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Streamlined Biodiversity Development Assessment Report



160 Bolong Road, Bomaderry NSW 2541

Streamlined Biodiversity Development Assessment Report

Prepared for: Allen Price

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Glossary and abbreviations

Acronym	Description
BAM	Biodiversity Assessment Method
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BC Reg	NSW <i>Biodiversity Conservation Regulation 2017</i>
BDAR	Biodiversity Development Assessment Report
BVM	Biodiversity Values Map
BOS	NSW Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DA	Development Application
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DotE	Commonwealth Department of the Environment (now DCCEEW)
DPE	NSW Department of Planning and Environment (now DCCEEW)
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act</i>
GHFF	Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)
ha	hectares
HBT	Hollow bearing tree
IBRA	Interim Biogeographic Regionalisation of Australia
LGA	Local Government Area



Acronym	Description
MNES	Matters of National Environmental Significance
mm/cm/m/km	millimetres/centimetres/metres/kilometres
PCT	Plant Community Type
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
VI	Vegetation Integrity
VIS	Vegetation Information System



Declarations

Certifications under clause 6.15 Biodiversity Conservation Act 2016

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the Biodiversity Conservation Act 2016 (BC Act).

Signature: 

Date: 05/02/2026

BAM Assessor Accreditation: BAAS25031

This BDAR has been prepared to meet the requirements of BAM 2020.

Details and experience of author/s and contributions

Name	BAM Assessor Accreditation No.	Position/Role	Task performed	Relevant qualifications
Sophie Starrett	BAAS25031	Senior Ecologist	BAM plot surveys, vegetation mapping, site assessment, report preparation.	BSc
Declan Moylan	-	Field Ecologist	Report preparation	BConsBio
Darren James	-	Senior GIS Consultant	Report review	BSc

Conflict of Interest

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client

Signature: 

Date: 05/02/2026

BAM Assessor Accreditation no. BAAS25031

1 Introduction

1.1 Background and Biodiversity Offset Scheme triggers

Ecoplanning was engaged by Allen Price Pty Ltd on behalf of Manildra Group (the Proponent) to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a modification to a State Significant Development Application (SSDA) for the proposed construction of additional grain handling, processing and storage facilities on Shoalhaven Starches land at 160 Bolong Road, Bomaderry NSW 2541 (**Figure 1.1**).

The proposed works take place within Lot 31 & Lot 34 // DP 1222627, Lot 2 // DP 548659, Lot 4 // DP 548205, Lot A & Lot B // DP 334511, Lot B // DP 376494, Lot 21 // DP 1000265, Lot 22 // DP 1296049, Lot 11 // DP 3885, Lot 241 // DP 1130535, Lot 243 // DP 1309744, Lot 1 // DP 1305953, Lot 1 // DP 385145, Lot 143 // DP 1069758, Lot 1 // DP 131008, Lot A // DP 384559, Lot 101 & Lot 102 // DP 1283484, Lot 4 // DP 610696, Lot 1 & Lot 2 // DP 842231 (collectively referred to as the **study area** hereafter).

This BDAR has been prepared by Sophie Starrett, an Accredited Assessor (BAAS 25031) under the NSW Biodiversity Conservation Act 2016 (BC Act) and is consistent with the Biodiversity Assessment Methodology (BAM) (DPIE 2020a). The BDAR has been prepared following the Development Assessment application type in the BAM Calculator (BAM-C) and all credit calculations have been undertaken in case number 00060469//25/00060470. The development plans provided by the Proponent are presented in **Figure 1.2**.

The NSW *Biodiversity Conservation Act 2016* (BC Act) establishes the biodiversity assessment requirements for proposed developments and land use change. The BC Act comprises a mandatory framework for addressing impacts on biodiversity from development and clearing. The framework includes the Biodiversity Offsets Scheme (BOS) and assessment methodologies such as the Biodiversity Assessment Method (BAM) (DPIE 2020a). When the BOS is triggered, a Biodiversity Development Assessment Report (BDAR) is required, and the BAM must be applied. Triggers for the BOS include:

- Exceeding the native vegetation clearing threshold (based on minimum lot size)
- Direct impacts occurring on land identified on the Biodiversity Values Map (BVM)
- A significant impact on threatened species or threatened ecological communities (or their habitat)

A search of the BVM found that the proposed development will impact an area containing mapped biodiversity values that are not biodiversity certified (NSW DCCEE 2025a) (**Figure 1.3**). The BVM indicates that the mapped area contains *threatened species or communities with potential for serious and irreversible impacts* (SAII). Given the proposed development may have impacts on land included on the BVM, the BOS is triggered and the preparation of a BDAR is required.

1.2 Streamlined Assessment module – small area

When the BOS is triggered but impacts to native vegetation or biodiversity may be low, the BAM provides an option to prepare a BDAR using a Streamlined Assessment. Streamlined

Assessments only assess impacts on threatened species that are at risk of Serious and Irreversible Impacts (SAILs).

This BDAR uses the Streamlined Assessment module for small area developments, as outlined in Appendix C of the BAM (DPIE 2020a). The small area module may be used where vegetation clearing is below the clearing threshold associated with the minimum lot size of the development site. The native vegetation clearing threshold associated with the development site is 0.25 ha. In accordance Table 12 of Appendix C in the BAM (DPIE 2020a), a small area module is appropriate to apply as only 0.08 ha of native vegetation is proposed for clearing.

This streamlined assessment module cannot be used if the Biodiversity Values within the subject land are mapped as core koala habitat identified in a plan of management under the *State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021*. There is no approved Koala Plan of Management associated with the subject land. The reporting requirements for this Streamlined Assessment are taken from Appendix C and Table 27 of the BAM (2020) (DPIE 2020a).

1.3 Location and site context

The land to which a BDAR applies is the **subject land**, which the BAM defines as land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. For this proposal, the subject land includes only that portion of the development site that will be subject to clearing or earthworks and contain the additional grain handling, processing and storage facilities. Within this BDAR, the subject land includes 25.48 ha of land as mapped within the red polygon shown in **Figure 1.2**. The subject land is contained within the study area, which is 179.73 ha in size and is mapped by the black polygon shown in **Figure 1.3**.

The subject land is located entirely within Shoalhaven Local Government Area (LGA) and is zoned under the *Shoalhaven Local Environmental Plan (SLEP) 2014* as RU1 – Primary Production, RU2 – Rural Landscape and E4 – General Industrial. The subject land is situated north and south of Bolong Road Bomaderry, within the Shoalhaven Starches wheat grain producing facility and the Water Treatment Plant (WTP).

1.4 Proposed development

The proposed development includes the construction of additional storage and handling facilities, Water Treatment Plant (WTP) upgrade, relation of silos, construction of rail maintenance building, construction of an Ethanol Maintenance building and Nitric Acid storage.

- Rock revetment works along the Shoalhaven River
- Construction of a conveyor belt along existing railway line
- Pipeline extension from the Shoalhaven Starches facility to the WTP
- Extension of existing WTP facilities including the combining of two existing storage ponds into one larger storage pond.

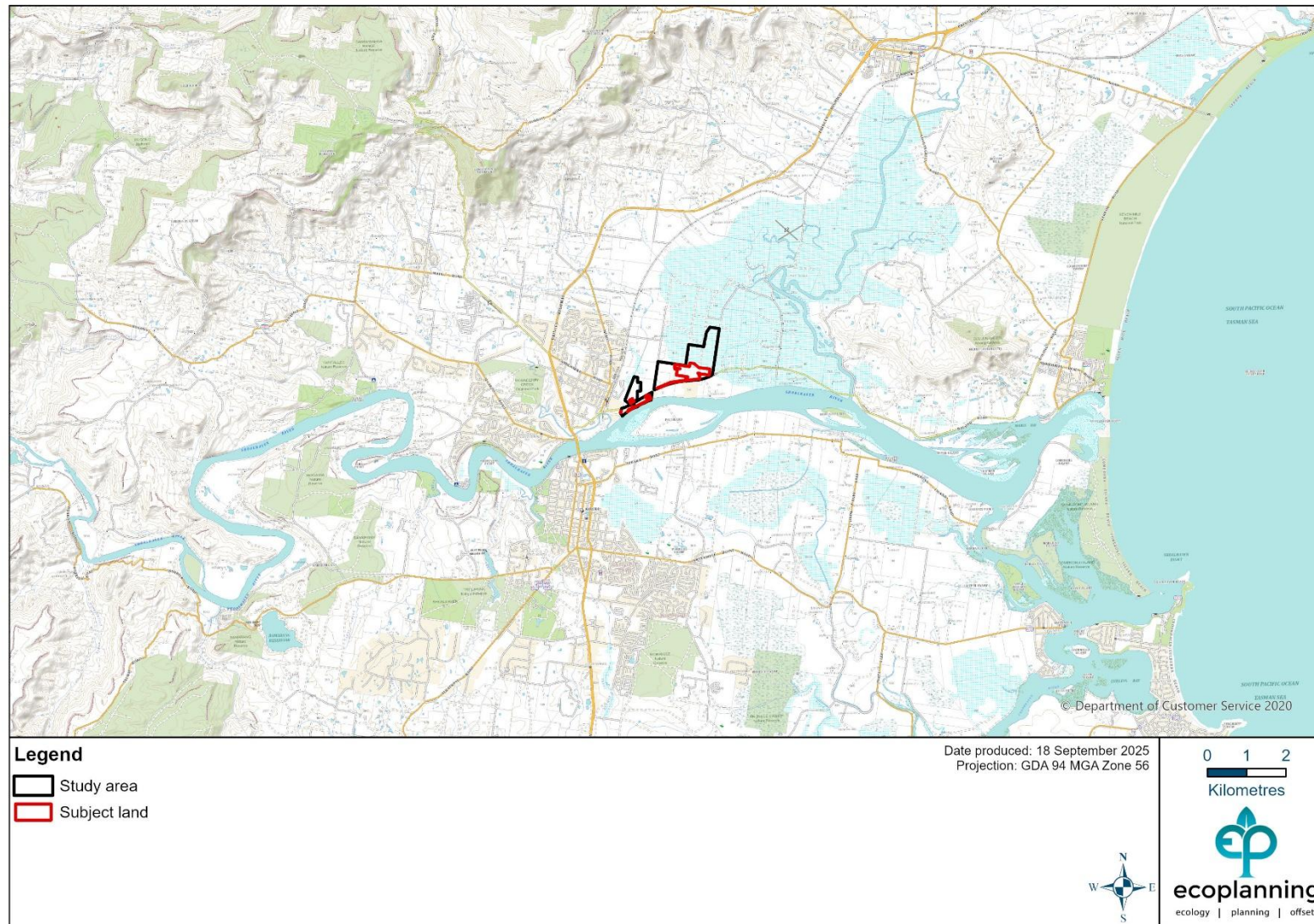


Figure 1.1: The location of the subject land and study area.



Figure 1.2: The location of the subject land and study area.



Figure 1.3: Study area, subject land, cadastre and biodiversity values map (BVM).

2 Landscape context

2.1 Identifying landscape features

In accordance with Section 3.1 of the BAM, several landscape features are assessed within the subject land and an assessment area surrounding the subject land. 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 a 1,500 m buffer surrounding the outside boundary of the subject land (1,697 ha). Landscape features for the subject land and the 1,500 m assessment buffer are described below and shown in **Figure 2.1**.

2.1.1 IBRA regions and subregions

Interim Biogeographic Regionalisation of Australia (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 Sydney Basin IBRA region and the Illawarra IBRA subregion (DoEE 2012). These attributes were entered into the BAM-Calculator (BAM-C).

2.1.2 NSW landscape regions (Mitchell Landscapes)

The subject land is located predominantly within the Shoalhaven Alluvial Plain Mitchell Landscape, with small portion occurring within the Bomaderry Plains Mitchell Landscape (DECC 2016). The Nowra-Durras Coastal Slopes landscape type also occurs within the 1,500 m assessment buffer (**Figure 2.1**).

The Shoalhaven Alluvial Plain landscape is characterised by: *'quaternary sands and gravels of the floodplain and terraces of the Shoalhaven River below the point where the river leaves its mountain and gorge tract to form a confined alluvial fan near the coast. Soils differ with sediment type but are generally uniform sandy loam with high organic content. General elevation 0 to 30 m, local relief <10 m. Minor geomorphic features of meander scroll plains, islands, cut-off meanders and associated swamps are common. River peppermint (Eucalyptus elata) and river oak (Casuarina cunninghamiana) common in the upper reaches merging downstream to brackish and saline riparian communities of swamp oak (Casuarina glauca), river mangrove (Aegiceras corniculatum) and common reed (Phragmites australis), to grey mangrove (Avicennia marina) and salt marsh'* (DECC 2002).

2.1.3 Other features

Rivers, streams and estuaries

Desktop analysis of the NSW hydrography dataset (DCS 2025) identified several streams across the development site. Part of the proposal including rock revetment works and construction of the conveyor belt are located on the banks of the Shoalhaven River, a 12th order stream. A 4th order watercourse, Abernethy's Creek, flows south and is tributary of the Shoalhaven River. One 2nd order stream is located in the south east of the subject land within the Water Treatment Plant.

