suitability koala habitat impacted (DPIE 2020b). With reference to the NSW koala habitat information base and Google Earth Engine Burnt Area Map (GEEBAM) spatial datasets, the closest bushfire affected koala habitat to the Project area occurs approximately 15 km to the south west in Wollemi National Park. There is minimal habitat connectivity between the Project area and the closest 2019-2020 bushfire affected koala habitat.

The original biodiversity impact assessment provided in the Referral (Umwelt 2021) found that the predicted impacts of the Project were unlikely to result in a significant impact on a population of the koala. DAWE determined a significant impact is likely for the koala in its controlled action decision. In the time since the Referral was lodged, further field surveys have been completed based a revised footprint of the Project. A revised assessment of significance for the species is provided in **Appendix A**. The results of the revised assessment have determined that the Project is unlikely to result in a significant impact on the population of koala given the majority of the habitat containing regionally relevant koala food trees exists as a thinned or disturbed condition coupled with the low number of recent (in the last 10 years) records of the koala in the locality.

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

The grey-headed flying-fox is listed as Vulnerable under the EPBC Act. It has not been recorded in the Project area however there are several records of the species within and surrounding the Project area.

According to the *National Recovery Plan for the Grey-Headed Flying-Fox* (CoA 2021), foraging habitat that meets one of the following criteria is considered critical or essential to the survival of the species:

- *Eucalyptus tereticornis, E. albens, E. crebra, E. fibrosa, E. melliodora, E. paniculata, E. pilularis, E. robusta, E. seeana, E. sideroxylon, E. siderophloia, Banksia integrifolia, Castanospermum australe, Corymbia citriodora citriodora, C. eximia, C. maculata, Grevillea robusta, Melaleuca quinquenervia* or *Syncarpia glomulifera*.

- contain native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May)

- contain native species used for foraging and occur within 20 km of a nationally important camp as identified on the Department's interactive flying-fox web viewer, or

- contain native and or exotic species used for roosting at the site of a nationally important grey-headed flying-fox camp as identified on the Department's interactive flying-fox web viewer

- the National Recovery Plan for the grey-headed flying-fox (CoA 2021) also includes criteria for roosting habitat critical to the survival of the species. Since the Project area does not contain a grey-headed flying-fox camp, roosting habitat critical to the survival of the species will not be impacted.

Vegetation communities within the Project area that contain at least one of the species listed above occur across approximately 49.33 ha. These are identified in **Table 2.3**.

The National Recovery Plan for the grey-headed flying-fox (CoA 2021) also includes criteria for roosting habitat critical to the survival of the species. Since the Project area does not contain a grey-headed flying-fox camp, roosting habitat critical to the survival of the species will not be impacted.

Camp sites (breeding habitat) have not been identified within the Project area and are not expected to occur. The National Flying-Fox Monitoring Viewer (DoEE 2021) identifies seven known roost camp sites within 35 km of the Project area including two nationally important sites. Not all of these sites have been identified as supporting a population in surveys conducted between February 2013 and August 2020. The nearest roost camp sites are at:

- Raymond Terrance (625) approximately 15 km north east of the Project area where the population estimates on more than 25 occasions since 2013 were at 10,000 to 15,999 individuals. This camp is identified as nationally important for this species.

- East Cessnock (334) approximately 10 km south of the Project area where the population estimates on more than 25 occasions since 2013 were at 2,500 to 9,999 individuals. This camp is identified as nationally important for this species.

- Strockrington, Black Hill (13) approximately 5 km to the south of the Project area. This camp has been surveyed from February 2013 to May 2015, but no grey-headed flying-foxes were found. This camp is not identified as nationally important for this species.

- Tenambit (926) approximately 8 km north east of the Project area where the population estimate is 1 to 499 individuals (217 and 2018) or 500-2,499 individuals (2019 and 2020). This camp is not identified as nationally important for this species.

- Maitland, Hannan Street (810) approximately 8 km north of the Project area where the population estimate is 500 to 2,499 individuals (August 2014, May 2015, February 2016 and February 2017) or 2,500 to 9,999 individuals (November 2014, February 2015 and November 2016). However surveys conducted since 2013 have not identified any grey-headed flying-foxes. This camp is not identified as nationally important for this species.

- Maitland, Lorn (380) approximately 8 km north of the Project area where the population estimate is 500 to 2,499 individuals from November 2012 to May 2013. However surveys conducted since 2013 have not identified any grey-headed flying-foxes. This camp is not identified as nationally important for this species.

- Millfield (829) approximately 25 km south west of the Project area. This camp was surveyed in May 2015, but no grey-headed flying-foxes were found. This camp is not identified as nationally important for this species.

The controlled action decision by DAWE states that the Project has a real chance or possibility to have a significant impact on the grey-headed flying-fox without further assessment of the potential impacts. The original Referral documentation estimated an impact of up to 52.32 ha of foraging habitat, however following Project footprint revisions, the area of potential habitat is now estimated to be approximately 49.33 ha (refer to **Table 2.3**). Of this potential habitat, 16.42 ha is classified as being in good or moderate condition, with 32.9 ha classified as thinned or disturbed.

Table 2.3 Potential Foraging Habitat for the Grey-headed Flying-fox in the Project Area

Vegetation Zone	Justification	Area (ha)
1568 – Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast		
Moderate/Good	Native forest habitat suitable for foraging.	0.82
1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest		
Moderate/Good	Native woodland habitat suitable for foraging.	10.33
Thinned/Disturbed		1.62
1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter		
Moderate/Good	Native woodland habitat suitable for foraging.	1.5
Thinned/Disturbed		4.34
1598 – Forest Red Gum grassy open forest on floodplains of the lower Hunter		
Thinned/Disturbed	Native woodland habitat suitable for foraging.	1.68
1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter		
Moderate/Good	Native woodland habitat suitable for foraging.	3.77
Thinned/Disturbed		25.27
TOTAL		**49.33**

The original biodiversity impact assessment provided in the Referral (Umwelt 2021) found that the predicted impacts of the Project were unlikely to result in a significant impact on a population of the grey-headed flying-fox. DAWE determined in the controlled action decision that the grey-headed flying-fox will be potentially significantly impacted by the Project resulting in the removal of foraging habitat critical to the survival of the species. In the time since the Referral was lodged, the Project has been revised and the impacts on biodiversity have been reduced. A revised assessment of significance for the species is provided in **Appendix A**. The results of the revised assessment have determined that the Project is unlikely to result in a significant impact on the population of the grey-headed flying fox.

2.3.4 Regent Honeyeater (*Anthochaera phrygia*)

The regent honeyeater is listed as critically endangered under the EPBC Act and has a patchy distribution extending from south-east Queensland, into NSW and the Australian Capital Territory, to central Victoria (CoA 2016). The species is highly mobile, capable of travelling large distances and occurs only irregularly at most sites in varying numbers. Adding further difficulty to the survey and study of this species is its ability to often go long periods without being observed anywhere (CoA 2016).

The regent honeyeater is endemic to mainland south-eastern Australia and mostly inhabits inland slopes of the Great Dividing Range (TSSC 2015). The regent honeyeater comprises a single population, with some exchange of individuals between regularly used areas (CoA 2016). As at 2010, the total population size is estimated at 350–400 mature individuals (CoA 2016).

As the species occurs as a single population in Australia, any record of the species would constitute part of a population as described above. The population of regent honeyeater has not been recorded within the Project area (DPIE 2021). The closest record of the species occurs approximately 1.5 km north-west from the Project area; however the majority of the records occur within the Tomalpin woodlands near Kurri Kurri, which represents the largest block of remaining natural woodland on the Hunter Valley floor. The Tomalpin Woodlands are located approximately 4 km south-west of the Project area at its closest point

No regent honeyeater individuals were identified utilising the Project area during surveys and the species has not been previously recorded in the Project Area or the locality, despite extensive survey.

The National Recovery Plan for the regent honeyeater identifies the following canopy species as key tree and mistletoe species across the species range:

- Mugga (or Red) Ironbark (*Eucalyptus sideroxylon*)
- Yellow Box (*E. melliodora*)
- White Box (*E. albens*)
- Yellow Gum (*E. leucoxylon*)
- Spotted Gum (*Corymbia maculata*)
- Swamp Mahogany (*E. robusta*)
- Needle-leaf Mistletoe (*Amyema cambagei*) on River Sheoak (*Casuarina cunninghamiana*)
- Box Mistletoe (*A. miquelii*)
- Long-flower Mistletoe (*Dendropthoe vitelline*).

Other tree species may be regionally important. For example, the Lower Hunter Spotted Gum forests have recently been demonstrated to support regular breeding events of regent honeyeaters. Flowering of associated species such as thin-leaved stringybark (*Eucalyptus eugenioides*) and other stringybark species, and broad-leaved ironbark (*Eucalyptus fibrosa*) can also contribute important nectar flows at times. The recovery plan also identifies that 'mature, large individual trees tend to be more important as they are more productive, particularly on highly fertile sites and in riparian areas'.

The regent honeyeater mainly breeds in three key sites in NSW being the Bundarra-Barraba area, the Capertee Valley, and the Lower Hunter Valley (DoE 2016 and OEH 2019). Other breeding areas are known in the Pilliga woodlands and the Mudgee-Wollar areas of NSW. The regent honeyeater has not been recorded in the Project area and it is unlikely to contain breeding or nesting habitat for the species.

The Project Area contains low to moderate quality potential foraging habitat for this species, and includes one of the priority feed tree species that are nominated in the National Recovery Plan (CoA 2016) as key foraging resources for the regent honeyeater in the Hunter Valley, being spotted gum (*Corymbia maculata*). Broad-leaved ironbark (*Eucalyptus fibrosa*) was also recorded within the Project area which is considered a regionally important tree species in the lower Hunter Valley according to the National Recovery Plan (CoA 2016). These species were identified in the Project area and were recorded in PCTs 1590, 1592 and 1600.

In addition, approximately 0.46 ha of the Project area is mapped as important habitat for the regent honeyeater under the Biodiversity Assessment Methodology (BAM) (DPIE 2021b). However, this area exists as a small patch of woodland within a largely disturbed environment and is surrounded by higher quality intact vegetation outside the Project area to the west and south. These areas of higher quality habitat have primarily been avoided as part of the Project design process.

The controlled action decision by DAWE states that the Project is likely to have a significant impact on the regent honeyeater due to the loss of approximately 49.95 ha of potential foraging habitat for the species, including 0.46 ha of area mapped as important habitat for the species. However, following detailed habitat assessments and impact boundary reductions, the area of potential habitat is estimated to be approximately 46.83 ha; this includes the 0.46 ha of area mapped as important habitat for the species (refer to **Table 2.4**). Of this potential habitat, 15.6 ha is classified as being in good or moderate condition, with the 30.78 ha classified as thinned or disturbed.

