

## Assessments of Significance for MNES with potential to be impacted by the proposed action

In accordance with the EPBC Act Significant Impact Guidelines 1.1 (DotE, 2013) Assessments of Significance (AoS) have been prepared for biota listed under the EPBC Act that are likely to be impacted by the proposed action. These include:

### Threatened ecological communities

- River-flat eucalypt forest on coastal floodplains of southern NSW and eastern Victoria – listed as a critically endangered ecological community (CEEC) under the EPBC Act

### Threatened flora

- Small-flower Grevillea (*Grevillea parviflora* subsp. *parviflora*) – listed as a vulnerable species under the EPBC Act
- Bynoe’s Wattle (*Acacia bynoeana*) – listed as a vulnerable species under the EPBC Act
- Earp’s Gum (*Eucalyptus parramattensis* subsp. *decadens*) - listed as a vulnerable species under the EPBC Act

### Threatened fauna

- Grey-headed Flying-fox (*Pteropus poliocephalus*) - listed as a vulnerable species under the EPBC Act
- Large-eared-Pied Bat (*Chalinolobus dwyeri*) - listed as a vulnerable species under the EPBC Act
- Swift Parrot (*Lathamus discolor*) - listed as a critically endangered species under the EPBC Act
- Regent Honeyeater (*Anthochaera phrygia*) – listed as a critically endangered species under the EPBC Act

Table AH 1 provides as summary of impacts of the proposed action on MNES and conclusions of the completed AoS.

Table AH 1 Summary of impacts on MNES

Threatened biota	Listing under EPBC Act	Associated PCTs/habitat <sup>1</sup>	Impact	Potential for significant impact
River-flat eucalypt forest on coastal floodplains of southern NSW and eastern Victoria	CEEC	PCT 1594 PCT 1591	Removal of 7.6 ha (7.07 ha in good condition (condition class B3) and 0.53 ha in moderate condition (condition class C2)	Possible
Small-flower Grevillea ( <i>Grevillea parviflora</i> subsp. <i>parviflora</i> )	V	PCT 1633 PCT 1600	Removal of up to 1495 individuals (some of which area likely to be intergrades with <i>Grevillea humilis</i> )	Possible
Bynoe’s Wattle ( <i>Acacia bynoeana</i> )	V	PCT 1633 PCT 1600	Removal of up to 6 individuals	Unlikely
Earp’s Gum ( <i>Eucalyptus parramattensis</i> subsp. <i>decadens</i> )	V	PCT 1633	Removal of 3224 individuals (including 1064 adults, 1612 juveniles and 548 seedlings)	Possible
Grey-headed Flying-fox ( <i>Pteropus poliocephalus</i> )	V	PCT 1633 PCT 1600 PCT 1591	Removal of up to 109.06 ha of potential foraging habitat	Unlikely

Threatened biota	Listing under EPBC Act	Associated PCTs/habitat <sup>1</sup>	Impact	Potential for significant impact
		PCT 1954		
Large-eared-Pied Bat ( <i>Chalinolobus dwyeri</i> )	V	PCT 1633 PCT 1600	Removal of up to 84.1 ha of potential foraging habitat	Unlikely
Swift Parrot ( <i>Lathamus discolor</i> )	CE	PCT 1633 PCT 1600	Removal of up to 84.1 ha of low-moderate value potential foraging habitat	Unlikely
Regent Honeyeater ( <i>Anthochaera phrygia</i> )	CE	PCT 1600	Removal of up to 36.4 ha of low-moderate value potential foraging habitat (including habitat identified as critical for the species within recovery plan)	Possible

<sup>1</sup> PCT associations have been sourced from Department of Planning and Environment (DPE) Threatened Biodiversity Database Collection (TBDC)

CEEC= critically endangered ecological community

V= vulnerable species

CE = critically endangered species

M = migratory species

## River-Flat eucalypt forest on coastal floodplains of southern NSW and eastern Victoria - critically endangered

### Description

The CEEC is found on the floodplains of the eastern and southern watershed of the Great Dividing Range from central and southern New South Wales to eastern Victoria, with the northern end of its range extending to around Raymond Terrace, just north of Newcastle.

The CEEC occurs on alluvial landforms related to coastal river floodplains and associated sites where transient water accumulates. The CEEC is typically found below 50 m ASL. The CEEC occurs on alluvial soils of various textures including silts, clay loams and sand loams, gravel and cobbles.

The structure of the community is generally a tall open forest to woodland dominated by eucalypt species that may exceed 40 m in height but can be considerably shorter. The local expression of the ecological community is influenced by its location relative to the riparian areas of the floodplain, frequency of inundation, local climate, latitude and the contribution of biota from surrounding areas. Hence, there is regional variation of key species, although structure and function remain similar throughout the extent.

### Distribution in the proposed action area

Within the proposed action area this CEEC predominantly occurs along the alluvial terraces associated with Swamp Creek and its tributaries. There are also several smaller patches located to the east of the former smelter site which comprise of mature planted vegetation that was established as part of land rehabilitation undertaken for the former Aluminium smelter.

An assessment was completed of vegetation within the proposed action area that has potential to be commensurate with River-flat Eucalypt Forest CEEC. This included reviewing plot data and completing assessments within quadrats established in PCTs located on floodplain alluvial soils, including PCT 1594, PCT 1598 and PCT 1591. This assessment determined that approximately 7.6 ha of vegetation mapped as PCT 1594 (Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter) and a small patch of PCT 1591 Grey Gum - Rough-barked Apple shrubby open forest of the lower Hunter) meets the identification guidelines and condition thresholds for the River-flat Eucalypt Forest CEEC described in the conservation advice for the community (DAWE 2020c).

**EPBC Act - Assessment of Significance – River-flat eucalypt forest on coastal floodplains**

**According to the DotE (2013) 'significant impact criteria' for critically endangered ecological communities, an action is likely to have a significant impact on a critically endangered community if there is a real chance or possibility that it will:**

**Reduce the extent of an ecological community**

The current extent of the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria across its range is approximately 20,500 ha, of which 10,600 ha occurs within NSW. The proposed action would result in the removal of up to 7.6 ha of this CEEC, comprised of numerous patches ranging in size and condition. Of this, approximately 7.07 ha is in good condition (condition class B3) and 0.53 ha is in moderate condition (condition class C2).

Removal of 7.6 ha represents approximately 0.004% of the total extent of the CEEC and 0.07% of the NSW extent of the CEEC (DEWA 2020c).

**Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines**

Previous disturbance at the site has resulted in the current, fragmented distribution of this community. Across the proposed action area the community occurs in numerous discrete patches that range in size from 0.5 ha to up to 4 ha.

Within the proposed action area larger patches of this CEEC are connected to other plant community types, while some are surrounded by mixed grassland and therefore more subject to edge effects. Patches that are larger and less disturbed are likely to provide greater biodiversity value and are likely to be buffered to disturbance by the surrounding vegetation (DAWE 2020c). However, even patches in heavily cleared areas where they meet the minimum condition thresholds have high conservation value (DAWE 2020c). Patches that occur at the natural edge of the community range, such as the proposed action area, are also likely to be considered high conservation value.

The current proposed action would not cause fragmentation of a larger patch of this community, but it would result in the removal of patches such that a network of patches of this CEEC would no longer be present within the site. This in turn would increase the distance between patches within the broader landscape as well as reduce the size of several patches where this CEEC is part of larger patches that extend out of the proposed action area. Reducing the size of these patches would potentially reduce their long term viability and contribute to increased isolation of patches within the broader landscape.

**Adversely affect habitat critical to the survival of an ecological community**

Habitat or areas most critical to the survival of the community are patches in the best condition and closest to the benchmark state of the ecological community. Patches of the community within the proposed action area correspond with classes B3 and C2 in the conservation advice for the community (DAWE 2020c). Areas corresponding with Class B3 are likely to represent habitat critical to the survival of the ecological community. Patches that are in Class C2, although not the best examples of the community, are still considered important particularly where they occur in positions that are important for biodiversity or function.

The removal of 7.6 ha of this community has the potential to adversely affect habitat critical to the survival of the CEEC by removing several patches of high conservation value.

**Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns**

The proposed action would cause soil disturbance due to the earthworks required for construction this could lead to alteration of surface water drainage patterns and increase runoff from areas of hardstand. This may in turn impact area of CEEC adjoining the proposed action area. The impacts to soil, water and nutrients would be manageable with appropriate engineering, stormwater management and implementation of erosion and sedimentation controls.

**Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting**

There is a risk that increased edge effects associated with vegetation clearing within this CEEC may lead to some changes in species composition through the introduction and spread of exotic species through the retained patches of the community. These potential impacts however would be managed through ongoing management activities within these areas that will form part of a biodiversity stewardship site. It is therefore unlikely that the project would result in a substantial change in species composition including causing a decline or loss of functionally important species within adjoining patches of River-flat eucalypt forest.

**EPBC Act - Assessment of Significance – River-flat eucalypt forest on coastal floodplains**

**Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to:**

The areas of the ecological community impacted by the proposed action already have reduced community integrity and functionality due to previous disturbance. The composition of the ecological community within the proposed action area has been modified due to previous disturbance and are prone to edge effects including invasion by exotic species. The small size and fragmented distribution of the patches within the proposed action area is likely to reduce their functionality and reduce dispersal of species that may be functionally important.

**assisting an invasive species, which are harmful to the listed ecological community to become established, or**

Vegetation disturbance at the site has the potential to increase weed incursion to surrounding vegetation including adjoining areas of this CEEC and increase edge effects by removing buffering vegetation. Where this community occurs in the surrounding landscape, the proposed action has the potential to impact on its quality or integrity, these impacts would be mitigated through the ongoing management of vegetation adjoining the site (including patches of River-flat eucalypt forest CEEC) which will form part of a biodiversity stewardship site.

**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**

It is unlikely that the proposed action would result in regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into patches of this ecological community that adjoin the proposed action area.

