Biodiversity Development Assessment Report (BDAR)

Italia Road Intersection

Italia Road and Pacific Highway intersection, Balickera NSW 2324

Report prepared for:
Boral Resources (NSW) Pty Ltd

Version 3.0 – 2 August 2024

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Prepared for:
Boral Resources (NSW) Pty Ltd

Prepared by:

Wedgetail Project Consulting Pty Ltd

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Certification 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).

BAM Assessor	Date of Certification	Signature
Dr. George Plunkett Senior Ecologist (BAAS19010)	2 August 2024	

Document Control:

Rev. No.	Revision Date	Author/s	Reviewer	Details
1.0	4 December 2023	George Plunkett and Ashley Elise Owen	George Plunkett	Draft V1
2.0	12 December 2023	George Plunkett and Ashley Elise Owen	George Plunkett, Samara Schulz	Draft V2
3.0	2 August 2024	Ashley Elise Owen	George Plunkett	PS Council Feedback

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1. INTRODUCTION

1.1 SCOPE

Wedgetail Project Consulting Pty Ltd (Wedgetail) was engaged by Boral Resources (NSW) Pty Ltd to prepare a Biodiversity Development Assessment Report (BDAR) to support the proposed upgrade to the intersection of Italia Road and the Pacific Highway, Balickera, New South Wales (NSW), 2324 and adjacent road reserves (hereafter referred to as the "study area") (Figure 1).

The proposed development is to upgrade the existing intersection to provide longer sliplanes for quarry trucks entering Italia Road from the SW and exiting to the NE. The proposal includes works to construct new road infrastructure for the left turn slip lane and acceleration lane. All works would be located within the existing road reserve of Italia Road and the Pacific Highway.

This assessment has been undertaken in accordance with the NSW Biodiversity Assessment Method 2020 (BAM) (Department of Planning, Infrastructure and Environment [DPIE] 2020a, now NSW Department of Planning and Environment [DPE]) under the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and the *Biodiversity Conservation Regulation 2017* (BC Regulation) to support the Development Application (DA).

1.1.1 Terminology

The following terms are used throughout this report to describe specific areas (see Figure 1):

Development footprint means the area directly affected by the proposal. It has the same meaning as "Subject Land" defined below.

Study Area is the portion of land that encompasses all surveys undertaken and is usually all land contained within the designated property boundary. The study area extends as far as is necessary to assess all important biodiversity values known and likely to occur within the Subject Land and includes the development footprint and any additional areas which are likely to be affected by the proposal, either directly or indirectly.

Subject Land is land to which the BAM is applied in Stage 1 to assess the biodiversity values. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement. In this case, it refers to the area designated as the development footprint and has the same meaning for the purposes of this report and includes the intersection and associated infrastructure and earthworks. The terms "Subject Land" and "development footprint" are interchangeable in this regard.

Locality is land within a 5 km radius of the Study Area.

1.2 LOCAL CONTEXT

The Study Area is located within the suburb of Balickera, approximately 11 km NE of the Raymond Terrace CBD (Figure 1) and is within the Port Stephens Local Government Area (LGA). The Pacific Highway is zoned as *SP2 – Infrastructure (Classified Road)*, while most of the area adjacent to Italia Road is zoned *RU2 – Rural Landscape*.

The Study Area is surrounded by a managed powerline easement and rural properties to the north and the four-lane Pacific Highway to the south. Beyond this is private rural land and land owned by Hunter Water Corporation (Zone SP1 – Special Activities (Hunter Water Corporation)) containing extensive remnant native vegetation. The Study Area itself is highly disturbed and is largely characterised by exotic grassland, planted *Casuarina glauca*, and small areas of remnant vegetation.

1.3 PROPOSED DEVELOPMENT

Boral Resources (NSW) Pty Ltd (Boral) acts on behalf of Eagleton Rock Syndicate (Eagleton) and Australian Resource Development Group Pty Limited (ARDG) (collectively referred to as the 'quarry operators') in submitting a development application (DA) to Port Stephens Council (Council), pursuant to Part 4 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act), for proposed upgrades to the Italia Road / Pacific Highway intersection.

Transport for NSW (TfNSW) has identified the need for safety upgrades to the intersection to meet the future predicted traffic growth of the area. The need to bring forward the safety upgrades to the intersection is in direct response to the vehicle movements predicted to be generated by the following State significant development (SSD) applications submitted by all three quarry operators:

- SSD 7332 – for the proposed Eagleton Hard Roack Quarry;
- SSD 10432 – for the proposed ARDG Stone Ridge Quarry; and
- SSD 9254474 – for an expansion to the Boral Seaham Quarry.

Consequently, the quarry operators have been working closely with TfNSW since 2020 to prepare a design for the intersection upgrades (the proposed development).

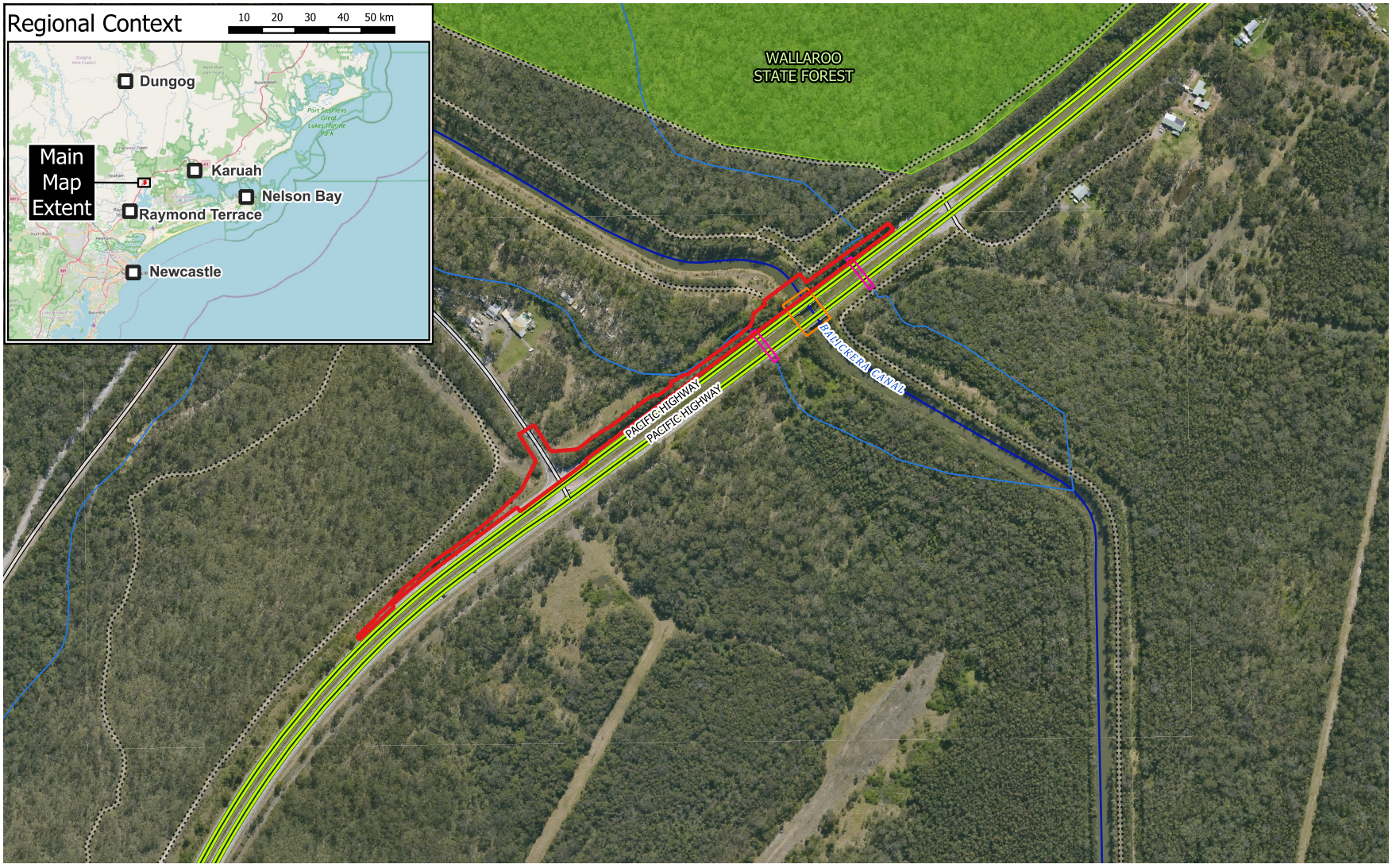
In summary, the proposed development involves safety upgrades to the intersection of Italia Road and Pacific Highway, including the following:

- construction of a dedicated left-turn northbound acceleration lane from Italia Road onto the Pacific Highway, which will replace the current left-turn give-way movement with a safer downstream merge movement;
- widening of the existing bridge over the Balickera Canal (to accommodate the north-bound acceleration lane); and
- lengthening of the northbound deceleration lane into Italia Road.

All works are proposed to be undertaken within the existing road reserve.

In-principle support was provided by TfNSW for a preliminary concept design in June 2022 on the basis that the quarry operators agreed to jointly fund all costs associated with the approval and construction of the required upgrades. A commercial agreement between the quarry operators is in place, and subject to approvals, construction of the intersection is expected to be finalised and operational within the last quarter of 2025.

The concept design has now been further developed to meet the requirements of TfNSW, Council and Hunter Water Corporation (HWC) and this refined design forms the basis of the DA. The proposed development outline is illustrated in Figure 2.



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Subject Land
State Forest
Bridge
Culvert

Major watercourse
Minor Watercourse (true path)
Primary Road
Local Road
Track-Vehicular

Figure 1
Regional Context

100 200 300 400 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 31/07/2024
Produced By: Sarah Harries

Wedgetail Project Consulting\Arbus - Documents\Italia Road Intersection\@GIS\ItaliaRoad_F1_Locality.qgz

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- Subject Land
- Cadastre
- State Forest
- Road Corridor
- Bridge
- Culvert
- Major watercourse
- Minor watercourse
- Primary Road
- Local Road
- Track-Vehicular
- Contours (10m)
- Contours (5m)

Figure 2
Development Site

100 200 300 400 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 31/07/2024
Produced By: Sarah Harries

Wedgetail Project Consulting\Arbus - Documents\Italia Road Intersection\@GIS\ItaliaRoad_F2_DevSite.qgz

1.4 INFORMATION SOURCES

The following sources of information were used appropriately inform this report:

- The NSW Department of Planning and Environment (DPE), BioNet Atlas (DPE 2022a) for previous records of threatened species, populations, and ecological communities within 5 km radius of the Subject Land.
- The Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST) (DAWE 2022a) for Matters of National Environmental Significance (MNES) including predicted threatened species, populations and ecological communities.
- Port Macquarie Hastings LGA Vegetation and EEC Maps 2014 (VIS_ID 4205 and VIS_ID 4206) (DPIE 2015) and previous vegetation mapping and reporting (Peter Parker 2014) were reviewed to assist with the determination of Plant Community Types (PCTs) within the Subject Land.
- The NSW DPE, BioNet Vegetation Classification Database (DPE 2022b) for identification and allocation of PCTs to vegetation zones.
- The NSW DPE, BioNet Threatened Biodiversity Data Collection (DPE 2022c), Threatened Species Profiles (DPE 2022d) and Final Determinations (DPE 2022e) for information on threatened species, populations, and ecological communities.

1.5 LEGISLATIVE CONTEXT

This assessment was undertaken in accordance with and/or in consideration of the following Acts and Policies:

- NSW:
    - Biodiversity Assessment Method (BAM) (DPE 2020a).
    - *Biodiversity Conservation Act 2016* (BC Act).
    - *Biodiversity Conservation Regulation 2017* (BC Regulation).
    - *Biosecurity Act 2015*.
    - *Coastal Management Act 2016*.
    - *Environmental Planning and Assessment Act 1979* (EP&A Act).
    - *Local Land Services Act 2013* (LLS Act).
    - *State Environmental Planning Policy (Biodiversity and Conservation) 2021*.
    - *State Environmental Planning Policy (Resilience and Hazards) 2021.*
    - *Water Management Act 2000* (WM Act).
    - Commonwealth:
    - *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*
- Local:
    - *Port Stephens Local Environmental Plan 2013.*
    - *Port Stephens Development Control Plan 2014.*

1.5.1 Biodiversity Conservation Act 2016 (NSW)

The NSW *Biodiversity Conservation Act 2016* (BC Act), the NSW *Biodiversity Conservation Regulation 2017* (BC Regulation) and amendments to the NSW *Local Land Services Act 2013* (LLS Act) commenced on 25 August 2017. The legislation aims to "maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development". The BC Act repeals several pre-existing Acts, most notably the NSW *Threatened Species Conservation Act 1995* (TSC), the NSW *Nature Conservation Trust Act 2001* and the NSW *Native Vegetation Act 2003*.

The BC Act together with the BC Regulation outlines the framework for addressing impacts on biodiversity from development and clearing. The framework details a pathway to avoid, minimise and offset impacts on biodiversity from development through the NSW Biodiversity Offset Scheme (The BOS).

1.5.1.1 Entry into the Biodiversity Offset Scheme

Entry into the Biodiversity Offset Scheme (BOS) is triggered by developments, projects and activities that meet criteria or certain thresholds for significant impacts on biodiversity in accordance with Section 6.3 of the BC Act. Alternatively, the BOS can be entered into on an opt-in basis.

Criteria to which the BOS applies includes the following:

- Local Development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that triggers the BOS Threshold or is "likely to significantly affect threatened species" (based on a test of significance pursuant to Section 7.3 of the BC Act). The BOS Threshold has two parts, and is triggered by the following:
- Clearing of vegetation that exceeds an area threshold (based on the minimum lot size), or
- Impacts are predicted to occur within an area mapped on the Biodiversity Values Map (the BV Map).
- State Significant Development (SSD) and State Significant Infrastructure (SSI) projects, unless "the Secretary of the Department of Planning and Environment and the environment agency head determine that the project is not likely to have a significant impact".
- Biodiversity certification proposals.
- Clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the BOS threshold and does not require development consent.
- Clearing of native vegetation that requires approval by the Native Vegetation Panel under the LLS Act.
- Activities assessed and determined under Part 5 of the EP&A Act (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

The Study Area was determined to be mapped under the NSW Biodiversity Values Map (BV Map) (DPE 2022f) following a review on 02 May 2022. The Biodiversity Values mapped within the Subject Land are associated with the presence of "Core Habitat within an approved Koala Plan of Management (Koala SEPP)". The proposed development will also result in impacts to 0.55 ha of

native vegetation. This area of impact is below the vegetation clearing threshold ≥1 ha based on the Study Area's minimum lot size of 40 ha. Impacts to areas mapped on the BV map (Core Koala Habitat) means entry into the BOS is triggered and a BDAR is required to support the DA.

The Proposed development has been assessed in accordance with the BAM (DPIE 2020a).

1.5.1.2 Application of the Biodiversity Offset Scheme

Section 2.2 of the BAM (DPIE 2020a) details three (3) streamlined assessment modules intended to align assessment requirements in relation to the level of biodiversity risk, enabling the preparation of a reduced assessment scope in accordance with the BAM.

These streamlined assessment modules may be used where the proposed development impacts on:

A. Scattered trees (Appendix B of the BAM).

B. A small area (Appendix C of the BAM).

C. Planted native vegetation, where the planted native vegetation was planted for purposes such as street trees and other roadside plantings, windbreaks, landscaping in parks and gardens, and revegetation for environmental rehabilitation (Appendix D of the BAM).

Appendices B, C and D of the BAM set out the circumstances where each of the streamlined assessment modules can be used to assess a proposal and the specific assessment requirements. The streamlined assessment modules were not deemed suitable for this BDAR.

1.5.2 State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 4 - Koala Habitat Protection 2021

This Chapter of the Biodiversity and Conservation SEPP incorporates the provisions of the now repealed *State Environmental Planning Policy (Koala Habitat Protection) 2021* (Koala SEPP 2021). The Chapter aims to encourage the conservation and management of areas of natural vegetation that provide habitat for Koalas to support a permanent free-living population over their present range and reverse the current trend of Koala population decline.

Chapter 4 applies to each Local Government Area listed in Schedule 2 of the Biodiversity and Conservation SEPP. Where a Koala Plan of Management (KPoM) applies to the land, Clause 8 of the Koala SEPP 2021 applies to the development. In this case the proposed development must be consistent with the approved KPoM that applies to the land.

Port Stephens LGA is listed in Schedule 2 of the Biodiversity and Conservation SEPP 2021. However, as the Study Area is subject to the approved *Port Stephens Council Comprehensive Koala Plan of Management (CKPoM) (Port Stephens Council, 2002*), any Development Application to Council will need to be consistent with the requirements of the CKPoM.

Port Stephens Comprehensive Koala Plan of Management (CKPoM) 2002

The CKPoM was prepared by Port Stephens Council with the Australian Koala Foundation (2002) in accordance with SEPP 44 (now the Biodiversity and Conservation SEPP 2021) and activated by the proposed amending clause of the Port Stephens LEP (Appendix 3). This regulation represents an important means by which koala habitat can be protected and effectively managed. The general aims and objectives of these performance criteria are as follows:

i) To ensure that the koala population in the Port Stephens LGA is sustainable over the long-term.

ii) To protect koala habitat areas from any development which would compromise habitat quality or integrity.

iii) To ensure that any development within or adjacent to koala habitat areas occurs in an environmentally sensitive manner.

iv) To ensure that acceptable levels of investigation are undertaken, considered and accepted prior to any development in or adjacent to koala habitat areas.

v) To encourage koala habitat rehabilitation and restoration.

vi) Maintain interconnection between areas of Preferred and Supplementary Koala Habitat and minimise threats to safe koala movements between such areas.

vii) To ensure that development does not further fragment habitat areas either through the removal of habitat or habitat links or through the imposition of significant threats to koalas.

viii) To provide guidelines and standards to minimise impacts on koalas during and after development, including any monitoring requirements.

ix) To provide readily understandable advice to proponents preparing development applications and for Council officers involved in the assessment of those applications.

According to the Guidelines for Koala Habitat Assessments in the PSC CKPoM (2002), to satisfy requirements for a development assessed under Part 4 of the EP&A Act, a Koala Habitat Assessment (Appendix 6) must be carried out by a suitably qualified person (a brief CV should be included for each person involved in the assessment), and include the following four steps:

1. Preliminary Assessment
2. Vegetation Mapping
3. Koala Habitat Identification
4. Assessment of Proposal

See Section 7.2 for a summary of the Koala habitat assessment completed in accordance with the requirements of the CKPoM (Appendix 6) along with an assessment to meet performance criteria according to Appendix 6 of the CKPoM, with inclusion of consideration for the construction of roads according to Appendix 7 of the CKPoM.

1.5.3 Coastal Management Act 2016

The *Coastal Management Act 2016* replaces the *Coastal Protection Act 1979* and establishes a strategic framework and objectives for managing coastal issues in NSW. The Act promotes a focus on ecologically sustainable development in relation to the 'coastal zone' as defined by the Act comprising of four coastal management areas:

- **Coastal wetlands and littoral rainforests area** – areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26.
- **Coastal vulnerability area** – areas subject to coastal hazards such as coastal erosion and tidal inundation.
- **Coastal environment area** – areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included.
- **Coastal use area** – land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

Mapping of, and provisions for the management of, the abovementioned coastal management areas are detailed under the *State Environmental Planning Policy (Resilience and Hazards) 2021* summarised in Section 1.5.4 below.

1.5.4 State Environmental Planning Policy (Resilience and Hazards) 2021

The *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) consolidates, transfers and repeals the provisions of three SEPPs into a single environmental planning instrument, including; the *SEPP (Coastal Management) 2018 (Coastal Management SEPP)*, *SEPP 33 – Hazardous and Offensive Development (SEPP 33)*, and *SEPP 55 – Remediation of Land (SEPP 55)*. The Resilience and Hazards SEPP aims to promote the protection and improvement of key environmental assets for their intrinsic value and the social and economic benefits they provide. Relevant chapters of the Resilience and Hazards SEPP are considered below:

Chapter 2 – Coastal Management

The aim of this Chapter is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the *Coastal Management Act 2016*, including the management objectives for each coastal management area, by:

- Managing development in the coastal zone and protecting the environmental assets of the coast, and
- Establishing a framework for land use planning to guide decision-making in the coastal zone, and
- Mapping the four coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the *Coastal Management Act 2016*.

The Coastal Management Chapter incorporates the provisions of the now repealed *Coastal Management SEPP* which commenced on 3 April 2018 and consolidated the provisions of: SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection).

The Coastal Management Chapter defines the four coastal management areas in accordance with the *Coastal Management Act* and details mapping and specifies assessment criteria that are tailored for each coastal management area. Councils and other consent authorities must apply these criteria when assessing proposals for development that fall within one or more of the mapped areas. The four coastal management areas are listed in **Section 1.5.3**, and include *Coastal wetlands and littoral rainforests area, Coastal vulnerability area*, *Coastal environment area*, and *Coastal use area*.

The Study Area does not occur within a mapped Coastal Wetlands or mapped Proximity Areas. Further consideration of this SEPP is not required.

1.5.5 Water Management Act 2000

Controlled activities carried out in, on or under waterfront land are regulated by the *Water Management Act 2000* ("WM Act"). 'Waterfront land' is defined as the bed of any river, lake or estuary, and the land within 40 m of the riverbanks, lake shore or estuary mean high water mark. A mapped second order watercourse exists within the Subject Land. As such, the proposed development is likely to constitute a 'controlled activity' in accordance with the WM Act.

1.5.6 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act, an approval is required for actions that are likely to have a significant impact on Matters of National Environmental Significance (MNES). An action includes a project, development, undertaking, activity or series of activities. When a person proposes to take an action, which they believe may need approval under the EPBC Act, they must refer the proposal to the Australian Government Minister for the Environment. The Act identifies the following nine MNES:

- World Heritage properties.
- National heritage places.
- Wetlands of international importance (Ramsar Convention).

- Listed threatened species and communities.
- Migratory species listed under international agreements.
- Great Barrier Reef Marine Park.
- Commonwealth marine areas.
- Nuclear actions; and
- Water resources in respect to CSG and large coal mines.

While this BDAR is not required to address MNES, the proponent is required to address the EPBC Act as part of their development application to Council. Item 4 is relevant to the proposed development.

Refer to Section 7.1 for a summary of the assessment.

1.5.7 Port Stephens Local Environmental Plan 2013

The Port Stephens LGA Local Environmental Plan 2013 (LEP) controls development within the Study Area through zoning and development controls. These controls are described in greater detail by the supporting Port Stephens Development Control Plan 2013 (DCP).

An amendment to the LEP is included in the PSC CKPoM (Appendix 3) (PSC, 2002) to activate its provisions and thereby ensure the long term sustainability of the local koala population.

1.5.8 Port Stephens Development Control Plan 2014

The DCP supports the LEP by providing additional detail and guidance on addressing biodiversity issues associated with development. Regarding biodiversity, the DCP contains provisions that relate to environmental effects, soil and erosion control and vegetation. These provisions have been considered during the assessment.

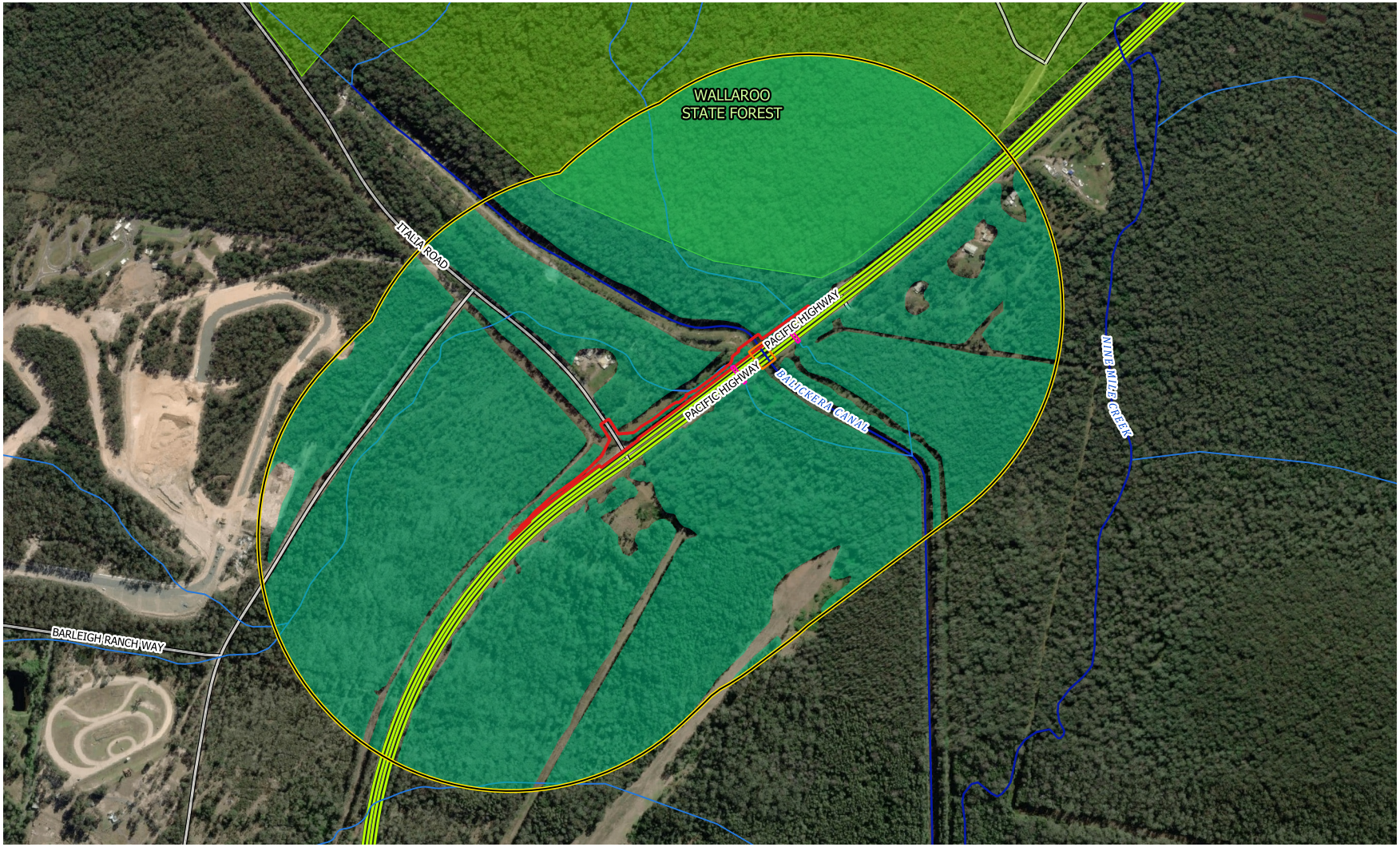
2. SITE CONTEXT

2.1 LANDSCAPE FEATURES

The landscape features detailed in Section 3 of the BAM (DPIE 2020a) and applicable to the Subject Land are described in **Table 1**. These landscape features are also shown on **Figure 3**.

Table 1: Landscape Features.

Landscape Feature	Summary
IBRA Region	*NSW North Coast*
IBRA Subregion	*Karuah Manning*.
Local Government Area (LGA)	*Port Stephens Council*
NSW (Mitchell) Landscapes	**Newcastle Coastal Ramp** (Undulating lowlands and low to steep hills on complex patterns of faulted and gently folded Carboniferous conglomerate, lithic sandstone, felspathic sandstone, and mudstone, general elevation 50 to 275m, local relief 40 to 150m. Stony red texture-contrast soils on steep slopes, yellow and brown texture-contrast soils on lower slopes and deep dark clay loams along streams. Woodland of spotted gum (*Corymbia maculata*), forest red gum (*Eucalyptus tereticornis*), red ironbark (*Eucalyptus sideroxylon*), white mahogany (*Eucalyptus acmenoides*), large-fruited grey gum (*Eucalyptus canaliculata*), with sub-tropical rainforest elements in sheltered gullies. Similar eucalypts with forest oak (*Allocasuarina torulosa*) and grasses on lower slopes, merging to forest of smooth-barked apple (*Angophora costata*), red bloodwood (*Corymbia gummifera*), blackbutt (*Eucalyptus pilularis*) with bracken (*Pteridium esculentum*) and grasses nearer the coast.
Rivers, streams and estuaries	One unnamed second order watercourse occurs north of, and runs parallel to, the Subject Land, funneling into a dam that occurs partly within the Subject Land, and running into a culvert beneath the highway. The Balickera Canal, which is an artificial watercourse, bisects the Subject Land below the existing Pacific Highway traffic bridge. A second unnamed, second order watercourse occurs east of the Balickera Canal, and runs into a culvert beneath the highway (this watercourse has been artificially redirected). See Figure 2.
Wetlands	No Coastal Wetlands or coastal wetland proximity areas are mapped within the Study Area of Subject Land.
Connectivity of different areas of habitat	The Subject Land is well connected to large areas of remnant forest to the north. To the south, connectivity is broken by the Pacific Highway. Balickera Canal bisects the Subject Land and breaks connectivity east-west.
Areas of geological significance.	The Study Area is not located with an area identified as having any particular geological significance. There are no karst, caves, crevices, cliffs, rocks. However, there are two bridges in close proximity to the study area that have the potential to act as artificial habitat structures.
Areas of outstanding biodiversity value	There are no areas of “outstanding biodiversity value” (in accordance with Section 3.1.3 of the BAM [DPIE 2020a]) mapped within the Study Area.
Soil hazard features	No areas associated with a high risk of Acid Sulphate Soils occur within the Subject Land.
Native Vegetation Cover	Native Vegetation was assessed as per Section 3.2 of the BAM 2020 (DPIE 2020a). Native vegetation constitutes 85% (797 ha) of the projected 1,500 m site buffer (939 ha) associated with the Subject Land (see **Figure 3**). Native Vegetation Cover therefore is classed as **>70%.**



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Subject Land
Assessment Area (500m)
State Forest
Native Vegetation
Bridge
Culvert

Major watercourse
Minor watercourse
Primary Road
Local Road

Figure 3
Landscape Assessment

100 200 300 400 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 02/08/2024
Produced By: Sarah Harries

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3. NATIVE VEGETATION

3.1 METHODOLOGY

Native vegetation within the Subject Land was assessed in accordance with the BAM (DPE 2020a).

3.1.1 Data Review

The NSW State Vegetation Type Map (DPE 2022) identifies the following Plant Community Types (PCTs) within and nearby the study area:

- PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
- PCT 4042 - Lower North Riverflat Eucalypt-Paperbark Forest

Previous vegetation mapping by Kleinfelder (2020) maps vegetation in the south of the study area as Lower Hunter Spotted Gum – Ironbark Forest.

3.1.2 Vegetation Mapping Surveys

Vegetation surveys were conducted within the Study Area on 3 July & 6 November, 2023. Areas of vegetation to be impacted by the proposed development were mapped during this period. Survey involved traversing the Study Area on foot, identifying vegetation communities, and delineating the boundaries between. Dominant species within each vegetation community were recorded. Plots were conducted on 6 November, 2023 and undertaken in all native vegetation zones. Following site inspection, current aerial imagery was interpreted to clarify vegetation boundaries.

3.1.3 Plant Community Type and Determination

Each vegetation community identified within the Study Area was assigned to the closest equivalent PCT from those listed in the BioNet Vegetation Classification database (DPIE 2022b). The closest equivalent PCT for each vegetation community was determined through a comparison of the floristic descriptions of PCTs in the database with the plot/transect data collected from the Subject Land. In addition to floristic and structural similarity, the landscape position, soil type and other diagnostic features of the vegetation communities on the Subject Land were compared to the descriptions in the database to determine the most suitable PCT. Threatened ecological communities (TECs) as defined in NSW and Commonwealth legislation were also identified if present.

Exotic vegetation does not require assignment to a PCT in accordance with the BAM.

3.1.4 Vegetation Zones

Vegetation zones were identified and delineated in the Subject Land in accordance with Section 4.3 of the BAM (DPIE 2020a). A vegetation zone is defined in the BAM as a relatively homogenous area that is the same vegetation type and broad condition.

3.1.5 Floristic Identification and Nomenclature

Floristic identification and nomenclature were based on Harden (1992, 1993, 2000 and 2002) with subsequent revisions as published on PlantNet (http://plantnet.rbgsyd.nsw.gov.au).

3.2 ASSESSMENT RESULTS

3.2.1 Vegetation within the Subject Land

3.2.1.1 Vegetation communities

The following vegetation communities were identified within the Study Area (Figure 4; see Table 2 for summary):

PCT 4042 - Lower North Riverflat Eucalypt-Paperbark Forest

This vegetation represents most roadside vegetation along the Pacific Highway to the north of the intersection. The canopy is dominated by *Casuarina glauca*, a species that is indigenous to the area but would not naturally occur in this landscape position. These trees are positioned in neat rows, indicating they are planted. In addition, historical aerial imagery from 2001 shows the area currently containing this vegetation was completely cleared at that time (Plate 12). *Eucalyptus tereticornis* is also present within the canopy. The midstory is disturbed with a high abundance of *Lantana camara*, while some native shrubs and vines are present and include *Dodonaea triquetra, Breynia oblongifolia, Leucopogon juniperinus, Glochidion ferdinandi, Acacia longifolia, Parsonsia straminea* and *Clematis aristata.* The ground layer is also highly disturbed and is dominated by exotic *Chloris gayana, Setaria parviflora* and *Watsonia meriana.*

PCT 4042 is associated with *Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion*, which is listed as endangered under the NSW BC Act, and *Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and Southeast Queensland bioregions* listed as endangered under the Commonwealth EPBC Act.

This PCT occurs within a highly modified landscape within an area that was completely cleared in 2001 (Plate 12). Soil and rock have been transported to build the road, and to batter the edges, and the water flow has been altered through artificial bank stabilisation and construction of a dam . This vegetation community began as planted *Casuarina glauca*, with native and exotic shrubs and groundcovers becoming self-established in the following years. Given this planted and derived origin, this vegetation cannot be assigned to a TEC. Further, the vegetation present does not occur in a suitable landscape to align with the BC Act or EPBC Act listed TECs. The Final Determination for this TEC states that occurs on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains (DPIE 2011). The EPBC-listed TEC occurs on alluvial landforms, including floodplains, the riparian zones of parent rivers and other order tributaries, alluvial flats, floodplain/alluvial terraces and periodically flooded depressions (DCCEEW 2022) whereas PCT 4042 within the Subject Land is growing on a constructed road batter and modified drainage line. The dominance of *Casuarina glauca* rather than Eucalypt species also indicates that this vegetation is not commensurate with the TEC: the final determination states the TEC has a tall open tree layer of eucalypts (DPIE 2011). Similarly, DCCEEW (2022) states that the TEC has a canopy dominated by one or a combination of *Angophora, Corymbia, Eucalyptus, Lophostemon* and/or *Syncarpia.*

PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

This vegetation represents the only remnant native vegetation within the study area. The majority occurs beyond the roadside, with two small areas on the inside of each corner at the junction of Italia Road and the Pacific Highway (Figure 4). A few scattered remnant trees also occur further NE along the outer edge of the planted native vegetation. Our mapping of remnant PCT 3433 is consistent

with the historical aerial imagery from 2001 which shows remnant vegetation in these areas surrounded by then-cleared land (Plate 12). The canopy is dominated by *Corymbia maculata, Eucalyptus fibrosa* and *E. tereticornis*, with some other species occurring in lower abundance. The midstory is dominated by *Melaleuca nodosa,* with *Acacia longifolia*, *Breynia oblongifolia, Parsonsia straminea, Leucopogon juniperinus* and *Glochidion ferdinandi* also common. Exotic *Lantana camara* occurs occasionally. The ground layer contains a high abundance of exotic grasses and forbs, including *Chloris gayana, Hyparrhenia hirta, Setaria parviflora* and *Watsonia meriana.* Native groundcovers include *Oplismenus aemulus, Lobelia purpurascens* and *Digitaria didactyla.*

PCT 3433 is associated with *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*, which is listed as endangered under the NSW BC Act. This PCT is not aligned with any TEC listed under the Commonwealth EPBC Act.

In assessing PC 3433 vegetation against the Final Determination for *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions* (DPIE), we conclude that it is commensurate with this TEC for the following reasons:

- Forest dominated by *Corymbia maculata* and *E. fibrosa.* Whilst only *C. maculata* occurs within the Subject Land*, E. fibrosa* is abundant in the surrounding vegetation.
- Occurs in the Lower Hunter region
- Grows in soils derived from Carboniferous geology (Seaham Formation sedimentary rock)

This community is present in two conditions within the Subject Land – moderate and poor. Moderate condition describes areas where there are a canopy, shrub and grass layer present. Poor condition vegetation includes cleared areas where there may be some regenerating shrubs present.