Table 2.4 Potential Habitat for the Regent Honeyeater in the Project Area

Vegetation Zone	Justification	Area (ha)
1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest		
Moderate/Good	Contains key feed tree spotted gum (*Corymbia maculata*) and broad-leaved ironbark (*Eucalyptus fibrosa*).	10.33
Thinned/Disturbed		1.62
1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter		
Moderate/Good	Contains key feed tree spotted gum (*Corymbia maculata*) and broad-leaved ironbark (*Eucalyptus fibrosa*).	1.5
Thinned/Disturbed		4.34
1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter		
Moderate/Good	Contains key feed tree spotted gum (*Corymbia maculata*) and broad-leaved ironbark (*Eucalyptus fibrosa*).	3.77
Thinned/Disturbed		25.27
TOTAL		**46.83**

The original biodiversity impact assessment provided in the Referral (Umwelt 2021) found that the predicted impacts of the Project were unlikely to result in a significant impact on a population of the regent honeyeater. DAWE determined in the controlled action decision that the regent honeyeater will be potentially significantly impacted by the Project. In the time since the Referral was lodged, the Project has been revised and the impacts on biodiversity have been reduced. A revised assessment of significance for the species is provided in **Appendix A**. The results of the revised assessment have determined that the Project is unlikely to result in a significant impact on the population of the regent honeyeater.

2.3.5 Swift Parrot (*Lathamus discolor*)

The swift parrot is listed as critically endangered under the EPBC Act. The species breeds in Tasmania and moves to mainland Australia for the non-breeding season (usually arriving between February and March) (Saunders and Tzaros 2011). Most of the population winters in Victoria and NSW where it disperses across broad landscapes foraging on nectar and lerps in eucalypts. Until recently it was believed that in NSW, swift parrots forage mostly in the coastal and western slopes region along the inland slopes of the Great Dividing Range but are patchily distributed along the north and south coasts including the Sydney region (Saunders and Tzaros 2011). However, evidence is gathering that the forests on the coastal plains from southern to northern NSW are also important. They return to Tasmania in spring (September-October). The movements of this species on the mainland are poorly understood, but it is considered to be nomadic and irruptive, moving in response to food supply.

The swift parrot occurs as a single population that migrates annually from breeding grounds in Tasmania to the winter foraging grounds on the coastal plains and slope woodlands of mainland eastern Australia (Saunders and Tzaros 2011). Approximately 200 mature birds (10% of the total estimated population) are known to over-winter in the Lower Hunter Region of New South Wales (Roderick et al. 2013).

As the species occurs as a single population in Australia, any record of the species would constitute a part of a *population* as described above. There have been few records of the species within the Central Hunter Valley in the past few years, however recent sightings have been recorded in the winter 2020 season in the lower Hunter areas with small flocks observed feeding in flowering spotted gum (*Corymbia maculata*) and grey box (*Eucalyptus moluccana*) (Birdline NSW 2020). This species has the potential to make use of the open forest and woodland habitats of the Project area, particularly where there are prolific flowering eucalypts and this migratory species is likely to move throughout the area in response to mass flowering events. This species does not breed on mainland Australia, and as such the Project area only represents potential foraging habitat for this species.

The Project area contains low to moderate quality potential foraging habitat for this species. In accordance with the National Recovery Plan for the Swift Parrot (Saunders and Tzaros 2011) approximately 51.36 ha of potential woodland foraging habitat occurs within the Project area, based on the presence of spotted gum (*Corymbia maculata*) and forest red gum (*Eucalyptus tereticornis*) which are identified as key foraging resources for the swift parrot in the Hunter Valley. Analysis of vegetation survey data and habitat assessment results indicates that the additional key foraging species that provide habitat for the species in the Hunter Valley, as per the Recovery Plan, were not recorded in the Project area.

The controlled action decision by DAWE states that the Project has a real chance or possibility to have a significant impact on the swift parrot without further assessment of the potential impacts. The original Referral documentation estimated an impact of up to 54 ha of foraging habitat, however following Project footprint revisions, the area of potential habitat is now estimated to be approximately 51.81 ha (refer to **Table 2.5**). Of this potential habitat, 16.42 ha is classified as being in good or moderate condition, with 34.94 ha classified as thinned or disturbed.

Table 2.5 Potential Habitat for the Swift Parrot in the Project Area

Vegetation Zone	Justification	Area (ha)
1568 – Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast		
Moderate/Good	Contains key feed tree spotted gum (*Corymbia maculata*).	0.82
1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest		
Moderate/Good	Contains key feed tree spotted gum (*Corymbia maculata*).	10.33
Thinned/Disturbed		1.62
1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter		
Moderate/Good	Contains key feed tree spotted gum (*Corymbia maculata*).	1.5
Thinned/Disturbed		4.34
1598 – Forest Red Gum grassy open forest on floodplains of the lower Hunter		
Thinned/Disturbed	Contains key feed tree forest red gum (*Eucalyptus tereticornis*).	1.68
1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter		
Moderate/Good	Contains key feed tree spotted gum (*Corymbia maculata*).	3.77
Thinned/Disturbed		25.27
1633 - Parramatta Red Gum - Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area		
Thinned/Disturbed	Contains key feed tree forest red gum (*Eucalyptus tereticornis*), which are in low abundance scattered throughout the vegetation community.	2.48
TOTAL		**51.81**

The original biodiversity impact assessment provided in the Referral (Umwelt 2021) found that the predicted impacts of the Project were unlikely to result in a significant impact on a population of the swift parrot. DAWE determined in the controlled action decision that the swift parrot will be potentially significantly impacted by the Project. In the time since the Referral was lodged, the Project has been revised and the impacts on biodiversity have been reduced. A revised assessment of significance for the species is provided in **Appendix A**. The results of the revised assessment have determined that the Project is unlikely to result in a significant impact on the population of the swift parrot.

Habitat critical to the survival of the swift parrot includes those areas of priority habitat for which the species has a level of site fidelity or possess phenological characteristics likely to be of importance to the swift parrot (Saunders and Tzaros 2011). The swift parrot has not been recorded within the Project area or the immediate locality and has not shown site fidelity to the habitats of the Project area. The Project area includes vegetation containing spotted gum and forest red gum which are key feed tree species for the swift parrot in the Hunter-Central Rivers (Saunders and Tzaros 2011). The Project will result in the loss of 51.81 ha of potential habitat that is not important, notable, or of consequence, having regard to its context or intensity.

2.4 Assessment of Impacts to Listed Threatened Species and Communities

The development of the Project will result in direct, indirect and consequential impacts on biodiversity values. Direct impacts include the loss of native vegetation and fauna habitats as a result of clearance works. The Project is not expected to result in any substantial indirect impacts on the biodiversity values of surrounding lands. However, some minor indirect impacts associated with habitat connectivity, dust, noise, weeds and feral animals may occur during the Project.

Consequential impacts arise where a project creates a requirement for additional development or where additional development is facilitated to a significant extent by a project. The Project is not expected to result in substantial consequential biodiversity impacts.

It is recognised that the Project will remove vegetation and further increase fragmentation and isolation of habitats, and thus contribute to cumulative habitat loss and vegetation clearance in the locality.

These impacts are summarised in **Table 2.6.**

Table 2.6 Predicted Impacts from the Project on EPBC Act listed threatened species and communities

Impact Type	MNES	Description	Nature of Impact	Direct Impact Area
Direct	*River-flat Eucalypt Forest CEEC*	Loss of 1.1 ha of forest through clearing.	Permanent	1.1 ha
Direct	regent honeyeater	Removal of potential foraging habitat containing key feed trees including 0.46 ha important mapped area	Permanent	46.83 ha
Direct	swift parrot	Removal of potential foraging habitat containing key feed trees and suitable	Permanent	51.81 ha
Direct	koala	Removal of potential habitat containing regionally relevant feed trees	Permanent	57.72 ha
Direct	grey-headed flying-fox	Removal of potential foraging habitat	Permanent	49.33 ha
Indirect	Non-specific Biodiversity related MNES	Noise impacts during construction may have a minor indirect impact on fauna species. Potential impacts include noise disturbing the roosting and foraging behaviour of fauna species and/or reducing the occupancy of areas of otherwise suitable habitat.	Medium term	-
Indirect	Non-specific Biodiversity related MNES	Air quality impacts during construction have the potential to adversely impact native species from dust generating activities during ground disturbing works. Potential impacts include dust covering vegetation thereby potentially reducing vegetation health and growth and increased air pollutants for native species (flora and fauna).	Medium term	-

Impact Type	MNES	Description	Nature of Impact	Direct Impact Area
Indirect	Non-specific Biodiversity related MNES	Weed species could be inadvertently brought into the Project area with imported materials or could invade naturally through removal of native vegetation. The presence of weed species within the Project area has the potential to decrease the value of extant vegetation to native species, particularly threatened species. Populations of feral fauna species such as foxes, rabbits, pigs, deer, dogs and cats can increase and quickly populate new areas as a result of disturbance.	Medium term	-
Cumulative	Non-specific Biodiversity related MNES	The history of land clearing associated with agriculture and approved mining industrial and urban development has resulted in an incremental loss of vegetation and fauna habitat surrounding the Project area, and within the Hunter Valley more generally. The Project will result in a loss of approximately 64.73 ha of native vegetation in various condition states. The Project will remove vegetation and further increase fragmentation and isolation of habitats, and thus contribute to cumulative habitat loss and vegetation clearance in the locality.	Medium – long term	-
Consequential	Non-specific Biodiversity related MNES	The Project uses existing infrastructure facilities where possible, therefore consequential impacts are not predicted.	Medium – long term	-

The relevant impacts of the Project are considered to be well known and predictable based on the extensive knowledge of the ecological values of the Project area and a sound understanding of the impacts of the Project (e.g. clearing of vegetation, earthworks and water management). The direct impacts of the Project, as they relate to the clearing of EPBC Act-listed CEEC and threatened species habitat is predicted to be medium to long-term; however, a detailed biodiversity offset and rehabilitation program will be prepared as part of the Project in order to compensate for the residual impacts of habitat loss that cannot be adequately avoided or minimised. The proposed rehabilitation and reinstatement of habitat will mean that, over time, impacts will not be completely irreversible as most key ecological features will be recovered. Rehabilitation of the Project area, in addition to an appropriate biodiversity offset strategy will ensure that there is no residual significant impact to the landscape in the medium-long term as a result of the Project. Further details regarding the proposed biodiversity offset strategy are discussed in Section 7.5.5 of the EIS.

3.0 Avoidance and Mitigation of Impacts

3.1.1 Avoidance Strategies

A range of design concepts and alignments for the Project have been evaluated based on detailed consideration of the biophysical environment and land uses in the area. The design concept and alignment that has been assessed in this EIS was selected as it provides an acceptable degree of construction complexity, the greatest potential to minimise the environmental and social impacts, as well as providing an economic solution with the lowest cost of all feasible design concepts considered.

With regards to minimising biodiversity impacts, the Project components have been strategically located to avoid impacts to ecological values where practicable and includes placement within areas that have been previously cleared or where existing infrastructure is present.

Associated surface facilities have been located on areas that support exotic grassland (JGN offtake facility) or on the hardstand site of the former Kurri Kurri aluminium smelter (compressor station and delivery station). Similarly, pipe laydown areas have been located on areas of existing industrial and mining hardstands.

