

Biodiversity Development Assessment Report



149 Airds Road, Minto, NSW (Lot 12 // DP 251997)

Proposed warehouse and distribution centre

Prepared for: Charter Hall

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Glossary and abbreviations

Acronym	Description
AOO	Area Of Occupancy
BAM	Biodiversity Assessment Method
BC Act	NSW Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BVM	Biodiversity Values Map
CEMP	Construction Environmental Management Plan
СКРоМ	Campbelltown Koala Plan of Management
CLEP	Campbelltown Local Environmental Plan (2015)
CPLS	Cumberland Plain Land Snail
СՍ	Compensation unit
DA	Development Application
DAWE	NSW Department of Agriculture, Water and the Environment (formerly DEWHA)
DLS	Dural Land Snail
DPE	NSW Department of Planning and Environment
EPBC	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EOO	Extent Of Occurrence
НВТ	Hollow bearing tree
IBRA	Interim Biogeographic Regionalisation of Australia
KAAR	Koala Activity Assessment Report
LGA	Local Government Area
OEH	NSW Office of Environment and Heritage (now EES)
РСТ	Plant Community Type
RtS	Response to Submission
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Protection Policy
SSTF	Shale Sandstone Transition Forest



Acronym	Description
SRZ	Structural Root Zone
TEC	Threatened Ecological Community
TPZ	Tree Protection Zone
TSSC	Commonwealth Threatened Species Scientific Committee
VAR	Vegetation Assessment Report
VI	Vegetation Integrity
VIS	Vegetation Information System



1 Introduction

1.1 Background

This Biodiversity Development Assessment Report (BDAR) has been prepared to accompany a Development Application (DA) relating to a proposed warehouse and distribution centre and enabling infrastructure on Lot 12 // DP 251997 (149 Airds Road, Minto, NSW). This BDAR has been prepared by Ed Cooper, an Accredited Person (BAAS18047) and transferred to Lucas McKinnon, an Accredited Person (BAAS17012) to apply the Biodiversity Assessment Method 2020 (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act).

The BDAR has been prepared following the BAM 2020 and all credit calculations have been undertaken using the BAM Calculator (BAMC) in case number 00036632/BAAS18047/22/00036633.

1.2 Biodiversity Offset Scheme Triggers

A BDAR is required (and the BAM applied) when any one of the Biodiversity Offset Scheme (BOS) thresholds for local development under Part 4 of the NSW *Environment Planning and Assessment Act 1997* (EP&A Act) are triggered, being:

- Exceeding the native vegetation clearing threshold (based on minimum lot size).
- Direct impacts to land included in the Biodiversity Values Map.
- Significant impact on threatened species, ecological communities (or their habitat).
- Impacts to an Area of Outstanding Biodiversity Value.

Campbelltown Local Environmental Plan (CLEP) (2015) is the relevant Environmental Planning Instrument applying to the subject land, which provides the minimum lot size of $4,000 \text{ m}^2$ for the entire lot. As such, the BOS entry trigger is clearing 0.25 ha of native vegetation. The proposed warehouse and distribution centre will directly impact 0.80 ha (i.e., >0.25 ha) of native vegetation, therefore entry to the NSW BOS is triggered.

1.3 Location and site context

The BAM defines the land to which the BDAR applies as the *subject land* which includes areas proposed to be directly and indirectly impacted. For the purposes of this BDAR, the subject land includes 3.89 ha of land as mapped in **Figure 1.1** and **Figure 1.2** (53% of the study area). It is noted that the subject land does not include the full extent of Lot 12 // DP 251997 (the 'study area') (7.29 ha). A separate DA will address the proposed development and impacts to the remining 3.40 ha of Lot 12 // DP 251997.

The subject land is within the Campbelltown Local Government Area (LGA) and is zoned IN1: General Industrial. It is bordered by Campbelltown Road to the west, Airds Road to the east and other industrial warehouses to the north and south. The subject land has been predominantly cleared for an existing warehouse and associated infrastructure, native vegetation within the subject land is located along the boundaries of the lot in a disturbed and scattered paddock trees (SPT) condition classes consistent with the native Plant Community Types (PCTs) present.



1.4 Proposed development

The proposed development includes the construction of a warehouse and distribution centre, parking spaces, access roads and associated infrastructure. The development will require the removal of native vegetation, landscaping and earthworks (levelling through cut and fill) (**Figure 1.3**).





Figure 1.1: Locations of study area and subject land





Figure 1.2: Site map, including land mapped on the BVM (DPE 2022).





Figure 1.3: Proposed development footprint



2 Landscape context

2.1 Identifying landscape features

The landscape feature assessment for the subject land has been conducted in accordance with Section 3.1 of the BAM. Landscape features provide a general description of the subject land in relation to its topographic and hydrological setting, geology and soils. The site-based method was applied for this assessment; therefore, the assessment area is the 1,500 m buffer surrounding the outside edge of the boundary of the subject land. Landscape features for the subject land and the 1,500m assessment buffer are described below and shown in the Location Map in **Figure 2.1**.

2.1.1 IBRA regions and subregions

IBRA regions represent a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna species present. The subject land is located entirely within the **Cumberland** IBRA subregion (version 7.0) and within the **Sydney Basin** IBRA region (version 7.0), DoEE 2012. These attributes were entered into the BAM calculator.

2.1.2 NSW landscape regions (Mitchell Landscapes)

The subject land and the majority of the 1,500m assessment buffer is located within the **Georges River Alluvial Plain** landscape (Mitchell Landscapes v3.1; DECC 2016).

The Georges River alluvial plain landscape occurs on channel, floodplain and terraces of the Georges River on Quaternary and Tertiary alluvial sediments. Mostly clayey sand and sand with limited gravel on the highest terrace, general elevation 0 to 30 m, local relief 10 m. Massive uniform or gradual profiles on yellow brown to orange clayey sand, Podsols with well-developed double pans on limited areas of deep quartz sand, stony, harsh, yellow, texture-contrast soils on higher terraces. Forest and woodland of Cabbage Gum (*Eucalyptus amplifolia*), Rough-barked Apple (*Angophora floribunda*), Broad-leaved Ironbark (*Eucalyptus fibrosa ssp. fibrosa*), Scribbly Gum (*Eucalyptus sclerophylla*) and Narrow-leaved Apple (*Angophora bakeri*). Extensive Swamp Oak (*Casuarina glauca*) along the riverbanks and in low-lying areas often with Prickly-leaved tea-tree (*Leptospermum styphelioides*), these extend to brackish estuarine swamps with Grey Mangrove (*Avicennia marina*) and limited saltmarsh (DECC 2002).

2.1.3 Other features

Rivers, streams and estuaries

The study area does not contain any mapped streams, however, one unnamed 1st order stream runs parallel outside the northern boundary of the study area. The 1st order stream flows downstream joining Bow Bowing Creek, a 4th order stream, located east of the study area across Airds Road (**Figure 2.1**).

Local and important wetlands

No local or important wetlands are present within the subject land or within the 1,500 m assessment circle.



Habitat connectivity

The subject land does not form part of any recognised biodiversity corridor, flyway, or habitat connectivity feature.

Vegetation within the study area is only present along the lot boundaries with limited connectivity to patchy vegetation within the surrounding area. Industrial estates, residential areas and major roads interrupt vegetation within the study area from connecting to other patches of vegetation within the assessment circle.

Areas of geological significance and soil hazard features

No other landscape features including areas of geological significance (including karst, caves, crevices and cliffs) or soil hazard features have been identified within the subject land and 1,500 m assessment circle.

Areas of outstanding biodiversity value, biodiversity values map and the BAM important areas map

The subject land does not contain any Areas of Outstanding Biodiversity Value.

2.2 Determining site context

2.2.1 Assessing native vegetation cover

In accordance with Section 3.2 and Section 4.3.2 of the BAM, native vegetation cover must be assessed for a 1,500 m assessment buffer around the subject land to assess the habitat suitability for threatened species. The extent of native vegetation on the subject land and immediate surrounds was mapped using OEH (2016) with edits made to the layer to improve linework and where obvious changes to vegetation extent had occurred (**Figure 2.1**).

The total area of the 1,500 m buffer around the subject land is 831.30 ha, the area of native vegetation mapped within the buffer is 27.68 ha. This is a native vegetation cover of 3% (0-10% class as defined in the BAM) and this value was entered into the BAM calculator.

2.2.2 Assessing patch size

Patch size is defined by the BAM as 'an area of native vegetation that:

- occurs on the development site or biodiversity stewardship, and
- includes native vegetation that has a gap of <100 m from the next area of native vegetation (or <30 m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site.'

In assessing patch size, stands of native vegetation within 100 m of other areas of native vegetation, but which are separated by hard barriers (permanent artificial structures, wide roads, etc.) have been treated as separate patches. These highly modified breaks in vegetation connectivity would significantly alter ecological function of these areas of native vegetation such that these areas warrant recognition as separate patches.

Patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-<25 ha, 25-100 ha, or \geq 100 ha. Patch size was calculated for the vegetation within the subject land using the field validated map and native vegetation mapped within the 1,500 m buffer based on the mapping of OEH (2016).



The Hume Motorway and industrial properties, surrounding the subject land, act as hard barriers altering potential ecological values of remaining patches of vegetation. As such, vegetation with a gap of <100 m from the next area of native is approximately 5 ha, this therefore, can be assigned to the <5 ha class. Thus, a patch size of 4 ha was entered into the BAM Calculator for vegetation zones.





Figure 2.1: Location map



3 Native vegetation

3.1 Regional vegetation mapping

Existing information relevant to the native vegetation of the subject land and the 1,500 m assessment circle has been reviewed. Vegetation mapping by OEH (2016) *The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 VIS_ID 4489* did not identify any native vegetation within the study area. However, two areas along the western boundary of the subject land were mapped as Urban Exotic / Native vegetation (**Figure 3.1**). According to OEH (2016) mapping, areas mapped as Urban Exotic / Native vegetation are areas >0.1 ha in size for which urban land use covered more than 70% of the area and evidence of both exotic and native species in the upper or lower strata occur. Typically, these areas include backyard trees, street trees, gardens, median strips and other small-scale features that are small isolated stands.

3.2 Native vegetation extent and field assessment

Assessment and mapping of native vegetation into PCTs was based upon the validation and extent of the vegetation mapped by OEH (2016). Field survey was undertaken on 28 October 2022 by Sophie Starrett (Consultant Ecologist) and Edwin Vaca (Field Ecologist). Areas of vegetation were traversed whilst recording the vegetation structure and dominant species within each structural layer. The field surveys were conducted to identify the extent of native vegetation, validate PCT boundaries and map the extent of vegetation zones (variation in the broad condition state of vegetation polygons) in accordance with the BAM.

A total of 0.80 ha of the 3.89 ha subject land was identified as supporting native vegetation. A 0.04 ha area within the north eastern portion of the subject land contained planed horticultural natives and exotic species scattered around a car park area. The remainder of the subject land consists of clear lands and infrastructure (3.05 ha, approximately 78% of the subject land). Areas that are not native vegetation do not require further assessment, except where they represent habitat for threatened species. The area of planted natives and exotics was found in a degraded condition, with the base of all shrub species been surrounded by concrete roads, therefore plot data in accordance with the BAM (2020) was not collected for this vegetation zone. Lastly, scattered trees along the northern boundary of the subject land, are consistent with native vegetation communities identified within the subject land. However, the total area covered by the scattered native trees (0.03 ha) was too small for a floristic pot, and therefore, this vegetation zone was agglomerated with a larger vegetation zone for assessment. This is discussed further in **Section 3.5.1**.

Two vegetation integrity (VI) plots were conducted as part of the field surveys to inform the presence of two PCTs, representing two vegetation zones (**Table 3.1**). Effort was made to place VI plots in locations that avoided ecotones and edges of vegetation zones; however, given the small size of some vegetation zones, linear nature of the vegetation present and location of vegetation within subject land, this was unavoidable.

Two PCTs were validated within the subject land; PCT 1395 – *Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion* and PCT 1800 – Swamp Oak open forest on riverflats of the Cumberland Plain and



Hunter valley. These PCTs correspond to TECs listed under the BC Act and EPBC Act. Further details are provided in **Section 3.4**.





Figure 3.1: Regional vegetation community mapping (OEH 2016)



3.3 Plant Community Type selection and descriptions

A summary of the PCT and vegetation zones within the subject land is provided in **Table 3.1**. A description of the vegetation communities, including justification for the assigned vegetation community and PCT, is provided in the following sections.

In determining the PCT for the subject land, various attributes were considered in combination to assign vegetation to the best fit PCT. Attributes included (but not limited to) consideration of dominant species in each stratum and relative abundance, community composition, previous vegetation mapping, soils and landscape position. Reference was made to the PCT descriptions in the NSW Vegetation Information Sydney (VIS) Classification Database (DPE 2022b) and the final scientific determinations for assignment of TECs.

Based on the attributes considered above, two PCTs were identified and mapped within the subject land:

- PCT 1395 Narrow-leaved Ironbark Broad-leaved Ironbark Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion (Disturbed condition class)
- PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley (Disturbed and Scattered Paddock Trees (SPT) condition class)

PCT 1800 was recorded in two condition classes, disturbed (0.16 ha) and SPT (0.03 ha), however, the area for PCT 1800 in a SPT condition was too small for VI plot data to be collected in accordance with the BAM (2020). Therefore, this vegetation zone was agglomerated with a larger vegetation zone, consistent with PCT 1800, for assessment.

In 2022 the NSW Department of Planning and Environment (DPE) released the revised East Coast PCT Classifications. In late 2022, the old PCTs were decommissioned and the new PCTs were activated, however at the time of preparing this BDAR, the new PCTs have not yet been incorporated into the BAM credit calculator (BAM-C) for use within the BOS. As such, this BDAR refers to the old PCTs that are still active within BAM-C. For completeness, a conversion of old PCTs and new PCTs recorded within the subject land is provided in **Table 3.1**.

Table 3.1 details the TEC listed under the BC Act and EPBC Act, which correspond to the PCTs identified within the subject land.

Veg. Zone	Plant Community Types (PCTs)	Plant Community Types (PCTs)	Vegetation formation and class	Condition class	BC Act	EPBC Act	Area in subject land
1	PCT 1395 – Narrow-leaved Ironbark - Broad- leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion	<u>PCT 3321 –</u> Cumberland Shale- Sandstone Ironbark Forest	Grassy Woodlands and Coastal Valley Grassy Woodlands	Disturbed	Shale Sandsto Forest in the S Bioregion	ne Transition ydney Basin	0.61

Table 3.1: Details of vegetation communities recorded within the subject land.



Veg. Zone	Plai Cor Typ	nt nmunity bes (PCTs)	Plant Community Types (PCTs)	Vegetation formation and class	Condition class	BC Act	EPBC Act	Area in subject land
	<u>PC</u> Swa ope	<u>T 1800</u> – amp Oak en forest on	<u>PCT 4023 –</u> Coastal Valleys and		Disturbed	Swamp Oak Floodplain Forest of the NSW North Coast.	Coastal Swamp Oak (Casuarina glauca)	0.16
2	riverflats of the Cumberland Plain and Hunter valley		Swamp Oak Coas Riparian Flood Forest Weth	Coastal Floodplain Wetlands	SPT	Sydney Basin and South East Corner Bioregions	Forest of New South Wales and South East Queensland	0.03
Total (native vegetation)						·	0.80	
-	-			-	Planted natives and exotics	-	-	0.04



3.3.1 PCT 1395 – Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion

NSW VIS overview	
Plant community type (PCT)	Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion
Old PCT ID / New PCT ID	PCT 1395 / PCT 3321
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Percent cleared	80%
Conservation status	BC Act and EPBC Act - Critically Endangered Ecological Community (CEEC)
Subject land description	
Description and occurrence	Cumberland Shale-Sandstone Ironbark Forest is found on the fringes of the Cumberland Plain. It is one of a suite of forests that are associated with the subtle intergrade between clay-rich shale soil and the coarse sandy substrates of the sandstone plateau. It is most extensively distributed on the western edge of the Woronora Plateau and above the Nepean and Georges rivers between Appin and the Holsworthy defence area. It is a moderately tall eucalypt forest with a mixed understorey of sclerophyll shrubs and grasses (Tozer et al. 2010). Sites invariably have one of two species of Ironbark (<i>Eucalyptus crebra</i> or <i>Eucalyptus fibrosa</i>) present in the canopy along with Grey Gum (<i>Eucalyptus punctata</i>) and Red Bloodwood (<i>Corymbia gummifera</i>). Spotted Gum (<i>Corymbia maculata</i>) and Blackbutt (<i>Eucalyptus pilularis</i>) are included amongst the canopy in the Appin and Wedderburn area respectively. A sparse cover of tall Casuarinas (<i>Allocasuarina littoralis / Allocasuarina torulosa</i>) is common. The understorey supports a mix of shrubs that are common on shale substrates such as Blackthorn (<i>Bursaria spinosa</i>) and those more commonly associated with sandstone soils such as Geebungs (<i>Persoonia</i> spp.). Beneath this diverse mix of shrubs is a high cover of grass and forbs. The grass layer includes a wide range of species, most of which occur more extensively on the Cumberland Plain.
Study area / Subject land	0.83 ha / 0.61 ha
Upper stratum	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark), <i>Eucalyptus fibrosa</i> (Red Ironbark), <i>Allocasuarina littoralis</i> (Black She-Oak), <i>Eucalyptus punctata</i> (Grey Gum)
Middle stratum	Persoonia linearis (Narrow-leaved Geebung), Bursaria spinosa subsp. spinosa (Native Blackthorn), Ozothamnus diosmifolius (White Dogwood), Hibbertia aspera (Rough Guinea Flower)
Ground stratum	Lepidosperma laterale (Variable Sword-sedge), Cheilanthes sieberi subsp. sieberi (Rock Fern), Aristida vagans (Threeawn Speargrass), Pratia purpurascens (Whiteroot), Microlaena stipoides var. stipoides (Weeping Grass) , Entolasia stricta (Wiry Panic), Lomandra multiflora (Many-flowered Mat- rush), Themeda australis, Panicum simile (Two-colour Panic), Echinopogon caespitosus (Bushy Hedgehog-grass), Pomax umbellata (Pomax), Dichondra repens (Kidney Weed) , Billardiera scandens (Hairy Apple Berry), Opercularia diphylla (Stinkweed)

Table 3.2: PCT 1395 description within the subject land.



Vegetation Zones	One vegetation zone – 'Disturbed'			
	PCT classification was limited to consideration of canopy composition as little native shrub and understorey cover was present.			
Justification for PCT selection	PCT 1395 in a 'Disturbed' condition class exists in small patches along the western and eastern boundaries of the subject land. These areas support a thin canopy of <i>Eucalyptus crebra</i> (Narrow-leaved Ironbark), <i>Eucalyptus punctata</i> (Grey Gum), <i>Eucalyptus tereticornis</i> (Forest Red Gum) and <i>Eucalyptus microcorys</i> (Tallowwood). No <i>Eucalyptus moluccana</i> (Grey Box) was recorded suggesting soils present are on the shale-sandstone transition rather than purely shale derived. The shrub layer was generally sparse to absent and was dominated by exotic species such as <i>Lycium ferocissimum</i> (African Boxthorn), <i>Olea europaea subsp. cuspidata</i> (African Olive), <i>Solanum nigrum</i> (Black-berry Nightshade) and <i>Araujia sericifera</i> (Moth Vine). The ground layer was mown limiting identification, however, it was largely dominated by exotic species, such as <i>Ehrharta erecta</i> (Panic Veldtgrass), <i>Plantago lanceolata</i> (Lamb's Tongues), <i>Trifolium repens</i> (White Clover) and <i>Gamochaeta purpurea</i> (Purple Cudweed), native species present within the ground layer were <i>Microlaena stipoides</i> (Weeping Grass), <i>Dichondra repens</i> (Kidney Weed) and <i>Cynodon dactylon</i> (Couch).			

*Species in **bold**, denote species recorded within subject land.