Exotic vegetation

This vegetation occupies most of the Subject Land, particularly the immediate roadsides (Figure 4). Dominant species are the exotic grasses *Chloris gayana, Hyparrhenia hirta* and *Briza subaristata.* Other exotic species include *Bidens pilosa, Verbena bonariensis, Lantana camara, Plantago lanceolata, Paspalum urvillei, Setaria parviflora* and *Andropogon virginicus.*

Table 2: Summary of Vegetation Communities within the Subject Land

Vegetation community / PCT	Vegetation Formation	Vegetation Class	Area within Subject Land
PCT 4042 – Hunter Coast Foothills Spotted Gum – Ironbark Grassy Forest	Forested Wetlands	Coastal Floodplain Wetlands	0.41 ha
PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Hunter-Macleay Dry Sclerophyll Forests	0.14 ha
Exotic vegetation	NA	NA	0.25 ha

Plate 1: PCT 4042 Lower North Riverflat Eucalypt-Paperbark Forest to the north of the Subject Land

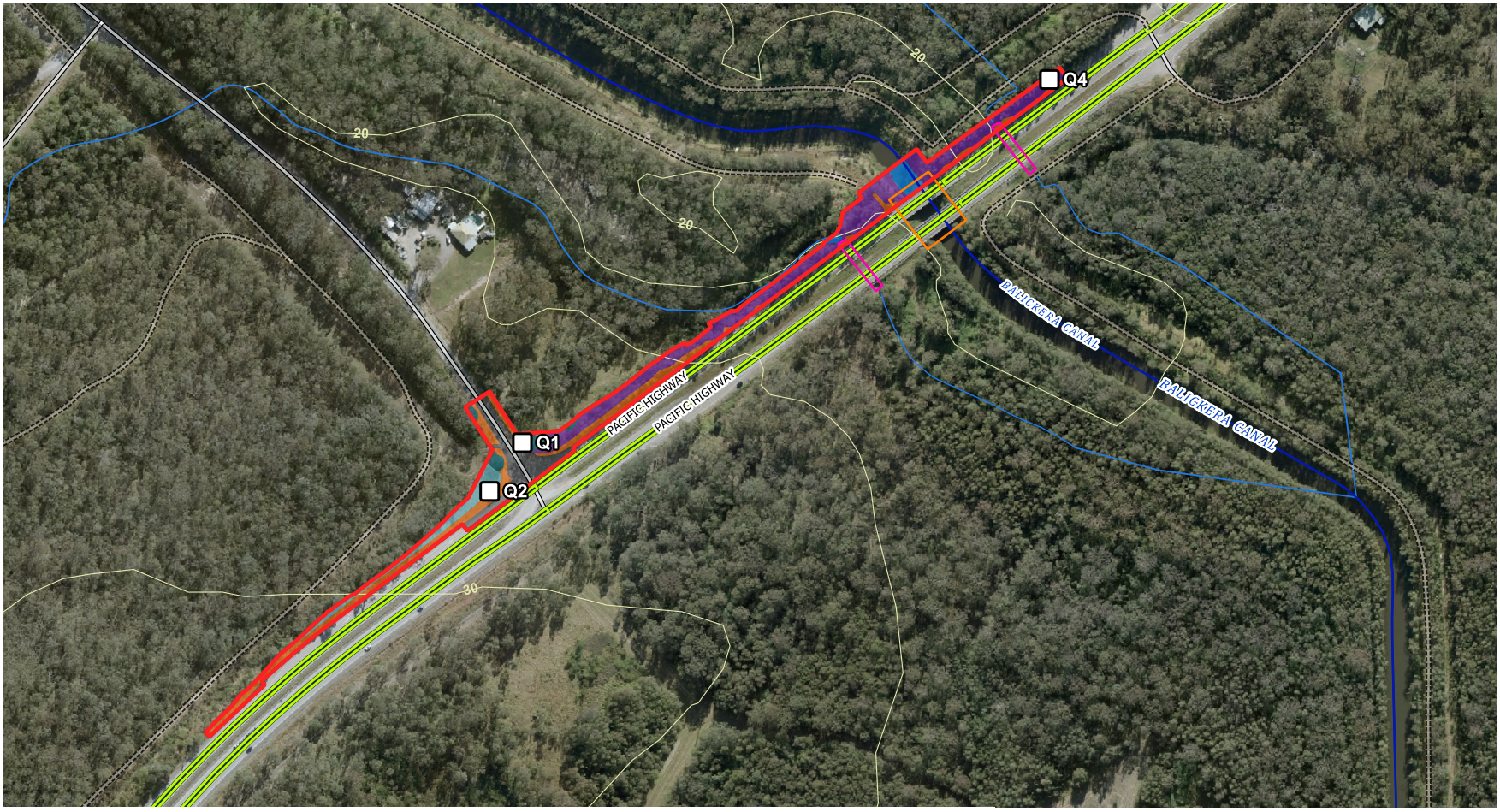
Plate 2: PCT 4042 Lower North Riverflat Eucalypt-Paperbark Forest within the Subject Land comprised of planted *Casuarina glauca* (at left); exotic vegetation (grassland, at right)

Plate 3: PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest (moderate condition) remnant inside the northern corner of the intersection.

Plate 4: PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest (moderate condition) remnant inside the southern corner of the intersection

Plate 5: PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest (poor condition) (left) and exotic vegetation (managed grassland, at right).

Plate 6: Vegetation along the banks of Balickera Canal



- Plot / Transect
- Subject Land
- Bridge
- Culvert
- Contours (10m)
- Primary Road
- Local Road
- Track-Vehicular
- Major watercourse
- Minor watercourse

Vegetation Zones and Plant Community Types

- Vegetation Zone 1- PCT 4042: Lower North Riverflat Eucalypt-Paperbark Forest (Moderate)
- Vegetation Zone 2- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Moderate)
- Vegetation Zone 3- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Poor)
- Vegetation Zone 4- Exotic Vegetation
- Dam / Waterbody
- Road Corridor

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Figure 4

Vegetation Zones and Plant Community Types

100 200 300 400 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 31/07/2024
Produced By: Sarah Harries

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3.2.2 Assessment of Patch Size

The patch size for the Subject Land was assessed as >100 ha as this vegetation is connected to larger intact areas of native forest vegetation surrounding the Subject Land. Any gaps in the connective vegetation considered for the patch sizes are less than 100 m (appropriate for woody vegetation).

3.2.3 Vegetation Integrity Score

The current vegetation integrity scores of the vegetation zones located within the Subject Land are outlined in Table 3.

Table 3: Current vegetation integrity score for the vegetation zones

Zone	PCT	Condition class	Area (ha)	Condition scores (Current Score)			Hollow-bearing Trees	Vegetation integrity score
				Composition	Structure	Function		
1	4042	Moderate	0.41	46.4	34.4	50	No	43.1
2	3433	Moderate	0.05	45.6	8.2	45.2	No	25.7
3	3433	Poor	0.09	45.6	8.2	27.3	No	21.5

4. THREATENED SPECIES

4.1 ASSESSING HABITAT SUITABILITY

To inform the assessment of suitable habitat for threatened species and populations within the Study Area, a database search of the NSW DPE BioNet Atlas (DPIE 2022a) and the Commonwealth DAWE Protected Matters Search Tool (PMST) (DAWE 2022a) were conducted. Results of the database search and 'likelihood of occurrence' assessment has been provided in Appendix 1.

4.2 HABITAT ASSESSMENT

4.2.1 Flora

The Study Area is characterised by areas of planted vegetation dominated by *Casuarina glauca* and *Eucalyptus tereticornis*, with small areas of native vegetation (dominated by *Corymbia maculata* and *Eucalyptus tereticornis*) along with areas of regenerating natives dominated by exotic shrubs (adjacent the Balickera Canal and within powerline easements) as well as exotic grassland that occurs as disturbed roadside vegetation.

The vegetation within the Subject Land is not considered representative of habitat for any locally occurring threatened flora species owing to ongoing management of the roadsides and easements, past clearing of vegetation, and ongoing disturbance due to the area as a road corridor. Nonetheless, targeted survey was conducted for candidate species as required by the BAM and detailed in Section 4.5.1.

4.2.2 Fauna

Fauna habitat within the Study Area is characterised by areas of intact native canopy (including *Corymbia maculata* and *Eucalyptus tereticornis*) with a reduced native midstorey and groundcover, along with areas of planted *Casuarina glauca* and exotic grassland areas with some native and exotic shrubs. Much of the vegetation within the Subject Land has been subject to historical and recent disturbances from development and management. In addition, there are two drainage lines, a dam and canal (with overhead bridge) that pass through the Subject Land. The vegetation and waterbodies within the Subject Land are likely to only constitute habitat for highly mobile threatened species (i.e. birds and bats), and locally occurring species associated with rural environments (i.e. birds and common arboreal marsupials), as well as frogs.

Key Fauna habitat features within the Subject Land (see Figure 6) include the following:

- No hollow-bearing trees occur within the Subject Land.
- Mapped 'Preferred Koala Habitat', 'Preferred Habitat Link' area, and 'Preferred Koala Habitat Buffer' areas (Figure 11)
- Two mapped second order watercourse occur within the Subject Land. The small, shallow, ephemeral watercourses have been subject to impacts from the surrounding development and are likely to represent habitat for common local frog species.
- The above watercourse flows into a dam area that contains native and exotic vegetation and would provide suitable frog habitat.

- The Balickera canal crosses the Subject Land, beneath the Pacific Highway. Fauna crossings (for koala) occur here.
- Two bridges (Pacific Highway north bound and south bound) that occur over the Balickera canal have potential to provide habitat for threatened bat species (Plate 7 & Plate 8)
- Fauna crossings within culverts and over the Balickera Canal.

Plate 7: Southbound bridge showing opportunistic roosting habitat for bats

Plate 8: **Northbound Bridge Inspection showing no opportunistic roosting habitat**

- Culverts were present within the Development Footprint at two locations where watercourses intersect the Pacific Highway. These were inspected (by WPC Senior Fauna Ecologist - Mark Dean on 13 June 2024) for potential bird and bat habitat. The culverts were assessed as having potential to provide suitable roosting and potential breeding habitat for microbats such as Southern Myotis. In addition to this, they have fauna crossing structures incorporated into them (see Plate 9 & Plate 10).

Plate 9: Box culverts (south of Balickera Canal) at dam entrance and fauna crossings along box culverts within the Subject Land

Plate 10: Box culverts (north of Balickera Canal), with fauna crossing.

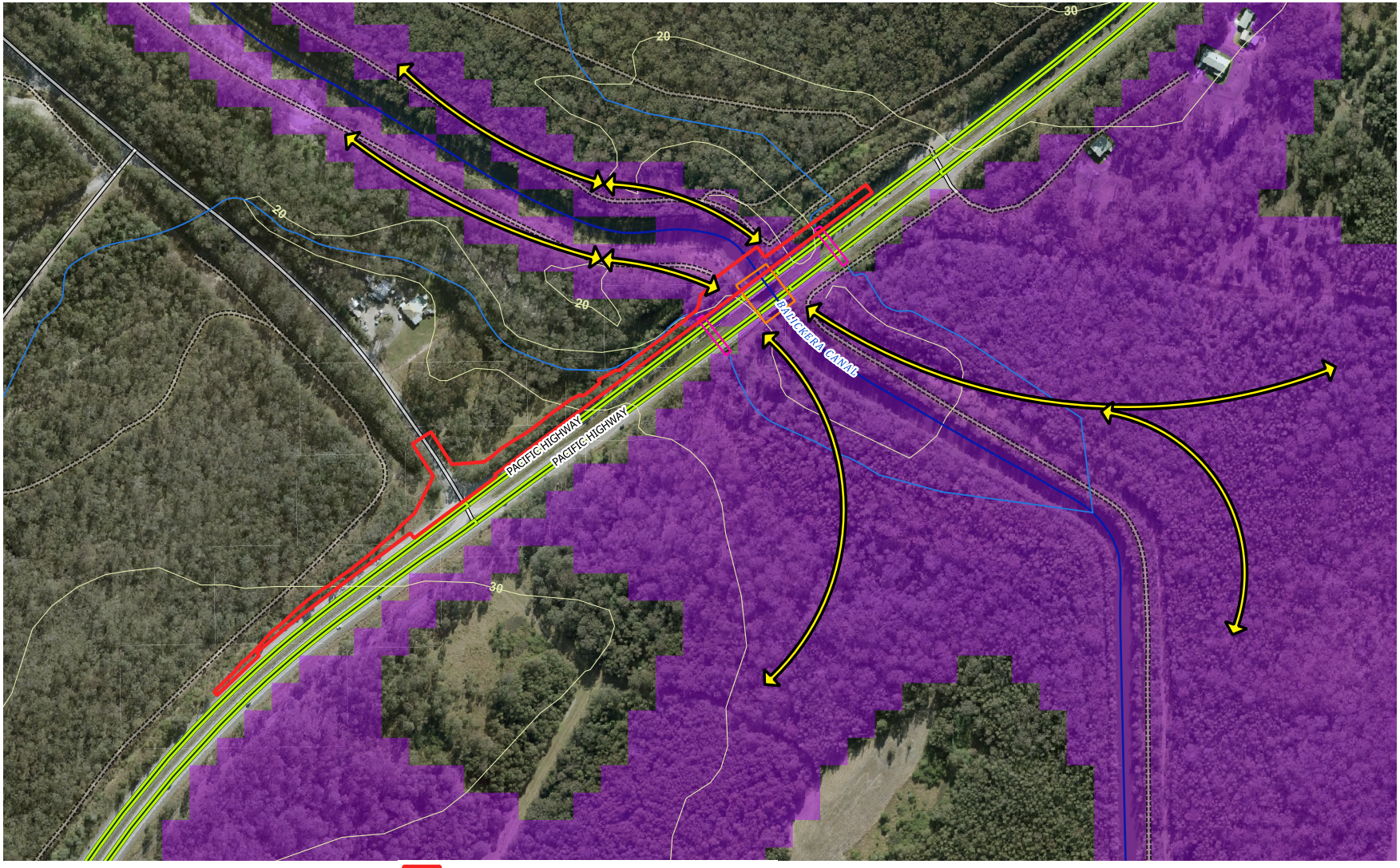
Koala Habitat: A total of three tree species of significance to koalas, were identified within the Subject Land. One tree species considered a preferred koala feed tree according to the Comprehensive Koala Plan of Management (CKPoM) (PSC, 2002) in the Port Stephens LGA: *Eucalyptus tereticornis* (Forest Red Gum). Two tree species that 'may be important' (PSC, 2002) to koalas were identified within the Subject Land: *Corymbia maculata* (Spotted Gum), and *Casuarina glauca* (Swamp She-oak).

The area of the Subject Land that intersects Balickera Canal corridor is mapped as 'Preferred Koala Habitat' (Figure 11) under the CKPoM (PSC, 2002). The majority of vegetation within the Subject Land sits within the 'Preferred Habitat Link' area over 'Marginal Koala Habitat', and 'Preferred Koala Habitat Buffer' areas. The main aim of the buffer areas is to protect the Preferred Koala Habitat from edge effects (PSC, 2002), of which the vegetation on the Subject Land is already exposed to, as it exists either side of a of a multi-laned highway and powerline easement.

Guidelines for Koala Habitat Assessments were developed to provide the information necessary to support a development application under Part 4, of the Environmental Planning and Assessment Act 1979. The Guidelines for Koala Habitat Assessments in the Port Stephens LGA are presented in Section 5.5 of the CKPoM Resource Document and Appendix 6 of the CKPoM, and Section 7.2 of this report.

Frog Habitat: There is a vegetated dam that occurs within the Subject Land that could provide suitable habitat for frogs following rainfall events. This area has been highly modified and lined with rock to stabilise the banks. This area is very degraded due to the entire surrounding area being cleared prior to 2001 (Plate 12). This is not likely to provide suitable breeding habitat for threatened frog species, but targeted survey was conducted in accordance with the BAM, as detailed in Section 4.5.2.1.

Bat Habitat: Artificial habitat in the form of roosting structures do occur within proximity to the Subject Land, including two bridges, however they are not likely to provide suitable breeding habitat. These features may provide opportunistic roosting habitat at times (personal comms Greg Ford, Balance! Environmental), particularly on the southern bridge where drain holes are present (Plate 7) and swallows have built nests. However, the northbound bridge contained no cracks, drain holes or other areas that could provide suitable roosting habitat or breeding for bats (Plate 8). Box culverts provide suitable roosting and / or breeding habitat for bats.



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Subject Land
Bridge
Culvert
Major watercourse
Minor watercourse
Contours (10m)
Primary Road
Local Road
Track-Vehicular
Core Koala Habitat
Movement Corridors

Figure 5
Biodiversity Values

100 200 300 400 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 31/07/2024
Produced By: Sarah Harries

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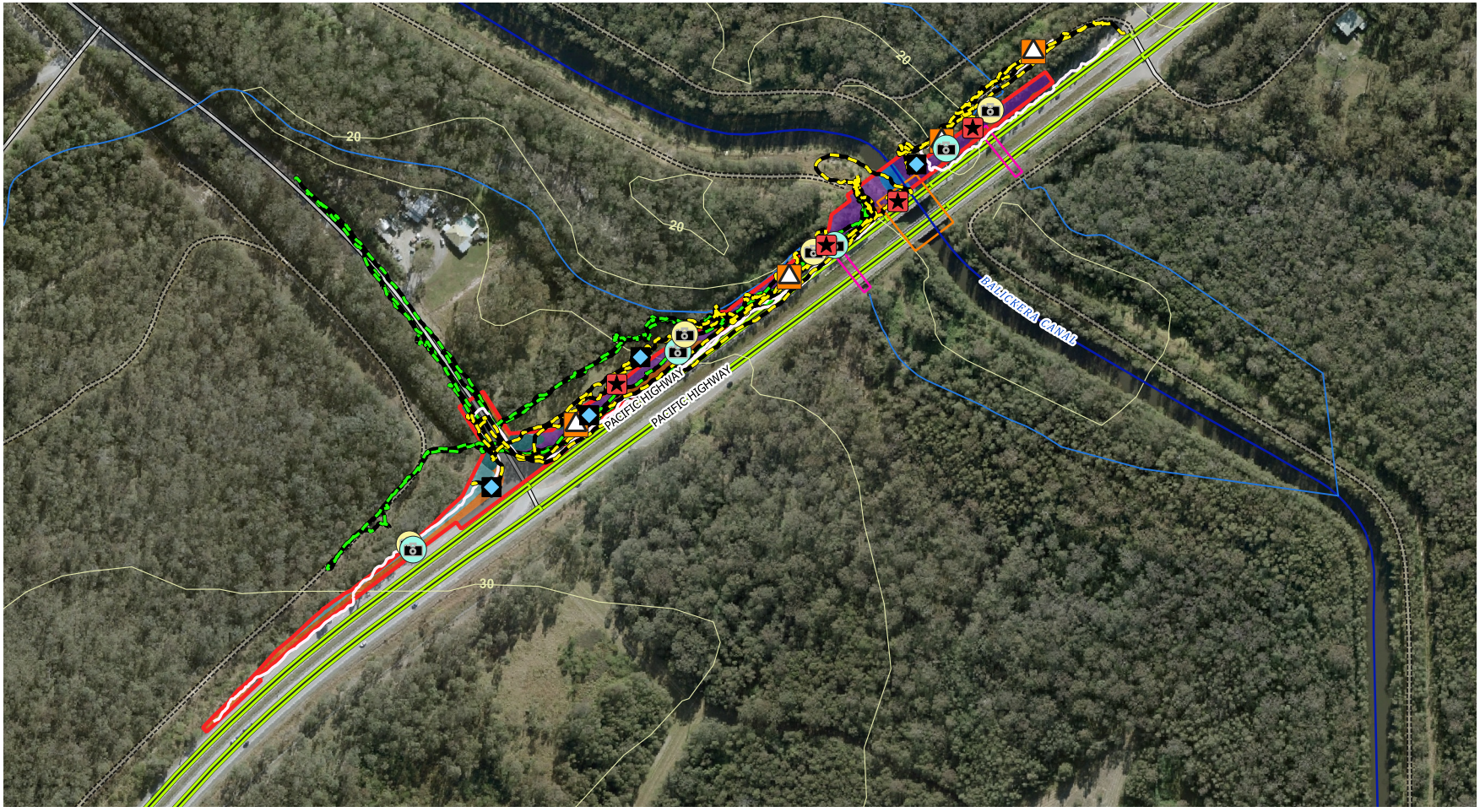

Subject Land
Primary Road
Local Road
Track-Vehicular
Bridge
Culvert
Contours (10m)
Major watercourse
Minor watercourse

Fauna Survey Effort

Anabat
Camera - Arboreal
Camera - Terrestrial
Elliot A - Terrestrial
Pitfall Trap Line
Amphibian Survey Tracks (6-7 November)
Amphibian Survey (28-29 November)
HBT and Nest Survey Tracks

Vegetation Zones and Plant Community Types

Vegetation Zone 1- PCT 4042: Lower North Riverflat Eucalypt-Paperbark Forest (Moderate)
Vegetation Zone 2- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Moderate)
Vegetation Zone 3- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Poor)
Vegetation Zone 4- Exotic Vegetation
Dam / Waterbody
Road Corridor

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Figure 6

Habitat Features and Fauna Survey Effort

50 100 150 200 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 02/08/2024
Produced By: Sarah Harries

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Subject Land
Bridge
Culvert
Targeted Threatened Flora Survey (26 July 2023)
Targeted Threatened Flora Survey (4 October 2023)
Targeted Threatened Flora Survey (6 November 2023)
Major watercourse
Minor watercourse

Vegetation Zones and Plant Community Types

Vegetation Zone 1- PCT 4042: Lower North Riverflat Eucalypt-Paperbark Forest (Moderate)
Vegetation Zone 2- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Moderate)
Vegetation Zone 3- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Poor)
Vegetation Zone 4- Exotic Vegetation
Dam / Waterbody
Road Corridor

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Figure 7

Flora Survey Effort

50 100 150 200 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 31/07/2024
Produced By: Sarah Harries

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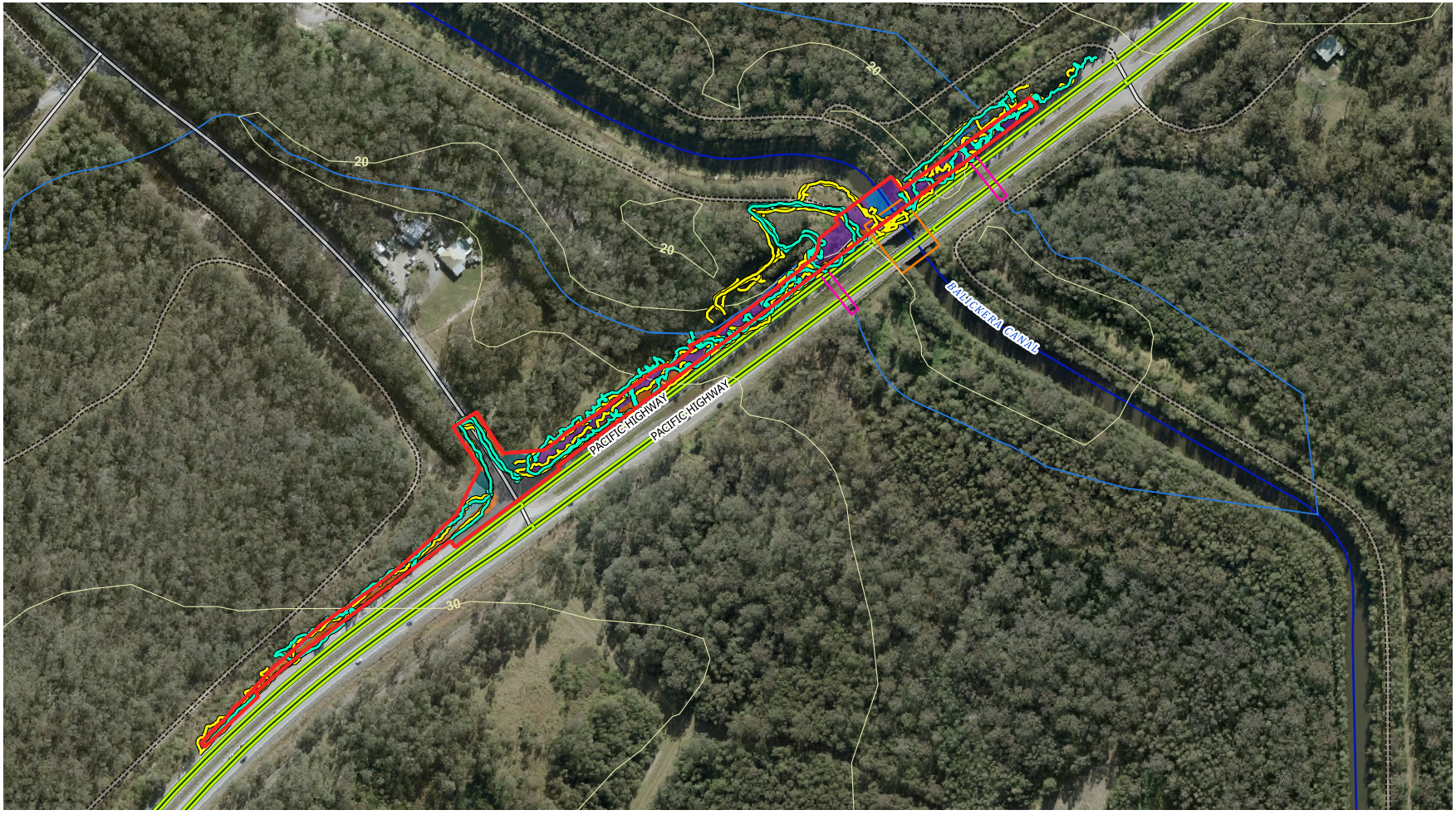

Subject Land
Bridge
Culvert
Primary Road
Local Road
Track-Vehicular
Major watercourse
Minor watercourse
Contours (10m)

Vegetation Zones and Plant Community Types

- Vegetation Zone 1- PCT 4042: Lower North Riverflat Eucalypt-Paperbark Forest (Moderate)
- Vegetation Zone 2- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Moderate)
- Vegetation Zone 3- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Poor)
- Vegetation Zone 4- Exotic Vegetation
- Dam / Waterbody
- Road Corridor
- Targeted Threatened Flora (Shurb) Survey (28 November 2023)
- Targeted Threatened Flora (Tree) Survey (28 November 2023)

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Figure 8

Flora Survey Effort

50 100 150 200 m

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 31/07/2024
Produced By: Sarah Harries

Wedgetail Project Consulting\Arbus - Documents\Italia Road Intersection\@GIS\ItaliaRoad_F8_Flora1.qgz

4.3 ECOSYSTEM CREDIT SPECIES

The following assessment of habitat suitability for ecosystem credit species was conducted in accordance with Section 6.2 of the BC Act. Ecosystem credits represent threatened species that can be predicted to be present by the type and condition of vegetation at the Subject Land. Targeted surveys are not required for ecosystem credit species.

Step 1: Identify threatened species for assessment

A list of predicted ecosystem credit species for the Subject Land was reviewed in the BAM calculator, according to PCTs present on the Subject Land. The Predicted Species Report is within Appendix 3.

Step 2: Assessment of the habitat constraints and vagrant species on the Subject Land

The potential for identified ecosystem credit species to occur on the Subject Land was assessed according to species specific habitat requirements, as detailed in Table 4. All predicted species were retained as ecosystem species as part of this assessment.

Table 4: Assessment of ecosystem credit species within the Subject Land.

Scientific name	Common name	Confirmed Predicted Species
Anthochaera phrygia	Regent Honeyeater	Yes
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Yes
Botaurus poiciloptilus	Australasian Bittern	Yes
Calidris ferruginea	Curlew Sandpiper	Yes
Callocephalon fimbriatum	Gang-gang Cockatoo	Yes
Calyptorhynchus lathami	Glossy Black-Cockatoo	Yes
Chthonicola sagittata	Speckled Warbler	Yes
Circus assimilis	Spotted Harrier	Yes
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Yes
Daphoenositta chrysoptera	Varied Sittella	Yes
Dasyurus maculatus	Spotted-tailed Quoll	Yes
Ephippiorhynchus asiaticus	Black-necked Stork	Yes
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Yes
Glossopsitta pusilla	Little Lorikeet	Yes
Haliaeetus leucogaster	White-bellied Sea-Eagle	Yes
Hieraaetus morphnoides	Little Eagle	Yes
Hirundapus caudacutus	White-throated Needletail	Yes
Ixobrychus flavicollis	Black Bittern	Yes
Lathamus discolor	Swift Parrot	Yes
Limicola falcinellus	Broad-billed Sandpiper	Yes
Lophoictinia isura	Square-tailed Kite	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Yes
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Yes
Miniopterus australis	Little Bent-winged Bat	Yes
Miniopterus orianae oceanensis	Large Bent-winged Bat	Yes
Neophema pulchella	Turquoise Parrot	Yes
Ninox connivens	Barking Owl	Yes
Ninox strenua	Powerful Owl	Yes
Pandion cristatus	Eastern Osprey	Yes
Petaurus australis	Yellow-bellied Glider	Yes
Petroica boodang	Scarlet Robin	Yes
Petroica phoenicea	Flame Robin	Yes
Phoniscus papuensis	Golden-tipped Bat	Yes
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Yes

Scientific name	Common name	Confirmed Predicted Species
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	Yes
Pseudomys novaehollandiae	New Holland Mouse	Yes
Pteropus poliocephalus	Grey-headed Flyingfox	Yes
Ptilinopus regina	Rose-crowned Fruit-Dove	Yes
Rostratula australis	Australian Painted Snipe	Yes
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Yes
Scoteanax rueppellii	Greater Broad-nosed Bat	Yes
Stagonopleura guttata	Diamond Firetail	Yes
Thylogale stigmatica	Red-legged Pademelon	Yes
Tyto longimembris	Eastern Grass Owl	Yes
Tyto tenebricosa	Sooty Owl	Yes
Tyto novaehollandiae	Masked Owl	Yes

4.4 SPECIES CREDIT SPECIES

Step 1: Identify threatened species for assessment

A list of predicted species credit species for the Subject Land was reviewed in the BAM calculator. Species credits pertain to threatened species that cannot be predicted by the vegetation present. The Candidate Species Report is detailed within Appendix 3.

Step 2: Assessment of the habitat constraints and vagrant species on the Subject Land

The potential for identified species credit species to occur on the Subject Land was assessed according to species specific habitat requirements. A total of 44 species credit species were identified as potentially occurring within the Subject Land (Table 5).

Step 3: Identify candidate species credit species for further assessment

Of the 44 identified species credit species, a total of 28 were selected as candidate species for assessment; six species credit species were excluded due to their geographic or habitat constraints not being met by the Subject Land, and no further assessment of these species was required (Table 5).

Table 5: Species credit species and justification for inclusion as candidate species.

Scientific name	Common name	Confirmed Candidate Species	Sensitivity to Gain	Justification
Flora				
Angophora inopina	Charmhaven Apple	Yes	High	-
Callistemon linearifolius	Netted Bottle Brush	Yes	Moderate	-
Corybas dowlingii	Red Helmet Orchid	Yes	Moderate	-
Eucalyptus glaucina	Slaty Red Gum	Yes	High	-
Eucalyptus parramattensis subsp. decadens	Eucalyptus parramattensis subsp. decadens	Yes	High	-
Eucalyptus seeana - endangered population	*Eucalyptus seeana* - endangered population in the Greater Taree LGA	No	High	**Geographic Limitations** (This study area is not within the Greater Taree LGA)
Grevillea guthrieana	-	Yes	High	-
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	Yes	High	-
Pomaderris queenslandica	Scant Pomaderris	Yes	High	-

Scientific name	Common name	Confirmed Candidate Species	Sensitivity to Gain	Justification
Pterostylis chaetophora	Pterostylis chaetophora	Yes	Moderate	-
Syzygium paniculatum	Magenta Lilly Pilly	Yes	High	-
Tetratheca juncea	Black-eyed Susan	Yes	High	-
Mammals				
Cercartetus nanus	Eastern Pygmy-possum	Yes	High	-
Macropus parma	Parma Wallaby	Yes	High	-
Petaurus norfolcensis	Squirrel Glider	Yes	High	-
Petrogale penicillata	Brush-tailed Rock-wallaby	No	Very High	**Habitat Constraints** (The Study Area is not within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops of clifflines)
Phascogale tapoatafa	Brush-tailed Phascogale	Yes	High	-
Phascolarctos cinereus	Koala	Yes	High	-
Planigale maculata	Common Planigale	Yes	High	-
Potorous tridactylus	Long-nosed Potoroo	Yes	High	**Habitat Constraints** (Dense shrub layer or alternatively high canopy cover exceeding 70% (i.e. to capture populations inhabiting wet sclerophyll and rainforest) not present)
Birds				
Anthochaera phrygia	Regent Honeyeater	No	High	**Habitat Constraints not met** (Important Habitat Mapping absent)
Burhinus grallarius	Bush Stone-curlew	Yes	High	-
Callocephalon fimbriatum	Gang-gang Cockatoo	No	High	**Habitat Constraints not met** (No hollow-bearing trees within subject land)
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	No	High	**Habitat Constraints not met** (No hollow-bearing trees within subject land)
Calidris ferruginea (breeding)	Curlew Sandpiper	No	High	**Habitat Constraints not met** (Important Habitat Mapping absent)
Dromaius novaehollandiae	Emu	Yes	Moderate	-
Haliaeetus leucogaster	White-bellied Sea-Eagle	Yes	High	-
Hieraaetus morphnoides	Little Eagle	Yes	Moderate	-
Lathamus discolor	Swift Parrot	No	Moderate	**Habitat Constraints not met** (Important Habitat Mapping absent)
Limicola falcinellus	Broad-billed Sandpiper	No	High	**Habitat Constraints not met** (Important Habitat Mapping absent)
Lophoictinia isura	Square-tailed Kite	Yes	Moderate	-
Ninox connivens	Barking Owl	No	High	**Habitat Constraints not met** (No hollow-bearing trees within subject land)
Ninox strenua	Powerful Owl	No	High	**Habitat Constraints not met** (No hollow-bearing trees within subject land)
Pandion cristatus	Eastern Osprey	No	Moderate	**Habitat Constraints not met** (No stick-nests within subject land)

Scientific name	Common name	Confirmed Candidate Species	Sensitivity to Gain	Justification
Tyto novaehollandiae	Masked Owl	No	High	**Habitat Constraints not met** (No hollow-bearing trees within subject land)
Tyto tenebricosa	Sooty Owl	No	Very High	**Habitat Constraints not met** (No hollow-bearing trees, cliffs, ledges or escarpments within subject land)
Amphibians				
Crinia tinnula	Wallum Froglet	Yes	Moderate	-
Litoria aurea	Green and Golden Bell Frog	Yes	High	-
Litoria brevipalmata	Green-thighed Frog	Yes	Moderate	-
Mixophyes balbus	Stuttering Frog	Yes	Very High	-
Uperoleia mahonyi	Mahony's Toadlet	Yes	High	-
Bats				
Chalinolobus dwyeri	Large-eared Pied Bat	Yes	Very High	-
Miniopterus australis	Little Bent-winged Bat	Yes	Very High	-
Miniopterus orianae oceanensis	Large Bent-winged Bat	Yes	Very High	-
Myotis macropus	Southern Myotis	Yes	Very High	-
Pteropus poliocephalus	Grey-headed Flying-fox	No	High	**Habitat Constraints not met** (No breeding camps present)
Vespadelus troughtoni	Eastern Cave Bat	Yes	Very High	-
Reptiles				
Hoplocephalus stephensii	Stephens' Banded Snake	Yes	High	-

4.5 THREATENED SPECIES SURVEYS

Step 4: Determine presence or absence of candidate species (species credit species)

4.5.1 Candidate Flora Surveys

The assessment identified ten (10) candidate threatened flora species, and these are listed in Table 6 below.

Table 6: Survey of requirements and timing conducted for candidate flora species

Scientific name	Common name	Species Presence	Survey Method	Survey Timing		Conclusion
				TBDC	WPC Surveys	
Flora						
Angophora inopina	Charmhaven Apple	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	All months	28-Nov-23	Species not detected during surveys. No further assessment required.
Callistemon linearifolius	Netted Bottle Brush	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	October to January	28-Nov-23	Species not detected during surveys. No further assessment required.

Scientific name	Common name	Species Presence	Survey Method	Survey Timing		Conclusion
				TBDC	WPC Surveys	
Corybas dowlingii	Red Helmet Orchid	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	June to July	26/07/2023	Species not detected during surveys. No further assessment required.
Eucalyptus glaucina	Slaty Red Gum	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	All months	28-Nov-23	Species not detected during surveys. No further assessment required.
Eucalyptus parramattensis subsp. *decadens*	Eucalyptus parramattensis subsp. decadens	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	All months	28-Nov-23	Species not detected during surveys. No further assessment required.
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	August to November	4-Oct-23	Species not detected during surveys. No further assessment required.
Maundia triglochinoides		No (surveyed)	Parallel traverses in suitable habitat (surrounding waterbody)	September to March	6-Nov-23	Species not detected during surveys. No further assessment required.
Melaleuca biconvexa	biconvex paperbark	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	All months	28-Nov-23	Species not detected during surveys. No further assessment required.
Pomaderris queenslandica	Scant Pomaderris	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	All months	27/11/2023	Species not detected during surveys. No further assessment required.
Pterostylis chaetophora	Pterostylis chaetophora	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	September to November	4-Oct-23	Species not detected during surveys. No further assessment required.
Rhodamnia rubescens	scrub turpentine	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	All months	28-Nov-23	Species not detected during surveys. No further assessment required.
Rhodomyrtus psidioides	native guava	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	All months	28-Nov-23	Species not detected during surveys. No further assessment required.
Syzygium paniculatum	Magenta Lilly Pilly	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	April– June	27/11/2023 Surveys were conducted outside of survey (flowering/fruiting period).	No Syzygium spp. were detected on-site. No further assessment required.

Scientific name	Common name	Species Presence	Survey Method	Survey Timing		Conclusion
				TBDC	WPC Surveys	
Tetratheca juncea	Black-eyed Susan	No (surveyed)	Parallel traverses in suitable habitat (All PCT)	September to October	4-Oct-23	Species not detected during surveys. No further assessment required.

4.5.1.1 Flora Survey Results

A total of 81 flora species were identified during field surveys, 35 of these were exotic species, of which seven are considered 'High Threat Exotics" and two are listed Weed of National Significance (WoNS) which are 'priority weeds' under the *Biosecurity Act 2015* (NSW), these being *Lantana camara* (Lantana) and *Senecio madagascariensis* (Fireweed). Identified weeds are discussed within Section 5 impact assessment.