The transmission pipeline has been preferentially located on land that has been cleared, or is approved for clearing, and follows existing Hunter Water corporation linear pipeline infrastructure for around 33% of its length. Between KP 1.4 and KP 2.6 the transmission pipeline traverses Lot 30 DP870411, site of the approved Hunter Business Park light industrial development. Biodiversity offsets for the approved clearing of this lot have previously been lawfully acquitted.

Trenchless crossings have been adopted for both the transmission pipeline and interconnect pipeline to avoid direct impacts on an area of remnant Kurri Sand Swamp Woodland to the north of the former Kurri Kurri aluminium smelter. The native vegetation avoided by these trenchless crossings is proposed for a stewardship area as part of the Regrowth Kurri Kurri project, and is mapped as important habitat for the regent honeyeater.

The storage pipeline is proposed to be located in an area of the buffer zone of the former Kurri Kurri aluminium smelter that is remote from all surrounding development and has predominantly been subject to previous clearing. In particular, remnant woodland areas of River-flat eucalypt forest on Coastal Floodplains of southern NSW and eastern Victoria CEEC have been avoided where practicable. A maximum of 1.1 ha of the CEEC is currently within the construction footprint. The CEEC extends beyond the Project area, and those areas of the CEEC within the Project area exist as a thinned/disturbed state.

Mapped areas of important habitat for the swift parrot are widespread in the surrounding area but have been entirely avoided apart from a small area that was the former carpark for the Kurri Kurri aluminium smelter, which has been incorrectly mapped. Only one small patch (0.46 ha) of mapped important habitat for the regent honeyeater is impacted within an area of thinned/disturbed vegetation west of Wentworth Swamp (refer to Figure 3.1H of the BDAR). Large areas of mapped important habitat for the regent honeyeater in remnant vegetation surrounding the storage pipeline construction footprint have been avoided.

Remnant woodlands and forests within the Project area have been avoided wherever practicable, minimising the impact on biodiversity values including impacts for many of the threatened fauna that have the potential to occur within the Project area. The grassland and woodland areas that will primarily be impacted by Project currently exist in a thinned/disturbed state and are considered to be of low biodiversity value.

The total area for the proposed Project was minimised as much as possible compared with the original footprint (refer to Section 4.0 of the BDAR) and has been further reduced following the biodiversity surveys completed in October 2021. The location of the Turkeys Nest Dam in the storage pipeline area was repositioned following biodiversity surveys to avoid an area of River-flat eucalypt forest CEEC. Whilst detailed design hasn't been completed, there is the potential that further refinements could be made and any currently unavoidable residual impacts, such as those relating River-flat eucalypt forest CEEC, will be prioritised if possible.

3.1.2 Mitigation Measures

The Project has committed to the design and implementation of a comprehensive biodiversity mitigation strategy to minimise the unavoidable impacts of the Project. A Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) will be prepared for the Project. Both plans will describe the avoidance, mitigation and management measures that will be undertaken to manage potential environmental impacts of the Project. They will be prepared to meet the specific requirements of the Project to avoid and minimise impacts on biodiversity values, in accordance with best practice.

The following specific control measures are recommended for the mitigation of impacts on the biodiversity features of the Project area:

- Salvage of biodiversity features, including habitat resources (e.g., hollow logs, tree hollows, fallen timber and rocks/boulders).
- A pre-clearing procedure will be implemented to minimise the potential for impacts on native fauna species (focusing on threatened species) as a result of the clearing of hollow-bearing trees. The pre-clearing procedure is designed to minimise impacts to hollow-dependent and ground-dwelling fauna.
- Weed management.
- Fencing and access control.
- Bushfire management.
- Erosion and sedimentation control.
- Workforce education and training.

Each of these minimisation measures will be included in the CEMP and will contribute to the maintenance of habitat quality in proximity to the Project area outside proposed disturbance areas.

Table 3.1 provides an outline of the avoidance and minimisation measures to be implemented by APA for the impacts described above to those MNES that are predicted to be significantly impacted by the Project.

Table 3.1 Avoidance and mitigation methods for residual impacts on EPBC listed threatened species and communities

EPBC Act listed species or community	Impact	Avoidance and mitigation measures
River-flat Eucalypt Forest CEEC	Direct impact – removal of approximately 1.1 ha of vegetation	Project planning and design stage resulted in substantial avoidance of areas of *River-flat eucalypt forest* CEEC. Options for avoiding or reducing impacts to the *River-flat eucalypt forest CEEC* vegetation community at the north-eastern extent of the storage pipeline footprint will be investigated and implemented if feasible. Any reduction in length of the storage pipeline construction footprint may require an increase in width. An extensive mitigation and offsetting strategy is proposed including the provision of: • the delineation of clearance areas to avoid unnecessary impacts and clearance of surrounding vegetation • habitat enhancement measures such as the reinstatement of as large hollow logs and large rocks to the ROW during rehabilitation if consistent with rehabilitation objectives at a particular location • rehabilitation of the Project area post construction as described in the EIS, and • the implementation of a biodiversity offset strategy in accordance with the NSW Biodiversity Offset Scheme and the EPBC Act Environmental Offsets Policy.
	Air quality impacts; dust covering vegetation impacting health and growth	A dust control plan will be prepared and incorporated into the Project CEMP. The design of the Project will include inherent measures to minimise the potential for adverse air quality impacts. These include: • progressive rehabilitation and stabilisation of disturbed land • dust suppression during construction
	Weed encroachment	A Biosecurity Management Plan will be developed for the construction phase of the Project and incorporated into the CEMP and OEMP for the Project to ensure appropriate management of weeds and pests. Any topsoil stockpiles to be maintained for an extended period of time (i.e. >4 months) will have the surface left in a rough state and protected with a soil stabilising polymer or seeded with appropriate species and monitored for weed management.
	Cumulative impacts of land clearing	Land-based offsetting of the CEEC will be a consideration in the development of the biodiversity offset strategy that will be prepared for the Project to ensure that there is no residual significant impact to the community in the medium-long term as a result of the Proposed Action.

EPBC Act listed species or community	Impact	Avoidance and mitigation measures

regent honeyeater
swift parrot
koala
grey-headed flying-fox
	Direct impact – loss of known or potential habitat	• Project planning at design stage resulted in substantial avoidance of known and potential MNES habitats.
		• An extensive mitigation strategy is proposed including the provision of:
		  ○ the delineation of clearance areas to avoid unnecessary impacts and clearance of surrounding vegetation
		  ○ pre-clearance surveys and tree-felling supervision
		  ○ habitat enhancement measures such as the reinstatement of as large hollow logs and large rocks to the ROW during rehabilitation if consistent with rehabilitation objectives at a particular location
		  ○ rehabilitation of the Project area post-construction as described in the EIS.
		• the implementation of a biodiversity offset strategy in accordance with the NSW Biodiversity Offset Scheme and the EPBC Act Environmental Offsets Policy.

	Removal of connectivity and corridor pathways for fauna movement and gene flow. Cumulative habitat loss and vegetation clearance in the locality.	The Project has been designed so that the construction footprint uses existing disturbed land areas or areas approved for disturbance by other projects. It has been designed so that it almost entirely avoids mapped important habitats for the regent honeyeater and swift parrot. Rehabilitation of the construction footprint will be undertaken to ensure the pre-construction environment is reinstated and disturbed habitats recreated where they do not affect pipeline operation and integrity (trees and shrubs are discouraged over and near the pipeline to maintain integrity of the pipe coatings) and to enable operational access. Shallow-rooted vegetation can be re-established across the entire easement, although tall and deep-rooted vegetation and mature trees cannot be located close to the pipelines, due to the potential to damage the pipeline coating and impediments to operational access requirements. The construction ROW for the Project will be 25 m wide which is a negligible distance for impacting habitat connectivity for these species.
	Noise impacts may disturb the roosting and foraging behaviour of fauna species and/or reduce the occupancy of areas of otherwise suitable habitat.	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The CEMP and NVMP will be regularly updated to account for any changes in noise and vibration management of the Project.

EPBC Act listed species or community	Impact	Avoidance and mitigation measures
	Air quality impacts; increased air pollutants for native species	A dust control plan will be prepared and incorporated into the Project CEMP. The design of the Project will include inherent measures to minimise the potential for adverse air quality impacts. These include: • progressive rehabilitation and stabilisation of disturbed land • dust suppression during construction
	Introduction of feral animals	The *Biosecurity Act 2015* provides the framework for managing diseases and pests that may cause harm to human, animal or plant health or the environment. Biosecurity will be considered in the Project design and operation in consultation with landowners to ensure appropriate management of weeds and pests.

4.0 Proposed Biodiversity Offset Strategy

A comprehensive Biodiversity Offset Strategy (BOS) will be developed for the Project in accordance with relevant NSW state legislation and/or policies, in accordance with the *Biodiversity Conservation Act 2016*. Accordingly, the offset strategy for the Project will be developed in consultation with the Department of Planning and Environment (DPE).

The NSW and Australian governments agree that endorsement of the NSW BOS to avoid, minimise and offset biodiversity impacts on both NSW and Commonwealth listed entities provides for the best biodiversity and streamlining outcomes. The Australian Government supports the use of the Biodiversity Assessment Method as the underpinning methodology for calculating biodiversity credit requirements.

On 22 November 2019, NSW passed an amendment to the NSW Biodiversity Conservation Regulation 2017. The amendment aligns the BOS offset rules to Australian Government requirements. The NSW BOS has requirements for retiring like-for-like credits or funding conservation actions that directly benefit the species or community impacted, and these meet the Australian Government's offsetting requirements. The NSW BOS also allows for variation rules to be used after reasonable steps have been taken to source like-for-like credits. NSW amended the Biodiversity Conservation Regulation 2017 so the variation rules do not apply to offsets required for Commonwealth listed entities for controlled actions. If the NSW approval requires biodiversity offsets for NSW only listed entities, proponents will still be able to use the variation rules for these.

To meet offsets required for Commonwealth listed entities for controlled actions under the NSW BOS, APA retains the ability to:

- retire biodiversity credits based on the like-for-like provisions in the Biodiversity Conservation Regulation 2017
- fund biodiversity conservation actions that are listed in the Ancillary rules: Biodiversity conservation actions and directly benefit the threatened entity impacted
- pay into the Biodiversity Conservation Fund, noting it is the proponent's responsibility to notify the Biodiversity Conservation Trust that their payment is for a controlled action.

The Biodiversity Conservation Trust is required to meet the Commonwealth offset requirement component in a like-for-like manner. This is by retiring like-for-like credits, by funding conservation actions that are listed in the Ancillary rules: Biodiversity conservation actions and benefit the threatened entity impacted or by funding other conservation measures approved by the NSW Minister for Energy and Environment that directly benefit the entity impacted.

Table 4.1 outlines the credit requirement for the relevant habitat areas for impacted MNES outlined in **Section 2.0** of this report, as calculated by the BAM. Note: ecosystem credit requirements outlined in **Table 4.1** are not cumulative.