Figure 3.2: PCT 1395 in a disturbed condition, western boundary





Figure 3.3: PCT 1395 in disturbed condition, northern boundary. *Lycium ferocissimum* (African Boxthorn) and exotics dominating the ground and shrub layer



3.3.2 PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley

NSW VIS overview				
Plant community type (PCT)	Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley			
Old PCT ID / New PCT ID	PCT 1800 / PCT 4023			
Vegetation formation	Forested Wetlands			
Vegetation class	Coastal Floodplain Wetlands			
Percent cleared	60%			
Conservation status	BC Act – Endangered Ecological Community (ECC) - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EPBCT Act – ECC - Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community			
Subject land description				
Description and occurrence	Cumberland Swamp Oak Riparian Forest (NPWS 2002, Tozer 2003) is found on the riverflats of the Cumberland Plain in western Sydney and in the Hunter Valley (NPWS 2000c). The distinguishing feature is the prominent stands of Swamp Oak (<i>Casuarina glauca</i>) found along or near streams. Often these are relatively young trees, swarming amongst a mix of old and young eucalypts such as Rough-barked Apple (<i>Angophora floribunda</i>), Forest Red Gum (<i>Eucalyptus tereticornis</i>) and Grey Box (<i>Eucalyptus moluccana</i>). This community features an open grassy and herbaceous understorey, as is typical of riverflat forests. It may be that this is a pioneering community that is re-establishing following clearing. It is known that many creek lines in western Sydney are slightly saline, particularly during drought (Benson and Howell 1990). Water tables are likely to rise following clearing, bringing salt water closer to the surface. This may explain why the salt tolerant Swamp Oak is so prolific in these environments and in many instances appears to survive where the Eucalypt species do not. Similar dynamics appear to occur in the Hunter Valley (Williams 1993).			
Study area / Subject land	0.19 ha / 0.19 ha			
Upper stratum	Angophora floribunda (Rough-barked Apple); Casuarina glauca (Swamp Oak); Eucalyptus baueriana (Blue Box); Eucalyptus moluccana (Grey Box); Eucalyptus tereticornis (Forest Red Gum)			
Middle stratum	Bursaria spinosa (Native Blackthorn); Casuarina glauca (Swamp Oak); Melaleuca decora; Melaleuca nodosa; Melaleuca styphelioides (Prickly-leaved Tea Tree); Acacia decurrens (Black Wattle); Brunoniella australis (Blue Trumpet); Dianella longifolia (Blueberry Lily); Dichondra repens (Kidney Weed); Lomandra longifolia (Spiny-headed Mat-rush); Maytenus silvestris (Narrow- leaved Orangebark); Ozothamnus diosmifolius (White Dogwood); Polyscias sambucifolia (Elderberry Panax)			
Ground stratum	Commelina cyanea (Native Wandering Jew); Echinopogon ovatus (Forest Hedgehog Grass); Einadia hastata (Berry Saltbush); Entolasia marginata (Bordered Panic); Microlaena stipoides var. stipoides (Weeping Grass); Pratia purpurascens (Whiteroot); Senecio hispidulus (Hill Fireweed); Veronica plebeia (Trailing Speedwell); Wahlenbergia gracilis (Sprawling Bluebell)			

Table 3.3: PCT 1800 description within the subject land.



	One vegetation zone – 'Disturbed'.
Vegetation Zones	Areas of PVT 1800 were also found in a SPT condition (0.03 ha); however, these were too small for assessment using BAM VI plots, therefore, assessment for this patch was agglomerated with PCT 1800 in a disturbed condition / one vegetation zone.
Justification for PCT selection	PCT classification was limited to consideration of canopy composition as little native shrub and understorey cover was present. Particularly in areas where PCT 1800 was found in an SPT condition, as these areas were located within an existing car park. No shrub layer was present, the ground layer was cover in concrete and <i>Melaleuca styphelioides</i> . (Prickly-leaved Tea Tree), was the dominant canopy species.
	PCT 1800 in a 'disturbed' condition was identified where a canopy of <i>Casuarina glauca</i> (Swamp Oak) was observed as the dominant canopy species. These patches generally included stands of Swamp Oak with an exotic ground layer made up of exotic grassed and forbs and thus have been assigned a 'Disturbed' condition class.



Figure 3.4: PCT 1800 in a 'disturbed' condition, north eastern boundary.





Figure 3.5: PCT 1800 is a 'SPT' condition, northern boundary within existing car park

3.3.3 Planted natives and exotics

Planted natives and exotics, where identified within the car park located on the northern section of the subject land (**Figure 3.6**). Planted natives consisted of various cultivar species such as *Callistemon* spp and *Grevillia* spp. (Peaches and Cream) and *Eucalyptus robusta* (Swamp mahogany), which have been planted within the car par grounds and therefore contained no shrub or ground layer. This assemblage of native species is not consistent with any Plant Community Type, as held within the Bionet Vegetation Classification Data Collection. Exotic species were identified around the base of the planted native cultivars, with the rest of the ground paved for the car park. Exotic species included species such as *Dietes iridioides* (African Iris), *Cenchrus clandestinus* (Kikuyu Grass) and *Eragrostis curvula* (African Lovegrass).





Figure 3.6: Planted native cultivars and exotics, located in car part northern section of the subject land.





Figure 3.7: Field validated mapping within the subject land (Ecoplanning 2022)

ecoplanning

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ecology | planning | offsets







3.4 Threatened Ecological Communities

3.4.1 Shale Sandstone Transition Forest of the Sydney Basin Bioregion

PCT 1395 is a component of Shale Sandstone Transition Forest of the Sydney Basin Bioregion CEEC listed under the BC Act and EPBC Act. The criteria for listing under the BC Act differ from the EPBC Act listing in that more stringent condition thresholds apply. The EPBC Act focuses on capturing the most valuable stands of Shale Sandstone Transition Forest (SSTF), whilst largely excluding the heavily degraded patches that do not meet minimum condition thresholds.

Application of the condition thresholds (outlined in **Table 3.4** below) determined that PCT 1395 in a 'Disturbed' condition within the subject land is consistent with Class B - Moderate condition class stand of *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* CEEC listed under the EPBC Act, which applies to patches \geq 0.5 ha AND where \geq 50% of the perennial understorey vegetation is made of native species.

3.4.2 Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community

PCT 1800 is in part a component of *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community* ECC listed under the EPBC Act. The EPBC Act focuses on capturing the most valuable stands of the ECC, whilst largely excluding the heavily degraded patches that do not meet minimum condition thresholds.

Application of the condition thresholds (outlined in **Table 3.5** below) determined that PCT 1800 in a 'Disturbed' condition within the subject land does not meet the condition thresholds to form part of the ECC. The total patch size for PCT 1800 (0.19 ha), in a 'Disturbed' (0.16 h condition and 'SPT' condition (0.03 ha), does not meet the minimum patch size (0.5 ha) and it does not have a predominantly native understorey, as required by the community thresholds. As such no further assessment is required.

Additionally, PCT 1800 is equivalent to the EEC Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, listed under the BC Act. The BC Act does not have condition criteria like the EPBC Act, and therefore captures all stands of this ECC regardless of condition and/or nature of previous disturbances. Thus, PCT 1800 in both a 'Disturbed' and 'SPT' condition, within the subject land, are considered to be part of the Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions TEC



Category and Rationale	Thresholds			
	Patch size >0.5ha And >30% of the perennial understorey vegetation cover is made up of native species. And			
A. Moderate condition class Represented by medium to large-size patch as part of a larger native vegetation remnant and/or with mature trees	The patch is contiguous with a native vegetation remnant (any native vegetation where cover in each layer present is dominated by native species) >1ha in area	Or	The patch has at least one tree with hollows or at least one large locally indigenous tree (>80cm dbh).	
B. Moderate condition classPatch siRepresented by medium to large size patch with high quality native understorey>50% of the perennial und made up of the perennial understorey		n size >0.5ha And Inderstorey vegetation cover is of native species.		
C. High condition class Represented by medium to large size patch with very high-quality native understorey	Patch size >0.5ha And >70% of the perennial understorey vegetation cover is made up of native species.			
D. High condition class Represented by larger size patch with high quality native understorey	Patch size >2ha And >50% of the perennial understorey vegetation cover is made up of native species.			
Perennial understorey vegetation cover includes vascular plant species of both the ground layer and mid/shrub layer (where present) with a lifecycle of more than two growing seasons. Measurements of perennial understorey vegetation cover exclude annuals, cryptogams, leaf litter or exposed soil. Contiguous means the patch of the ecological community is continuous with, or in close proximity (within 100 m) to another area of vegetation that is dominated by native species in each vegetation layer present.				

Table 3.4: EPBC Act condition classes and thresholds for Shale Sandstone Transition Forest of the Sydney Basin Bioregion



Condition thresholds Patch size classes → Vegetation quality classes	Large patch The patch is at least 5 ha	Medium patch The patch is at least 2 ha and less than 5 ha	Small contiguous** patch The patch is at least 0.5 ha and less than 2 ha, and is connected to a larger area of native vegetation of at least 5 ha	Small patch The patch is at least 0.5 ha and less than 2 ha
HIGH QUALITY Predominantly native understorey Non-native species comprise less than 20% of total understorey vegetation cover*	CATEGORY A A large patch that meets key diagnostics and has a <u>predominantly</u> native understorey	CATEGORY B A <u>medium patch</u> diagnostics and native understore OR A <u>small patch</u> that diagnostics and native understore <u>contiguous</u> ** with of native vegetat	CATEGORY C A <u>small patch</u> that meets key diagnostics and has a <u>predominantly</u> native understorey	
GOOD QUALITY Mostly native understorey Non-native species comprise less than 50% of total understorey vegetation cover* AND transformer species*** comprise less than 30% of total understorey vegetation cover*	CATEGORY B A <u>large patch</u> that meets key diagnostics and has a mostly native understorey	CATEGORY C A <u>medium patch</u> diagnostics and understorey OR A <u>small patch</u> that diagnostics and understorey and another <u>large</u> are vegetation		
MODERATE QUALITY Some native understorey Non-native species comprise less than 80% of total understorey vegetation cover* AND transformer species*** comprise less than 50% of total understorey vegetation cover*	CATEGORY C A <u>large or mediu</u> meets key diagr <u>some</u> native und	<u>um patch</u> that nostics and has derstorey		

Table 3.5:	EPBC Act condition	classes and threshole	ds for Coastal Sv	vamp Oak Forest

*Refers to total perennial understorey vegetation cover for the patch of the ecological community. Includes vascular plant species of all layers below the canopy with a life-cycle of more than two growing seasons. It includes herbs (graminoids and forbs), grasses, shrubs and juvenile plants of canopy species, but does not include annual plants, cryptogams, plant litter or exposed soil. Areas of little to no understorey vegetation cover (e.g. plant litter) are included if key diagnostics are met and non-native species are below thresholds.

Contiguous means the patch is connected or in close proximity (within 30 m) to another area of native vegetation. *Transformer species (e.g. Chrysanthemoides monilifera, Asparagus spp, Pennisetum spp, Ipomoea spp. etc.) are nonnative plant species with the potential to permanently change the character, condition, form or nature of patches of the ecological community. See p. 43 for further information on weeds, including transformer species. Annual weeds, such as *Symphyotrichum subulatum* (saltmarsh aster), may be seasonally very abundant and temporarily restrict the development of native species, but would not be counted as transformer weeds in determining condition.



3.5 Vegetation zones and vegetation integrity

3.5.1 Vegetation integrity survey plots

Two VI survey plots were completed in the subject land to meet the requirements of the BAM. See **Appendix A** and **Appendix B** for data captured and **Figure 3.8** for the location of VI plots.

The number of plots was consistent with the requirements as outlined within Table 3 of the BAM (see **Table 3.6**). Given the proximity and size of each vegetation zone, plots were orientated as best as possible to capture the most representative parts of each zone and to avoid ecotones, zone boundaries and disturbances such as tracks. However, this was not always possible.

The total area of PCT 1800 in a 'SPT' condition (0.03 ha) was too small to be assessed via a VI plot. Additionally, the areas of SPT were located on the edges of an existing car park, where the ground was covered by concrete, eliminating any shrub and ground layer. Identification of this PCT was based solely on canopy species. Thus, for the aforementioned reasons the area of PCT 1800 in an 'SPT' condition was agglomerated with the larger patch of PCT 1800 in a disturbed condition, which contained native ground cover.

PCT Name	Condition / Vegetation Zone	Area in Study Area	Area in Subject Land	Number plots required (completed)
<u>PCT 1395</u> – Narrow-leaved Ironbark - Broad- leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion	Disturbed (VZ 1)	0.83 ha	0.61 ha	1 (BAM01)
<u>PCT 1800</u> – Swamp Oak open forest on	Disturbed (VZ 2)	0.19 ha	0.16 ha	1 (BAM02)
riverflats of the Cumberland Plain and Hunter valley	SPT (combined with VZ 2)	0.19 ha	0.03 ha	(combined with VZ 2)

Table 3.6:	Number of VI plots	required for eac	h vegetation zone	based on their	respective sizes
			0		

3.5.2 Current and future vegetation integrity scores

Vegetation integrity scores were calculated based on the VI survey plots collected for each vegetation zone. Data collected for each plot is included in **Appendix A**. The VI scores for each vegetation zone are shown in **Table 3.7** and are representative of a condition score / class out of 100. It is anticipated that all native vegetation will be removed for the development therefore the future VI scores have been left at the default; zero.

Mag			Area	Vegetation Integrity Score		
zone	РСТ	Condition class ir		Before development	After development	
1	PCT 1395	Disturbed	0.61	33.4	0	

Table 3.7:	Vegetation	Integrity	Scores.

Veg zone	PCT	Condition class	Area impacted (ha)	Vegetation Integrity Score	
				Before development	After development
2	PCT 1800	Disturbed and SPT	0.19	30.1	0




Figure 3.9: Vegetation zones within subject land



4 Threatened species

Section 5 of the BAM details the process for determining the habitat suitability for threatened species.

Under the BAM, threatened species are separated into two classes, 'ecosystem' and 'species' credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or which a targeted survey has a low probability of detection, are identified a 'ecosystem' credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey are identifiable as species credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

For some threatened species, they are identified as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species foraging habitat is an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the subject land, and the results of the targeted surveys for candidate threatened species.

4.1 Threatened species for assessment

Threatened species that require assessment are initially identified based upon the following criteria:

- the distribution of the species includes the IBRA subregion in which the subject land occurs
- the subject land is within any geographic constraints of the distribution of the species within the IBRA subregion
- the species is associated with any of the PCTs identified within the subject land
- the native vegetation cover within an assessment area including a 1,500 m buffer around the subject land and is equal to or greater than the minimum required for the species
- the patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species
- the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the above criteria is completed through the BAM Calculator. The PCT identified within the subject land, patch size and native vegetation cover, as outlined in **Section 2.2** and **Section 3**, were entered into the BAM Calculator and a preliminary list of ecosystem and species credit species was tabulated.



4.2 Ecosystem credit species

A review of the predicted ecosystem credit species was conducted to determine the likelihood of species occurring on the subject land. The review considers whether necessary habitat components are present as described above. For the purpose of this report, all species were included (**Table 4.1**).

Scientific Name / Common Name	Habitat Constraints / Geographic Limitation	Included / Excluded	BC Act status*	EPBC Act status*
Anthochaera phrygia Regent Honeyeater (Foraging)		Included	CE	CE
Artamus cyanopterus cyanopterus Dusky Woodswallow		Included	V	-
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)		Included	V	E
Calyptorhynchus lathami Glossy Black-Cockatoo (Foraging)	 Other Presence of Allocasuarina and casuarina species 	Included	V	-
Chthonicola sagittata Speckled Warbler		Included	V	-
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)		Included	V	-
Dasyurus maculatus Spotted-tailed Quoll		Included	V	E
<i>Glossopsitta pusilla</i> Little Lorikeet		Included	V	-
<i>Hieraaetus morphnoides</i> Little Eagle (Foraging)		Included	V	-
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Foraging)	 N/A Waterbodies Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines 	Included	V	-
<i>Hirundapus caudacutus</i> White-throated Needletail		Included	-	V
<i>Lathamus discolor</i> Swift Parrot (Foraging)		Included	E	CE



Micronomus norfolkensis

Eastern Coastal Free-tailed Bat

Included

V

Scientific Name / Common Name	Habitat Constraints / Geographic Limitation	Included / Excluded	BC Act status*	EPBC Act status*
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Foraging)		Included	V	-
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Foraging)		Included	V	-
<i>Pandion cristatus</i> Eastern Osprey (Foraging)		Included	V	-
<i>Petroica boodang</i> Scarlet Robin		Included	V	-
<i>Petroica phoenicea</i> Flame Robin		Included	V	-
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Foraging)		Included	V	V
Stagonopleura guttata Diamond Firetail		Included	V	-

* CE- Critically Endangered; E- Endangered, V- Vulnerable

4.3 Identify candidate species (species credit species)

Candidate species (species credit species) predicted to occur within the development footprint (as determined by the BAMC), their associated habitat constraints, geographic limitations and sensitivity to gain class are included in **Table 4.2**.

In accordance with Section 5.2.3 of the BAM, a predicted candidate species can be considered unlikely to occur with the subject land (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to use the area. Justification for the exclusion of species credit species from further assessment is detail on **Table 4.2**



Scientific Name / Common	Habitat Constraints /	Sensitivity to	BC Act	EPBC Act	lustification for species inclusion or evolusion
Name	Geographic Limitation	Gain Class	status*	status*	oustilleation for species inclusion of exclusion
<i>Acacia bynoeana</i> Bynoe's Wattle		High	E	V	Excluded: The species is currently known from 30 locations, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. The subject land falls outside these regions. Additionally, some of the main threats of to the species include clearing, weed invasion, road, trail and powerline maintenance (TSSC 1999), within the subject land, areas have been cleared for past development, are constantly mown and are disturbed by weeds. Therefore, the subject land is unlikely to provide suitable habitat for the species.
<i>Acacia pubescens</i> Downy Wattle		High	V	V	Excluded: The known distribution for the species is concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon, all areas outside the subject land. Furthermore, the subject land is subject to active maintenance and disturbance from mowing, therefore, the subject land is unlikely to provide suitable habitat for the species.
Anthochaera phrygia Regent Honeyeater (Breeding)	OtherAs per mapped area	High	CE	CE	Excluded: The subject land is not part of the species Important Habitat Area Map
Caladenia tessellata Thick Lip Spider Orchid		Moderate	E	V	Excluded: The subject land is actively disturbed by landscape maintenance activities, such as mowing, and degraded by weed species. These impacts are listed as main threats to the species, thus habitat within the subject land is unlikely to provided suitable habitat for the species.
<i>Callistemon linearifolius</i> Netted Bottle Brush		Moderate	V	-	Excluded: Urban development is one of the main threats to the species. The study area and its immediate surroundings have been previously cleared for industrial warehouse developments and major roads (Hume Motorway). Currently, the subject land is disturbed by weeds and active landscape management (mowing). Thus, habitat within the subject land is degraded and is unlikely to provide suitable habitat for the species.

Table 4.2: Assessment of candidate species within the subject land



Scientific Name / Common	Habitat Constraints /	Sensitivity to	BC Act	EPBC Act	Justification for species inclusion or exclusion
Name	Geographic Limitation	Gain Class	status*	status*	
<i>Calyptorhynchus lathami</i> Glossy Black-Cockatoo (Breeding)	 Hollow bearing trees Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground 	High	V	-	<u>Excluded:</u> Subject land does not contain any hollow bearing trees.
Deyeuxia appressa		High	E	E	Excluded: Given the species hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology. However, the subject land is disturbed (mowing, clearance and weeds), therefore suitable habitat for the species in unlikely to be present within the subject land.
Dillwynia tenuifolia		Moderate	V	-	Excluded: The subject land is located outside the know core distribution for the species. Additionally, the peak flowering period for the species is from August to March, site assessment did not record the species within the subject land, which is in a disturbed condition.
<i>Dillwynia tenuifolia -</i> endangered population <i>Dillwynia tenuifolia,</i> Kemps Creek	 Bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool LGA 	High	E	-	Excluded: The subject land is located outside the geographic distribution of the endangered population.
Epacris purpurascens var. purpurascens		Moderate	V	-	<u>Excluded:</u> The subject land is subject to constant disturbance (mowing), which impacts the likelihood of suitable habitat been present. Further, site assessments and VI plots did not record the species within the subject land.
Grevillea parviflora subsp. parviflora Small-flower Grevillea		High	V	V	Excluded: Key threatening process for the species, such as clearing, urban development, road maintenance and weeds, are present within the subject land due to past clearing, industrial warehouse development, landscape mowing and weed species present. These processes have degraded the subject land, thus its unlikely that suitable habitat is available for the species.