Five rounds of threatened flora surveys were conducted over the months of July, October and November 2023, with the flora survey effort shown in Figure 7. All flora surveys were conducted as per relevant guidelines listed in the BAM. Reference populations were checked for orchid species to confirm that the species was in flower at the locality at the time of survey. No threatened flora species were identified within the Subject Land during field surveys. A list of the flora species identified within the Study Area is provided in Appendix 1.

4.5.2 Candidate Threatened Fauna

The following candidate threatened fauna species were surveyed as per the BAM (Table 7). Surveys were undertaken across the Subject Land by suitably qualified ecologists. Survey methodologies for each round of targeted surveys are shown on Table 7.

Table 7: Survey of requirements and timing conducted for candidate fauna species

Scientific name	Common name	Species Presence	Survey Method	Survey Timing		Conclusion
				TBDC	WPC Surveys	
Mammals						
Cercartetus nanus	Eastern Pygmy-possum	No (surveyed)	Remote Cameras	Oct–March	9/11/2023 to 23/11/2023	Species not detected during surveys. No further assessment required.
Macropus parma	Parma Wallaby	No (surveyed)	Remote Cameras	All months	9/11/2023 to 23/11/2023	Species not detected during surveys. No further assessment required.
Petaurus norfolcensis	Squirrel Glider	**Assumed present**	-	All months	-	**Further impact assessment required**
Phascogale tapoatafa	Brush-tailed Phascogale	**Assumed present**	-	Dec–June	-	**Further impact assessment required**

Scientific name	Common name	Species Presence	Survey Method	Survey Timing		Conclusion
				TBDC	WPC Surveys	
Phascolarctos cinereus	Koala	**Assumed present**	-	All months	-	**Further impact assessment required**
Planigale maculata	Common Planigale	No (surveyed)	Pitfall Trapping	All months	18/09/2023 – 22/09/2023	Species not detected during surveys. No further assessment required.
Potorous tridactylus	Long nosed potoroo	No (surveyed)	Remote Cameras	All months	9/11/2023 to 23/11/2023	Species not detected during surveys. No further assessment required.
Birds						
Burhinus grallarius	Bush Stone-curlew	No (surveyed)	Spotlighting / Callplayback	All months	6-7/11/2023 28-29/11/2023	Species not detected during surveys. No further assessment required.
Callocephalon fimbriatum	Gang-gang Cockatoo	No (surveyed)	Hollow-bearing Tree Survey	All months	24/10/2023	Species not detected during surveys. No further assessment required.
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	No (surveyed)	Hollow-bearing Tree Survey	All months	24/10/2023	Species not detected during surveys. No further assessment required.
Dromaius novaehollandiae	Emu – endangered population	No (surveyed)	Remote Cameras	All months	9/11/2023 to 23/11/2023	Species not detected during surveys. No further assessment required.
Haliaeetus leucogaster	White-bellied Sea-Eagle	No (surveyed)	Stick-nest Survey	July–Dec	24/10/2023	Species not detected during surveys. No further assessment required.
Hieraaetus morphnoides	Little Eagle	No (surveyed)	Stick-nest Survey	Aug–Oct	24/10/2023	Species not detected during surveys. No further assessment required.
Lophoictinia isura	Square-tailed Kite	No (surveyed)	Stick-nest Survey	Sept–Dec	24/10/2023	Species not detected during surveys. No further assessment required.

Scientific name	Common name	Species Presence	Survey Method	Survey Timing		Conclusion
				TBDC	WPC Surveys	
Ninox connivens	Barking Owl	No (surveyed)	Hollow-bearing Tree Survey	May–Dec	24/10/2023	Species not detected during surveys. No further assessment required.
Ninox strenua	Powerful Owl	No (surveyed)	Hollow-bearing Tree Survey	May–Aug	24/10/2023	Species not detected during surveys. No further assessment required.
Pandion cristatus	Eastern Osprey	No (surveyed)	Stick-nest Survey	April–Nov	24/10/2023	Stick-nests not detected during surveys. No further assessment required.
Turnix maculosis	Red-backed button-quail	No (surveyed)	Spotlighting	All months	6-7/11/2023 28-29/11/2023	Species not detected during surveys. No further assessment required.
Tyto tenebricosa	Sooty Owl	No (surveyed)	Hollow-bearing Tree Survey	April–Aug	24/10/2023	No habitat features were identified on-site (caves cliffs, escarpments or hollow-bearing trees). No further assessment required.
Amphibians						
Crinia tinnula	Wallum Froglet	No (surveyed)	Aural-visual survey after flooding rains	All months	6-7/11/2023 28-29/11/2023	Species not detected during surveys. No further assessment required.
Litoria aurea	Green and Golden Bell Frog	No (surveyed)	Aural-visual survey	Nov–Mar	6-7/11/2023 28-29/11/2023	Species not detected during surveys. No further assessment required.
Litoria brevipalmata	Green-thighed Frog	No (surveyed)	Aural-visual survey after flooding rains	Sept–Apr	6-7/11/2023 28-29/11/2023	Species not detected during surveys. No further assessment required.
Mixophyes balbus	Stuttering Frog	No (surveyed)	Aural-visual survey	Sept–Mar	6-7/11/2023 28-29/11/2023	Species not detected during surveys. No further assessment required.

Scientific name	Common name	Species Presence	Survey Method	Survey Timing		Conclusion
				TBDC	WPC Surveys	
Mixophyes iteratus	Giant barred frog	No (surveyed)	Aural-visual survey	Oct–Mar	6-7/11/2023 28-29/11/2023	Species not detected during surveys. No further assessment required.
Uperoleia mahonyi	Mahony's Toadlet	No (surveyed)	Aural-visual survey	Oct–Mar	6-7/11/2023 28-29/11/2023	Species not detected during surveys. No further assessment required.
Bats						
Chalinolobus dwyeri	Large-eared Pied Bat	No (surveyed)	Acoustic detection (Anabat)	Nov–Jan	9 -15/11/2023 and 16-20/11/2023	Species not detected during surveys. No further assessment required.
Miniopterus australis	Little Bent-winged Bat	Yes (surveyed)	Acoustic detection (Anabat)	Dec–Feb	9 -15/11/2023 and 16-20/11/2023	No breeding habitat occurs within the Subject Land; therefore, no further assessment is required as a Species Credit Species.
Miniopterus orianae oceanensis	Large Bent-winged Bat	Yes (surveyed)	Acoustic detection (Anabat)	Dec–Feb	9 -15/11/2023 and 16-20/11/2023	No breeding habitat occurs within the Subject Land; therefore, no further assessment is required as a Species Credit Species.
Myotis macropus	Southern Myotis	Yes (surveyed)	Acoustic detection (Anabat)	Oct–Mar	9 -15/11/2023 and 16-20/11/2023	**Further impact assessment required**
Vespadelus troughtoni	Eastern Cave Bat	Yes (surveyed)	Acoustic detection (Anabat)	Nov–Jan	9 -15/11/2023 and 16-20/11/2023	**Further impact assessment required**
Reptiles						
Hoplocephalus stephensii	Stephens' Banded Snake	Yes (surveyed)	Spotlighting	Oct–Mar	6-7/11/2023 28-29/11/2023	Species not detected during surveys. No further assessment required.

Table 8: Reference Populations checked prior to Orchid Surveys

Species	Survey Requirements	Survey Timing	Date of Reference Population Inspection	Location of Reference Population	Confirmed Species Flowering at Location	Personnel
Corybas dowlingii	June - July	26-Jul-23	9 June, 2023	Stoney Ridge Reserve	Yes	Email advice from Ashley Bacales at Port Stephens Council
Pterostylis chaetophora	September - November	4-Oct-23	3 October, 2023	Hanwood Rd, North Rothbury	Yes	Marie Duffy

4.5.2.1 Survey Methodology

The following sub-sections outline the methods for all fauna surveys conducted across the Subject Land. Surveys were completed as per *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)* (Department of Environment and Conservation [DEC], 2004), relevant BAM Species Survey Guidelines, and DoEE Guidelines. Fauna Survey Effort is summarised in Figure 6.

Terrestrial Mammals

Targeted surveys for two candidate threatened terrestrial mammal species was undertaken through installation of 10 Boly Guard remote trigger cameras placed at heights of 0.5 m (Figure 6). Cameras installed onsite were active for 14 nights during November 2023 (9/11/2023 to 23/11/2023). Cameras were baited with a mixture of honey, oats, peanut butter and treacle in a mesh canister. The surrounding area was sprayed with honey water mixture, cameras were checked and re-baited on 16/11/2023. Images were analysed in-house to identify species captured on camera.

A total of four pitfall traps were installed and active onsite for a minimum of four consecutive nights from 18/09/2023 to 22/09/2023 to target the Common Planigale.

Microchiropteran Bats

Anabat^{TM} bat-call detectors were used passively to record the calls of passing Microchiropteran bats. Four Anabats^{TM} were set up within suitable microchiropteran bat habitat and along potential flyways and left to record for four consecutive nights between 9–15/11/2023 and 16–20/11/2023 (Figure 6) as per the *'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method* (OEH 2018). Nocturnal searches of blossoming trees were also undertaken during spotlighting to detect Megachiropteran bats. Anabat^{TM} Walkabout was used during daylight hours to undertake a bridge inspection on the 28/11/2023 to determine whether any bats were using the bridge as roosting habitat.

Birds

Habitat Assessments (nest and hollow surveys) were conducted throughout the Study Area on 24/10/2023. Surveys targeted suitable, mature hollow-bearing trees and stick-nests suitable for

species including Powerful Owl, Barking Owl, Eastern Osprey, Sooty Owl, Gang-gang Cockatoo, Glossy Black Cockatoo, Square-tailed Kite, Little Eagle and White-bellied Sea-Eagle. Surveys focused on areas containing large mature trees (Figure 6). Bird observations and nests were also noted during threatened flora searches.

Targeted surveys for one threatened terrestrial bird population (Emu) were undertaken through installation of 10 Boly Guard remote trigger cameras placed at heights of 0.5 m along tracks (Figure 6). Cameras installed onsite were active for 14 days and nights during November 2023 (9/11/2023 to 23/11/2023).

Spotlighting surveys were conducted on 6–7/11/2023 and 27 & 29/11/2023 via random meanders across the Study Area using high-powered headtorches to search for Bushstone Curlew, and Red-backed Button Quail. Call playback was used for Bushstone Curlew.

Amphibians

Targeted amphibian surveys were carried out within suitable locations within the Study Area over two nights (6/11/2023 and 7/11/2023) following heavy rainfall (see Figure 6) and as per the methods described in the *NSW Survey Guide for Threatened Frogs* (DPIE 2020g). An additional two nights of surveys were undertaken (28/11/2023 and 29/11/2023).

Targeted amphibian surveys involved the completion of nocturnal aural-visual surveys along a transect through available breeding habitat. Surveys involved active searches inspecting of emergent vegetation with a spotlight or head torch, with listening points positioned within suitable habitat, along the transect at approximately 50 m intervals (Figure 6). Adult frogs encountered were identified by visual confirmation or by their distinct advertisement calls.

Amphibian surveys were conducted after inundating rain (the watercourses and dam were flooded, prompting frog-calling behaviour on the Subject Land) which occurred prior to surveys on 6-7/11/2023 (19.5 mm in previous 48 hrs) and 28–29/11/2023. These surveys were conducted by Ecologists Jake Mauger, Rachael Neal and Carla Robertson under guidance from Senior Fauna Ecologist Mark Dean (see qualifications listed in Appendix 9).

Survey effort included two person hours per evening over four evenings, surveying suitable breeding habitat. No call playback was used for amphibian surveys.

Reptiles

Spotlighting surveys were conducted on 6–7/11/2023 and 27 & 29/11/2023 via random meanders across the Study Area using high-powered headtorches to search for all types of nocturnal fauna.

Weather Data

Temperature and rainfall data for the survey period is summarised per month in Table 9. Temperature rainfall data is from the Williamtown RAAF weather station (BOM: 061078).

Table 9: Weather conditions recorded at Williamtown RAAF weather station during fauna surveys.

Date	Temperature (°C)		Rain (mm) to 9 am	Surveys Completed
	Minimum	Maximum		
September				
18/09/2023	9.4	33.3	0	Elliot and Pitfall Trapping Surveys
19/09/2023	10.2	34	0	Elliot and Pitfall Trapping Surveys
20/09/2023	11.4	34.1	0	Elliot and Pitfall Trapping Surveys
21/09/2023	14.5	24.7	0	Elliot and Pitfall Trapping Surveys
22/09/2023	12.6	20	0.6	Elliot and Pitfall Trapping Surveys
November				
6/11/2023	11.2	21.1	19.4	Spotlighting and Call Playback; Aural visual surveys
7/11/2023	11.9	23.5	0.2	Spotlighting and Call Playback; Aural visual surveys
9/11/2023	17.2	27.6	0	Anabat Recording, Cameras
10/11/2023	16.9	25.6	16	Anabat Recording, Cameras
11/11/2023	17	31.9	0.2	Anabat Recording, Cameras
12/11/2023	18.6	26.5	0	Anabat Recording, Cameras
13/11/2023	18.2	23.1	0	Anabat Recording, Cameras
14/11/2023	14.9	27.6	0	Anabat Recording, Cameras
15/11/2023	17.8	29	0	Anabat Recording, Cameras
16/11/2023	17.4	25.8	0	Anabat Recording, Cameras
17/11/2023	16.1	22.2	8.2	Anabat Recording, Cameras
18/11/2023	11.3	23.8	0.2	Anabat Recording, Cameras
19/11/2023	11.2	28.3	0	Anabat Recording, Cameras
20/11/2023	18.7	25	0	Cameras
21/11/2023	17.5	24.7	0.6	Cameras
22/11/2023	16.8	25	0.4	Cameras
23/11/2023	17	25	0	Cameras
24/11/2023	18.2	24.8	5.4	-
25/11/2023	19.9	24.7	0.2	-
26/11/2023	18	33	0	-
27/11/2023	17.5	26.7	0.2	Anabat Walkabout
28/11/2023	19.5	24.4	1.2	Spotlighting and Call Playback; Aural visual surveys
29/11/2023	20.4	-	5.6	Spotlighting and Call Playback; Aural visual surveys
30/11/2023	-	-	5.2	-

4.5.2.2 Fauna Survey Results

A total of 26 species of fauna were detected within the Subject Land during field surveys (see Appendix 2). This included three pest species (Deer, Dog and Rat). Also, six species listed as threatened in NSW were recorded during surveys. These were as follows:

- Eastern Cave Bat – (*Vespadelus troughtoni*) This species was recorded at one Anabat (Anabat B) installed across the Subject Land (see Figure 6). The species is a Species Credit Species, as such a species polygon was generated over suitable PCTs that occur within 2 km of roosting features (as per TBDC).
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) – An Ecosystem Credit species that was recorded via Anabat™ (Anabat A, Anabat B, Anabat C).
- Grey-headed flying-fox (*Pteropus poliocephalus*) – This species was recorded seen feeding outside the impact area during spotlighting surveys, however, was not recorded on the Subject Land.
- Little Bent-winged Bat (*Miniopterus australis*) – This species was recorded via Anabat™ within the Subject Land (Anabat A, Anabat B, Anabat C).
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) – This species was recorded via Anabat™ within the Subject Land (Anabat B, Anabat C).

  The Little Bent-winged Bat and Large Bent-winged Bat are dual credit species: an ecosystem credit species for foraging habitat and a Species Credit species for breeding habitat. No foraging habitat constraints are listed for these species in the Threatened Biodiversity Data Collection. The breeding habitat constraint listed for this species in the Threatened Biodiversity Data Collection (caves) is not present within or in proximity to the Study Area. No bats were detected in these areas during daylight hours during surveys (Plate 11). The occurrence of this species within the Subject Land was therefore assessed as an Ecosystem Credit species. Impacts to habitat for this species is offset through calculation of Ecosystem Credits for native vegetation removal.
- Southern Myotis (*Myotis macropus*) – This species was recorded at four Anabats (A, B, C & D) installed across the Subject Land (see Figure 10). The species is a Species Credit Species, as such a species polygon was generated over foraging habitat (waterbodies >3 m and 200 m of the waterbody).

Plate 11: Anabat Walkabout detected no bat species present during daylight hours

4.5.2.3 Identified Threatened Species

Step 5: Determine the area or count, and location of suitable habitat for species credit species.

n/a

Step 6: Determine the habitat condition within the species polygon for species assessed by area.

A total of five species credit species were assumed present within the Subject Land based on the occurrence of species records, suitable foraging habitat and the occurrence of important area mapping two species credit species were detected throughout fauna surveys.

Species where presence is assumed were amphibians and arboreal mammal species and include;

- Squirrel Glider (*Petaurus norfolcensis*)
- Brush-tailed Phascogale (*Phascogale tapoatafa tapoatafa*)
- Koala *(Phascolarctos cinereus)*

Species credit species that were recorded within the Subject Land were all bat species and include:

- Southern Myotis (*Myotis macropus*)
- Eastern Cave Bat (*Vespadelus troughtoni*)

The location and condition of potentially suitable habitat for all seven Species Credit species is discussed below:

Squirrel Glider (*Petaurus norfolcensis*)

The species is assumed present within the Subject Land. This included all PCTs associated with squirrel glider (VZ1, VZ2 & VZ3) that contains suitable hollows or foraging habitat. As such, a species polygon, with a combined total area of 0.55 ha was established within the Subject Land (Figure 9).

Brush-tailed Phascogale (*Phascogale tapoatafa tapoatafa*)

The species is assumed present within the Subject Land. Species sightings were recorded in the locality in 2017 and 2020 (Bionet). This included all vegetation zones, of a PCT associated with brush-tailed phascogale (VZ1, VZ2 & VZ3) that contains hollows or foraging habitat. As such, a species polygon, with a combined total area of 0.55 ha was established within the Subject Land (Figure 9).

Koala (Phascolarctos cinereus)

The species is assumed present within the Subject Land. Recent records for the species were recorded within 4 km of the Subject Land. The vegetation within the Subject Land contains koala feed trees, and trees considered important to koalas listed in the CKPoM (PS, 2002). Preferred Koala Habitat and associated buffer areas along with habitat linkage areas make up the Subject Land (as per CKPoM (PS, 2002) mapping). In accordance with Section 5.2.5 of the BAM a species polygon must be prepared if the species is “likely to use suitable habitat on the Subject Land”. As such, a species polygon, with a combined total area of 0.55 ha was established within suitable Koala habitat within the Subject Land (Figure 9). This included all native vegetation zones, in accordance with the

BAM Survey Guide for Koala, “any vegetation zone of a PCT associated with koalas will determine the full extent of that PCT as suitable habitat” (DPE, 2022). There are koala feed trees throughout every native vegetation zone (VZ1, VZ2 & VZ3).

Southern Myotis (*Myotis macropus*)

This species was identified at four locations within the Subject Land - Anabat A, B, C & D. A total of four calls were positively identified. BioNet records also show the presence of Southern Myotis recorded beneath the southern bridge adjacent to the Subject Land. The portion of the Subject Land included within the species polygon were any areas of suitable PCTs (according to the TBDC) that occur within 200 m of a water body, as per the requirements for threatened bats in the BAM (DPIE, 2021). The Southern Myotis species polygon within the Subject Land has combined total area of 0.40 ha restricted to within VZ1 (Figure 10).

Eastern Cave Bat (*Vespadelus troughtoni*)

The species was recorded at one (1) location within the Subject Land – Anabat B (**Figure 6**). The species polygon included all associated vegetation zones (VZ1, VZ2 & VZ3) that are within 2 km of potential roosting habitat (0.55 ha; Figure 9). There was no suitable breeding habitat recorded within 2 km of the Subject Land. Impacts to breeding habitat for this species is considered a Serious and Irreversible Impact (SAII). However, when the species is present on the Subject Land and the proposed impact does not trigger an SAII, standard species credits will be generated (DPIE 2022c).

Subject Land
Contours (10m)
Primary Road
Local Road
Track-Vehicular
Bridge
Culvert
Major watercourse
Minor watercourse

Threatened Fauna

Squirrel Glider, Brush-tailed Phascogale, Koala, Eastern Cave Bat

Vegetation Zones and Plant Community Types

Vegetation Zone 1- PCT 4042: Lower North Riverflat Eucalypt-Paperbark Forest (Moderate)
Vegetation Zone 2- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Moderate)
Vegetation Zone 3- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Poor)
Vegetation Zone 4- Exotic Vegetation
Dam / Waterbody
Road Corridor

WEDGETAIL
PROJECT CONSULTING PTY LTD

Figure 9

Threatened Fauna Species Polygon

50 100 150 200 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 31/07/2024
Produced By: Sarah Harries

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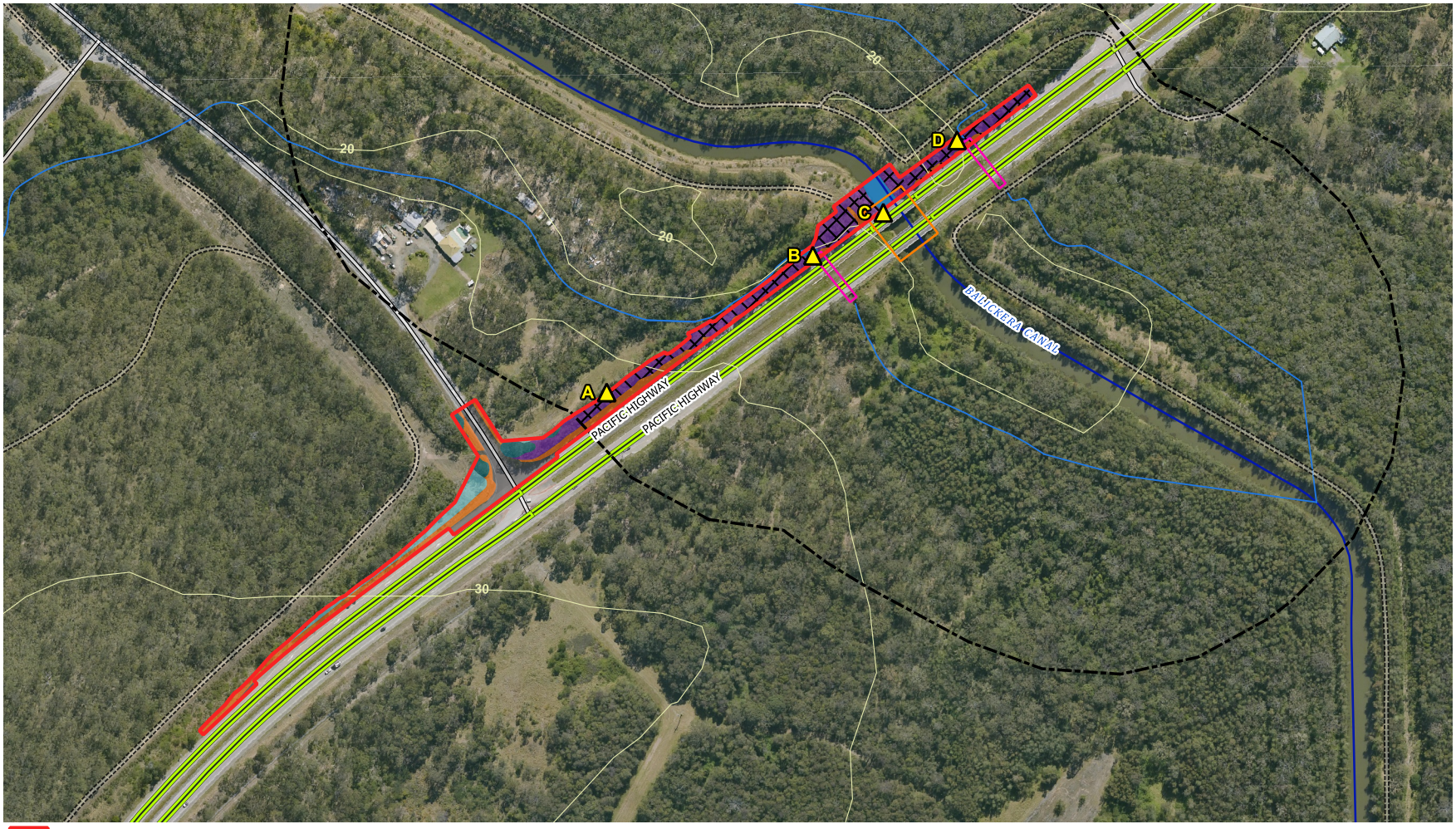

Subject Land
Primary Road
Local Road
Track-Vehicular
Bridge
Culvert
Contours (10m)

Major watercourse
Minor watercourse

Vegetation Zones and Plant Community Types

Vegetation Zone 1- PCT 4042: Lower North Riverflat Eucalypt-Paperbark Forest (Moderate)
Vegetation Zone 2- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Moderate)
Vegetation Zone 3- PCT 3433: Hunter Coast Foothills Spotted Gum - Ironbark Grassy Forest (Poor)
Vegetation Zone 4- Exotic Vegetation
Dam / Waterbody
Road Corridor

Southern Myotis Map Features

Anabat
Southern Myotis species polygon
200 m buffer of waterbodies

WEDGETAIL
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Figure 10
Southern Myotis (*Myotis macroplus*) Species Polygon

50 100 150 200 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 31/07/2024
Produced By: Sarah Harries

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5. BIODIVERSITY IMPACTS

5.1 PRESCRIBED BIODIVERSITY IMPACTS

The following are prescribed impacts which need to be considered as per Section 8.3 of the BAM (DPIE 2020a).

- **Impacts of the development on the habitat of threatened species or ecological communities associated with significant geological features, human made structure or non-native vegetation.**

The proposed development will impact on one dam, one canal and two artificially redirected watercourses, and this is discussed below (impact to watercourses).

While the southbound bridge was found to provide potential roosting habitat, the northbound bridge that will be impacted by the development was found to provide no suitable roosting or breeding habitat for any threatened species, and no significant geological features were present within Subject Land. Impacts to native vegetation, threatened ecological communities and threatened species and their habitat are addressed in Section 5.2.1.1.

Existing culverts within the Development footprint require extensions (described in greater detail within the Strategic Design Report - Section 3.6 (GHD, 2023)). These have been assessed as having suitable roosting and / or breeding habit for microbats such as the Southern Myotis. In addition, they have fauna crossings within them that will be temporarily inaccessible (affecting Koalas).

As the culverts are not being removed, the habitat is only expected to be temporarily disturbed by construction. Mitigations measures have been included in Section 5.3.

- **Impacts of the development on the connectivity of different habitat which facilitates movement of threatened species.**

Vegetation Zone 1 within the Subject Land is recognised as preferred koala habitat due to the occurrence of *E. tereticornis* making up more than 10% of the canopy according to the CKPoM (PSC, 2002). The vegetation is likely to help facilitate movement of species including Koalas through the landscape. The use of the vegetation within the Subject Land is supported by recent Koala records within 4 km of the area and the occurrence of Preferred Koala Feed Tree species including *Eucalyptus tereticornis* (Forrest Red Gum) as well as other trees considered important for koalas including *Corymbia maculata* (Spotted Gum), and *Casuarina glauca* (Swamp Oak) as listed in the CKPoM (PS, 2002).

As the proposed development will be limited to the existing road corridor, it will not fragment habitat beyond the existing approved disturbance, and connectivity will largely be maintained throughout the locality.

However, construction works could impact on connectivity for koalas, as a koala crossing will require replacement over the Balickera Canal. In addition, construction activities to extend culverts will temporarily impact fauna (Koala) crossings within the culverts, crossing beneath the Pacific Highway.

- **Impact of the development on movement of threatened species that maintains their life cycle**

As discussed above, the proposed development would have limited impacts on the movement of threatened species in the locality. While a small area of vegetation is proposed to be removed, movement corridors and mapped Koala habitat linkages within the local area would largely be maintained with the retention of a Koala feed trees adjacent to the development.

There may be an impact to movement of threatened species throughout the construction process, due to works being undertaken to construct a bridge, that may interrupt koala movement along the Balickera Canal.

To minimise potential impacts from increased movement of vehicles during the construction phase appropriate mitigation measures will be enforced, as outlined in Section 5.3.

- **Impacts of the development on water quality, bodies and hydrological processes that sustain threatened species or ecological communities**

No threatened species or ecological communities within or surrounding an aquatic environment were identified within the subject site or assessed as having a moderate to high likelihood of occurrence within the Subject Land.

However, impacts to these areas will be avoided and minimised through appropriate stormwater design and the implementation of erosion and sediment control in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004) prior to commencement of construction (outlined in Section 5.3.).

During construction of culverts, water quality measures, including soil and water management will be incorporated into the construction phase (GHD, 2023). The GHD (2023) impact assessment outcome was that construction is not likely to have a negative impact on water quality throughout operation.

- **Impact of wind turbine strikes on protected animals**

Not applicable to the current application.

- **Impacts of vehicle strikes on threatened species or on animals that are part of a TEC**

Given the nature of the proposed development, impacts of vehicle strikes on threatened species or animals are unlikely to be exacerbated beyond that of the previously approved roads. Impacts through vehicle strikes are further reduced through repair to koala crossings over the Balickera Canal, beneath the Pacific Highway. To minimise potential impacts from increased movement of vehicles during the construction phase appropriate mitigation measures will be enforced, as outlined in Section 5.3.

5.2 AVOID AND MINIMISE

5.2.1 Design and Location of the Proposed Development

The proposed development has been designed to limit the disturbance to within the existing road corridor, and as such to limit the impact to previously cleared vegetation. This vegetation has been impacted by construction of the current highway, powerline easements, and service roads adjoining

the Subject Land. The area has been almost entirely cleared, as shown in Plate 12 below. Regrowth of native vegetation has occurred since 2001, however the Subject Land remains highly degraded due to previously clearing and edge effects of the roads and powerline easements.

5.2.1.1 Impacts on Native Vegetation and Habitat Direct Impacts

The Proposed Development will impact on approximately 0.55 ha of native vegetation identified within the Subject Land. The three vegetation zones within the Study Area are represented by three management zones, and the future value of each attribute (composition, structure, and function) and the future vegetation integrity score for these management zones will be zero. A total of 46 Koala Feed Trees will be removed because of the development. The proposed development avoids impacts to any hollow-bearing trees.

Plate 12: Historical imagery from 2001

(Source: NSW Historical Imagery Search and Discovery portal. https://portal.spatial.nsw.gov.au/portal/apps/webappviewer/index.html?id=f7c215b873864d44bccddda8075238cb)

Table 10: Native Vegetation Impacts

Vegetation Zone	Subject Land	Current VI Score	Future VI Score
Vegetation Zone 1: *PCT 4042 - Lower North Riverflat Eucalypt-Paperbark Forest*	0.41	43.1	0
Vegetation Zone 2: *PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest* (Moderate Condition).	0.05	25.7	0
Vegetation Zone 3: *PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest* (Poor Condition).	0.09	21.7	0

5.2.1.2 Indirect Impacts

The proposed development has the potential for edge effects on the adjoining vegetation. Potential indirect impacts resulting from the development include:

- Increased weed invasion and potential spread/introduction of pathogens to retained vegetation.
- Accidental incursions during clearing.
- Reduced viability of adjoining habitats due to increased noise, dust or light spill; or
- Increase in rubbish dumping in adjoining habitats.

These potential indirect impacts may have an effect on vegetation adjacent to the Subject Land. Provided appropriate mitigation measures and management plans are enforced, the proposed development is unlikely to indirectly impact threatened species, ecological communities, and their habitats during construction and operational phases. Appropriate mitigation measures are detailed in Section 5.3.

5.2.2 Prescribed Biodiversity Impacts

The proposed development has the potential to contribute to two prescribed impacts (Section 5.2.2);

- Impacts of the development on the connectivity of different habitat which facilitates movement of threatened species
- Impacts of the development on water quality, bodies and hydrological processes that sustain threatened species or ecological communities

Implementation of measures detailed in Section 5.3 will mitigate impacts to connectivity within the landscape and indirect impacts to the mapped watercourse and downstream coastal wetlands.

5.3 MITIGATE AND MANAGE IMPACTS ON BIODIVERSITY VALUES

The measures outlined in Table 11 are proposed to mitigate potential impacts associated with the proposed development.

Table 11: Summary of mitigation and management measures for direct, prescribed and indirect impacts of the proposed development

Impact	Action and Outcome	Responsibility	Timing
Direct impact / prescribed impact			
Clearing of native vegetation	▪ Clearly delineate the boundaries of the development footprint to prevent any unnecessary clearing beyond its extent. This includes physical demarcation of the extent of the proposed Subject Land within the existing road corridor. ▪ Ensure vehicle and equipment parking areas and stockpile areas are identified and positioned to avoid areas containing ecological value. Stockpiling must not occur within, or in close proximity (5 m) to, areas of native vegetation retained under the proposed development. ▪ Appropriate signage such as 'no go zone' or 'environmental protection area' should be installed surrounding the area of retained native vegetation. ▪ Identify and communicate the location of any 'no go zones' in site inductions. ▪ The clearing of native vegetation must not proceed until the area has been inspected by a suitably qualified ecologist / fauna spotter catcher. ▪ Impacts to up to 46 *E. tereticornis* Koala Feed Trees are to be mitigated by planting of 92 replacement trees (i.e. replacement at 2:1 ratio) ideally along the Williams River Floodplain. Tree species may be *E. tereticornis* or *E. robusta.* Consultation is being undertaken with Lower Hunter Landcare to secure a location for these trees on private property. A Vegetation Management Plan (VMP) is to be developed that provides details of suitable location and ongoing management actions for Koala tree replacement plantings for a minimum of 5 years. The requirement for the VMP is to be part of any consent conditions for the proposed development. ▪ Approval to proceed with the clearing of native vegetation in accord with the above point is only valid for the day on which the inspection has been undertaken. The clearing of native vegetation and/or earthworks must be temporarily suspended within a range of 25 m from any tree that is occupied by a Koala and must not resume until the Koala has moved from the tree of its own volition.	Construction site manager	Prior to and during vegetation clearing
Removal of vegetation resulting in fauna injury and mortality	▪ Limit removal of trees to that required within the proposed development footprint where possible. ▪ A pre-clearing protocol will be implemented during clearing works, as follows:	Construction site manager and suitably qualified/trained fauna handler	Prior to and during tree clearing

Impact	Action and Outcome	Responsibility	Timing
	▪ Pre-clearance surveys will be undertaken to determine if any inhabiting fauna, or habitat features (i.e. nests) are present. ▪ A suitably qualified and trained fauna handler will be present during habitat tree clearing to rescue and relocate displaced fauna. ▪ Considering allowance for Tree Protection Zones in accordance with AS4970 (Standards Australia, 2009).		
Injury to microbats or mortality due to works being undertaken on artificial habitat features (culverts and / or bridges), and fauna crossings	Transport for NSW Microbat Management Guidelines 2023 should be followed to Manage Impact on Microbats (Section 3) . This includes: ▪ Construction should take place outside of breeding season for Southern Myotis (October to April) where possible ▪ Where Southern Myotis is present, activities undertaken at night may reduce the impact, as the bats can relocate themselves to a less disturbed site. ▪ Where bent-wing bats are present – working at night is only relevant from March to October. ▪ Undertaking microbat surveys prior to construction by a suitably qualified fauna ecologist.	Construction site manager and suitably qualified/trained fauna handler	Prior to and during works being undertaken on artificial habitat structures and fauna crossings
Impacts to surface and groundwater quality and quantity due to sediment run-off and/or contaminant runoff into adjacent watercourses	▪ Source controls such as sediment fences, mulching and jute matting will be used where appropriate. ▪ Site-based vehicles and plant equipment will carry spill kits. ▪ Erosion and sediment control will be required for the development in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004) prior to commencement of construction. ▪ Any proposed pesticide usage within the Balickera Canal catchment should only occur with prior approval from Hunter Water. ▪ The installation of sediment filters (also known as sediment retention traps) and sediment fencing within the vicinity of the proposed stormwater outlet to minimize movement of sediments into the mapped watercourse. They should be regularly inspected, particularly following rainfall events to ensure their ongoing functionality. ▪ Regular inspection of erosion and sediment control measures, particularly prior to and following rainfall events to ensure their ongoing functionality. ▪ Avoid stockpiling of materials adjacent to native vegetation, but instead use areas that are already cleared/ disturbed. ▪ Undertake maintenance of silt fences and other mitigation measures to isolate runoff.	Construction site manager	During vegetation clearing, construction and operation
Vehicle collision with fauna	▪ Speed limits within the Subject Land should be limited as appropriate during construction. ▪ The Subject Land should be separated from vegetated areas throughout the construction and operational phases of the development. This separation should be achieved through physical barriers including fencing and appropriate signage. ▪ The use of fauna exclusion fencing particularly for koalas, during construction (road and culverts) is required,	Construction site manager	During construction and operation

Impact	Action and Outcome	Responsibility	Timing
	redirecting fauna to alternative crossings. Fauna exclusion fencing should be designed in accordance with DPIE 2024 Koala Vehicle Strike: ○ Option 1: floppy top wildlife fencing ○ Option 2: 1.5m high chain-mesh fence with flashing ○ fence returns be used in conjunction with fauna crossing structures (e. g. bridges and underpasses).  Figure 1 Floppy-top wildlife fencing (a) and 1-5-metre-high chain-mesh fence with flashing (b), feature on long sections of the Pacific Highway upgrade in northeast NSW. (Sandpiper Ecological) **Plate 13: Exclusion fencing (DPIE 2024)** ▪ Continuation of existing infrastructure within culverts is recommended, including the raised edge. However this could be improved by providing wildlife 'furniture' such as a wooden ledge to make it easier for koalas to cross (see Koala Vehicle Strike Fact sheet 2, Figure 2, DPIE 2024)		
Impacts of the development on the connectivity of different habitat which facilitates movement of threatened species.	▪ Construction of koala crossing across the Balickera Canal – design options. ○ Option 1: Port Stephens Council suggested a design similar to the Koala Log Bridge constructed at Boundary Road in Brisbane City Council by Fauna Crossings Australia.  **Plate 14: Koala Log Bridge** ○ Option 2: pine post bridge with koala refuge poles		

Impact	Action and Outcome	Responsibility	Timing
	 **Plate 15: Pine post with koala refuge poles (DPIE 2024)**		
Indirect Impact			
Transfer of weeds and pathogens to and from site	▪ The fungal pathogens *Phytophora cinnamomi* and Myrtle Rust (*Puccinia psidii*) are known to occur in the Port Stephens LGA, however, it is unknown if they occur within the Subject Land. These pathogens can have devastating impacts on native plant communities and inhabiting fauna if not properly managed. ▪ All plant and equipment brought on to site should be assessed (or declared) as clean of biological contamination. ▪ Ensure soil seed material is not transferred. ▪ Undertake regular weed management activities throughout the construction process in accordance with Hunter Region Strategic Management Plan 2023-2027 (LLS, 2022). ▪ Consult Hunter Water prior to considering the use of pesticides, as they have not been permitted for use on-site. ▪ Use weed prevention strategies such as: o applying mulch and revegetating disturbed sites as soon as practicable. o separating weed infested soils from clean soils o monitoring bare ground and stockpiles o remove weeds prior to or at the time of flowering to prevent seeds development	Construction site manager	During vegetation clearing, construction, and operation
Noise, vibration, lighting, waste and air pollution impacts to adjacent sensitive habitat areas	▪ Increased human activity (from workers and traffic levels) directly adjacent to sensitive habitat areas may cause disturbance to flora and fauna species in adjoining habitat. ▪ Impacts from construction and operational activities, such as disturbance to an animal's normal behavior patterns due to noise, vibration, lighting or dust may cause areas of previously suitable habitat to become sub-optimal and may cause fauna species to vacate areas previously suitable. ▪ Measures to mitigate impacts on flora and fauna from noise, vibration, waste, light and air pollution such as: ▪ Enforce 'carry-in, carry-out' policy regarding rubbish and waste materials generated on-site during construction to avoid waste materials entering adjacent vegetation.	Construction site manager	During construction and operation

Impact	Action and Outcome	Responsibility	Timing
	▪ Restriction of public access and associated impacts from domestic pets, waste dumping and damage to adjoining vegetation must be enforced pre, during and post construction. ▪ Levels of lighting within the site will be reduced to a minimal level to reduce any adverse effects upon the essential behavioral patterns of light-sensitive fauna. ▪ Lighting should comply with Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting. ▪ Noise minimisation practices in accordance with DPIE recommendations. ▪ Dust control measures such as covering loads where required; amending operations under excessive wind conditions including ceasing operations if required; use of water tankers as required, to control dust; rehabilitation through vegetation of surfaces to be left unsealed; and, truck wheel washes or other dust removal measures.		