Further threatened species surveys will be conducted in areas that have been subject to access restrictions and seasonal limitations to ascertain whether additional species credits are required to offset the impacts of the Project i.e. for the koala. Until these surveys have been completed, it will be assumed that the koala is present in PCTs with suitable habitat for the purposes of generating offset calculations, despite the very low likelihood that they occur in the Project area.

Table 4.1 Ecosystem and Species-credit Species credits Relevant for Impacted MNES

MNES	PCTs and Habitats	Area of Impact (ha)	Credits Required
Ecosystem Credits			
River-flat Eucalypt Forest CEEC	1594 Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter *thinned/disturbed*	1.1	80
	TOTAL	**1.1**	**80**
regent honeyeater (*Anthochaera phrygia*)	1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest – *moderate/good condition*	10.33	100
	1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest – *thinned/disturbed condition*	1.17	18
	1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter – *moderate/good condition*	1.5	45
	1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter – *thinned/disturbed condition*	4.34	75
	1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter – *moderate/good condition*	3.77	47
	1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter – *thinned/disturbed condition*	25.27	0
	TOTAL	**46.38**	**285**
swift parrot (*Lathamus discolor*)	1568 – Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	0.82	12
	1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest – *moderate/good condition*	10.33	100
	1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest – *thinned/disturbed condition*	1.17	18
	1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter – *moderate/good condition*	1.5	45

MNES	PCTs and Habitats	Area of Impact (ha)	Credits Required
	1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter – *thinned/disturbed condition*	4.34	75
	1598 – Forest Red Gum grassy open forest on floodplains of the lower Hunter – *thinned/disturbed condition*	1.68	31
	1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter – *moderate/good condition*	3.77	47
	1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter – *thinned/disturbed condition*	25.27	0
	1633 – Parramatta Red Gum - Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area	2.48	0
	TOTAL	**51.36**	**328**
grey-headed flying-fox (*Pteropus poliocephalus*)	1568 – Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	0.82	12
	1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest – *moderate/good condition*	10.33	100
	1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest – *thinned/disturbed condition*	1.17	18
	1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter – *moderate/good condition*	1.5	45
	1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter – *thinned/disturbed condition*	4.34	75
	1598 – Forest Red Gum grassy open forest on floodplains of the lower Hunter – *thinned/disturbed condition*	1.68	31
	1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter – *moderate/good condition*	3.77	47
	1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter – *thinned/disturbed condition*	25.27	0
	TOTAL	**48.88**	**328**
koala (Phascolarctos cinereus)	1568 – Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	0.82	12

MNES	PCTs and Habitats	Area of Impact (ha)	Credits Required
	1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest – *moderate/good condition*	10.33	100
	1590 – Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest – *thinned/disturbed condition*	1.17	18
	1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter – *moderate/good condition*	1.5	45
	1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter – *thinned/disturbed condition*	4.34	75
	1594 – Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter – *thinned/disturbed condition*	3.33	80
	1598 – Forest Red Gum grassy open forest on floodplains of the lower Hunter – *thinned/disturbed condition*	1.68	31
	1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter – *moderate/good condition*	3.77	47
	1600 – Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter – *thinned/disturbed condition*	25.27	0
	1619 – Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands – *moderate/good condition*	1.99	15
	1633 – Parramatta Red Gum - Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area	2.48	0
	TOTAL	**53.35**	**423**
Species Credits – known impacts			
regent honeyeater (*Anthochaera phrygia*)	mapped important area	0.46	9
Species Credits – assumed presence			
koala (*Phascolarctos cinereus*)	PCTs containing regionally relevant tree species	22.02	302

The MNES that were determined by DAWE to be significantly impacted by the Project are included in the credit liability for ecosystems and relevant species-credits required to be offset.

The Biodiversity Offset Strategy will be developed with consideration of the need to compensate for residual significant impacts to River-flat Eucalypt Forest CEEC, the koala, grey-headed flying-fox, regent honeyeater and swift parrot, with the aim to maintain or improve the biodiversity values of the surrounding region in the medium to long term. This aim will be delivered through the securing of in-perpetuity 'like-for-like' land-based offsets and in conjunction with the various impact mitigation and offset strategies that are proposed to be employed as part of the Project.

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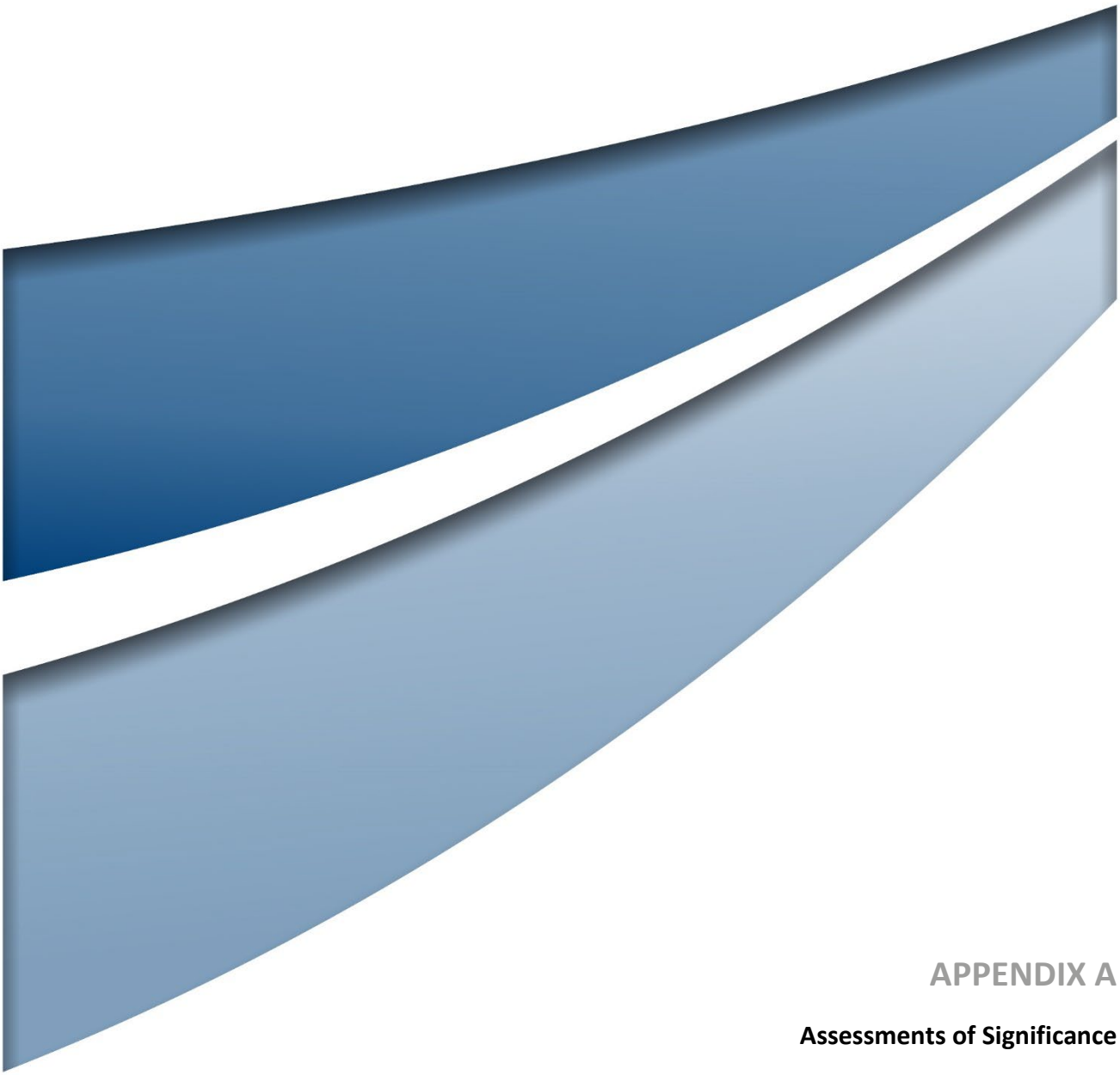

APPENDIX A

Assessments of Significance

The EPBC Act requires an Assessment of Significance relating to the potential impacts of a proposed action on listed MNES. These assessments have been conducted in accordance with the Significant Impact Guidelines 1.1 (DoE 2013). Assessments of significance were provided in the original Referral documentation, however these have been updated as per the further assessment and project boundary revisions outlined in this report.

As outlined in **Section 1.0**, the following EPBC Act listed species and communities are considered by DoEE to be likely to be or have the potential to be significantly impacted by the Proposed Actions (the Project):

Critically Endangered or Endangered Ecological Communities

- *River-flat Eucalypt Forest CEEC*

Critically Endangered and Endangered Species

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

Vulnerable Species

- koala (*Phascolarctos cinereus*) (combined populations of Qld, NSW and the ACT)
- grey-headed flying fox (*Pteropus poliocephalus*)

A1 Critically Endangered or Endangered Ecological Communities

A1.1 River-flat Eucalypt Forest CEEC

The distribution of River-flat Eucalypt Forest on Coastal Floodplains of southern NSW and eastern Victoria CEEC occurs along coastal floodplains from Raymond Terrace, NSW to Sale, Victoria. It occurs in the Sydney Basin and South East Corner Bioregions (TSSC, 2020).

Detailed assessment of the vegetation communities described and mapped within the Project area was undertaken to determine whether the vegetation present met the condition class thresholds identified in the Listing Advice (TSSC 2020). The following PCT in the Project area was identified as potentially conforming to the River-flat Eucalypt Forest CEEC:

- 1594 Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter

Parts of this PCT also met the Listing Advice criteria of containing a dominant canopy of the one or a combination of species listed in the conservation advice as diagnostic species, occurring on alluvial soils and alluvial landforms and occurring as woodland with a crown canopy cover of at least 20%.

Approximately 1.1 ha of woodland that conforms to River-flat Eucalypt Forest on Coastal Floodplains CEEC has been mapped within the Project area.

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:
• reduce the extent of an ecological community
River-flat eucalypt forest occurs on coastal floodplains from Sale in Victoria to Raymond Terrace in NSW and persists on alluvial landforms related to coastal river floodplains, along the western slopes and tablelands of the Great Dividing Range from southern Queensland through NSW to central Victoria. It is suggested that the remaining area of this community is about 30% of its original range. Approximately 1.1 ha woodland that conforms to the CEEC was identified within the Project area and will be directly impacted as a result of the Project. The permanent loss of approximately 1.1 ha woodland conforming to River-flat Eucalypt Forest on Coastal Floodplains CEEC as a result of the Project represents a negligible reduction in the estimated current extent of the community across its national range.
• fragment or increase fragmentation of an ecological community
This ecological community has been heavily cleared across most of its range. The remaining extent of the ecological community is highly fragmented, occurring in small, isolated patches on productive agricultural land, or proximal to coastal areas (TSSC, 2020). Vegetation occurring within the Project area is currently highly fragmented as a result of historic and current agricultural land practices. The removal of 1.1 ha of woodland conforming to River-flat Eucalypt Forest on Coastal Floodplains CEEC is not likely to result in an increase in the level of fragmentation of this CEEC in the local area or across its range.