Local and important wetlands

Under the BAM, a Local Wetland is defined as an area of land that is wet by surface water or groundwater, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle (DPIE 2020a). An Important Wetland is a wetland listed under the Directory of Important Wetlands of Australia (DIWA, Environment Australia 2001) or coastal wetland area included under the *State Environmental Planning Policy (Hazards and Resilience) 2021*. No local or important wetlands occur within the subject land or surrounding 1,500 m assessment buffer.

Coastal wetland mapping including Coastal Use Area and Coastal Environment Area Map applies to a portion of the subject land (see **Figure 2.2**) buffered off the Shoalhaven River. Therefore, adverse impact to factors such as integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment, coastal environmental values and natural coastal processes; and marine vegetation, native vegetation and fauna and their habitat need to be addressed. This has been addressed in **Section 6.2.3**.

Habitat connectivity

Desktop analysis was undertaken to identify connectivity of different areas of habitat that may serve as movement corridors for threatened species across their range. Within the 1,500 m assessment buffer, habitat connectivity is severely limited due to clearing for agricultural, residential and industrial purposes. Nevertheless, a restricted band of riparian habitat occurs along the northern bank of the Shoalhaven River, representing a limited area of connected habitat within the development site. This band extends to larger areas of connected vegetation including Bomaderry Creek Regional Park.

Areas of geological significance and soil hazard features

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

The land and soil capability of the development site and surrounding 1,500 m assessment buffer is moderately limited (NSW DCCEE 2025b). Within the assessment buffer there is a moderate risk of hazards including acidification, shallow soils and rockiness, structural decline, waterlogging and wind erosion, and a slight to very slight risk of mass soil movement and water erosion.

The subject land occurs on the Shoalhaven soil landscape. The Shoalhaven soil landscape location is described as level to gently undulating active floodplain with small levees, minor depressions and backwater swamps on the Coastal Plain. Flat to gently undulating terrace surfaces of the Shoalhaven River. The geology is described as Alluvium – gravel, sand, silt and clay derived mainly from sandstone and shale overlying buried estuarine sediments.

Areas of outstanding biodiversity values and the biodiversity values map

There are currently four areas of outstanding biodiversity value declarations within NSW. These include:

- Critical habitat for the Gould's Petrel (Cabbage Tree Island and Boondelbah Island off the coast of Port Stephens).



- Critical habitat for Little Penguin population in Sydney's North Harbour.
- Critical habitat for Mitchell's Rainforest Snail in Stotts Island Nature Reserve.
- Critical habitat for the Wollemi Pine.

No areas of outstanding biodiversity value have been identified within the subject land or assessment buffer. However, other areas of significant biodiversity value are present, with areas of native vegetation and the Shoalhaven River identified on the BVM (**Figure 1.3**).

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 area around the subject land to assess habitat suitability for threatened species.

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 site, and*
- *includes native vegetation that has a gap of less than 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 or biodiversity stewardship 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, 5-24 ha, 25-100 ha or ≥ 100 ha. Vegetation located along the Shoalhaven River retains connectivity to riparian vegetation located along the watercourse and associated tributaries, and leads to the proximate nature reserve Bomaderry Creek Regional Park. Vegetation located along the Shoalhaven River was assigned the maximum patch size class of ≥ 100 ha. A patch size of 101 ha was entered into the BAM Calculator.

Isolated patches located within the Water Treatment Plant do not have any connectivity to native vegetation in the broader locality. As such a patch size of < 5 ha has been assigned in BAM Calculator.

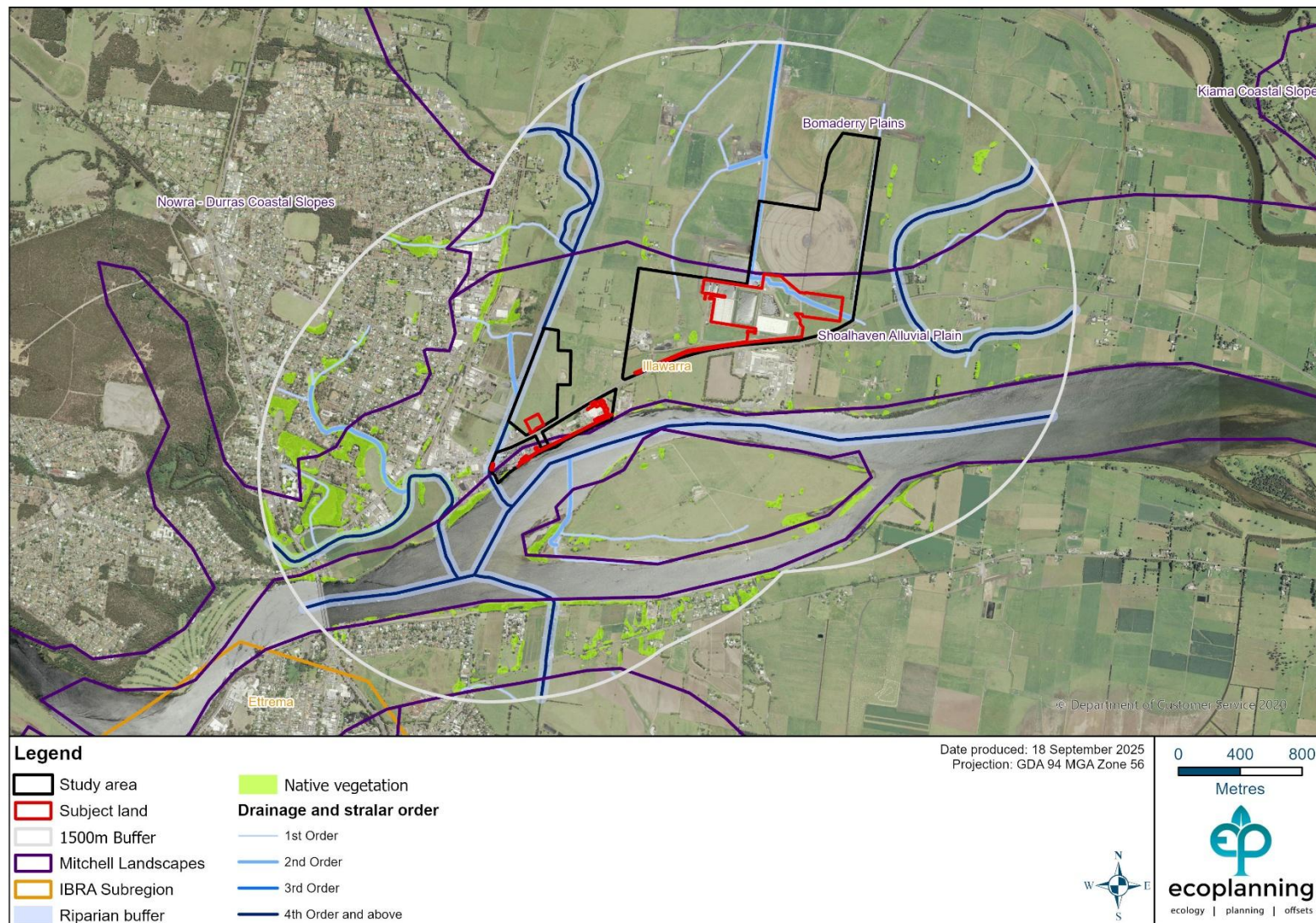


Figure 2.1: The 1,500 m assessment area, showing watercourses, native vegetation cover, IBRA subregion and Mitchell Landscapes.

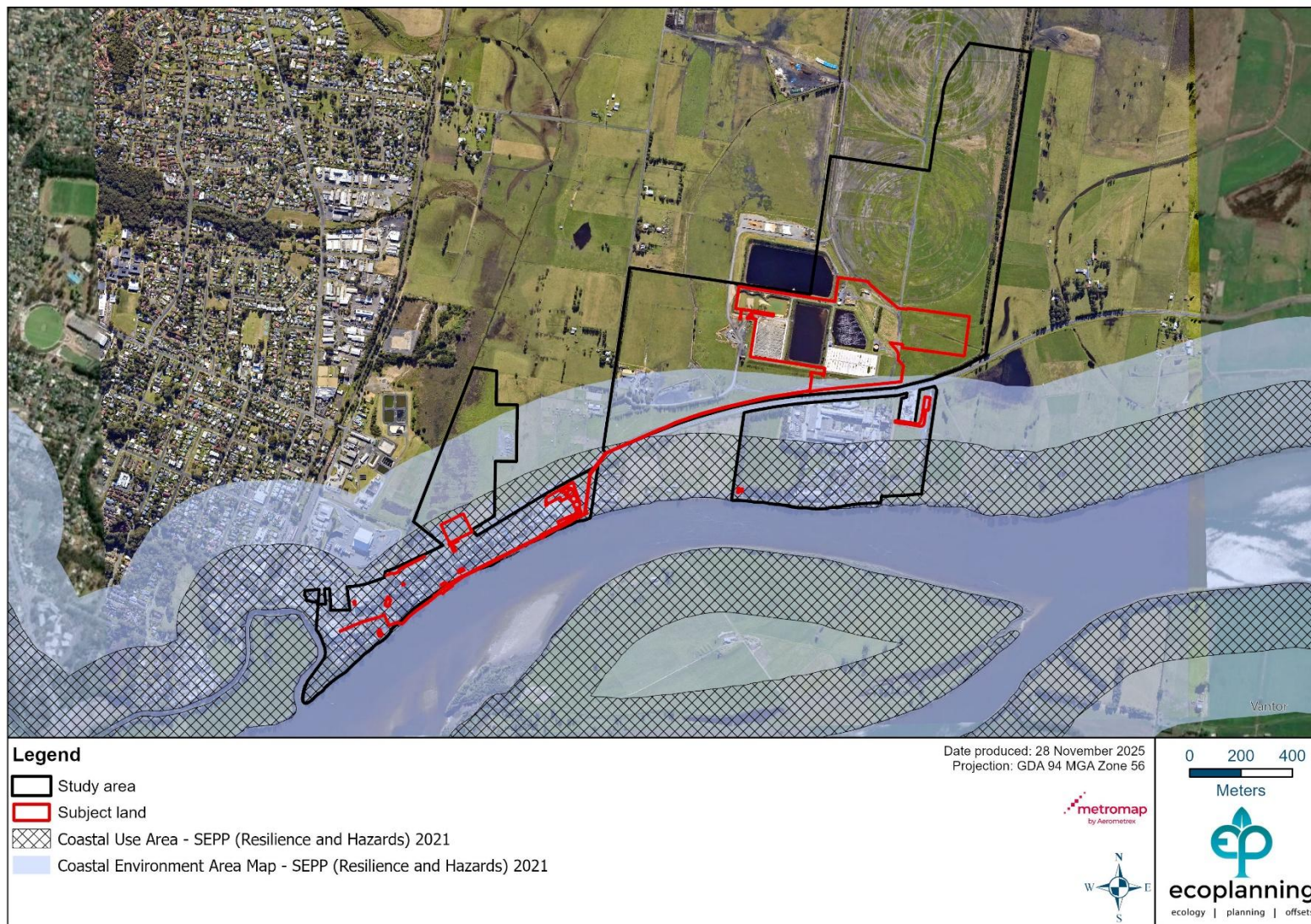


Figure 2.2: Coastal wetlands, Coastal Use Area (Hazards and Resilience SEPP 2021).

3 Native vegetation

Plant community types (PCTs) are units that allow the characterisation of assemblages of native flora species. In NSW, a database has been published by DPE which holds the descriptions of all PCTs, which includes the known assemblages of flora, diagnostic flora species, landscape position, soil types, etc. PCTs can be identified by their name or their PCT identification number. For the purposes of this report, PCTs will be referred to by their PCT ID number, unless otherwise.

3.1 Regional vegetation mapping

In accordance with Section 4.1 of the BAM, existing information relevant to the native vegetation of the subject land and the 1,500 m buffer area has been reviewed. Vegetation mapping by DCCEEW (2024) identified one Plant Community Type (PCT) within the subject land. An additional three PCTs were identified proximate to the subject land. PCTs are the finest level of in the NSW Vegetation Classification hierarchy. They identify and describe recurring patterns of native plant species assemblages in relation to environmental conditions (soil, temperature, moisture and other factors). The floristic composition of PCTs is characterised by frequently co-occurring species, including combinations of trees, shrubs and/or ground cover plants (DCCEEW 2024).