6. IMPACT SUMMARY

6.1 SERIOUS AND IRREVERSIBLE IMPACTS

No Serious and Irreversible Impacts (SAIIs) were found to occur on the Subject Land.

6.2 IMPACTS ON NATIVE VEGETATION

This section provides an assessment of the impacts requiring offsetting in accordance with Section 10.1 of the BAM (DPIE 2020a).

The proposed development will result in the clearing of 0.55 ha of native vegetation. In accordance with the BAM (Section 9.2.1 [DPIE 2020a]) assessors must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

- ≥15, where the PCT is representative of an EEC or a CEEC.
- ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community.
- ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

A summary of the impacts on native vegetation and the required ecosystem credits is provided in Table 12.

Table 12: Summary of ecosystem credit requirements

Zone	Vegetation zone name	VI loss	Area (ha)	Sensitivity to loss	Sensitivity to loss (Justification)	Species sensitivity to gain class	Biodiversity risk weighting	Ecosystem credits
Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest								
2	3433_Moderate	25.7	0.05	High	Biodiversity Conservation Act listing status	High	2	1
3	3433_Regenerating	21.7	0.09	High	Biodiversity Conservation Act listing status	High	2	1
								Subtotal: **2**
Lower North Riverflat Eucalypt-Paperbark Forest								
1	4042_Moderate01	43.1	0.41	High	PCT Cleared - 73%	High	2	9
								Subtotal: **9**
								Total: 11

6.2.1 Impacts on Species Credit Species

A summary of the impacts on species credit species and the required species credits is provided in **Table 13**.

Table 13: Summary of species credit requirements

Veg. zone name	VI loss	Area (ha)	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Biodiversity risk weighting	Potential SAII	Species credits
***Myotis macropus* / Southern Myotis (Fauna)**								
4043_Moderate	37.3	0.40	Moderate	BC Act listing status	High	2	False	9
								Subtotal: **9**
***Petaurus norfolcensis* / Squirrel Glider (Fauna)**								
3433_Moderate	25.7	0.05	Moderate	BC Act listing status	High	2	False	1
3433_Regenerating	21.7	0.09	Moderate	BC Act listing status	High	2	False	1
4043_Moderate	37.3	0.41	Moderate	BC Act listing status	High	2	False	9
								Subtotal: **11**
***Phascogale tapoatafa* / Brush-tailed Phascogale (Fauna)**								
3433_Moderate	25.7	0.05	Moderate	BC Act listing status	High	2	False	1
3433_Regenerating	21.7	0.09	Moderate	BC Act listing status	High	2	False	1
4043_Moderate	37.3	0.41	Moderate	BC Act listing status	High	2	False	9
								Subtotal: **11**
***Phascolarctos cinereus* / Koala (Fauna)**								
3433_Moderate	25.7	0.05	High	BC Act listing status	High	2	False	1
3433_Regenerating	21.7	0.09	High	BC Act listing status	High	2	False	1
4043_Moderate	37.3	0.41	High	BC Act listing status	High	2	False	9
								Subtotal: **11**
***Vespadelus troughtoni* / Eastern Cave Bat (Fauna)**								
3433_Moderate	25.7	0.05	Moderate	BC Act listing status	Very High	3	True	1
3433_Regenerating	21.7	0.09	Moderate	BC Act listing status	High	3	True	1
4043_Moderate	37.3	0.41	Moderate	BC Act listing status	Very High	3	True	13
								Subtotal: **15**

6.3 IMPACTS NOT REQUIRING OFFSETS

Impacts to exotic vegetation (Zone 4) do not require offsets. This vegetation is mapped on Figure 4.

7. ASSESSMENT OF BIODIVERSITY LEGISLATION

7.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

7.1.1 Assessment Requirements

The EPBC Act requires that developments or undertakings that are likely to have a significant impact on MNES be referred for a determination as to whether they are a controlled action that requires approval under the EPBC Act (Section 1.5.1).

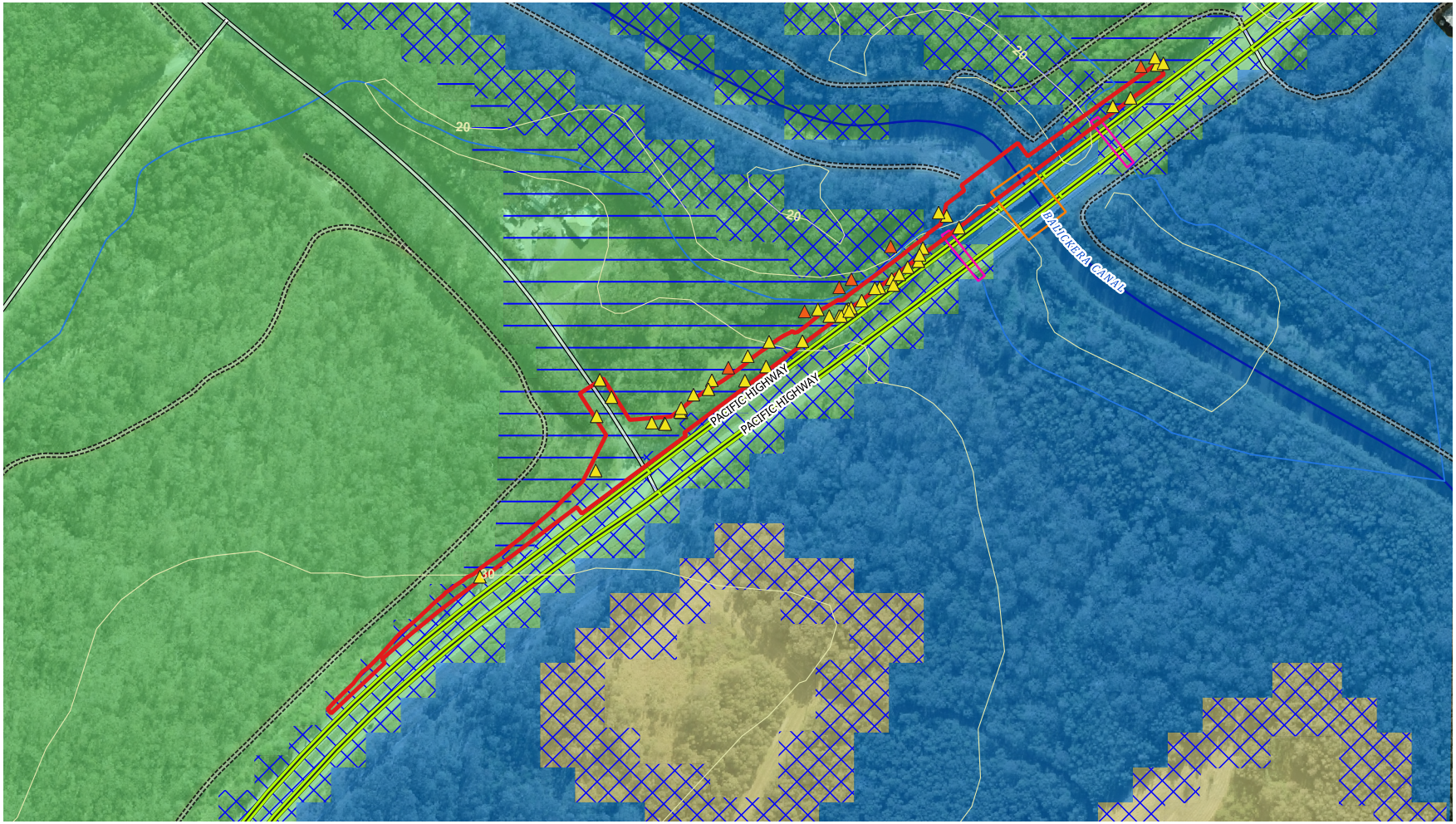
Of the nine MNES listed under the Act, the one MNES considered relevant to the Study Area was potential impacts on marginal habitat for listed threatened species. An assessment of the relevant threatened species databases and an assessment of the likelihood of occurrence of threatened and migratory species is provided in Appendix 1. Three EPBC listed species were assessed as having potential habitat within the Subject Land, Koala (*Phascolarctos cinereus*), -Grey-headed Flying-fox (*Pteropus poliocephalus*) and South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami lathami*). An assessment of significance was completed for these species in accordance with EPBC Act Matters of National Environmental Significance Significant impact guidelines 1.1 (Department of the Environment [DotE], 2013) (provided in Appendix 5). Impacts to any EPBC-listed species are unlikely to be significant. As such, a referral to the Commonwealth Minister for the Environment is not considered necessary.

7.2 STATE ENVIRONMENTAL PLANNING POLICY (BIODIVERSITY AND CONSERVATION) 2021

Port Stephens LGA is listed in Schedule 2 of the Biodiversity and Conservation SEPP 2021. Therefore, the Study Area is subject to an approved CKPoM, the *Port Stephens Comprehensive Koala Plan of Management (CKPoM)* (PS 2002), any Development Application to PSC will need to be consistent with the requirements of the CKPoM.

7.2.1 Port Stephens Council Comprehensive Koala Plan of Management (CKPoM)

Identification of Koala Habitat Review of the Koala Habitat Planning Map for the Port Stephens LGA indicates that the Subject Land is mapped as either 'Preferred Koala Habitat' on either side of the Balickera Canal (Figure 11) (PSC 2002). There are also areas of 'Preferred Koala Habitat Buffer', 'Preferred Habitat Link over Marginal' Habitat areas, and 'Marginal Koala Habitat', so that the majority of the Subject Land is considered Koala habitat. A site inspection was undertaken to confirm mapping and record occurrence of Koala feed trees (i.e. *Eucalyptus robusta, E. parramattensis* and *E. tereticornis*) within the Subject Land. The results of the site inspection revealed that 46 of *E. tereticornis* occur within the Subject Land (5 m buffer to allow for GPS accuracy of ±5 m) with 52 total (within 10 m of the Subject Land) (Figure 11). It is assumed that all 46 trees within the Subject Land will be removed as part of the Proposed Development.



Subject Land
Bridge
Culvert
Major watercourse
Minor watercourse
Contours (10m)

Primary Road
Local Road
Track-Vehicular
Eucalyptus tereticornis (within the Development Site)
Eucalyptus tereticornis (outside Development Site)

Koala Habitat

Mainly Cleared Land
Marginal Koala Habitat
Preferred Koala Habitat
Preferred Koala Habitat Buffer over Cleared Land
Preferred Koala Habitat Buffer over Marginal
Preferred Koala Habitat Link over Marginal

Figure 11

Koala (*Phascolarctos cinereus*) Species Polygon

N

GDA94 / MGA zone 56
EPSG:28356

50 100 150 200 m

Map Produced: 31/07/2024
Produced By: Sarah Harries

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7.2.2 Site Specific Mapping of Koala Habitat in accordance with the Port Stephens Council CKPoM

A vegetation assessment undertaken identified two native plant communities as occurring within the Subject Land (Figure 4), along with exotic vegetation. Following a review of the definitions of 'Preferred', 'Supplementary' and 'Marginal' Koala Habitat detailed by Lunney *et al.* (1998), it was determined that the area mapped as PCT 4042 (Lower North Riverflat Eucalypt-Paperbark Forest) (Zone 1), was considered 'preferred' koala habitat due to the high number of *Eucalyptus tereticornis* present. PCT 3433 (*Hunter Coast Foothills Spotted Gum – Ironbark Forest*) (Zones 2) would likely constitute 'Marginal' Koala Habitat as there is less than 10% cover of preferred koala feed trees. Due to the poor condition of the vegetation as a result of management, PCT3433 (Zone 3 (poor condition) and the exotic vegetation in Zone 4 is considered as 'Mainly Cleared' (see Table 14). Figure 12 shows a site-specific Koala Habitat map.

Table 14: Classification of Koala habitat within Subject Land

PCT	Applicable Vegetation Zones	Community Based Survey Equivalent	Proposed Koala Habitat Mapping
PCT 4042	Zone 1	*Spotted Gum and Ironbark F (Category E)*	*'Preferred' Koala Habitat*
PCT 3433	Zone 2	*Spotted Gum and Ironbark F (Category E)*	*'Marginal' Koala Habitat'*
PCT 3433	Zone 3	*Spotted Gum and Ironbark F (Category E)*	*'Mainly Cleared'*
Exotic Grassland	*Zone 4*	*Cleared*	*'Mainly Cleared'*

*Preferred Koala Feed Trees: *Eucalyptus tereticornis*, *Eucalyptus robusta*, *Eucalyptus parramattensis* (Lunney *et al.* 1998)

Performance Criteria for development (Appendix 5 of CKPoM)

The performance criteria for the proposed development are addressed below:

a) Minimise the removal or degradation of native vegetation within Preferred Koala Habitat or Habitat Buffers;

No areas of 'Preferred' Koala Habitat or Habitat Buffers are proposed for removal. A number of preferred Koala feed trees (*E. tereticornis*) are required to removed; however, these trees represent a small proportion of the total number of trees within the vegetation community.

b) Maximise retention and minimise degradation of native vegetation within Supplementary Koala Habitat and Habitat Linking Areas;

A narrow strip of native vegetation totalling 0.55 ha is proposed to be removed within the Subject Land, some of which is mapped within Habitat Linking Areas (Figure 11). No areas of Supplementary Habitat are mapped within the Subject Land or adjacent areas. The proposed development occurs on an already disturbed and degraded roadside that does not provide any connectivity value due to the proximity of the motorway directly south. East-west connectivity is also broken by Italia Road and Balickera Canal. As such, the proposed development will not substantially degrade vegetation such that any local Koala will be limited in dispersing across the landscape.

The vegetation that occurs within the proposed development footprint is very degraded and impacted by edge effects from the adjacent road and powerline easement. However, it is proposed that 92 Koala Feed trees will be planted within a priority area for the same Koala Management Unit (Balickera KMU), so that trees will be replaced in an area that is less exposed to degradation than the Subject Land.

c) **Minimise the removal of any individuals of preferred koala food trees, where ever they occur on a development site. In the Port Stephens LGA these tree species are Swamp Mahogany (*Eucalyptus robusta*), Parramatta Red Gum (*Eucalyptus parramattensis*), and Forest Red Gum (*Eucalyptus tereticornis*), and hybrids of any of these species. An additional list of tree species that may be important to koalas based on anecdotal evidence is included in Appendix 8**

A total of 46 *Eucalyptus tereticornis* trees occur within the development footprint, with no other koala feed trees present.

d) Make provision, where appropriate, for restoration or rehabilitation of areas identified as Koala Habitat including Habitat Buffers and Habitat Linking Areas over Mainly Cleared Land. In instances where Council approves the removal of koala habitat (in accordance with dot points 1-4 of the above waive clause), and where circumstances permit, this is to include measures which result in a "net gain" of koala habitat on the site and/or adjacent land;

As the land to be cleared is a road corridor, and therefore an area of high disturbance, restoration actions outlined in CKPoM are proposed as follows: to plant 92 (a ratio of 2:1 to that which is being cleared) of *Eucalyptus tereticornis* (Forest Red Gum) and / or *Eucalyptus robusta* (Swamp Mahogany) to improve koala habitat connectivity within the region. Consultation with the Hunter Region Landcare Network – Lower Hunter is currently being undertaken in order to identify location/s that would be suitable for this number of trees. An email of support from Hunter Regional Landcare is provided in Appendix 11.

e) Make provision for long term management and protection of koala habitat including both existing and restored habitat;

A Vegetation Management Plan (VMP) is to be developed that provides details of ongoing management actions for Koala tree replacement plantings for a minimum of 5 years. The requirement for the VMP is to be part of any consent conditions for the proposed development.

f) Not compromise the potential for safe movement of koalas across the site. This should include maximising tree retention generally and minimising the likelihood that the proposal would result in the creation of barriers to koala movement, such as would be imposed by certain types of fencing. The preferred option for minimising restrictions to safe koala movement is that there be no fencing (of a sort that would preclude koalas) associated with dog free developments within or adjacent to Preferred or Supplementary Koala Habitat, Habitat Buffers or Habitat Linking Areas. Suitable fencing for such areas could include:

i) fences where the bottom of the fence is a minimum of 200 mm above ground level that would allow koalas to move underneath;

ii) fences that facilitate easy climbing by koalas; for example, sturdy chain mesh fences, or solid style fences with timber posts on both sides at regular intervals of approximately 20 m;

or iii) open post and rail or post and wire (definitely not barbed wire on the bottom strand).

The proposed development will impact on Koala crossings at the Balickera Canal. These crossings should be replaced. Prior to construction, any Koala crossings in the area surrounding the development should be inspected, and replaced where they are in poor condition. Specifications are provided in Table 11. A fauna spotter catcher or otherwise suitably qualified person should be present on site during construction of the bridge, to allow for relocation of any koalas that enter the site.

Checklist for development applications

The proposed development contains Preferred (Koala) Habitat, Habitat Buffers and Habitat Linking Areas, and so the following information must be submitted with the development application (see Table 15).

Table 15: Checklist of information to accompany development applications.

Information to Accompany Applications (Appendix 4 CKPoM).	Section of report that this has been included
1. An assessment of koala habitat, by a suitably qualified person, in accordance with the attached Guidelines for Koala Habitat Assessment, which appear in Appendix 6.	A list of staff who contributed to this BDAR are included in Appendix 5 with a description of the qualifications and experience for those who conducted specific assessments in relation to Koala Habitat, showing they are suitably qualified to undertake these assessments.
2. Clear details concerning which vegetation is to be cleared or disturbed and that which is to be retained.	Section 3.2.1 details the vegetation to be cleared and calculations of these areas are included in Table 2, shown in Figure 4.
3. Details of any proposed building envelopes and fire fuel reduction zones and the means by which they are to be enforced.	N/A
4. Proposed measures to restore or rehabilitate koala habitat, including measures which will result in the net gain of koala habitat.	This is addressed above in Section 7.2.1 performance criterion d).
5. Proposed measures to allow the safe movement of koalas across the site including road designs and speed mediation measures, fence construction	The Balickera Canal acts as a koala movement corridor beneath the Pacific Highway, and measures proposed to allow for safe movement of koalas are included

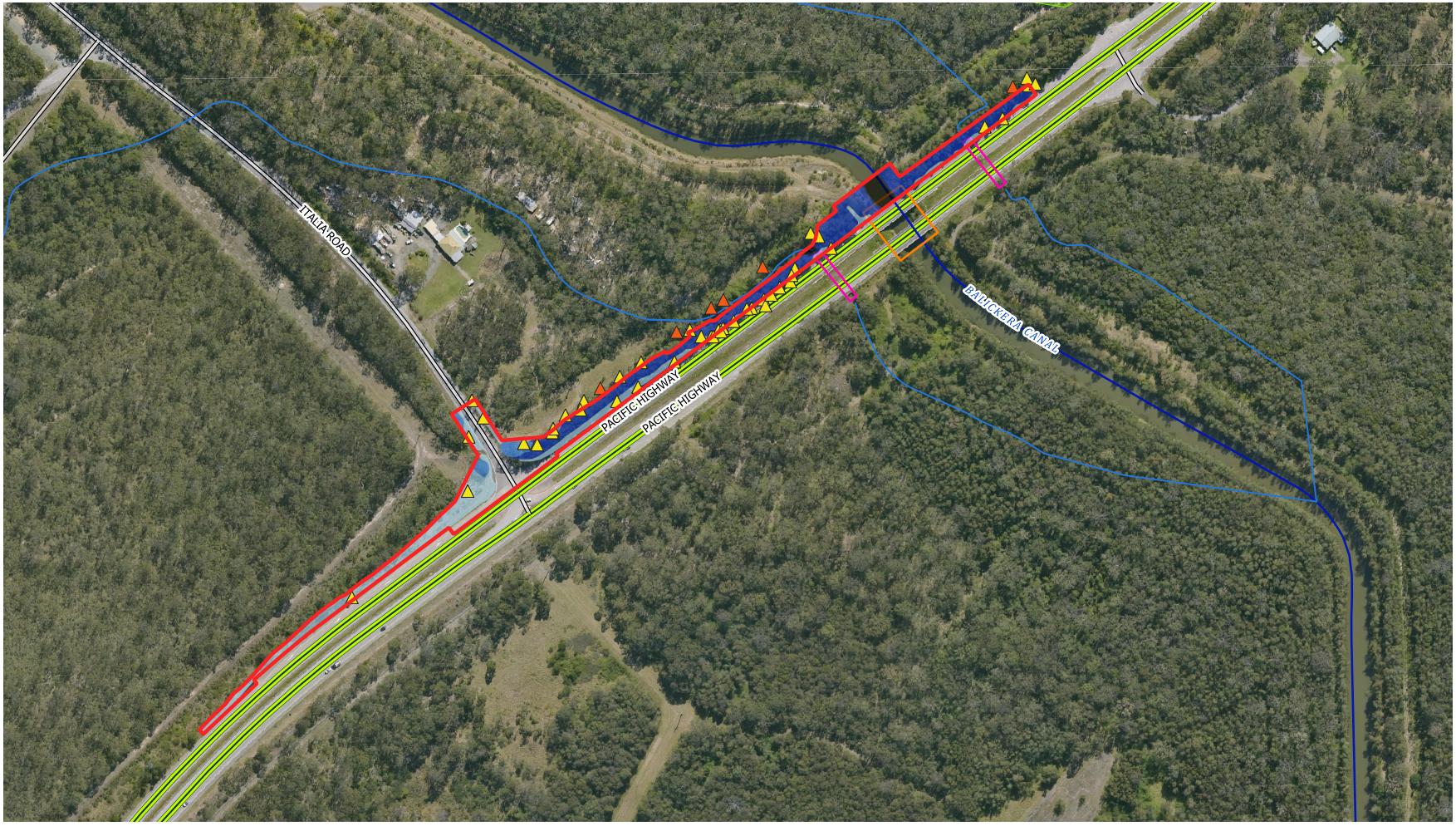
Information to Accompany Applications (Appendix 4 CKPoM).	Section of report that this has been included
details where fencing is proposed, and swimming pool specifications.	above in Section 7.2.1, performance criterion f).
6. Proposed measures to mitigate the impacts on koalas by dogs.	As the Subject Land is a public roadside, domestic dogs are not expected to frequent the site.
7. Details of any proposed program to monitor koalas and koala habitat, during and following development activity on a site. Monitoring programs would not be required for single lot developments. Rather, they would be expected for subdivisions. The following information must be submitted with applications for development on sites that are adjacent to Preferred or Supplementary Habitat, Habitat Buffers or Habitat Linking Areas.	A qualified fauna ecologist is to inspect vegetation on site prior to clearing and remain present on site through the process of clearing vegetation.
8. Proposed measures to mitigate the impacts by dogs on koalas which occupy adjacent habitat. This must include measures (such as education of dog owners, appropriate signs, or restrictions on dog ownership) that reduce the likelihood of domestic dogs straying into koala habitat.	As the Subject Land is a public roadside, domestic dogs are not expected to frequent the site.
9. Proposed measures to mitigate the impact on koalas of motor vehicles travelling to the site. This must include appropriate traffic control measures on roads which run through or adjacent to nearby koala habitat and which are subject to increased traffic volumes due to the development on the site.	Addressed above in Section 7.2.1 performance criteria f).

Guidelines for Koala Habitat Assessments in the Port Stephens LGA

The following table (Table 16) provides a checklist to ensure that all information has been provided as required in Appendix 6 of the PSC CKPoM, to cover the proposed development that is being assessed under Part 4 of the EP&A Act.

Table 16: Guidelines for Koala Assessments being considered under Part 4 of the EP&A Act (Appendix 6 CKPoM).

Guidelines for Koala Assessments being considered under Part 4 of the EP&A Act (Appendix 6 CKPoM).	Relevant section of this report
Preliminary Assessment	Reference to the Koala Habitat Mapping has been included in Section 7.2.1.
Vegetation Mapping	Figure 4
Koala Habitat Identification	Sections 4 & 7.2.1
Assessment of the Proposal	Performance Criteria are assessed above in Section 7.2.1



Subject Land
State Forest
Bridge
Culvert

Major watercourse
Minor watercourse
Primary Road
Local Road

Site Specific Koala Habitat
Preferred Koala Habitat
Marginal Koala Habitat
Mainly Cleared
Dams/Waterbodies

Eucalyptus tereticornis (within the Development Site)
Eucalyptus tereticornis (outside Development Site)

Figure 12

Site Specific Koala Habitat Mapping

50 100 150 200 m

N

GDA94 / MGA zone 56
EPSG:28356

Map Produced: 31/07/2024
Produced By: Sarah Harries

WEDGETAIL
PROJECT CONSULTING PTY LTD

Wedgetail Project Consulting\Arbus - Documents\Italia Road Intersection\@GIS\ItaliaRoad_F12_SiteSpecificKoalaHabitatMap.qgz

8. SUMMARY

Wedgetail Project Consulting Pty Ltd (Wedgetail) was engaged by Boral Resources (NSW) Pty Ltd to prepare a Biodiversity Development Assessment Report (BDAR) to support the proposed upgrade to the intersection of Italia Road and the Pacific Highway, Balickera, New South Wales (NSW), 2324 and adjacent road reserves. The proposed development will result in impacts to native vegetation including:

- PCT 4042 – Hunter Coast Foothills Spotted Gum – Ironbark Grassy Forest: 0.41 ha
- PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest: 0.14 ha
- Exotic vegetation: 0.25 ha

Four threatened species were recorded within the Subject Land: Little Bent-winged Bat, Large Bent-winged Bat, Southern Myotis and Eastern Cave Bat. Species credits are required for the recorded Southern Myotis and Eastern Cave Bat. A further three species credit species (Koala, Squirrel Glider and Brush-tailed Phascogale) were assumed present based on the occurrence of species records and suitable foraging habitat.

The proposal is not likely to cause a significant impact on Matters of National Environmental Significane in accordance with the Commonwealth's Significant Impact Guidelines. As such, a referral to the Commonwealth Minister for the Environment is not considered necessary.

The following offsets are required as a result of impacts to vegetation and threatened species habitat in accordance with the BAM:

- 2 ecosystem credits for PCT 3433 / Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions.
- 9 ecosystem credits for PCT 4042
- 9 species credits for Southern Myotis
- 11 species credits for Squirrel Glider
- 11 species credits for Brush-tailed Phascogale
- 11 species credits for Koala
- 15 species credits for Eastern Cave Bat

Impacts not requiring offsets include impacts to 0.25 ha of exotic vegetation. Potential direct and indirect impacts associated with the proposed development would be further mitigated through implementation of measures outlined in Section 5.3 including provisions of the Port Stephens CKPoM.

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APPENDIX 1. THREATENED SPECIES DATABASE SEARCH

A list of threatened species, populations and ecological communities that have been reported or modelled to occur from within a five-kilometre radius of the Study Area was obtained from the following databases:

NSW DPIE BioNet Atlas: (http://www.bionet.nsw.gov.au/); and

Commonwealth DAWE Protected Matters search tool: (https://www.environment.govSPRAT.au/epbc/protected-matters-search-tool).

Further resources used to inform the threatened species database search included:

The BAM – Calculator (BAM Calculator (nsw.gov.au));

NSW DPIE BioNet Threatened Biodiversity Profiles: (NSW BioNet Quick Guides and Manuals | NSW Environment, Energy and Science/); and

DAWE (2021b). *Species Profile and Threats Database (SPRAT)*. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

An assessment was then made of the likelihood of the threatened species, populations, and ecological communities reported or modelled to occur in the locality occurring within the Subject Land or using the habitat within the Subject Land as an essential part of a foraging range.

The table below summarises the likelihood of threatened species and EPBC Act listed migratory species occurring within the Subject Land based on the habitat requirements of each species.

A brief definition of the likelihood of occurrence criteria is provided below:

Known – species identified within the site during surveys.

High – species known from the area (DPIE BioNet Atlas records), suitable habitat (such as roosting and foraging habitat) present within the site.

Moderate – species may be known from the area; potential habitat is present within the site.

Low – species not known from the area and/or marginal habitat is present within the site; and

Nil – habitat requirements not met for this species within the site.

Table A1 'Likelihood of Occurrence' table

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
Threatened Ecological Communities								
1.	**Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BCA Act)** **Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and Southeast Queensland ecological community (EPBC Act)**	E	E		PMST	The ecological community occurs in sub-tropical, sub-humid and temperate climatic zones from Curtis Island, north of Gladstone, in Queensland to Bermagui in southern New South Wales. The ecological community occurs in coastal catchments, mostly at elevations of less than 20 m above sea-level (ASL) that are typically found within 30 km of the coast. On the mid and north coast of NSW the ecological community may also occur up to 50 m ASL on floodplains of, or coastland flats associated with, former or current coastal river systems (Department of Environment and Climate Change, 2007). Coastal Swamp Oak Forest typically occurs on unconsolidated sediments, including alluvium deposits, and where soils formed during the Quaternary period because of sea-level rise during the Holocene period (Sloss et al., 2007). These are typically hydrosols, which are saturated with water for long periods of time (typically grey-black clay-loam and/or sandy loam soils). The ecological community can also occur on	Nil	Community absent from the Subject Land.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						organosols (peaty soils). Occurrences of swamp oak trees on rocky headlands or other consolidated substrates are not considered to be a part of the ecological community, but areas where soils transition into unconsolidated sediments may contain the ecological community. The ecological community is typically found where groundwater is saline or brackish but can occur in areas where groundwater is relatively fresh. It is typically found on coastal flats, floodplains, drainage lines, lake margins, wetlands, and estuarine fringes where soils are at least occasionally saturated, water-logged, or inundated.		
2.	**Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act)** **Coastal Swamp Sclerophyll Forest of New South Wales and Southeast Queensland (EPBC Act)**	E	E		PMST	The Coastal Swamp Sclerophyll Forest ecological community occurs on the mainland and islands near to the coast (within 20 km) within the following IBRA2 Bioregions: Southeast Queensland (SEQ); NSW North Coast (NNC); Sydney Basin (SYB); and the Bateman subregion of the Southeast Corner (SEC2). The ecological community typically occurs in low-lying coastal alluvial areas with minimal relief, such as swamps, floodplain pockets, depressions, alluvial	Nil	Community absent from the Subject Land.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						flats, back-barrier flats, fans, terraces, and behind fore-dunes (DPI 2016; Queensland Government 2019a). The ecological community most commonly occurs at elevations below 20m above sea-level (ASL) but may occur occasionally up to 220m ASL on hill slopes, for example in association with perched swamps and lakes, or a naturally high-water table.		
3.	**Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion (BC Act)** **Lowland Rainforest of Subtropical Australia (EBPC Act)**	E	CE		PMST	The Lowland Rainforest of Subtropical Australia ecological community primarily occurs from Maryborough in Queensland to the Clarence River (near Grafton) in New South Wales (NSW). The ecological community also includes isolated areas between the Clarence River and Hunter River such as the Bellinger and Hastings Valleys. The ecological community occurs on basalt and alluvial soils, including sand and old/elevated alluvial soils as well as floodplain alluvia. It also occurs occasionally on historically enriched rhyolitic soils and basaltically enriched metasediments.	Nil	Community absent from the Subject Land.
4.	**Subtropical Coastal Floodplain Forest of the New**	E	E		PMST	This community occurs in the New South Wales North Coast and Southeastern Queensland bioregions and on Curtis Island in the Brigalow Belt North	Moderate	Community absent from the Subject Land: see Section 3.2.1.1.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
	South Wales North Coast Bioregion (BC Act) **Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and Southeast Queensland bioregions (EPBC Act)**					Bioregion. This encompasses an area from just north of Newcastle, NSW (around Raymond Terrace) in the south, to just north of Gladstone in Queensland in the north. is found on alluvial landforms, including floodplains, the riparian zones of rivers and tributaries, alluvial flats, floodplain/alluvial terraces, and periodically flooded depressions. Generally, occurs at below 50 m above sea-level (ASL), although it can occur up to 250 m.		
5.	**River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BCAct)** **River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (EPBC Act)**	E	E		PMST	Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Palerang, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. Associated with silts, clay-loams, and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Generally, occurs below 50	Nil	Community absent from the Subject Land.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						m elevation, but may occur on localised river flats up to 250 m above sea level.		
6.	**Central Hunter Valley eucalypt forest and woodland (EPBC Act)**	-	CE	-	PMST	The Central Hunter Valley eucalypt forest and woodland ecological community is dominated by one or more of the following four eucalypt species: *Eucalyptus crebra* (narrow-leaved ironbark), *Corymbia maculata* (syn. E. maculata) (spotted gum), *E. dawsonii* (slaty gum) and *E. moluccana* (grey box). This TEC generally occurs on soils derived from the Permian sedimentary bedrock found on the valley floors and on lower hillslopes and low ridges. The Permian derived soils are dominated by soloths, solodics, yellow podzolics, with limited areas of brown clays and red clays. These soils are typically medium in fertility, relative to nearby Quaternary deep alluvial soils (richer in fertility) and the skeletal soils of the bordering Triassic landscape (poorer in fertility). The Permian sediments are much older than the Triassic sediments; they are finer grained, typically supporting soils with a high clay content (argillaceous), as	Low – *E. fibrosa*, present in the surrounding vegetation and part of PCT 3433, is listed as a contra-indicative species. Further, geology on site is of Carboniferous origin, not Permian.	Community absent from the Subject Land. PCT 3433 is commensurate with BC Act listed TEC Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions (see below).