**Interfere with the recovery of an ecological community**

The proposed action would result in the removal of 7.6 ha of River-flat eucalypt forest CEEC. This would interfere with the recovery of the community as it is in opposition with the conservation advice provided in DAWE 2020c, particularly the following key objectives:

- Protect and conserve remaining areas of the ecological community
- Avoid further clearance and destruction of the ecological community
- Retain other native vegetation near patches of the ecological community, where they are important for connectivity, diversity of habitat, and/or act as buffer zones between the ecological community and threats or development zones
- Where regeneration occurs, provide measures that will support the regeneration to maturity
- Protect mature trees and stags, particularly with hollows.

**Conclusion of Assessment of Significance**

The proposed action has the potential to result in a significant impact on River-flat eucalypt forest on coastal floodplains CEEC due to the following:

- The proposed action would result in the removal of approximately 7.6 ha of this community including 7.07 ha in good condition and 0.53 ha in moderate condition
- The proposed action would adversely impact habitat critical to the survival of the CEEC
- The proposed action has the potential to interfere with the recovery of the CEEC

## Threatened flora

### Small-flower Grevillea (*Grevillea parviflora* subsp. *parviflora*) - vulnerable

#### Distribution

Small-flower Grevillea (*Grevillea parviflora* subsp *parviflora*) occurs as several disjunct populations within NSW. The distribution of the species comprises two relatively distinct regional populations, one in the Lower Hunter and Central Coast regions, and the other generally south-west of Sydney. There are also several outlying populations that have been recorded in the Port Stephens, Great Lakes, Singleton, Campbelltown, Wollondilly and Wingecarribee LGAs.

#### Habitat requirements

Small-flower Grevillea is known to grow on sandy to gravelly clay over shale on crests, upper slopes or plains in a range of topographic positions including riparian areas. The species is known from a range of vegetation types from heath and shrubby woodland to open forests. Populations have also been recorded on disturbed sites along roads and tracks and within open areas of habitat (TSSC 2008). The species is capable of suckering via underground rhizomes. Due to this habit it is often difficult to determine the numbers of plants present at a site and population estimates are essentially a reflection of the number of suckers rather than individual plants.

The NPWS impact assessment guidelines for this species state that although most populations of Small-Flower Grevillea are relatively large due to the suckering nature of the species, the health and long-term viability of populations is likely to be dependent on adequate seedling recruitment. As such any activity or development that impacts on the accumulation of seed in the soil seedbank, seed germination or seedling growth is likely to be a threat to the population or species (NPWS 2002).

#### Occurrence with the proposed action area

Approximately 1495 Small-flower Grevillea (*Grevillea parviflora* subsp *parviflora*) stems occur within the proposed action area. It is likely that at least some of these stems however are intergrades with *Grevillea humilis* subsp *humilis* (Pers com Andrew Orne, National Herbarium of NSW).

The stems within the proposed action area form part of the larger regional, Kurri Kurri population. This population extends east to Heddon Greta, north through the Hydro buffer lands to near Bishops Bridge, west to near Ellalong and south to near Richmond Vale (DPIE 2022a). The total area of this larger regional population is approximately 5000 ha. The Kurri Kurri population is considered to be an important population as the Small Flowered Grevillea occurs in disjunct populations and the Kurri population is near the northern extent of its range. The population is also likely to be a key source population and is likely to play an important role in maintaining genetic diversity of the species.

#### **EPBC Act - Assessment of Significance - Small-flower Grevillea (*Grevillea parviflora* subsp *parviflora*)**

**According to the DotE (2013c) 'significant impact criteria' for vulnerable species, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**

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

Approximately 1495 Small-flower Grevillea (*Grevillea parviflora* subsp *parviflora*) stems occur within the proposed action area. The stems were recorded within a number of patches of PCT 1633 Earp's Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland that occur to the north-east and west of the former Hydro Smelter Site.

The stems recorded within the site occur within approximately 10.9 ha of occupied habitat.

The plants within the proposed action area form part of an important regional population that extends east to Heddon Greta, north through the Hydro buffer land to near Bishops Bridge, west to near Ellalong and south to near Richmond Vale (DPIE 2022a). The total area of occupancy of this larger regional population is approximately 5000 ha (DPIE 2022a).

Clearing activities associated with the proposed action would result in a small decrease in the size of this important population, however this impact would be small relative to the size of the regional population (approximately 0.21

**EPBC Act - Assessment of Significance - Small-flower Grevillea (*Grevillea parviflora* subsp *parviflora*)**

percent). The proposed action may result in a very small decrease in the in the Kurri Kurri population of Small-flower Grevillea.

**Reduce the area of occupancy of an important population**

The proposed action would result in the removal of approximately 40.7 ha of known and potential habitat for Small-flower Grevillea within areas of Earp's Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland within the proposed action area. Within this vegetation type the area of occupancy of Small-flower Grevillea has been calculated to be approximately 10.9 ha (applying a 30 metre buffer around individuals and including contiguous vegetation between groups of individuals recorded during targeted surveys that were completed across the entire site). The proposed action would therefore result in an approximate 10.9 ha reduction in the known area of an important population of Small-flower Grevillea. There is also potential that proposed action would impact additional areas of occupancy where this species may be present within the stored soil seed bank.

Although the proposed action would result in a small reduction in occupancy of an important population of Small-flower Grevillea, this species is known to occur within at least 32 ha of occupied habitat within the 275 ha of suitable Earp's Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland (PCT 1633) habitat that occurs adjacent to the site. This vegetation would be conserved and managed as part of a proposed 765 ha biodiversity stewardship site. This estimate of occupied habitat within adjoining vegetation however is a conservative estimate as detailed targeted surveys have not been completed though this entire vegetation community and the extent of the population is likely to be much larger.

**Fragment an existing important population into two or more populations**

The individuals that would be impacted by the proposed action are located near the edges of the known local population (DPIE 2022a). The removal of these individuals would therefore not result in the fragmentation of the population into two or more populations.

**Adversely affect habitat critical to the survival of the species**

This species occurs in a range of vegetation types from heath and shrubby woodland to open forest and can occur in disturbed areas. There are no areas of habitat that have been declared or are known to be critical to the survival of the Small-flower Grevillea.

**Disrupt the breeding cycle of an important population**

There is limited information available on the breeding cycle of the Small-flower Grevillea although the species is known to regenerate from both suckering and seeds. The NSW National Parks and Wildlife Service Environmental Impact Assessment guidelines identify that impacts on the accumulation of seed in the soil seedbank, seed germination or seedling growth is likely to be a threat to the population or species (NPWS 2002). Inappropriate fire regimes are cited as the primary threat to these stages of the species life cycle. The proposed action would include provisions for buffers and fire protection zones that would minimise potential impacts from fire on individuals that may be present within vegetation adjacent to the proposed action area. Regular mowing or slashing of vegetation adjacent to the proposed Hunter Express Way off ramps could result in the prevention of some individuals present within this vegetation from maturing or setting seed. Overall, however it is unlikely that the proposed action would disrupt the breeding cycle of the greater regional population. t as there are substantial areas of alternative habitat/known occurrence of this species nearby. This includes 275 ha of potential habitat (including 32 ha of known occupied habitat) located within a proposed biodiversity stewardship site adjacent to the proposed action area that will be established and managed to offset the impacts of the proposal.

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

The proposed action would remove approximately 10.9 ha of occupied habitat for the Small-flower Grevillea and 40.7ha of potential habitat. This represents a small area relative to the area known to be inhabited by the regional population (approximately 0.21 percent) which includes approximately 5000 ha of known habitat. The proposed action also has the potential to modify or decrease the availability and/or quality of habitat for this species adjacent to the site through the introduction of weeds or pathogens during construction or operation. The construction of urban and industrial development may also result in modification of adjacent habitat as a result of overshadowing, altered hydrology and dumping of fill, rubbish and or garden waste. Mitigation measures would be implements to minimise the potential impacts of weeds, waste and water runoff on adjacent potential habitat and as such it is unlikely that the proposed action would modify, destroy, remove isolate or decrease the availability of quality of habitat to such an extent that the species would decline.

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

There is potential that the construction and/or operation of the proposed action would result in the establishment of weeds within areas of potential habitat for this species located adjacent the proposed action area. The introduction of weeds into these areas may result in competition for resources such as light, space and/or nutrients and consequently decrease the value of this habitat. Mitigation measures would be implemented to limit the potential impacts of weeds on adjacent vegetation during construction and operation of the proposal.

**EPBC Act - Assessment of Significance - Small-flower Grevillea (*Grevillea parviflora* subsp *parviflora*)**

**Introduce disease that may cause the species to decline**

The proposed action is not likely to result in the introduction of any diseases that may cause the species to decline.

**Interfere substantially with the recovery of the species**

There is no adopted or made Recovery Plan for this species.

**Conclusion of Assessment of Significance**

On consideration of the above criteria, the proposed action has potential to have a significant impact on Small-flower Grevillea given that:

- The proposed action may lead to a long-term decrease in an important population
- The proposed action would result in a small reduction in the area of occupancy for an important population

## Bynoe's Wattle (*Acacia bynoeana*) – vulnerable

### Distribution

Bynoe's Wattle is endemic to NSW and is found in central eastern NSW, from the Hunter District south to the Southern Highlands and west to the Blue Mountains. The species is known from about 30 locations, with the size of most populations being very small (between 1 to 5 plants). The total population size has been estimated at less than 2000 individuals. The species occurs in heath or dry sclerophyll forest on sandy soils where it is often found growing in open slightly disturbed sites such as trail margins, roadsides and recently burnt patches (DPIE 2022b). Due to the fragmented nature of the populations, small sizes and proximity to urbanisation, the species is susceptible to catastrophic events and localised extinction (NSW Scientific Committee 1999).

In the Kurri Kurri area, Bynoe's Wattle has been recorded at Heddon Greta immediately east of the proposed action area. It has also been recorded adjacent to the Hunter Express Way, to the south of the site (DPIE 2022b). It is likely that the plants that have been recorded near Heddon Greta are part of the same population as those previously recorded within the proposed action area as they occur in close proximity within contiguous vegetation.

### Occurrence within the proposed action area

Six *Acacia bynoeana* (Bynoe's Wattle) individuals have been previously recorded within the proposed action area during surveys completed in 2015 (ELA 2016). These plants were located within a patch of PCT 1633 Earp's Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area located to the east of the former Hydro Smelter Site. Multiple targeted surveys completed in 2020 were unable to relocate any of these individuals or verify their occurrence within the site. For the purpose of this assessment it has been assumed that there is potential habitat within the site for Bynoe's Wattle and that the species may persist within the soil seed bank of the site.