Desktop assessment of vegetation mapping by DCCEEW (2024) identified the following vegetation community within the subject land:

- PCT 4049 - South Coast Floodplain Grassy Swamp Forest
- PCT 3269 - Shoalhaven Lowland Spotted Gum-Paperbark Forest
- PCT 3654 - Shoalhaven Lowland Bloodwood Shrub Forest
- PCT 3153 - Illawarra Escarpment Bangalay x Blue Gum Wet Forest

An additional four PCTs are mapped (DCCEEW 2024) in proximity to the subject land, these include:

- PCT 3045 - South Coast Temperate Gully Rainforest
- PCT 3078 - Illawarra Lowland Wet Vine Forest
- PCT 3270 - Shoalhaven Lowland Wet Gully Forest
- PCT 3962 - Coastal Floodplain Phragmites Reedland

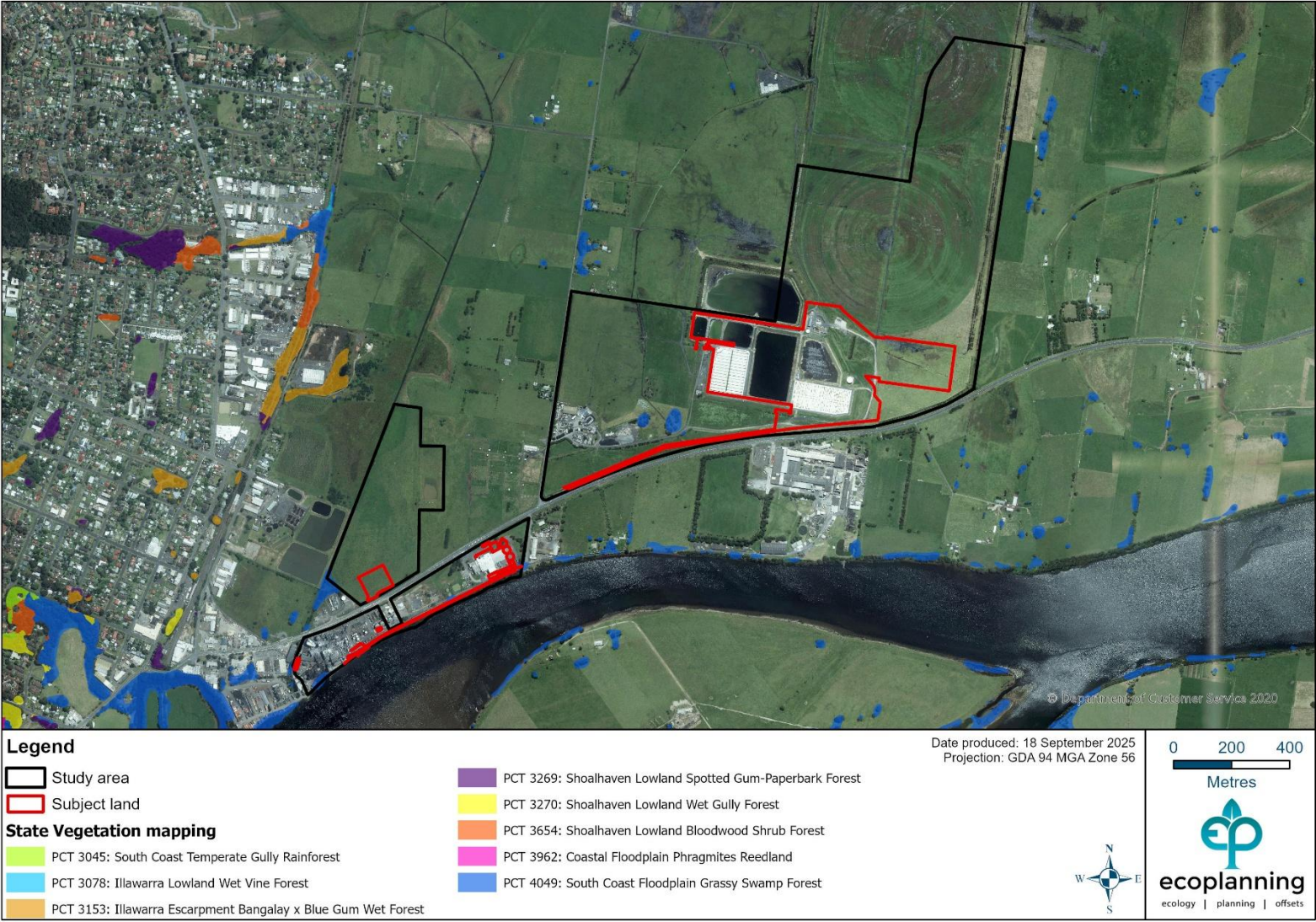


Figure 3.1: Regional vegetation mapping in the study area (DCCEEWS 2024).

3.2 Vegetation extent and field assessment

In accordance with Section 4.1 of the BAM, the extent of native vegetation was identified and mapping of native vegetation in PCTs was conducted in accordance with BioNet Vegetation Classification Database (DCCEEW 2025b). Vegetation mapping by DCCEEW 2024 was consulted to inform field validated vegetation mapping in the study area.

Field survey for vegetation mapping was undertaken by Sophie Starrett (Senior Ecologist) on 2 September 2025 over eight hours. Areas of vegetation were traversed whilst recording the vegetation structure and dominant species within each structural layer. The field survey was conducted to identify the extent of native vegetation, validate PCT boundaries and map the extent of vegetation zones (variations in broad condition state of polygons) in accordance with the BAM.

3.3 Plant Community Type selection and descriptions

A summary of the PCT and vegetation zones within the study area and subject land is provided in **Table 3.1** and **Figure 3.2**, and **Figure 3.3** shows the validated vegetation mapping of the study area. A description of the vegetation community, including justification for the assigned PCT and vegetation zone, is provided in the following sections.

In determining the PCTs across the study area, various attributes were considered in combination to assign vegetation to be the best fit PCT. Attributes included (but are not limited to) consideration of IBRA subregion, dominant species in each stratum and relative abundance, community composition, previous vegetation mapping, soils and landscape position. Reference was made to the PCT profiles in the BioNet Vegetation Classification Database (DCCEEW 2025c).

Based on the floristic composition of the vegetation in the study area one PCT (PCT 4049) in three conditions were identified in the study area. PCT 4049 was identified in a 'Planted', 'Regeneration' and 'Disturbed' condition classes (see **Table 3.1**). Association of the validated vegetation to Threatened Ecological Communities (TECs) listing under the BC Act or EPBC Act are provided in **Table 3.2**.

Table 3.1: Details of PCTs recorded within the study area.

Veg. Zone	Plant Community Type (PCT)	Vegetation formation and class	Condition class	Area in study area (ha)	Area in subject land (ha)
1	PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Forested Wetlands Coastal Floodplain Wetlands	Planted	0.09	0.09
2	PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Forested Wetlands Coastal Floodplain Wetlands	Disturbed	1.44	0.11
3	PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Forested Wetlands Coastal Floodplain Wetlands	Regeneration	1.09	0.03
-	Exotic vegetation and infrastructure	NA	-	177.53	25.25

*Subject to rounding errors

Table 3.2: Association of Validated PCT's to Threatened Ecological Communities (TEC's) listed under the BC Act and EPBC Act.

PCT	BC Act TEC	EPBC Act TEC
PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community



Figure 3.2: Field validated vegetation mapping within the subject land, southern portion (Ecoplanning 2025).

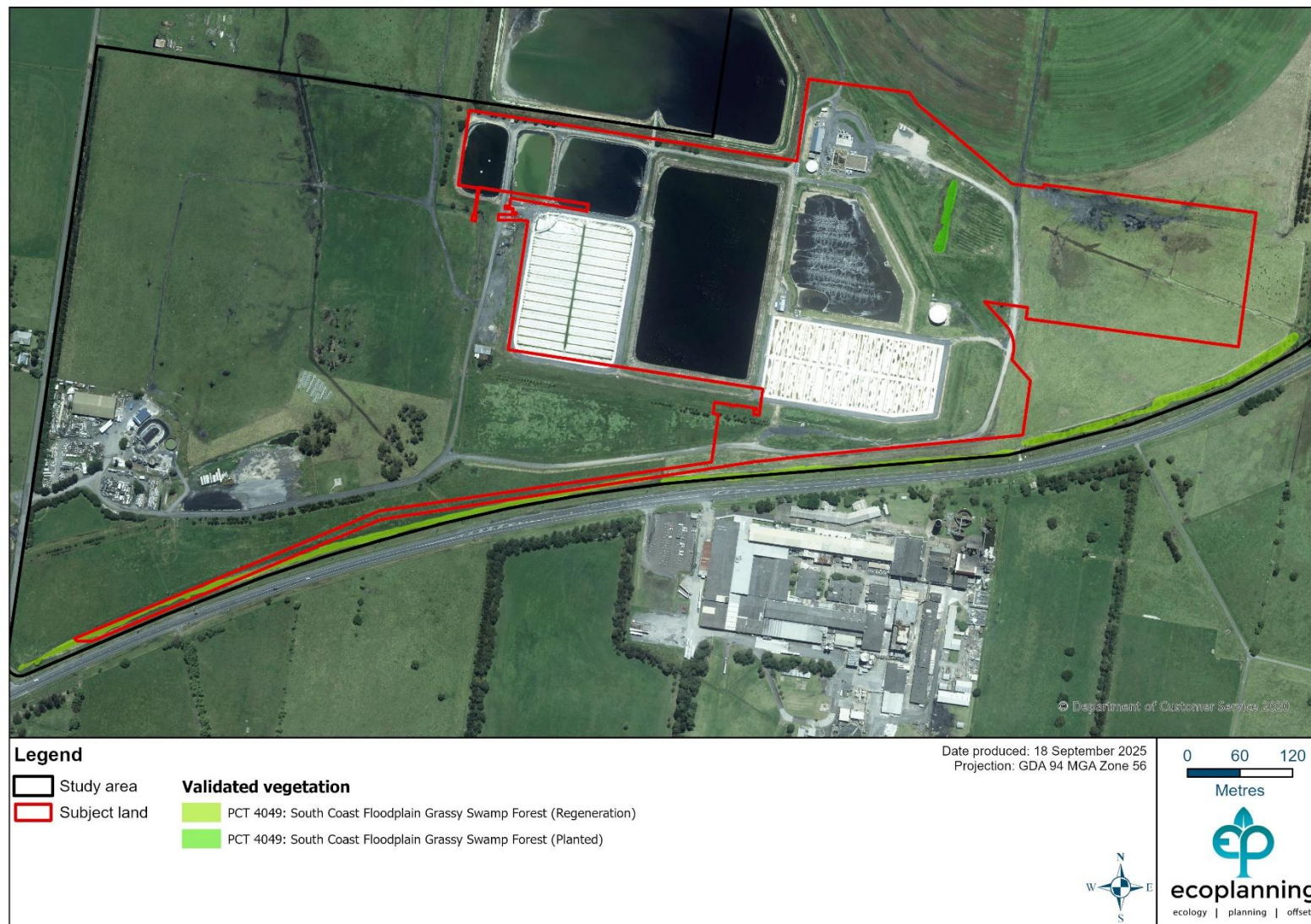


Figure 3.3: Field validated vegetation mapping within the subject land, northern portion (Ecoplanning 2025).

PCT 4049 - South Coast Floodplain Grassy

Field assessment determined that patches of native vegetation within the study area were consistent with PCT 4049 – South Coast Floodplain Grassy Swamp Forest. A description of PCT 4049 within the study area and justification for its selection is discussed below. A summary of the PCT 4049 profile from the BioNet Vegetation Classification Database (DCCEEW 2025c) is provided in **Table 3.3**.

Table 3.3: BioNet Vegetation Classification Database PCT 4049 profile (DCCEEW 2025c).

PCT profile	
PCT Name	South Coast Floodplain Grassy Swamp Forest
PCT ID	PCT 4049
Vegetation formation	Forested Wetlands
Vegetation class	Coastal Floodplain Wetlands
Percent cleared	85.68%
Conservation status	BC Act: Endangered Ecological Community (EEC) Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EPBC Act: EEC Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community
Vegetation description	A tall grassy open forest
Landscape position	Occurs on low-lying slightly saline sites on coastal floodplain margins and headlands soaks of the southern Sydney Basin between Narooma and Wollongong at elevations of 2-25 metres asl in areas receiving 1000-1350 mm mean annual rainfall commonly on organic-rich sandy clay alluvium.
Upper stratum	<i>Casuarina glauca</i> , <i>Eucalyptus longifolia</i> , <i>Notelaea longifolia</i> , <i>Allocasuarina littoralis</i> , <i>Eucalyptus botryoides</i>
Middle stratum	<i>Pittosporum undulatum</i> , <i>Leucopogon juniperinus</i> , <i>Melaleuca ericifolia</i> , <i>Breynia oblongifolia</i> , <i>Kunzea ambigua</i> , <i>Melaleuca linariifolia</i> , <i>Callistemon linearis</i> , <i>Leptospermum polygalifolium</i>
Ground stratum	<i>Oplismenus imbecillis</i> , <i>Entolasia marginata</i> , <i>Microlaena stipoides</i> , <i>Lomandra longifolia</i> , <i>Lobelia purpurascens</i> , <i>Dichondra repens</i>

Species found within the subject land are in **bold**.

PCT 4049 occurs in a 'Planted', 'Disturbed' and 'Regeneration' condition across the study area. PCT 4049 in a 'Planted' condition is located in the water treatment plant and is a narrow strip of vegetation likely planted as a wind break. The area contained planted rows of *Casuarina glauca*, *Melaleuca styphelioides* and *Callistemon sp.*. This vegetation zone occurs on a man-made mound in a low-lying area. The shrub layer is highly disturbed containing *Lantana camara** (Lantana). The ground layer largely consists of exotic grasses *Cenchrus clandestinus** (Kikuyu) and *Bromus catharticus** (Prairie Grass).