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						opposed to the sandier soils associated with Triassic sediments (Peake, 2015).		
7.	**Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions (BC Act)**	E	-	Recorded	Site inspection	This community is dominated by Spotted Gum *Corymbia maculata* and Broad-leaved Ironbark *Eucalyptus fibrosa*, while Grey Gum *E. punctata* and Grey Ironbark *E. crebra* occur occasionally. Occurs principally on Permian geology in the central to lower Hunter Valley.	Recorded within Subject Land	Suitable habitat, nearby occurrences. **Recorded during site assessment** (see Section 3.2.1.1)
Flora								
1.	*Angophora inopina* **Charmhaven Apple**	V	V	2	BioNet PMST	This species is endemic to the central coast region of NSW and is known to occur in four main vegetation communities: Eucalyptus haemastoma / Corymbia gummifera / Angophora inopina woodland / forest; Hakea teretifolia / Banksia oblongifolia wet heath; Eucalyptus resinifera / Melaleuca sieberi / Angophora inopina sedge / woodland; and Eucalyptus capitellata / Corymbia gummifera / Angophora inopina woodland / forestelegans. Flowering generally poor and sporadic.	Nil	No suitable habitat within the Subject Land. Only 2 records within locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
2.	*Arthraxon hispidus* **Hairy Jointgrass**	V	V	-	PMST	The species has been recorded from scattered locations throughout Queensland and on the northern tablelands and north coast of NSW. Hairy-joint Grass is found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps as well as woodland.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
3.	*Asperula asthenes* **Trailing Woodruff**	V	V	1	BioNet PMST	This small herb occurs only in NSW. It is found in scattered locations from Bulahdelah north to near Kempsey, with several records from the Port Stephens/Wallis Lakes area. Occurs in damp sites, often along riverbanks.	Nil	No suitable habitat within the Subject Land. Only 1 record within locality. **Not recorded during site assessment.**
4.	*Caladenia tessellata* **Thick Lip Spider Orchid**	E	V	-	PMST	Occurs from Central Coast NSW to southern VIC. Mostly coastal but extends inland to Braidwood in southern NSW. In NSW grows in grassy dry sclerophyll woodland on clay loam or sandy soils, and less commonly in heathland on sandy loam soils.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
5.	*Commersonia prostrata* **Dwarf Kerrawang**	E	E	-	PMST	Dwarf Kerrawang occurs on the Southern Highlands and Southern Tablelands (one plant at Penrose State Forest, one plant at Tallong, a small population near the Corang and about 2000 plants at Rowes Lagoon), a larger population in the	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						Thirlmere Lakes area (particularly among the dying reeds at the edge of the water), and on the North Coast (less than 100 plants at the Tomago sandbeds north of Newcastle).		
6.	*Corybas dowlingii* **Red Helmet Orchid**	E	-	383	BioNet	Tuberous orchid species which grows in clonal colonies. The orchid has a solitary dark green heart-shaped to circular leaf 15-35 mm long and 15-35 mm wide ending in a sharp point. The solitary, erect flower grows close to the ground and is dark purplish red with whitish areas in the labellum. Occurs in sheltered areas such as gullies and southerly slopes in tall open forest on well-drained gravelly soil at elevations of 10-200 m.	Low	Broadly suitable habitat within the Subject Land. Nearest record within 2.5 km of the Subject Land. **Not recorded during targeted threatened species surveys.**
7.	*Cryptostylis hunteriana* **Leafless Tongue Orchid**	V	V	-	PMST	The species occurs in coastal areas from East Gippsland to southern Queensland. Habitat preferences for this species are not well defined, however it is known to grow in coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest. Prefers open areas in the understorey and is often found in association with Cryptostylis subulata and Cryptostylis erecta.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
8.	*Cynanchum elegans* **White-flowered Wax Plant**	E	E	-	PMST	The species occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby LGAs, may also occur in the western part of Gosford LGA. Habitat for the species includes Hawkesbury sandstone, commonly amongst rocky outcrops and boulders in sheltered forests on mid- to lower slopes and valleys.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
9.	*Dichanthium setosum* **Bluegrass**	V	V	-	PMST	Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
10.	*Diuris praecox* **Rough Doubletail**	V, 2	V	-	PMST	Occurs between Ourimbah and Nelson Bay on the New South Wales (NSW) north coast. This species has also been identified on the Wallarah Peninsula, near Lake Macquarie in NSW. Grows on hills and slopes of near-coastal districts, in open heathy forests which have a grassy to fairly dense understorey.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
11.	*Eucalyptus camfieldii* **Camfield's Stringybark**	V	V	-	PMST	Occurs from Raymond Terrace to Waterfall, with populations known from Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West	Nil	No suitable habitat within the Subject Land. No records within the locality.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						Head), Terrey Hills, Killara, North Head, Menai and the Royal NP. Occurs in exposed situations on sandstone plateaus, ridges and slopes near the coast, often on the boundary of tall coastal heaths or low open woodland. It grows in shallow sandy soils overlying Hawkesbury sandstone.		**Not recorded during site assessment.**
12.	*Eucalyptus glaucina* **Slaty Red Gum**	V	V	-	PMST	Found in separate districts along the eastern seaboard of NSW, from near Casino, to Taree, south to Broke, and recently discovered on the eastern side of the Blue Mountains National Park near Warragamba Dam. Grows in grassy woodland and dry eucalypt forest and also on deep, moderately fertile and well-watered soils.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
13.	*Eucalyptus parramattensis subsp. decadens*	V	V	-	PMST	The Tomago Sandbeds meta-population is bounded by Salt Ash and Tanilba Bay in the north and Williamtown and Tomago in the south. Generally, occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						Often where this species occurs, it is a community dominant.		
14.	*Euphrasia arguta*	E4A	CE	-	PMST	Known from Nundle State Forest and adjacent private land, in New South Wales. The species is known from three locations in two areas approximately 14 km apart. Occur in eucalypt forest with a mixed grass and shrub understorey within Nundle State Forest.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
15.	*Grevillea parviflora subsp. parviflora* **Small-flower Grevillea**	V	V	6	BioNet PMST	The species distribution is between Moss Vale/Bargo and the lower Hunter Valley, with most occurrences in Appin, Wedderburn, Picton and Bargo. The habitat for the species is broad including heath, shrubby woodland and open forest on light clay or sandy soils, and often in disturbed areas such as on the fringes of tracks.	Low	No suitable habitat within the Subject Land. Records within the locality including, within proximity to the Subject Land, albeit occur in more suitable habitat. **Not recorded during targeted threatened species surveys.**
16.	*Melaleuca biconvexa* **Biconvex Paperbark**	V	V	-	PMST	Scattered, disjunct populations in coastal areas from Jervis Bay to Port Macquarie, with most populations in the Gosford-Wyong areas. Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
17.	*Persicaria elatior* **Tall Knotweed**	V	V	-	PMST	Grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. Recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests).	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
18.	*Prasophyllum* sp. Wybong	-	CE	-	PMST	The species occurs within the Sydney Basin, New England Tablelands, Brigalow Belt South and NSW Southwestern Slopes IBRA Bioregions and the Border Rivers–Gwydir, Namoi, Hunter–Central Rivers and Central West Natural Resource Management Regions. The distribution of this species overlaps with the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EPBC Act-listed threatened ecological community.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
19.	*Pterostylis chaetophora*	V, 2	-	539	BioNet	In NSW it is currently known from 18 scattered locations in a relatively small area between Taree and Kurri Kurri, extending to the south-east towards Tea Gardens and west into the Upper Hunter, with additional records near Denman and Wingen. The most observed habitat is vegetation characterised by grassy open forests or derived native grasslands of Eucalyptus amplifolia and Eucalyptus moluccana on gentle flats, or that are dominated by Corymbia maculata with any of Eucalyptus fibrosa, Eucalyptus sideroploia or Eucalyptus crebra.	Low	Broadly suitable habitat within the Subject Land. Nearest record within 2.5km of the Subject Land. **Not recorded during targeted threatened species surveys.**
20.	Rhizanthella slateri Rhizanthella slateri (Rupp) M.A. Clem. & Cribb in the Great Lakes local government area	E2, V, 2	E	-	PMST	The species grows in eucalypt forest but no informative assessment of the likely preferred habitat for the species is available. Currently known only from 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
21.	*Rhodamnia rubescens* **Scrub Turpentine**	E4A	CE	2	BioNet PMST	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of R. rubescens typically occur in coastal regions and	Nil	No suitable habitat within the Subject Land. Only 2 records within locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.		
22.	*Rhodomyrtus psidioides* **Native Guava**	E4A	CE	1	BioNet PMST	Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines.	Nil	No suitable habitat within the Subject Land. Only 1 record within locality. **Not recorded during site assessment.**
23.	*Syzygium paniculatum* **Magenta Lilly Pilly**	E1	V	-	PMST	The species occurs in a narrow coastal strip from Bulahdelah to Conjola State Forest. Rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas, often in remnant littoral or gallery rainforests Plants produce white flower-clusters at the end of each branch is the preferred	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						habitat for this species. The petals are small accompanied by prominent long stamens.		
24.	*Tetratheca juncea* **Black-eyed Susan**	V	V	-	PMST	Regarded as extinct within the Sydney area, current range from Wyong north to Bulahdelah and inland 50km to edge of Sugarloaf Range. Occurs predominately in areas of over 1000 mm annual rainfall, within dry sclerophyll forest, and sometimes heath and moist forest, with a preference for Coastal Plains Smooth-barked Apple Woodland and Coastal Plains Scribbly Gum Woodland.	Nil	No suitable habitat within the Subject Land. **Not recorded during site assessment.**
25.	*Thesium australe* **Austral Toadflax**	V	V	-	PMST	The species occurs in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Habitat for this species includes grassland on coastal headlands or grassland and grassy woodland away from the coast.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
Birds								
1.	*Actitis hypoleucos* **Common Sandpiper**	-	C,J,K	-	PMST	In Australia, the Common Sandpiper is found in coastal or inland wetlands, both saline and fresh. It is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes	Nil	No suitable habitat within the Subject Land. No records within the locality.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						and shallow rivers. The Common Sandpiper breeds in Europe and Asia. In Australasia it visits New Guinea and Australia, mainly in the north and west. It is less often seen in New Zealand.		**Not recorded during site assessment.**
2.	*Apus pacificus* **Fork-tailed Swift**	-	C,J,K	-	PMST	The Fork-tailed Swift is a non-breeding visitor to all states and territories of Australia. They mostly occur over inland plains but sometimes above foothills or in coastal areas.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
3.	*Artamus cyanopterus cyanopterus* **Dusky Woodswallow**	V	-	1	BioNet	The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and groundcover of grasses or sedges and fallen woody debris.	Nil	No suitable habitat within the Subject Land. Only 1 record within locality. **Not recorded during site assessment.**
4.	*Botaurus poiciloptilus* **Australasian Bittern**	E	E	1	BioNet PMST	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of	Nil	No suitable habitat within the Subject Land. Only 1 record within locality.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.).		**Not recorded during site assessment.**
5.	*Burhinus grallarius* **Bush Stone-Curlew**	E	-	1	BioNet	Scattered distribution across NSW. Inhabits lowland grassy woodland and open forest and, in coastal areas, Casuarina and Melaleuca woodlands, saltmarsh and mangroves. Requires a low, sparse groundcover, some fallen timber and leaf litter, and a general lack of a shrubby understory.	Nil	No suitable habitat within the Subject Land. Only 1 record within locality. **Not recorded during site assessment.**
6.	*Calidris canutus* **Red Knot**	-	E, M	-	PMST	Medium sized wader that migrated south from breeding grounds in Siberia the species is widespread around the Australian coast. The species is known to gather in large flocks on sandy estuaries.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
7.	*Calidris ferruginea* **Curlew Sandpiper**	E	CE, C, M	-	PMST	The species occurs along the entire coast of NSW, particularly in the Hunter Estuary, and freshwater wetlands in the Murray-Darling Basin. Breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving between August and November, and departing between March	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales can be found mainly in intertidal mudflats of sheltered coasts.		
8.	*Callocephalon fimbriatum* **Gang-gang Cockatoo**	V	E	-	PMST	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (Eucalyptus pauciflora) woodland and occasionally in temperate rainforests.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
9.	*Calyptorhynchus lathami lathami* **South-eastern Glossy Black-Cockatoo**	V	V	20	BioNet PMST	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (Allocasuarina	**Moderate**	Broadly suitable foraging habitat within the Subject Land. However, no potential breeding habitat recorded within the Subject Land. Species recorded within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						littoralis) and Forest Sheoak (A. torulosa) are important foods.		
10.	*Charadrius leschenaultii* **Greater Sand-plover**	V	V, C, M	-	PMST	The Greater Sand-plover breeds in central Asia from Armenia to Mongolia, moving further south for winter. In NSW, the species has been recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries. Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
11.	*Chthonicola sagittata* **Speckled Warbler**	V	-	1	BioNet	Within NSW most frequently reported from the hills and tablelands of the Great Dividing Range, rarely from the coast. The species inhabits a wide range of Eucalypt-dominated communities with a grassy understorey, a sparse shrub layer, often on rocky ridges or in gullies. Sedentary and requires large, relatively undisturbed remnants to persist in an area. Forages on the ground for seeds and insects, and nests in a slight hollow	Nil	No suitable habitat within the Subject Land. Only 1 record within the locality. Not recorded during site assessment.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						in the ground or at the base of low dense plants.		
12.	*Climacteris picumnus victoriae* **Brown Treecreeper (eastern subspecies)**	V	-	4	BioNet PMST	Small grey-brown bird with black streaking on the lower breast/belly and black bars on the undertail. Inhabits Box-Gum woodlands and dry open forest of inland slopes and plains. Preferred woodlands dominant by stringybarks or other rough-barked eucalypts. Forages in trees and on the ground. Endemic to eastern Australia, occurring from the coast to inland plains and western slopes of the Great Dividing Range. Nests in tree or stump hollows greater than 6cm.	Nil	No suitable habitat within the Subject Land. Only 4 records within the locality. **Not recorded during site assessment.**
13.	*Cuculus optatus* **Oriental Cuckoo**	-	C, M	-	PMST	It mainly inhabits forests, occurring in coniferous, deciduous, and mixed forest. The exact extent of its wintering range is uncertain due to its secretive habits and the difficulty of separating it from the Himalayan cuckoo and other similar species. It is believed to include the Malay Peninsula, Indonesia, the Philippines, New Guinea, western Micronesia, the Solomon Islands, and northern and eastern Australia with occasional birds reaching New Zealand.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						It has occurred as a vagrant in Ukraine, Israel and Alaska.		
14.	*Daphoenositta chrysoptera* **Varied Sittella**	V	-	5	BioNet	Sedentary, occurs across NSW from the coast to the far west. Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee, and Acacia woodland. Sensitive to habitat isolation and loss of structural complexity, and adversely affected by dominance of Noisy Miners. Cleared agricultural land is potentially a barrier to movement. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	**Low**	Broadly suitable habitat within the Subject Land. Only 5 records within the locality. **Not recorded during site assessment.**
15.	*Ephippiorhynchus asiaticus* **Black-necked Stork**	E	-	4	BioNet	Primarily inhabits permanent freshwater wetlands and surrounding vegetation including swamps, floodplains, watercourses and billabongs, freshwater meadows, wet heathland, farm dams and shallow floodwaters. Will also forage in inter-tidal shorelines, mangrove margins and estuaries. Feed in shallow, still water. This species breeds during	Nil	Marginally suitable habitat within close proximity to the Subject Land, albeit not within the Subject Land. 4 records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						summer, nesting in or near a freshwater swamp.		
16.	*Erythrotriorchis radiatus* **Red Goshawk**	E	V	-	PMST	Inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus Forest of coastal rivers.	Low	Broadly suitable foraging habitat present within the Subject Land. No suitable nests recorded within the Subject Land. **Not recorded during site assessment.**
17.	*Falco hypoleucos* **Grey Falcon**	V	V	-	PMST	Medium-sized, compact, pale falcon with a heavy, thick-set, deep-chested appearance. The species is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
18.	*Glossopsitta pusilla* **Little Lorikeet**	V	-	8	BioNet	The species occurs from the coast to western slopes of the Great Dividing Range and inhabits dry, open eucalypt	Nil	No suitable habitat within the Subject Land. 8

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						forests and woodlands. Occurrence is positively associated with patch size, and with components of habitat complexity including canopy cover, shrub cover, ground cover, logs, fallen branches and litter. Feed primarily on profusely flowering eucalypts and a variety of other species including melaleucas and mistletoes. On the western slopes and tablelands *Eucalyptus albens* and *E. melliodora* are particularly important food sources for pollen and nectar respectively. Mostly nests in small (opening approx. 3cm) hollows in living, smooth-barked eucalypts, especially *Eucalyptus viminalis, E. blakelyi* and *E. dealbata*. Most breeding records are from the western slopes.		records within the locality. **Not recorded during site assessment.**
19.	*Grantiella picta* **Painted Honeyeater**	V	V	-	PMST	The species is nomadic, occurring in low densities across most of NSW. Highest concentrations and almost all breeding occur on inland slopes of the Great Dividing Range. Habitat for the species includes Boree, Brigalow and Box Gum woodlands and Box-Ironbark forests.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
20.	*Haliaeetus leucogaster* **White-bellied Sea-Eagle**	V	-	17	BioNet	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the seashore) and around terrestrial	Low	Broadly suitable foraging habitat present within the Subject Land.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						wetlands in tropical and temperate regions of mainland Australia and its offshore islands. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals, and carrion. Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.		No suitable nests recorded within the Subject Land. **Not recorded during site assessment.**
21.	*Hirundapus caudacutus* **White-throated Needletail**	-	V, M	-	PMST	Widespread in eastern and south-eastern Australia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground.	Nil	Broadly suitable aerial foraging habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
22.	*Lathamus discolor* **Swift Parrot**	E	CE	6	BioNet PMST	A migratory species that travels to the mainland from March to October, the species breeds in Tasmania from September to January. The principal over-winter habitat is box-ironbark communities on the inland slopes and	Nil	No suitable habitat within the Subject Land. 6 records within the locality.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						plains. Eucalyptus robusta, Corymbia maculata and C. gummifera dominated coastal forests are also important habitat.		**Not recorded during site assessment.**
23.	*Limosa lapponica baueri* **Bar-tailed Godwit (baueri)**	-	V	-	PMST	The Bar-tailed Godwit is a migratory wader which undertakes the largest non-stop flight of any bird. The subspecies is most frequently recorded along major coastal river estuaries and sheltered embayments, particularly the Tweed, Richmond, Clarence, Macleay, Hastings, Hunter and Shoalhaven River estuaries, Port Stephens and Botany Bay.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
24.	*Lophoictinia isura* **Square-tailed Kite**	V	-	1	BioNet	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Breeding is from July to February.	Low	Broadly suitable foraging habitat present within the Subject Land. No suitable nests recorded within the Subject Land. Only 1 record within the locality. **Not recorded during site assessment.**
25.	*Melanodryas cucullata cucullata* **Hooded Robin (south-eastern form)**	V	-	-	PMST	Widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. The south-eastern form	Nil	No suitable habitat within the Subject Land. No records within the locality.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						(subspecies *cucullata*) is found from Brisbane to Adelaide and throughout much of inland NSW. Prefers a lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs, and a ground layer of moderately tall native grasses.		**Not recorded during site assessment.**
26.	*Monarcha melanopsis* **Black-faced Monarch**	-	-	-	PMST	The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub, and damp gullies. It may be found in more open woodland when migrating. Found along the coast of eastern Australia, becoming less common further south.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
27.	*Myiagra cyanoleuca* **Satin Flycatcher**	-	-	-	PMST	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
28.	*Neophema chrysostoma* **Blue-winged Parrot**	-	-	-	PMST	Breeds on mainland Australia south of the Great Dividing Range in southern Victoria from Port Albert in Gippsland west to Nelson, and sometimes in the far	Nil	No suitable habitat within the Subject Land. No records within the locality.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						south-east of South Australia, and the north-western, central, and eastern parts of Tasmania (Emison et al. 1987; Higgins 1999). A partial migrant, variable numbers of birds migrate across Bass Strait in winter. During the non-breeding period, from autumn to early spring, birds are recorded from northern Victoria, eastern South Australia, south-western Queensland and western New South Wales with some birds reaching south-eastern New South Wales and eastern Victoria, particularly on the southern migration (Higgins 1999).		**Not recorded during site assessment.**
29.	*Neophema pulchella* **Turquoise Parrot**	V, 3	-	1	BioNet	Inhabits fringes of eucalypt woodlands, often adjacent to clearings, ridges, and farmland creeks. Typically forages on the ground under trees. Distributed from southern Queensland to northern Victoria, extending from the coast to the western slopes of the Great Dividing Range. Nesting occurs from December to August in tree hollows.	Nil	No suitable habitat within the Subject Land. Only 1 record within the locality. **Not recorded during site assessment.**
30.	*Ninox connivens* **Barking Owl**	V, 3		1	BioNet	Occurs from coast to inland slopes and plains, though is rare in dense, wet forests east of the Great Dividing Range and sparse in higher parts of the tablelands and in the arid zone. Inhabits	Low	Broadly suitable foraging habitat within the Subject Land. No suitable breeding habitat within

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						eucalypt woodlands, open forest, swamp woodlands, and, especially in inland areas, timber along watercourses. Roosts along creek lines in dense, tall understorey foliage (e.g., in Acacia and Casuarina), or dense eucalypt canopy. Nests in hollows of large, old eucalypts including Eucalyptus camaldulensis, *Eucalyptus albens*, *Eucalyptus polyanthemos* and *Eucalyptus blakelyi*. Birds and mammals' important prey during breeding. Territories range from 30 to 200 hectares.		the Subject Land. Only 1 record within the locality. **Not recorded during site assessment.**
31.	*Ninox strenua* **Powerful Owl**	V	-	7	BioNet	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or	Low	Broadly suitable foraging habitat within the Subject Land. No suitable breeding habitat within the Subject Land. Only 7 records within the locality. **Not recorded during site assessment**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						woodlands and occasionally hunts in open habitats.		
32.	*Numenius madagascariensis* **Eastern Curlew**	-	CE, C, J, K	-	PMST	The eastern curlew is Australia's largest shorebird and a long-haul flyer. It is easily recognisable, with its long, down-curved bill. The species takes an annual migratory flight to Russia and northeastern China to breed, arriving back home to Australia in August.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
33.	*Pandion cristatus* **Eastern Osprey**	V, 3	-	-	PMST	Favour coastal areas, especially the mouths of large rivers, lagoons, and lakes. Feeds on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometer of the sea.	Low	Broadly suitable foraging habitat within the Subject Land. No suitable breeding habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
34.	*Petroica boodang* **Scarlet Robin**	V		2	BioNet	Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with a few scattered shrubs. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Habitat usually contains abundant logs and fallen timber: these are important components of its	Nil	No suitable habitat within the Subject Land. Only 2 records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						habitat. Mainly breed between the months of July and January.		
35.	*Pomatostomus temporalis temporalis* **Grey-crowned Babbler (eastern subspecies)**	V	-	9	BioNet	Fairly large brown babbler with distinctive white/grey crown and brow. Live in family groups of up to 15 birds. Inhabits Box-Gum woodlands on slopes, and Box-Cypress pine and Open-Box woodlands when on Alluvial plains. Distribution along most of the eastern side of Australia, particularly the western slopes of the Great Dividing Range. Breeding occurs between July and February. Several conspicuous dome-shaped nests are built and maintained in shrubs, sapling eucalypts or lower branches of larger eucalypts. Territories are usually around 10ha but can be up to 50ha.	Nil	No suitable habitat within the Subject Land. Records within the locality. **Not recorded during site assessment.**
36.	*Ptilinopus magnificus* **Wompoo Fruit-Dove**	V	-	1	BioNet	Occurs from Hunter River to Cape York, but rare south of Coffs Harbour. No recent records from Illawarra where it once occurred. Inhabits rainforest, low elevation moist eucalypt forest and brush box forests, mostly in mature forest but also remnant and regenerating rainforest. Feeds on fruit and is locally nomadic following food availability. Builds nest platform on thin branch or palm frond,	Nil	No suitable habitat within the Subject Land. Only 1 record within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						often over water, usually 3-10m above ground.		
37.	*Pycnoptilus floccosus* **Pilotbird**	-	V	-	PMST	Pilotbirds are endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria (Higgins & Peter 2002; Loyn et al. 2021). Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne (Higgins & Peter 2002; Loyn et al. 2021).	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
38.	*Rhipidura rufifrons* **Rufous Fantail**	-	-	-	PMST	The Rufous Fantail is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. Forages mostly in the air. The Rufous Fantail feeds on insects, which it gleans from the middle and lower levels of the canopy.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
39.	*Rostratula australis* **Australian Painted Snipe**	E1	E	-	PMST	Normally found in permanent or ephemeral shallow inland wetlands, either freshwater or brackish. The species nests on the ground amongst tall	Nil	No suitable habitat within the Subject Land. No records within the locality.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						reed-like vegetation near water. Habitat for the species includes the fringes of swamps, dams, and nearby marshy areas with cover of grasses, lignum, low scrub, or open timber.		**Not recorded during site assessment.**
40.	*Stagonopleura guttata* **Diamond Firetail**	V	-	-	PMST	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (Eucalyptus pauciflora) Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Groups separate into small colonies to breed, between August and January.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
41.	*Sternula nereis* **Fairy Tern**	-	-	-	PMST	Within Australia, the Fairy Tern occurs along the coasts of Victoria, Tasmania, South Australia, and Western Australia, occurring as far north as the Dampier Archipelago near Karratha. The subspecies has been known from New South Wales (NSW) in the past, but it is unknown if it persists there (Birdlife International 2010; Garnett & Crowley 2000). The Fairy Tern (Australian) nests on sheltered sandy beaches, spits, and banks above the high tide line and below	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						vegetation. The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline (Higgins & Davies 1996; Lindsey 1986a).		
42.	*Symposiachrus trivirgatus* **Spectacled Monarch**	-	-	-	PMST	The Spectacled Monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. It is much less common in the south. It is also found in Papua New Guinea, the Moluccas and Timor. The Spectacled Monarch prefers thick understorey in rainforests, wet gullies, and waterside vegetation, as well as mangroves.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
43.	*Tyto novaehollandiae* **Masked Owl**	V	-	1	BioNet	Occurs across NSW except NW corner. Most common on the coast. Inhabits dry eucalypt woodlands from sea level to 1100 m. Roosts and breeds in large (>40cm) hollows and sometimes caves in moist eucalypt forested gullies. Hunts along the edges of forests and roadsides. Home ranges between 500 ha and 1000 ha. Prey mostly terrestrial mammals but arboreal species may also be taken.	Low	Broadly suitable foraging habitat within the Subject Land. No suitable breeding habitat within the Subject Land. Only 1 record within the locality. **Not recorded during site assessment**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
Mammals								
1.	*Cercartetus nanus* **Eastern Pygmy-possum**	V	-	1	BioNet	In NSW, has been found in mallee shrubland dominated by either spinifex (Triodia spp.) or with an understorey of tea-tree (Leptospermum spp.) and in Belah (Casuarina pauper) in a mixed woodland with well-developed understorey of saltbush. In other states is also frequently found in woodlands with dense heath understorey (particularly Proteaceae species such as Banksia and Hakea species).	Nil	No suitable habitat within the Subject Land. Only 1 record within the locality. **Not recorded during site assessment.**
2.	*Chalinolobus dwyeri* **Large-eared Pied Bat**	V	V	1	BioNet PMST	The species occurs from the coast to the western slopes of the divide. The largest numbers of records are from sandstone escarpment country in the Sydney Basin and Hunter Valley. The species roosts in caves and mines and most recorded from dry sclerophyll forests and woodlands. In southern Sydney appears to be largely restricted to the interface between sandstone escarpments and fertile valleys.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
3.	*Dasyurus maculatus* **Spotted-tailed Quoll**	V	E	10	BioNet PMST	Found in eastern NSW, eastern Victoria, south-east and north-east Queensland, and Tasmania the species has been recorded across a range of habitat types,	Nil	No suitable habitat within the Subject Land. Records within the locality.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						including rainforest, open forest, woodland, coastal heath, and inland riparian forest, from the sub-alpine zone to the coastline		**Not recorded during site assessment.**
4.	*Falsistrellus tasmaniensis* **Eastern False Pipistrelle**	V	-	5	BioNet	The species occurs on the southeast coast and ranges. Prefers tall (>20m) and wet forest with dense understorey. Absent from small remnants, preferring continuous forest but can move through cleared landscapes and may forage in open areas. Roosts include hollow trunks of Eucalypts, underneath bark or in buildings. Forages in gaps and spaces within forest, with large foraging range (12km foraging movements recorded).	Nil	No suitable habitat within the Subject Land. Records within the locality. **Not recorded during site assessment.**
5.	*Micronomus norfolkensis* **Eastern Coastal Free-tailed Bat**	V	-	12	BioNet	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	Low	No suitable habitat within the Subject Land. Records within the locality. **Not recorded during site assessment.**
6.	*Miniopterus australis* **Little Bent-winged Bat**	V	-	89	BioNet	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal	**Species recorded. No breeding habitat.**	**Species recorded within the Subject Land.** Subject Land supports suitable foraging habitat; however, not suitable

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						forests, and banksia scrub. Generally found in well-timbered areas.		roosting habitat was recorded within the Subject Land. Records within the locality.
7.	*Miniopterus orianae oceanensis* **Large Bent-winged Bat**	V	-	12	BioNet	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings, and other man-made structures.	**Species recorded. No breeding habitat.**	The Subject Land supports suitable foraging habitat; however, not suitable roosting habitat was recorded within the Subject Land. Records within the locality. **Species recorded within the Subject Land.**
8.	*Myotis macropus* **Southern Myotis**	V	-	10	BioNet	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	Present	**Species recorded within the Subject Land.** The Subject Land supports suitable foraging habitat. The southern bridge (outside of the Subject Land) provides roosting habitat where drain holes.

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
								However, the northbound bridge within the Subject Land contained no cracks, drain holes or other areas that could provide suitable roosting habitat or breeding for bats.
9.	*Notamacropus parma* **Parma Wallaby**	V	V	-	PMST	The species once occurred in north-eastern NSW from the Queensland border to the Bega area in the southeast. Their range is now confined to the coast and ranges of central and northern NSW from the Gosford district to south of the Bruxner Highway between Tenterfield and Casino. Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
10.	*Petauroides volans* **Southern Greater Glider**	E	E	-	PMST	The species occurs in eucalypt forests and woodlands along the east coast of Australia from northeast Queensland to the Central Highlands of Victoria. Feeds exclusively on eucalypt leaves, buds, flowers, and mistletoe. Occupy a relatively small home range with an average size of 1 to 3 ha.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
11.	*Petaurus australis* **Yellow-bellied Glider (population on the Bago Plateau)**	E, V	V	1	BioNet PMST	Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forests generally in areas with high rainfall and nutrient rich soils. Very mobile species known to occupy large home ranges between 20 to 85 ha.	Nil	No suitable habitat within the Subject Land. Only 1 record within the locality. **Not recorded during site assessment.**
12.	*Petaurus norfolcensis* **Squirrel Glider**	V	-	20	BioNet	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum Forest west of the Great Dividing Range and Blackbutt-Bloodwood Forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	**High**	Suitable habitat within the Subject Land. Records within the locality. **Not recorded during site assessment (survey not conducted to demonstrate presence/absence).**
13.	*Phascogale tapoatafa* **Brush-tailed Phascogale**	V	-	17	BioNet	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs, or leaf litter. Also inhabit heath, swamps, rainforest, and wet sclerophyll forest. Mating occurs May – July.	**Moderate**	Suitable habitat within the Subject Land. Records within the locality. **Not recorded during site assessment (survey not conducted to demonstrate presence/absence).**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
14.	*Phascolarctos cinereus* **Koala**	E1	E	388	BioNet PMST	Fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	**Moderate**	Suitable foraging habitat present within the Subject Land including *E. tereticornis* (Forest Red Gum) which is a listed Preferred Koala Food Tree under the Port Stephens CKPoM. Records within the locality. **Species assumed present within the Subject Land.**
15.	*Phoniscus papuensis* **Golden-tipped Bat**	V	-	1	BioNet	Distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to south of Eden in southern NSW. It has recently been trapped just inside the Victorian border. It also occurs in New Guinea. Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, Casuarina-dominated riparian forest, and coastal Melaleuca forests.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
16.	*Potorous tridactylus* **Long-nosed Potoroo**	V	V	-	PMST	Restricted to east of the Great Dividing Range, with annual rainfall >760 mm. Inhabits coastal heath and dry and wet sclerophyll forests. Requires relatively thick ground cover and appears restricted to areas of light and sandy soil. Feeds on fungi, roots, tubers, insects and their larvae, and other soft-bodied animals in the soil.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
17.	*Pseudomys novaehollandiae* **New Holland Mouse**	-	V	6	BioNet PMST	The species occurs in disjunct coastal populations from Tasmania to Queensland. In NSW it inhabits a variety of coastal habitats including heathland, woodland, dry sclerophyll forest with a dense shrub layer and vegetated sand dunes. Species presence is strongly correlated with understorey vegetation density, and high floristic diversity in regenerating heath.	Low	Broadly suitable habitat within the Subject Land. Species detected within the locality of the Subject Land. **Not recorded during site assessment.**
18.	*Pteropus poliocephalus* **Grey-headed Flying-fox**	V	V	13	BioNet PMST	Generally, this species is found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. Inhabit subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths, and swamps as well as urban	**Moderate**	Broadly suitable foraging habitat within the Subject Land. **Species detected within the locality of the Subject Land.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.		**Not recorded during site assessment.**
19.	*Saccolaimus flaviventris* **Yellow-bellied Sheathtail-bat**	V	-	3	BioNet	Migrates from tropics to SE Aus in summer. Forages across a range of habitats including those with and without trees, from wet and dry sclerophyll forest, open woodland, Acacia shrubland, mallee, grasslands, and desert. Seasonal movements are unknown.	Nil	Broadly suitable habitat within the Subject Land. Species detected within the locality of the Subject Land. **Not recorded during site assessment.**
20.	*Scoteanax rueppellii* **Greater Broad-nosed Bat**	V	-	3	BioNet	The species is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however, does not occur at altitudes above 500 m. Inhabits a variety of habitats from woodland to wet and dry sclerophyll forests and rainforest, also remnant paddock trees and timber-lined creeks.	Nil	No suitable habitat within the Subject Land. Records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
21.	*Vespadelus troughtoni* **Eastern Cave Bat**	V	-	3	BioNet	Found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine site workings.	**Species recorded. No breeding habitat.**	**Species recorded within the Subject Land**. The Subject Land supports suitable foraging habitat. The southern bridge (outside of the Subject Land) provides roosting habitat where drain holes. However, the northbound bridge within the Subject Land contained no cracks, drain holes or other areas that could provide suitable roosting habitat or breeding for bats.
Amphibians								
1.	*Litoria aurea* **Green and Golden Bell Frog**	E1	V	-	PMST	Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Inhabits marshes, dams, and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Optimum	Unlikely	Suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						habitat includes waterbodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available.		
2.	*Mixophyes balbus* **Stuttering Frog**	E1, 2	V	-	PMST	The species occurs along the east coast of Australia. Habitat for the species includes rainforest and wet, tall, open forest, sheltering in deep leaf litter and thick understorey vegetation on the forest floor. Within Sydney Basin the species is now confined to populations in the Watagan Mountains, the southern Blue Mountains and Macquarie Pass. The species does not occur in areas where the riparian vegetation has been disturbed or where there have been significant upstream human impacts.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**
3.	*Uperoleia mahonyi* **Mahony's Toadlet**	E	E	-	PMST	Mahony's Toadlet is endemic to the mid-north coast of New South Wales (NSW) and to date has been found between Kangy Angy and Seal Rocks. Current observations indicate Mahony's Toadlet inhabits ephemeral and semi-permanent swamps and swales on the coastal fringe of its range. Known records occur in heath or wallum habitats almost exclusively associated with leached	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						(highly nutrient impoverished) white sand. Commonly associated with acid paperbark swamps, Mahony's Toadlet also is known to occur in wallum heath, swamp mahogany-paperbark swamp forest, heath shrubland and Sydney red gum woodland.		
Migratory Birds								
1.	*Actitis hypoleucos* **Common Sandpiper**	-	C, J, K	-	PMST	In Australia, the Common Sandpiper is found in coastal or inland wetlands, both saline and fresh. It is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes and shallow rivers. The Common Sandpiper breeds in Europe and Asia. In Australasia it visits New Guinea and Australia, mainly in the north and west. It is less often seen in New Zealand.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
2.	*Apus pacificus* **Fork-tailed Swift**	-	C, J, K	2	PMST	The Fork-tailed Swift is a non-breeding visitor to all states and territories of Australia. They mostly occur over inland plains but sometimes above foothills or in coastal areas.	Unlikely	Suitable foraging habitat In airspace above the Subject Land. No records within the locality. **Not recorded during site assessment**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
3.	*Calidris acuminata* **Sharp-tailed Sandpiper**	-	C, J, K	-	PMST	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh, or other low vegetation.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
4.	*Calidris canutus* **Red Knot**	-	E, C, J, K	-	PMST	Medium sized wader that migrated south from breeding grounds in Siberia the species is widespread around the Australian coast. The species is known to gather in large flocks on sandy estuaries.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
5.	*Calidris ferruginea* **Curlew Sandpiper**	E	CE, C, J, K	-	PMST	The species occurs along the entire coast of NSW, particularly in the Hunter Estuary, and freshwater wetlands in the Murray-Darling Basin. Breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales can be found mainly in intertidal mudflats of sheltered coasts.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
6.	*Calidris melanotos* **Pectoral Sandpiper**	-	J, K	-	PMST	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons,	Nil	No suitable habitat within the Subject Land. No

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains, and artificial wetlands.		records within the locality. **Not recorded during site assessment**
7.	*Charadrius leschenaultii* **Greater Sand-plover**	V	V, C, J, K	-	PMST	The Greater Sand-plover breeds in central Asia from Armenia to Mongolia, moving further south for winter. In NSW, the species has been recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries. Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly, or muddy beaches or estuaries with large intertidal mudflats or sandbanks.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
8.	*Cuculus optatus* **Oriental Cuckoo**	-	C, J, K	1	BioNet	It mainly inhabits forests, occurring in coniferous, deciduous, and mixed forest. The exact extent of its wintering range is uncertain due to its secretive habits and the difficulty of separating it from the Himalayan cuckoo and other similar species. It is believed to include the Malay Peninsula, Indonesia, the Philippines, New Guinea, western Micronesia, the Solomon Islands, and northern and eastern Australia with occasional birds reaching New Zealand.	Low	Marginal habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						It has occurred as a vagrant in Ukraine, Israel and Alaska.		
9.	*Gallinago hardwickii* **Latham's Snipe**	-	J, K	1	BioNet PMST	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
10.	*Hirundapus caudacutus* **White-throated Needletail**	-	V, C, J, K	-	PMST	Widespread in eastern and south-eastern Australia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground.	Nil	Suitable habitat in airspace above the Subject Land. No records within the locality. **Not recorded during site assessment**
11.	*Limosa lapponica* **Bar-tailed Godwit**	-	C, J, K	-	PMST	Bar-tailed Godwits are quite large waders, with females being bigger than males. The Bar-tailed Godwit is mainly mottled brown above and lighter and more uniform buff below. The species arrives in Australia each year in August from breeding grounds in the northern hemisphere. The species is known to inhabit estuarine mudflats, mangroves, and beaches.	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
12.	*Monarcha melanopsis* **Black-faced Monarch**	-	-	-	PMST	The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub, and damp gullies. It may be found in more open woodland when migrating. Found along the coast of eastern Australia, becoming less common further south.	Unlikely	Marginal habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
13.	*Motacilla flava* **Yellow Wagtail**	-	C, J, K	-	PMST	IUCN listed this species as least concern in the Red List of Threatened Species 2015. This species breeds in much of temperate Europe and Asia. It is resident in the milder parts of its range, such as western Europe, but northern and eastern populations migrate to Africa and south Asia.	Unlikely	Marginal habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
14.	*Myiagra cyanoleuca* **Satin Flycatcher**	-	-	-	PMST	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	Unlikely	Marginal habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
15.	*Numenius madagascariensis* **Eastern Curlew**	-	CE, C, J, K	-	PMST	The eastern curlew is Australia's largest shorebird and a long-haul flyer. It is easily recognisable, with its long, down-curved bill. The species takes an annual migratory flight to Russia and	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						northeastern China to breed, arriving back home to Australia in August.		
16.	*Pandion cristatus* **Eastern Osprey**	V, 3	-	-	PMST	Favour coastal areas, especially the mouths of large rivers, lagoons, and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometer of the sea.	Nil	Marginal habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
17.	*Rhipidura rufifrons* **Rufous Fantail**	-	-	1	BioNet PMST	The Rufous Fantail is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. Forages mostly in the air. The Rufous Fantail feeds on insects, which it gleans from the middle and lower levels of the canopy.	Unlikely	Marginal habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**
18.	*Symposiachrus trivirgatus* **Spectacled Monarch**	-	-	-	PMST	The Spectacled Monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. It is much less common in the south. It is also found in Papua New Guinea, the Moluccas and Timor. The Spectacled Monarch prefers thick understorey in rainforests, wet	Unlikely	Marginal habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
						gullies, and waterside vegetation, as well as mangroves.		
19.	*Tringa nebularia* **Common Greenshank**	-	C, J, K	-	PMST	The Common Greenshank does not breed in Australia; however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia. The species has been recorded in most coastal regions. It is widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions (Higgins & Davies 1996).	Nil	No suitable habitat within the Subject Land. No records within the locality. **Not recorded during site assessment**

* Status. *Biodiversity Conservation Act 2016* (BC), *Environment Protection and Biodiversity Conservation Act 1999* (EPBC), M (Migratory), V (Vulnerable), E (Endangered), CE (Critically Endangered), E3 (Endangered Ecological Community), E4B (Critically Endangered Ecological Community)

** Records. # (number of records within locality), P (Predicted), K (known to occur with the locality).

*** Source. Bionet (NSW Department of Planning and Environment (DPE) BioNet Atlas), PMST (Protected matter database search tool).