The proposed action would potentially result in the clearing of six Bynoe's Wattle individuals (although their presence could not be confirmed during recent surveys). These plants would be considered to be part of an important population as due to the small and fragmented nature of populations, all individuals are likely to be important for maintaining genetic diversity of the species.

#### EPBC Act - Assessment of Significance - *Acacia bynoeana* (Bynoe's Wattle)

**According to the DotE (2013c) 'significant impact criteria' for vulnerable species, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**

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

Six *Acacia bynoeana* (Bynoe's Wattle) individuals have previously been recorded within the proposed action area (ELA 2016). These individuals were recorded within a patch of PCT 1633 Earp's Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland located to the east of the former Hydro Smelter Site during surveys completed during 2015. Multiple targeted surveys completed in 2020 were unable to relocate any of these individuals. For the purpose of this referral, it has been assumed that these individuals may still be present at the site.

These individual plants are part of a small population that extends off the site to the east within a small patch of vegetation bordering the Heddon Greta residential housing subdivision. It is unlikely that the removal of a small number of individuals (if present) would lead to a long term decrease in the size of an important population.

##### **Reduce the area of occupancy of an important population**

The proposed action would result in the removal of approximately 40.7 ha of potential habitat for Bynoe's Wattle within areas of Earp's Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland within the proposed action area. There is also potential that the proposed action would impact additional areas of occupancy where this species may be present within the stored soil seed bank. Of the 40.7 ha of potential habitat within the site 2.7 ha is considered occupied habitat for this species (based on past records and application of 30 metre buffer).

##### **Fragment an existing important population into two or more populations**

The individuals potentially impacted by the proposed action are located at the margins of the known local population (DPIE 2022a). The removal of these individuals (if still present) would therefore not result in the fragmentation of the population into two or more populations.



**EPBC Act - Assessment of Significance - *Acacia bynoeana* (Bynoe's Wattle)**

**Adversely affect habitat critical to the survival of the species**

This species occurs in a range of vegetation types from heath and shrubby woodland to open forest. There are no areas of habitat that have been declared or are known to be critical to the survival of Bynoe's Wattle.

**Disrupt the breeding cycle of an important population**

Bynoe's Wattle flowers in from September to March with pods forming in November through to March. The species is thought to be pollinated by native bees and wasps (DEWA 2020b). Plants generally produce small numbers of seeds and there is little local dispersal. Bynoe's Wattle is also known to be capable of spreading vegetatively via underground stems. The proposed action has the potential to remove six individuals from the small local population (although their presence has not been confirmed on site) and as such may result in a reduction in the abundance of pollen available to other individuals within the population. The proposed action would not impact on mechanisms for pollination of the species. Given the small size of the population it is not likely that the proposed action would disrupt the breeding cycle of the population.

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

The proposed action would remove an estimated 2.7 ha of occupied habitat for Bynoe's Wattle. The proposed action also has the potential to modify or decrease the availability and/or quality of habitat for this species adjacent to the site through the introduction of weeds or pathogens during construction or operation. The construction of urban and industrial development may also result in modification of adjacent habitat as a result of overshadowing, altered hydrology and dumping of fill, rubbish and or garden waste. Mitigation measures would be implements to minimise the potential impacts of weeds, waste and water runoff on adjacent potential habitat and as such it is unlikely that the proposed action would modify, destroy, remove isolate or decrease the availability of quality of habitat to such an extent that the species would decline.

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

There is potential that the construction and/or operation of the proposed action would result in the establishment of weeds within areas of potential habitat for this species located adjacent the proposed action area. The introduction of weeds into these areas may result in competition for resources such as light, space and/or nutrients and consequently decrease the value of this habitat. Mitigation measures would be implemented to limit the potential impacts of weeds on adjacent vegetation during construction and operation of the proposal.

**Introduce disease that may cause the species to decline**

The proposed action is not likely to result in the introduction of any diseases that may cause the species to decline.

**Interfere substantially with the recovery of the species**

There is no adopted or made Recovery Plan for this species.

**Conclusion of Assessment of Significance**

On consideration of the above criteria, the proposed action is unlikely to have a significant effect on Bynoe's Wattle given that:

- The proposal is not likely to lead to the long term decrease of an important population as no individuals were confirmed to occur within the site and the population extends to the east and south of the site.
- The proposed clearing would occur along the edge of potential habitat, therefore the proposed action would not result in the fragmentation of an important population
- The proposed action would remove a small amount of habitat for the species however this habitat does not contain any confirmed recent occurrences of the species.
- The proposed action would not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
- It is unlikely that the proposed action would result in invasive species that are harmful to Bynoe's Wattle becoming established in the species habitat.
- The proposed action is unlikely to introduce disease that may cause the species to decline.
- The proposed action is not likely to substantially interfere with the recovery of the species.

## Earp's Gum (*Eucalyptus parramattensis* subsp. *decadens*) – vulnerable

### Distribution

Earp's Gum is a small smooth barked tree to 15 m tall (although generally around 7 m). The species is endemic to the Hunter Region where it occurs within two distinct meta populations, one occurring on the Tomago Sandbeds and one within Cessnock-Kurri Kurri region (Bell 2006). Within the Cessnock-Kurri Kurri region, 15 sub-populations of the species have been identified, with an estimated total abundance of 2,500 to more than 8,000 individuals (Bell 2006). This estimate was based on the number of BioNet Atlas Records as is unlikely to be a true representation of the number of individuals within the population. Assessments completed on the Hydro Lands indicate that the population in the Kurri Kurri area is much larger, with surveys completed across the Hydro site indicating that there is approximately 35,000 within 285 ha of Kurri Sand Swamp Woodland that will form part of a biodiversity stewardship site..

### Habitat requirements

Earp's Gum generally occupies deep, low-nutrient sands, and often those subject to periodic flooding or where the water table is high (OEH, 2019). This subspecies occurs often as a dominant component of dry sclerophyll woodland with an understorey of dry heath, or as an emergent in dry or wet heath (OEH 2019).

### Occurrence within the proposed action area

The proposed action would result in the clearing of 3224 Earp's Gum individuals (including 1064 adults, 1612 juveniles and 548 seedlings) within 47.2 ha of occupied habitat. These plants are considered to be part of an important population due to the endemic nature of the species which indicates that the entire Kurri Kurri/Cessnock regional population is likely to be important for maintaining genetic diversity of the species within the region.

An estimated 35,000 Earp's Gum individuals are also known to occur within approximately 287 ha of Parramatta Red Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland that occurs within a proposed 765 ha biodiversity stewardship site located adjacent to the proposed action area that would be conserved to offset the impacts of the proposal.

#### **EPBC Act - Assessment of Significance - Earp's Gum (*Eucalyptus parramattensis* subsp. *decadens*)**

**According to the DotE (2013c) 'significant impact criteria' for vulnerable species, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**

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

Within the proposed action area there is a total of 3224 (including 1064 adults, 1612 juveniles and 548 seedlings) Earp's Gum individuals. These individuals all occur within approximately 47.7 ha of (Parramatta Red Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland PCT 1633) that is proposed to be impacted.

Parramatta Red Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland (PCT 1633) extends to the east and south of the proposed action area. Within this area the community forms a large contiguous patch of approximately 300 ha, with several smaller fragmented patches in close proximity. Field surveys have been completed within the 287 ha of PCT 1633 that will form part of large biodiversity stewardship site adjacent to the proposed action area. Results of these field surveys indicate there is and it is estimated that there are approximately 35,000 Earp's Gum individuals that would be conserved adjacent to the proposed action area.

Regional vegetation mapping indicates that there is approximately 2330 ha of PCT 1633 within 10 km of the proposed action area and approximately 7,320 ha within the Hunter IBRA sub-region.

The removal of 47.7 ha of occupied habitat would represent impacts to approximately 2.1 percent of the known habitat within 10 km of the site and less than 0.7 % in the Hunter IBRA sub-region.

The removal of 3224 individuals (including 1069 adults, 1604 juveniles and 548 seedlings) within 47.7 ha of occupied habitat may lead to a small decrease in the size of an important population of Earp's Gum.

**EPBC Act - Assessment of Significance - Earp's Gum (*Eucalyptus parramattensis* subsp *decadens*)**

**Reduce the area of occupancy of an important population**

The proposed action would result in the removal of 3224 Earp's Gum individuals within approximately 47.7 ha of habitat. The known area of occupancy of the species has been calculated to include all areas of PCT 1633 within the proposed action area.

This likely decrease in occupancy for Earp's Gum represents an approximate 2.1 percent decrease in the area of occupancy within 10 km of the site and less than 0.7 % decrease in the area of occupancy within the Hunter IBRA sub-region.

Within the former Hydro aluminium site, the proposed action would remove approximately 8 percent of the Earp's Gum calculated to be present within the site. The remaining 98 percent would be conserved as part of a biodiversity stewardship site.

**Fragment an existing important population into two or more populations**

The individuals that would be impacted by the proposed action are located at the margins of the known local population. The removal of these individuals would not result in the fragmentation of the population into two or more populations.

**Adversely affect habitat critical to the survival of the species**

There are no areas of habitat that have been declared or are known to be critical to the survival of *Eucalyptus parramattensis* subsp *decadens*.

Within the Cessnock areas Earp's Gum forms the dominant canopy species and is characteristic of Parramatta Red Gum – Narrow-leaved Apple - Prickly-leaved Paperbark shrubby woodland. As the species is highly restricted to this vegetation type it is likely that this habitat would be critical to the survival of the species.

**Disrupt the breeding cycle of an important population**

Earp's Gum flowers from November to January and seed dispersal is mainly by wind. Pollination is mostly likely to occur by the foraging activities of bats, birds and insects (House 1997 cited in DECCW NSW 2009). Earp's Gum germinates easily and readily re-sprouts after bushfire or other disturbance (Bell 2006). The proposed action would remove 3224 individuals (including 1069 adults, 1604 juveniles and 548 seedlings) from a much larger local population and as such would result in a small reduction in the abundance of pollen available to other individuals within the population. The proposed action would not impact on mechanisms for pollination of the species. Considering the above it is unlikely that the proposed action would disrupt the breeding cycle of an important population of Earp's Gum.