PCT 4049 in a Disturbed condition occurred in one patch along the Shoalhaven River, adjacent to the railway line within the Shoalhaven Starches facility. This vegetation zone contains a mix of planted vegetation such as *Corymbia maculata* and *Casuarina glauca*, as well as naturally occurring and regenerating *Casuarina glauca*. The midstorey was limited to Lantana and *Araujia sericifera* (Moth Vine). Due to the presence of gravel along the railway line and Casuarina needles contributing to litter, ground layer cover was very low. Ground cover species detected in this area included *Dichondra repens*, *Carex sp.* and *Ehrharta erecta** (Panic Veldtgrass).

PCT 4049 in a Regeneration vegetation zone was located directly north of Bolong Road within the water treatment plant along an unmapped drainage line. This area included a thin band of planted *Casuarina glauca*s and *Melaleuca* species along the edge of the drainage line and the drainage line that is colonised by native rushes and aquatic forbs. It is noted that during dry periods groundcover in this area is likely to be limited to exotic species. Ground cover largely included *Eleocharis gracilis*, *Bromus catharticus**, *Cynodon dactylon* (Couch) and *Trifolium repens** (White Clover).

It is worth noting that PCT 4049 across all three condition classes were considered to be highly modified. All vegetation zones contain native planted species, including *Casuarina glauca*.

Justification for PCT selection and other PCT's considered

PCT 4049 occurs on coastal floodplain margins and headland soaks of the southern Sydney Basin and northern South East Corner Bioregions. The PCT occurs between Narooma and Wollongong at elevations between 2-25 metres asl in areas receiving 1000-1300 mm mean annual rainfall, commonly on organic-rich sandy clay alluvium (DCCEEW 2025c). These abiotic factors are consistent with the conditions within the study area.

Given the highly degraded nature of the vegetation within the study area and the lack of native diversity and historical planting across the landscape it is difficult to determine the PCTs present based purely on floristic assemblage. However, PCT 4049 is typically dominated by *Casuarina glauca*, this is consistent with the vegetation in the subject land. *Pittosporum undulatum* was observed during the field survey within the shrub layer, which was otherwise dominated by *Lantana camara**. The ground layer typically comprised exotic grasses and forbs, however *Dichondra repens* was located across the study area. The limited native vegetation present contained diagnostic species of PCT 4049 (DCCEEW 2025c).

PCT 4049 was identified as the PCT of best-fit for native vegetation in the study area based on landscape position and prevalence of some diagnostic species recorded during the field survey (see **Appendix A** for floristic plot data and **Appendix B** for additional incidental flora species recorded during the field survey).

The filter tool was used to help determine the best fit PCT for vegetation within the study area. The IBRA subregion and LGA was used to narrow down the list of potential PCTs. Dominant canopy, shrub and ground layer species was used to filter PCTs. A total of nine PCTs were included in the initial PCT list, and were considered as described below.

PCT 3327 and PCT 3330 were removed from the list of PCTs as PCT 3327 and PCT 3330 are allocated to the 'Grassy Woodland' vegetation formation. The vegetation within the subject land occurs in low lying areas and along the edge of the Shoalhaven River, and therefore more closely resembles the 'Forested Wetland' vegetation formation.

PCT 4020, PCT 4021 and PCT 4047 were removed from the PCT selection list as each of these PCTs are characterized by a canopy that contain a suite of *Eucalyptus* species. *Eucalyptus* species were absent from subject land (with the exception of planted species).

Other PCT's that were considered based on the output of the PCT filter tool were PCT 4009, PCT 4027, PCT 4028 and PCT 4056. **Table 3.4** provides the reasoning for excluding these PCT's from the assessment.

Table 3.4: Justification for PCT 4049 compatibility in the study area.

Other PCTs considered	Justification
PCT 4009 - Shoalhaven Lowland Flats Wet Swamp Forest	PCT 4009 is described as a very tall swampy sclerophyll open forest with layered mid-stratum of <i>Melaleucas</i> , commonly with <i>Casuarina glauca</i> . This PCT is characterised by a canopy either <i>Eucalyptus botryoides</i> or <i>Eucalyptus robusta</i> , neither of which were present in the study area. Furthermore, this community typically sits higher in the landscape than PCT 4049.
PCT 4027 - Estuarine Swamp Oak-Mangrove Forest	PCT 4027 commonly contains a saltmarsh ground layer. No saltmarsh species are present within the subject land, nor is any habitat suitable for saltmarsh within the subject land. The canopy almost always includes <i>Casuarina glauca</i> , which was located across the subject land. It is expected that beyond the study area on the lower banks of Shoalhaven River that this PCT may occur.
PCT 4028 - Estuarine Swamp Oak Twig-rush Forest	PCT 4028 generally occurs on the edges of tidal estuaries and tidal creek flats. The location of native vegetation within the subject land was devoid of any tidal influence. This PCT commonly includes <i>Casuarina glauca</i> however, it occurs on slightly lower and wetter areas than PCT 4049. It is expected that beyond the study area on the lower banks of Shoalhaven River that this PCT may occur.
PCT 4056 - Southern Estuarine Swamp Paperbark Creekflat Scrub	PCT 4056 occur in slightly saline swamps, near permanently waterlogged margins of estuaries and coastal lagoons. No areas within the subject land support saline swamps or near-permanently waterlogged estuaries or lagoons. Therefore, the landform elements present on site do not align with this PCT.



Figure 3.4: PCT 4049 in an 'planted' condition class in the subject land.



Figure 3.5: PCT 4049 in an 'Regeneration' condition class in the subject land.



Figure 3.6: PCT 4049 in an 'Disturbed' condition class in the subject land.

3.4 Threatened Ecological Communities

PCT 4049 is associated with a Threatened Ecological Community (TEC) listed under both the BC Act and EPBC Act. Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions listed under the BC Act as an Endangered Ecological Community (EEC). Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community is listed under the EPBC Act as an EEC.

While the BC Act aims to protect all stands of the EEC regardless of condition, the EPBC Act listing specifies condition thresholds and aims to protect the stand of the EEC in the best condition. The conservation advice for the EEC EPBC Act listing establishes key diagnostic characteristics and minimum condition thresholds to identify the EEC. Having considered the key diagnostic characteristics, the vegetation within the study area is valid for further consideration.

The Conservation Advice for the community (TSSC 2018), outlines the key diagnostic characteristics and condition thresholds for the EEC. A stand of vegetation must meet the key diagnostic characteristics and minimum condition thresholds to be eligible for assessment under the EPBC Act. All stands of vegetation within the subject land meet the key diagnostics criteria. However, the vegetation within the subject land does not meet the minimum condition threshold. **Table 3.5** includes the minimum condition threshold for the ECC. PCT 4049 in a 'planted' is a small distinct patch that does not retain any connectivity to the areas of native vegetation; therefore this vegetation zone does not meet the minimum size thresholds to be

considered the EEC. PCT 4049 in a 'regeneration' and 'disturbed' vegetation zone are contiguous with larger areas of native vegetation. The perennial understory was largely absent for the 'disturbed' zone and dominated by exotic species in the 'regeneration' zone. As such neither of these areas conform with the minimum condition thresholds for the EPBC EEC.

Table 3.5: Condition thresholds, classes, and categories for patches of the EPBC EEC (TSSC, 2018)

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** Small 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 <u>large patch</u> that meets key diagnostics and has a <u>predominantly native understorey</u>	CATEGORY B A <u>medium patch</u> that meets key diagnostics and has a <u>predominantly native understorey</u> OR A <u>small patch</u> that meets key diagnostics and has a <u>predominantly native understorey</u> and is <u>contiguous**</u> with another <u>large</u> area of native vegetation	CATEGORY C A <u>small patch</u> that meets key diagnostics and has a <u>predominantly native understorey</u>	
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 <u>mostly native understorey</u>	CATEGORY C A <u>medium patch</u> that meets key diagnostics and has a <u>mostly native understorey</u> OR A <u>small patch</u> that meets key diagnostics and has a <u>mostly native understorey</u> and is <u>contiguous**</u> with another <u>large</u> area of native 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 medium patch</u> that meets key diagnostics and has <u>some native understorey</u>			
*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. <i>Chrysanthemoides monilifera</i>, <i>Asparagus</i> spp, <i>Pennisetum</i> spp, <i>Ipomoea</i> spp. etc.) are non-native 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 <i>Symphyotrichum subulatum</i> (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 zone and vegetation integrity

3.5.1 Vegetation integrity survey plots

Three vegetation integrity (VI) survey plots (VI plots) were undertaken within the study area by Sophie Starrett (Senior Ecologist) on the 2 September 2025. In accordance with Section 4.34 of the BAM, the VI plots were located to provide a representative assessment of the vegetation zone. Given the very narrow strips of vegetation present, and the narrow subject land in some areas, the VI plots were positioned as close to the subject land as possible whilst being placed in areas representative of the vegetation zones present.

See **Appendix A** for plot data captured and **Figure 3.7** and **Figure 3.8** for the location of VI plots and survey tracks. The number of plots was consistent with the requirements outlined in Table 3 of the BAM 2020.

For Plot 1 and Plot 3 the dimensions of the plot had to be adjusted to assess the narrow strip of vegetation present in these areas. The floristic plot dimensions for Plot 1 and Plot 3 were 16m wide x 25m long (total 400m²), the function plot dimensions were 16m wide x 62.5m long (total 1000m²).

Table 3.6: Number of plots required per vegetation zone.

Plant Community Type (PCT)	Vegetation Zone	Area in subject land (ha)	# plots required	# plots completed
PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Planted	0.09	1	1
	Regeneration	1.09	1	1
	Disturbed	1.44	1	1

3.5.2 Current and future vegetation integrity scores

Vegetation integrity (VI) scores were calculated based on the three VI plots collected for each of the three vegetation zones listed above in **Table 3.6**. Data collected for each plot is included in **Appendix A** and **Appendix B**.

The plot data was entered into the BAM-C. The results of the VI score are shown in **Table 3.7** and are representative of a condition score/class out of 100. The BAM-C returned a VI score of 21.9 for the 'Planted' zone, 20.5 for the 'Regeneration' zone and 24.6 for the 'Disturbed' zone. Given the vegetation within the subject land aligns with an EEC, vegetation zones with a VI score of ≥15 is valid for offsetting.

Table 3.7: Vegetation Integrity Scores.

Plant Community Type (PCT)	Vegetation Zone	Area impacted	Vegetation Integrity Score	
			Before Development	After development
PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Planted	0	21.9	21.9
	Regeneration	0	20.5	20.5
	Disturbed	0.08	24.6	0

3.5.3 Survey limitations

Survey timing was considered suitable as many flora species were at various stages of flowering, budding or fruiting. However, some species were not able to be identified to species level due to lack of fertile parts present. The location of Plot 3 was highly constrained due to presence of the active trainline and a train being present at the time of survey. In addition, Plot 3 is located along the Shoalhaven River, this area is subject to erosion and has steep and hazardous banks. This presented a challenge in locating the plot in an area wide enough to adequately survey the floristics and surveying the mid and lower banks. As well as surveying flora on the lower banks.

Approximately one third of Plot 2 had been slashed prior to the survey taking place. The plot could not be moved to an area that had not been slashed as the native vegetation being assessed is a narrow strip of planted trees along a shallow drainage depression.

The paddocks located to the east of the water treatment plant could not be accessed during the field survey. These paddocks contain a number of cattle and no access was granted here due to safety concerns. An 'over-the-fence' assessment was undertaken in this area.



Figure 3.7: Survey tracks and location of BAM plots in the southern portion of the subject land.