APPENDIX 2. FLORA SPECIES LIST

Table 2A Flora Species List

Family	Scientific Name	Common Name	Form	Q1		Q2		Q3		Q4		Q5	
				Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund
Apiaceae	*Centella asiatica*	Indian Pennywort	Forb (FG)			0.1	200						
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	Exotic									0.2	20
Apocynaceae	*Parsonsia straminea*	Common Silkpod	Other (OG)	0.5	20			0.2	20	5	50		
Apocynaceae	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	Exotic	0.1	1	0.1	2					0.2	20
Araliaceae	*Polyscias sambucifolia*	Elderberry Panax	Shrub (SG)							0.1	1		
Asteraceae	*Taraxacum officinale*	Dandelion	Exotic	0.1	5	0.1	5						
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	Exotic	0.1	20					0.1	20		
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	Exotic	0.1	5	0.1	10					0.2	20
Asteraceae	*Senecio madagascariensis*	Fireweed	HTW			0.1	20					0.2	20
Asteraceae	*Ageratina adenophora*	Crofton Weed	HTW			0.1	50	0.1	10				
Blechnaceae	*Doodia caudata*		Fern (EG)					0.1	1				
Boraginaceae	*Heliotropium amplexicaule*	Blue Heliotrope	HTW			0.1	20						
Campanulaceae	*Lobelia purpurascens*	whiteroot	Forb (FG)	0.1	5								
Caryophyllaceae	*Stellaria media*	Common Chickweed	Exotic	0.1	5								
Casuarinaceae	*Casuarina glauca*	Swamp Oak	Tree (TG)	5	5	0.2	1	10	20	50	50		
Commelinaceae	*Commelina cyanea*	Native Wandering Jew	Forb (FG)									2	2000
Convolvulaceae	*Dichondra repens*	Kidney Weed	Forb (FG)	0.1	50	0.1	5						
Cyperaceae	*Gahnia clarkei*	Tall Saw-sedge	Grass & grasslike (GG)			0.1	5						
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge	HTW					0.1	100				

Family	Scientific Name	Common Name	Form	Q1		Q2		Q3		Q4		Q5	
				Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund
Cyperaceae	*Cyperus brevifolius*		Exotic			0.1	50	0.1	1				
Ericaceae	*Leucopogon juniperinus*	Prickly Beard-heath	Shrub (SG)	0.1	1								
Ericaceae	*Leucopogon lanceolatus*		Shrub (SG)			0.1	1	0.1	2				
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla	Other (OG)	0.1	5					0.1	10		
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine	Other (OG)							0.1	10		
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine	Other (OG)									0.1	10
Fabaceae (Mimosoideae)	*Acacia terminalis*	Sunshine Wattle	Shrub (SG)	0.1	1								
Fabaceae (Mimosoideae)	*Acacia falcata*		Shrub (SG)	0.1	1	0.1	1						
Fabaceae (Mimosoideae)	*Acacia longifolia*		Shrub (SG)					0.1	1				
Gentianaceae	*Erythraea centuarium*		Exotic			0.1	10					0.2	20
Iridaceae	*Watsonia meriana*		HTW - Manageable	1	20	5	100						
Juncaceae	*Juncus acutus*		Exotic			0.1	20	5	200	0.1	10		
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	Grass & grasslike (GG)	0.1	10			1	100				
Loranthaceae	*Amyema pendula*		Other (OG)	0.1	5								
Malvaceae	*Sida Rhombifolia*	Paddy's Lucerne	Exotic	0.1	10					0.1	20	1	100
Myrtaceae	*Corymbia Maculata*	Spotted Gum	Tree (TG)	15	20					0.5	1		
Myrtaceae	*Eucalyptus Tereticornis*	Forest Red Gum	Tree (TG)	1	5	0.2	2	0.5	1	1	5		
Myrtaceae	*Melaleuca linariifolia*	Flax-leaved Paperbark	Shrub (SG)			2.5	50	0.1	1				

Family	Scientific Name	Common Name	Form	Q1		Q2		Q3		Q4		Q5	
				Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund
Myrtaceae	*Eucalyptus sp.*	Stringybark	Tree (TG)							1	2		
Oleaceae	*Notelaea longifolia*	Large Mock-olive	Tree (TG)							0.1	2		
Oxalidaceae	*Oxalis perennans*		Forb (FG)			0.1	20					0.1	10
Phormiaceae	*Dianella caerulea*	Blue Flax-lily	Forb (FG)	0.1	5								
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush	Shrub (SG)	0.1	5	0.1	2	0.1	2	0.2	20		
Phyllanthaceae	*Glochidion ferdinandi*	Cheese Tree	Tree (TG)	0.1	1	0.2	5	0.2	2	0.1	1		
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum	Shrub (SG)	0.1	1								
Plantaginaceae	*Plantago debilis*	Shade Plantain	Forb (FG)	0.5	100	0.2	100					0.1	100
Poaceae	*Briza subaristata*		HTW	1	100	1	1000					30	3000
Poaceae	*Chloris gayana*	Rhodes Grass	HTW	50	2000	0.2	50			40	2000	15	1500
Poaceae	*Briza maxima*	Quaking Grass	Exotic	2	100							15	1500
Poaceae	*Eragrostis curvula*	African Lovegrass	HTW	5	100								
Poaceae	*Melinis repens*	Red Natal Grass	Exotic	0.1	10							2	200
Poaceae	*Briza minor*	Shivery Grass	Exotic			0.1	20						
Poaceae	*Hyparrhenia hirta*	Coolatai Grass	HTW			0.2	50					20	2000
Poaceae	*Digitaria sanguinalis*	Crab Grass	Exotic			10	10000						
Poaceae	*Oplismenus aemulus*		Grass & grasslike (GG)					2	1000	20	2000		
Poaceae	*Panicum simile*	Two-colour Panic	Grass & grasslike (GG)					0.1	10	0.1	20		
Poaceae	*Avena barbata*	Bearded Oats	Exotic							0.1	10		
Poaceae	*Oplismenus hirtellus*		Grass & grasslike (GG)							10	2000		

Family	Scientific Name	Common Name	Form	Q1		Q2		Q3		Q4		Q5	
				Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund
Poaceae	*Aira caryophyllea*	Silvery Hairgrass	Exotic									0.2	20
Poaceae	*Elymus repens*	English Couch	Exotic									5	500
Poaceae	*Rytidosperma sp.*		Grass & grasslike (GG)	0.1	5								
Poaceae	*Entolasia stricta*		Grass & grasslike (GG)	0.1	10								
Poaceae	*Echinopgon caespitosus*		Grass & grasslike (GG)					0.1	10				
Polygalaceae	*Polygala paniculata*		Exotic									1	1000
Polygonaceae	*Persicaria decipiens*	Slender Knotweed	Forb (FG)					0.1	50				
Polygonaceae	*Rheum palmatum*	#N/A	Exotic	0.1	10								
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel	Exotic	0.1	2	0.1	20						
Proteaceae	*Lomatia silaifolia*	Crinkle Bush	Shrub (SG)							0.2	50		
Pteridaceae	*Cheilanthes sieberi*	Rock Fern	Fern (EG)	0.1	5								
Pteridaceae	*Pellaea falcata*	Sickle Fern	Fern (EG)					0.1	1				
Ranunculaceae	*Clematis aristata*	Old Man's Beard	Other (OG)					0.1	2				
Rubiaceae	*Richardia stellaris*		Exotic			0.1	10					0.2	200
Sapindaceae	*Dodonaea viscosa*	Sticky Hop-bush	Shrub (SG)	0.5	10								
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	Exotic			0.1	10					0.1	10
Typhaceae	*Typha orientalis*	Broad-leaved Cumbungi	Grass & grasslike (GG)					20	2000				
Urticaceae	*Urtica doica*		Exotic					0.1	2	0.1	10		
Verbenaceae	*Lantana camara*	Lantana	HTW - Manageable	5	50	0.2	5			20	200		
Verbenaceae	*Verbena bonariensis*	Purpletop	Exotic	0.1	5	2	100			0.1	20	2	200

Family	Scientific Name	Common Name	Form	Q1		Q2		Q3		Q4		Q5	
				Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund	Cover	Abund
Verbenaceae	*Verbena rigida*		Exotic	0.1	5	0.1	20			0.1	10		
Vitaceae	*Cissus antarctica*	Water Vine	Other (OG)							0.1	10		

APPENDIX 3. FAUNA SPECIES LIST

Table 3A Fauna Species List

Scientific Name	Common Name	Status		Observation Type*
		BC	EPBC	
Austronomus australis	White-striped Freetail-bat	P	-	Anabat
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P	-	Anabat
Chalinolobus gouldii	Gould's Wattled Bat	P	-	Anabat
Ozimops ridei	Eastern Free-tailed Bat	P	-	Anabat
Myotis macropus	Southern Myotis	V,P	-	Anabat
Scotorepens orion	Eastern Broad-nosed Bat	P	-	Anabat
Nyctophilus sp.	Long-eared bat	P	-	Anabat
Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P	-	Anabat
Vespadelus regulus	Southern Forest Bat	P	-	Anabat
Vespadelus vulturnus	Little Forest Bat	P	-	Anabat
Rhinolophus megaphyllus	Eastern Horseshoe-bat	P	-	Anabat
Vespadelus troughtoni	Eastern Cave Bat	V,P	-	Anabat
Miniopterus australis	Little Bent-winged Bat	V,P	-	Anabat
Litoria fallax	Eastern Dwarf Tree Frog	P	-	Frog Survey
Limnodynastes tasmaniensis	Spotted Grass Frog	P	-	Frog Survey
Uperoleia laevigata	Smooth Toadlet	P	-	Frog Survey
Limnodynastes peronii	Brown-striped Frog	P	-	Frog Survey
Crinia signifera	Common Eastern Froglet	P	-	Frog Survey
Antechinus stuartii	Brown Antechinus	P	-	Remote Camera
Canis familiaris	Dog	Ex.	-	Remote Camera
Rattus rattus	Black Rat	Ex.	-	Remote Camera
Dama dama	Fallow Deer	Ex.	-	Remote Camera
Hydromys chrysogaster	Water-rat	P	-	Nocturnal Herp Survey
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V	Nocturnal Herp Survey
Litoria tyleri	Tyler's Tree Frog	P	-	Nocturnal Herp Survey
Pseudophryne coriacea	Red-backed Toadlet	P	-	Nocturnal Herp Survey

APPENDIX 4. BAM-C Credit REPORTS

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00044455/BAAS19010/23/00044456	Italia Road Intersection BDAR	14/03/2024
Assessor Name	Report Created	BAM Data version *
Ashley Elise Owen	02/08/2024	67
Assessor Number	BAM Case Status	Date Finalised
BAAS21020	Finalised	02/08/2024
Assessment Revision	Assessment Type	BOS entry trigger
7	Part 4 Developments (General)	BOS Threshold: Biodiversity Values Map

* 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 SAII	Ecosystem credits

Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest												
2	3433_Moderate	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	25.7	25.7	0.05	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		1
3	3433_Regenerating	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	21.7	21.7	0.09	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		1
											Subtotal	**2**
Lower North Riverflat Eucalypt-Paperbark Forest												
1	4042_Moderate01	Not a TEC	43.1	43.1	0.41	PCT Cleared - 73%	High Sensitivity to Gain			2.00		9
											Subtotal	**9**
											Total	**11**

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 SAII	Species credits
Myotis macropus / Southern Myotis (Fauna)									
4042_Moderate 01	43.1	43.1	0.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	9
								Subtotal	**9**
Petaurus norfolcensis / Squirrel Glider (Fauna)									
4042_Moderate 01	43.1	43.1	0.41	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	9
3433_Moderate	25.7	25.7	0.05	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
3433_Regenerating	21.7	21.7	0.09	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
								Subtotal	**11**

Phascogale tapoatafa / Brush-tailed Phascogale (Fauna)									
4042_Moderate 01	43.1	43.1	0.41	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	9
3433_Moderate	25.7	25.7	0.05	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
3433_Regenerating	21.7	21.7	0.09	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
								Subtotal	**11**
Phascolarctos cinereus / Koala (Fauna)									
4042_Moderate 01	43.1	43.1	0.41	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Endangered	False	9
3433_Moderate	25.7	25.7	0.05	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Endangered	False	1

3433_Regenerating	21.7	21.7	0.09	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Endangered	False	1
								Subtotal	**11**
Vespadelus troughtoni / Eastern Cave Bat (Fauna)									
4042_Moderate 01	43.1	43.1	0.41	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	13
3433_Moderate	25.7	25.7	0.05	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	1
3433_Regenerating	21.7	21.7	0.09	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	1
								Subtotal	**15**

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00044455/BAAS19010/23/00044456	Italia Road Intersection BDAR	14/03/2024
Assessor Name	**Report Created**	**BAM Data version ***
Ashley Elise Owen	02/08/2024	67
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS21020	Part 4 Developments (General)	Finalised
Assessment Revision	**Date Finalised**	**BOS entry trigger**
7	02/08/2024	BOS Threshold: Biodiversity Values Map

* 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.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	4042_Moderate01	4042-Lower North Riverflat Eucalypt-Paperbark Forest	Moderate01	0.41	1	

2	3433_Moderate	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Moderate	0.05		
3	3433_Regenerating	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Regenerating	0.09		

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00044455/BAAS19010/23/00044456	Italia Road Intersection BDAR	14/03/2024
Assessor Name	Report Created	BAM Data version *
Ashley Elise Owen	02/08/2024	67
Assessor Number	Assessment Type	BAM Case Status
BAAS21020	Part 4 Developments (General)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
7	BOS Threshold: Biodiversity Values Map	02/08/2024

* 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.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Australasian Bittern	Botaurus poiciloptilus	4042-Lower North Riverflat Eucalypt-Paperbark Forest
Australian Painted Snipe	Rostratula australis	4042-Lower North Riverflat Eucalypt-Paperbark Forest
Black Bittern	Ixobrychus flavicollis	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Black-necked Stork	Ephippiorhynchus asiaticus	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Broad-billed Sandpiper	Limicola falcinellus	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Curlew Sandpiper	Calidris ferruginea	4042-Lower North Riverflat Eucalypt-Paperbark Forest

Diamond Firetail	Stagonopleura guttata	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Eastern Chestnut Mouse	Pseudomys gracilicaudatus	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Eastern False Pipistrelle	Falsistrellus tasmaniensis	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Eastern Grass Owl	Tyto longimembris	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Eastern Osprey	Pandion cristatus	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Flame Robin	Petroica phoenicea	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Gang-gang Cockatoo	Callocephalon fimbriatum	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Golden-tipped Bat	Phoniscus papuensis	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Greater Broad-nosed Bat	Scoteanax rueppellii	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Grey-headed Flying-fox	Pteropus poliocephalus	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Large Bent-winged Bat	Miniopterus orianae oceanensis	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Little Bent-winged Bat	Miniopterus australis	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Little Eagle	Hieraaetus morphnoides	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Little Lorikeet	Glossopsitta pusilla	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
New Holland Mouse	Pseudomys novaehollandiae	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Red-legged Pademelon	Thylogale stigmatica	4042-Lower North Riverflat Eucalypt-Paperbark Forest
Regent Honeyeater	Anthochaera phrygia	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Rose-crowned Fruit-Dove	Ptilinopus regina	4042-Lower North Riverflat Eucalypt-Paperbark Forest
Scarlet Robin	Petroica boodang	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Speckled Warbler	Chthonicola sagittata	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Spotted Harrier	Circus assimilis	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Spotted-tailed Quoll	Dasyurus maculatus	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Square-tailed Kite	Lophoictinia isura	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Superb Fruit-Dove	Ptilinopus superbus	4042-Lower North Riverflat Eucalypt-Paperbark Forest
Swift Parrot	Lathamus discolor	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Turquoise Parrot	Neophema pulchella	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Varied Sittella	Daphoenositta chrysoptera	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
White-throated Needletail	Hirundapus caudacutus	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Yellow-bellied Glider	Petaurus australis	4042-Lower North Riverflat Eucalypt-Paperbark Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C

BAM Candidate Species Report

Proposal Details

Assessment Id 00044455/BAAS19010/23/00044456	Proposal Name Italia Road Intersection BDAR	BAM data last updated * 14/03/2024
Assessor Name Ashley Elise Owen	Report Created 02/08/2024	BAM Data version * 67
Assessor Number BAAS21020	Assessment Type Part 4 Developments (General)	BAM Case Status Finalised
Assessment Revision 7	Date Finalised 02/08/2024	BOS entry trigger BOS Threshold: Biodiversity Values Map

* 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.

List of Species Requiring Survey

Name	Presence	Survey Months
Angophora inopina Charmhaven Apple	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Burhinus grallarius Bush Stone-curlew	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Callistemon linearifolius Netted Bottle Brush	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Cercartetus nanus Eastern Pygmy-possum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Chalinolobus dwyeri Large-eared Pied Bat	No (expert report)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Corybas dowlingii Red Helmet Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☑ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Crinia tinnula Wallum Froglet	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Dromaius novaehollandiae - endangered population Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus glaucina Slaty Red Gum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Eucalyptus parramattensis subsp. decadens Eucalyptus parramattensis subsp. decadens	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Grevillea guthrieana Guthrie's Grevillea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Grevillea parviflora subsp. parviflora Small-flower Grevillea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Hoplocephalus stephensii Stephens' Banded Snake	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Litoria aurea Green and Golden Bell Frog	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Litoria brevipalmata Green-thighed Frog	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Lophoictinia isura Square-tailed Kite	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Maundia triglochinoides Maundia triglochinoides	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Melaleuca biconvexa Biconvex Paperbark	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Miniopterus australis Little Bent-winged Bat	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?
Miniopterus orianae oceanensis Large Bent-winged Bat	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?

Mixophyes balbus Stuttering Frog	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Mixophyes iteratus Giant Barred Frog	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Myotis macropus Southern Myotis	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Notamacropus parma Parma Wallaby	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Petaurus norfolcensis Squirrel Glider	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Phascogale tapoatafa Brush-tailed Phascogale	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Phascolarctos cinereus Koala	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Planigale maculata Common Planigale	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Pomaderris queenslandica Scant Pomaderris	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Potorous tridactylus Long-nosed Potoroo	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Pterostylis chaetophora Pterostylis chaetophora	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhodamnia rubescens Scrub Turpentine	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Rhodomyrtus psidioides Native Guava	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Syzygium paniculatum Magenta Lilly Pilly	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?
Tetratheca juncea Black-eyed Susan	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Turnix maculosus Red-backed Button-quail	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Uperoleia mahonyi Mahony's Toadlet	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Vespadelus troughtoni Eastern Cave Bat	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

BAM Candidate Species Report

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Habitat constraints
Broad-billed Sandpiper	Limicola falcinellus	Habitat constraints
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Curlew Sandpiper	Calidris ferruginea	Habitat constraints
Eastern Osprey	Pandion cristatus	Habitat constraints
Eucalyptus seeana population in the Greater Taree local government area	Eucalyptus seeana - endangered population	Refer to BAR
Gang-gang Cockatoo	Callocephalon fimbriatum	Habitat constraints
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Little Eagle	Hieraaetus morphnoides	Habitat constraints
Masked Owl	Tyto novaehollandiae	Habitat constraints
Powerful Owl	Ninox strenua	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Sooty Owl	Tyto tenebricosa	Habitat constraints
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	Habitat constraints
Swift Parrot	Lathamus discolor	Habitat constraints

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00044455/BAAS19010/23/00044456

Proposal Name
Italia Road Intersection BDAR

BAM data last updated *
14/03/2024

Assessor Name
Ashley Elise Owen

Assessor Number
BAAS21020

BAM Data version *
67

Proponent Names

Report Created
02/08/2024

BAM Case Status
Finalised

Assessment Revision
7

Assessment Type
Part 4 Developments (General)

Date Finalised
02/08/2024

BOS entry trigger
BOS Threshold: Biodiversity Values Map

* 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.

Potential Serious and Irreversible Impacts

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

Species
Vespadelus troughtoni / Eastern Cave Bat

Additional Information for Approval

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
4042-Lower North Riverflat Eucalypt-Paperbark Forest	Not a TEC	0.4	0	9	9
3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	0.1	0	2	2

3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions This includes PCT's: 3433, 3442, 3443, 3444, 4158	-	3433_Moderate	No	1	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions This includes PCT's: 3433, 3442, 3443, 3444, 4158	-	3433_Regenerating	No	1	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
4042-Lower North Riverflat Eucalypt-Paperbark Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	Coastal Floodplain Wetlands This includes PCT's: 4015, 4023, 4024, 4025, 4026, 4027, 4029, 4034, 4035, 4036, 4037, 4041, 4042, 4044, 4046, 4049, 4050, 4051, 4055, 4059	Coastal Floodplain Wetlands >=70% and <90%	4042_Moderate01	No	9	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Myotis macropus / Southern Myotis	**4042_Moderate01**	0.4	9.00
Petaurus norfolcensis / Squirrel Glider	**4042_Moderate01, 3433_Moderate, 3433_Regenerating**	0.6	11.00
Phascogale tapoatafa / Brush-tailed Phascogale	**4042_Moderate01, 3433_Moderate, 3433_Regenerating**	0.6	11.00
Phascolarctos cinereus / Koala	**4042_Moderate01, 3433_Moderate, 3433_Regenerating**	0.6	11.00

Vespadelus troughtoni / Eastern Cave Bat	**4042_Moderate01, 3433_Moderate, 3433_Regenerating**	0.6	15.00

Credit Retirement Options

Like-for-like credit retirement options

Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW
Petaurus norfolcensis / Squirrel Glider	Spp	IBRA subregion
	Petaurus norfolcensis / Squirrel Glider	Any in NSW
Phascogale tapoatafa / Brush-tailed Phascogale	Spp	IBRA subregion
	Phascogale tapoatafa / Brush-tailed Phascogale	Any in NSW
Phascolarctos cinereus / Koala	Spp	IBRA subregion
	Phascolarctos cinereus / Koala	Any in NSW
Vespadelus troughtoni / Eastern Cave Bat	Spp	IBRA subregion
	Vespadelus troughtoni / Eastern Cave Bat	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00044455/BAAS19010/23/00044456

Proposal Name
Italia Road Intersection BDAR

BAM data last updated *
14/03/2024

Assessor Name
Ashley Elise Owen

Assessor Number
BAAS21020

BAM Data version *
67

Proponent Name(s)

Report Created
02/08/2024

BAM Case Status
Finalised

Assessment Revision
7

Assessment Type
Part 4 Developments (General)

Date Finalised
02/08/2024

BOS entry trigger
BOS Threshold: Biodiversity Values Map

* 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.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Vespadelus troughtoni / Eastern Cave Bat		

Additional Information for Approval

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
4042-Lower North Riverflat Eucalypt-Paperbark Forest	Not a TEC	0.4	0	9	9.00
3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	0.1	0	2	2.00

3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions This includes PCT's: 3433, 3442, 3443, 3444, 4158	-	3433_Moderate	No	1	Karuah Manning,Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions This includes PCT's: 3433, 3442, 3443, 3444, 4158	-	3433_Regenerating	No	1	Karuah Manning,Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	3433_Moderate	No	1	IBRA Region: NSW North Coast, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	3433_Regenerating	No	1	IBRA Region: NSW North Coast, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
4042-Lower North Riverflat Eucalypt-Paperbark Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	Coastal Floodplain Wetlands This includes PCT's: 4015, 4023, 4024, 4025, 4026, 4027, 4029, 4034, 4035, 4036, 4037, 4041, 4042, 4044, 4046, 4049, 4050, 4051, 4055, 4059	Coastal Floodplain Wetlands >=70% and <90%	4042_Moderate01	No	9	Karuah Manning,Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Forested Wetlands	Tier 2 or higher threat status	4042_Moderate01	No	9	IBRA Region: NSW North Coast, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Myotis macropus / Southern Myotis	**4042_Moderate01**	0.4	9.00
Petaurus norfolcensis / Squirrel Glider	**4042_Moderate01, 3433_Moderate, 3433_Regenerating**	0.6	11.00
Phascogale tapoatafa / Brush-tailed Phascogale	**4042_Moderate01, 3433_Moderate, 3433_Regenerating**	0.6	11.00
Phascolarctos cinereus / Koala	**4042_Moderate01, 3433_Moderate, 3433_Regenerating**	0.6	11.00

Vespadelus troughtoni / Eastern Cave Bat	**4042_Moderate01, 3433_Moderate, 3433_Regenerating**	0.6	15.00

Credit Retirement Options

Like-for-like options

Myotis macropus/ Southern Myotis	Spp	IBRA region	
	Myotis macropus/Southern Myotis	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petaurus norfolcensis/ Squirrel Glider	Spp	IBRA region	
	Petaurus norfolcensis/Squirrel Glider	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act	IBRA region

		shown below	
	Fauna	Vulnerable	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Phascogale tapoatafa/ Brush-tailed Phascogale	Spp	IBRA region	
	Phascogale tapoatafa/Brush-tailed Phascogale	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Phascolarctos cinereus/ Koala	Spp	IBRA region	
	Phascolarctos cinereus/Koala	Any in NSW	
	Variation options		
	Kingdom	Any species with same or	IBRA region

		higher category of listing under Part 4 of the BC Act shown below	
	Fauna	Endangered	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Vespadelus troughtoni/ Eastern Cave Bat	Spp	IBRA region	
	Vespadelus troughtoni/Eastern Cave Bat	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Karuah Manning, Hunter, Macleay Hastings, Mummel Escarpment and Upper Hunter. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

APPENDIX 5. EPBC ASSESSMENTS OF SIGNIFICANCE

Species Assessed under the EPBC Act Significant Impact Guidelines

The following pertains to Assessments of Significance for direct or indirect impacts to EBPC Act listed threatened species, populations and communities.

The following species have been assessed under the EPBC Act *Matters of National Environmental Significance Significant impact guidelines 1.1* (Department of the Environment [DotE], 2013) (Significant Impact Guidelines):

Critically Endangered Species

- None

Endangered Species

- Koala (*Phascolarctos cinereus*)

Vulnerable Species

- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami lathami*)

Migratory Species

- None

Critically Endangered and Endangered Species – EPBC Act Assessment of Significance

The EPBC Act Significant Impact Guidelines (DOE 2013) state:

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
lead to a long-term decrease in the size of a population

reduce the area of occupancy of the species

fragment an existing population into two or more populations

adversely affect habitat critical to the survival of a species

disrupt the breeding cycle of a population

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

result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

introduce disease that may cause the species to decline, or

interfere with the recovery of the species.

A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:
a geographically distinct regional population, or collection of local populations, or

a population, or collection of local populations, that occurs within a particular bioregion.

An 'invasive species' is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

for activities such as foraging, breeding, roosting, or dispersal

for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)

to maintain genetic diversity and long term evolutionary development, or

for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.

Koala (*Phascolarctos cinereus*) - Endangered
Assessment of Significance

Note: As of 22 February 2022 the "*EPBC Act referral guidelines for the vulnerable koala*" and associated policy documents are no longer current. In the absence of a replacement policy and guideline specific to assessing the significance of impacts to Koalas at the time of this assessment the following assessment of significance was undertaken using a combination of the now discontinued Koala guidelines and general *EPBC Significant Impact Guidelines*.

1. ***Is the action likely to lead to a long-term decrease in the size of an important population of a species?***

An 'important population' is defined as 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.

EPBC conservation advice for Koala (DAWE 2022) defines important populations within NSW based on Areas of Regional Koala Significance (ARKS) identified in *Saving Our Species: Framework for the spatial prioritisation of koala conservation actions in NSW* (DPIE 2020). The Subject Land falls within the Wang Wauk State Forest ARKS and it is therefore considered that any local Koalas are part of and important Koala population under this definition.

Whilst no Koalas (or signs thereof) were detected during surveys completed within the Subject Land previous records of Koala nearby and presence of suitable Koala feed trees indicates that the Subject Land likely represents part of a broader foraging habitat for the species and population. The proposal will impact 0.55 ha of potential habitat for Koala including 46 kala feed trees (*Eucalyptus tereticornis*). As detailed in Section 7.2.1, restoration actions outlined in the Balickera Koala Management Unit (KMU) are proposed as follows: to plant 92 (a ratio of 2:1 to that which is being cleared) of *Eucalyptus tereticornis* (Forest Red Gum) and / or *Eucalyptus robusta* (Swamp Mahogany) in areas along the Williams River flood plain in co-operation with the Hunter Region Landcare Network – Lower Hunter. Consultation with Landcare is currently being undertaken in order to identify location/s that would be suitable for this number of trees. An email of support from Hunter Regional Landcare is provided in Appendix 11.. As such, it is unlikely the proposed development will significantly impact an important Koala population or lead to a long-term decrease in the size of the important population within the locality.

1. ***Will the action reduce the area of occupancy of an important population of the species?***

The koala has an extensive distribution that spans four states and the Australian Capital Territory. Collectively this represents an area of occupancy of over one million square kilometres. The Wank Wauk ARKS covers a total area of 174,864 ha. The proposed action will not reduce the area of occupancy of this important population.

2. *Will the action fragment an existing important population into two or more populations?*

The proposed action will not impact an important population that would be split into two or more populations.

3. *Will the action adversely affect habitat critical to the survival of a species?*

Yes, the Subject Land does contain habitat critical to the survival of the Koala as defined under the *EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)* (DotE 2014) (Referral Guidelines) (see Koala Habitat Assessment Tool results in Table 5a).

Table 5a: Impact Assessment for SAII species – Koala (*Phascolarctos cinereus*)

Attribute	Score	Habitat Appraisal	
Koala Occurrence	+1	Desktop	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 5 years.
		Field Assessment	Koala scats were not detected during surveys completed within the Subject Land.
Vegetation composition	+1	Field Assessment	One known koala use trees occur on site: *Eucalyptus tereticornis.*
Habitat connectivity	+2	Vegetation within the Subject Land is well connected to adjacent vegetation covering an area of >10,000 ha.	
Key existing threats	+1	Koala mortality from vehicle strike due to proximity to Pacific Motorway. DPIE (2022) identify as dog attack, wildfire and fragmentation as high likelihood threats for the Wang Wuak ARKS.	
Recovery value	+1	The site contains only a Low cover of Koala use trees and is surrounded by barriers (i.e. roads and canal), the vegetation constitutes part of a movement corridor possibly used by Koalas. The site therefore provides a moderate recovery value for the species.	
Total	**6**	The proposed development will involve the clearing of 0.55 ha of native vegetation considered to represent foraging habitat for the koala (Vegetation Zones 1–3). Therefore, with a score of 6 the vegetation with the Subject Land constitutes habitat critical to the koala.	

4. *Will the action disrupt the breeding cycle of an important population?*

The proposed development is unlikely to disrupt the breeding cycle of an important population considering the degraded nature of the site, more suitable koala habitat occurring to the north-east of the Subject Land, and minor impact of 0.55 ha on suitable foraging habitat within the Subject Land .

5. *Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?*

The development will impact 0.55 ha of potential Koala habitat that is connected to a larer area of >10,000 containing similar and better-quality habitat for Koala. This level of impact is low and is not expected to result in the decline of the species.

6. *Will the action result in invasive species that are harmful to a endangered species becoming established in the endangered species' habitat?*

No, this development will not result in an increase in invasive species that are harmful to the endangered species if mitigation measures provided in **Section 5.3** are followed.

7. *Will the action introduce disease that may cause the species to decline?*

No, the development will not result in the introduction of disease that may cause the species to decline locally.

8. *Will the action interfere substantially with the recovery of the species?*

No, the development is unlikely to impact the recovery of the Koala within the locality.

Conclusion

Based on the above assessment it is considered unlikely that this Commonwealth-listed species will be significantly impacted by the proposal. Given that 0.55 ha of vegetation constituting "habitat critical for the survival of the species" is to be impacted and the Subject Land sits on the periphery of a larger expanse (>10,000 ha) of higher-quality habitat, a referral is not recommended.

F2 Vulnerable Species – EPBC Act Assessment of Significance

The EPBC Act Significant Impact Guidelines (DotE 2013) state:

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*
- *reduce the area of occupancy of an important population*
- *fragment an existing important population into two or more populations*
- *adversely affect habitat critical to the survival of a species*
- *disrupt the breeding cycle of an important population*
- *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*
- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat introduce disease that may cause the species to decline, or*
- *interfere substantially with the recovery of the species.*

An 'important population' is 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.*

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

Assessment of Significance

1. *Is the action likely to lead to a long-term decrease in the size of an important population of a species?*

An 'important population' is defined as 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 Study Area contains a number of myrtaceous tree species which may provide foraging habitat for the species. However, no breeding habitat (camps) were identified within the Study Area. Therefore, the Study Area is unlikely to contain a key source population for breeding, or one that is necessary for maintaining genetic diversity. The Study Area is also highly connected to large areas (>10,000 ha) of suitable foraging habitat within remnant vegetation to the north, east and west of the site.

As such, it is unlikely the Study Area comprises an important population of Grey-headed Flying-fox.

2. *Will the action reduce the area of occupancy of an important population of the species?*

The area of occupancy of the Grey-headed Flying-fox is not known but the species exists as one interconnected population along the eastern Australian coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. The area occupied by this species would remain the same after the action. No decrease in the area of occupancy for this species is expected as a result of the proposal.

3. *Will the action fragment an existing important population into two or more populations?*

Highly mobile species such as bats are expected to be less impacted by fragmentation. The Grey-headed Flying-fox is particularly well adapted to accessing widely spaced habitat resources given its mobility and preference for seasonal fruits and blossom in differing parts of the landscape. The proposal would not fragment an important population of the Grey-headed Flying-fox. Individuals would still be able to disperse between roosts along the east Australian coast. Genetic exchange within the population and dispersal would not be disrupted by the proposal.

The proposed action is therefore unlikely to increase existing fragmentation of vegetation and is unlikely to significantly impact the continued survival of the population.

4. *Will the action adversely affect habitat critical to the survival of a species?*

This species typically exhibits very large home range and Grey-headed Flying-fox is known to travel distances of at least 50 km from roost sites to access seasonal foraging resources. There are no known roost camps within the study area and the site does not provide critical roosting habitat. However, there are a number of known roost camps within a 20 km radius of the proposal, the closest being the Raymond Terrace and Moffats Swamp camps. Wallaroo SF camp is c. 2 km north, but no bats have been recorded there for the last decade.

The recovery plan for the Grey-headed Flying-fox identifies critical foraging habitat for this species as:

- Winter and spring flowering native vegetation
- 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)

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

Native vegetation within the study area may constitute critical foraging habitat but the affected area of foraging habitat would represent a small percentage of the total extent of important foraging vegetation types present within a 20 km radius of the closest camps. Given the high-quality foraging habitats within the locality, outside of the study area, the proposal is not expected to adversely affect foraging habitat critical to the survival of this species in this region..