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

The proposed action would remove 3224 individuals within approximately 47.7 ha of known habitat for Earp's Gum. The proposed action also has the potential to modify or decrease the availability and/or quality of habitat for this species adjacent to the site through the introduction of weeds or pathogens during construction or operation. The construction of urban and industrial development may also result in modification of adjacent habitat as a result of overshadowing, altered hydrology and dumping of fill, rubbish and or garden waste. Mitigation measures would be implemented to minimise the potential impacts of weeds, waste and water runoff on adjacent potential habitat and as such it is unlikely that the proposed action would modify, destroy, remove isolate or decrease the availability of quality of habitat to such an extent that the species would decline.

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

There is potential that the construction and/or operation of the proposed action would result in the establishment of weeds within areas of potential habitat for this species located adjacent the proposed action area. The introduction of weeds into these areas may result in competition for resources such as light, space and/or nutrients and consequently decrease the value of this habitat. Mitigation measures would be implemented to limit the potential impacts of weeds on adjacent vegetation during construction and operation of the proposal.

**Introduce disease that may cause the species to decline**

The proposed action is not likely to result in the introduction of any diseases that may cause the species to decline.

**Interfere substantially with the recovery of the species**

There is no adopted or made Recovery Plan for this species.

**Conclusion of Assessment of Significance**

On consideration of the above criteria, the proposed action has the potential to have a significant impact on *Eucalyptus parramattensis* subsp. *decadens* given that:

- The proposed action would may lead to a small decrease in the size and area of occupancy of an important population of Earp's Gum.

## Threatened fauna

### Grey-headed Flying-fox (*Pteropus poliocephalus*) – vulnerable

#### Distribution

The Grey-headed Flying-fox population throughout Australia is spatially structured into colonies (Parry-Jones & Wardle 2004). However, no separate or distinct populations occur due to the constant genetic exchange and movement between camps over the entire species' geographic range, indicating one single interbreeding population (Webb & Tidemann 1995; DSE 2005).

In winter, the species congregates in coastal lowlands north of the Hunter Valley and is occasionally found on the south coast of NSW (associated with flowering Spotted Gum (*Corymbia maculata*) and on the northwest slopes (generally associated with flowering White Box (*Eucalyptus albens*) or Mugga Ironbark (*Eucalyptus sideroxylon*)) (NSW DECCW 2010).

#### Habitat requirements

The Grey-headed Flying-fox roosts in congregations (camps) typically located near water, such as lakes, rivers or the coast (van der Ree et al. 2005). Camps can occur in a variety of vegetation types including rainforest, Melaleuca stands, mangroves and riparian vegetation (Nelson 1965; Ratcliffe 1931). The species is also known to roost and forage in highly modified urban areas (Birt et al. 1998; Tidemann & Vardon 1997; van der Ree et al. 2005).

The Grey-headed Flying-fox is a canopy-feeding frugivore and nectarivore, which primarily feeds on blossom from Myrtaceous species (Eby 1998). The species is highly mobile and utilises a range of vegetation including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. The species is also known to feed on introduced tree species in urban areas and commercial fruit crops. None of the species the Grey-headed Flying-fox feed on flower continuously throughout the year. As a result the species developed complex migration behaviours due to ephemeral and patchy food resources (Duncan et al. 1999; Eby 1996, 1998; Nelson 1965; Parry-Jones & Augee 1992; Spencer et al. 1991).

The species has historically been subject to culling as a result of impacts to commercial fruit crops. However, in more recent times non-lethal methods of crop protection are used such as full exclusion netting have been used to prevent damage to crops (OEH 2015).

The primary food source is blossom from Eucalyptus and related genera but in some areas it also utilises a wide range of rainforest fruits (Eby 1998). None of the vegetation communities used by the Grey-headed Flying-fox produce continuous foraging resources throughout the year. As a result, the species has adopted complex migration traits in response to ephemeral and patchy food resources (Duncan et al. 1999; Eby 1996, 1998; Nelson 1965; Parry-Jones & Augee 1992; Spencer et al. 1991).

#### Habitat within proposed action area

Habitat within the site includes vegetation types that contain several tree species that flower in winter and would provide potential foraging habitat for this species during times of the year when food is generally scarce. PCTs that occur within the subject site that are associated with the Grey-headed Flying-fox are PCT 1600, 1591, 1594 and PCT 1633. Within these PCTs there is suitable foraging habitat within vegetation zones 1,2, 4, 5, 6, 7, 8, 9, and 10. The total area of potential foraging habitat for this species within the proposed development footprint is 109.06 ha.

There are no Grey-headed Flying Fox camps within or within proximity to the proposed action area.

**EPBC Act - Assessment of Significance - Grey-headed Flying-fox (*Pteropus poliocephalus*)**

**According to the DoE (2013) 'significant impact criteria' for vulnerable species, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**

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

The Grey-headed Flying fox feeds on nectar and pollen from flowers of canopy trees and fleshy fruits from rainforest trees and vines. The species generally moves through the landscape feeding on suitable trees when they come into flower/fruit. The proposed action would involve the removal of approximately 109.6 ha of potential foraging habitat for this species. This habitat includes several tree species that would provide food for this species at certain times of the year when in fruit/flower, including *Eucalyptus fibrosa* (Red Ironbark), *Corymbia maculata* (Spotted Gum) and *Eucalyptus tereticornis* (Forest Red Gum) which have been identified as significant feed species (Peggy & Law 2008). The Grey-headed Flying-fox has been recorded foraging within and adjacent to the proposed action area.

Grey-headed Flying-fox camps are known to occur within the locality at East Cessnock, Lorn, Maitland (Hannan St), and Stockington. The closest known Grey-headed Flying-fox camp is located at East Cessnock. This camp is mapped on the National Flying-fox monitoring viewer as a nationally important camp and lies approximately 10 km south-west of the proposed action area (DoE 2020). There would be no direct impact on this camp.

The proposed action would not isolate any areas of habitat or cause significant habitat fragmentation that would affect the breeding, foraging or dispersive movements of this highly mobile species. Given the high mobility of this species, large areas of native vegetation located nearby would provide alternative foraging habitat for the species (including vegetation conserved within Mt Sugarloaf Flora and Fauna Reserve, Lower Hunter National Park, Cessnock State Forest and Werakata National Park). The resources present in the proposed action area, are minor in comparison to available similar foraging resources in nearby areas, including approximated 6,560 km<sup>2</sup> of potential foraging habitat (Yengo and Wollemi National Parks) located to the south-west.

Given that the proposed action would not impact on any roosting or breeding sites for this species and the large areas of native vegetation in the locality that would provide foraging habitat for this species, it is unlikely that the removal of 109.6 ha of potential foraging habitat would lead to a long-term decrease in the size of the population.

**Reduce the area of occupancy of an important population**

The proposed action would not reduce the area of occupancy of this highly mobile species.

The resources present in the proposed action area, occur in very low abundance and are minor in comparison to available similar foraging resources in nearby areas, including 6,560 km<sup>2</sup> of potential foraging habitat (Yengo and Wollemi National Parks) located to the south-west.

The 109.6 ha of potential foraging habitat that would be impacted therefore constitute a very small proportion of the available foraging habitat within the locality and would not create any barriers to movement or isolate any areas of habitat for this mobile species.

**Fragment an existing important population into two or more populations**

The proposed action would not isolate or fragment the existing population of this highly mobile species.

The Grey-headed Flying-fox is a highly mobile species that is capable of accessing isolated patches of foraging habitat within urban areas. The species is known to regularly travel distances of 50 kilometres from roost sites to access seasonal foraging resources (Eby 1996). At a local scale, the proposed action may widen some existing gaps in vegetation, however the resulting gap in vegetation cover would be readily traversed by these highly mobile, aerial species. The proposed action would not impact on any camp/roost sites for this species. The action would not prevent Grey-headed Flying-fox individuals from travelling between camps and foraging habitat.

It is therefore highly unlikely that the proposed action would cause fragmentation of the Grey-headed Fox population into two or more populations.

**Adversely affect habitat critical to the survival of the species**

The Grey-headed Flying-fox requires a temporal sequence of productive foraging habitats linked by migration corridors or stopover habitats combined with suitable roosting habitat in close proximity to foraging areas (DoEE 2017).

The recovery plan for Grey-headed Flying-fox identifies critical habitat as vegetation communities which:

- contain tree species utilised by Grey-headed Flying-foxes over winter or
- contain native species that are productive foraging habitat during late gestation, following birth, lactation and conception (August to May)
- containing native species used for foraging within 20 km of a nationally important camp
- containing native and/or exotic species used for roosting at the site of a nationally important camp (DAWE 2021).

Within the proposed action area habitat critical habitat includes vegetation communities that contain the following winter flowering foraging species *Eucalyptus fibrosa* (Red Ironbark), *Eucalyptus tereticornis* (Forest Red Gum) and *Corymbia maculata* (Spotted Gum) (DAWE 2021). These include:

- PCT 1600 - Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub grass open forest of the lower Hunter

**EPBC Act - Assessment of Significance - Grey-headed Flying-fox (*Pteropus poliocephalus*)**

- PCT 1633 - Parramatta Red Gum – Narrow-leaved Apple – Prickly-leaved Paperbark shrubby woodland in the Cessnock-Kurri Kurri area and
- PCT 1594 -Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter.
- PCT 1591 is also likely to be critical habitat as it contains known foraging species (i.e *Eucalyptus punctata* (Grey Gum) and *Angophora floribunda* (Rough-barked Apple) and is located within 20km of the Nationally Important Grey-headed Flying Fox camp at East Cessnock.

Given the definitions of critically habitat provided in the Grey-headed Flying-fox recovery plan it is likely that the proposal would result in impacts to critical habitat for this species.

**Disrupt the breeding cycle of an important population**

Grey-headed Flying-foxes are seasonal breeders with a single breeding event per-year. Females generally reach sexual maturity in their second year and pregnant females will give birth to a single pup generally between October to December (DoEE 2017). Flying-foxes have been known to abort fetuses and have premature births in response to environmental stress (DoEE 2017).