Scientific Name / Common Name	Habitat Constraints / Geographic Limitation	Sensitivity to Gain Class	BC Act status*	EPBC Act status*	Justification for species inclusion or exclusion
Grevillea parviflora subsp. supplicans	- North of the Great Western Highway	High	E	-	Excluded: The subject land is located outside the geographic distribution of the species.
Gyrostemon thesioides	 Other Sandy, alluvial or colluvial soil within 50 m of a water course 	High	E	-	Excluded: In NSW, known from hillsides, slopes, terraces and riverbanks within 180 metres of watercourses. Although, a mapped watercourse is located outside the norther boundary of the subject land, there is no evidence of hillsides, slopes, terraces and riverbanks present. Moreover, the subject land primarily consists of warehouses and area with native vegetation are disturbed and consistently mown. Thus, suitable habitat for the species is not present.
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (Breeding)	 Other Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines 	High	V	-	Excluded: Within 1 km of the subject land there is limited potential foraging habitat (rivers, lakes, large dams or creeks, wetlands and coastlines). The mapped first order stream outside the northern boundary of the subject site, did not present evidence of any water flow. Limited mature living trees suitable for breeding habitat are present within the subject land, site assessment did not identify any stick nest. Therefore, the subject land does not provide suitable breeding habitat for the species.
Hibbertia puberula		High	E	-	 <u>Excluded:</u> the subject land is degraded due to active mowing, weed invasion and previous clearing. Thus, potential suitable habitat for the species is not present. Additionally, site assessment during the flowering period of the species (October) did not record the species within the subject land.
<i>Hibbertia spanantha</i> Julian's Hibbertia		High	CE	CE	Excluded: the species is known to be restricted to three known locations in the northern Sydney suburbs of Turramurra, North Ryde and Cheltenham. Furthermore, the subject land is disturbed by active mowing and weeds, thus, suitable habitat for the species is not present within the subject land.
Hibbertia superans		High	E	-	Excluded: Grows ins ridgetop woodlands. Weed invasion and disturbance from active mowing have degraded habitat within



Scientific Name / Common	Habitat Constraints /	Sensitivity to	BC Act	EPBC Act	lustification for species inclusion or evolusion
Name	Geographic Limitation	Gain Class	status*	status*	Justification for species inclusion of exclusion
					the subject land, as such potential habitat for the species is not present within the subject land.
<i>Lathamus discolor</i> Swift Parrot (Breeding)	OtherAs per mapped area	Moderate	E	CE	Excluded: The subject land is not part of the species Important Habitat Area Map.
Leucopogon fletcheri subsp. fletcheri	 Other Slopes nearby rocky areas or within 50 m Rocky areas Weathered laterite over sandstone on sandstone ridges, outcrops 	High	E	-	Excluded: The subject land does not contain any of the habitat constraints for the species.
<i>Litoria aurea</i> Green and Golden Bell Frog	 Semi- permanent/ephemeral wet areas Within 1km of wet areas Swamps Within 1km of swamp Waterbodies Within 1km of waterbody 	High	E	V	Excluded: Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.), these flora species were not present within the subject land. Additionally, water-bodies capable of sustain a population of the species is not present within the subject land. The 1 st order stream, located outside the norther boundary of the subject land, did not show evidence of water. Thus, habitat within and immediately surround the subject land, do not present suitable habitat for the species.
Marsdenia viridiflora subsp. viridiflora - endangered population Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	- Blacktown, Camden, Campbelltown, Canterbury, Bankstown, Cumberland, Fairfield, Liverpool and Penrith LGAs (as amended from the Determination))	Moderate	E	-	Excluded: Habitat degradation by past clearing, active mowing and weeds within the subject land limit any potential habitat for the species. Additionally, site assessment during the species flowering period (October – spring) did not identify the species.

Scientific Name / Common	Habitat Constraints /	Sensitivity to	BC Act	EPBC Act	
Name	Geographic Limitation	Gain Class	status*	status*	Justification for species inclusion or exclusion
Maundia triglochinoides	 Other Riparian areas/drainage lines, water ponding, man- made dams and drainage channels up to 1 m deep Semi- permanent/ephemeral wet areas Swamps Shallow swamps up to 1 m deep Waterbodies Shallow waterbodies up to 1 m deep 	High	V	-	<u>Excluded:</u> The subject land does not contain any of the habitat constraints for the species.
<i>Melaleuca deanei</i> Deane's Paperbark		Very High	V	V	Excluded: The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone. The subject land has been largely disturbed by mowing and weeds, additionally, clearing for the existing industrial development limits any potential habitat. Thus, its unlikely potential habitat is present within the subject land.
<i>Meridolum corneovirens</i> Cumberland Plain Land Snail		High	E	-	<u>Retained:</u> The species is known from Shale Gravel Transition Forests and the margins of River-flat Eucalypt Forest. Typically, lives under litter of bark, leaves and logs. Suitable habitat occurs within subject land, species retained as a candidate species.
<i>Miniopterus australis</i> Little Bent-winged Bat. (Breeding)	 Cave Cave, tunnel, mine, culvert or other structure thought to be used for breeding including species records with microhabitat code "IC - in cave. 	Very High	V	-	<u>Excluded:</u> Habitat constraints absent – no suitable breeding or structures present within the subject land



Scientific Name / Common	Habitat Constraints /	Sensitivity to	BC Act	EPBC Act	luctification for anapies inclusion or evolution
Name	Geographic Limitation	Gain Class	status*	status*	Justification for species inclusion or exclusion
	 "observation type code "E nest-roost "with numbers of individuals >500 or from the scientific literature 				
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Breeding)	 Cave Cave, tunnel, mine, culvert or other structure thought to be used for breeding including species records with microhabitat code "IC - in cave " observation type code "E nest-roost " with numbers of individuals >500 	Very High	V	-	<u>Excluded:</u> Habitat constraints absent – no suitable breeding or structures present within the subject land
<i>Myotis macropus</i> Southern Myotis	 Waterbodies Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other, on or within 200m of the site. 	High	V	-	 <u>Excluded:</u> The subject land does not contain any hollow bearing trees, bridges, caves or other artificial structures, which can be used by the species for rooting or breeding habitat. No mapped streams are present within the subject land. However, within 200 m of the northern boundary of the subject land, a first order stream is present. This stream, however, did not present evidence of permanent pools of water, which is an important habitat constraint for potential foraging habitat for the species. As such, it's unlikely that potential habitat for the species is present within the subject land



Scientific Name / Common	Habitat Constraints /	Sensitivity to	BC Act	EPBC Act	Justification for species inclusion or exclusion
Name	Geographic Limitation	Gain Class	status*	status*	
<i>Pandion cristatus</i> Eastern Osprey (Breeding)	 Other Presence of stick- nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting) 	Moderate	V	-	<u>Excluded:</u> No stick nests were identified during site assessment. Additionally, the subject land is not located within 100 m of a floodplain.
<i>Persicaria elatior</i> Tall Knotweed	 Semi- permanent/ephemeral wet areas or within 50m Swamps or within 50m Waterbodies including Wetlands, or within 50 m 	High	>	V	 <u>Excluded:</u> The main identified threats to Knotweed are damage to populations from road and track maintenance activities, clearing and hydrological changes to wetlands (DECC 2005). The subject land does not contain any watercourses; however, a 1st order stream is mapped outside the norther boundary of the subject land. This mapped stream did not present evidence of water flow or wet areas (at the time of survey). It was evident that the bed and bank of this mapped steam had been altered, likely due to development of the local industrial areas. This, therefore, will result in hydrological changes to the mapped stream. Furthermore, habitat within the subject land is degraded due to weeds and active landscape mowing. As a result, potential habitat for the species is not present within the subject land.
<i>Persoonia bargoensis</i> Bargo Geebung		High	Е	V	Excluded: Although, <i>Persoonia</i> spp. are known to benefit from disturbance on margins, such as roadsides, however, the
Persoonia hirsuta Hairy Geebung		High	E	E	subject land is actively mown, which would largely impact any potential areas of habitat. Furthermore, across the subject land the shrub layer was largely absent and ground layer has been
Persoonia nutans Nodding Geebung		Moderate	E	E	impacted by weed species. Thus, it's unlikely that suitable habitat for the species is present within the subject land.



Scientific Name / Common Name	Habitat Constraints / Geographic Limitation	Sensitivity to Gain Class	BC Act status*	EPBC Act status*	Justification for species inclusion or exclusion
Petaurus norfolcensis Squirrel Glider		High	V	-	Excluded: Suitable habitat not present within the subject land. No hollow bearing trees and ground cover is disturbed by regular clearing.
<i>Phascolarctos cinereus</i> Koala	- Other - Presence of Koala use trees - refer to Survey Comments field in TBDC	High	E	E	<u>Included:</u> The subject land covered by the Campbelltown Koala Plan of Management (CKPoM) (Phillips 2018). Although, the subject land is not mapped as core or potential kola habitat under the CKPoM, Koala Feed Trees (KFT) according to the plan are present within the subject land (<i>Eucalyptus tereticornis</i> , and <i>Eucalyptus punctata</i>). As the proposal will impact these species, a Koala Activity Assessment Report (KAAR) was conducted for the study area. Evidence of Koala activity was not found within the study area (further details in Section 4.4) therefore no species polygon has been prepared.
<i>Pilularia novae-hollandiae</i> Austral Pillwort		High	E	-	Excluded: The species is known to grow in shallow swamps and waterways, often among grasses and sedges. Such habitat is not present within the subject land.
Pimelea curviflora var. curviflora		High	V	V	Excluded: Distribution for the species is confined to the coastal area of the Sydney and Illawarra regions. It's known to occur on ridgetops and upper slopes amongst woodlands. These habitat constraints are not present within the subject land and the subject land is outside the known distribution of the species.
<i>Pomaderris brunnea</i> Brown Pomaderris		High	E	V	Excluded: The species is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden, which are outside the subject land. Additionally, the subject land is actively disturbed by active mowing and weeds. Therefore, potential habitat for the species is not present within the subject land.
Pommerhelix duralensis Dural Land Snail		High	E	E	<u>Retained:</u> The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris.



Scientific Name / Common	Habitat Constraints /	Sensitivity to	BC Act	EPBC Act	Justification for species inclusion or exclusion
Name	Geographic Limitation	Gain Class	status	Status	Suitable habitat occurs within subject land, species retained as a candidate species.
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Breeding)	- Other - Breeding camps	High	V	V	Excluded: No flying-fox camps within the study area.
<i>Pterostylis saxicola</i> Sydney Plains Greenhood		Moderate	E	E	 <u>Excluded:</u> The species is most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. Given the subject land is actively mown and the majority is covered by an industrial warehouse and associated infrastructure, it's unlikely that the disturbed habitat present would provide suitable habitat for the species.
<i>Pultenaea pedunculata</i> Matted Bush-pea		High	E	-	 <u>Excluded:</u> Habitat within the subject land is disturbed by active mowing, past clearance and weed species. The active mowing within the subject land will degrade the potential habitat suitability for the species. Additionally, site assessment conducted in October, during the species flowering period, did not identify the species within the subject land.
Tetratheca glandulosa		High	V	-	 <u>Excluded:</u> distribution for the specie sis restricted to the following LGAs; The Hills Shire, Gosford, Hawkesbury, Hornsby, Ku-ringgai, Northern Beaches, Ryde and Wyong. Key threats to the species include competition from weeds, such as Kikuyu grass, which is present across the subject land. Further the subject land is actively mown, thus, suitable habitat is not present within the subject land for the species.



4.4 Targeted fauna surveys

Review of available literature, habitat constraints and vegetation conditions within the subject land indicated that suitable habitat is present for three of the predicted candidate species credit species, *Meridolum corneovirens* (Cumberland Plain Land Snail) (CPLS), *Phascolarctos cinereus* (Koala) and *Pommerhelix duralensis* (Dural Land Snail) (DLS), and therefore require targeted fauna surveys. Targeted surveys for CPLS and DLS were conducted concurrent with the SAT surveys conducted for Koala and details in **Appendix E.** No live specimens or shells were recorded within the subject land, therefore both species are considered to be absent from the site and no species polygon has been prepared.

The subject land contains KFTs in accordance with the CKPoM (Phillips 2018) for the *Phascolarctos cinereus* (Koala) species credit species, to comply with the CKPoM a Koala Activity Assessment Report was conducted, which included targeted surveys for the species, details in **Appendix E**. The targeted surveys did not identify evidence of Koala presence within the study area therefore no species polygon has been prepared.



4.5 Identifying potential prescribed biodiversity impacts on threatened species

Prescribed biodiversity impacts are defined under Clause 6.1 of the BC Reg and Section 6 of the BAM 2020 and include impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. The presence of biodiversity values prescribed by the BC Reg 2017 and BAM 2020 have been considered in context of the subject land below (**Table 4.3**). It is unlikely that potential prescribed biodiversity impacts on threatened species would occur as a result of the proposal.

	Descentible of Displice of the large of	December within the Only in the L
	Prescribed Biodiversity Impacts	Presence within the Subject Land
(a)	the impacts of development on the following habitat of threatened species or ecological communities: (i) karst, caves, crevices, cliffs, rocks and other geological features of significance, (ii) human made structures, (iii) non-native vegetation,	The subject land does not contain areas of cliffs, crevices, rocks and other geological areas of significance. Man-made structures on site are associated with a warehouse and car park. The warehouse buildings are in use and in good condition, therefore, it's unlikely that species such as microbats utilise these areas for roosting. The non-native vegetation is comprised of exotic pasture and weeds (including sporadic woody weeds). The majority of the subject land is regularly disturbed by mowing of the grass layer, therefore, habitat value for threatened species is limited.
(b)	the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range (impacts on movement of threatened species that maintains lifecycles –BC reg)	No threatened species were found within the subject land. The area surrounding the is primarily an industrial area with limited vegetation and potential habitat. In addition, the study area is bound by major roads, such as Campbelltown Road to the west and Airds Road to the east. These all act as hard barriers for any potential threatened species movement or dispersal. Therefore, it's unlikely that the development will impact connectivity or movement of threatened species.
(c)	the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),	The site does not contain any watercourses. However, a 1 st order stream is present outside the northern boundary of the subject land, as no impacts are proposed to this area (outside the subject land), implementation of a CEMP will ensure no degradation to the 1 st order stream as a result of the development.
(d)	the impacts of wind turbine strike on threatened and protected animals,	Not applicable.
(e)	the impacts of vehicle strike on threatened species or fauna that are part of a threatened ecological community.	Any vehicle movement on site will be managed and potential impacts to fauna mitigated by the CEMP. Furthermore, threatened species (or general fauna) are considered unlikely to be present within subject land, due to the disturbed nature of the subject land, which primarily contains a warehouse building and car park. Given that the proposed development in similar to the existing industrial warehouse building the development will not

Table 4.3: Prescribed Biodiversity Impacts.



Prescribed Biodiversity Impacts	Presence within the Subject Land	
	further fragment any fauna which may be present within the area. Therefore, vehicle strikes on fauna are low.	



5 Avoiding and minimising impacts on biodiversity

5.1 Avoiding and minimising impacts on native vegetation and habitat during project planning

In accordance with Section 7 of the BAM, actions taken to avoid and minimise impacts through locating the project must be documented and justified in the BDAR. Impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas:

- lacking biodiversity values
- where the native vegetation or threatened species habitat is in the poorest condition (i.e., areas that have a low VI score)
- that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or a TEC or a PCT that is highly cleared.
- outside of the buffer area around breeding habitat features such as nest trees.

The proposal has been located within land zoned as *IN1: General Industrial*, which is fit for purpose of the proposed warehouse development. The majority of the proposed footprint (**Figure 1.3**) will be over the existing industrial warehouse. However, native vegetation, consisting of PCT 1395 in a disturbed condition (0.61 ha) and PCT 1800 in a disturbed and SPT condition (0.19 ha), will need to be removed as part of the proposal due to the earthworks required. Following Ecoplanning's site assessment, which identified native vegetation along the boundaries of the subject land, the proponent investigated alternative civil designs to avoid impacts to areas of biodiversity values within the subject land.

The alternative design involved the construction of retaining walls to avoid level changes, which would impact vegetation along the boundaries of the subject land, whilst still maximising the primary site uses. An assessment of potential impacts to the tree protection zones (TPZ) and/or the structural root zones (SRZ) of the trees to be impacted as a result of the alternative civil designs was undertaken by Canopy Consulting (2022). The report concluded that construction of retaining walls would result in impacts to the soil structure from increased soil permeability, compaction due to machinery movement and damage to tree roots within the TPZ and/or SRZ in areas were reduced ground levels are required. Therefore, Canopy Consulting (2022) determined that given the current footprint of the built design and level required to achieve engineering standards, the location of the retaining walls did not mitigate level changes entirely, which would ensure tree viability, or did not reduce cut or fill activities to an acceptable level allowing tree retention. Additionally, alterations to levels beyond the TPZ of trees in the north western and western subject land boundaries are required to avoid drainage issues and flooding. In the event that trees within these areas could be retained, the overall impact to soil hydrology and therefore access to soil moisture is likely to be impacted (Canopy Consulting 2022).

A response to submission (RtS) from Campbelltown Council relating to Version 1.0 of this report, indicated insufficient efforts to avoid and minimise impacts to native vegetation had been made by the project. As a result, the proponent attempted to avoid and/or minimise impacts to native vegetation within the subject land by investigating alternative designs, the following subsequent design changes were investigated and flood modelling scenarios considered in an attempt to increase retention of native vegetation within the subject land.



- Trees along the western boundary were originally impacted due to the location of a site office, relocation of this office was investigated to enable the alternative placement of firefighting infrastructure. This action, in addition to local re-grading to achieve compliance with flood planning levels, attempted to avoid impact to several trees in the north west corner of the site.
- Flood modelling scenarios, which attempted to retain additional trees along the western boundary and north western corner of the subject land, still showed water level changes, in the northern channel (and property north of that channel) outside the subject land, greater than 20 mm, and a reasonable area along the northern boundary of the subject land predicted water levels over 15 mm. Ecoplanning understands that previous discussion between the proponent, structural engineers and council have identified that impact thresholds for offsite water level impacts are to be maintained at 10-15 mm, therefore, flood modelling results, where additional trees could be retained, result in unacceptable flood impacts. In contrast, flood modelling scenarios, where the trees on the north western corner of the subject land are removed and coupled with further flood storage in the western carpark area, show good improvements to the offsite water level impacts, models indicate these are generally below 15 mm, or between 15-20mm within the trunk drainage corridor.

Trees along the eastern boundary will be impacted by the need to provide sufficient carparking in compliance with the DCP and provide adequate stormwater infrastructure to comply with flood planning requirements and discharge through the nominated discharge points. The SRZ of these trees would be impacted by hardstand and/or installation of deep stormwater and building services infrastructure. As a result, avoidance was not achieved in this area

Impacts to vegetation could not be avoided via alternative designs due to the earthworks required to meet engineering standards and offsite water level impact thresholds. Therefore, future plantings within the subject land should be consistent with native species consistent with the current PCTs on site. Lastly, implementing a Construction Environmental Management Plan (CEMP) will help to minimise and mitigate any unforeseen or unexpected impacts to biodiversity on areas outside the subject land.