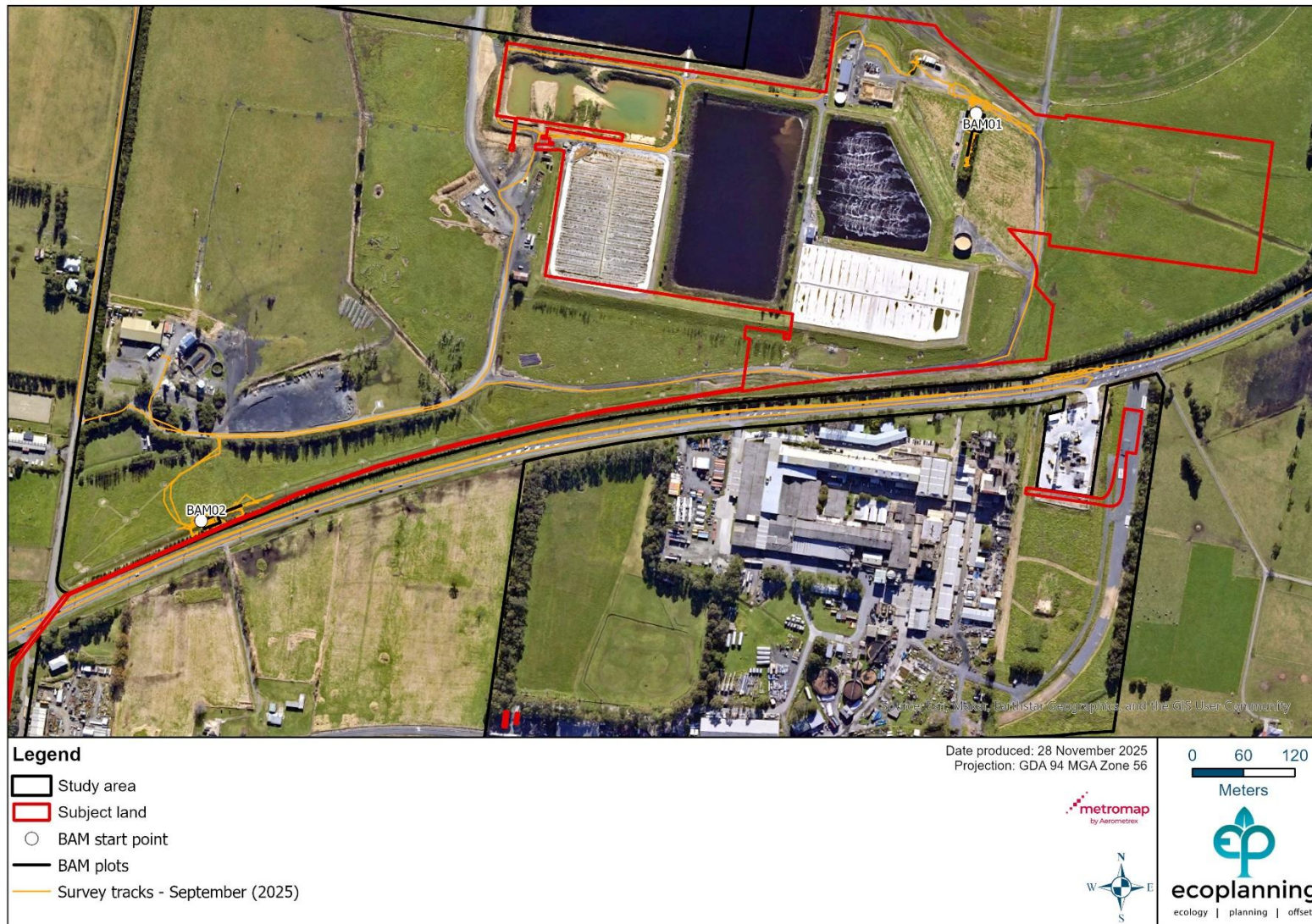


Figure 3.8: Survey tracks and location of BAM plots in the northern portion of the subject land.

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 as '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 (Bungonia IBRA subregion)
- 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 (TBDC).

The process for identifying threatened species which meet the above criteria is completed through the BAM-C. The PCTs identified within the subject land, patch size and native vegetation cover, as outlined in **Section 3**, were entered into the BAM-C 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. Therefore, in consultation with the threatened biodiversity profile search (DCCEEW 2025d), all predicted ecosystem credit species have been included for in the subject land (**Table 4.1**).

Table 4.1: Ecosystem credit species predicted in the subject land.

Scientific name / Common name	Habitat constraints / Geographic limitation	Included / Excluded	BC Act status	EPBC Act status
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow		Included	Vulnerable	Not Listed
<i>Botaurus poiciloptilus</i> Australasian Bittern	Waterbodies: Brackish or freshwater wetland	Included	Endangered	Endangered
<i>Calidris ferruginea</i> Curlew Sandpiper (foraging)		Included	Critically Endangered	Critically Endangered
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (foraging)		Included	Endangered	Endangered
<i>Calyptorhynchus lathami lathami</i> South-eastern Glossy Black- Cockatoo (foraging)	Presence of Allocasuarina and Casuarina species	Included	Vulnerable	Vulnerable
<i>Circus assimilis</i> Spotted Harrier		Included	Vulnerable	Not Listed
<i>Daphoenositta chrysoptera</i> Varied Sittella		Included	Vulnerable	Not Listed
<i>Dasyurus maculatus</i> Spotted-tailed Quoll		Included	Vulnerable	Endangered
<i>Ephippiorhynchus asiaticus</i> Black-necked Stork	Swamps; shallow open freshwater or saline wetlands or shallow edges of deeper wetlands within 300m of these swamps	Included	Endangered	Not Listed
<i>Glossopsitta pusilla</i> Little Lorikeet		Included	Vulnerable	Not Listed
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle (foraging)	Waterbodies; within 1km of rivers, lakes, large dams or creeks, wetlands and coastlines	Included	Vulnerable	Not Listed
<i>Hieraaetus morphnoides</i> Little Eagle (foraging)		Included	Vulnerable	Not Listed
<i>Hirundapus caudacutus</i> White-throated Needle-tail		Included	Vulnerable	Vulnerable

Scientific name / Common name	Habitat constraints / Geographic limitation	Included / Excluded	BC Act status	EPBC Act status
<i>Lathamus discolor</i> Swift Parrot (foraging)		Included	Endangered	Critically Endangered
<i>Lophoictinia isura</i> Square-tailed Kite (foraging)		Included	Vulnerable	Not Listed
<i>Micronomus norfolkensis</i> Eastern Coastal Free-tailed Bat		Included	Vulnerable	Not Listed
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (foraging)		Included	Vulnerable	Not Listed
<i>Neophema pulchella</i> Turquoise Parrot		Included	Vulnerable	Not Listed
<i>Pandion cristatus</i> Eastern Osprey (foraging)		Included	Vulnerable	Not Listed
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (foraging)		Included	Vulnerable	Vulnerable
<i>Pycnoptilus floccosus</i> Pilotbird		Included	Vulnerable	Vulnerable
<i>Rostratula australis</i> Australian Painted Snipe		Included	Endangered	Endangered
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat		Included	Vulnerable	Not Listed

4.3 Identify candidate species

In accordance with Section 5.2.1.4 of the BAM, a predicted candidate species can be considered unlikely to occur within the subject land (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to use the area, or where an expert report identifies that the species is unlikely to be present within the subject land (or a vegetation zone within the subject land). A predicted candidate species credit species that is not considered to have suitable habitat on the subject land (or specific vegetation zones) in accordance with Section 5.2.1.4 of the BAM does not require further assessment on the subject land (or specific vegetation zones). The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) is provided **Table 4.2**, this table includes a description of their habitat requirements and justification for their removal based on those habitat requirements.

Appendix C of the BAM ('Streamlined assessment module – small area') states that only candidate species credit species that are at a risk of an SAIL (serious and irreversible impact)

must be further assessed. Candidate species credit species that are not at risk of an SAI and are not incidentally recorded on the subject land do not require further assessment.

4.4 Determine presence or absence of candidate species credit species

Table 4.2: Assessment of candidate species for 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
<i>Calidris ferruginea</i> Curlew Sandpiper (Breeding)	As per Important Habitat Map	High	CE	CE	Excluded as not on the Important Habitat Map.
<i>Lathamus discolor</i> Swift Parrot (Breeding)	As per Important Habitat Map	Moderate	E	CE	Excluded as not on the Important Habitat Map.
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Breeding)	Caves; Cave, tunnel, mine, culvert or other structure known or suspected 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	High	V	Not listed	Excluded based on absence of habitat constraints. No caves, tunnels, mine, culvert or other structure known or suspected to be used for breeding. Although there are a number of building within or proximate to the subject land, none of these are abandoned or suspected to used by any microbat species including the Large Bent-winged Bat.

4.5 Other threatened species not predicted by the BAM-C

A database review of BioNet Atlas was undertaken for threatened species which were not predicted by the BAM-C. The BioNet Atlas review included a search of threatened flora and fauna species under the BC Act and EPBC Act that are entities at risk of an SAI that have been recorded within 5 km of the study area in the past 20 years and have habitat within the subject land. No additional SAI species were considered likely to occur within the subject land.

4.6 Non-SAI threatened species and habitat

One threatened species was observed during the field assessment, White-bellied Sea-Eagle (*Haliaeetus leucogaster*) was observed perched within the subject land at the WTP and two individuals were observed perched on a light pole outside of the subject land but within the study area. Although not observed within the study area an Eastern Osprey (*Pandion cristatus*) was observed in flight nearby.

One medium to large stick nest was observed within the subject land. This nest was contained within the canopy of a large *Corymbia maculata*, the tree was not an emergent in the landscape. Given the tree is not emergent in the landscape and the nest was concealed in the canopy, it is unlikely that this stick nest is used by a threatened species such as the White-bellied Sea-Eagle or the Eastern Osprey or another threatened species. No impacts to the stick nest are proposed. No suitable stick nests suitable for threatened species were observed within the study area.

One hollow bearing tree (HBT) was observed within the subject land **Figure 3.7**. The HBT is located in a large Fig tree along the Shoalhaven River. The tree will not be impacted as part of this proposal.

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 7.1.1.6 of the BAM, actions taken to avoid and minimise impacts through locating the project must be documented and justified in the BDAR. Additionally, Section 7.1.1.4 of the BAM states that in selecting a project location, the following should be addressed, as they apply to the project:

- 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 proponent has designed the proposed development to avoid impacts to native vegetation within the subject land. Efforts have been made to avoid all non-essential impacts with the only remaining impacts occurring to allow for the 50 m wide rock revetment along the Shoalhaven River that will include the removal of 0.08 ha of PCT 4049 in a 'Disturbed' condition. This will involve the removal of native trees including *Casuarina glauca*, and non-native trees such as *Erythrina x sykesii* (Coral tree). The location of trees is shown in **Figure 5.1**. Rock revetment is needed to stabilise existing erosion of the bank of the Shoalhaven River and is required in this area to ensure stability and avoid any bank collapses or further erosion.

During the field assessment it was noted that proposed pipeline within the WTP was impacting on PCT 4049 in a 'Regeneration' condition. Following the field assessment, Ecoplanning discussed realigning the placement of the pipeline alignment at the WTP. The original alignment was located within the vegetation mapped as PCT 4049 'Regeneration'. Ecoplanning suggested this pipeline alignment be adjusted to utilise the exotic grassland located directly north and avoid impacts to native vegetation. The proponent updated the location of the pipeline to avoid all planted *Casuarina glaucas* and regenerating vegetation along unmapped drainage line at the WTP. It is also noted that on ground siting of the pipeline will avoid native vegetation.

Furthermore, the small patch of PCT 4049 'Planted' was initially marked for removal to allow for the construction of the WTP extension. After further discussions with Shoalhaven Starches, further avoidance of vegetation was established. All impacts PCT 4049 in a 'Planted' condition and are completely avoided under the updated design.

Furthermore, additional impacts previously identified along Shoalhaven River in vegetation identified as PCT 4049 'Disturbed' condition have been reduced. Shoalhaven Starches have sited the grain handling facility to avoid impacts to planted *Corymbia maculata* trees that form part of PCT 4049 'Disturbed'. These planted trees provide nesting and foraging opportunities for a number of bird and nectivorous species. Additionally, one hollow bearing tree (HBT) was

identified in a Fig tree within the PCT 4049 'Disturbed' vegetation zone. This HBT was the only habitat feature identified within the subject land and will be avoided.

In summary, a total of 0.23 ha of native vegetation has been avoided by applying the avoid and minimise hierarchy. Impacts to one HBT and one stick nest has been avoided. Remaining impacts include the 0.08 ha of PCT 4049 in a 'Disturbed' condition that is required for bank stabilisation along the Shoalhaven River.

5.2 Avoiding and minimising prescribed biodiversity impacts during project planning

Prescribed biodiversity impacts are defined under Clause 6.1 of the BC Reg and Section 6 of the BAM 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 have been considered in context of the subject land below (**Table 5.1**).

Table 5.1: Prescribed Biodiversity Impacts.

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. There are many human made structures within the subject land and directly adjacent to the subject land. These include carparks, the railway line, silos and buildings. The water treatment plant includes large ponds, three smaller ponds will be combined to form one larger pond. The remaining ponds will be unchanged. The ponds provide some habitat for waterbirds. No human or manmade structures will be removed as part of the proposed works. A pair of White-bellied Sea Eagles were observed perched on a tall light pole within the Starches facility (outside of the subject land). Non-native vegetation is common throughout the subject land. Non-native vegetation within the subject land is made up of exotic paddocks typically dominated by Kikuyu grass and several weeds. A number of landscaped garden beds were also present within the subject land planted out with native species.
(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)	As discussed in Section 2.1 , native vegetation along Shoalhaven River retains some connectivity to Shoalhaven River riparian vegetation and Bomaderry Creek which flows into Bomaderry Creek Regional Park. Vegetation along Shoalhaven River eventually joins large expanses of bushland to the west of Nowra. This corridor along the Shoalhaven River is narrow and partially disturbed. Beyond the vegetation along the Shoalhaven River, the remainder of the subject land has no connectivity and is within a highly disturbed environment with

Prescribed Biodiversity Impacts	Presence within the subject land
	large areas of cleared land that are mostly used for agricultural purposes. The proposed works are contained to the extension of existing infrastructure. The only works that could impact upon movement corridors for fauna is the rock revetment along the Shoalhaven River. Given the subject land / footprint is positioned within a large forest/estuarine corridor, there will be no loss of connectivity as a result of the proposed works and no further assessment of impacts to habitat connectivity are required. The loss of 0.08 ha will not isolate or fragment any areas of habitat which may reduce the abundance of threatened species or restrict the movement of threatened species.
(c) that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or subsidence from underground mining)	The proposal includes works within the Shoalhaven River. Rock revetment along 50 m of the Shoalhaven River is needed to avoid potential spillage into the river. The Shoalhaven River is expected to provide habitat for threatened species, for example foraging habitat for the White-bellied Sea Eagle which was observed perched onsite during the field survey. The proposed rock revetment works within Shoalhaven River has the potential to impact on water quality and hydrological processes. An aquatic survey has been prepared by Lesryk Environmental (2025) to specifically assess fisheries habitat within the Shoalhaven River. The aquatic survey determined the presence of aquatic habitat in the form of sandy and silty substrates, scattered cobbles and pebbles, accumulations of woody debris, isolated boulders, small patches of <i>Avicennia marina</i> (Grey Mangrove), and the existing rock revetment wall. No seagrass beds, saltmarsh, or other mapped sensitive estuarine habitats were detected (Lesryk Environmental 2025). These habitats provide foraging opportunities, shelter, and structural complexity for fish and other aquatic biota, but do not meet the criteria for Type 1 KFH, which include critical habitats such as seagrass meadows, saltmarsh, and recognised spawning or nursery grounds. This means that the works footprint, and adjacent areas potentially subject to indirect impact, contain estuarine habitats of moderate ecological importance and that potential impacts can be managed effectively through the application of appropriate mitigation and management measures during construction.