5. Will the action disrupt the breeding cycle of an important population?

No breeding habitat for this species was identified within the Study Area, although breeding colonies occur within 11 km of the site. The proposed action will impact vegetation that is unlikely to significantly disrupt the breeding cycle of this species or significantly impact the continued survival of the species. The proposal would not directly impact on a known roost camp / breeding or maternity site. Alternative foraging resources are available in the locality that would provide suitable resources during the maternity season. The proposed action will not impact an important population of this vulnerable species.

6. Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The impacts to foraging habitat are minimal and no evidence of a roost camp has been identified from the study area. This impact is not expected to lead to a decline in the species in the region given the availability of high-quality foraging habitat (>10,000 ha) available to local animals in the surrounding area.

7. Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

The subject land is highly disturbed and already contains a high abundance of invasive species. The proposal is not expected to increase the prevalence of these species. The action is unlikely to result in an invasive species harmful to the Grey-headed Flying-fox becoming established in the habitat.

8. Will the action introduce disease that may cause the species to decline?

There are no known disease issues affecting this species in relation to the action. The action would be unlikely to increase the potential for significant disease vectors to affect local populations.

9. Will the action interfere substantially with the recovery of the species?

No, the proposed action will not interfere substantially with the recovery of the species due to low level of impact. Replacement plantings of *E. tereticornis* for mitigating impacts to Koala habitat (Section 7.2.1) will also increase winter-foraging resources for Grey-headed Flying-fox.

Conclusion

Based on the above assessment it is considered unlikely that this Commonwealth-listed species will be significantly impacted by the proposal.

South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*)

Assessment of Significance

1. ***Is the action likely to lead to a long-term decrease in the size of an important population of a species?***

An 'important population' is defined as 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 Study Area contains many planted *Casuarina cunninghamiana* trees which may provide foraging habitat for the species. However, no potential breeding habitat was identified within the Study Area. This species requires tree with hollows greater than 15 cm diameter and greater than 8 m above ground (TBDC). Therefore, the Study Area is unlikely to contain a key source population for breeding, or one that is necessary for maintaining genetic diversity. The Study Area is also highly connected to large areas of suitable foraging and likely breeding habitat within remnant vegetation to all directions of the site.

As such, it is unlikely the Study Area comprises an important population of Glossy Black-Cockatoo.

2. ***Will the action reduce the area of occupancy of an important population of the species?***

The AOO of this species is estimated to be 50, 000 km^2 (NSW Scientific Committee 2008). The area occupied by this species would remain the same after the action. No decrease in the area of occupancy for this species is expected as a result of the proposal.

3. ***Will the action fragment an existing important population into two or more populations?***

This species is highly mobile and is well adapted to accessing widely spaced habitat resources. The proposal would not fragment an important population of the South-eastern Glossy Black-Cockatoo. Individuals would still be able to disperse within the area and access larger areas of foraging habitat adjacent to the subject land. Genetic exchange within the population and dispersal would not be disrupted by the proposal.

The proposed action is therefore unlikely to increase existing fragmentation of vegetation and is unlikely to significantly impact the continued survival of the population.

4. ***Will the action adversely affect habitat critical to the survival of a species?***

No the proposed development will not impact habitat critical to the survival of this vulnerable species.

5. ***Will the action disrupt the breeding cycle of an important population?***

The proposed action will not impact an important population of this vulnerable species.

6. ***Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?***

No breeding habitat for this species was identified within the Subject Land. The proposed action will impact vegetation that is unlikely to significantly disrupt the breeding cycle of this species or significantly impact the continued survival of the species. Alternative foraging resources are available in the locality, including large

areas of remnant vegetation of > 10,000 ha. The proposed action will not impact an important population of this vulnerable species.

7. ***Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?***

The subject land is highly disturbed and already contains a high abundance of invasive species. The proposal is not expected to increase the prevalence of these species. The action is unlikely to result in an invasive species harmful to the Glossy-black Cockatoo becoming established in the habitat.

8. ***Will the action introduce disease that may cause the species to decline?***

There are no known disease issues affecting this species in relation to the action. The action would be unlikely to increase the potential for significant disease vectors to affect local populations.

9. ***Will the action interfere substantially with the recovery of the species?***

No, the proposed action will not interfere substantially with the recovery of the species.

Conclusion

Based on the above assessment it is considered unlikely that this Commonwealth-listed species will be significantly impacted by the proposal.

APPENDIX 6. BAM FIELD SHEETS

Quadrat Number: Q1 **Date:** 6/11/23 **Recorder:** J.M, A.O

Vegetation Type: PCT 3433 **Property Name or Project Name:** Italia Rd

Overstorey Species	F	Ab	Midstorey Species	F	Ab	Ground Cover (Shrubs)	F	Ab	Ground Cover (Grasses)	F	Ab	Ground Cover (Other)	F	Ab	Exotic	F	Ab
C.Maculata	15	20	She-Oak*	5	5	Dodonea Vis	0.5	10	Ryt.dasperma Sp	0.1	5	Parsonia Straw	0.5	20	Chloris Gayana	50	2000
E.Tereticornis	1	5				Acacia Sp*	0.2	5	Grass #1	1	100	Cissus Sp* Vine	0.1	5	L. Camara	5	50
Mistletoe	0.1	5				Breynia Ob	0.1	5	[redacted]		50	Dianella Caelu	0.1	5	Exotic Lily	1	20
						Acacia Terminal	0.1	1	Entolasia Stric	0.1	10	[redacted]			Cotton Bush	0.1	1
						Pittosporum Und	0.1	1				Lom longifolia	0.1	10	Briza Maxima	2	100
						Glochidion Ferd	0.1	1				Dichrodra Repens	0.1	50	Sida Rhombolia	0.1	10
						Acacia Fal	0.1	1				Hardenbergia Vai	0.1	5	Plantago Lance	0.5	100
												Sedge #1	0.1	1	Taraxacum	0.1	5
												Vine #2	0.1	5	Bidens Pilosa	0.1	20
												Vine #3	0.1	5	Turkey Rhubarb	0.1	10
												Leucopogon Jun	0.1	1	Verbena Rigida?	0.1	5
												Lobelia Purp	0.1	5	Verbena Bon	0.1	5
												Chielanthes Sd	0.1	5	Scarlet Pimpernel	0.1	2
															Conyza Bonar	0.1	5
															Stellaria?	0.1	5
															Eragrostis Curv	5	100
															Red Natal	0.1	10

F Foliage Projective Cover: within the boundaries of the plot including all attached plant material, alive or dead, rooted in or overhanging the plot. Cover should be recorded in decimals if less than 1% (0.1, 0.2, 0.3), in whole numbers up to 5% (1, 2, 3), to the nearest 5% if >5% (5, 10, 15, 20, 25, ...100%).
64 cm x 64 cm = 0.1%; 1 m x 1 m = 0.25%; 10 m^2 = 2.5%; 20 m^2 = 5%.

Ab Abundance Rating (no. of individuals or shoots rooted within the plot): 1-10, 20, 50, 100, 500, 1000, 1500, 2000 etc
(numbers > 20 are estimates only, and the recorded abundance is the upper end of each class, e.g. 50 represents an estimated abundance of between 20 and 50)

General Comments:

Quadrat Number: Q2 **Date:** 6-11-2023 **Recorder:** AO & JM

Vegetation Type: Exotic veg with regen natives. **Property Name or Project Name:** Italia Road.

Overstorey Species			Midstorey Species			Ground Cover (Shrubs)			Ground Cover (Grasses)			Ground Cover (Other)			Exotic		
	F	Ab		F	Ab		F	Ab		F	Ab		F	Ab		F	Ab
E lenb	0.2	2	A falc	0.1	1	Leuco	0.1	1	Ghania	0.1	5	(twining)			Verbena bon	2	100
			Ac sp	0.5	20	(red berry)						Vine #2	0.1	5	Plantago	0.2	100
			(straight leaf)			Brey obl	0.1	2				Dich rep	0.1	5	Sol nigr	0.1	10
			Mel?lin	2.5	50							~~Comm cyan~~			~~Afr love~~		
			Gloch fern	0.2	5							~~(vine 2)~~			Grass 1	10	1000
			Sheoke	0.2	1							Herb 1	0.1	100	Exotic lily	5	100
			Mel (sample)	0.1	1							~~white flower~~ Polygala panic			Juncus ac	0.1	20
												Centella	0.1	200	Blue heliot	0.1	20
												~~Go~~			Cyp brev	0.1	50
															Lantana	0.2	5
															Verb rig	0.1	20
															Scar pimp	0.1	20
															Oxalis	0.1	20
															Gomphocarpus cotton bush	0.1	2
															Briza minor	0.1	20
															Richard stell	0.1	10
															Taraxicum off	0.1	5
															Coolatai	0.2	50
															Dominant Grass 2	70	10000
																~~0.1~~	~~50~~
															Grass like? echinopogon	0.1	50
															Fireweed	0.1	20
															Conyza	0.1	10
															Chloris gayana	0.2	50
															Centaurium	0.1	10

Watsonia

Crofton weed 0.1/50

F Foliage Projective Cover: within the boundaries of the plot including all attached plant material, alive or dead, rooted in or overhanging the plot. Cover should be recorded in decimals if less than 1% (0.1, 0.2, 0.3), in whole numbers up to 5% (1, 2, 3), to the nearest 5% if >5% (5, 10, 15, 20, 25, ...100%). 64 cm x 64 cm = 0.1%; 1 m x 1 m = 0.25%; 10 m^2 = 2.5%; 20 m^2 = 5%.

Ab Abundance Rating (no. of individuals or shoots rooted within the plot): 1-10, 20, 50, 100, 500, 1000, 1500, 2000 etc (numbers > 20 are estimates only, and the recorded abundance is the upper end of each class, e.g. 50 represents an estimated abundance of between 20 and 50)

General Comments:

Quadrat Number: Q3 **Date:** 6-11-23 **Recorder:** Ao & Jm.

Vegetation Type: Lagoon **Property Name or Project Name:** Italia Rd

Overstorey Species	F	Ab	Midstorey Species	F	Ab	Ground Cover (Shrubs)	F	Ab	Ground Cover (Grasses)	F	Ab	Ground Cover (Other)	F	Ab	Exotic	F	Ab
E level	0.5	1	~~Shoots~~			Paperbark	0.1	1	Oplismenus	2	1000	Juncus(1)	5	200	Typha	20	2000
			Cas glauc	10	20	Ac long?	0.1	1	Erag caesp. hirtinus	0.1	10	Lom long	1	100	Persicaria	0.1	~~100~~ 50
			Gloch fern	0.1	2	Leuco (thin leaf)	0.1	2							Cyper erag	0.1	100
						(red berry)			Panicum sim	0.1	10				Bromus		
						Breyobl	0.1	2							Aquatic (1)	0.1	1
															Sting nettle	0.1	2
			Clematis?	0.1	2	Fern1	0.1	1									
			Pas stram	0.2	20	Fern2	0.1	1							Crofton weed	0.1	10
															Cyper(1)	0.1	1

F Foliage Projective Cover: within the boundaries of the plot including all attached plant material, alive or dead, rooted in or overhanging the plot. Cover should be recorded in decimals if less than 1% (0.1, 0.2, 0.3), in whole numbers up to 5% (1, 2, 3), to the nearest 5% if >5% (5, 10, 15, 20, 25, …100%).
64 cm x 64 cm = 0.1%; 1 m x 1 m = 0.25%; 10 m^2 = 2.5%; 20 m^2 = 5%.

Ab Abundance Rating (no. of individuals or shoots rooted within the plot): 1-10, 20, 50, 100, 500, 1000, 1500, 2000 etc
(numbers > 20 are estimates only, and the recorded abundance is the upper end of each class, e.g. 50 represents an estimated abundance of between 20 and 50)

General Comments:

Quadrat Number: Q4 **Date:** 6/11/23 **Recorder:** J, M, A, O

Vegetation Type: Planted Native Vegetation **Property Name or Project Name:** Italia Road

Overstorey Species	F	Ab	Midstorey Species	F	Ab	Ground Cover (Shrubs)	F	Ab	Ground Cover (Grasses)	F	Ab	Ground Cover (Other)	F	Ab	Exotic	F	Ab
Casuarina Glauca	50	50	Glochidion Ferd	0.1	1	Breynia Oblon	0.2	20	Bearded Oats	0.1	10	Parsonia Straw	5	50	Chloris Gayana	40	2000
E. Teretcornis	1	5				Notelea Longi	0.1	2	Oplismenus Aem	20	2000	Juncus Spp.	0.1	10	Verbena Bon	0.1	20
Stringybark Sp.	1	2				Sample #1	0.1	1	Panicum Sim		20	Hardenbergia Vio	0.1	10	Lantana Cam	20	200
C. Maculata	0.5	1				Sample #2	0.1	1	Oplismenus Hirt	10	2000	Glycine Cland	0.1	10	Bidens Pilosa	0.1	20
												Lomatia Silaf	0.2	50	Sida Rhombi	0.1	20
												Cissus Antarctica	0.1	10	Verbena Rig	0.1	10
												Stinging Nettle	0.1	10			

F Foliage Projective Cover: within the boundaries of the plot including all attached plant material, alive or dead, rooted in or overhanging the plot. Cover should be recorded in decimals if less than 1% (0.1, 0.2, 0.3), in whole numbers up to 5% (1, 2, 3), to the nearest 5% if >5% (5, 10, 15, 20, 25, ... 100%).
64 cm x 64 cm = 0.1%; 1 m x 1 m = 0.25%; 10 m^2 = 2.5%; 20 m^2 = 5%.

Ab Abundance Rating (no. of individuals or shoots rooted within the plot): 1-10, 20, 50, 100, 500, 1000, 1500, 2000 etc
(numbers > 20 are estimates only, and the recorded abundance is the upper end of each class, e.g. 50 represents an estimated abundance of between 20 and 50)

General Comments:

Quadrat Number: Q5 Date: 6/11/23 Recorder: J.M, A.C

Vegetation Type: Exotic Vegetation Property Name or Project Name: Italia Rd

Overstorey Species	F	Ab	Midstorey Species	F	Ab	Ground Cover (Shrubs)	F	Ab	Ground Cover (Grasses)	F	Ab	Ground Cover (Other)	F	Ab	Exotic	F	Ab
									Grass #1			Glycine Tub			Coolatai Grass		
									Briza			Commelina			Briza Max		
									subaristata			Centella			Verb Bon		
															S. da Rhom		
															Plantago		
															Solanum Nig		
															Polygala Pan		
															Oxalis		
															Celery Weed		
															Aira		
															Red Natal		
															Conyza Bon		
															Cotton Bush		
															Richardia		
															Senecio		
															Centuarium		
															Chloris Gayana		
															Kikuyu Grass		

F Foliage Projective Cover: within the boundaries of the plot including all attached plant material, alive or dead, rooted in or overhanging the plot. Cover should be recorded in decimals if less than 1% (0.1, 0.2, 0.3), in whole numbers up to 5% (1, 2, 3), to the nearest 5% if >5% (5, 10, 15, 20, 25, ... 100%).
64 cm x 64 cm = 0.1%; 1 m x 1 m = 0.25%; 10 m^2 = 2.5%; 20 m^2 = 5%.

Ab Abundance Rating (no. of individuals or shoots rooted within the plot): 1-10, 20, 50, 100, 500, 1000, 1500, 2000 etc
(numbers > 20 are estimates only, and the recorded abundance is the upper end of each class, e.g. 50 represents an estimated abundance of between 20 and 50)

General Comments:

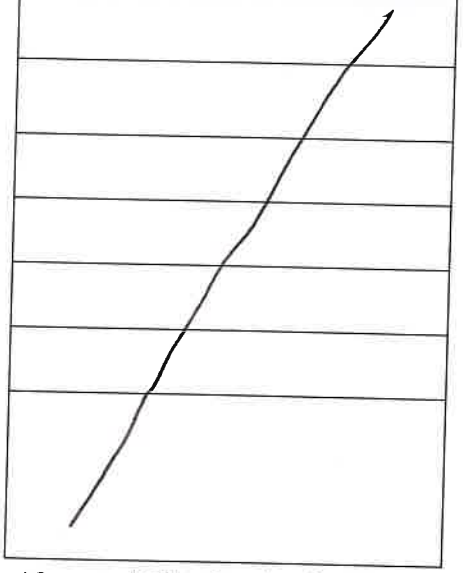
1,000 m² PLOT

Tree Stem Size Class*		Trees^
Count of Large Trees Record DBH of each tree at 1.3 m from ground.	80+ cm	–
	50+ cm	✓
All other Trees: Only record ***presence or absence*** of trees in these stem size classes. Record DBH of each tree at 1.3 m from ground.	30-49 cm	✓
	20-29 cm	✓
	10-19 cm	✓
	5-9 cm	✓
Presence or absence of **Regeneration#** Maximum stem diameter of <5 cm regardless of height.	<5 cm	✓

*Living trees only; for **multi-stemmed trees**, only largest stem is counted or recorded as present;

#Record presence of regeneration for any tree with a maximum stem diameter of <5 cm, regardless of height (i.e., record presence of regeneration if sapling or seedings that are <1.3 m heigh and have DBH <5 cm).

^Includes species classified as Trees under the BAM Growth Form Table.

Count of HBTs†


†Count of **hollow-bearing *trees*** and ***shrubs***; includes living and dead; record by stem size class.

Length of logs (m) Fallen logs = >10 cm diameter, that is dead and entirely or partly on the ground within the 1,000 m² plot. Only the length of log within the plot is recorded.	Tally	TOTAL LENGTH (m)
	1111	4m approx

1 m² sub PLOT

	Litter cover (%)				
Subplot	90	5%	95	50	100
Average	68%				

Litter includes leaves, seeds, twigs, branchlets and branches **less than 10 cm diameter**. Include all plant material that is detached from a plant and forms part of the litter layer on the ground surface. Litter cover is the two-dimensional litter layer in contact with the ground surface, including litter under the canopies of erect plants. Plant material that is not detached should be assessed as foliage cover, regardless of whether it appears alive or dead.

Quadrat Number: Q1 **Date:** 6/11 **Recorder:** J.M, A.C

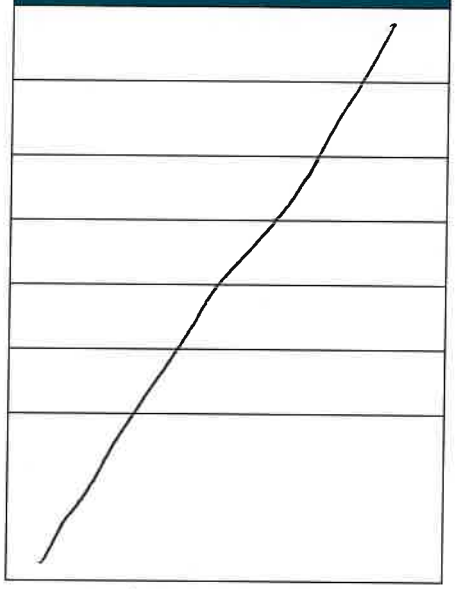
Property Name or Project Name: Italia Rd

☑ Both Start and End points collected on GPS

☑ Start and End locations are approximately 50 m apart on GPS

1,000 m² PLOT

Tree Stem Size Class*		Trees^
Count of Large Trees Record DBH of each tree at 1.3 m from ground.	80+ cm	—
	50+ cm	—
All other Trees: Only record ***presence or absence*** of trees in these stem size classes. Record DBH of each tree at 1.3 m from ground.	30-49 cm	—
	20-29 cm	—
	10-19 cm	✓
	5-9 cm	✓
Presence or absence of **Regeneration#** Maximum stem diameter of <5 cm regardless of height.	<5 cm	✓

Count of HBTs†


*Living trees only; for **multi-stemmed trees**, only largest stem is counted or recorded as present;

#Record presence of regeneration for any tree with a maximum stem diameter of <5 cm, regardless of height (i.e., record presence of regeneration if sapling or seedings that are <1.3 m heigh and have DBH <5 cm).

^Includes species classified as Trees under the BAM Growth Form Table.

†Count of **hollow-bearing *trees*** and ***shrubs***; includes living and dead; record by stem size class.

Length of logs (m) Fallen logs = >10 cm diameter, that is dead and entirely or partly on the ground within the 1,000 m² plot. Only the length of log within the plot is recorded.	**Tally**	**TOTAL LENGTH (m)**
	1, 1, 1	3m approx

1 m² sub PLOT

	Litter cover (%)				
Subplot	10	10	25	40	20
Average	21%				

Litter includes leaves, seeds, twigs, branchlets and branches **less than 10 cm diameter**. Include all plant material that is detached from a plant and forms part of the litter layer on the ground surface. Litter cover is the two-dimensional litter layer in contact with the ground surface, including litter under the canopies of erect plants. Plant material that is not detached should be assessed as foliage cover, regardless of whether it appears alive or dead.

Quadrat Number: Q2 **Date:** 6/11/23 **Recorder:** J, M, A, O

Property Name or Project Name: Italia Rd

☑ Both Start and End points collected on GPS

☑ Start and End locations are approximately 50 m apart on GPS

1,000 m² PLOT

Tree Stem Size Class*		Trees^
Count of Large Trees Record DBH of each tree at 1.3 m from ground.	80+ cm	—
	50+ cm	—
All other Trees: Only record ***presence or absence*** of trees in these stem size classes. Record DBH of each tree at 1.3 m from ground.	30-49 cm	—
	20-29 cm	✓
	10-19 cm	✓
	5-9 cm	✓
Presence or absence of **Regeneration#** Maximum stem diameter of <5 cm regardless of height.	<5 cm	✓

Count of HBTs†

*Living trees only; for **multi-stemmed trees**, only largest stem is counted or recorded as present;

#Record presence of regeneration for any tree with a maximum stem diameter of <5 cm, regardless of height (i.e., record presence of regeneration if sapling or seedings that are <1.3 m heigh and have DBH <5 cm).

^Includes species classified as Trees under the BAM Growth Form Table.

†Count of **hollow-bearing *trees*** and ***shrubs***; includes living and dead; record by stem size class.

Length of logs (m) Fallen logs = >10 cm diameter, that is dead and entirely or partly on the ground within the 1,000 m² plot. Only the length of log within the plot is recorded.	Tally	TOTAL LENGTH (m)
	2, 1, 1, 1	5m approx

1 m² sub PLOT

	Litter cover (%)				
Subplot					
Average	100%				

Litter includes leaves, seeds, twigs, branchlets and branches **less than 10 cm diameter**. Include all plant material that is detached from a plant and forms part of the litter layer on the ground surface. Litter cover is the two-dimensional litter layer in contact with the ground surface, including litter under the canopies of erect plants. Plant material that is not detached should be assessed as foliage cover, regardless of whether it appears alive or dead.

Quadrat Number: Q3 **Date:** 6/11/3 **Recorder:** J.M, A.O

Property Name or Project Name: Italia Rd

☐ Both Start and End points collected on GPS

☐ Start and End locations are approximately 50 m apart on GPS

1,000 m² PLOT

Tree Stem Size Class*		Trees^
Count of Large Trees Record DBH of each tree at 1.3 m from ground.	80+ cm	—
	50+ cm	—
All other Trees: Only record ***presence or absence*** of trees in these stem size classes. Record DBH of each tree at 1.3 m from ground.	30-49 cm	—
	20-29 cm	✓
	10-19 cm	✓
	5-9 cm	✓
Presence or absence of **Regeneration#** Maximum stem diameter of <5 cm regardless of height.	<5 cm	✓

Count of HBTs†
0.

*Living trees only; for **multi-stemmed trees**, only largest stem is counted or recorded as present;

#Record presence of regeneration for any tree with a maximum stem diameter of <5 cm, regardless of height (i.e., record presence of regeneration if sapling or seedings that are <1.3 m heigh and have DBH <5 cm).

^Includes species classified as Trees under the BAM Growth Form Table.

†Count of **hollow-bearing *trees*** and ***shrubs***; includes living and dead; record by stem size class.

Length of logs (m)	Tally	TOTAL LENGTH (m)
Fallen logs = >10 cm diameter, that is dead and entirely or partly on the ground within the 1,000 m² plot. Only the length of log within the plot is recorded.	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	50m

1 m² sub PLOT

	Litter cover (%)				
Subplot	95	100	100	100	95
Average	98				

Litter includes leaves, seeds, twigs, branchlets and branches **less than 10 cm diameter**. Include all plant material that is detached from a plant and forms part of the litter layer on the ground surface. Litter cover is the two-dimensional litter layer in contact with the ground surface, including litter under the canopies of erect plants. Plant material that is not detached should be assessed as foliage cover, regardless of whether it appears alive or dead.

Quadrat Number: Q4 **Date:** 6-11-23 **Recorder:** AO

Property Name or Project Name: Italia Rd

☑ Both Start and End points collected on GPS

☑ Start and End locations are approximately 50 m apart on GPS

Cmac.
Dodvis.

APPENDIX 7. BAM 2020 CHECKLIST

Minimum Requirements of a Biodiversity Development Assessment Report (BDAR)

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
Introduction	**Chapters 2 & 3**	*Introduction to the biodiversity assessment including:*			
		I	Brief description of the proposal	Yes	**Section 1.3**
		I	Identification of subject land (as defined in the BAM) boundary, including: • Operational footprint (if BDAR) • Construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR) • Land proposed for biodiversity certification (if BCAR)	Yes	**Section 1.1**
		I	General description of the subject land	Yes	**Section 1.1**
		I	Sources of information used in the assessment, including reports and spatial data	Yes	**Section 1.4**
		D	Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR)	Yes	**Figure 2**
Landscape Context	**Sections 3.1 and 3.2, Appendix E**	*Identification of site context components and landscape features, including:*			
		I	General description of subject land topographic and hydrological setting, geology and soils	Yes	**Section 2.1**
		I	Percent native vegetation cover in the assessment area (as described in BAM Section 3.2)	Yes	**Section 2.1**
		I	IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	Yes	**Section 2.1**
		I	Rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	Yes	**Section 2.1**
		I	Wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	Yes	**Section 2.1**
		I	Connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	Yes	**Section 2.1**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
		I	Karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.)	Yes	**Section 2.1**
		I	Areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	Yes	**Section 2.1**
		I	Any additional landscape features identified in any SEARs for the proposal	Yes	**Section 2.1**
		M	Site Map • Boundary of subject land • Cadastre of subject land • Landscape features identified in BAM Subsection 3.1.3	Yes	**Figure 2** **Figure 3**
		M	Location Map • Digital aerial photography at 1:1,000 scale or finer • Boundary of subject land • Assessment area, (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development • Landscape features identified in BAM Subsection 3.1.3 • Additional detail (e.g. local government area boundaries) relevant at this scale	Yes	**Figure 3**
		M	Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location map include: • IBRA bioregions and subregions • rivers, streams and estuaries • wetlands and important wetlands • connectivity of different areas of habitat • karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features • areas of outstanding biodiversity value occurring on the subject land and assessment area • any additional landscape features identified in any SEARs for the proposal • NSW (Mitchell) landscape on which the subject land occurs	Yes	**Figure 3**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
		D	All report maps as separate jpeg files Individual digital shape files of: • subject land boundary • assessment area (i.e. subject land and 1500 m buffer area) boundary • cadastral boundary of subject land • areas of native vegetation cover • landscape features	Yes	**Figure 3**
Native vegetation	**Chapter 4, Appendix A and Appendix H**	*I*	Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	Yes	**Section 3.2**
		I	Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	Yes	**Section 3.2**
		I	Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	Yes	**Section 3.1**
		I	Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	Yes	**Section 3.1**
		I	Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	Yes	**Section 3.1**
		I	For each PCT within the subject land, describe: • vegetation class • extent (ha) within subject land • evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.)) • plant species relied upon for identification of the PCT and relative abundance of each species	Yes	**Section 3.2**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
			• if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.)) • estimate of percent cleared value of PCT (BAM Subsection 4.2.1(5.))		
		I	Describe the vegetation integrity assessment of the subject land, including: • identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1) • assessment of patch size (as described in BAM Subsection 4.3.2) • survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.) • use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	Yes	**Section 3.1**
		I	Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A): • identify the PCT or vegetation class for which local benchmark data will be applied • identify published sources of local benchmark data (if benchmarks obtained from published sources) • describe methods of local benchmark data collection (if reference plots used to determine local benchmark data) • provide justification for use of local data rather than BioNet Vegetation Classification benchmark values • provide written confirmation from the decision-maker that they support the use of local benchmark data	Yes	**Section 3.2**
		M	Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	Yes	**Figure 4**
		M	Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Yes	**Figure 4**
		M	Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	Yes	**Figure 4**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
		M	Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCTs boundaries	Yes	**Figure 4**
		M	Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	Yes	**Figure 4**
		M	Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	Yes	**Figure 4** **Section 3.2.2**
		M	Table of current vegetation integrity scores for each vegetation zone within the site and including: • composition condition score • structure condition score • function condition score • presence of hollow bearing trees	Yes	**Table 3**
		D	All report maps as separate jpeg files	Yes	**Attachment**
		D	Plot field data (MS Excel format)	Yes	**Attachment**
		D	Plot field data sheets	Yes	**Appendix 6**
		D	Digital shape files of: • PCT boundaries within subject land • TEC boundaries within subject land • vegetation zone boundaries within subject land • floristic vegetation survey and vegetation integrity plot locations	Yes	**Attachment**
Threatened species	**Chapter 5**	*I*	Identify ecosystem credit species likely to occur on the subject land, including: • list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.)) • justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	Yes	**Section 4.1.2**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
			• justification for addition of any ecosystem credit species to the list		
		I	Identify species credit species likely to occur on the subject land, including: • list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1) • justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2) • justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2) • justification for addition of any species credit species to the list	Yes	**Section 4.4**
		I	From the list of candidate species credit species, identify: • species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.)) • species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.)) • species for which targeted surveys are to be completed to determine species presence (Subsection 5.2.4(2.b.)) • species for which an expert report is to be used to determine species presence (Subsection 5.2.4(2.c.))	Yes	**Section 4.4**
		I	Present the outcomes of species credit species assessments from: • threatened species survey (as described in BAM Section 5.2.4) • expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Section 5.2.4 and 5.3, Box 3)	Yes	**Section 4.5**
		I	Where survey has been undertaken include detailed information on: • survey method and effort, (as described in BAM Section 5.3) • justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the Department's taxa-specific survey guides or where no relevant guideline has been published • timing of survey in relation to requirements in the TBDC or the Department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys	Yes	**Section 4.5.1 and Section 4.5.2**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
			• survey personnel and relevant experience • describe any limitations to surveys and how these were addressed/overcome		
		I	Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include: • justification of the use of an expert report • identify the expert, provide evidence of their expert credentials and Departmental approval of expert status • all requirements of Box 3 have been addressed in the expert report	Not Applicable	**N/A**
		I	Where use of local data is proposed (BAM Subsection 1.4.2): • identify relevant species • identify data to be amended • identify source of information for local data, e.g. published literature, additional survey data, etc. • justify use of local data in preference to VIS Classification or TBDC data • provide written confirmation from the decision-maker that they support the use of local data	Not Applicable	**N/A**
		I	Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that: • the unit of measure for each species is documented *For Species assessed by **Area:*** • the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5) • a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied *For Species assessed by **Area:***	Yes	**Section 4.5.2.3**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
			• the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.)) • the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken • the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land		
		I	Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	Yes	**Table 12**
		M	Table showing ecosystem credit species in accordance with BAM Section 5.1.1, and identifying: • the ecosystem credit species removed from the list • the sensitivity to gain class of each species	Yes	**Table 4**
		M	Table detailing species credit species in accordance with BAM section 5.2 and identifying: • the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or micro habitat features are not present • the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	Yes	**Tables 5, 6 & 7**
		M	Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	Yes	**Tables 6 & 7**
		M	Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5)	Yes	**Figures 6, 9 & 10**
		D	Digital shape files of suitable habitat identified for survey for each candidate species credit species	Yes	**Attachment**
		D	Survey locations including GPS coordinates of any plots, transects, grids	Yes	**Attachment**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
		D	Digital shape files of each species polygon including GPS coordinates of located individuals	Yes	**Attachment**
		D	Species polygon map in jpeg format	Yes	**Attachment**
		D	Expert reports and any supporting data used to support conclusions of the expert report	Not Applicable	**N/A**
		D	Field data sheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	Yes	**Attachment**
Prescribed impacts	**Chapter 6**	I	Identify potential prescribed biodiversity impacts on threatened entities, including: • karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1) • occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2) • corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3) • water bodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4) • protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5) • where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	Yes	**Section 5.1**
		I	Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	Yes	**Section 5.1**
		I	Describe the importance of habitat features to the species including, where relevant, impacts on life-cycle or movement patterns (e.g. Subsection 6.1.3)	Yes	**Section 5.1**
		I	Where the proposed development is for a wind farm:	Not Applicable	**N/A**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
			• identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5) • provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.) • predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))		
		M	Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	Not Applicable	**N/A**
		M	Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)	Not Applicable	**N/A**
		D	Digital shape files of prescribed impact feature locations	Not Applicable	**N/A**
		D	Prescribed impact features map in jpeg format	Not Applicable	**N/A**
Stage 2 – Impact Assessment (Biodiversity Values)					
Avoid and minimise impacts	**Chapter 7**	I	Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative: • modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology • routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route • alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	Yes	**Section 5.2**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
			• alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site • Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2) • Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Section 7.2.1(3.))		
		M	Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Yes	**Section 5.2**
		M	Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	Not Applicable	**N/A**
		M	Maps demonstrating indirect impact zones where applicable	Not Applicable	**N/A**
		M	Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Yes	**Section 5.2**
		D	Digital shape files of: • alternative and final proposal footprint • direct and indirect impact zones • Maps in jpeg format	Not Applicable	**N/A**
Assessment of Impacts	Chapter 8, Sections 8.1 and 8.2	I	Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	Yes	**Section 6.2**
		I	Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	Yes	**Section 6.2**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
			• description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal • documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications • reporting any limitations or assumptions, etc. made during the assessment • identification of the threatened entities and their habitat likely to be affected		
		I	Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including: assessment of the nature, extent and duration of impacts on the habitat of threatened species or ecological communities associated with: • karst, caves, crevices, cliffs, rocks and other features of geological significance • human-made structures • non-native vegetation • connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range • movement of threatened species that maintains their life cycle • water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	Yes	**Section 5.1**
		I	Assessment of the impacts of wind turbine strikes on protected animals	Not Applicable	**N/A**
		I	Assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	Yes	**Section 5.1**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
		M	Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Yes	**Table 9**
Mitigation and Management of Impacts	**Chapter 8, Sections 8.4 and 8.5**	I	Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Subsections 8.4.1 and 8.4.2, including (as described in BAM Subsection 8.4.1(2.): • techniques, timing, frequency and responsibility • identify measures for which there is risk of failure • evaluate the risk and consequence of any residual impacts • document any adaptive management strategy proposed	Yes	**Section 5.3**
		I	Identification of measures for mitigating impacts related to: • indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.)) • mitigating prescribed biodiversity impacts if relevant (as described in BAM Subsection 8.4.2)	Yes	**Section 5.3**
		I	Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	Yes	**Section 5.3**
		M	Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Yes	**Table 10**
Impact Summary	**Chapter 9**	I	Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAII, in accordance with BAM Section 9.1) including: • addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAII present on the subject land • addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land • documenting assumptions made and/or limitations to information • documenting all sources of data, information, references used or consulted • clearly justifying why any criteria could not be addressed	Yes	**Section 6**
		I	Identification of impacts requiring offset in accordance with BAM Section 9.2	Yes	**Section 6**
		I	Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	Yes	**Section 6**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
		I	Identification of areas not requiring assessment in accordance with BAM Section 9.3	Yes	**Section 6**
		M	Map showing the extent of TECs at risk of an SAII within the subject land	Yes	**Figure 4**
		M	Map showing location of threatened species at risk of an SAII within the subject land	Not Applicable	**N/A**
		M	Map showing location of: • impacts requiring offset • impacts not requiring offset • areas not requiring assessment	Yes	**Section 6.2 and Figure 4**
		D	Digital shape files of: • extent of TECs at risk of an SAII within the subject land • location of threatened species at risk of an SAII within the subject land • boundary of impacts requiring offset • boundary of impacts not requiring offset • boundary of areas not requiring assessment Maps in jpeg format	Yes	**Attachment**
	Chapter 10	I	Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including: • future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H) • change in vegetation integrity score (BAM Subsection 8.1.1) • number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 9) • number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	Yes	**Section 6**
		M	Table of PCTs requiring offset and the number of ecosystem credits required	Yes	**Table 11**
		M	Table of threatened species requiring offset and the number of species credits required	Yes	**Table 12**