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- adversely affect habitat critical to the survival of an ecological community

According to the *Significant Impact Criteria in the Significant Impact Guidelines* (DoE 2013) habitat critical to the survival of an ecological community refers to areas that are necessary:

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

There are very few undisturbed patches of the community remaining in existence. Most remaining patches have some degree of disturbance and degradation. While habitat critical to the survival of the community has not been formally identified, given its threatened status, important habitat is assumed to consist of patches that meet the condition thresholds and listing status as a CEEC. However, the 1.1 ha which conforms to the River-flat Eucalypt Forest CEEC within the Project area would not be critical to the survival of the CEEC, in accordance with the Conservation Advice, as it exists as a moderate (C2) condition (TSSC 2020). While this area may still be important for the survival of the CEEC (TSSC 2020), the extent of the proposed clearing represents a small area in the context of the broader range of the community both in NSW and in Australia.

The 1.1 ha of this community being impacted by the Project is not considered to be critical to the survival of the CEEC, given the small size and relatively degraded condition of the community in the Project area.

- modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

While approximately 1.1 ha woodland that conforms to the CEEC will be removed from the Project area, the Project is not expected to adversely affect retained areas of the CEEC occurring outside the Project area as the Project will be designed to avoid offsite impacts. The Project will include detailed consideration of the effect of the Project on groundwater regimes and surface water flows with the minimisation of adverse impacts a key consideration in the design process.

- cause substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, or

The Project will result in the permanent loss of up to 1.1 ha of woodland representative of River-flat Eucalypt Forest on Coastal Floodplains CEEC.

The direct removal of 1.1 ha of this community will result in changes in species composition and vegetation structure, including the loss of overstorey species, and potentially important species identified in the condition thresholds for determining a listed community. However, the Project is unlikely to compromise the species composition in the surrounding areas of the CEEC on account of the avoidance and mitigation strategies implemented as part of the Project.

In the long term, any partially retained patches would likely involve a proliferation of tolerant species (typically grasses), a reduction in floristic diversity (particularly of small herbs) and reduced structural complexity due to the development of a continuous grass cover with little or no inter-tussock space. The project is also likely to alter the availability of food for attracting fauna into these habitats.

In conclusion, the Project is expected to cause a minor change in the species composition of the CEEC occurrence in the area of direct impact with impacts to the species composition in the surrounding areas mitigated through management actions.

- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
    - assisting invasive species that are harmful to the listed ecological community to become established, or

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:
○ causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or
The Project area already has ongoing disturbances from agricultural land uses including historical and ongoing grazing. It is unlikely that impacts related to the Project will cause a substantial reduction in CEEC quality for retained patches. Weeds are likely to invade the adjacent edges of the community. However, under the current land use regime, changes to the quality or integrity of the patch are likely to be negligible. The Project is not expected to cause a reduction in quality or integrity of the River-flat Eucalypt Forest on Coastal Floodplains CEEC occurrence recorded through assisting invasive species to become established or causing regular mobilisation of fertilisers.
• interfere with the recovery of an ecological community.
Currently, there is not a national recovery plan for the River-flat Eucalypt Forest on Coastal Floodplains CEEC It is unlikely that the Project will interfere with the recovery of this community through clearing of up to 1.1 ha.
Conclusion:
While the Project would remove up to 1.1 ha of the River-flat Eucalypt Forest on Coastal Floodplains CEEC, given the small area that may be impacted and the availability of this CEEC in the surrounding region adjacent to the Project area, this is not considered likely to be a significant impact on the CEEC in the region.

A2 Critically Endangered and Endangered Species

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

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

Species descriptions, in the Assessments of Significance below, are referenced from the threatened biodiversity (DPIE 2022) online species profiles, unless otherwise noted.

A2.1 Swift Parrot (*Lathamus discolor*)

The swift parrot breeds in Tasmania and moves to mainland Australia for the non-breeding season (usually arriving between February and March) (Saunders and Tzaros 2011). Most of the population winters in Victoria and NSW where it disperses across broad landscapes foraging on nectar and lerps in eucalypts. Until recently it was believed that in NSW, swift parrots forage mostly in the coastal and western slopes region along the inland slopes of the Great Dividing Range but are patchily distributed along the north and south coasts including the Sydney region (Saunders and Tzaros 2011). However, evidence is gathering that the forests on the coastal plains from southern to northern NSW are also important. They return to Tasmania in spring (September-October) to breed. The movements of this species on the mainland are poorly understood, but it is considered to be nomadic and irruptive, moving in response to food supply.

Upon reaching their core non-breeding range there is no known geographical pattern of movement. During the non-breeding season, the home-range varies tremendously between individuals and between years.

Priority sites for the swift parrot have been identified within the National Recovery Plan for the species (Saunders and Tzaros 2011). This species is likely to utilise coastal forest and river-flat vegetation associations within the coastal natural resource management region (which includes the Hunter-Central Rivers), in communities dominated by swamp mahogany (*Eucalyptus robusta*), blackbutt (*Eucalyptus pilularis*), forest red gum (*Eucalyptus tereticornis*) and spotted gum (*Corymbia maculata*) (Saunders and Tzaros 2011).

For the purpose of this assessment, it is assumed that the swift parrot has the potential to utilise woodland and forest habitat within the Project area, for foraging. The likelihood of the species utilising habitat in the Project area is consistent with that of extensive areas of degraded woodland and dry forest throughout the species range. For the purposes of this assessment, criteria are assessed under the assumption that there is only one single population of swift parrot (i.e. the national population). The swift parrot occurs as a single population that migrates annually from breeding grounds in Tasmania to the winter foraging grounds on the coastal plains and slope woodlands of mainland eastern Australia (Saunders et al. 2011). Approximately 200 mature birds (10% of the total estimated population) are known to over-winter in the Lower Hunter Region of New South Wales (Roderick et al. 2013).

The Project area contains low to moderate quality potential foraging habitat for this species, and includes two of the priority fed tree species that are nominated in the National Recovery Plan (Saunders and Tzaros 2011) as key foraging resources for the swift parrot in the Hunter Valley, being spotted gum (*Corymbia maculata*) and forest red gum (*Eucalyptus tereticornis*). These foraging species were identified during surveys and were recorded in PCTs 1568 1590, 1592, 1598, 1600 and 1633.

The Project area is not mapped as important habitat for the swift parrot under the Biodiversity Assessment Methodology (BAM) (DPIE 2021b). Substantial areas of important habitat are mapped to the south of the Project area however these have been avoided as part of the Project design process.

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
The *population* of the swift parrot has not been recorded in the Project area, however there are 22 records within 10 km of the Project area. The Project may result in the removal of approximately 51.81 ha of potential foraging habitat including areas that contain two key feed tree species, being spotted gum (*Corymbia maculata*) and forest red gum (*Eucalyptus tereticornis*). The Project area is not known as a historical or important foraging site for this species. It is considered unlikely that the Project will lead to a long-term decrease in the size of the population of swift parrot.
• reduce the area of occupancy of the species
The Project may reduce the potential foraging habitat for the swift parrot. However, clearance of such habitat is unlikely to have any adverse impact on the area of occupancy due to the presence of larger areas of equivalent habitat immediately adjacent to the Project area and in Werakata NP and Sugarloaf SCA. The Project may result in the loss of approximately 51.81 ha of potential foraging habitat including areas that contain two key feed tree species, being spotted gum (*Corymbia maculata*) and forest red gum (*Eucalyptus tereticornis*). While the Project will remove potential moderate quality habitat for this species, it is not likely to lead to a significant reduction in known habitat in the region.

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:
The proposed project may result in a reduction of the potential area of occupancy for the swift parrot in the Project area, however this is unlikely to substantially reduce the area of known occupancy in the wider locality or region.
• fragment an existing population into two or more populations
A *population* of the swift parrot has not been recorded in the Project area, however there are 22 records within 10 km of the Project area. The swift parrot is highly dispersive, and it is unlikely that the Project would create a significant change to the species' dispersal capacity or create a significant barrier to movement of the species.
• adversely affect habitat critical to the survival of a species
The habitat to be removed is not located within important habitat for swift parrot (DPIE 2021b). While approximately 51.81 ha of potential foraging habitat will be impacted by the Project, it is unlikely that such habitat is critical to the swift parrot's survival. Furthermore, the area is only considered habitat to the species when the Eucalypts are in flower. Breeding habitat, which is restricted to Tasmania, will not be affected by the Project. The Project is unlikely to adversely affect habitat that is critical to the survival of the species.
• disrupt the breeding cycle of a population
The Project is unlikely to disrupt the swift parrot's breeding cycle given that this breeds in Tasmania and migrates to mainland Australia during the non-breeding season. There is no potential for breeding habitat to occur in the Project area.
• modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The swift parrot has been recorded in the region, with records concentrated in the lower Hunter Valley. There are no records of the swift parrot within the Project area and 22 records within 10 km of the Project area. Most of these records are located within intact woodland to the south of the Project area in the Tomalpin woodlands east of Werakata NP and areas surrounding Sugarloaf SCA. The Project area does not contain any areas mapped as important habitat for the swift parrot in accordance with the BAM, however, approximately 8,830 ha of important habitat exists within 10 km of the Project area. The removal of approximately 51.81 ha of open forest and woodland that contains potential foraging habitat in the Project area is unlikely to cause the swift parrot to decline given the high quality intact vegetation surrounding the Project area. It is unlikely that removal of such habitat would affect the survival of the species utilising foraging resources in the region, and hence, in isolation, is not likely to cause the species to decline. Furthermore, the area is only considered habitat to the species when the Eucalypts are in flower. It is considered unlikely that the project will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that a population of the swift parrot would decline.
• result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
The Project is unlikely to result in invasive species that are harmful to the swift parrot becoming established in its habitat.

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:
• introduce disease that may cause the species to decline, or
Psittacine beak and feather disease is a common and potentially deadly disease of parrots caused by a circovirus named beak and feather disease virus. The disease appears to have originated in Australia and is widespread and continuously present in wild populations of Australian parrots. Beak and feather disease affecting endangered psittacine species (parrots and related species) was listed in April 2001 as a key threatening process under the EPBC Act. It is considered unlikely that the Project will result in the introduction of beak and feather disease or any other disease that may cause the swift parrot to decline.
• interfere with the recovery of the species.
The following recovery plan has been prepared: • National recovery Plan for the Swift Parrot (*Lathamus discolor*) (Saunders et al. 2001) Known or priority swift parrot habitat will not be impacted by the project and therefore the objectives of the National Recovery Plan are not likely to be contravened. It is considered unlikely that the Project will contribute to further decline of the swift parrot.
Conclusion:
No significant impact is anticipated upon the swift parrot as a result of the proposed Project.