Prescribed Biodiversity Impacts	Presence within the subject land
	The subject land contains areas mapped on the Acid Sulfate Soils Risk map (NSW DCCEE 2024b). The classes are defined below: • L4: Low probability >3 m below ground surface • L2: Low probability 1 - 3 m below ground surface • H1: High probability 1 - 2 m below surface Excavation of soils should consider potential acid sulfate soils risks, particularly in the northern portion of the subject land mapped as H1. The oxidation of acid sulfate soils (which can result in low dissolved oxygen, fish kills and plant kills) should be avoided. Furthermore, through the implementation Construction Environmental Management Plan (CEMP), any potential runoff and oxidation that may impact on water quality during the construction phase will be mitigated.
(d) on threatened and protected animals from turbine strikes from a wind farm	Not applicable – threatened species will not be at risk of turbine strikes from the proposal.
(e) on threatened species or fauna that are part of a TEC from vehicle strikes.	During the construction phase vehicle access is likely to increase. This would be limited to vehicles that require access to undertake the works. Following construction, vehicle access will not increase as a result of the proposed works. Increased vehicle strikes are unlikely to occur.

5.3 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 5.2** above has considered prescribed biodiversity impacts in relation to the proposal and determined that prescribed impacts are unlikely to occur 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.

5.4 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 (e.g. retained vegetation), or construction activities requiring a modified design or process. The proposed works on the banks of the Shoalhaven River may be uncertain and could result in unanticipated modification of native vegetation through hydrological changes. However, the impacts are expected to be direct and limited to the 50 m wide area, no changes to hydrological processes are anticipated.

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*.

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

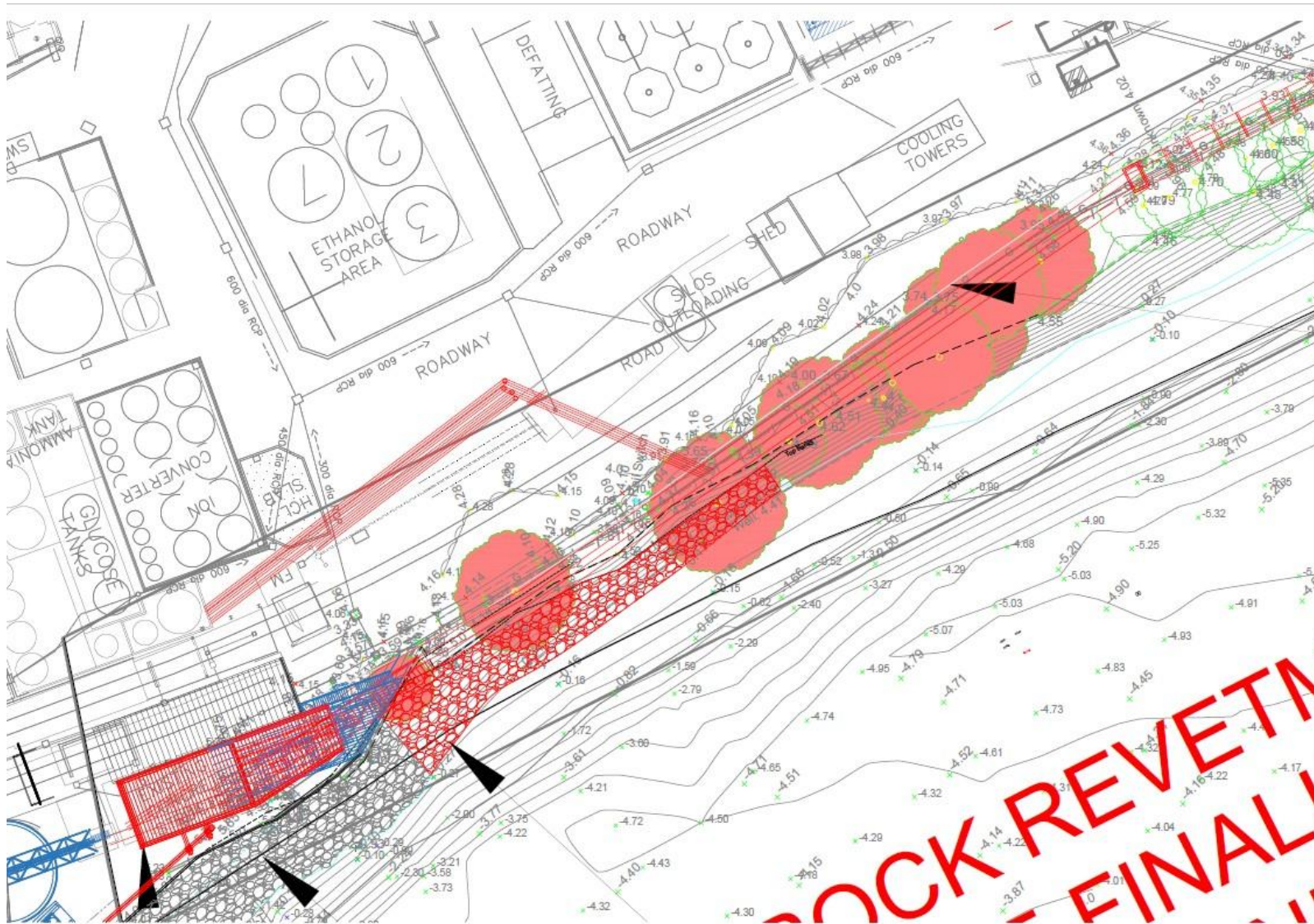


Figure 5.1: Survey plans showing the extent of rock revetment works and the location of trees to be removed.

6 Assessing and offsetting impacts

6.1 Assessment of impacts

6.1.1 Assessing impacts to native vegetation, habitat, TECs and threatened species habitat

In accordance with Section 8.1 of the BAM, direct impacts to threatened entities and their habitat must be assessed and impacts to native vegetation described.

The proposal will include direct impacts to 0.08 ha of native vegetation comprising PCT 4049 in a 'Disturbed' condition class. An area of 0.23 ha supporting PCT 4049 will be avoided within the subject land and a total of 2.49 ha of PCT 4049 will be retained in the study area. The extent of each retained vegetation zone is listed in **Table 3.1**. In accordance with Section 9.1 of the BAM, consideration must be given to identify every threatened entity at risk of Serious and Irreversible Impacts (SII) that may be affected by the proposal. **Section 4** demonstrates that threatened entities at risk of an SII have been considered in this assessment. No species at risk of an SII are expected to occur within the study area.

6.1.2 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 due to the conveyor belt construction and operation, erosion, altered run-off regimes or inadvertent impacts to adjacent aquatic habitat or vegetation. The existing highly disturbed nature of the subject land means that indirect impacts such as are unlikely to have a significant impact on the surrounding environment. An assessment of all potential indirect impacts resulting from the proposal is displayed below in **Table 6.1**.

6.1.3 Assessing prescribed biodiversity impacts

As outlined in **Section 5.2**, prescribed impacts resulting from the rock revetment, conveyor belt and additional construction potential impacts on the Shoalhaven River and threatened entities. An assessment of these prescribed impacts is provided below in accordance Section 8.3 of the BAM.

Table 6.1: Assessment of indirect impacts

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	There is a low possibility that the construction phase and during operation may result in inadvertent impacts to adjacent habitat or vegetation. The consequence of inadvertent impacts is high because native vegetation adjacent to the subject land is identified as a TEC. However, the probability of inadvertent impacts is low based on the existing use of the site and implementation of relevant mitigation measures including a CEMP. Mitigation and management of impacts is discussed further in Section 7 .	Native vegetation and habitat retained adjoining the subject land.	Ongoing during construction phase. Infrequent during operation phase.	Ongoing during construction phase	Ongoing during construction phase
Reduced viability of adjacent habitat due to edge effects	Majority of vegetation within the subject land are subject to edge effects. The strip of vegetation along the Shoalhaven River will be at risk of edge effects such as increased weed incursion. However, the risk of edge effects can be successfully managed through the implementation of mitigation measures during construction and operational phases. The proposal is unlikely to reduce the viability of areas of habitat in the subject land as the surrounding areas are fragmented from these areas and are already edge effected following the historic clearing of the vast majority of the subject land	Native vegetation and habitat retained adjoining 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	During construction there is the potential for dust and noise emissions to cause habitat within these areas to become temporarily unsuitable. However, these impacts will be temporary and intermittent by nature. It is anticipated that construction works will be restricted to daytime hours, therefore artificial light spill is unlikely to occur.	Native vegetation and habitat retained adjoining the subject land.	Ongoing during construction activities.	Throughout the construction period	Short term

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
	No reduction in viability of adjacent habitat is expected during the operational phase due to infrequent use and the low impact of the development in terms of small footprint.				
Transport of weeds and pathogens from the site to adjacent vegetation	There is potential to transport weeds and pathogens to the retained vegetation during construction and operation of the proposal. The current condition of vegetation to be retained is poor to moderate. Weed management measure will be implemented during construction and operational phases to reduce the risk of pathogens and weeds invading the vegetation corridor. As part of the CEMP, weed management and hygiene protocols should be strictly implemented during construction and operational phases to reduce the risk of pathogens and weeds invading the surrounding bushland.	Native vegetation and habitat retained adjoining the subject land	Ongoing during construction activities	Throughout the construction period	Potentially Long term
Increased risk of starvation, exposure and loss of shade or shelter	The development is not expected to result in any indirect impacts resulting in an increased risk of starvation, exposure and loss of shade or shelter. As no significant changes to exposure or shade are proposed within the redevelopment.	NA	NA	NA	NA
Loss of breeding habitats	No loss of breeding habitat is expected to result from the proposed development due to the small impact footprint and retention of vast areas of native vegetation within the forested corridor. No hollow bearing trees are being removed.	NA	NA	NA	NA

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Trampling of threatened flora species	The proposed construction is not expected to result in any indirect impacts resulting from trampling of threatened flora. No threatened flora species were recorded within the subject land and threatened flora is considered unlikely to occur in the adjacent vegetation.	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 the use of fertiliser as no dwelling or inhabited areas are being created.	NA	NA	NA	NA
Rubbish dumping	The proposal is not expected to result in any increased rubbish dumping.	NA	NA	NA	NA
Wood collection	The proposal is unlikely to result in wood collection given it will only be assessed by the staff and the estuarine vegetation is not likely to be used for firewood.	NA	NA	NA	NA
Bush rock removal and disturbance	Bush rock is not present within the study area or subject land.	NA	NA	NA	NA
Increase in predatory species populations	The development could result in a minor increase in predatory species by attracting feral cats and foxes which are adapted to modified landscapes. This is however unlikely, and these species already occur in the area.	NA	NA	NA	NA

Indirect impact type	Nature	Extent	Frequency	Duration	Timing
Increase in pest animal populations	The proposal is not expected to result in an increase in pest and vermin animal species, as the existing operations at the Shoalhaven Starches attract some pest and vermin species, such as rock doves, rats and mice.	NA	NA	NA	NA
Increased risk of fire	The development is not expected to result in any increased risk of fire.	NA	NA	NA	NA
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

6.2 Assessment of impacts (non-BAM)

Matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the proposed development. Other policy and legalisation are discussed in the sections below, and include:

- Matters of National Environmental Significance (MNES) in accordance with the EPBC Act,
- *State Environmental Planning Policy (Biodiversity and Conservation) 2021* and *State Environmental Planning Policy (Hazards and Resilience) 2021* in accordance with the *NSW Environment Planning and Assessment Act 1979*.

6.2.1 Matters of National Environmental Significance

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where MNES may be affected. Under the Act, any action which 'has, will have, or is likely to have a significant impact on a matter of MNES' is defined as a 'controlled action', and requires approval from the Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) which is responsible for administering the EPBC Act.