5.2 Avoiding and minimising prescribed biodiversity impacts during project planning

The nature of prescribed impacts mean they can be difficult to offset through the provision of biodiversity credits (e.g., impacts to caves, rocky outcrops and flyways) and cannot be readily replaced. **Section 4.5** above has considered prescribed biodiversity impacts in relation to the proposal and determined that prescribed impacts are unlikely as a result of the proposal.

Efforts to avoid and minimise impacts to native vegetation and habitat in relation to the project location and design have been described above. These efforts are applicable to any potential unforeseen prescribed biodiversity impacts.

5.3 Adaptive management for uncertain impacts

Impacts associated with the proposal are largely certain and associated with the direct impacts due to vegetation clearing. Uncertain impacts associated with the proposal would likely be limited to inadvertent impacts to adjacent vegetation or construction activities requiring a modified design or process. The effect of altering surface and groundwater flow paths can be



uncertain and can result in unanticipated modification of native vegetation through the increase or decrease in soil moisture. Given that a mapped 1st order stream is located outside the northern boundary of the subject land, a CEMP must be in place prior to works commencing to mitigate and avoid uncertain impacts to the stream.

During the construction and operation phase of the project, the works should be undertaken in accordance with any licence issued under by the NSW Environment Protection Authority or the controls under the NSW *Protection of the Environment Operations Act 1997*.

Aside from the need for a CEMP, no additional adaptive management measures are proposed.



6 Assessing and offsetting impacts

6.1 Assessing impacts to native vegetation and habitat

The proposed development will include direct impacts to 0.80 ha of native vegetation, including PCT 1395 *Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion* in a 'disturbed' condition (0.61 ha) and PCT 1800 *Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley* in a 'disturbed' (0.16 ha) and 'SPT' (0.03 ha) conditions. The direct clearing and subsequent development of the subject land would represent a permanent impact, or loss, of this native vegetation and habitat (**Figure 6.1**). As outlined in **Section 3.5.2** of this BDAR, and in accordance with Section 8.1.1.5 of the BAM, the future VI score for all vegetation within the subject land has been assigned 0.

Targeted threatened species surveys were conducted for CPLS, GLS and Koala and no threatened species were recorded.

6.2 Assessing indirect impacts on native vegetation

It is difficult to quantify indirect impacts associated with the project (construction and operation phases), but these may include impacts such as noise, erosion, altered run-off regimes or inadvertent impacts to adjacent habitat or vegetation. Indirect impacts will be managed through the development of a CEMP during construction and the Operational Management Plan (OMP) during the operational phase.

The project is considered unlikely to reduce viability of any adjacent native vegetation or habitat due to edge effects, noise, dust, or light spill as these impacts are already occurring within the area. The local area is primarily an industrial business area and major roads surrounding the subject land, such as Campbelltown Road, Airds Road and the Hume Motorway, already have some impact due to noise and light spill.

Nevertheless, implementing a CEMP and OMP will include weed control measures to minimise and mitigate any unforeseen or unexpected impacts to biodiversity as a result of weed spreading and other indirect impacts. Sediment and erosion controls will also be put in place according to best practices (Landcom 2004). An assessment of indirect impacts is provided in **Table 6.1**.



Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	The subject land is in close proximity to a small patch of vegetation mapped as 'Urban exotic /native' (OEH 2016). This patch of vegetation is fragmented from by major roads (Campbelltown Road and the Hume Motorway) further west and currently subject to indirect impacts (noise and light spill) from the surrounding roads and industrial businesses. Construction activities in proximity to the boundaries of the subject land present a risk of inadvertent impacts including accidental vegetation damaged during works etc. The current condition of land outside the north western corner of the subject land is unknown, however, precautions should be put in place to avoid any further impacts to this small patch. Although the consequence of inadvertent impacts is potentially high, the probability is low based on the implementation of relevant mitigation measures (Section 6.4).	Mapped Urban exotic / native vegetation outside the subject land	Ongoing during construction and clearing phase	Ongoing during construction and clearing phase	Ongoing during construction and clearing phase
Reduced viability of adjacent habitat due to edge effects	The subject land is bound by industrial business to the north and south, which do not present habitat connectivity. Within the north western boundary of the subject land, a small patch of vegetation is present, which presents connectivity with native vegetation within the subject land, however, no impacts are proposed to this area. The risk of additional edge effects to these areas is considered low with a low consequence as the proposed development will not fragment any remaining vegetation.	Mapped Urban exotic / native vegetation outside the subject land	Ongoing during construction and operation activities	Throughout the construction and operation period	Short term
Reduced viability of adjacent habitat due to noise, dust or light spill	Indirect impacts from noise, dust and light spill on nearby habitat is considered low. Noise and light spill impacts are already impacting the subject land and surrounding areas due to local industrial business and major road. Any additional impacts will be temporary and intermittent. It is anticipated that clearing will be restricted to daytime, therefore artificial light spill is unlikely to increase.	Subject land	Ongoing during construction activities	Throughout the construction period	Short term
Transport of weeds and pathogens from the site to adjacent vegetation	There is low potential to transport weeds and pathogens to nearby vegetation, following the implementation of the CEMP. The current condition of vegetation outside the north western boundary of the subject land is unknow, however, its mapped as "urban exotic / native' (OEH 2016), implementing weed management measures during construction and operational phases to reduce the risk of pathogens and weeds invading vegetation outside the subject land.	Mapped Urban exotic / native vegetation outside the subject land	Ongoing during construction activities	Throughout the construction period	Ongoing during construction and clearing phase

Table 6.1: Assessment of indirect impacts



Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Increased risk of starvation, exposure and loss of shade or shelter		NA	NA	NA	NA
Loss of breeding habitats	Loss of breeding habitats habitats located adjacent to the development site.		NA	NA	NA
Trampling of threatened flora speciesThe development is not expected to result in any indirect impacts resulting from trampling of threatened flora species given no individuals are to be retained within the development site, and none were recorded in areas adjacent to the site.		NA	NA	NA	NA
Inhibition of nitrogen fixation and increased soil salinity The development is not expected to result in any inhibition of nitrogen fixation.		NA	NA	NA	NA
Fertiliser drift	The development is not expected to result in any fertiliser drift.	NA	NA	NA	NA
Rubbish dumping	The development could result in a minor increase in rubbish dumping as people use the future development. This would likely be minor in nature and managed by providing waste disposal facilities and fencing of the subject land from adjacent areas.	The operational footprint	Ongoing during construction and operation activities	Throughout the construction and operation period	Potentially long term
Wood collection	The development is not expected to result in any wood collection.	NA	NA	NA	NA
Bush rock removal and disturbance	The development is not expected to result in any bush rock removal or disturbance.	NA	NA	NA	NA
Increase in predatory species populations	The development could result in a minor increase in predatory species by attracting feral foxes closer. This would likely be minor in nature, as the area is already serving as an industrial business development and the proposed development will not change the	The operational footprint and surrounding area	Ongoing during construction and operation activities	Throughout the construction and operation period	Potentially long term
Increase in pest animal populations	The development could result in a minor increase in pest and vermin animal species. This would likely be minor in nature, given the proposed development is similar to the existing industrial warehouse and can be managed by providing waste disposal facilities.	The operational footprint and surrounding area	Ongoing during construction and operation activities	Throughout the construction and operation period	Potentially long term
Increased risk of fire	The development is not expected to result in any increased risk of fire.	NA	NA	NA	NA

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Disturbance to specialist breeding and foraging habitat, e.g., beach nesting for shorebirds.	The development is not expected to result in any disturbance to specialist breeding and foraging habitat.	NA	NA	NA	NA



6.3 Other legislative requirements

6.3.1 State Environmental Planning Policy (SEPP) – Biodiversity and Conservation 2021 – Chapter 4 Koala habitat protection

Within NSW, the state government has developed state environmental planning policies (SEPPs) to address development which may impact certain environmental or ecological values. SEPPs give guidance on how a development may minimise its impacts on the respective environmental or ecological feature. SEPP Biodiversity and Conservation (2021) – Chapter 4 - Koala Habitat Protection is relevant to the proposed development.

Clause 4.8 of the SEPP (2021) provides that a council's determination of a DA must be consistent with any approved Koala plan of management that applies to the land.

The Campbelltown Comprehensive Koala Plan of Management (CKPoM) was prepared in 2018 and approved by the Secretary of the Department of Planning, Industry and Environment (DPIE) on 30 July 2020. Accordingly, the provisions of the CKPoM govern the DA for the proposed development, and assessment of potential Koala habitat and presence have been assessed in accordance with the CKPOM (Section 6.3.2, Appendix D and Appendix E).

6.3.2 Campbelltown Koala Plan of Management

The CKPOM (2018) provides a strategic approach to the protection, management and restoration of Koala habitat within Campbelltown LGA. Part 5 of the CKPOM describes how proposals for development must assess the potential impacts of development on Koalas and their habitat, with planning controls varying depending on whether the land to be impacted by the development is identified as core Koala habitat, potential Koala habitat, or displays indications that Koalas use the land. Figure 6.1 of the CKPOM (2018) outlines the steps required to determine the appropriate level and methods of assessment.

Application of the CKPoM (Phillips 2018) framework to the proposed development has determined that a Vegetation Assessment Report (VAR) and a Koala Activity Assessment Report are required. A VAR is required as the study area is located within the Campbelltown LGA and the DA for the development is not for an area <1 ha and requires the removal of native vegetation. Subsequently, a KAAR is also required as the site contains >15% Koala Feed Trees (KFT). The VAR and KAAR assessments required for the site are detailed in **Appendix D** and **Appendix E**.

The VAR concluded that the subject land is to be classed as 'potential Koala Habitat' (CKPoM 2018), as the total number of trees in the upper or lower strata of native vegetation within the subject site constitutes to >15% of the total number of trees types listed in Schedule 2 of SEPP44 (KFTs) and (P)KFT as listed in CKPoM (2018).

The Spot Assessment Techniques (SAT) (Phillips and Callaghan 2011), conducted as part of the KAAR, determined that no Koalas, or Koala activity indicated by presence of scratches or faecal pellets, were recorded present on site, thus, Koala activity levels within the area assessed are zero.

Nevertheless, as the subject land has been classified as 'potential Koala habitat'. The proposed development must comply with Section 6.4.8 – Planning controls in 'potential Koala habitat' (CKPoM 2018).



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Section 6.4.8 requires the proposal to demonstrate, to the satisfaction of Council that retention of (P)KFTs > 200mm DBH has been maximised and that the proposed tree removal will not prejudice the overall vision, aims and objectives of the Plan.

Section 5, of this BDAR highlights the actions taken by the proponent to avoid and minimise impacts on biodiversity within the subject land. As noted in this section, cut and fill requirements to achieve engineering standards have resulted in a need to remove (P)KFTs > 200mm DBH.

The overall vision of the plan is to "provide for the long-term maintenance of a viable, freeranging Koala population in the Campbelltown LGA" (CKPoM 2018). Although, (P)KFTs within the subject land cannot be retained, the proposed development will not prejudice the overall vision of the CKPoM, given that extensive survey, as part for the KAAR, did not identify evidence of Koalas within the subject land and the already fragmented and disturbed nature of vegetation within the subject land.

Additionally, Section 6.4.8 of the CKPoM indicated that Council may exercise discretion in terms of requiring the development to conform Sections 6.4.3 – 6.4.6 of the Plan. These sections, however, are only applicable to residential developments/subdivision or where a new roads or road upgrades are proposed in areas that traverse areas of Koala habitat and are predicted to accommodate in excess of 1,500 vehicle movements/day. The proposed development is not likely to accommodate vehicle movements in excess of 1,500 vehicle movements/day.

Lastly, as the subject land is consistent with the CKPoM's definition of 'potential Koala habitat' by the CKPoM (2018), Section 7 of the plan applies to the proposed development. Section 7 of the CKPoM, includes provisions for compensation of trees removed from Koala habitat 'to provide a standardised approach to the compensation and offsetting of Koala habitat loss with a transparent assessment process that enables loss to be quantified'.

Where a proponent chooses to seek the removal of (P)KFTs or shelter trees in accordance with a DA, as detailed in Section 7 of the Plan, provision must be made to compensate for the loss of the associated habitat. Compensation units are used to calculate the compensation owing per tree, based on categories set for minor or major developments. The proposed development is classified as 'major' development as the DA relating to this proposed development requires the removal of three or more (P)KFTs for each hectare of assessable land to which the DA relates.

The total compensation units required to compensate for the removal of (P)KFTs within the subject land is **\$456,210.00**. Appendix F, details how compensation units were calculated and how Section 7 applies to the proposed development.

6.3.3 Matters of National Environmental Significance

Threatened entities listed in the EPBC Act, such as threatened species or threatened ecological communities, require separate assessment to determine if a development will have a significant impact on relevant threatened entities. The Significant Impact Criteria, published by the Commonwealth Department of the Environment (2013), was applied to the Dural Land Snail, as areas within the subject land are contain potential suitable habitat for the species despite it not being recorded during targeted survey.



The significant impact assessment for the DLS is detailed in **Appendix C**. The assessments concluded that the proposal will not have a significant impact on the DLS, given that the potential impact is small, areas are already disturbed and fragmented by local industrial businesses and road, and mitigation methods will avoid indirect impacts to areas outside the study area. Therefore, referral in accordance with the EPBC Act is not required.

Additionally, a significant impact assessment for the Shale Sandstone Transition Forest is detailed in **Appendix C**. The assessments concluded that the proposal will not have a significant impact on the Shale Sandstone Transition Forest CEEC, given that the proposed impact is small, will not fragment surrounding vegetation, and mitigation methods will avoid indirect impacts to areas of mapped 'urban exotic / native' (OEH 2016) outside the subject site. Therefore, referral in accordance with the EPBC Act is not recommended.

6.3.4 Serious and Irreversible Impacts (SAII)

This section documents the additional impact assessment provisions for communities and species at risk of SAII (Section 9.1.1 and Section 9.1.2 of the BAM) relevant to the proposal:

• PCT 1395 Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain (Shale Sandstone Transition Forest in the Sydney Basin Bioregion CEEC)

Detailed consideration of whether impacts on the Shale Sandstone Transition Forest (SSTF) are serious and irreversible are included in **Table 6.2**. Consideration was given to the principles and criteria set out in the *Guidance to assist a decision-maker to determine a serious and irreversible impact* (OEH 2017b)

SAII (BAM [2020], Section 9.1.1)	Response
 The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII 	The actions and measures taken to avoid direct and indirect impacts on the patch of SSTF within the subject land are outlined in Section 5.1 of this report.
	A CEMP will be implemented for the duration of the project to reduce the potential of indirect or inadvertent impacts outside of the development footprint.
 2) The assessor must consult the TBDC and/or sources to report on the current status of the TEC including: a) Evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal) 	NSW scientific determination (NSW Scientific Committee 2014) for the TEC estimated the total extent of the TEC to be 9,600 ha (in 2010). This represents approximately 20-40% of the pre-European distribution of the TEC. It is likely that a majority of the TEC was cleared prior to 1970, however, the less fertile components of this community were not cleared as extensively for agriculture as the vegetation on soils with a higher clay content. More recently, urban development has resulted in further loss. The estimated loss of the TEC since 1970 is not known.

 Table 6.2:
 SAII assessment for Shale Sandstone Transition Forest



SAII (BAM [2020], Section 9.1.1)	Response
2) b) extent of reduction in ecological function for the TEC using evidence that describe the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC	Across its range, SSTF is likely to have been subject to considerable change in composition, structure, function and connectivity. The scientific determination refers to a very severe reduction in its ecological integrity through fragmentation, structural alteration, weed invasion and decline in native species diversity, particularly fauna.
 Regulation) indicated by: i) change in community structure ii) change in species composition iii) disruption of ecological processes iv) invasion and establishment of exotic species v) degradation of habitat, and vi) fragmentation of habitat 	Historical aerial imagery from 1960s shows the subject land and surrounding area to have been cleared. Following that, aerial imagery from the 70s and 80s, shows development of roads and the current industrial warehouse with no evidence of canopy species present. These impacts would suggest the subject land would have been subject to changes in community structure, ecological processes, habitat degradation and fragmentation.
	Similar to other remnants of this TEC across NSW, the subject land is regularly mown as part of landscape maintenance. The TSSC (2014) describes mowing and grazing (including feral herbivores such as rabbits) as activities which contribute to the loss of sensitive species (Douglas and James, pers. comms., 2011)
2) c) evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the:	Maps of the ecological community and associated data from DECCW (2009) and Tozer et al.(2010) indicate that the present geographic distribution of the ecological community is 'restricted' with the total area of occupancy <10,000 ha.
 i) extent of occurrence ii) area of occupancy and iii) number of threat-defined locations 	DECCW (2010) estimates the remaining extent of the ecological community to be approximately 20% of the original extent. Based on this estimate, the ecological community is considered to have undergone a 'severe' decline (> 70%) in geographic extent.
	SSTF is restricted to the outer edges of the Cumberland Plain in western Sydney. There are no known threat-defined locations.
2) d) evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC	The TBDC only lists Application of ecological fire management" as a management action. However, there is no data to address this matter.
Regulation)	The Cumberland Plain Recovery Plan (DECCW 2011) details that the protection and management of large, intact remnants of TECs within the Cumberland Plain is more effective and efficient compared to protection and management of smaller, fragmented remnants.
3) Where the TBDC indicates data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Subsection 9.1.1(2.), the assessor must record this in the BDAR or BCAR.	Not applicable
4) a) In relation to the impacts from the proposal on the TEC at risk of	The proposal will impact 0.61 ha of SSTF (within the subject land).

SAII (BAM [2020], Section 9.1.1)	Response
 an SAII, the assessor must include data and information on: i) in hectares, and ii) as a percentage of the current geographic extent of the TEC in NSW 	The proposed impact of 0.61 ha of SSTF within the subject land constitutes to approximately 0.006% of the occurrence of the TEC, within its current geographic extent in NSW.
 4) b) the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by: i) estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals ii) describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by: distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and estimated maximum dispersal distance for native flora species characteristic of the TEC, and other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development 	 Within 500 m of the proposed development footprint regional vegetation mapping by OEH (2016) and Tozer et. al (2010) estimate different amounts of areas corresponding to the TEC. OEH (2016) estimates that approximately 2.24 ha of the community will remain outside the subject land, whereas Tozer et. al (2010) maps the entire 500 m buffer as 'cleared land'. The proposal will only impact 0.61 ha of the community as part of the development within the subject land. Therefore, it's possible that within a 500 m radius of the proposed development an approximate 1.63 ha of this community will remain, this is likely to be an underestimate given regional mapping by OEH (2016) maps several areas as 'Urban exotic and native', validation of these areas could increase the total area size of the potential TEC remaining. The 0.61 ha of PCT 1395 which is to be impacted by the proposed development, has already been fragmented from other areas of native vegetation, largely due industrial development (warehouses) and major roads within the locality. OEH (2016) maps the nearest potential stand of SSTF approximately 180 m away from the subject land. Should the currently fragmented vegetation present within the subject land be removed, other patches of potential SSTF (also fragmented) would retain an average distance of approximately 400 m. One vegetation zone, representing SSTF, has been assessed as present within the subject land. VI scores for the vegetation zone, relevant composition, structure and function scores are detailed in Appendix A and Section 3.3 of this report.
iii) describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition structure and	
function condition scores for each vegetation zone	

SAII (BAM [2020], Section 9.1.1)	Response
5.) The assessor may also provide	No new information is provided.
new information that demonstrates	
that the principle identifying that the	
TEC is at risk of an SAII is not	
accurate.	









6.4 Mitigation and management of impacts on biodiversity values

As all impacts to biodiversity cannot be avoided by the proposal, the mitigation measures proposed below (**Table 6.3**) will assist with ensuring that direct and indirect impacts are mitigated to the fullest extent practical.