There are three Grey-headed Flying-fox camps known to support breeding females (maternity camps) within or close by the locality; East Cessnock, Lorn and Maitland (Hannan St). The East Cessnock camp, which is located approximately 10 km south west of the proposed action area has been identified as a nationally important camp.

The proposed action area is likely to be used by the Grey-headed Flying-foxes from the surrounding camps for foraging habitat. However, the foraging habitat within the locality (Mt Sugarloaf Flora and Fauna Reserve, Lower Hunter National Park, Cessnock State Forrest, Werakata National Park) would likely provide ample foraging resources. Considering this, the proposed action is unlikely to disrupt the breeding cycle of the Grey-headed Flying-fox. Furthermore, the proposed action would not create a barrier to migratory or dispersal movements for this species that could interfere with breeding behaviours.

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

The proposed action would remove 109.6 ha of potential foraging habitat for the Grey Headed Flying-fox. The proposed action would not isolate any areas of habitat for this highly mobile species. Due to the large area of potential alternative foraging habitat within the locality, and the highly mobile nature of the species, the removal of 109.6 ha of potential foraging habitat it is considered unlikely to result in the decline of the species.

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

Slight increases in the incidence of weeds in adjacent vegetation may occur as a result of vegetation clearing. Weed control measures would be implemented to mitigate this risk. The introduction and/or spread of weeds is not likely to decrease the value of potential foraging habitat for this species as there is already a high abundance of weeds within the area and the introduction on new infestations is not likely to impact on the foraging resources available to Grey-headed Flying-fox.

Invasive fauna species, including predators such as cats and foxes, are already present within the proposed action area and locality. The proposed action is unlikely to result in changes that would lead to an increase in feral animals, nor is the proposed action likely to increase the incidence of invasive predators or introduce new invasive species in the area.

**Introduce disease that may cause the species to decline**

Grey-headed Flying-foxes are reservoirs of a number of diseases including Australian bat lyssavirus, Hendra virus and Menangle virus. Although lyssavirus can cause clinical disease and mortality in Grey-headed Flying-foxes the incidence of disease in populations is generally low (<1%) and the virus is thought to be generally in equilibrium with the population (DECCW 2007). It has however been noted that when flying-foxes are exposed to significant ecological stress the incident of lyssavirus can increase and the population can be impacted (DECCW 2007). The proposed action is unlikely to result in ecological stresses to any of the nearby flying-fox populations such that the instances of lyssavirus would significantly increase.

There are no clinical disease or mortality in flying-foxes associated with Hendra or Menagle virus, regardless the proposed action is not likely to lead to an increase in either of these viruses within the Grey-headed Flying-fox population.

Construction activities have the potential to introduce or spread pathogens such as Phytophthora (*Phytophthora cinnamomi*) and Myrtle Rust (*Uredo rangelii*) into areas of adjacent foraging habitat for this species. These pathogens could result in a decline in health and/or mortality of flying fox feed trees. There is little available information about the distribution of these pathogens within the locality, and no evidence of these pathogens was observed during surveys. Mitigation measures, including strict hygiene protocols for plant and machinery, and restrictions on imported fill would be implemented to prevent the introduction of Phytophthora and/or Myrtle Rust.

No diseases that may cause the species to decline are likely to become established in the proposed action area as a result of the proposed action.

## EPBC Act - Assessment of Significance - Grey-headed Flying-fox (*Pteropus poliocephalus*)

### Interfere substantially with the recovery of the species

As discussed above, foraging habitat within the proposed action area is consistent with the definition of habitat critical to the survival of the Grey-headed Flying-fox as it contains winter flowering feed trees. The proposed action is therefore inconsistent with one of the stated objectives of the draft recovery plan (DoEE 2017), which is to 'identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes throughout their range'. With clearing of vegetation containing winter flowering feed trees of particular concern. Although the study site contains winter flowering species *Eucalyptus fibrosa* (Red -Ironbark), *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus robusta* (Swamp Mahogany) that could be utilised by Grey-headed Flying-fox these species occur in very low numbers through the site and the 109.6 ha of potential foraging habitat within the study site is minor in proportion of available foraging habitat for this highly mobile species within the locality. It is considered unlikely, therefore, that the proposed action would substantially interfere with the recovery of the species.

### Conclusion of Assessment of Significance

On consideration of the above criteria, the proposed action is unlikely to have a significant effect on the Grey-headed Flying-fox given that:

- The proposed action area contains potential foraging habitat only for this species and know roosting or breeding camps occur in or within proximity to the site.
- The proposed action would not isolate areas of habitat or result in the fragmentation of the Grey-headed Flying-fox population
- The proposed action is not likely to disrupt the breeding cycle of the Grey-headed Flying-fox
- Is unlikely to lead to the long term decrease of the population of Grey-headed Flying-fox
- There are large areas of alternative foraging habitat for this species within the locality including vegetation contained within the Sugarloaf Flora and Fauna Reserve, Lower Hunter National Park, Cessnock State Forrest and Werakata National Park.

## Large-eared-Pied Bat (*Chalinolobus dwyeri*) - vulnerable

### Distribution

The Large -eared Pied Bat (*Chalinolobus dwyeri*) is a small to medium sized bat that is mainly found within areas with extensive cliffs and caves. The species has a discontinuous distribution that ranges from Rockhampton in Queensland to Bungonia in the NSW southern highlands (DPIE 2022b). The species is listed as vulnerable under both the EPBC Act and BC Act.

### Habitat Requirements

Large-eared Pied Bats are known to mostly roost in caves and overhangs in sandstone cliffs where they will forage in nearby high-fertility forest or woodland near watercourses (Pennay 2008). They are also known to utilise abandoned mine tunnels and disused fairy martin nests for roosting (DPIE 2022b).

### Habitat in the proposed action area

Calls of the Large-eared Pied Bat (*Chalinolobus dwyeri*) were recorded within the proposed action area on an Anabat Express Zero Crossing detector (Titley Scientific). This species is likely to be utilising the site for foraging habitat only as there is no suitable breeding habitat (i.e. caves, scarps, cliffs, rock overhangs or disused mines) present within or nearby to the proposed action area (within 2 km).

The TSDC identifies that of the PCTs that occur within the proposed action area Large-eared Pied Bat habitat is known to be associated with PCT 1600 and 1633 (DPIE 2022a) Approximately 84.1 ha of woodland and forest vegetation within the proposed action area would provide potential foraging habitat for this species.

Large-eared Pied Bats that are utilising the proposed action area for foraging are not likely to be part of an important population as the site is not located near the limit of the species range and are not likely to be part of a key source population of breeding or a population necessary for maintaining genetic diversity.

The recovery plan for the Large-eared Pied Bat identifies likely important populations as being those associated with sandstone escarpments in Queensland and the Sydney Basin as well as the Population at Shoalwater Bay and northwest slopes of NSW. The proposed action area does not occur within an area identified by the recovery plan as likely to contain an important population (DERM 2011).

Critical habitat for the Large-eared Pied Bat has been identified as sandstone cliffs and fertile wooded valley habitats within close proximity of each other. Rainforests and moist eucalypt forest habitats have also been identified as likely to be critical to the species (DERM 2011).

As there are no sandstone escarpments (or other roosting habitat) within or in close proximity to the proposed action area the proposed action area is not considered important habitat for the species.

**EPBC Act - Assessment of Significance – Large-eared Pied Bat (*Chalinolobus dwyeri*)**

**According to the DotE (2013) ‘significant impact criteria’ for vulnerable species, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:**

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

The Large-eared Pied Bat has the potential to forage throughout the vegetated parts of the proposed action area however no evidence of roosting habitat was observed within or adjacent to the site. The removal of approximately 84.1 ha of potential foraging habitat for this species represent only a very small proportion of alternative foraging habitat for this species in the locality.

As noted above Large-eared Pied Bats that are utilising the proposed action area for foraging are not likely to be part of an important population as the site is not located near the limit of the species range and are not likely to be part of a key source population of breeding or a population necessary for maintaining genetic diversity. Also as described above the recovery plan for the species does not identify the habitat within the proposed action area as likely to support an important population.

Furthermore given there is no roosting and/or breeding habitat within or in close proximity to the proposed action area and potential foraging habitat to be removed is not located near sandstone cliffs, the proposed action is unlikely to lead to a long-term decrease in the size of an important population of a species.

**Reduce the area of occupancy of an important population**

The proposed action would not substantially reduce the area of occupancy of this highly mobile species as the 84.1 of potential foraging habitat that would be impacted would constitute a very small proportion of the available foraging habitat within the locality.

The Large-eared Pied Bat is known from Shoalwater Bay, north of Rockhampton, QLD, south to the vicinity of Ulladulla in NSW, and west to the Pilliga. The proposed action would not create any barriers to movement or isolate any areas of habitat for this highly mobile species.

For the reasons above it is unlikely that the proposed action would reduce the area of occupancy of an important population of Large-eared Pied Bat.

**Fragment an existing important population into two or more populations**

The proposed action would not isolate or fragment the existing population of Large-eared Pied Bat. The species is a highly mobile and capable of traveling large distances to forage. At a local scale, the proposed action may widen some existing gaps in vegetation, however the resulting gap in vegetation cover would be readily traversed by these highly mobile, aerial species. The proposed action would not impact on any roost sites for this species or prevent individuals from travelling between roosts and foraging habitat.

As such, the proposed action would not result in the fragmentation of a population of Large-eared Pied Bat into two or more populations.

**Adversely affect habitat critical to the survival of the species**

The Large-eared Pied Bat is dependent on the presence of diurnal roosts for shelter which they utilise during the day and also at night when not feeding as well as for raising young (DERM 2011). Roost sites include caves, overhangs, disused mine shafts and abandoned fairy martin nests.

The recovery plan for the Large-eared Pied Bat, identifies critical habitat for the species to be maternity roosts and any sandstone cliffs and fertile wooded valley habitat within close proximity of each other (DERM 2011).