The Commonwealth has developed Significant Impact Guidelines (DotE 2013) and conservation advice for each MNES, to provide assistance in assessing impacts on MNES and help decide whether or not a referral to the Commonwealth is required.

Following review of the results of a Protected Matters Search Tool Report (Commonwealth DCCEEW 2025) and fields surveys (as part of this BDAR) of the subject land one MNES is present within the subject land. Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland is an Endangered Ecological Community listed under the EPBC Act. This community was considered as part of this assessment, however the vegetation within the subject land does not meet the minimum condition thresholds to be valid for assessment under the EPBC Act.

The Grey-headed Flying-fox is listed as Vulnerable under the EPBC Act. Foraging habitat is present in the study area in the form of native and exotic flowering trees and shrubs. A significant impact assessment in accordance with the Significant Impact Guidelines (DotE 2013) has been undertaken and is provided in **Appendix D**. This assessment has determined that no significant impact to the species will occur as a result of the proposal

6.2.2 State Environmental Planning Policy (SEPP) (*Biodiversity and Conservation*) 2021

Chapter 4 (*Koala habitat protection 2021*) of *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity Conservation SEPP 2021) applies to the study area, as it has an area greater than 1 ha and occurs in the Shoalhaven City Council Local Government Area (Shoalhaven LGA).

Clause 4.2 defines Core Koala habitat as:

(a) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or

(b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

The subject land occurs within the South Coast Koala Management Area. One tree species present within the subject land, *Corymbia maculata*, is listed as a Koala use tree species for the South Coast in Schedule 2 of the Biodiversity Conservation SEPP 2021. *Corymbia maculata* trees have been planted along the railway line proximate to the proposed conveyor belt alignment and grain handling facility. These trees are isolated and do not adjoin any suitable larger areas of suitable Koala habitat. The nearest record for the Koala located 4.51 km from the subject land at Cabbage Tree Flat recorded in January 2023, however this record is on the opposite side of the Shoalhaven River and is therefore geographically isolated from the subject land (NSW DCCEEW 2025d). The next nearest record is from Jaspers Brush, approximately 6.65 km north of the subject land (NSW DCCEEW 2025d). However, there is no evidence of historical occupation in the subject land.

Although some Koala use trees are present in the subject land, the subject land is not considered to be suitable habitat for the Koala. The subject land lacks areas of suitable habitat that are connected to broader areas of Koala habitat. There are no records for Koalas within the subject land.

6.2.3 State Environmental Planning Policy (SEPP) (*Hazards and Resilience*) 2021

Figure 2.2 shows how the proposed upgrades interacts with land identified as Coastal Use Area and Coastal Environment Area Map.

Development on land within the coastal use area

(1) Development consent must not be granted to development on land that is within the coastal use area unless the consent authority—

(a) has considered whether the proposed development is likely to cause an adverse impact on the following—

- (i) existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
- (ii) overshadowing, wind funnelling and the loss of views from public places to foreshores,*
- (iii) the visual amenity and scenic qualities of the coast, including coastal headlands,*
- (iv) Aboriginal cultural heritage, practices and places,*
- (v) cultural and built environment heritage, and*

(b) is satisfied that—



- (i) the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or*
 - (ii) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*
 - (iii) if that impact cannot be minimised—the development will be managed to mitigate that impact, and*
- (c) has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development.*

The proposed development will not impact any existing access to the coastal use area, as no the public access exists presently. No overshadowing, wind funnelling or loss of views from public places to foreshores will result as part of the proposal. Nor will the visual amenity and scenic qualities of the coast/coastal headlands be affected. This report has not assessed the presence of Aboriginal cultural heritage or any cultural and built environment heritage.

The development has no impact on Coastal Use Areas. The proposal includes upgrades to the existing Shoalhaven Starches facility including the WTP. The design has taken into account the surrounding coastal and built environment.

Development on land within the coastal environment area

(1) Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following—

- (a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,*
- (b) coastal environmental values and natural coastal processes,*
- (c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,*
- (d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,*
- (e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
- (f) Aboriginal cultural heritage, practices and places,*
- (g) the use of the surf zone.*

(2) Development consent must not be granted to development on land to which this section applies unless the consent authority is satisfied that—

- (a) the development is designed, sited and will be managed to avoid an adverse impact referred to in subsection (1), or*

(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.

The bank stabilisation works within the Shoalhaven River may temporarily alter the integrity and resilience of the hydrological values of the Shoalhaven River. Water quality may also be temporarily impacted. However, the works are needed to prevent further bank erosion and collapses and cannot be reasonably avoided, and impacts will be minimised through the implementation of the site-specific CEMP.

The proposed development has been sited to avoid all non-essential impacts to vegetation, fauna and fauna habitats. Rock revetment works will impact on 0.08 ha native vegetation located along the Shoalhaven River.

The development is not expected to impact upon coastal processes as the proposal does not involve any changes to the existing use of the coastal area. Existing public open space and safe access to and along the foreshore, beach, headland, rock platform or surf zone will not be altered as part of this proposal.

Indirect impacts to native vegetation, fauna, water quality, hydrological regime and the coastal environments will be managed through the implementation of the CEMP, see details below in **Section 7**.

This report has not assessed the presence of Aboriginal cultural heritage, practices and places.

7 Mitigation and management of impacts

As all impacts to biodiversity cannot be avoided by the proposal, the mitigation measures proposed below will assist with ensuring that direct and indirect impacts are mitigated to the fullest extent practical. **Table 7.1** includes measures to be implemented to avoid and minimise biodiversity impacts, consistent with the requirements of Section 8.4 of the BAM 2020.

7.1 Construction Environmental Management Plan (CEMP)

A site-specific CEMP will be developed prior to any works taking place and implemented over the life of the project. The CEMP will incorporate adaptive management principles.

The CEMP should incorporate the recommendations included in the Lesryk Environmental Aquatic Survey (2025) to ensure impacts aquatic environment are minimised. 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 measures to prevent the introduction of weed species. Any management actions should follow best practice protocols such as Landcom (2004) or the NSW Transport Biodiversity Guidelines (2011).

Proposed mitigation measures have been outlined below. An unexpected finds procedure will be put in place at the time of construction to avoid and mitigate any potential harm or injury to non-threatened fauna species. Pre-clearance protocols have also been discussed in the following section.

In summary, the CEMP should be provided as a plan(s) in A1 format and illustrate details such as:

- Staging methodology
- Location of site fencing
- Location of silt fences, traps or filters
- Location of stockpiles, storage sheds and equipment
- Vegetation protection
- Biodiversity Management Plan
- Any approval and notification requirements
- Other relevant recommendations and issues as identified

The CEMP should incorporate the recommendations included in the Lesryk Environmental Aquatic Survey (2025).

7.1.1 Pre-clearance protocols

Native fauna may be present on the subject land 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 native fauna. These protocols should be included in the CEMP. They should include, as a minimum, pre-clearance surveys to identify habitat trees within or near the proposed footprint. Habitat trees are considered any tree which may provide shelter, foraging or breeding habitat for fauna and include, but not limited to hollow branches

or stick nests. Micro siting of the proposed footprint can then be implemented to allow for retention of any habitat trees.

7.1.2 Site management and construction controls

To avoid potential indirect offsite impacts during construction, an appropriate erosion and sedimentation control plan should be in place, following best practice protocols such as those detailed in Landcom (2004). The recommendations included in the Lesryk Environmental Aquatic Survey (2025) specially addressing indirect impacts to the aquatic environment should be considered.

Table 7.1: Summary of proposed mitigation measures.

Mitigation action	Development phase	Outcome	Timing	Responsibility
As part of the CEMP, a Biodiversity Management Plan (BMP) will be prepared prior to clearing of native vegetation subject land. The BMP would include the following: • Preparation of maps to clearly identify construction limits. • Erosion and sediment control actions in accordance with the Blue Book (Landcom 2004) to be implemented during construction phases. • Any required updates to the site induction procedure. • Pre-clearance protocols as outlined above. • Identification of weed plumes and priority weeds including their treatment and management. • Ensure clean plant and equipment are used to ensure pathogens and environmental weeds are not introduced.	Pre-construction	Flora and fauna would be managed in accordance with the requirements of the BMP; prevention of over clearing of vegetation; prevention of weed establishment and invasion.	Pre-construction and construction	Construction contractor
Prior to the commencement of clearing, a pre-clearing survey will be conducted to confirm the absence of any fauna within the trees to be removed. Any habitat trees (e.g. Mangroves and Swamp Oaks containing hollows and/or nests/possum dreys should be clearly identified.	Pre-construction	Prevents fauna injury/mortality	Prior to vegetation removal	Project ecologist

Mitigation action	Development phase	Outcome	Timing	Responsibility
Site inductions during construction to include a briefing regarding the local fauna of the site and protocols to be undertaken if fauna are encountered.	Pre-construction	Prevents fauna injury/mortality	Construction	Construction contractor
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
For unexpected finds or if any animal is injured during the construction, 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 and operation	Construction contractor

8 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 proposed development to achieve the 'no net loss standard' established by the BAM.

8.1 Impacts on native vegetation and TECs

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

- Vegetation zones that have a VI 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 ≥ 20 .

As shown below in **Table 8.1**, the vegetation integrity score for each vegetation zone is above the minimum requiring offsetting. Given that all vegetation zone are identified as a TEC and have VI scores greater than 17.

Table 8.1: Vegetation zones assessed that require offsetting.

Veg zone	PCT	Condition class	Vegetation Integrity Score	Total impact (ha)
3	PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Disturbed	24.6	0.08

8.2 Impacts on threatened species and their habitat

Section 9.2.2 of the BAM requires offsetting for the impacts of proposals on threatened species that require species credits. Section 5.2.5 of the BAM requires a species polygon to be prepared if surveys confirm that a species credit species is present. No species credit species were detected within the subject land and no offsetting for threatened species and their habitat is required.



Figure 8.1: Impacts requiring an offset.

8.3 Impacts that do not require offsetting or further assessment

In accordance with Section 9.3 of the BAM, areas within the subject land that do not contain native vegetation do not need to be assessed for ecosystem credits. As shown in **Figure 8.1**, only a small portion of the native vegetation within the subject land is going to be impacted and thus requires offsetting.

8.2 Credit calculations

8.2.1 Ecosystem credits

The ecosystem credits required to offset the proposal are provided in **Table 8.2**. A total of one ecosystem credit is required to offset the proposed vegetation clearing. Applicable offset rules are listed in the Biodiversity Credit Report in **Appendix C**.

Table 8.2: Ecosystem credit summary.

Vegetation zone	Plant community type	Condition class	VI Score	Total impact (ha)	Ecosystem credits
3	PCT 4049 - South Coast Floodplain Grassy Swamp Forest	Disturbed	24.6	0.08	1
Total				0.08	1

The following offset rules apply for the credit class for PCT 4049:

- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. This includes PCT's: 1731, 3962, 3963, 3985, 3987, 3993, 4016, 4023, 4026, 4027, 4028, 4030, 4035, 4038, 4040, 4048, 4049, 4050, 4056
- In the following subregions - Illawarra, Ettrema, Jervis, Moss Vale, Sydney Cataract and Northern Basalts or any IBRA subregion that is within 100 km of the outer edge of the impacted site.
- Containing hollow bearing trees – No.

8.2.2 Species credits

No species credits are required to be offset.