A2.2 Regent Honeyeater (*Anthochaera phrygia*)

The regent honeyeater is listed as critically endangered under the EPBC Act and has a patchy distribution extending from south-east Queensland, into NSW and the Australian Capital Territory, to central Victoria (CoA, 2016). The species is highly mobile, capable of travelling large distances and occurs only irregularly at most sites in varying numbers. Adding further difficulty to the survey and study of this species is its ability to often go long periods without being observed anywhere (CoA 2016). Its primary habitat is box-ironbark eucalypt woodland and dry sclerophyll forest, however it does utilise riparian vegetation and lowland coastal forest. Habitat critical to the survival of the regent honeyeater includes any breeding or foraging areas where the species is likely to occur and any newly discovered breeding or foraging locations.

The species is known to undertake a complex series of movements, which are thought to be governed mainly by the flowering of a select number of Eucalyptus species. It is likely the species use different areas within its range in different years depending on food resources (CoA 2016).

The Project area does occur within one of the four known breeding areas for the species where it is regularly recorded, being the lower Hunter Valley in NSW.

The regent honeyeater is not known to occur within the Project area, however the species has been recorded on three occasions within 10 km of the Project area, the most recent record being near Richmond Vale in 2009.

The regent honeyeater is endemic to mainland south-eastern Australia and mostly inhabits inland slopes of the Great Dividing Range (TSSC, 2019b). The regent honeyeater comprises a single population, with some exchange of individuals between regularly used areas (TSSC, 2019b). It is estimated that the NSW population of Regent Honeyeaters may now be fewer than 250 mature individuals (TSSC, 2019b).

As the species occurs as a single population in Australia, any record of the species would constitute part of a population as described above. The population of regent honeyeater has not been recorded within the Project area however it has been recorded approximately 1.5 km north east of the Project area (at Seahen Swamp near Maitland) however this is a historic record from 1981 (DPIE, 2021).

The Project area contains low to moderate quality potential foraging habitat for this species, and includes one of the priority feed tree species that are nominated in the National Recovery Plan (CoA 2016) as key foraging resources for the regent honeyeater in the Hunter Valley, being spotted gum (*Corymbia maculata*). Broad-leaved ironbark (*Eucalyptus fibrosa*) was also recorded within the Project area which is considered a regionally important tree species in the lower Hunter Valley according to the National Recovery Plan (CoA 2016). These species were identified in the Project area and were recorded in PCTs 1590, 1592 and 1600.

Approximately 0.46 ha of the Project area is mapped as important habitat for the regent honeyeater under the Biodiversity Assessment Methodology (BAM) (DPIE 2021b). Substantial areas of important habitat are mapped to the west and south of the Project area however these areas have primarily been avoided as part of the Project design process.

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
The population of the regent honeyeater has not been recorded within the Project area however potential foraging habitat was identified. The Project may result in the loss of approximately 46.83 ha of vegetation containing foraging habitat for the regent honeyeater as their diet primarily consists of nectar from eucalypts and mistletoe (CoA, 2016b), including 0.46 ha mapped as important habitat for the regent honeyeater under the BAM (DPIE 2021b). The 0.46 ha area of important habitat has been mapped according to the National recovery plan for the regent honeyeater as an area critical to the survival of the species based on expert opinion and PCTs associated with the species. As per the Atlas of NSW Wildlife, the closest record of the regent honeyeater to the Project area is approximately 1.5 km north east however this is a historic record from 1981 (DPIE, 2022). The 0.46 ha of the Project area that is mapped as important habitat for the species is a small patch of woodland within a largely disturbed environment comprised of moderate to good condition west of Wentworth Swamp. This patch is surrounded by higher quality intact vegetation outside the Project area to the west and north. Therefore, it is considered unlikely that the Project will lead to a decrease in the size of the population of regent honeyeater.
• reduce the area of occupancy of the species
The regent honeyeater has not been recorded within the Project area, however it is known to occur within 10 km of the Project area. The Project may result in the loss of approximately 46.37 ha of potential habitat including spotted gum (*Corymbia maculata*) (CoA 2016) and 0.46 ha of important habitat mapped under the BAM. Approximately 8,800 ha of important habitat exists within 10 km of the Project area. While the Project will remove potential moderate quality habitat of this species, it is not likely to lead to a significant reduction in known habitat in the region. The Project may result in a reduction of the potential area of occupancy for the regent honeyeater in the Project area, however this is unlikely to substantially reduce the area of known occupancy in the wider locality or region.

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:
• fragment an existing population into two or more populations
The decline of the population of the regent honeyeater is attributed to clearing, fragmentation and degradation of its habitat (TSSC, 2019b). The *population* of regent honeyeater has not been recorded within the Project area. The regent honeyeater is highly dispersive and it is unlikely that the Project would create a significant change to the species' dispersal capacity or create a significant barrier the movement of the species. It is unlikely that the Project would result in the fragmentation of the existing *population* into two or more populations.
• adversely affect habitat critical to the survival of a species
Habitat critical to the survival of the regent honeyeater includes any breeding or foraging areas where the species is likely to occur and any newly discovered breeding or foraging locations (TSSC, 2019b). The species has not been recorded breeding in the Project area. The Project area does include vegetation containing spotted gum (*Corymbia maculata*) and broad-leaved ironbark (*Eucalyptus fibrosa*) which are key feed tree species for the regent honeyeater (CoA, 2016) in the Hunter Valley, as described in the National Recovery Plan for the species. The Project may result in the loss of 46.38 ha of this habitat, including 0.46 ha mapped as important habitat for the species under the BAM (DPIE 2021b). The 0.46 ha area of important habitat has been mapped according to the National recovery plan for the regent honeyeater as an area critical to the survival of the species based on expert opinion and PCTs associated with the species. Despite 0.46 ha of the Project area being mapped as important habitat for the species, this is a small patch of woodland within a largely disturbed environment and is surrounded by higher quality intact vegetation outside the Project area, and is therefore not considered critical to the survival of the species. However, this 0.46 ha area has been mapped under the National Recovery Plan as critical to the survival of a *population* of the regent honeyeater.
• disrupt the breeding cycle of a population
The regent honeyeater mainly breeds in three key sites in NSW being the Bundarra-Barraba area, the Capertee Valley, and the Lower Hunter Valley (CoA 2016 and DPIE 2020). Other breeding areas are known in the Pilliga woodlands and the Mudgee-Wollar areas of NSW. The regent honeyeater has not been recorded in the Project area and it is unlikely to contain breeding or nesting habitat for the species. The Project is not expected to disrupt the breeding cycle of the *population* of regent honeyeater.
• modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The regent honeyeater has been recorded in the region however this species has not been recorded within the Project area. The regent honeyeater is considered to have potential to occur in areas of appropriate winter-flowering eucalypt habitat. The Project will involve the removal of 46.83 ha of vegetation that contains areas of key feed tree species for the regent honeyeater, as described by the National recovery Plan for the species. Additionally, 0.46 ha of this is mapped as important habitat for the species under the BAM (DPIE 2021b). Intact areas of vegetation surrounding the Project area support habitat that contains suitable woodland and forest vegetation that would also provide potential habitat for this species such as Werakata NP. The Project will remove 0.46 ha of habitat mapped as important habitat for the species, however due to the small isolated path of this habitat and higher quality intact habitat in the wider locality, it is considered unlikely that the Project would modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that a *population* of the regent honeyeater would decline.

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:
• result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
The Project is not expected to result in invasive species that are harmful to the regent honeyeater becoming established in its habitat.
• introduce disease that may cause the species to decline, or
The Project is not expected to introduce any disease that may cause the regent honeyeater to decline.
• interfere with the recovery of the species.
The following recovery plan has been prepared: • National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (CoA 2016) Any impacts to known habitat for the regent honeyeater will likely contravene the objectives of the recovery plan. The regent honeyeater has not been recorded within the Project area, however approximately 46.83 ha of potential moderate quality foraging habitat has been identified. Additionally, 0.46 ha of this is mapped as important habitat according to the National recovery plan for the regent honeyeater as an area critical to the survival of the species based on expert opinion and PCTs associated with the species. It is considered unlikely that the Project will interfere with the recovery of the regent honeyeater (*Anthochaera phrygia*) throughout Australia.
Conclusion:
Although the Project area provides potential foraging habitat for this species, and includes 0.46 ha mapped as important habitat according to the BAM, the area proposed to be disturbed is small relative to the area of occupancy of the species and the regent honeyeater has not been recorded utilising the potential habitat within the Project area.

A3 Vulnerable Species

The following vulnerable species is considered in this assessment:

- koala (*Phascolarctos cinereus*) (Combined Populations of Qld, NSW and ACT)
- grey-headed flying fox (*Pteropus poliocephalus*)

A3.1 Koala (*Phascolarctos cinereus*)

The koala (*Phascolarctos cinereus*) is listed as vulnerable under the EPBC Act. The species is known to occur naturally in eucalypt woodlands and forests from north-eastern QLD, along the eastern coast of NSW, to the south-east corner of SA. The species has a fragmented distribution, and in NSW it mainly occurs on the central and north coasts, with some populations in the west of the Great Dividing Range

The occurrence of habitat for the koala in the Project area has been assessed based on guidance provided in the NSW State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala SEPP) and the *EPBC Act Referral Guidelines for the Vulnerable Koala* (DoE 2014a).

The Koala SEPP defines core koala habitat as an area of highly suitable koala habitat where koalas are recorded as being present at the time or in the previous 18 years. Koala feed trees are identified for regions in NSW in the Koala SEPP and the Koala Habitat Information Base Technical Guide (DPIE 2019). The Project area occurs within the Central Coast Koala Management Area where 42 regionally relevant koala feed tree species have been identified. These trees have been ranked in preference of use in the Koala Habitat Information Base (DPIE 2019). Seventeen species of regionally relevant koala feed tree species have been identified in the Project area (refer to **Table A3.1**)

Table A3.1 Identification of Potential Koala Habitat in the Project Area

Habitat tree ranking	Scientific Name	Common Name	Regionally relevant koala feed trees present in the Vegetation Zone (VZ)											
			1568_ VZ2	1590_ VZ4	1590_ VZ5	1592_ VZ7	1592_ VZ8	1594_ VZ9	1598_ VZ11	1600_ VZ12	1600_ VZ13	1619_ VZ14	1633_ VZ15	Native Plantation
High preferred use	*Eucalyptus microcorys*	Tallowwood	-	-	-	-	-	-	-	-	-	-	-	Y
	Eucalyptus moluccana	Grey box	-	-	-	-	Y	-	-	Y	-	-	-	-
	Eucalyptus parramattensis	Parramatta red gum	-	-	-	-	-	-	Y	-	-	-	Y	-
	Eucalyptus punctata	Grey gum	-	-	Y	Y	Y	-	-	-	-	Y	-	Y
	Eucalyptus tereticornis	Forest red gum	-	-	Y	-	Y	-	Y	-	-	-	Y	-
High use	*Eucalyptus globoidea*	White stringybark	-	Y	-	Y	-	-	-	-	-	-	-	-
	Eucalyptus paniculata	Grey ironbark		Y	-	-	-	-	-	-	-	-	-	-
	Allocasuarina torulosa	Forest oak	-	Y	Y	-	-	-	-	-	-	Y	-	-
Significant use	*Angophora costata*	Smooth-barked apple	-	Y	Y	-	-	-	-	-	-	Y	-	-
	Eucalyptus crebra	Narrow-leaved ironbark	-	-	-	-	Y	-	-	Y	Y	-	-	Y
	Eucalyptus fibrosa	Broad-leaved red ironbark	-	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	-