6.4.1 Construction Environmental Management Plan (CEMP)

A site-specific CEMP will be developed prior to construction taking place and implemented during the construction phase of the project. The CEMP will incorporate adaptive management principles. The CEMP will outline management actions to avoid inadvertently causing additional impacts to those described in this BDAR. Management actions will avoid and/or limit the potential for indirect offsite impacts and include an appropriate erosion and sedimentation control plan and weed control activities. Any management actions should follow best practice protocols such as Landcom (2004) or the RMS Biodiversity Guidelines (2011).

A number of non-threatened fauna species such as birds and reptiles are likely to be present at the subject land. Therefore, an appropriate pre-clearance and fauna management protocol, and unexpected finds procedure will be put in place at the time of construction to avoid and mitigate any potential harm or injury to these individuals.

6.4.2 Operational Management Plan (OMP)

A site-specific OMP will be developed prior to operational commencing and will be implemented over the life of the project. The OMP will include management actions to avoid inadvertently causing additional impacts to those described in this BDAR. Management actions will avoid and/or limit the potential for indirect offsite impacts.

6.4.3 Pre-clearance protocols

It is possible that fauna, such as common birds and reptiles are present within the site at the time of construction. Appropriate pre-clearance protocols are to be put in place at the time of vegetation clearing to mitigate and avoid potential harm or injury to these individuals. These protocols should be included in the CEMP. They should include, as a minimum, pre-clearance surveys, clearing supervision and soft-felling techniques where habitat trees are required to be removed. Habitat trees are those that provide sheltering or breeding habitat for fauna and include, but not limited to hollow branches or stick nests. These protocols should be adaptive depending on site specific conditions. As habitat trees (where nests or other habitat features are identified) have not been identified within the subject land (at the time of survey), a pre-clearance survey should aim to identify any active nests prior to works commencing.

Soft-felling techniques as part of vegetation clearing encourages fauna to relocate outside of the disturbance footprint prior to habitat clearing or alternatively provide an opportunity to move fauna during vegetation clearing works. Soft felling techniques should be adaptive depending on site species conditions and reduces the chance of injury to fauna.

Should habitat trees be present in the subject land at the time of construction and soft-felling techniques required, then the project ecologist is to develop the clearing procedure in coordination with the project manager and any clearing contractors. This will include notifying WIREs or a local vet clinic prior to clearing, marking habitat trees, staged vegetation removal,



presence of a qualified wildlife handler, and a plan for the relocation of any fauna and salvageable habitat features.

Additionally, prior to clearing of vegetation:

- The subject land boundaries should be fenced to avoid impacts to vegetation proposed to retention.
- Signs should be clearly located along the fence to ensure no access to areas outside the subject land by works personnel or machinery.
- Fencing and signage should remain in place until all works are completed within the subject land.
- WIRES and the nearest veterinary clinic should be notified of the works and the potential for injured wildlife.



Identifier	Mitigation action	Development phase	Outcome	Timing	Responsibility
E01	A Construction Environmental Management Plan (CEMP) would be prepared and approved by Campbelltown City Council prior to clearing of native vegetation and threatened species habitat within the development site. The CEMP would include the following: Identification of necessary hold points to ensure all biodiversity management actions are met. i.e., pre-clearing surveys followed by stage clearing of vegetation. Preparation of maps to clearly identify construction limits and environmentally sensitive areas outside the subject land. Erosion and sediment control actions in accordance with the Blue Book (Landcom 2004) to be implemented during construction phases. Updates to avoid and minimise indirect impacts to threatened species habitat and ecological communities located adjacent to the development site. Any required updates to the site induction procedure.	Pre-construction	Flora and fauna would be managed in accordance with the requirements of the CFFMP; prevention of weed establishment and invasion.	Pre-construction and construction	Project ecologist Construction contractor
E02	Site inductions during construction to include a briefing regarding the local fauna of the site and protocols to be undertaken if fauna are encountered.	Construction	Prevents fauna injury/mortality	Construction	Construction contractor
E03	Prior to the commencement of clearing, the project ecologist will conduct a pre-clearing survey to confirm the absence of any nesting fauna within the trees to be removed.	Construction	Prevents fauna injury/mortality	Pre-construction	Project ecologist
E04	Vegetation occurring within the first 30 metres of the western boundary of the subject land would be monitored to ensure it is not being indirectly impacted by construction for the development (e.g., establishment of weeds, erosion and sedimentation or from earthworks). Where impacts are detected, the project ecologist would prepare an adaptive management plan to avoid further impacts.	Construction	Prevention of indirect impacts to adjacent vegetation	Monthly during construction	Construction contractor
E05	Frequent maintenance of construction machinery and plant will be undertaken to minimise unnecessary noise or air pollution.	Construction	Minimises disruption to fauna foraging, nesting or roosting behaviours	Construction	Construction contractor

Table 6.3: Proposed mitigation measures



E06	If any animal is injured during the clearing process, contact the relevant local wildlife rescue agency (e.g., WIRES) and/or veterinary surgery as soon as practical. Until the animal can be cared for by a suitably qualified animal handler, if possible, minimise stress to the animal and reduce the risk of further injury by: Handling fauna with care and as little as possible. Covering larger animals with a towel or blanket and placing in a large cardboard box. Placing small animals in a cotton bag, tied at the top. Keeping the animal in a quiet, warm, ventilated and dark location.	Construction / Operation	Prevents fauna injury/ mortality	Pre-construction, construction	Construction contractor Wildlife handler / suitably qualified Ecologist
E07	During operation, where possible, lighting fixtures will be deactivated when not required during night-time hours. If this is not possible, directional lighting or light shades will be adopted to reduce light spill into adjacent habitat.	Construction / Operation	Minimises disruption to fauna foraging, nesting or roosting behaviours	Construction	Construction contractor



7 Offset requirements and credit calculations

A biodiversity offset requirement for residual impacts of a proposed development, must be calculated in accordance with section 10.1 and section 10.2 of the BAM. The following section outlines the credit requirements for the Project in order to achieve the 'no net loss standard' as established by the BAM.

It should be noted that Biodiversity Offsets Payment Calculator (BOPC) was replaced by the Biodiversity Conservation Fund (BCF) Charge System on 17 October 2022. The new BCF Charge System will now be used to determine the amount a proponent may pay into the BCF to meet a biodiversity offset obligation. Quotes for current credit pricing can be obtained directly from the Biodiversity Conservation Trust (BCT) following the lodgement of DA.

7.1 Impacts which require an offset

Section 9.2.1 of the BAM indicates that the following vegetation zones require offsets:

- vegetation zones that have a vegetation integrity score ≥15 where the PCT is representative of an endangered (EEC) or critically endangered ecological community (CEEC)
- a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat or is a vulnerable ecological community
- a vegetation zone that has a vegetation integrity score \geq 20.

All vegetation zones within the subject land are representative of an ECC/CECC and/or had a vegetation integrity score of greater than 15 (**Table 7.1**) and, therefore, <u>require offsetting</u>.

Vegetation zone	Plant community type	Condition Class	Vegetation Integrity Score	Total impact (ha)
1	PCT 1395 - Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion	Disturbed	33.4	0.61
2	PCT 1800 - Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Disturbed and SPT	30.1	0.19
Total native vegetation			-	0.80

Table 7.1:	Vegetation zones assessed that require an offset.
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7.2 Impacts that do not require offsetting or further assessment

There are no impacts to native vegetation that do not require offsetting. Therefore, there are no areas of native vegetation of threatened species habitat that scored a vegetation integrity score below the offset condition threshold outlined above.



Impacts to areas identified as 'planted natives and exotics' within the subject land were not further assessed in this report because they could not be characterised as a native vegetation community due to lack of vegetation present.

7.3 Credit calculations and classes

7.3.1 Ecosystem credits

The ecosystem credits required to offset the proposal are provided in **Table 7.2**. Based on 0.80 ha of native vegetation removal and a VI score of 33.4 and 30.1, a total of **16** ecosystem credits are required to offset the proposed development. Biodiversity offset credits will need to be obtained by purchasing credits available on the market or by paying into the Biodiversity Conservation Fund (BCF).

Table 7.2. Leosystem creates summary and create promes.

Veg zone number	Plant community type	Condition Class	Credits required
1	PCT 1395 - Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion	Disturbed	13
2	PCT 1800 - Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Disturbed	3
Total			16

The following offset rules apply for the credit class for PCT 1395:

- Shale Sandstone Transition Forest of the Sydney Basin Bioregion. This includes PCT's: 1281 and 1395.
- In the following subregions Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo or any IBRA subrefion that is within 100 kilometres of the outer edge of the impacted site.
- Doesn't contain hollow bearing trees.

The following offset rules apply for credit class PCT 1800:

- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. This includes PCT's: 915, 916, 917, 918, 919, 1125, 1230, 1232, 1234, 1235, 1236, 1726, 1727, 1728, 1729, 1731, 1800 and 1808.
- In the following subregions Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo or any IBRA subrefion that is within 100 kilometres of the outer edge of the impacted site.
- Doesn't contain hollow bearing trees.


7.3.2 Species credits

No species credits are required to offset the proposal as no species credit species were recorded or assumed to be present within the subject land.



8 References

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Appendix A Plot data collected

Plot No.	РСТ	Area (ha)	Condition class	Zone	Easting	Northing	Bearing
1	1395	0.61	Disturbed	56	299568	6231537	156
2	1800	0.19	Disturbed	56	299788	6231459	165

Plot No.	Composition							
	Tree	Shrub	Grass	Forb	Fern	Other		
1	4	0	4	6	0	1		
2	3	0	2	2	0	1		

Plot No.	Structure							
	Tree	Shrub	Grass	Forb	Fern	Other		
1	20.1	0	10.5	3.9	0	0.5		
2	25	0	11	4	0	0.1		

		Function									
Plot No.	Large trees	Hollow trees	Litter cover (%)	Fallen logs (m)	Tree stem 5-10 cm	Tree stem 10-20 cm	Tree stem 20-30 cm	Tree stem 30-50 cm	Tree stem 50-80 cm	Tree regen	High threat exotic
1	3	0	26	9	Р	Р	Р	Р	А	А	24.3
2	1	0	10	1	А	А	А	Р	Р	Р	30

A – Absent, P – Present, NA – No benchmark data



Appendix B Flora and fauna species inventories

Flora

Family name	Scientific name	Common Name	Native/ Exotic	Cover	Abundance
		Plot 1			
Alliaceae	Allium triquetrum	Three-corned Garlic	exotic	0.1	10
Apocynaceae	Araujia sericifera	Moth Vine	high threat	1	10
Asparagaceae	Asparagus asparagoides	Bridal Creeper	high threat	1	20
	Bidens pilosa	Cobbler's Pegs	high threat	0.2	40
	Cirsium vulgare	Spear Thistle	exotic	0.1	5
	Conyza spp.		exotic	0.3	30
	Cotula australis	Common Cotula	native	0.1	1
	Gamochaeta purpurea	Purple Cudweed	exotic	1	200
Asteraceae	Hypochaeris radicata	Catsear	exotic	0.1	5
	Senecio madagascariensis	Fireweed	high threat	0.1	5
	Soliva sessilis	Bindyi	exotic	2	100
	Sonchus oleraceus	Common Sowthistle	exotic	0.5	20
	Taraxacum officinale	Dandelion	exotic	0.2	20
Brassicaceae	Lepidium africanum	Common Peppercress	exotic	0.1	1
	Lepidium bonariense	Argentine Peppercress	exotic	0.1	1
Caryophyllaceae	Stellaria media	Common Chickweed	exotic	0.5	100
	Einadia hastata	Berry Saltbush	native	0.1	5
Chenopodiaceae	Einadia nutans	Climbing Saltbush	native	0.5	20
Convolvulaceae	Dichondra repens	Kidney Weed	native	3	200
	Carex spp.		native	0.5	20
Cyperaceae	Cyperus gracilis	Slender Flat- sedge	native	1	50
	Hardenbergia violacea	False Sarsaparilla	native	0.5	3
	Lotus subbiflorus	Hairy Birds-foot Trefoil	exotic	0.1	10
Fabaceae (Faboideae)	Medicago minima	Woolly Burr Medic	exotic	0.2	50
	Trifolium dubium	Yellow Suckling Clover	exotic	0.1	10
	Trifolium repens	White Clover	exotic	2	100
Malvaceae	Modiola caroliniana	Red-flowered Mallow	exotic	1	70
Meliaceae	Melia azedarach	White Cedar	native	0.1	1
Murtoooco	Eucalyptus microcorys	Tallowwood	native	3	1
Myrtaceae	Eucalyptus punctata	Grey Gum	native	15	10



Family name	Scientific name	entific name Common Name		Cover	Abundance				
	Eucalyptus tereticornis	Forest Red Gum	native	2	1				
Oleaceae	Olea europaea subsp. cuspidata	African Olive	exotic	2	1				
Oxalidaceae	Oxalis spp.		native	0.1	10				
	Plantago lanceolata	Lamb's Tongues	exotic	2	100				
Plantaginaceae	Plantago myosuros subsp. myosuros		exotic	0.1	10				
	Bromus catharticus	Praire Grass	exotic	5	50				
	Cynodon dactylon	Couch Grass	native	4	100				
Poaceae	Ehrharta erecta	Panic Veldtgrass	high threat	15	500				
	Lolium rigidum	Wimmera Ryegrass	exotic	0.1	1				
	Microlaena stipoides	Weeping Grass	native	5	200				
	Asperula spp.	Woodruff	native	0.1	10				
Rubiaceae	Galium tricornutum	Three-horned Bedstraw	exotic	0.5	1				
Solanacoao	Lycium ferocissimum	African Boxthorn	high threat	7	10				
Solaliaceae	Solanum nigrum	Black-berry Nightshade	exotic	0.1	5				
Plot 2									
Alliaceae	Allium triquetrum	Three-corned Garlic	exotic	0.1	20				
Apiaceae	Cyclospermum leptophyllum	Slender Celery	exotic	0.1	1				
Apocynaceae	Araujia sericifera	Moth Vine	high threat	5	25				
	Arctotheca calendula	Capeweed	exotic	0.1	10				
	Conyza spp.		exotic	0.1	10				
	Gamochaeta purpurea	Purple Cudweed	exotic	0.1	10				
Asteraceae	Hypochaeris spp.		exotic	0.1	1				
	Soliva sessilis	Bindyi	exotic	0.5	50				
	Sonchus oleraceus	Common Sowthistle	exotic	0.1	5				
	Taraxacum officinale	Dandelion	exotic	0.5	20				
Caryophyllaceae	Stellaria media	Common Chickweed	exotic	0.5	100				
Casuarinaceae	Allocasuarina littoralis	Black She-Oak	native	5	3				
Casuannaceae	Casuarina glauca	Swamp Oak	native	10	20				
Convolvulaceae	Dichondra repens	Kidney Weed	native	3	500				
Cyperaceae	Cyperus gracilis	Slender Flat- sedge	native	1	20				
Fabaceae (Faboideae)	Trifolium dubium	Yellow Suckling Clover	exotic	0.1	50				
Loranthaceae	Amyema cambagei	Needle-leaf Mistletoe	native	0.1	1				
Malvaceae	Modiola caroliniana	Red-flowered Mallow	exotic	5	100				
Myrtaceae	Eucalyptus tereticornis	Forest Red Gum	native	10	3				
Oxalidaceae	Oxalis spp.		native	1	100				



Family name	Scientific name	Common Name	Native/ Exotic	Cover	Abundance
	Plantago lanceolata	Lamb's Tongues	exotic	0.1	5
Plantaginaceae	Plantago myosuros subsp. myosuros		exotic	0.1	1
	Bromus catharticus	Praire Grass	exotic	5	200
Poaceae	Ehrharta erecta	Panic Veldtgrass	high threat	25	500
	Microlaena stipoides	Weeping Grass	native	10	200

Fauna

Family	Scientific name	Common name	Native / Exotic	Observation type*
Charadriidae	Vanellus miles	Masked Lapwing	Native	O, W
Corvidae	Corvus coronoides	Australian Raven	Native	0
Leporidae	Oryctolagus cuniculus	Rabbit	Exotic	0
Meliphagidae	Manorina melanocephala	Noisy Miner	Native	O, W
Monarchidae	Grallina cyanoleuca	Magpie-lark	Native	W
Psittacidae	Trichoglossus haematodus	Rainbow Lorikeet	Native	O, W
Sturnidae	Sturnus tristis	Common Myna	Exotic	O, W

*Observation type: O = Observed, W = Heard



Appendix C Assessments of Significance

Commonwealth listings under the EPBC Act

The EPBC Act Matters of National Environmental Significance (MNES) (EPBC Act Significant Impact Guidelines) (DotE 2013) provides 'Significant Impact Criteria' that are to be used to assist in determining whether a proposed action is likely to have a significant impact on a MNES and subsequently the need for referral. MNES identified within the subject land, including the Swift Parrot, have been addressed below.

Pommerhelix duralensis (Dural Land Snail) - endangered species

The Dural Land Snail (*Pommerhelix duralensis*) is a medium sized species of land snail with a dark brown, semi-translucent shell. The Dural Land Snail is somewhat like the Cumberland Plain Land Snail (*Meridolum corneovirens*), although their ranges are parapatric. Dural Land Snail is found on low densities along the western to Norwest fringes of the Cumberland IBRA subregion in NSW, in northern vegetation communities residing on soils derived from a shale-sandstone interface bedrock. The estimated density of the species in is approximately three individuals per hectare, although this is expected to be an underestimate.

The behaviour of Dural Land Snail is dissimilar to related species (such as *M. corneovirens*) as it is not known to burrow or climb, but instead, can be found in leaf litter and on exposed rock. Its maximum dispersal range has been observed at around 1 m, and all activity has been observed at night (Ridgeway et al. 2014). It is known to be frugivorous but is expected to forage on other forms of detritus.

Fecundity is not known for Dural Land Snail, but studies on *M. corneovirens* suggests that fecundity is low. *Meridolum corneovirens* lay <32 eggs per season, with mortality of offspring being 99.8% over five years. Individuals are expected to live for up to five years, with a generation length being estimated at three to five years.

The information presented above is summarised from the EPBC Act Approved Conservation Advice (DoE 2015).

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

- lead to a long-term decrease in the size of a population,
- reduce the area of occupancy of the species,
- fragment an existing population into two or more populations,

There have been no records of the species within 5 km of the subject land (DPE 2022c). Within the subject land, the species was not detected, however there is limited potential habitat for the species (0.81 ha). Areas of potential habitat are disturbed by active maintenance and mowing, furthermore, the area of impact is already fragmented by current land use (warehouse) and surrounding roads and businesses, as such, the proposed impact is not expected to lead to a long-term decrease in the size of the population of Dural Land Snail.

The proposal will not reduce the area of occupancy on the basis that the species was not detected within the subject land during targeted survey. .



The proposal will remove 0.81 ha of potential habitat from the subject land. It is not clear how existing boundary fences may currently fragment Dural Land Snail in the immediate area, however, while the area of suitable habitat may be reduced, the proposal will not further fragment the population. Ridgeway et al. (2014) determines that poorly dispersed and, therefore, semi-isolated populations of Dural Land Snail are uniquely placed to adapt to fine-scale habitat variations given the species low investment in sheltering/borrowing behaviours, which reduce its metabolic costs in resource poor habitats. Areas of similar potential habitat (logs, leaf litter, barks) will remain outside the western boundary of the subject land.

- adversely affect habitat critical to the survival of a species,
- disrupt the breeding cycle of a population,

Little is known about the breeding cycle of Dural Land Snail, however, given that the area of impact to potential habitat is 0.81 ha, and it is situated in an industrial landscape, the proposed impact is not expected to significantly impact the breeding cycle of the species. Potential suitable habitat for the species will also remain outside the subject land, and given the species poor dispersal, and has not been recorded within 5 km of the subject (DPE 2022c) within the last 20 years, it is unlikely that the current potential habitat is critical to the survival of the species.

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

The quality of habitat within the subject land was considered relatively low for Dural Land Snail as it was located within an industrial landscape, is actively maintained and mown. In addition, the location was isolated from other areas of potential habitat, that is, vegetation within the study area is fragmented from other larger stands vegetation in the locality. Small areas out similar potential habitat will however remain outside the western boundary of the subject land. Preclearance surveys for the species will ensure that any individuals found within the areas of impact can be relocated, thereby, avoiding any decrease in population numbers.

- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat,
- introduce disease that may cause the species to decline, or

The proposed impact is not expected to result in the introduction of invasive species or diseases to the local area. The report recommends that landscaping use species endemic to the area and characteristic of the PCT 1395 and 1800.

• interfere with the recovery of the species.

The removal of 0.81 ha of non-critical habitat is not expected to impact the recovery of Dural Land Snail. Additionally, preclearance surveys for the species will ensure any individuals found within the areas of impact can be relocated, thereby, avoiding any decrease in population numbers, given the poor dispersal of the species the proposed development will not interfere with the recovery of the species.

Conclusion of EPBC Act Significant Impact Guidelines (DotE 2013) for Dural Land Snail



A referral is not recommended for the Dural Land Snail, as:

- potential habitat for the species is largely disturbed
- the proposal is unlikely to impact on the breeding cycle of nearby populations
- the proposal would not affect critical habitat (e.g., further fragment the surrounding bushland or remove essential habitat)
- there have been no records of the species within 5 km of the subject land in the past 20 years

Shale Sandstone Transition Forest of the Sydney Basin Bioregion - CEEC

The Shale Sandstone Transition Forest in the Sydney Basin Bioregion occurs only in New South Wales within the Sydney Basin Bioregion. The ecological community occurs between other ecological communities found respectively on shale sandstone or substrates. The ecological community is found to the west of Sydney, on the edges of the Cumberland Plain, (particularly the southern edge), as well as on the sandstone-dominated Hornsby, Woronora, and Lower Blue Mountains plateaux that adjoin the plain.

The ecological community is found in a range of situations across the gradient between shale based and sandstone-based soils, with its expression reflecting the level of sandstone influence on the otherwise primarily shale-associated vegetation.

Within the subject land, 0.61 ha of SSTF has been identified, which is represented by PCT 1395 – Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion (see **Section 3**).

The patch of PCT 1395 in 'Disturbed' condition (0.61 ha) contains >50% of the perennial understorey vegetation cover which is made up of native species. As such, this patch of PCT 1395 is consistent with listing criteria under the EPBC Act as class B stand of SSTF.

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

• reduce the extent of an ecological community

The proposed development requires the removal of 0.61 ha of SSTF in a 'Disturbed' condition from the subject land. 24.48 ha of potential SSTF has been mapped (OEH 2016) within a 1.5 km radius of the study area. The proposed works will reduce the extend of the ecological community, however, the impacts have been assessed as low, given loss of 0.61 ha accounts for a total reduction of 2% of the mapped TEC in the local area (1.5 km radius). This is likely to be an underestimate given areas mapped as 'Urban exotic / native' by OEH (2016) within the locality have not been ground truthed. As described in **Section 3**, these mapped units in OEH (2016) when ground truthed can be identified as native PCTs.

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

A total of 0.61 ha of SSTF within the subject land will be impacted by the proposal. This patch of SSTF within the subject land is in a 'Disturbed' condition and is surrounded by major roads, Campbelltown Road and Airds Roads, and other industrial business surrounding the study



area. This vegetation is already fragmented, thus the proposed works will not result in increased fragmentation of the TEC..

adversely affect habitat critical to the survival of an ecological community

Vegetation that meets the minimum (moderate class) condition thresholds are considered critical to the survival of the ecological community. As such, the proposed removal of the TEC within the subject land will adversely affect habitat critical to the survival of the TEC. However, based on the 24.48 ha of potential SSFT, mapped by OEH (2016), which will remain within the local area (1.5 km radius from the subject land) this impact is considered negligible in the local context.

 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 is unlikely to modify or destroy abiotic factors necessary for the survival of SSTF. These factors will continue to operate outside the subject land and mitigation measures through the implementation of the CEMP would ensure that indirect impacts (such as weed spread, sediment and nutrient transportation) would be controlled and would not impact areas outside the study area.

• 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 or fauna harvesting

The proposed development would not cause a substantial change in the species composition of an occurrence of this community. The 0.61 ha of SSTF which will be impacted is in a 'Disturbed' condition, shrub layer is very sparse and the ground layer is regularly mown and contains high threat exotic species. Furthermore, this patch of SSTF is already fragment by hard barries, such as major roads and industrial warehouses, which currently impact the functionality of this TEC within the subject land.

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

Wood exotic species such as African Olive and African boxthorn, are both present within the patch of SSTF to be impacted. These exotic species as high threat species for the community and will already be impacting the quality and integrity of the TEC. Furthermore, landscape maintenance and regular mowing of the subject land have disturbed the condition of the TEC.



Specific mitigation measures would be in place to ensure that erosion and sediment control is undertaken and weed control measures are in place (implemented through the CEMP). Would avoid any indirect impacts to areas outside the subject land.

c) interfere with the recovery of an ecological community.

The patch of SSFT in a 'disturbed' condition has experienced past disturbance, including clearing and edge effects, which have promoted the growth of exotic species, such woody exotic weeds. Additionally, the area is regularly disturbed by mowing and fragmented by hard barries such as roads and industrial warehouses. As such the removal 0.61 ha of SSTF within the subject land is unlikely to impact the recovery of the ecological community. Furthermore, the Cumberland Plain Recovery Plain (DECCW 2011), which includes recovery methos to areas of SSTF, details that the protection and management of large, intact remnants of TECs within the Cumberland Plain is more effective and efficient compared to protection and management of smaller, fragmented remnants.

<u>Conclusion of EPBC Act Significant Impact Guidelines (DotE 2013) for Shale Sandstone</u> <u>transition Forest TEC</u>

A referral is not recommended for the patch of SSTF community, as:

- only a relatively small area 0.61 ha of this community would be removed,
- the proposed activity is unlikely to interfere with the recovery of this community,
- the proposed activity is unlikely to substantially fragment the community, and the proposed activity is unlikely adversely affect habitat critical to this community



Appendix D Vegetation Assessment Report (CKPoM)

A VAR is undertaken to determine if land proposed to be developed contains any 'potential Koala habitat' that may not currently be mapped within the CKPoM. The CKPoM provides that potential Koala habitat:

- is any area of native vegetation where the trees of the types listed in Schedule 2 of SEPP44 (KFTs) constitute at least 15% of the total number of trees in the upper or lower strata of the tree component;
 - a) as identified in Figure 5.1 of this Plan, or
 - b) any other land identified as such by other processes arising from the Plan (such as a VAR).

Trees considered within this VAR

The CKPoM defines KFTs; which for the purpose of the CKPoM is required by the DoPE to be consistent with Schedule 2 of SEPP44^{1*} (for the purposes of identifying potential Koala habitat), and includes:

- Forest Red Gum (*Eucalyptus tereticornis*)
- Grey Gum (*Eucalyptus* punctata)
- Broad-leaved Scribbly Gum (*Eucalyptus* haemastoma)
- Manna Gum (*Eucalyptus* viminalis)

In addition to the tree species relevant to determining whether land is potential Koala habitat, a VAR may, in appropriate cases, consider Preferred Koala Trees ((P)KFTs) and shelter trees for the purpose of determining compensation for the removal of Koala habitat.

The CKPOM defines (P)KFT, which for the purpose of the CKPoM includes the following species (in addition to listed KFTs) that are recognised as important food trees for the Campbelltown LGA¹:

- Blue-leaved Stringybark (*Eucalyptus agglomerata*)
- Woolybutt (*Eucalyptus longifolia*)
- Grey Box (*Eucalyptus moluccana*)

Shelter Trees are defined by the CKPoM as tree species known to be preferentially utilised by Koalas in the Campbelltown LGA for roosting or thermoregulatory purposes:

- Turpentine (*Syncarpia glomulifera*)
- Brush Box (*Lophostemon confertus*)

The relevant tree species, as defined by the CKPoM and SEPP 44, which are found within the study area are detailed in **Table 8.1**, below.

¹ Refer to Appendix E for more information regarding the classification of KFTs and PKFTs.

Scientific name	Common name	CKPoM classification		
Eucalyptus tereticornis	Forest red gum	KFT		
Eucalyptus punctata	Grey Gum	KFT		
Eucalyptus microcorys	Tallowwood	KFT (SEPP 44)		
Eucalyptus robusta	Swamp mahogany	KFT (SEPP 44)		

 Table 8.1:
 Tree species defined as KFTs or listed in Schedule 2 of SEPP 44

(P)KFTs and shelter trees are considered under Chapter 7 of the CKPOM, 'Compensation for loss of Koala habitat'. Any (P)KFTs or shelter trees to be removed must be compensated for when a VAR determines that a proposed development will result in the loss of Koala habitat.

VAR requirements

A VAR required is to include:

- A description of the tallest stratum cover and details of the species composition of each vegetation community
- A checklist of native vegetation species occurring in each vegetation patch
- A survey that identifies the location identity and DBH of all native vegetation proposed to be removed and/or within 20m of the proposed development footprint
- A map of where (P)KFTs and shelter trees were recorded

This VAR is based on desktop analysis and field inspections carried out on 28 October 2022 by Sophie Starrett (Consultant Ecologist) and Edwin Vaca (Field Ecologist) as part of the BDAR prepared for the proposal (Ecoplanning 2022), field inspection conducted as part of the KAAR for this report, on 23 January 2023 by Edwin Vaca (Field Ecologist). In addition, it uses field inspection carried out on 1 March 2022 by Sophie Starrett (Consultant Ecologist) and Simon Lee (Field Ecologist) as part of an Ecological Due Diligence report (Ecoplanning 2022b) and Arboricultural Impact Assessment and Tree Protection Management Plan (Canopy Consulting 2022a & b)

A total of 0.80 ha of the 3.89 ha of the subject land and 1.02 ha of the 9.02 ha of the study area were identified as supporting native vegetation. Vegetation across the study area was identified in a disturbed or SPT condition, containing KFTs, as detailed on **Table 8.1**. Native vegetation is fragmented by major roads and industrial business, which surround the subject land. In addition, 0.09 ha is planted native and exotic vegetation, namely, Callistemon spp. and Grevillia spp. cultivar species, as well as three *Eucalyptus robusta* species planted on car park grounds and *Corymbia citriodora* (Lemon-Scented Gum) species, a non-indigenous species, scattered along the boundaries of the study area. The remainder of the study area comprises cleared land and infrastructure approximately 8.13 ha.

Based on the floristic composition of vegetation within the subject site, two PCTs have been identified:

- PCT 1395 Narrow-leaved Ironbark Broad-leaved Ironbark Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion
- PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley



Distribution of these PCTs is shown in **Figure 3.7** of this report. Detailed assessment and description of vegetation within the subject land is discussed in **Section 3** of this report.

The tallest native stratum differed across the subject land depending on the PCT present. The tallest stratum in areas of PCT 1395 consisted of species such as *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus sideroxylon* (Mugga Ironbark), *Eucalyptus punctata* (Grey Gum), *Eucalyptus microcorys* (Tallowwood), and *Eucalyptus crebra* (Narrow-leaved Ironbark). Areas of PCT 1800 contained species such as *Casuarina glauca* (Swamp She Oak), *Casuarina cunninghamiana* (River She Oak), *Melaleuca styphelioides* (Prickly-leaved Tea Tree) and *Eucalyptus tereticornis* (Forest Red Gum). Lastly, although, the planted native and exotic areas were identified within the car park of the current warehouse, it contained canopy species such as *Eucalyptus robusta* (Swamp mahogany).

Species considered (P)KFT or shelter trees under the CKPoM and/or SEPP 44 within the tallest stratum of the subject land are detailed in **Table 8.1.** A summary of the vegetation communities within the subject land is provided in **Table 3.1** of this report.

Native tree species within the study area have been identified and mapped in the Arboricultural Impact Assessment and Tree Protection Management Plan by Canopy Consulting (2022a). A total of 207 trees were identified, of which 202 are proposed for removal.

Of the 202 trees within the subject land proposed for removal, 56 (29%) are of a species recognised within the CKPoM as KFTs and/or (P)KFTs. Two of the five trees to be retained are (P)KFTs (*Eucalyptus tereticornis* and *Eucalyptus punctata*). A further two trees are KFTs (*Eucalyptus microcorys*). None of the trees within the subject land are considered shelter trees by the CKPoM.

Tree ID number, species identity, DBH and classification under the CKPOM for each individual tree are provided in **Table 8.2** below. **Figure 8.1** shows the location of each tree within the study area.

Figure 8.2 shows the location of all KFTs and (P)KFTs within the subject land to be removed.

It should be noted that impacts to and assessment of vegetation and potential Koala habitat within the adjoining lots, south of the study area, has been conducted via the Arboricultural Impact Assessment and Tree Protection Management Plan (Canopy Consulting 2022b), a Flora and Fauna Assessment (Ecoplanning 2022a), which includes a VAR and KAR for the site. Assessment has been document is sperate reports to accompany the relevant DA for which they are to accompany.



Tre e ID	Scientific name	Common name	Native / Exotic	DBH (mm)	Retain / Remove	KFT	(P)KFT
83	Eucalyptus tereticornis	Forest Red Gum	Native	410	Remove	х	
102	Casuarina glauca	Swamp Sheoak	Native	193.4	Remove		
103	Casuarina glauca	Swamp Sheoak	Native	371.2	Remove		
104	Casuarina glauca	Swamp Sheoak	Native	410	Remove		
105	Dead tree	'		240	Remove		
106	Casuarina glauca	Swamp Sheoak	Native	247.6	Remove		
107	Eucalyptus crebra	Narrow-leaved Ironbark	Native	330	Remove		
108	Casuarina glauca	Swamp Sheoak	Native	400	Remove		
109	Casuarina glauca	Swamp Sheoak	Native	568.5	Remove		
110	Casuarina glauca	Swamp Sheoak	Native	120	Remove		
111	Casuarina glauca	Swamp Sheoak	Native	310	Remove		
112	Casuarina cunninghamiana	River Sheoak	Native	320	Remove		
113	Dead tree			160	Remove		
114	Casuarina glauca	Swamp Sheoak	Native	440	Remove		
115	Casuarina glauca	Swamp Sheoak	Native	320	Remove		
116	Eucalyptus tereticornis	Forest Red Gum	Native	490	Remove	Х	
117	Eucalyptus tereticornis	Forest Red Gum	Native	580	Remove	Х	
118	Casuarina glauca	Swamp Sheoak	Native	485.1	Remove		
119	Eucalyptus fibrosa	Red Ironbark	Native	776.2	Remove		
120	Eucalyptus fibrosa	Red Ironbark	Native	470	Remove		
121	Eucalyptus fibrosa	Red Ironbark	Native	420	Remove		
122	Eucalyptus fibrosa	Red Ironbark	Native	420	Remove		
123	Eucalyptus fibrosa	Red Ironbark	Native	569.4	Remove		
124	Casuarina glauca	Swamp Sheoak	Native	150	Remove		
125	Casuarina glauca	Swamp Sheoak	Native	184.4	Remove		
126	Casuarina glauca	Swamp Sheoak	Native	320	Remove		
127	Casuarina glauca	Swamp Sheoak	Native	410	Remove		
128	Casuarina glauca	Swamp Sheoak	Native	300	Remove		
129	Olea europaea subsp. cuspidata	African Olive	Exotic	108.2	Remove		
130	Casuarina glauca	Swamp Sheoak	Native	410	Remove		
131	Casuarina glauca	Swamp Sheoak	Native	260	Remove		
132	Casuarina glauca	Swamp Sheoak	Native	300	Remove		
133	Casuarina glauca	Swamp Sheoak	Native	320	Remove		
134	Casuarina glauca	Swamp Sheoak	Native	150	Remove		
135	Casuarina glauca	Swamp Sheoak	Native	190	Remove		
136	Casuarina glauca	Swamp Sheoak	Native	180	Remove		
137	Casuarina glauca	Swamp Sheoak	Native	140	Remove		
138	Casuarina glauca	Swamp Sheoak	Native	170	Remove		
139	Casuarina glauca	Swamp Sheoak	Native	330	Remove		
140	Casuarina glauca	Swamp Sheoak	Native	200	Remove		
141	Casuarina glauca	Swamp Sheoak	Native	180	Remove		
142	Casuarina glauca	Swamp Sheoak	Native	370	Remove		
143	Casuarina glauca	Swamp Sheoak	Native	260	Remove		

Table 8.2: Trees identified within the subject land



Tre	Scientific name	Common name	Native /	DBH (mm)	Retain /	KFT	(P)KFT
144	Casuarina dauca	Swamp Sheoak	Native	200	Remove		
145	Casuarina glauca	Swamp Sheoak	Nativo	200	Remove		
146	Casuarina glauca	Swamp Sheoak	Nativo	140	Remove		
140	Casuarina giauca	River Sheoak	Nativo	260	Remove		
147		Swamp Shook	Nativo	150	Remove		
140		Swamp Shook	Nativo	100	Remove		
149	Casuarina glauca	Swamp Shook	Nativo	200	Removo		
150	Casuarina glauca	Swamp Shook	Nativo	200	Remove		
152	Casuarina glauca	Swamp Shook	Nativo	240	Remove		
152	Casuarina glauca	Swamp Sheeak	Native	340	Remove		
153	Casuarina giauca	Swamp Sneoak	Native	268.5	Remove		
154	Casuarina glauca	Swamp Sheoak	Native	90	Remove		X
155	Eucalyptus robusta	Swamp Mahogany	Native	410	Remove		X
156	Eucalyptus robusta	Swamp Mahogany	Native	340	Remove		X
157	Eucalyptus robusta	Swamp Mahogany	Native	470	Remove		Х
158	Melaleuca quinquenervia	Broad-leaved Paperbark	Native	367.7	Remove		
159	Melaleuca quinquenervia	Broad-leaved Paperbark	Native	1096.6	Remove		
160	Melaleuca quinquenervia	Broad-leaved Paperbark	Native	670	Remove		
161	Melaleuca quinquenervia	Broad-leaved Paperbark	Native	714.4	Remove		
162	Leptospermum petersonii	Lemon-scented Tea Tree	Native	433.8	Remove		
163	Leptospermum petersonii	Lemon-scented Tea Tree	Native	525.8	Remove		
164	Eucalyptus microcorys	Tallowwood	Native	445.6	Remove		Х
165	Eucalyptus microcorys	Tallowwood	Native	544.9	Remove		Х
166	Melaleuca quinquenervia	Broad-leaved Paperbark	Native	626.3	Remove		
167	Melaleuca alternifolia	Narrow-leaf Paperbark	Native	244.1	Remove		
168	Callistemon citrinus	Crimson Bottlebrush	Native	212.6	Remove		
169	Melaleuca amillaris	Bracelet Honey-myrtle	Native	364.3	Remove		
170	Casuarina cunninghamiana	River Sheoak	Native	280	Remove		
171	Callistemon citrinus	Crimson Bottlebrush	Native	200	Remove		
172	Eucalyptus robusta	Swamp Mahogany	Native	261.2	Remove		х
173	Eucalyptus robusta	Swamp Mahogany	Native	210	Remove		Х
174	Callistemon citrinus	Crimson Bottlebrush	Native	244.9	Remove		
175	Melaleuca quinquenervia	Broad-leaved Paperbark	Native	600.3	Remove		
176	Melaleuca quinquenervia	Broad-leaved Paperbark	Native	618.5	Remove		
177	Casuarina glauca	Swamp Sheoak	Native	108.2	Remove		
178	Melaleuca quinquenervia	Broad-leaved Paperbark	Native	150	Remove		
179	Casuarina glauca	Swamp Sheoak	Native	580	Remove		
180	Casuarina glauca	Swamp Sheoak	Native	490	Remove		
181	Casuarina glauca	Swamp Sheoak	Native	410	Remove		
182	Casuarina glauca	Swamp Sheoak	Native	230	Remove		
183	Casuarina glauca	Swamp Sheoak	Native	170	Remove		
184	Casuarina glauca	Swamp Sheoak	Native	320	Remove		
185	Melaleuca guinguenervia	Broad-leaved Paperbark	Native	222	Remove		
186	Melaleuca guinguenervia	Broad-leaved Paperbark	Native	364	Remove		
187	Eucalyptus crebra	Narrow-leaved Ironbark	Native	560	Remove		