8.2.3 Biodiversity Conservation Fund

The Biodiversity Offsets Payment Calculator (BOPC) was replaced by the Biodiversity Conservation Fund (BCF) Charge System on 17 October 2022. Under the BCF Charge System, the cost of ecosystem credits is no longer provided in the BAM-C. The BCF Charge

System is managed by the Biodiversity Conservation Trust (BCT), who will determine the credit charge. A biodiversity credit report is provided in **Appendix C**

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Appendix A Plot data

Plot No.	PCT	Area (ha) in subject land	Condition class	Zone	Easting	Northing	Bearing
1	4049	0	Planted	56	283760	6141436	180
2	4049	0	Genregeration	56	282852	6140960	56
3	4049	0.08	Disturbed	56	285258	6140616	232

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

Plot No.	Structure					
	Tree	Shrub	Grass	Forb	Fern	Other
1	15	11.1	0.1	0.1	0	0.2
2	2	0	27.6	0.8	0	0
3	40	0	0.1	0.1	0	0

Plot No.	Function									
	Tree regen.	Tree stem 5-9 cm	Tree stem 10-19 cm	Tree stem 20-29 cm	Tree stem 30-49 cm	Large trees	HBTs	Litter cover	Fallen logs (m)	High threat exotic
1	0	1	1	1	0	0	0	38	1	73.5
2	0	1	1	0	0	0	0	6	0	20.1
3	1	1	1	1	1	6	0	37	24	6.1

Appendix B Flora and fauna inventories

Flora inventory

Plot 1						
Family	Scientific name	Common name	Growth form	Exotic	Abundance	Cover
Apocynaceae	<i>Araujia sericifera</i>	Moth Vine	-	High threat	50	0.5
Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs	-	High threat	200	2
Poaceae	<i>Bromus catharticus</i>	Praire Grass	-	Exotic	30	0.1
Myrtaceae	<i>Callistemon salignus</i>	Willow Bottlebrush	Shrub (SG)	Native	30	8
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak	Tree (TG)	Native	20	15
Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu Grass	-	High threat	1000	60
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	-	Exotic	20	0.5
Asteraceae	<i>Conyza spp.</i>		-	Exotic	5	0.1
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	Forb (FG)	Native	80	0.1
Poaceae	<i>Ehrharta erecta</i>	Panic Veldtgrass	-	High threat	400	10
Rubiaceae	<i>Galium aparine</i>	Goosegrass	-	Exotic	10	0.5
Juncaceae	<i>Juncus spp.</i>		Grass & grasslike (GG)	Native	5	0.1

Plot 1						
Family	Scientific name	Common name	Growth form	Exotic	Abundance	Cover
Verbenaceae	<i>Lantana camara</i>	Lantana	-	High threat	50	1
Malvaceae	<i>Malva parviflora</i>	Small-flowered Mallow	-	Exotic	50	1
Fabaceae (Faboideae)	<i>Medicago spp.</i>		--	Exotic	20	0.1
Myrtaceae	<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree	Shrub (SG)	Native	30	3
Bignoniaceae	<i>Pandorea pandorana</i>	Wonga Wonga Vine	Other (OG)	Native	10	0.2
Polygonaceae	<i>Rumex crispus</i>	Curled Dock	-	Exotic	10	0.5
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	-	Exotic	50	0.5
Solanaceae	<i>Solanum mauritianum</i>	Wild Tobacco Bush	-	Exotic	100	5
Myrtaceae	<i>Syzygium spp.</i>		Shrub (SG)	Native	1	0.1

Plot 2						
Family	Scientific name	Common name	Growth form	Exotic	Abundance	Cover
Poaceae	<i>Axonopus compressus</i>	Broad-leaved Carpet Grass		exotic	20	0.5
Poaceae	<i>Bromus catharticus</i>	Praire Grass		exotic	500	25
Brassicaceae	<i>Capsella bursa-pastoris</i>	Shepherd's Purse		exotic	5	0.1
Brassicaceae	<i>Cardamine spp.</i>		Forb (FG)	native	50	0.2
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak	Tree (TG)	native	3	2
Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu Grass		high threat	200	20
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle		exotic	10	0.1
Asteraceae	<i>Conyza spp.</i>			exotic	5	0.1
Poaceae	<i>Cynodon dactylon</i>	Common Couch	Grass & grasslike (GG)	native	50	2
Apiaceae	<i>Daucus glochidiatus</i>	Native Carrot	Forb (FG)	native	20	0.1
Cyperaceae	<i>Eleocharis gracilis</i>		Grass & grasslike (GG)	native	1000	25

Plot 2						
Family	Scientific name	Common name	Growth form	Exotic	Abundance	Cover
Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge	Grass & grasslike (GG)	native	10	0.1
Primulaceae	<i>Lysimachia arvensis</i>	Scarlet Pimpernel		exotic	50	0.2
Oxalidaceae	<i>Oxalis perennans</i>		Forb (FG)	native	10	0.1
Polygonaceae	<i>Persicaria decipiens</i>	Slender Knotweed	Forb (FG)	native	100	0.2
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues		exotic	20	0.1
Poaceae	<i>Poa annua</i>	Winter Grass		exotic	50	1
Polygonaceae	<i>Rumex crispus</i>	Curled Dock		exotic	5	0.1
Goodeniaceae	<i>Selliera radicans</i>	Swamp Weed	Forb (FG)	native	100	0.1
Asteraceae	<i>Senecio madagascariensis</i>	Fireweed		high threat	10	0.1
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade		exotic	10	0.5
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle		exotic	40	0.5

Plot 2						
Family	Scientific name	Common name	Growth form	Exotic	Abundance	Cover
Sparganiaceae	<i>Sparganium subglobosum</i>	Floating Bur-reed	Grass & grasslike (GG)	native	50	0.5
Caryophyllaceae	<i>Stellaria media</i>	Common Chickweed		exotic	50	0.5
Fabaceae (Faboideae)	<i>Trifolium repens</i>	White Clover		exotic	1000	3

Plot 3						
Family	Scientific name	Common name	Growth form	Exotic	Abundance	Cover
Apocynaceae	<i>Araujia sericifera</i>	Moth Vine		high threat	10	0.1
Cyperaceae	<i>Carex spp.</i>		Grass & grasslike (GG)	native	5	0.1
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak	Tree (TG)	native	20	15
Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum	Tree (TG)	native	7	25
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	Forb (FG)	native	50	0.1
Poaceae	<i>Ehrharta erecta</i>	Panic Veldtgrass		high threat	100	1
Verbenaceae	<i>Lantana camara</i>	Lantana		high threat	50	5

Fauna inventory

Class	Scientific name	Common name	Native/ Exotic	Observation type*
Aves	<i>Acanthiza nana</i>	Yellow Thornbill	Native	O
Aves	<i>Acridotheres tristis</i>	Common Myna	Native	O
Aves	<i>Anas superciliosa</i>	Pacific Black Duck	Native	O
Aves	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	Native	OW
Aves	<i>Columba livia</i>	Rock Dove	Exotic	OW
Aves	<i>Corvus coronoides</i>	Australian Raven	Native	O
Aves	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Native	O
Aves	<i>Egretta novaehollandiae</i>	White-bellied Sea-Eagle	Native	O
Aves	<i>Elanus axillaris</i>	Black-shouldered Kite	Native	O
Aves	<i>Eolophus roseicapilla</i>	Galah	Native	OW
Aves	<i>Grallina cyanoleuca</i>	Magpie-lark	Native	OW
Aves	<i>Gymnorhina tibicen</i>	Australian Magpie	Native	OW
Aves	<i>Haliaeetus leucogaster</i>	White-faced Heron	Native	O
Aves	<i>Haliastur sphenurus</i>	Whistling Kite	Native	O
Aves	<i>Hirundo neoxena</i>	Welcome Swallow	Native	O
Aves	<i>Malurus cyaneus</i>	Superb Fairy-wren	Native	OW
Aves	<i>Manorina melanocephala</i>	Noisy Miner	Native	OW
Aves	<i>Ocyphaps lophotes</i>	Crested Pigeon	Native	O
Aves	<i>Passer domesticus</i>	House Sparrow	Native	O
Aves	<i>Pelecanus conspicillatus</i>	Australian Pelican	Native	O
Aves	<i>Rhipidura leucophrys</i>	Willie Wagtail	Native	OW
Aves	<i>Threskiornis moluccus</i>	Australian White Ibis	Native	O
Aves	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	Native	O
Aves	<i>Vanellus miles</i>	Masked Lapwing	Native	OW

Appendix C BAM Calculator report



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00060469//25/00060470	Modification 26 - Shoalhaven Starches	05/08/2025
Assessor Name	Report Created	BAM Data version *
Sophie Starrett	05/02/2026	Current classification (live - default) (82)
Assessor Number	BAM Case Status	Date Finalised
BAAS25031	Finalised	05/02/2026
Assessment Revision	BOS entry trigger	Assessment Type
1		Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAIL	Ecosystem credits
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Assessment Id
00060469//25/00060470

Proposal Name
Modification 26 - Shoalhaven Starches

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BAM Credit Summary Report

South Coast Floodplain Grassy Swamp Forest

1	4049_Disturbed	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	24.6	24.6	0.08	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		1
											Subtotal	1
											Total	1

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAI	Species credits

Assessment Id
00060469//25/00060470

Proposal Name
Modification 26 - Shoalhaven Starches

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BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00060469//25/00060470	Modification 26 - Shoalhaven Starches	05/08/2025
Assessor Name	Assessor Number	BAM Data version *
Sophie Starrett	BAAS25031	Current classification (live - default) (82)
Proponent Names	Report Created	BAM Case Status
	05/02/2026	Finalised
Assessment Revision	BOS entry trigger	Assessment Type
1		Major Projects
Date Finalised	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
05/02/2026		

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

Assessment Id	Proposal Name	Page 1 of 3
00060469//25/00060470	Modification 26 - Shoalhaven Starches	





BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added
None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
4049-South Coast Floodplain Grassy Swamp Forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.1	0	1	1

Assessment Id
00060469//25/00060470

Proposal Name
Modification 26 - Shoalhaven Starches

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ecoplanning

ecology | planning | offsets

Appendix D Assessment of Significance under the EPBC Act

The EPBC Act Matters of National Environmental Significance (MNES) 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 include Grey-headed Flying-fox, which has been addressed below.

Grey-headed Flying-fox (Pteropus poliocephalus) – vulnerable species

The Grey-headed Flying-fox (GHFF) occurs within 200 km of the eastern coastline of Australia, from Rockhampton in Queensland to Adelaide in South Australia. They prefer subtropical and temperate rainforest, tall sclerophyll forests and woodlands, as well as heaths and swamps. Roosting areas are often selected upon their proximity to a regular food source (within 20 km), often in gullies, close to water, or in vegetation with a dense canopy. This species roosts communally in large, established camps which can support several thousand individuals. The GHFF can travel up to 50 km from camp to forage (typically <20 km), where they feed on nectar and pollen from *Eucalyptus*, *Banksia* and *Melaleuca* spp., as well as the fruits of native and exotic species.

Threats to this species include:

- Loss of roosting and foraging habitat
- Heat stress
- Electrocution on powerlines and entanglement on netting

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

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

An important population is considered a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are key source populations either for breeding or dispersal; populations that are necessary for maintaining genetic diversity; and/or populations that are near the limit of the species range.

The Grey-headed Flying-fox (GHFF) is considered to consist of one national population due to the constant genetic exchange and movement of individuals between camps throughout the geographic distribution. Hence the individuals in the locality are part of an important population.

The proposed action is unlikely to lead to a long-term decrease in the size of the national population. There are no camps in the subject land and no camps would be indirectly impacted by the proposed action. The closest GHFF camp is likely located at Brinawarr St, Nowra approximately 1.5km from the subject land. A small area of potential foraging habitat (0.08 ha) will be impacted.

Reduce the area of occupancy of an important population

The proposed development would not reduce the area of occupancy of an important population of the GHFF as no roosting camp occurs within the subject land or immediate surrounds. Furthermore, the proposed 0.08 ha of native vegetation impacts proposed that may provide some foraging habitat for the species, is not anticipated effect an important population.

Fragment an existing important population into two or more populations

As the GHFF is highly dispersive and mobile, the proposed action would not fragment the existing population into two or more populations. Following the proposed development, GHFF could continue to fly over the subject land or forage in the retained.

Adversely affect habitat critical to the survival of a species

Habitat critical to the survival of the Grey-headed Flying-fox is outlined in the National Recovery Plan (DAWE 2021).

Under the Recovery Plan, critical habitat includes winter and spring flowering vegetation communities that contain *Eucalyptus tereticornis*, *E. albens*, *E. crebra*, *E. fibrosa*, *E. melliodora*, *E. paniculata*, *E. pilularis*, *E. robusta*, *E. seeana*, *E. sideroxylon*, *E. siderophloia*, *Banksia integrifolia*, *Castanospermum australe*, *Corymbia citriodora*, *C. eximia*, *C. maculata*, *Grevillea robusta*, *Melaleuca quinquenervia* or *Syncarpia glomulifera*.

Habitat critical to the survival of the GHFF may also be vegetation communities which:

- contain native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May)
- contain native species used for foraging and occurring within 20 km of a nationally important camp (identified on the Department's interactive flying-fox web viewer), or
- contain native and or exotic species used for roosting at the site of a nationally important Grey-Headed Flying-Fox camp (as identified on the Department's interactive flying-fox web viewer)

Some planted individuals located within the study area are identified as critical habitat (*Corymbia maculata*) however, these species are not going to be impacted. Some species identified within the subject land flower between August to May and therefore is considered vegetation critical to survival to the species. Therefore up to 0.08 ha of habitat critical to the survival of the species will be impacted as a result of the proposed works.

Disrupt the breeding cycle of an important population

As there are no GHFF roosting camps in the subject land, the proposed action is unlikely disrupt the breeding cycle of an important population. The removal of large areas of productive foraging habitat would reduce the availability of foraging resources and disrupt breeding cycle of this species. However, the small extent of habitat that would be removed by the proposed development is unlikely to disrupt a breeding cycle.

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

The proposed development would result in the removal of 0.08 ha of potential foraging habitat for GHFF. Given that a relatively small amount of vegetation in degraded condition is being removed the proposal will not remove habitat to an extent that will cause a decline in the GHFF.

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

The proposed development would not result in an invasive species becoming established in the habitat.

Introduce disease that may cause the species to decline, or

The proposed development would not result in the introduction of any diseases within the subject land.

Interfere substantially with the recovery of the species.

The proposed removal of 0.08 ha of potential foraging habitat will not interfere with the recovery of the species.

Conclusion of EPBC Act Significant Impact Guidelines (DotE 2013) for Grey-headed Flying-fox

A referral is not recommended for the GHFF, as:

- no breeding or roosting habitat will be impacted,
- the proposal is unlikely to impact upon the breeding cycle of nearby populations, and
- minimal foraging habitat will be impacted.