Habitat tree ranking	Scientific Name	Common Name	Regionally relevant koala feed trees present in the Vegetation Zone (VZ)											
			1568_ VZ2	1590_ VZ4	1590_ VZ5	1592_ VZ7	1592_ VZ8	1594_ VZ9	1598_ VZ11	1600_ VZ12	1600_ VZ13		1619_ VZ14	1633_ VZ15	Native Plantation
	Syncarpia glomulifera	Turpentine		Y	-	-	-	-	-	-	-		Y	-	-
Irregular use	*Corymbia maculata*	Spotted gum	Y	Y	Y	Y	Y	-	-	Y	Y		Y	-	Y
	Eucalyptus acmenoides	White mahogany	-	-	Y	-	-	-	-	-	-		-	-	-
	Eucalyptus amplifolia	Cabbage gum	-	-	-	-	-	Y	-	-	-		-	-	-
	Eucalyptus agglomerata	Blue-leaved stringybark			-	Y	-	-	-	-	-		-	-	-
	Eucalyptus umbra	Bastard white mahogany	Y	-	-	-	-	-	-	-	-		Y	-	-
Highly suitable koala habitat			Mar.	Yes	Yes	Yes	Yes	Mar.	Yes	Yes	Yes		Yes	Yes	Yes
Area in Project area (ha)				0.82	10.33	1.62	1.5	4.34	3.33	1.68	3.77	25.27	1.99	2.48	0.59

The Assessment of Significance for the koala has been prepared with consideration of the *EPBC Act Referral Guidelines for the Vulnerable Koala* (DoE 2014a). The Referral Guidelines advise that the assessment of impacts on the koala is undertaken primarily through the assessment of habitat critical to the survival of the koala and actions that interfere substantially with the recovery of the koala. This approach aims to avoid and address habitat loss as well as promote a streamlined assessment and approval process.

Koala Habitat Assessment Tool (Table 3 from DoE 2014)			**Project area Assessment**	
Attribute	Score	Coastal	Allocated Score	Score Justification
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 2 years.	+1	No koalas have been recorded in the Project area during surveys to date. A review of BioNet records identifies 13 records within 10 km of the Project area. These range in age from 1980 to 2020. The most recent record is approximately 6.5 km to the south west of the Project area. There are three records of koala within 2 km of the Project area in 1980, 2000 and 2010. The Port Stephens area of regional koala significance is approximately 5 km to the east of the Project area while the Lower Hunter area of regional koala significance is about 10 km to the south of the Project area.
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 5 years.		
	0 (low)	None of the above.		
Vegetation composition	+2 (high)	Has forest or woodland with 2 or more known koala food tree species, OR 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	+2	The Project area contains a number of koala feed trees known to be associated with the PCTs descried in the Project area (refer to **Table A3.1**). This includes five species classed as high preferred use according to the Central Coast management area, being: *Eucalyptus tereticornis*, *E. parramattensis*, *E. microcorys* (as a plantation), *E. punctata* and *E. moluccana*.
	+1 (medium)	Has forest or woodland or shrubland with only 1 species of known koala food tree present.		
	0 (low)	None of the above.		
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 500 ha.	+1	The Project area is located in a disjunct landscape dominated by

Koala Habitat Assessment Tool (Table 3 from DoE 2014)			Project area Assessment	
	+1 (medium)	Area is part of contiguous landscape < 500 ha, but ≥ 300 ha.		rural grassland and woodland vegetation which are divided by barriers such as main roads. A large part of the Project area is cleared of trees and therefore contains limited foraging habitat value but does provide for movement. The areas of remnant vegetation that does occur within the Project area was not affected by the 2019-2020 bushfires. There is minimal connectivity between the Project area and Wollemi NP which is the closest koala habitat affected by the 2019-2020 bushfires. There are three koala records in this area of contiguous landscape.
	0 (low)	None of the above.		
Key existing threats	+2 (low)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence.	+1	Score 0 for koala occurrence but likely to have some degree of threat from dogs or vehicles.
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, OR areas which score 0 for koala occurrence are likely to have some degree of dog or vehicle threat present.		
	0 (high)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the Project area at present, OR areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.		
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives	+0	The Project area is unlikely to be important for achieving the interim recovery objectives due to

Koala Habitat Assessment Tool (Table 3 from DoE 2014)			Project area Assessment	
		for the relevant context, as outlined in Table 1.		the isolated nature of the Project area relative to other koala records.
	+1 (medium)	Uncertainty exists as to whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.		
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.		
TOTAL SCORE			5	≥ 5 indicates habitat critical for the survival of the koala.

As the habitats identified in the proposal area scored 5 using the Referral Guidelines habitat assessment tool, the Project area is considered to contain habitat critical to the survival of the koala (DoEE 2014a).

In keeping with Section 9 of the referral guidelines, the action will have or is likely to have a significant impact on the koala if the action adversely affects habitat critical to the survival of the koala and/or interferes substantially with the recovery of the koala through the introduction or exacerbation of key threats in areas of habitat critical to the survival of the koala. There is one record of the koala within five kilometres of the Project area and the habitat assessment has identified that the Project area does support habitat critical to the survival of the koala. Accordingly, an Assessment of Significance in accordance with the Significant Impact Guidelines 1.1 (DoE 2013) has been prepared.

The koala has not been recorded in the Project area. The species has been recorded historically in the wider locality, but is not known to occur in the habitats within or surrounding the Project area. The most recent record of the species is from 2020 in and around intact habitats approximately 6.5 km south of the Project area (DPIE 2022). Records also exist from within the wider area of the Project area that range from 1980 to 2020 (DPIE 2022).

The Project area contains areas of eucalypt woodlands and forests, including five species identified as being high preferred use (as per the Koala SEPP), being forest red gum (*Eucalyptus tereticornis*), *E. parramattensis* subsp. *decadens*, grey gum (*E. punctata*), grey box (*E. moluccana*) and tallowwood (*E. microcorys*); the latter occurring as a stand of planted trees. These species occur in small patches in the Project area associated with the PCTs listed in **Table A3.1**.

The recent 2019-2020 bushfires affected substantial natural areas of NSW, including koala habitat. Approximately 3.6 million ha (26%) of all moderate to very high quality koala habitat in eastern NSW was affected by the bushfires (DPIE 2020b). Approximately 1.9 million ha (22%) was high or very high suitability koala habitat (DPIE 2020b). Of the six koala management areas, the Central Coast Koala Management Area was one of the least affected by the 2019-2020 bushfires with approximately 15.3% of high to very high suitability koala habitat impacted (DPIE 2020b). With reference to the NSW koala habitat information base and Google Earth Engine Burnt Area Map (GEEBAM) spatial datasets, the closest bushfire affected koala

habitat to the Project area occurs approximately 15 km to the south west in Wollemi National Park. There is minimal habitat connectivity between the Project area and the closest 2019-2020 bushfire affected koala habitat.

Given the paucity of nearby recent (in last 10 years) records and the low abundance of key food trees, the Project area is unlikely to support key source koala populations for breeding or dispersal. The Project area is unlikely to comprise populations necessary for maintaining genetic diversity given the small area to be cleared. The Project area is also not near the limit of the known range of this species. Therefore the Project area is unlikely to contain an *important population* of the koala.

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
No *important populations* of the koala have been recorded within the Project area or the immediate locality. The proposed action will result in the loss of approximately 57.72 ha of vegetation containing regionally relevant koala feed trees, however the majority of this vegetation within the Project area occurs as a thinned or disturbed state which is reflective of historic land practices including grazing, mining and urban development. While sporadic, and mainly historic, records of the species occur in the locality, the Project area does not provide known habitat for this species. It is considered unlikely that the Project will lead to a decrease in the size of *important populations* of koala.
• reduce the area of occupancy of an important population
The Project will result in the loss of 57.32 ha of vegetation containing regionally relevant koala feed trees, however the majority of this vegetation within the Project area occurs as a thinned or disturbed state. While the Project will remove potential habitat for this species, it is not likely to lead to a significant reduction in known habitat in the region. Substantial areas of higher quality habitats for this species occur in surrounding localities to the Project area, including in Werakata NP, Awaba SF, Pokolbin SF, Tiligerry SCA, Corrabare SF, Wollemi NP, and Watagans SF. The Project may result in a reduction of the potential area of occupancy for the koala in the Project area, however this is unlikely to substantially reduce the area of an important population in the wider locality or region.
• fragment an existing important population into two or more populations
The habitats within the Project area currently contain fragmented woodlands and are dominated by exotic grasslands, characteristic of the surrounding agricultural landscape. As the Project area does not support an important population of the koala, the Project will not result in the fragmentation of an important population of koala into two or more populations.
• adversely affect habitat critical to the survival of a species
The assessment of koala habitat within the context of the koala referral guidelines (above) indicates that the Project area does comprise habitat critical to the survival of the species. However, the removal of approximately 57.32 ha of potential koala habitat, is considered a small area in the context of substantial areas of similar surrounding remnant vegetation, including in Werakata NP, Wollemi NP, Awaba SF, Pokolbin SF, Tiligerry SCA, Corrabare SF and Watagans SF and the intact vegetation south of the site. Additionally potential habitat in the Project area occurs as a thinned or disturbed state due to historic land practices. There are a low number of recent records of the koala in the local area and this species was not recorded as part of targeted surveys. The Project is unlikely to adversely affect habitat critical to the survival of the koala.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
• disrupt the breeding cycle of an important population
No important populations of the koala have been identified within the Project area, nor have any breeding populations of this species been recorded in the locality. The Project is therefore unlikely to disrupt the breeding cycle of an important population of this species.
• modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Project area contains potential koala habitat which occurs in a thinned or disturbed state due to historic land practices. The Project is unlikely to modify, destroy, remove, isolate, or decrease the availability or quality of habitat for this species to the extent that the koala would be likely to decline.
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Given the mosaic landscape within and surrounding the Project area including urban development, agriculture, industrial, mining and remnant vegetation it is likely that invasive species harmful to the koala already occur. The Project is not expected to result in invasive species that are harmful to the koala becoming established in the species habitat.
• introduce disease that may cause the species to decline, or
The koala is known to contract strains of *Chlamydia* and the koala retrovirus. Chlamydia infections are known to cause blindness, pneumonia and reduced female fertility and is almost ubiquitous among koala populations (DAWE 2021b). The koala retrovirus is a gamma retrovirus that has integrated into the koala germ line of northern koala populations (DAWE 2021b). It is implicated in immunodeficiency including leukemaia and lymphoma increasing susceptibility to infectious diseases such as chlaymdia (DAWE 2021b). An emerging disease that affects koala habitat is myrtle rust (*Austropuccinia psidii*) impacting on availability of foraging resources. There are a number of interacting factors involved in susceptibility to disease correlated to population decline. Chronic stress from poor nutrition, reduced habitat quality, exposure to unnatural stressors (dogs, traffic), heat-stress, bushfires likely increase susceptibility of the koala to disease and loss of fertility. This is more likely to occur in urban and peri-urban landscapes or in areas of marginal habitat (DAWE 2021b). The Project will involve loss of habitat and during construction there will be increase in traffic however this unnatural stress can be managed such that the Project does not involve any processes that are likely to introduce a disease for the koala that may cause this species to decline.
• interfere with the recovery of the species.
An assessment was undertaken to determine the impacts which are likely to substantially interfere with the recovery of the koala. The Referral Guidelines (DoE 2014) identifies these impacts. The Project may: • result in an increase to vehicle movements, however this is considered to be a low level of increase to the local area and it is unlikely to subject the koala to increased mortality levels • result in the creation of minor additional barriers to koala movement in the local area. The Project is not expected to: • introduce or increase dogs to the local area and therefore is unlikely to increase the threat of dog attacks to any local koala population

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
• facilitate the introduction or spread of pathogens as *Phytophthora cinnamomi* or Chlamydia or • result in hydrological changes to the surrounding environment such that the function and integrity of the existing habitat for the koala is jeopardized. Based on the above, it is considered unlikely that the Project will interfere with the recovery of the koala throughout its range in Qld, NSW and the ACT.
Conclusion:
The Project is unlikely to result in a significant impact for koala.