Tre	Scientific name	Common name	Native /	DBH (mm)	Retain /	KFT	(P)KFT
188	Olea europaea subsp. cuspidata	African Olive	Exotic	176.9	Remove		
190		Narrow looved Ironbark	Notivo	310	Romovo		
109		Narrow leaved Ironbark	Nativo	500	Removo		
190			Twatia	149.7	Remove		
191		African Olive	Exolic	146.7	Remove		
192	Olea europaea subsp. cuspidata	African Olive	Exotic	204.7	Remove		
193	Eucalyptus crebra	Narrow-leaved Ironbark	Native	280	Remove		
194	Eucalyptus punctata	Grey Gum	Native	680	Remove	X	
195	Eucalyptus punctata	Grey Gum	Native	410	Remove	Х	
196	Eucalyptus crebra	Narrow-leaved Ironbark	Native	370	Remove		
197	Eucalyptus crebra	Narrow-leaved Ironbark	Native	240	Remove		
198	Eucalyptus tereticornis	Forest Red Gum	Native	500	Remove	Х	
199	Eucalyptus crebra	Narrow-leaved Ironbark	Native	230	Remove		
200	Eucalyptus crebra	Narrow-leaved Ironbark	Native	220	Remove		
201	Eucalyptus tereticornis	Forest Red Gum	Native	560	Remove	Х	
202	Eucalyptus tereticornis	Forest Red Gum	Native	190	Remove	Х	
203	Eucalyptus tereticornis	Forest Red Gum	Native	320	Remove	Х	
204	Eucalyptus punctata	Grey Gum	Native	360	Remove	Х	
205	Eucalyptus punctata	Grey Gum	Native	460	Remove	Х	
206	Eucalyptus punctata	Grey Gum	Native	220	Remove	Х	
207	Eucalyptus punctata	Grey Gum	Native	510	Remove	Х	
208	Eucalyptus microcorys	Tallowwood	Native	410	Remove		Х
209	Olea europaea subsp. cuspidata	African Olive	Exotic	108.2	Remove		
210	Eucalyptus tereticornis	Forest Red Gum	Native	410	Remove	Х	
211	Eucalyptus tereticornis	Forest Red Gum	Native	200	Remove	Х	
212	Eucalyptus punctata	Grey Gum	Native	450	Remove	Х	
213	Eucalyptus punctata	Grey Gum	Native	220	Remove	Х	
214	Eucalyptus tereticornis	Forest Red Gum	Native	440	Remove	Х	
215	Melia azedarach	White Cedar	Native	90	Remove		
216	Eucalyptus punctata	Grey Gum	Native	390	Remove	Х	
217	Eucalyptus punctata	Grey Gum	Native	600	Remove	Х	
218	Acacia decurrens	Black Wattle	Native	80	Remove		
219	Eucalyptus punctata	Grey Gum	Native	50	Remove	Х	
220	Eucalvptus punctata	Grev Gum	Native	170	Remove	Х	
221	Eucalvptus punctata	Grev Gum	Native	70	Remove	х	
222	Eucalvptus punctata	Grev Gum	Native	380	Remove	х	
223	Eucalyptus punctata	Grev Gum	Native	260	Remove	X	
224	Eucalyptus punctata	Grev Gum	Native	470	Remove	X	
225	Fucalyptus punctata	Grev Gum	Native	110	Remove	x	
226	Fucalyptus punctata	Grev Gum	Native	120	Remove	x	
227	Fucalyptus punctata	Grev Gum	Nativo	100	Remove	x	
229		Grey Gum	Nativo	260	Remove	×	
220	Mololouco stunbolicidoo	Drickly looved Deperherk	Nativo	200	Pomove	^	
229	Conumbia maguilata		Native	300.3	Remove		
230		Spotted Gum	Native	3/0	Remove		
231	Corympia maculata	Spottea Gum	inative	211	Remove		



BID Exotic (mm) Remove X 232 Eucalyptus punctata Grey Gum Native 180 Remove X 233 Olea europaea subsp. cuspidata African Olive Exotic 98.5 Remove X 234 Eucalyptus sideroxylon Mugga Ironbark Native 450 Remove X 235 Eucalyptus sideroxylon Mugga Ironbark Native 550 Remove X 236 Eucalyptus sideroxylon Mugga Ironbark Native 320 Remove X 237 Eucalyptus sideroxylon Mugga Ironbark Native 320 Remove X 238 Eucalyptus sideroxylon Mugga Ironbark Native 320 Remove X 240 Eucalyptus punctata Grey Gum Native 400 Remove X 241 Eucalyptus tereticornis Forest Red Gum Native 240 Remove X 242 Eucalyptus punctata Grey Gum Native	Tre	Scientific name	Common name	Native /	DBH	Retain /	KFT	(P)KFT
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256Eucalyptus tereticornisForest Red GumNative350RemoveX257Eucalyptus sideroxylonMugga IronbarkNative520Remove258Eucalyptus sideroxylonMugga IronbarkNative510Remove259Eucalyptus microcorysTallowwoodNative520RemoveX260Eucalyptus microcorysTallowwoodNative570RemoveX261Corymbia maculataSpotted GumNative320Remove262Eucalyptus crebraNarrow-leaved IronbarkNative210Remove263Eucalyptus sideroxylonMugga IronbarkNative670Remove264Callistemon citrinusCrimson BottlebrushNative82.5Remove265Eucalyptus sideroxylonMugga IronbarkNative440Remove266Olea europaea subsp. cuspidataAfrican OliveExotic277.3Remove	255	Eucalyptus tereticornis	Forest Red Gum	Native	560	Remove	Х	
257Eucalyptus sideroxylonMugga IronbarkNative520Remove258Eucalyptus sideroxylonMugga IronbarkNative510Remove259Eucalyptus microcorysTallowwoodNative520RemoveX260Eucalyptus microcorysTallowwoodNative570RemoveX261Corymbia maculataSpotted GumNative320RemoveX262Eucalyptus crebraNarrow-leaved IronbarkNative210Remove263Eucalyptus sideroxylonMugga IronbarkNative670Remove264Callistemon citrinusCrimson BottlebrushNative82.5Remove265Eucalyptus sideroxylonMugga IronbarkNative440Remove266Olea europaea subsp. cuspidataAfrican OliveExotic277.3Remove	256	Eucalyptus tereticornis	Forest Red Gum	Native	350	Remove	Х	
258Eucalyptus sideroxylonMugga IronbarkNative510Remove259Eucalyptus microcorysTallowwoodNative520RemoveX260Eucalyptus microcorysTallowwoodNative570RemoveX261Corymbia maculataSpotted GumNative320RemoveX262Eucalyptus crebraNarrow-leaved IronbarkNative210Remove263Eucalyptus sideroxylonMugga IronbarkNative670Remove264Callistemon citrinusCrimson BottlebrushNative82.5Remove265Eucalyptus sideroxylonMugga IronbarkNative440Remove266Olea europaea subsp. cuspidataAfrican OliveExotic277.3Remove	257	Eucalyptus sideroxylon	Mugga Ironbark	Native	520	Remove		
259Eucalyptus microcorysTallowwoodNative520RemoveX260Eucalyptus microcorysTallowwoodNative570RemoveX261Corymbia maculataSpotted GumNative320RemoveX262Eucalyptus crebraNarrow-leaved IronbarkNative210RemoveX263Eucalyptus sideroxylonMugga IronbarkNative670RemoveX264Callistemon citrinusCrimson BottlebrushNative82.5RemoveX265Eucalyptus sideroxylonMugga IronbarkNative440RemoveX266Olea europaea subsp. cuspidataAfrican OliveExotic277.3Remove	258	Eucalyptus sideroxylon	Mugga Ironbark	Native	510	Remove		
260Eucalyptus microcorysTallowwoodNative570RemoveX261Corymbia maculataSpotted GumNative320Remove262Eucalyptus crebraNarrow-leaved IronbarkNative210Remove263Eucalyptus sideroxylonMugga IronbarkNative670Remove264Callistemon citrinusCrimson BottlebrushNative82.5Remove265Eucalyptus sideroxylonMugga IronbarkNative440Remove266Olea europaea subsp. cuspidataAfrican OliveExotic277.3Remove	259	Eucalyptus microcorys	Tallowwood	Native	520	Remove		Х
261Corymbia maculataSpotted GumNative320Remove262Eucalyptus crebraNarrow-leaved IronbarkNative210Remove263Eucalyptus sideroxylonMugga IronbarkNative670Remove264Callistemon citrinusCrimson BottlebrushNative82.5Remove265Eucalyptus sideroxylonMugga IronbarkNative440Remove266Olea europaea subsp. cuspidataAfrican OliveExotic277.3Remove	260	Eucalyptus microcorys	Tallowwood	Native	570	Remove		Х
262Eucalyptus crebraNarrow-leaved IronbarkNative210Remove263Eucalyptus sideroxylonMugga IronbarkNative670Remove264Callistemon citrinusCrimson BottlebrushNative82.5Remove265Eucalyptus sideroxylonMugga IronbarkNative440Remove266Olea europaea subsp. cuspidataAfrican OliveExotic277.3Remove	261	Corymbia maculata	Spotted Gum	Native	320	Remove		
263Eucalyptus sideroxylonMugga IronbarkNative670Remove264Callistemon citrinusCrimson BottlebrushNative82.5Remove265Eucalyptus sideroxylonMugga IronbarkNative440Remove266Olea europaea subsp. cuspidataAfrican OliveExotic277.3Remove	262	Eucalyptus crebra	Narrow-leaved Ironbark	Native	210	Remove		
264Callistemon citrinusCrimson BottlebrushNative82.5Remove265Eucalyptus sideroxylonMugga IronbarkNative440Remove266Olea europaea subsp. cuspidataAfrican OliveExotic277.3Remove	263	Eucalyptus sideroxylon	Mugga Ironbark	Native	670	Remove		
265 Eucalyptus sideroxylon Mugga Ironbark Native 440 Remove 266 Olea europaea subsp. cuspidata African Olive Exotic 277.3 Remove	264	Callistemon citrinus	Crimson Bottlebrush	Native	82.5	Remove		
266 Olea europaea subsp. cuspidata African Olive Exotic 277.3 Remove	265	Eucalyptus sideroxylon	Mugga Ironbark	Native	440	Remove		
	266	Olea europaea subsp. cuspidata	African Olive	Exotic	277.3	Remove		
267 Eucalyptus sideroxylon Mugga Ironbark Native 650 Remove	267	Eucalyptus sideroxylon	Mugga Ironbark	Native	650	Remove		
268 Eucalyptus sideroxylon Mugga Ironbark Native 260 Remove	268	Eucalvptus sideroxvlon	Mugga Ironbark	Native	260	Remove		
269 Callistemon citrinus Crimson Bottlebrush Native 84.9 Remove	269	Callistemon citrinus	Crimson Bottlebrush	Native	84.9	Remove		
270 Eucalyptus sideroxylon Mugga Ironbark Native 470 Remove	270	Eucalvptus sideroxvlon	Mugga Ironbark	Native	470	Remove		
271 Eucalyptus sideroxylon Mugga Ironbark Native 390 Remove	271	Eucalyptus sideroxylon	Mugga Ironbark	Native	390	Remove		
272 Fucalvotus sideroxylon Mugga inclusion Native 490 Remove	272	Fucalyptus sideroxylon	Mugga Ironbark	Native	490	Remove		
273 Eucalyptus sideroxy/on Mugga Ironbark Native 580.5 Remove	273		Muqqa Ironbark	Native	580 5	Remove		
274 Fucelyptus sideroxy/on Mugga Ironbark Native 440 Remove	274		Mugga Ironbark	Nativo	440	Remove		
275 Fucal/ptus sideroxy/on Mugga ironbark Native 400 Remove	275		Mugga Ironbark	Native	400	Remove		



Tre e ID	Scientific name	Common name	Native / Exotic	DBH (mm)	Retain / Remove	KFT	(P)KFT
276	Eucalyptus sideroxylon	Mugga Ironbark	Native	340	Remove		
277	Eucalyptus crebra	Narrow-leaved Ironbark	Native	230	Remove		
278	Eucalyptus sideroxylon	Mugga Ironbark	Native	480	Remove		
279	Eucalyptus sideroxylon	Mugga Ironbark	Native	440	Remove		
280	Eucalyptus sideroxylon	Mugga Ironbark	Native	407.1	Remove		
281	Eucalyptus punctata	Grey Gum	Native	290	Remove	х	
282	Syagrus romanzoffiana	Cocos Palm	Native	260	Remove		
283	Eucalyptus sideroxylon	Mugga Ironbark	Native	540	Remove		
284	Eucalyptus sideroxylon	Mugga Ironbark	Native	490	Remove		
285	Corymbia maculata	Spotted Gum	Native	690	Remove		
286	Eucalyptus tereticornis	Forest Red Gum	Native	290	Remove	х	
287	Eucalyptus tereticornis	Forest Red Gum	Native	870	Remove	Х	
288	Eucalyptus crebra	Narrow-leaved Ironbark	Native	370	Remove		
289	Casuarina glauca	Swamp Sheoak	Native	160	Remove		
290	Casuarina glauca	Swamp Sheoak	Native	220	Remove		
291	Casuarina glauca	Swamp Sheoak	Native	216.3	Remove		
292	Casuarina glauca	Swamp Sheoak	Native	216.3	Remove		
293	Casuarina glauca	Swamp Sheoak	Native	216.3	Remove		
294	Casuarina glauca	Swamp Sheoak	Native	290	Remove		
295	Araucaria cunninghamii	Hoop Pine	Native	310	Remove		
296	Araucaria cunninghamii	Hoop Pine	Native	280	Remove		
297	Araucaria cunninghamii	Hoop Pine	Native	290	Remove		
298	Araucaria cunninghamii	Hoop Pine	Native	382.1	Remove		
299	Araucaria cunninghamii	Hoop Pine	Native	350	Remove		
300	Araucaria cunninghamii	Hoop Pine	Native	330	Remove		
301	Araucaria cunninghamii	Hoop Pine	Native	320	Remove		
302	Araucaria cunninghamii	Hoop Pine	Native	270	Remove		
303	Araucaria cunninghamii	Hoop Pine	Native	210	Remove		
304	Eucalyptus microcorys	Tallowwood	Native	850	Retain		Х
305	Eucalyptus microcorys	Tallowwood	Native	1050	Retain		Х
306	Jacaranda mimosifolia	Jacaranda	Exotic	231.5	Retain		
307	Jacaranda mimosifolia	Jacaranda	Exotic	172	Retain		
308	Jacaranda mimosifolia	Jacaranda	Exotic	120	Retain		















VAR conclusion

The test for whether a patch of native vegetation should be classified as potential Koala habitat under the CKPoM, and thus require a full Koala Activity Assessment Report (KAAR) and compensation for loss of Koala habitat under Chapter 7 of the CKPoM, is whether subject site contains at least 15% KFT.

A total of 59 trees to be removed within the subject land, are of a species recognised within the CKPoM as (P)KFTs. This constitutes to 29% of all trees within the subject land, which are to be impacted. As such, the patches of vegetation within the subject land, which are to be impacted are considered 'potential Koala habitat' by the CKPoM and a KAAR is required for the proposal. **Appendix E** details the KAAR for the proposed development.



Appendix E Koala Activity Assessment Report

Section 6.3.2 of the CKPoM (2018) applies to land that is located outside the boundaries of mapped core Koala habitat as identified in Figure 5.1 of the CKPoM; and on which potential Koala habitat has been identified as a consequence of a VAR.

The VAR (**Appendix D**) identified a total of 59 trees to be removed within the subject land, are of a species recognised within the CKPoM as (P)KFTs. This constitutes to 29% of all trees within the subject land, which are to be impacted. As such, the patches of vegetation within the subject land, are considered 'potential Koala habitat' by the CKPoM.

As required by section 6.3.2 of the CKPoM, this KAAR employs the methodology detailed in Appendix B of the CKPoM, to identify the potential Koala activity levels within the area. Appendix B of the CKPoM (2018) states that the ecology of Koalas in the Campbelltown LGA is, among other things, influenced by the availability of, and access to preferentially utilised food tree species. The purpose of the appendix is to assist landholders and proponents of development to identify important habitat areas that are currently being utilised as part of normal Koala ranging, socialising and feeding patterns.

KAAR field assessment was conducted by Edwin Vaca (Field Ecologist) on 23 January 2023, over 7 person hours. Weather conditions for the field survey were sunny with no wind.

Step 1

The appropriate sampling intensity for the subject land to be assess was determined using table C1 of the CKPoM, reproduced below (**Table 8.3**):

Area of land being subject of DA or rezoning application	Initial SAT sampling intensity	High SAT sampling intensity
< 15ha	250m intervals	125m intervals
15 - 50ha	500m intervals	250m intervals
> 50ha	700m intervals	350m intervals

Table 8.3: Sampling intensity per unit area

The study area for the KAAR, is based on the total area size for the three lots owned by the proponent. This includes Lot 213 // DP 260735, Lot 131 DP 583995 and Lot 12 // DP 251997. The total area size for the study area is 9.02 ha, **Table 8.4** details the size of each lot within the KAAR study area.

Table 8.4:	Lots v	within	KAAR	study	area
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Lot // DP	Area (ha) within study area	Area (%) within study area
12 // DP 251997	7.29	81
131 // DP 583995	0.38	4
213 // DP 260735	1.35	15
Total	9.02	100

Based on a 9.02 ha area, the required SAT sampling intensity for this KAAR assessment is 125 m intervals. Relevant grid intervals have been overlayed to the study area (**Figure 8.3**).





Figure 8.3: 125 m high SAT sampling intensity grids over the study area



Step 2

Using the high SAT sampling intensity 125 m grid intervals (**Figure 8.3**), areas of land where trees of any species that have a DBH \geq 100mm were identified. Theoretically, these areas could be sampled within a radius approximately equal to that of 50% of the sampling intensity being utilised (e.g., 150m = 75m radius, 250m = 125m etc). Areas of cleared land with scattered trees were also included for assessment purposes.

The study area covered two thirds of the overlayed grid intervals, which includes a total of 308 trees identified within the study area by Canopy Consulting (2022a & b), of which 84 are consistent with (P)KFTs in accordance with the CKPoM (). Therefore, assessment focused on evaluating trees within those grid intervals with more intensity. Further details are provided in Step 3 of the KAAR.

Field assessment determined that remaining grid intervals contained trees on the eastern side of Airds Road, all of which consisted of Casuarina spp., which are not (P)KFT or shelter trees listed under the CKPoM. A further stand of Eucalypts, further east could not be assessed at the time of survey, due to lack of access to private property, where a construction site was operational at the time. However, this stand of trees is fragmented by hard barriers, such as constructions fencing, roads and an active construction site, it was therefore determined that this stand of eucalypts presented limited potential habitat for Koalas.





Figure 8.4: Areas of trees assessed by the KAAR



Step 3

The Spot Assessment Technique (SAT) of Phillips and Callaghan (2011) was used to undertake sampling at sampling point.