The proposed action area does not contain and/or occur nearby to any roosting habitat that could provide maternity roosts for the species, nor is it in close proximity to any sandstone cliffs.

The proposed action is therefore unlikely to affect habitat critical to the survival of the Large-eared Pied Bat.

**Disrupt the breeding cycle of an important population**

Over most of its range, the Large-eared Pied Bat appears to roost predominantly in caves and overhangs in sandstone cliffs and forage in nearby high-fertility forest or woodland near watercourses. The structure of maternity roosts appears to be very specific (arch caves with dome roofs) (DERM 2011). Caves need to be high and deep enough to allow juvenile bats to learn to fly safely inside and have indentations in the roof. Roosting bats cluster in these indentations, presumably to allow the capture of heat. These physical characteristics are very uncommon in the landscape and their scarcity presumably poses an important limiting factor in the distribution of the species (Pennay 2008, DERM 2011).

The proposed action area or surrounding area does not contain any breeding habitat for the Large-eared Pied Bat. Therefore it is very unlikely that the proposed action would disrupt the breeding cycle of the Large-eared Pied Bat.



## EPBC Act - Assessment of Significance – Large-eared Pied Bat (*Chalinolobus dwyeri*)

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

The proposed action would remove 84.1 ha of potential foraging habitat for the Large-eared Pied Bat. The proposed action would not impact any breeding sites or isolate any areas of habitat for this highly mobile species. Due to the large area of alternative potential foraging habitat that occurs within the locality the removal of 84.1 ha of potential foraging habitat it is considered unlikely to result in the decline of the species.

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

Slight increases in the incidence of weeds in adjacent vegetation may occur as a result of vegetation clearing. Weed control measures would be implemented to mitigate this risk. The introduction and/or spread of weeds is not likely to decrease the value of potential foraging habitat for this species as there is already a high abundance of weeds within the area and the introduction on new infestations is not likely to impact on the foraging resources available to Large-eared Pied Bat.

Invasive fauna species, including predators such as cats and foxes, are already present within the proposed action area and locality. The proposed action is unlikely to result in changes that would favour feral animals, nor is the proposed action likely to increase the incidence of invasive predators or introduce new invasive species in the area. A 765 ha biodiversity stewardship site would be established adjacent to the proposed action area. This site would be actively managed for conservation purposes and include a feral animal control program and as such the incidence of invasive fauna species that could be harmful to the Large-eared Pied Bat is likely to be reduced.

### Introduce disease that may cause the species to decline

Australian bats are known to be susceptible to a number of diseases including Australian bat lyssavirus, Hendra virus and Menangle virus. There is no literature that indicates that Large-eared Pied Bats carry these diseases however there is a possibility that they could carry these diseases. The proposed action is unlikely to result in ecological stresses to any of the nearby Large-eared Pied Bat populations such that the instances of any of these viruses would increase.

Construction activities have the potential to introduce or spread pathogens such as *Phytophthora cinnamomi* and Myrtle Rust (*Uredo rangelii*) into areas of adjacent foraging habitat for this species. These pathogens could result in a decline in health and/or mortality of additional areas of Large-eared Pied Bat foraging habitat. There is little available information about the distribution of these pathogens within the locality, and no evidence of these pathogens was observed during surveys. Mitigation measures, including strict hygiene protocols for plant and machinery, and restrictions on imported fill would be implemented to prevent the introduction of *Phytophthora* and/or Myrtle Rust.

No diseases that may cause the species to decline are likely to become established in the proposed action area as a result of the proposed action.

### Interfere substantially with the recovery of the species

As discussed above, foraging habitat within the proposed action area is not considered to be habitat critical to the survival of the Large-eared Pied Bat as it does not contain or occur in close proximity to any roosting habitat or maternity site. The proposed action does not conflict with any of the specific recovery objective specified in the recovery plan for this species (DERM 2011). It is considered unlikely, therefore, that the proposed action would substantially interfere with the recovery of the species.

### Conclusion of Assessment of Significance

On consideration of the above criteria, the proposed action is unlikely to have a significant effect on the Large-eared Pied Bat given that:

- No roosting or breeding habitat would be impacted by the proposal.
- The foraging habitat within the proposed action area is not likely to support an important population of Large-eared Pied Bat.
- Vegetation to be removed comprises a negligible proportion of potential foraging habitat present in surrounding areas and the broader locality.
- The proposed action would not form a barrier to the movement of this highly mobile species.
- The species is highly mobile and the proposed action would not isolate any areas of habitat.
- The proposed action would not substantially interfere with the recovery of the species.

## Swift Parrot (*Lathamus discolor*) - critically endangered

### Distribution

The Swift Parrot breeds in Tasmania during the summer and the entire population migrates north to mainland Australia for the winter, with the majority being found in Victoria and NSW (DEE 2019b).

### Habitat Requirements

While on the mainland, Swift Parrots are nomadic, spending weeks or months at some sites and only a few hours at others, determined by the supply of nectar (Parks 2010). On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations (EES 2019b). Favoured feed trees include winter flowering species such as Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Red Bloodwood (*Corymbia gummifera*), Forest Red Gum (*Eucalyptus tereticornis*), Mugga Ironbark (*Eucalyptus sideroxylon*), and White Box (*Eucalyptus albens*) (EES 2019b). Commonly used lerp infested trees include Inland Grey Box (*Eucalyptus microcarpa*), Grey Box (*Eucalyptus moluccana*), Blackbutt (*Eucalyptus pilularis*) and Yellow Box (*Eucalyptus melliodora*). The Swift Parrot returns to some foraging sites on a cyclic basis depending on food availability (EES 2019b).

The extent of habitat use in each region varies according to food availability and competition, with Swift Parrots briefly passing through some habitats feeding opportunistically, and remaining in other habitats foraging for several days, weeks or months. The Hunter Valley has been identified as providing important winter foraging resources for the Swift Parrot.

### Habitat in the proposed action area

No Swift Parrot individuals have been recorded within the proposed action area during any of the many surveys that have been completed within the Hydro site.

Of the PCTs that occur within the site PCT 1600 and PCT 1633 are known to provide habitat for the Swift Parrot. Within the proposed action area vegetation zones 1, 2, 8, 9 and 10 may provide potential foraging habitat for this species. A total of 84.1 ha of potential foraging habitat would be impacted by the proposed action of which 66.6 ha is mapped as important habitat by DPIE and has therefore been used to create a species polygon for the purpose of species credit calculations in the BCAR (noting that impacts to the remaining 17.3 ha of foraging habitat would be offset through the retirement of ecosystem credits). An assessment by a species expert has identified 47.55 ha of important habitat within the site and as such this smaller area has been quoted in this assessment of significance (Crates 2022).

The potential foraging habitat within the proposed action area includes areas in poor condition due to clearing and under-scrubbing for agricultural purposes to more intact, good quality remnants. The vegetation types present contain several important feed tree species for the Swift Parrot including *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus moluccana* (Grey Box), and *Corymbia maculata* (Spotted Gum). All these tree species occur in low densities through the proposed action area.

## Assessment of significance for Swift Parrot (*Lathamus discolor*)

According to the DotE (2013) 'significant impact criteria' for critically endangered species, an action is likely to have a significant impact on a critically 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 EPBC Act defines a 'population of a species' as an occurrence of the species in a particular area which includes but is not limited to geographically distinct regional populations or collections of local populations or a population, or collection of populations, which occur within a particular bioregion" (DotE 2013).

The Swift Parrot occurs as single, migratory population that disperses widely in Victoria and New South Wales in the non-breeding season. Small numbers of this species are often observed in the Australian Capital Territory and south-eastern Queensland and less often in south-eastern South Australia (Saunders and Tzaros 2011). All individuals are considered to be part of the one population.

The Swift Parrot has not been recorded during any of the numerous ecological assessments that have been completed within the Hydro site. The closest record of the species is from approximately 2 km south of the proposed action area within the township of Kurri Kurri. There are also numerous records from approximately 4 km south-west of the site within a large patch of native vegetation that forms part of the Hunter Economic Zone (HEZ).

There is a total of 84.1 ha of potential foraging habitat for the Swift Parrot within the proposed action area, most of this habitat contains a low abundance of key foraging resources for the species. Of the 84.1 ha of potential foraging habitat within the site 47.55 ha has been identified as important foraging habitat by a species expert (Crates 2022).

Regional vegetation mapping indicates that within the Hunter IBRA subregion there is approximately 46,565 ha of habitat that contains key foraging species for the Swift Parrot. The removal of 84.1 ha of potential foraging habitat of foraging resources would reduce the available foraging habitat within the Hunter IBRA subregion by about 0.2 percent. This habitat loss will result in a small decrease in the availability of winter forage for individual birds that disperse throughout the area during winter. It is unlikely however that this small reduction in potential foraging habitat would lead to a long-term decrease in the size of the Swift Parrot Population.

### Reduce the area of occupancy of a population

The distributional range of the Swift Parrot extends from Tasmania (where breeding occurs) through parts of Victoria and NSW to southeast Queensland. Within this range, the area of occupancy for the species would include breeding grounds in Tasmania, migration routes and foraging habitats on mainland Australia.

The proposed action would result in the removal of 84.1 ha of potential foraging habitat which includes known feed species such as Spotted Gum (*Corymbia maculata*), *Eucalyptus moluccana* (Grey Box) and Swamp Mahogany (*E. robusta*). Of the potential foraging habitat within the site 47.55 ha has been identified as important (low to moderate) by a species expert (Crates 2022).

No Swift Parrots have been recorded utilising the proposed action area during any of the numerous surveys that have been completed through the Hydro site over many years.

Regional vegetation mapping indicates that within the Hunter IBRA subregion there is approximately 46,565 ha of habitat that contains key trees species for the Swift Parrot. The removal of 84.1 ha of potential habitat containing a low abundance of foraging resources would reduce the available foraging habitat within the Hunter IBRA subregion by about 0.2 percent. It is therefore unlikely that this reduction in potential low-moderate foraging habitat would substantially reduce the area of occupancy of this highly mobile species.