A3.2 Grey-headed Flying-fox (*Pteropus poliocephalus*)

A preliminary assessment of whether the Project area provides habitat for the vulnerable grey-headed flying-fox (*Pteropus poliocephalus*) has been undertaken based on the presence of preferred foraging resources and searches for breeding camps as part of the general biodiversity surveys undertaken across the Project area.

The National Flying-Fox Monitoring Viewer (DoEE 2021) identifies seven known roost camp sites within 35 km of the Project area including two nationally important sites. Not all of these sites have been identified as supporting a population in surveys conducted between February 2013 and August 2020. The nearest roost camp sites are at:

- Raymond Terrance (625) approximately 15 km north east of the Project area where the population estimates on more than 25 occasions since 2013 were at 10,000 to 15,999 individuals. This camp is identified as nationally important for this species.
- East Cessnock (334) approximately 10 km south of the Project area where the population estimates on more than 25 occasions since 2013 were at 2,500 to 9,999 individuals. This camp is identified as nationally important for this species.
- Strockrington, Black Hill (13) approximately 5 km to the south of the Project area. This camp has been surveyed from February 2013 to May 2015, but no grey-headed flying-foxes were found. This camp is not identified as nationally important for this species.
- Tenambit (926) approximately 8 km north east of the Project area where the population estimate is 1 to 499 individuals (217 and 2018) or 500-2,499 individuals (2019 and 2020). This camp is not identified as nationally important for this species.
- Maitland, Hannan Street (810) approximately 8 km north of the Project area where the population estimate is 500 to 2,499 individuals (August 2014, May 2015, February 2016 and February 2017) or 2,500 to 9,999 individuals (November 2014, February 2015 and November 2016). However surveys conducted since 2013 have not identified any grey-headed flying-foxes. This camp is not identified as nationally important for this species.

- Maitland, Lorn (380) approximately 8 km north of the Project area where the population estimate is 500 to 2,499 individuals from November 2012 to May 2013. However surveys conducted since 2013 have not identified any grey-headed flying-foxes. This camp is not identified as nationally important for this species.

- Millfield (829) approximately 25 km south west of the Project area. This camp was surveyed in May 2015, but no grey-headed flying-foxes were found. This camp is not identified as nationally important for this species.

Grey-headed flying-fox presence in the region would be in response to the availability of food resources. The grey-headed flying-fox may forage up to 40 km from the roost however foraging distances are more often less than 20 km (CoA 2017). Woodland and forested habitats in the Project area would contribute to the foraging area for the both the Cessnock Road and Raymond Terrace camps.

Important foraging resources include vegetation communities that contain *Eucalyptus tereticornis, E. albens, E. crebra, E. fibrosa, E. melliodora, E. paniculata, E. pilularis, E. robusta, E. seeana, E. sideroxylon, E. siderophloia, Banksia integrifolia, Castanospermum australe, Corymbia citriodora citriodora, C. eximia, C. maculata), Grevillea robusta, Melaleuca quinquenervia* or *Syncarpia glomulifera* (CoA 2017). Important foraging resources in the Project area include *E. crebra, E. tereticornis, E. fibrosa* associated with PCTs 1568, 1590, 1592, 1598 and 1600.

The Project area is considered to comprise areas of potentially suitable foraging habitat for this species but is unlikely to contain significant breeding and roosting habitat necessary for maintaining genetic diversity. Therefore, the Project area is unlikely to contain an *important population* of the grey-headed flying-fox.

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
The national population of the grey-headed flying fox is spatially structured into colonies however there is no separate or distinct population due to genetic exchange and movement between camps. Based on the national flying fox monitoring program, estimates of the national population size in 2015 was in the order of 680,000 individuals. No camps have been identified in the Project area and the Project would not impact on breeding or roosting habitat. The Project would reduce the availability of foraging resources, particularly the nectar and pollen of Eucalyptus sp, and Angophora sp, by 49.33 ha. These foraging resources are within the usual nightly foraging distance for the camps in East Cessnock and Raymond Terrace. Given that the Project area does not support an important population of the grey-headed flying-fox, the project will not lead to a long-term decrease in the size of an important population of this species.
• reduce the area of occupancy of an important population
The Project would not remove any roost sites but would remove about 48.88 ha of potential foraging habitat for the grey-headed flying-fox that congregate at the Raymond Terrace and East Cessnock camps within 35 km of the Project area, though this habitat is only present when Eucalypt species are in flower. The Project will result in the loss of approximately 49.33 ha of potential foraging habitat for grey-headed flying-fox. However, since the Project area does not contain an *important population* of the grey-headed flying-fox, the project will not reduce the area of occupancy of an *important population* of this species.

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

- fragment an existing important population into two or more populations

The national population of the grey-headed flying-fox is considered to be one population with localised colonies across its range. The grey-headed flying-fox move in response to availability of seasonal flowering resource particularly moving to the coastal lowlands in autumn.

The Project would clear up to 49.33 ha of potential foraging habitat including winter foraging resources for any individuals that are over wintering in the nearby camps, though this habitat is only present when Eucalypt species are in flower.

The Project does not impact on breeding habitat and/or provide a barrier to dispersal of individuals within the national population. The Project is not likely to fragment the national population.

- adversely affect habitat critical to the survival of a species

According to the *National Recovery Plan for the Grey-Headed Flying-Fox* (CoA 2021), foraging habitat that meets one of the following criteria is considered critical or essential to the survival of the species:

- *Eucalyptus tereticornis, E. albens, E. crebra, E. fibrosa, E. melliodora, E. paniculata, E. pilularis, E. robusta, E. seeana, E. sideroxylon, E. siderophloia, Banksia integrifolia, Castanospermum australe, Corymbia citriodora citriodora, C. eximia, C. maculata, Grevillea robusta, Melaleuca quinquenervia* or *Syncarpia glomulifera*.
- contain native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May)
- contain native species used for foraging and occur within 20 km of a nationally important camp as identified on the Department's interactive flying-fox web viewer, or
- contain native and or exotic species used for roosting at the site of a nationally important Grey-Headed Flying-Fox camp as identified on the Department's interactive flying-fox web viewer

Habitat critical to the survival of the grey-headed flying fox include continuous temporal sequence of productive foraging resources, linked by migration corridors and suitable roosting habitat within nightly foraging territory. Clearing of reliable winter flowering resource, particularly in northern NSW and south east Queensland, is a key threat for the species (CoA 2021). Due to unpredictability of flowering, all foraging habitat has potential to provide habitat critical for the grey-headed flying-fox.

The Project area is considered to comprise approximately 49.33 ha of potentially suitable foraging habitat for this species. The Project area occurs within the foraging range from the Raymond Terrace roost site known to support populations of >10,000 individuals.

Given that this species has not been recorded in the Project area, the relatively small area of suitable habitat when compared to the local area, the Project is unlikely to significantly reduce the availability of foraging habitat critical to the survival of the species.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
• disrupt the breeding cycle of an important population
Grey-headed flying-fox are seasonal breeders with a single breeding event per year. The majority of births occur between October and December with the young being reared in large aggregations or 'camps'. The young are highly dependent on their mother for food and thermoregulation with their mother carrying the young for the first four to five weeks. The young are then left in the maternity camp while their mothers forage until they are independent after around 12 weeks. The young may remain at the camp over winter and typically females will conceive from around two to three years of age, female grey-headed flying-foxes conceive one young (annually). No grey-headed flying-fox breeding populations or camps have been identified in the Project area and the Project does not impact on the known camps within 35 km of the Project area such that it would disrupt breeding cycle. The clearance of up to 49.33 ha of potential foraging resources is not anticipated to reduce availability of foraging habitat such that it would disrupt the breeding cycle of the national population.
• modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The Project may impact up to 49.33 ha of potential foraging resources for the grey-headed flying-fox. Given the larger areas of high quality remnant vegetation in surrounding areas, the Project area is unlikely to be depended on by local grey-headed flying-fox colonies. It is considered unlikely that the project will modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the grey-headed flying-fox would decline.
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
The project is not expected to result in invasive species that are harmful to the grey-headed flying-fox becoming established in the species habitat.
• introduce disease that may cause the species to decline, or
While the grey-headed flying-fox carries pathogens that may pose human health risks these viruses cause only asymptomatic infections in the flying-fox and will not cause a decline of the grey-headed flying-fox. The Project is not expected to introduce any diseases that may cause these species to decline.
• interfere with the recovery of the species.
The following recovery plan has been prepared: • National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus* (CoA 2021) The overall objectives of the recovery plan are: • to improve the grey-headed flying-foxes national population trend by reducing the impact of the threats outlined in this plan on Grey-headed Flying-foxes through habitat identification, protection, restoration and monitoring, and • to assist communities and grey-headed flying-foxes to coexist through better education, stakeholder engagement, research, policy and continued support to fruit growers. The Project would clear approximately 49.33 ha of potential foraging habitat for grey-headed flying-fox, however this is not anticipated to interfere with the recovery of the species as a whole. No significant effect on the recovery of the grey-headed flying-fox is expected to occur as a result of the Project as the potential areas of foraging habitat that will be impacted as a result of the Project are not expected to impact an important population of this species.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Conclusion:
The Project would clear approximately 49.33 ha of foraging resource, particularly winter foraging resources, for grey-headed flying-fox occupying the two nationally important camps that occur within 35 km of the Project area. Individuals in these camps are part of the national population of the grey-headed flying-fox and monitoring of the camp indicates occupation occurs mainly over the summer to autumn months. The Project is not likely to have a significant impact on the grey-headed flying-fox population.

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