The SAT involves a radial assessment of Koala "activity" within the immediate area surrounding a tree of any species that is known to have been utilised by the species, or otherwise considered to be of some importance for Koala conservation and/or management purposes. In the field the technique is applied as follows:

1. Locate and uniquely mark with flagging tape a tree(the centre tree) that meets one or more of the following selection criteria:

- a. a tree of any species beneath which one or more Koala faecal pellets have been observed and/or
- b. a tree in which a Koala has been observed and/or
- c. any other tree known or considered to be potentially important for Koalas, or of interest for other assessment purposes
- 2. Identify and uniquely mark the 29 nearest trees to the centre tree,

3. Undertake a search for Koala faecal pellets beneath each of the 30 marked trees based on a cursory inspection of the undisturbed ground surface within a distance of 100 centimetres around the base of each tree, followed (if no faecal pellets are initially detected) by a more thorough inspection involving disturbance of the leaf litter and ground cover within the prescribed search area

For the purpose of this KAAR, the SAT applied used (P)KFTs as the centre tree. (P)KFTs are known or considered to be potentially important for Koalas by the CKPoM. A total of seven SAT grids (40 m x 40 m) with a (P)KFT as the centre tree were conducted as part of this KAAR assessment (**Figure 8.5**). As required by Phillips and Callaghan (2011), the centre tree as well as the other 29 trees within the assessment grid were marked for each SAT plot (**Figure 8.6 and Figure 8.7**). A 100 cm search at the base of each tree was conducted to identify/collect potential Koala faecal pellets. Additionally, all trees were observed for any Koala use activity, such as scratch marks and/or presence of a Koala within the tree.

Given that a total of 59 (P)KFTs are to be removed and the proximity of (P)KFTs to other non (P)KFTs, faecal pellets searches were conducted at the base of all trees within and immediately adjoining the site, to ensure the site was thoroughly surveyed for any evidence of Koala presence or usage of the site.

A total of 7 person hours were spent to conduct the KAAR field assessment. Survey effort is shown on **Figure 8.5**.











Figure 8.6: Marked centre tree, SAT 1



Figure 8.7: Trees marked for assessment within SAT 4



SAT assessment conclusion

The activity level for a SAT site is simply expressed as the percentage equivalent of the proportion of surveyed trees within the site that had a Koala faecal pellet recorded within the prescribed search area (Phillips and Callaghan 2011).

No Koalas, or Koala activity indicated by presence of scratches or faecal pellets, were recorded during site survey. Therefore, calculations of Koala activity levels within the area assessed are zero.



Appendix F Compensation units

Section 7 of the CKPoM outlines the required compensatory measures for 'major development.

Compensatory options include either of the below, at the applicant's expense:

- Entering into a legally binding agreement with Council to make a monetary contribution towards the Koala Habitat Rehabilitation Program as detailed in Part 8 of the CKPoM; or
- Entering into a legally binding agreement with Council to undertake rehabilitation works in areas identified by the Koala Habitat Rehabilitation Program detailed in Part 8 of the CKPoM. This will include payment of a Compensation Guarantee in the form of a Bank Bond which will be released once the required works have been implemented in accord with the agreement. The purpose of a Compensatory Guarantee is to allow Council to implement the required works in the event that the proponent is unable or unwilling to comply (Phillips 2018).

The amount of money to be paid is based on the value of the required 'Compensation Units' (CU) (for every mm of DBH or part thereof) arising from the total number and size of (P)KFTs and shelter trees that will be removed, as follows:

- a) Small (DBH < 100 mm) 8 CU / mm of DBH
- b) Medium (DBH > 100 mm < 300 mm) 15 CU / mm of DBH
- c) Large (DBH > 300 mm) 25 CU / mm of BDH

Note: Value of a CU at the date of the commencement of the CKPoM was \$1.00 (Phillips 2018) and this has therefore been applied below. This value is to be adjusted annually using the CPI increase for the 12 months prior to the review date (Phillips 2018).

Table 8.5 below lists the (P)KFT and shelter species (based on SEPP 44 and CKPoM) to be removed from the site, their DBH and equivalent CU value (see **Figure 8.2**). A total compensatory value of **\$456,210.00** is required to be paid for the removal of (P)KFT on the site.

Development consent shall be conditional upon the agreement being registered and in place prior to issuing of a Construction Certificate; and be subject to random audits.



Scientific name	Common name	Tree	DBH	CU class	CU multiplier	CU cost
		number	(mm)**		•••	
Eucalyptus tereticornis	Forest red gum	116	490	Large (DBH >300mm)	25	\$12,250
Eucalyptus tereticornis	Forest red gum	117	580	Large (DBH >300mm)	15	\$8,700
Eucalyptus robusta	Swamp mahogany	155	410	Large (DBH >300mm)	25	\$10,250
Eucalyptus robusta	Swamp mahogany	156	340	Large (DBH >300mm)	25	\$8,500
Eucalyptus robusta	Swamp mahogany	157	470	Large (DBH >300mm)	25	\$11,750
Eucalyptus microcorys	Tallowwood	164	445	Large (DBH >300mm)	25	\$11,125
Eucalyptus microcorys	Tallowwood	165	544	Large (DBH >300mm)	25	\$13,600
Eucalyptus robusta	Swamp mahogany	172	261	Medium (DBH >100<300mm)	15	\$3,915
Eucalyptus robusta	Swamp mahogany	173	210	Medium (DBH >100<300mm)	15	\$3,150
Eucalyptus punctata	Grey Gum	194	680	Large (DBH >300mm)	25	\$17,000
Eucalyptus punctata	Grey Gum	195	410	Large (DBH >300mm)	25	\$10,250
Eucalyptus tereticornis	Forest red gum	198	500	Large (DBH >300mm)	25	\$12,500
Eucalyptus tereticornis	Forest red gum	201	560	Large (DBH >300mm)	25	\$14,000
Eucalyptus tereticornis	Forest red gum	202	190	Medium (DBH >100<300mm)	15	\$2,850
Eucalyptus tereticornis	Forest red gum	203	320	Large (DBH >300mm)	25	\$8,000
Eucalyptus punctata	Grey Gum	204	360	Large (DBH >300mm)	25	\$9,000
Eucalyptus punctata	Grey Gum	205	460	Large (DBH >300mm)	25	\$11,500
Eucalyptus punctata	Grey Gum	206	220	Medium (DBH >100<300mm)	15	\$3,300
Eucalyptus punctata	Grey Gum	207	510	Large (DBH >300mm)	25	\$12,750
Eucalyptus microcorys	Tallowwood	208	410	Large (DBH >300mm)	25	\$10,250
Eucalyptus tereticornis	Forest red gum	210	410	Large (DBH >300mm)	25	\$10,250
Eucalyptus tereticornis	Forest red gum	211	200	Medium (DBH >100<300mm)	15	\$3,000
Eucalyptus punctata	Grey Gum	212	450	Large (DBH >300mm)	25	\$11,250
Eucalyptus punctata	Grey Gum	213	220	Medium (DBH >100<300mm)	15	\$3,300
Eucalyptus tereticornis	Forest red gum	214	440	Large (DBH >300mm)	25	\$11,000
Eucalyptus punctata	Grey Gum	216	390	Large (DBH >300mm)	25	\$9,750
Eucalyptus punctata	Grey Gum	217	600	Large (DBH >300mm)	25	\$15,000

Table 8.5: Compensatory units per tree to be removed (tree numbers, species and DBH taken from Canopy Consulting 2022a)



Eucalyptus punctata	Grey Gum	219	50	Small (DBH <100mm)	8	\$400
Eucalyptus punctata	Grey Gum	220	170	Medium (DBH >100<300mm)	15	\$2,550
Eucalyptus punctata	Grey Gum	221	70	Small (DBH <100mm)	8	\$560
Eucalyptus punctata	Grey Gum	222	380	Large (DBH >300mm)	25	\$9,500
Eucalyptus punctata	Grey Gum	223	260	Medium (DBH >100<300mm)	15	\$3,900
Eucalyptus punctata	Grey Gum	224	470	Large (DBH >300mm)	25	\$11,750
Eucalyptus punctata	Grey Gum	225	110	Medium (DBH >100<300mm)	15	\$1,650
Eucalyptus punctata	Grey Gum	226	120	Medium (DBH >100<300mm)	15	\$1,800
Eucalyptus punctata	Grey Gum	227	190	Medium (DBH >100<300mm)	15	\$2,850
Eucalyptus punctata	Grey Gum	228	260	Medium (DBH >100<300mm)	15	\$3,900
Eucalyptus punctata	Grey Gum	232	180	Medium (DBH >100<300mm)	15	\$ 2,700
Eucalyptus punctata	Grey Gum	237	180	Medium (DBH >100<300mm)	15	\$2,700
Eucalyptus punctata	Grey Gum	240	230	Medium (DBH >100<300mm)	15	\$3,450
Eucalyptus punctata	Grey Gum	241	400	Large (DBH >300mm)	25	\$10,000
Eucalyptus tereticornis	Forest red gum	242	180	Medium (DBH >100<300mm)	15	\$2,700
Eucalyptus tereticornis	Forest red gum	243	260	Medium (DBH >100<300mm)	15	\$3,900
Eucalyptus tereticornis	Forest red gum	244	240	Medium (DBH >100<300mm)	15	\$3,600
Eucalyptus tereticornis	Forest red gum	245	566.4	Large (DBH >300mm)	25	\$14,160
Eucalyptus punctata	Grey Gum	246	200	Medium (DBH >100<300mm)	15	\$3,000
Eucalyptus punctata	Grey Gum	247	150	Medium (DBH >100<300mm)	15	\$2,250
Eucalyptus tereticornis	Forest red gum	248	440	Large (DBH >300mm)	25	\$11,000
Eucalyptus microcorys	Tallowwood	249	350	Large (DBH >300mm)	25	\$8,750
Eucalyptus microcorys	Tallowwood	250	560	Large (DBH >300mm)	25	\$14,000
Eucalyptus tereticornis	Forest red gum	251	360	Large (DBH >300mm)	25	\$9,000
Eucalyptus tereticornis	Forest red gum	252	370	Large (DBH >300mm)	25	\$9,250
Eucalyptus tereticornis	Forest red gum	255	560	Large (DBH >300mm)	25	\$14,000
Eucalyptus tereticornis	Forest red gum	256	350	Large (DBH >300mm)	25	\$8,750
Eucalyptus microcorys	Tallowwood	259	520	Large (DBH >300mm)	25	\$13,000
Eucalyptus microcorys	Tallowwood	260	570	Large (DBH >300mm)	25	\$14,250
Eucalyptus punctata	Grey Gum	281	290	Medium (DBH >100<300mm)	15	\$4,350



Eucalyptus tereticornis	Forest red gum	286	290	Medium (DBH >100<300mm)	15	\$4,350
					Total	\$456,210

**DHB provided by Canopy consultancy (2022a and b) was converted from cm to mm, for this report.



Appendix G BAMC Credit Reports

ssessment Id 0036632/BAAS1804	10000000000			Prop	L NI						
0036632/BAAS1804	1/22/00026622			riop	osal Name			BAM data l	ast updated	*	
00036632/BAAS18047/22/00036633				149	Airds Road Min	to	01/02/2023				
ssessor Name				Report Created				BAM Data	version *		
l Cooper				07/02/2024				57			
ssessor Number				BAM	Case Status			Date Finalis	sed		
AAS18047				Final	ised			24/02/2023	3		
ssessment Revision				Asse	ssment Type			BOS entry	trigger		
0				Part 4 Developments (General) BOS Threshold: Area clearing threshold							
cosystem credits	for plant comr	munities	types (PC	Г), ес	ological com	munities & t	hreatened speci	es habitat			
one Vegetatio TE n zone name	C name C V n in so	Current /egetatio ntegrity core	Change in Vegetatio n integrity (loss / gain)	Are a (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversit y risk weighting	Potenti al SAII	Ecosyste m credits


	K V							BAM	Credit Su	ımma	ary F	Repor
umberl	land shal	e - sandstone Iro	nbark forest									
1 1: u	395_Dist rbed	Shale Sandstone Transition Forest of the Sydney Basin Bioregion	33.4	33.4	0.61	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		1:
											Subtot al	13
umberl	land Swa	mp Oak riparian	forest									
2 1: u	800_Dist rbed	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	30.1	30.1	0.19	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		
											Subtot al	3
											Total	10
pecies /egetationame	on zone	for threatened Habitat condition (Vegetation Integrity)	species Change in habitat condition	Area (ha)/Co (no.	unt	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act list status	ing Po SA	tential II	Species credits
	ant Id			individu	ials)	sal Namo						Page 2 of
aaeaanne	and fu				iopo:	an Hallie						age 2 OI



Proposal Details			
Assessment Id		Proposal Name	BAM data last updated
00036632/BAAS18047/22/00036633		149 Airds Road Minto	01/02/2023
Assessor Name		Assessor Number	BAM Data version *
Ed Cooper		BAAS18047	57
Proponent Names		Report Created	BAM Case Status
		07/02/2024	Finalised
Assessment Revision		Assessment Type	Date Finalised
0		Part 4 Developments (General)	24/02/2023
BOS entry trigger BOS Threshold: Area clearing threshold	* B	Disclaimer: BAM data last updated may indicate eith AM calculator database. BAM calculator database m	her complete or partial update of the nay not be completely aligned with Bione
Potential Serious and Irreversible Imp	acts	Nerve of Direct Community Terry (ID	
	Listing status	Name of Plant Community Type/ID	
Species			
Nil			
Additional Information for Approval			
Assessment Id	Proposal Name		Page 1 of



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OVERNMENT		BAM Bi	odiversi	ty C	Credit Re	eport	(Like	e for like
CT Outside Ibra Added								
ione added								
PCTs With Customized Benchn	narks							
ст								
No Changes								
Predicted Threatened Species	Not On Site							
Name								
No Changes								
Ecosystem Credit Summa	ry (Number and class of	f biodiversity credit	s to be retired)					
Name of Plant Community Typ	e/ID	Name of threatened	ecological commu	unity	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
Name of Plant Community Typ 1395-Cumberland shale - sand	e/ID Istone Ironbark forest	Name of threatened Shale Sandstone Trar Sydney Basin Bioregi	ecological commu nsition Forest of th on	unity ne	Area of impact	HBT Cr 0	No HBT Cr 13	Total credits to be retired 1
Name of Plant Community Typ 1395-Cumberland shale - sand 1800-Cumberland Swamp Oak	e/ID Istone Ironbark forest riparian forest	Name of threatened Shale Sandstone Tran Sydney Basin Bioregi Swamp Oak Floodpla South Wales North C South East Corner Bio	ecological commu nsition Forest of th on ain Forest of the N coast, Sydney Basir pregions	unity ne ew n and	Area of impact 0.6 0.2	HBT Cr 0	No HBT Cr 13 3	Total credits to be retired 1
Name of Plant Community Typ 1395-Cumberland shale - sand 1800-Cumberland Swamp Oak 1395-Cumberland shale -	be/ID Istone Ironbark forest riparian forest Like-for-like credit reti	Name of threatened Shale Sandstone Trar Sydney Basin Bioregi Swamp Oak Floodpla South Wales North C South East Corner Bio	ecological commu nsition Forest of th on in Forest of the N coast, Sydney Basin pregions	inity ne ew n and	Area of impact 0.6 0.2	HBT Cr 0	No HBT Cr 13 3	Total credits to be retired
Name of Plant Community Typ 1395-Cumberland shale - sand 1800-Cumberland Swamp Oak 1395-Cumberland shale - sandstone Ironbark forest	be/ID Istone Ironbark forest riparian forest Like-for-like credit reti Name of offset trading group	Name of threatened Shale Sandstone Trar Sydney Basin Bioregi Swamp Oak Floodpla South Wales North C South East Corner Bio Trement options Trading group	ecological commu nsition Forest of th on in Forest of the N coast, Sydney Basin pregions Zone	ew n and HBT	Area of impact 0.6 0.2 Credits	HBT Cr 0 0	No HBT Cr 13 3	Total credits to be retired



	Shale Sandstone Transition Forest of the Sydney Basin Bioregion This includes PCT's: 1281, 1395	-	1395_Disturbe d	No	13	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo or Any IBRA subregion that is within 10 kilometers of the outer edge of the impacted site.
1800-Cumberland Swamp	Like-for-like credit retir	ement options				
Dak riparian forest	Name of offset trading	Trading group	Zone	HBT	Credits	IBRA region
	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 915, 916, 917, 918, 919, 1125, 1230, 1232, 1234, 1235, 1236, 1726, 1727, 1728, 1729, 1731, 1800, 1808	-	1800_Disturbe d	No	3	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo or Any IBRA subregion that is within 10 kilometers of the outer edge of the impacted site.



GOVERNMENT	BAM Biodiversity Credit Report (Like	for like)
1800-Cumberland Swamp Oak riparian forest		
Species Credit Summary No Species Credit Data		
Credit Retirement Options	Like-for-like credit retirement options	
Assessment ld 00036632/BAAS18047/22/00036633	Proposal Name 149 Airds Road Minto	Page 4 of 4





BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Propos	sal Name	BAM data last updated *				
00036632/BAAS18047/22/00036633	149 Ai	rds Road Minto	01/02/2023				
Assessor Name	Assess	or Number	BAM Data version *				
Ed Cooper	BAAS1	8047	57				
Proponent Name(s)	Report	t Created	BAM Case Status				
	24/02/	2023	Finalised				
Assessment Revision	Assess	ment Type	Date Finalised				
0	Part 4	Developments (General)	24/02/2023				
BOS entry trigger	* Discl	aimer: BAM data last updated may indicate	e either complete or partial update of the BAM				
BOS Threshold: Area clearing threshold	calcula	calculator database. BAM calculator database may not be completely aligned with Bior					
Potential Serious and Irreversible Impact Name of threatened ecological community	ts Listing status	Name of Plant Community Type/ID					
Species							
Nil							
Additional Information for Approval PCT Outside Ibra Added None added							
PCTs With Customized Benchmarks							
Assessment Id Pro	oposal Name		Page 1 of 4				

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149 Airds Road Minto

		BAM B	iodiversi [.]	ty	Credit	Repo	rt (Vai	riations)		
PCT				-		<u> </u>	•	-		
No Changes										
Predicted Threatened Species	Not On Site									
Name										
No Changes										
Ecosystem Credit Summar	ry (Number and class of	biodiversity credits to	o be retired)							
Name of Plant Community Typ	pe/ID	Name of threatened ecological community Are			Area of impact	t HBT Cr	No HBT Cr	Total credits to be retired		
1395-Cumberland shale - sand	lstone Ironbark forest	Shale Sandstone Transit Sydney Basin Bioregion	ion Forest of the		0.6	0.6 0 13				
1800-Cumberland Swamp Oak	riparian forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions			0.2	2 0	3	3.00		
1395-Cumberland shale -	Like-for-like credit retirement options									
sandstone Ironbark forest	Class	Trading group Zone HBT Credits IBRA region					l.			
	Shale Sandstone Transition Forest of the Sydney Basin Bioregion This includes PCT's: 1281, 1395	-	1395_Distu rbed	No	13	Cumberland Sydney Cata Any IBRA su kilometers d impacted si	rland,Burragorang, Pittwater, Cataract, Wollemi and Yengo or A subregion that is within 10 ters of the outer edge of the ed site.			
	Variation options									
	Formation	Trading group	Zone	HBT	Credits	IBRA region	l.			
Assessment Id	Proposal Name	2						Page 2 of 4		
00036632/BAAS18047/22/000366	33 149 Airds Road	l Minto								





BAM Biodiversity Credit Report (Variations)

	Grassy Woodlands	Tier 2 or higher threat status	1395_Distu rbed	No	13	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.		
1800-Cumberland Swamp	Like-for-like credit retire	ment options						
Dak riparian forest	Class	Trading group	Zone	HBT	Credits	IBRA region		
	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 915, 916, 917, 918, 919, 1125, 1230, 1232, 1234, 1235, 1236, 1726, 1727, 1728, 1729, 1731, 1800, 1808	-	1800_Distu rbed	No	3	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.		
	Variation options							
	Formation	Trading group	Zone	HBT	Credits	IBRA region		
	Forested Wetlands	Tier 3 or higher threat status	1800_Distu rbed	No	3	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.		
Species Credit Summary lo Species Credit Data								
Assessment Id	Proposal Name					Page 3 o		
0036632/BAAS18047/22/000366	33 149 Airds Road	Minto						



GOVERNMENT		BAM Biodiversity Credit Report (Variat	ions)
Credit Retirement Options	like-for-like options		
Assessment Id	Proposal Name		Page 4 of 4
00036632/BAAS18047/22/00036633	149 Airds Road Minto	0	