### Fragment an existing population into two or more populations

The Swift Parrot is a highly mobile species that routinely traverses large expanses of open water and open country, including Bass Strait, agricultural land and other clearings during its annual migration. The Swift Parrot would rely on 'steppingstones' of suitable foraging and roosting habitat during migrations and is thought to prefer 'corridors' of woodland vegetation over which to traverse. While the proposed action would, in places widen an existing gap, dispersal or movement of the Swift Parrot across the landscape is unlikely to be affected as clearings created by the proposed action would not be of a scale that would isolate habitat with respect to this species. As such, the proposed action would not fragment the existing population into two or more populations.

## Assessment of significance for Swift Parrot (*Lathamus discolor*)

### Adversely affect habitat critical to the survival of the species

The *Recovery Plan for the Swift Parrot* notes that habitat critical to the survival of the Swift Parrot includes; those areas of priority habitat for which the Swift Parrot has a level of site fidelity or possess phenological characteristics likely to be of importance to the Swift Parrot (Saunders, DL and Tzaros C.L (2011)). Priority habitat include areas that are used:

- for nesting
- by large proportions of the Swift Parrot population
- repeatedly between seasons or
- for prolonged periods of time

The proposed action area would not be used by the Swift Parrot for nesting and there has been no records of the species utilising the site. A report prepared by a species expert who assessed the quality of habitat within the site concluded that the site would provide low to moderate foraging habitat for the species and would not be considered critical habitat for the species (Crates 2022).

Considering the report prepared by Dr Crates the lack of evidence that Swift Parrots utilise the proposed action area it is unlikely that the proposed action would affect habitat critical to the survival of the species.

### Disrupt the breeding cycle of a population

Breeding does not occur on mainland Australia. Adult birds would only occur within the proposed action area as part of seasonal foraging behaviour during winter.

Habitat loss could decrease the availability of winter forage for individuals that may disperse throughout the region during winter. The reduced availability of foraging habitat, particularly during poor flowering seasons and/or drought periods, could theoretically reduce the health and condition of adult birds, which could in turn, lead to poor condition and reduced breeding success. However due to the relatively low abundance of key feed species within the proposed action area it is unlikely that the condition and health of individuals that may forage in the proposed action area on occasion would be compromised to the extent that breeding success of individuals would be affected. Furthermore, the proposed action would not fragment a population of the Swift Parrot or create a barrier to local or regional movements of the species between foraging and breeding areas.

Given the above points, the proposed action is unlikely to disrupt the breeding cycle of a population of Swift Parrot

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

The removal of 84.1 ha of potential foraging habitat will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. Regional vegetation mapping indicates that within the Hunter IBRA subregion there is approximately 46,565 ha of habitat that contains key trees species for the Swift Parrot. The removal of 84.1 ha of potential habitat containing a low abundance of foraging resources would reduce the available foraging habitat within the Hunter IBRA subregion by about 0.2 percent.

Within the Hunter region potential foraging resources occur within a number of reserves including Mt Sugarloaf Flora and Fauna Reserve, Lower Hunter National Park, Cessnock State Forrest, Werakata National Park) and further throughout the region (Yengo and Wollemi National Parks).

This species is highly mobile and has a home range spanning several hundred kilometres. The removal of 84.1 ha of potential foraging habitat represents a small fraction of the potential foraging habitat for the species and is unlikely to cause a decline in the population of Swift Parrot.

Given that no breeding habitat would be impacted and that no areas of habitat would become isolated, it is unlikely that the proposed action would result in the overall decline of the species.

### Result in invasive species that are harmful to a critically endangered species becoming established in the critically endangered species' habitat

The primary threat associated with clearing of Swift Parrot habitat as a result of the Hydro development are potential increases in the local population of Noisy Miners. Noisy Miners are edge specialists (Piper & Catterall 2003) and can prevent Swift Parrots from occupying potential foraging or breeding habitats when their numbers exceed a threshold density of approximately 0.65 birds per hectare (Thompson et al. 2015). Noisy miners are already present in some areas of mapped important Swift Parrot habitat adjacent to the proposed action area, but there are some areas of mapped habitat that could become exposed to Noisy Miners as a result of fragmentation of habitats surrounding the proposed action area.

The proposed action is not likely to result in the introduction or establishment of any other invasive species that are harmful to Swift Parrot becoming established.

## Assessment of significance for Swift Parrot (*Lathamus discolor*)

### Introduce disease that may cause the species to decline

Psittacine beak and feather disease is a common and potentially deadly disease of parrots. Susceptibility to the infection may be influenced by environmental factors, such as climate, nutrition, habitat quality and social factors (DEH 2005).

The proposed action is unlikely to introduce Psittacine beak and feather disease, however cumulative impacts of further land clearing and impacts on habitat has the potential to increase susceptibility of individuals.

### Interfere substantially with the recovery of the species

Habitat loss is a key factor in the current threatened status of the Swift Parrot. The proposed action would remove 84.1 ha of potential foraging habitat containing preferred feed species for this species. Of this 47.55 ha has been identified as containing low to moderate value habitat for the species (Crates 2022).

This habitat loss will decrease the availability of winter forage for individual Swift Parrots that disperse throughout the region during winter. Although there would be no impact on breeding habitat, 47.55 ha of vegetation considered to be important foraging habitat for the species would be impacted. This represents approximately 0.38 percent of the mapped important habitat within the Hunter IBRA subregion. As this represents only a small proportion of the mapped important habitat for the region and the vegetation within the site contains a relatively low abundance of key feed species for the Swift Parrot, the proposed action is unlikely to substantially interfere with the recovery of the species.

### Conclusion of Assessment of Significance

The proposed action is unlikely to result in a significant impact on the Swift Parrot as it is unlikely that it would:

- Lead to a long term decrease in the size of the population as it would remove only low-moderate foraging habitat.
- Reduce the area of occupancy of the population as the species has not been previously recorded within the site.
- Fragment an existing population into two or more populations.
- Adversely affect habitat critical to the survival of the population as the site does not contain breeding habitat and the species has not been previously recorded utilising the site.
- Disrupt the breeding cycle of the population as the species does not breed on mainland Australia.
- Result in invasive species that are harmful to a critically endangered species becoming established in the critically endangered species' habitat.
- Introduce disease that is likely to cause the population to decline.
- Interfere substantially with the recovery of the species.

## Regent Honeyeater (*Anthochaera phrygia*)

### Characteristics and distribution

The Regent Honeyeater (*Anthochaera phrygia*) is a medium-sized honeyeater with predominantly black plumage with bright yellow edges to the wing and tail feathers. The distribution of the species is extremely patchy with contractions in the home range of the species having been observed in past decades (Franklin et al. 1989).

The Regent Honeyeater formerly occurred throughout south-eastern Australia in the Adelaide region to 100 km north of Brisbane, Queensland. The population has been continually contracting with the species northern extent primarily restricted to Gore-Karara region south of Brisbane and the species is no longer observed in South Australia (Franklin et al., 1989).

The Regent Honeyeater occurs as a single population with exchanges of individuals between regularly used areas (Garnett et al., 2011). The Regent Honeyeater population continues to decline in NSW. Due to the species' life-history attributes of small population size, large range and irregular, long-distance movement patterns (Commonwealth of Australia 2016), it is challenging to estimate with confidence the size of the NSW Regent Honeyeater population. Best estimates suggest that the NSW Regent Honeyeater population may have halved over the past decade, with a contemporary population comprising between 150 and 300 individuals (Garnett et al. 2021).

### Habitat Requirements

There are four known key breeding regions remaining for the Regent Honeyeater: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley, the Bundarra-Barraba region near Gunnedah and the Hunter Valley. In NSW the distribution is very patchy and mainly confined to main breeding areas in the Capertee Valley and Hunter Valley in and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests (EES 2019a).

The timing of breeding varies between regions and appears to correspond with the flowering of key eucalypt and mistletoe species (Franklin et al., 1989; Geering & French 1998). Breeding mostly occurs during spring and summer, from August to January (Franklin et al., 1989). While nectar flows are important for breeding, some pairs have been recorded to successfully fledge their young using insects and lerps only (Geering & French 1998).

The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Most records of regent honeyeaters come from box-ironbark eucalypt associations, where the species seems to prefer more fertile sites with higher soil water content, including creek flats, broad river valleys and lower slopes. Regent Honeyeaters may use different areas in different years depending on food resources (DoE 2016).

Key eucalypt species include Mugga (or Red) Ironbark (*Eucalyptus sideroxylon*), Yellow Box (*Eucalyptus melliodora*), White Box (*Eucalyptus albens*), Yellow Gum (*Eucalyptus leucoxylon*) Spotted Gum (*Corymbia maculata*) and Swamp Mahogany (*Eucalyptus robusta*). Nectar and fruits from Mistletoes including Needle-leaf Mistletoe (*Amyema cambagei*), Box Mistletoe (*Amyema miquelii*), *Amyema pendula* and Long-flower Mistletoe (*Dendrophoe vitellina*) are also utilised (EES 2019a). When nectar is scarce lerp and honeydew can comprise a large proportion of the diet. Insects make up about 15% of the total diet and are important components of the diet of nestlings.

Lower Hunter Spotted Gum forests in the Hunter Valley have recently been demonstrated to support regular breeding events of regent honeyeaters (Roderick et al 2014). 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 (DoE 2016).

## Habitat within the proposed action area

Of the PCTs that occur within the proposed action area the Regent Honeyeater is associated with PCT 1600 (DPIE 2022a). Within the proposed action area intact and grazed areas of PCT 1600 Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub grass open forest of the lower Hunter ((VZ 8, VZ 9 and VZ 10) contains occasional *Corymbia maculata* (Spotted Gum) individuals as well as *Eucalyptus fibrosa* (Red Ironbark).

There is at total of approximately 36.4 ha of potential foraging habitat for the Regent Honeyeater within the proposed action area, of this 34.63 has been identified by a species expert as potential important habitat (Crates 2022).

Due to the very low abundance of mistletoe through the proposed action area it does not provide any suitable breeding habitat for the Regent Honeyeater (Crates 2022)

The National Recovery Plan for the Regent Honeyeater states that any areas where the species is likely to breed or forage is considered critical habitat for the species. The plan notes that habitat within the Hunter Valley would be critical to the survival of the Regent Honeyeater.

### EPBC Act - Assessment of Significance

#### Regent Honeyeater (*Anthochaera phrygia*)

**According to the DoE (2013) 'significant impact criteria' for critically endangered species, an action is likely to have a significant impact on a critically endangered species if there is a real chance or possibility that it will:**

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

The EPBC Act defines a 'population of a species' as an occurrence of the species in a particular area which includes but is not limited to geographically distinct regional populations or collections of local populations or a population, or collection of populations, which occur within a particular bioregion (DoE 2013).

The Regent Honeyeater occurs as a single population with exchanges of individuals between regularly used areas (Garnett et al., 2011). The total Regent Honeyeater population is estimated to be no more than 1000 birds, however numbers may be as low as 150-300 individuals (Garnett et al 2021).

The Regent Honeyeater has not been recorded during any of the numerous ecological assessments that have been completed within the Hydro site. The closest record of the species is from approximately 3 km south of the proposed action area within the township of Kurri Kurri. There are also numerous records including observations of breeding from approximately 4 km south-west of the site within a large patch of native vegetation that forms part of the Hunter Economic Zone (HEZ).

There is at total of 36.4 ha of potential foraging habitat for the Regent Honeyeater within the proposed action area. Most of this habitat however contains a low abundance of key foraging resources for the Regent Honeyeater. The proposed action would not remove any known breeding habitat for the species and an assessment of the site by a species expert has determined that due to the paucity of mistletoe through the site it is not likely to provide breeding habitat for this species (Crates 2022).

Regional vegetation mapping indicates that within the Hunter IBRA subregion there is approximately 39,162 ha of habitat that contains key trees species for the Regent Honeyeater. The removal of 36.4 ha of potential habitat would reduce the available foraging habitat within the Hunter IBRA subregion by about 0.1 percent. It is unlikely that this reduction in potential foraging habitat would impact local breeding within the HEZ site or lead to a long term decrease in the size of the Regent Honeyeater population.

#### **Reduce the area of occupancy of the species**

The distributional range of the Regent Honeyeater extends from parts of Victoria, through NSW to southeast Queensland. The area of occupancy is estimated at 300,000 km<sup>2</sup>. The extent of occurrence is likely to be declining based on historical declines and the present status of the species (DoE 2016).

The proposed action would result in the removal of 36.4 ha of potential foraging habitat. No Regent Honeyeaters have been recorded utilising the proposed action area during any of the numerous surveys that have been completed through the Hydro site over many years. There is therefore no evidence that the site forms part of the areas of occupancy for the species.

Regional vegetation mapping indicates that within the Hunter IBRA subregion there is approximately 39,162 ha of habitat that contains key trees species for the Regent Honeyeater. The removal of 36.4 ha of potential habitat would reduce the available foraging habitat within the Hunter IBRA subregion by about 0.1 percent. It is therefore unlikely that this reduction in potential habitat would substantially reduce the area of occupancy of this highly mobile species.

## EPBC Act - Assessment of Significance

### Fragment an existing population into two or more populations

The Regent Honeyeater occurs as a single population with exchanges of individuals between regularly used areas (Garnett et al., 2011). This species is capable of moving long distances to occupy new locations in response to changing food availability (Roderick et al 2013). There is an estimated 20,985 ha of available potential Regent Honeyeater foraging and breeding habitat in the Hunter IBRA subregion including large areas within close proximity to the proposed action area. Vegetation proposed to be cleared occurs as small scattered remnants within agricultural paddocks or on the edge of larger patches. Highly mobile species such as the Regent Honeyeater are expected to be less impacted by fragmentation and this species is well-adapted to accessing widely spaced habitat resources given its mobility and preference for seasonal foraging resources. Given the clearing occurs on the edge of patches, the high mobility of the species, and large areas of alternative habitat within the locality, the proposed action is unlikely to fragment a population into two or more populations.

### Adversely affect habitat critical to the survival of the species

The National Recovery Plan for the Regent Honeyeater specifies that any breeding or foraging habitat in areas where the species is likely to occur (as defined by the distribution map provided in Figure 2 of the Recovery Plan is considered critical to the survival of the species (DotE 2016). The proposed action area contains tree species that could provide foraging resources for the Regent Honeyeater (*Eucalyptus punctata*, *E. fibrosa*, *E. moluccana*, *E. amplifolia* and occasional *Corymbia maculata*) and is within the area mapped as key breeding habitat within the Hunter Valley on Figure 2 of the Recovery Plan. As such the proposed action has the potential to adversely affect habitat critical to the survival of the Regent Honeyeater.

### Disrupt the breeding cycle of the population

Numerous field surveys of the Hydro site have not found any evidence of Regent Honeyeater foraging or breeding (nests or pairs) within the proposed action area. Although there is known breeding habitat for the Regent Honeyeater approximately 4 km to the south, it is unlikely that the species would utilise the proposed action area for breeding due to the relatively low abundance of mistletoe (Crates 2022). Despite this, the site could be contributing to the overall foraging resources of breeding pairs within the locality.

An assessment of habitat by a species expert has concluded that Regent Honeyeater habitat within the proposed action area is considered to be of low to moderate quality, relative to other areas of mapped important habitat within the lower Hunter Valley, such as parts of Werakata National Park and the Hunter Economic Zone. Given the large areas of higher quality foraging habitat in the locality it is considered unlikely that the removal of 36.4 ha of potential foraging habitat would disrupt the breeding cycle of the Regent Honeyeater population.

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

The proposed action would remove of 36.4 ha of potential foraging habitat for the Regent Honeyeater. No known or potential breeding habitat would be removed from the site (Crates 2022).

The proposed action would remove small patches of potential foraging habitat that may contribute to cumulative fragmentation of habitat in the landscape. Given the high mobility of the species however it is unlikely that the proposed action would lead to any substantial fragmentation or isolation of any habitat for this species.

Given the habitat within the site is considered low to moderate when compared to other habitat within the locality (including large areas of known foraging and breeding habitat contained within the Werakata National Park and the Hunter Economic Zone) it is unlikely that the removal of 36.4 ha of potential habitat within the proposed action area would contribute to the decline of the species.

### Result in invasive species that are harmful to a critically endangered species becoming established in the critically endangered species' habitat

The primary threat associated with clearing of Regent Honeyeater habitat as a result of the Hydro development are potential increases in the local population of Noisy Miners. Noisy Miners are edge specialists (Piper & Catterall 2003) and can prevent Swift Parrots from occupying potential foraging or breeding habitats when their numbers exceed a threshold density of approximately 0.65 birds per hectare (Thompson et al. 2015). Noisy Miners are already present in the proposed action area, however as the proposed action would result in new exposed edges around the periphery of the site there is potential that this could result in an increase in the Noisy Miner population within retained vegetation adjacent to the site. These potential edge effect impacts would be managed through ongoing management of the Biodiversity Stewardship Site (BSS) that would be established on lands adjacent to the site. .

### Introduce disease that may cause the species to decline

No diseases are likely to be introduced as part of the proposal. A detailed assessment of the disease risk to the Regent Honeyeater was conducted by Jakob-Hoff et al. (2014) and identified the release of birds in captive breeding programs as the main vector for the transmission of diseases into the wild population. As no captive Regent Honeyeaters are being released as part of this proposed action it is unlikely that any diseases that would affect the local wild population would occur.



## EPBC Act - Assessment of Significance

### Interfere substantially with the recovery of the species

The proposed action would result in the clearing of 36.4 ha of habitat mapped critical to the survival of the Regent Honeyeater. As there is no evidence that the Regent Honeyeater utilises the site for breeding or foraging and it is unlikely that the removal of 36.4 ha of low to moderate value habitat would substantially interfere with the recovery of the species.

### Conclusion of Assessment of Significance

The proposed action has the potential to result in a significant impact on the Regent Honeyeater as:  
The proposed action will result in the clearing of 36.4 ha of foraging habitat with potential to be critical to the survival of the species. This habitat however has been assessed by a species expert of being low to moderate quality and does not contain suitable breeding habitat for the species

## References

- Birt, P., N. Markus, L. Collins & L.S. Hall (1998). Urban Flying-foxes. *Nature Australia*. 26:54-59.
- Commonwealth of Australia (2016). National Recovery Plan for the regent honeyeater (*Anthochaera phrygia*). Available at: <https://www.awe.gov.au/sites/default/files/documents/national-recovery-plan-regent-honeyeater.pdf>.
- Crates, R, Hydro Swift Parrot and Regent Honeyeater Important Habitat Expert Assessment, unpublished report prepared for Hydro Aluminium Pty Ltd.
- DAWE (2020a). *Protected Matters Online Search Tool*. Department of the Environment. Accessed at <http://www.environment.gov.au/arccgis-framework/apps/pmst/pmst.jsf>
- DAWE (2020b). Species profiles and threats database (SPRAT). Department of the Environment. Accessed at <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- DAWE (2020c). Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria. Department of Agriculture, Water and Environment.
- DAWE (2021). National Recovery Plan for the Grey-headed Flying-fox (*Pteropus poliocephalus*), Department of Agriculture, Water and the Environment, Canberra
- DAWE (2022) National Flying-fox monitoring viewer. Available from: [National Flying-fox monitoring viewer \(environment.gov.au\)](http://www.environment.gov.au)
- Department of Environment and Resource Management (DERM). 2011. National recovery plan for the large-eared pied bat *Chalinolobus dwyeri*. Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra.
- DECCW (2009). Draft National Recovery Plan: Earp's Dirty Gum *Eucalyptus parramattensis* subsp. *decadens*. Sydney: Department of Environment, Climate Change and Water NSW.
- Department of the Environment (DoE) (2013), *Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*. Department of the Environment.
- Department of the Environment (DoE) (2016). National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*). Commonwealth of Australia.
- DoE (2016). National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*). Commonwealth of Australia.
- OEH (2019). *Eucalyptus parramattensis* subsp. *decadens* – profile. NSW Government. Accessed <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10305>
- OEH (2020f) Swift Parrot Saving our Species Strategy; Accessed at <https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10455>
- Saunders, D.L. and Tzaros, C.L. (2011). *National Recovery Plan for the Swift Parrot Lathamus discolor*, Birds Australia, Melbourne.