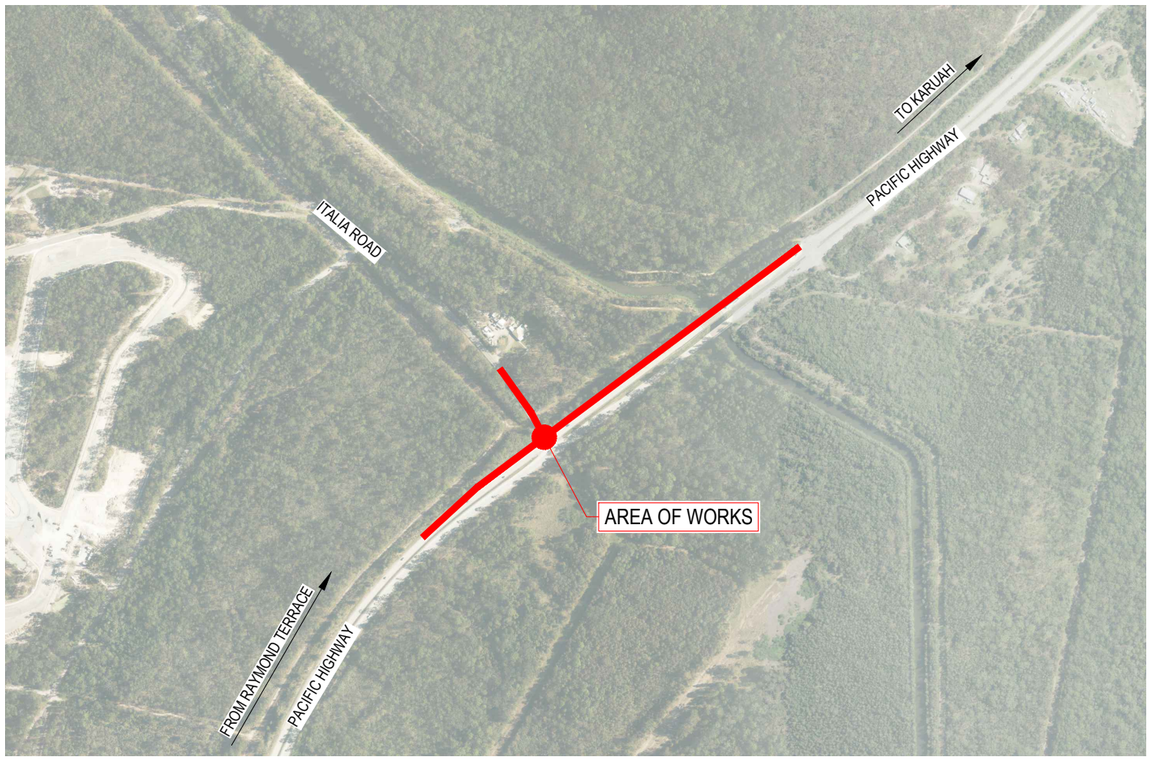
Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
		D	Submitted proposal in the BAM Calculator	Yes	**Submitted**
Biodiversity credit report	**Chapter 10**	I	Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2)	Yes	**Attachment**
		M	Table of credit class and matching credit profile	Yes	**Attachment**
		D	BAM credit report in pdf format	Yes	**Appendix 4**
Biodiversity certification offsets and strategy (biodiversity certification only)	**Chapter 12 and Appendix J**	I	Land-based conservation measures including (strategic biodiversity certification only): • identification of parcels subject to land-based conservation measures • identification of land-based conservation measures proposed for each parcel • supporting information to demonstrate suitability of land-based conservation measures (Appendix J) • credit score of land-based conservation measures (Appendix J)	Not Applicable	**N/A**
		I	Biodiversity certification strategy including: • land proposed for biodiversity certification • land proposed for biodiversity conservation • proposed conservation measures • legal mechanisms for securing delivery of proposed conservation measures • parties to the biodiversity certification and responsibilities, noting where biodiversity certification agreements are proposed • timing for delivery of conservation measures • funding sources for delivery of conservation measures	Not Applicable	**N/A**

Section	BAM 2020 Reference	Reporting Requirement		Document Reference	
		Type *	Detail	Completion	Reference
			• framework for monitoring, reporting or auditing implementation of conservation measures		
		M	Maps of parcels of land proposed for land-based conservation measures	Not Applicable	**N/A**
		M	Maps as per Appendix M as required in relation to any land-based conservation measures	Not Applicable	**N/A**
		M	Tables as per Appendix M as required in relation to any land-based conservation measures	Not Applicable	**N/A**
		M	Table of credit scores for land-based conservation measures, including scores produced by BAM and weighting adjusted scores as per Appendix J	Not Applicable	**N/A**
		D	Digital shape files of parcels of land proposed for land-based conservation measures	Not Applicable	**N/A**
		D	Maps in jpeg format	Not Applicable	**N/A**

* I: Information, M: Maps & tables, D: Data (to be supplied)

APPENDIX 8. ITALIA ROAD INTERSECTION ROAD DESIGN

BORAL RESOURCES (NSW) PTY LTD
BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION
12599191



LOCALITY
N.T.S

DRAWING INDEX	
DRAWING No.	DRAWING TITLE
12599191-GHD-00-00-DRG-CI-01001	COVER SHEET, LOCALITY AND DRAWING INDEX
12599191-GHD-00-00-DRG-CI-01031	TYPICAL SECTIONS - SHEET 1 OF 1
12599191-GHD-00-00-DRG-CI-01051	OVERVIEW PLAN
12599191-GHD-00-00-DRG-CI-01101	DETAIL PLAN - SHEET 1 OF 3
12599191-GHD-00-00-DRG-CI-01102	DETAIL PLAN - SHEET 2 OF 3
12599191-GHD-00-00-DRG-CI-01103	DETAIL PLAN - SHEET 3 OF 3
12599191-GHD-00-00-DRG-CI-01111	LONGITUDINAL SECTIONS - SHEET 1 OF 4
12599191-GHD-00-00-DRG-CI-01112	LONGITUDINAL SECTIONS - SHEET 2 OF 4
12599191-GHD-00-00-DRG-CI-01113	LONGITUDINAL SECTIONS - SHEET 3 OF 4
12599191-GHD-00-00-DRG-CI-01114	LONGITUDINAL SECTIONS - SHEET 4 OF 4
12599191-GHD-00-00-DRG-CI-01301	ROADSIDE FURNITURE AND PAVEMENT PLAN - SHEET 1 OF 3
12599191-GHD-00-00-DRG-CI-01302	ROADSIDE FURNITURE AND PAVEMENT PLAN - SHEET 2 OF 3
12599191-GHD-00-00-DRG-CI-01303	ROADSIDE FURNITURE AND PAVEMENT PLAN - SHEET 3 OF 3
12599191-GHD-00-00-DRG-CI-01401	TURNING PATHS
12599191-GHD-00-00-DRG-CI-01501	EROSION AND SEDIMENT CONTROL PLAN - SHEET 1 OF 3
12599191-GHD-00-00-DRG-CI-01502	EROSION AND SEDIMENT CONTROL PLAN - SHEET 2 OF 3
12599191-GHD-00-00-DRG-CI-01503	EROSION AND SEDIMENT CONTROL PLAN - SHEET 3 OF 3
12599191-GHD-00-00-DRG-CI-01511	EROSION AND SEDIMENT CONTROL NOTES AND DETAILS
12599191-GHD-00-00-DRG-CI-01601	CROSS SECTION - SHEET 1 OF 6
12599191-GHD-00-00-DRG-CI-01602	CROSS SECTION - SHEET 2 OF 6
12599191-GHD-00-00-DRG-CI-01603	CROSS SECTION - SHEET 3 OF 6
12599191-GHD-00-00-DRG-CI-01604	CROSS SECTION - SHEET 4 OF 6
12599191-GHD-00-00-DRG-CI-01605	CROSS SECTION - SHEET 5 OF 6
12599191-GHD-00-00-DRG-CI-01606	CROSS SECTION - SHEET 6 OF 6

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Designer C.BARTLEY Design Check N.HINCKS

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Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title COVERSHEET, LOCALITY AND DRAWINGS INDEX
Size A3
Drawing No. 12599191-GHD-00-00-DRG-CI-01001
Rev D

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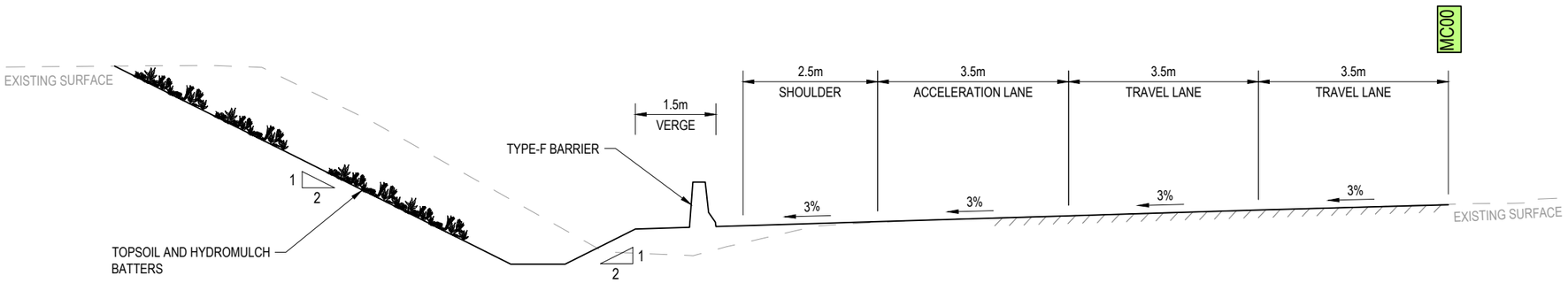

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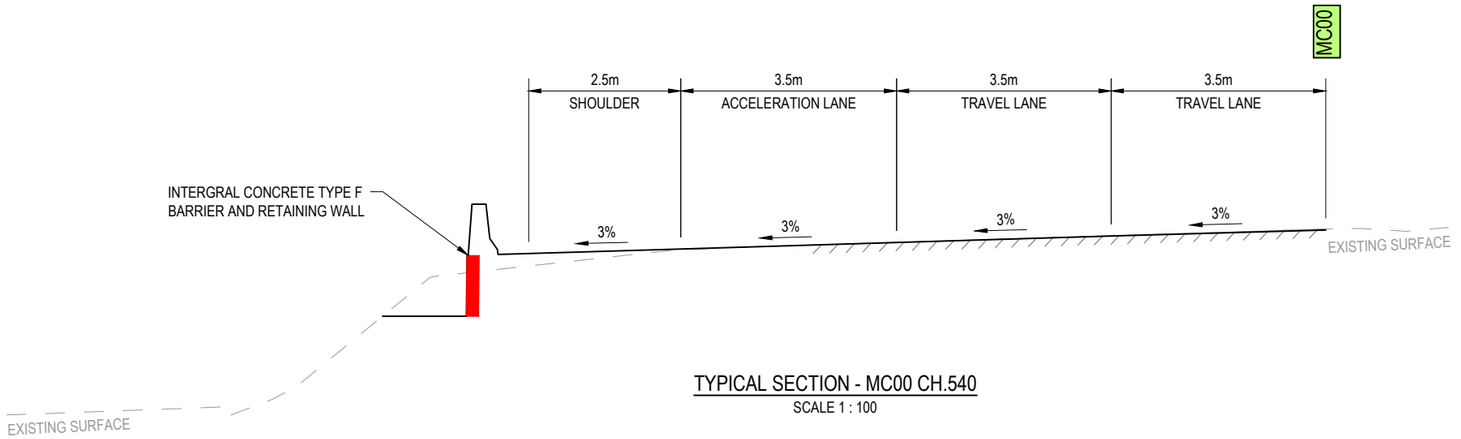

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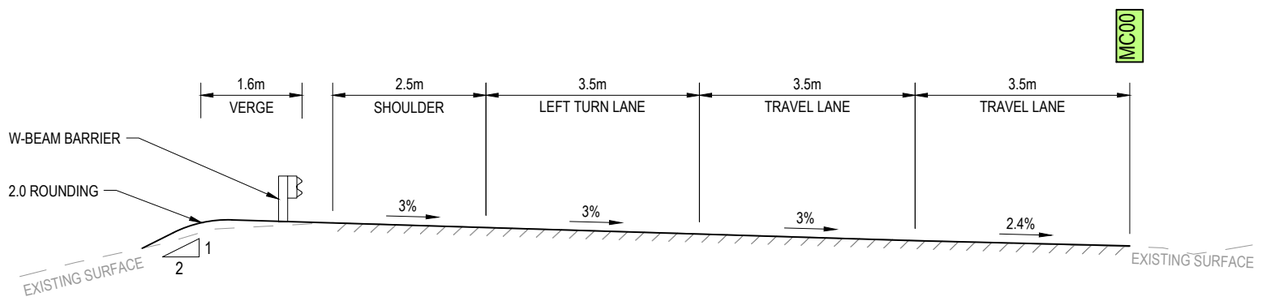

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Author B.DREW **Drafting Check** C.PURDON

Designer C.BARTLEY **Design Check** N.HINCKS

0 1 2 3m

SCALE 1:100 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title TYPICAL SECTIONS

SHEET 1 OF 1

Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01031

Rev D

Plot Date: 27 July 2023 - 1:53 PM Plotted by: Blake Drew

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PLAN
SCALE 1:5000

GENERAL

1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE PROJECT CONTRACT,SCOPE OF WORKS AND SPECIFICATIONS, INCLUDING THE RELEVANT TfNSW AND AUSTRALIAN STANDARDS UNLESS NOTED OTHERWISE.
2. PROVISION OF TRAFFIC CONTROL DURING CONSTRUCTION TO BE IN ACCORDANCE WITH THE CURRENT TfNSW SPECIFICATION G10 AND TfNSW PUBLICATION "TRAFFIC CONTROL AT WORK SITES".
3. ALL LOCATIONS, ORIENTATIONS AND LEVELS TO BE VERIFIED ON SITE BEFORE COMMENCING ANY WORK. REFER DISCREPANCIES TO THE PRINCIPAL. DO NOT OBTAIN DIMENSIONS FROM SCALING. NATURAL SURFACE LEVELS ON THE DRAWINGS ARE INDICATIVE ONLY.

ALIGNMENT SETOUT CONTROL PLANS AND TABLES

1. SURVEY HEIGHT DATUM IS AHD.
2. SURVEY COORDINATE GRID IS MGA2020, ZONE 56.
3. SURVEY MARKS ARE NOT TO BE DISTURBED BEFORE ASSESSMENT BY SURVEYOR.
4. THE CONTRACTOR SHALL CHECK SUSTAINABILITY OF THE STATED COORDINATES PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
5. ANY SURVEY PMs OR SSMs THAT ARE DESTROYED ARE TO BE REPLACED WITH ANOTHER PM OR SSM TO LANDS DEPARTMENT STANDARDS. IT ALSO SHOULD BE DOCUMENTED AND CO-ORDINATED TO EQUIVALENT LANDS DEPARTMENT STANDARDS.
6. REFER TfNSW SPECIFICATION G71 FOR SURVEY REQUIREMENTS FOR SPATIAL TOLERANCES AND QUALITY ASSURANCE REQUIREMENTS
7. REFER TfNSW STANDARD DRAWINGS R0400-01 AND R0400-02 FOR SETTING OUT DIAGRAMS FOR ROADS

UTILITIES

1. LOCATION AND LEVEL OF ALL EXISTING AND PROPOSED SERVICES MUST BE OBTAINED PRIOR TO CONSTRUCTION. ALL LEVELS MUST BE CHECKED FOR CONFLICT WITH ANY SERVICES, AND ANY CONFLICTS TO BE RAISED WITH THE PRINCIPAL.
2. THE CONTRACTOR MUST FOLLOW ALL UTILITY AUTHORITIES "DUTY OF CARE" WHEN WORKING IN THE VICINITY OF SERVICES. ANY DAMAGE TO THE EXISTING SERVICES SHALL BE RECTIFIED AND VERIFIED WITH THE AUTHORITY REPRESENTATIVE AT THE CONTRACTORS EXPENSE.

ROADSIDE FURNITURE AND DELINEATION

1. PAVEMENT MARKING AND SIGNAGE TO BE IN ACCORDANCE WITH TfNSW SPECIFICATIONS, GUIDELINES AND STANDARDS.
2. SIGNAGE TO BE LOCATED IN ACCORDANCE WITH AS1742.
3. MOUNTED HEIGHT FOR SIGNS TO BE 1.5m MIN.
4. THE CONTRACTOR IS TO ENSURE THAT SIGN FOOTINGS DO NOT CLASH WITH UNDERGROUND UTILITIES. SHOULD SIGN LOCATIONS NEED TO BE MOVED, APPROVAL IS REQUIRED FROM THE PRINCIPAL.
5. ALL SIGN SUPPORT STRUCTURES ARE TO BE GRADE C320LO IN ACCORDANCE WITH TfNSW SPECIFICATION R143 UNLESS NOTED OTHERWISE.
6. RAISED REFLECTIVE PAVEMENT MARKERS TO BE INSTALLED IN ACCORDANCE WITH THE SPACINGS SPECIFIED IN THE TfNSW DELINEATION GUIDELINES.
7. REUSE OF ANY EXISTING SIGN FACES AND SUPPORT STRUCTURES REQUIRE APPROVAL FROM THE PRINCIPAL.
8. CONTRACTOR TO ENSURE SAFETY BARRIER FOOTINGS DO NOT CLASH WITH UNDERGROUND UTILITIES.
9. CONTRACTOR TO INSTALL GUIDE POSTS IN ACCORDANCE WITH TfNSW DELINEATION GUIDE SECTION 16 - GUIDE POSTS AND DELINEATION OF SAFETY BARRIERS.

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Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 50 100 150m
SCALE 1:5000 AT ORIGINAL SIZE

N

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title OVERVIEW PLAN AND GENERAL NOTES
Size A3
Drawing No. 12599191-GHD-00-00-DRG-CI-01051
Rev D

Plot Date: 27 July 2023 - 1:54 PM Plotted by: Blake Drew
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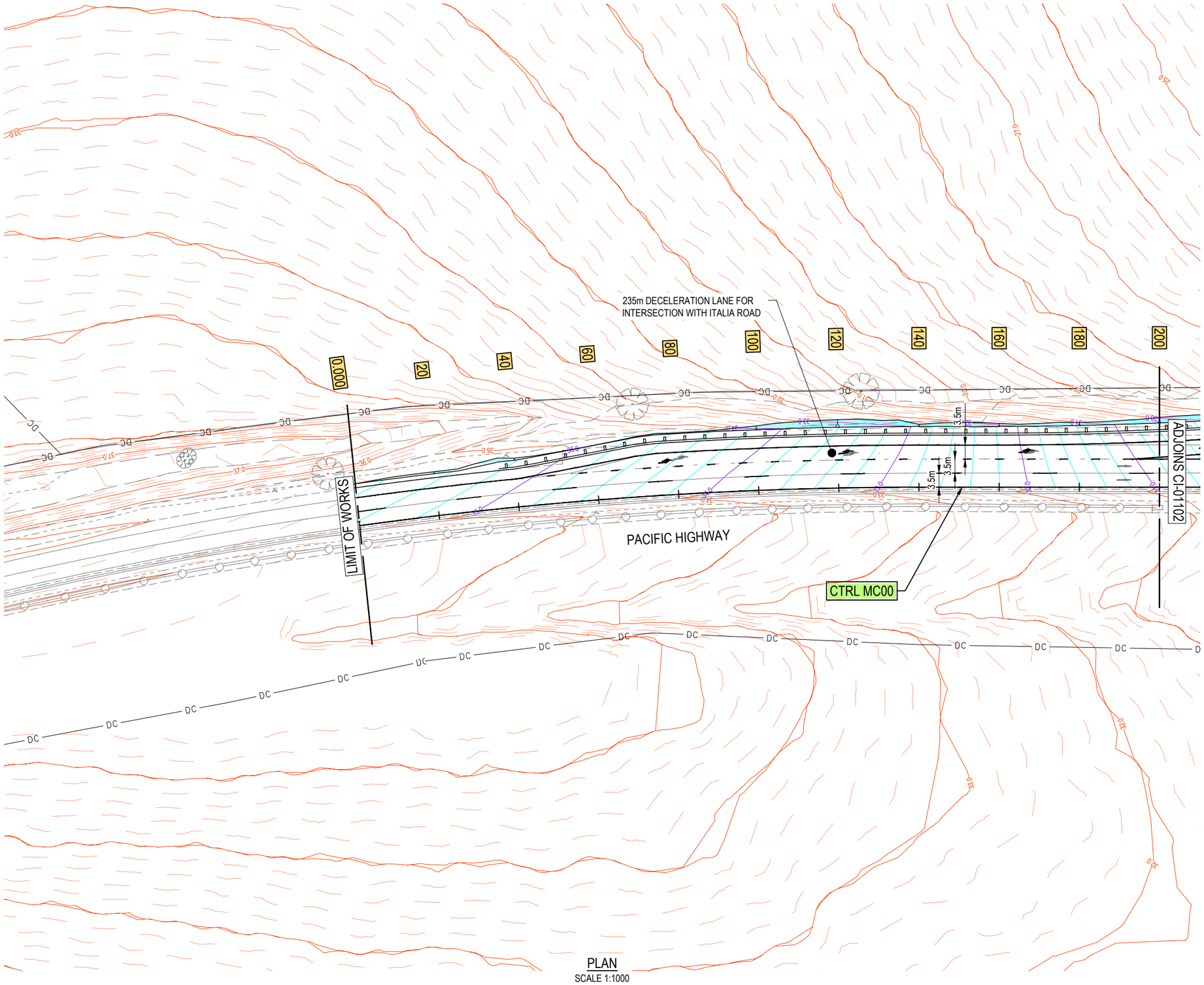

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SCALE 1:1000

LEGEND

GENERAL

- EXISTING CONTOUR MAJOR (1.0m)
- EXISTING CONTOUR MINOR (0.2m)
- DESIGN CONTOUR MAJOR (1.0m)
- DESIGN CONTOUR MINOR (0.2m)
- SURVEY
- DESIGN STRINGS
- DIGITAL CADASTRE
- EXISTING BRIDGE DECK
- PROPOSED BRIDGE DECK
- EZYGUARD 4 (OR SIMILAR) BARRIER
- RETAINING WALL WITH TYPE F BARRIER

ROAD GEOMETRY & ALIGNMENT

- MASTER CONTROL LINE

DRAINAGE

- NEW STORMWATER PIPE
- PIPE SIZE AND FLOW DIRECTION (Ø375)
- NEW STORMWATER PIT; KERB INLET PIT

NOTE

1. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01051 FOR OVERVIEW PLAN
2. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01111 FOR MC00 LONGITUDINAL SECTION
3. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01601 TO 12599191-GHD-00-00-DRG-CI-01606 FOR MC00 CROSS SECTIONS
4. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01301 TO 12599191-GHD-00-00-DRG-CI-01303 FOR ROADSIDE FURNITURE AND PAVEMENT PLANS

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0 10 20 30m
SCALE 1:1000 AT ORIGINAL SIZE

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ITALIA ROAD INTERSECTION
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Drawing Title DETAIL PLAN
SHEET 1 OF 3
Size A3
Drawing No. 12599191-GHD-00-00-DRG-CI-01101
Rev E

Plot Date: 27 July 2023 - 1:54 PM Plotted by: Blake Drew
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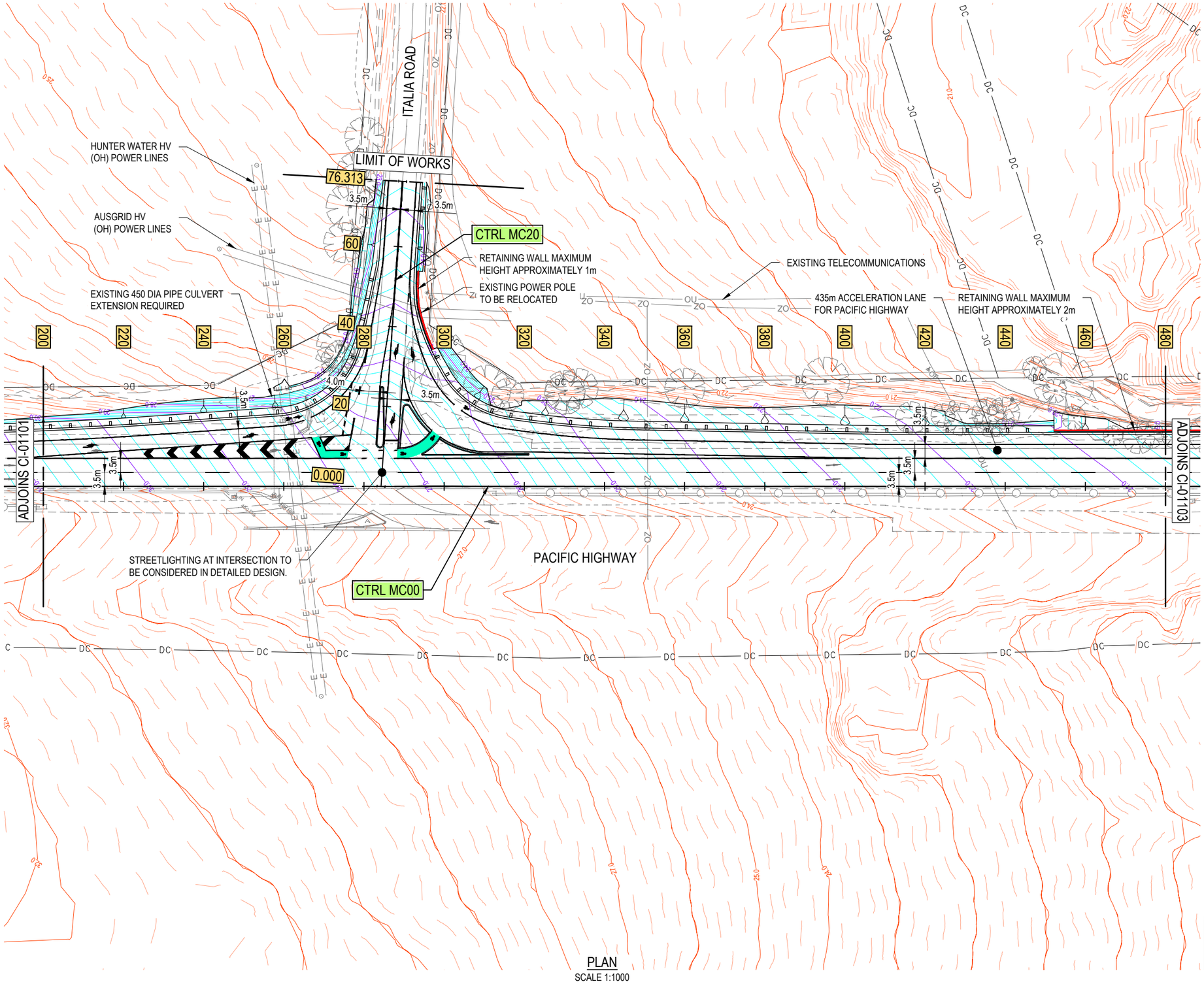

PLAN
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LEGEND

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DRAINAGE

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- PIPE SIZE AND FLOW DIRECTION
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Drawing Title DETAIL PLAN
SHEET 2 OF 3
Size A3
Drawing No. 12599191-GHD-00-00-DRG-CI-01102
Rev E

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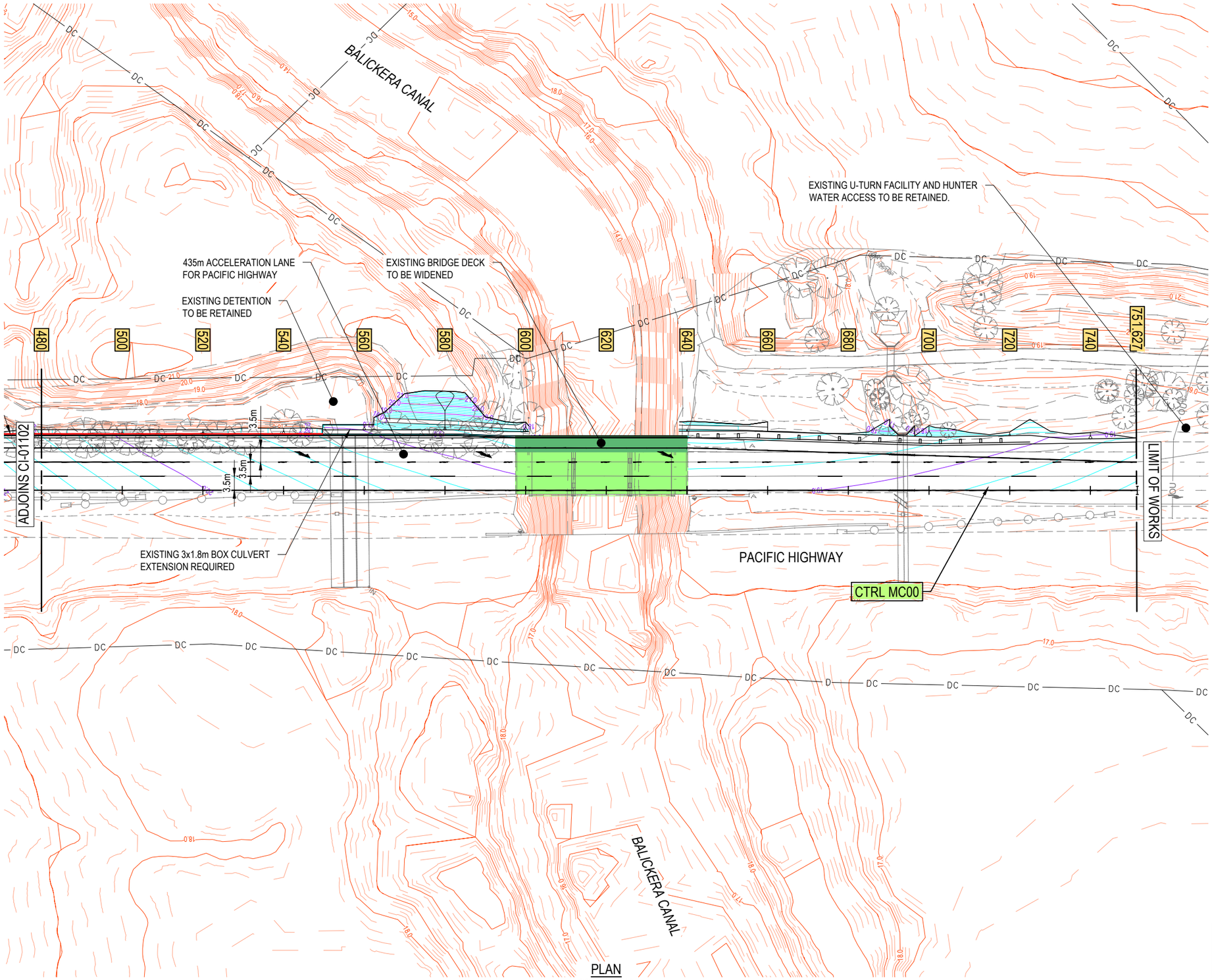

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E	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
D	CONCEPT DESIGN FOR DA APPROVAL			30.06.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 10 20 30m
SCALE 1:1000 AT ORIGINAL SIZE

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Project No. 12599191

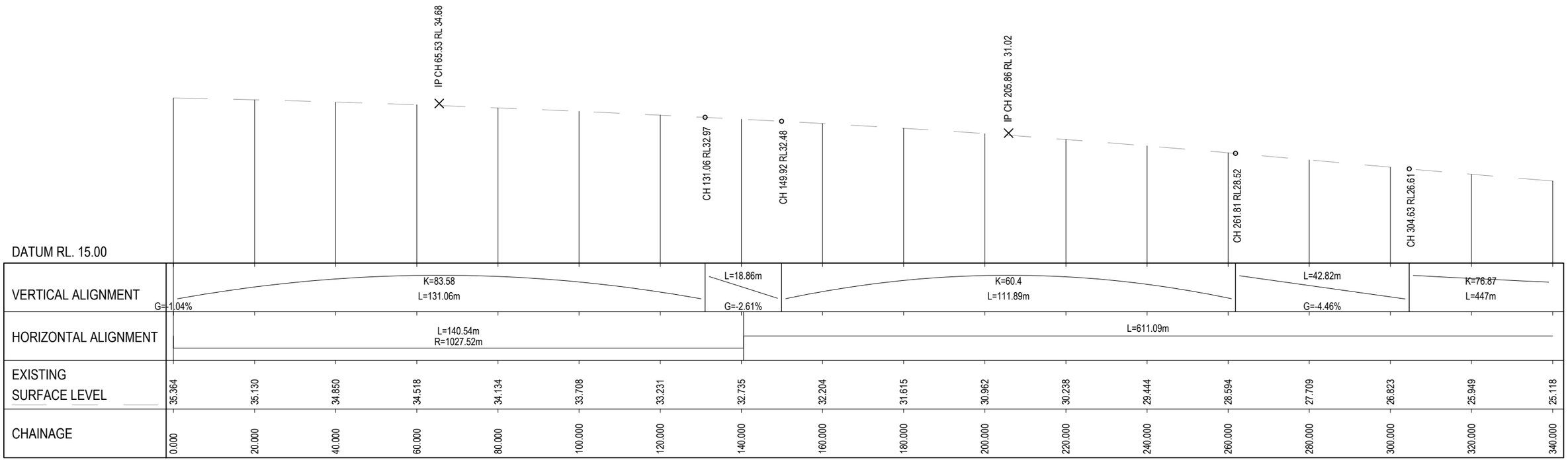
Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title DETAIL PLAN
SHEET 3 OF 3
Drawing No. 12599191-GHD-00-00-DRG-CI-01103
Size A3
Rev E

Plot Date: 27 July 2023 - 1:54 PM Plotted by: Blake Drew
File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01100.dwg

NOTES

1. ROAD GEOMETRY ESTIMATED BASED ON EXISTING SURFACE SURVEY.
   VERTICAL AND HORIZONTAL ALIGNMENT TO MATCH EXISTING.



LONGITUDINAL SECTION - MC00

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:500

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
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A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

VERTICAL SCALE 1:500 AT ORIGINAL SIZE 0 5 10 15m
HORIZONTAL SCALE 1:1000 AT ORIGINAL SIZE 0 10 20 30m

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title LONGITUDINAL SECTIONS
SHEET 1 OF 4
Drawing No. 12599191-GHD-00-00-DRG-CI-01111
Size A3
Rev D

Plot Date: 27 July 2023 - 1:54 PM Plotted by: Blake Drew
File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01110.dwg

NOTES

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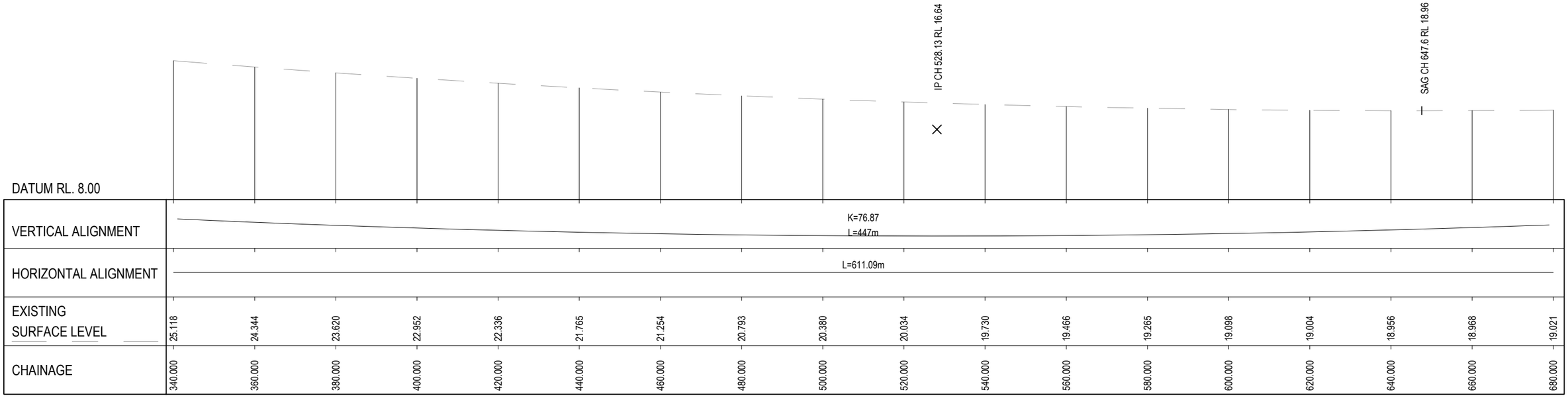

LONGITUDINAL SECTION - MC00

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:500

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

VERTICAL SCALE 1:500 AT ORIGINAL SIZE
HORIZONTAL SCALE 1:1000 AT ORIGINAL SIZE
0 5 10 15m
0 10 20 30m

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title LONGITUDINAL SECTIONS
SHEET 2 OF 4
Size A3
Drawing No. 12599191-GHD-00-00-DRG-CI-01112
Rev D

Plot Date: 27 July 2023 - 1:54 PM Plotted by: Blake Drew
File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01110.dwg

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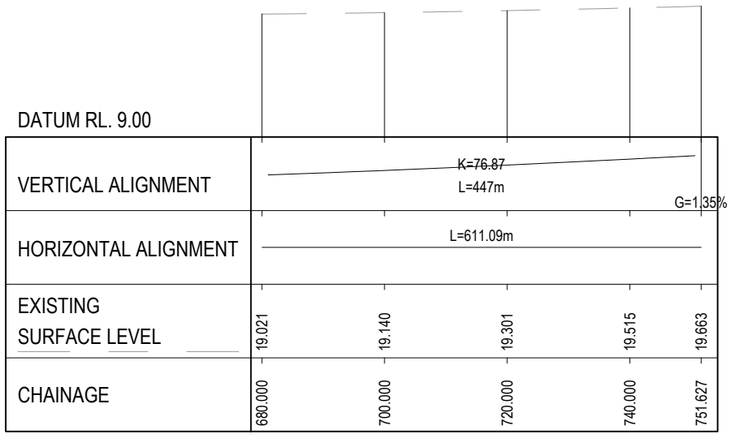
1. ROAD GEOMETRY ESTIMATED BASED ON EXISTING SURFACE SURVEY.
   VERTICAL AND HORIZONTAL ALIGNMENT TO MATCH EXISTING.



LONGITUDINAL SECTION - MC00

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:500

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW **Drafting Check** C.PURDON
Designer C.BARTLEY **Design Check** N.HINCKS

VERTICAL SCALE 1:500 AT ORIGINAL SIZE 0 5 10 15m
HORIZONTAL SCALE 1:1000 AT ORIGINAL SIZE 0 10 20 30m

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title LONGITUDINAL SECTIONS

SHEET 3 OF 4

Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01113

Rev D

Plot Date: 27 July 2023 - 1:54 PM Plotted by: Blake Drew

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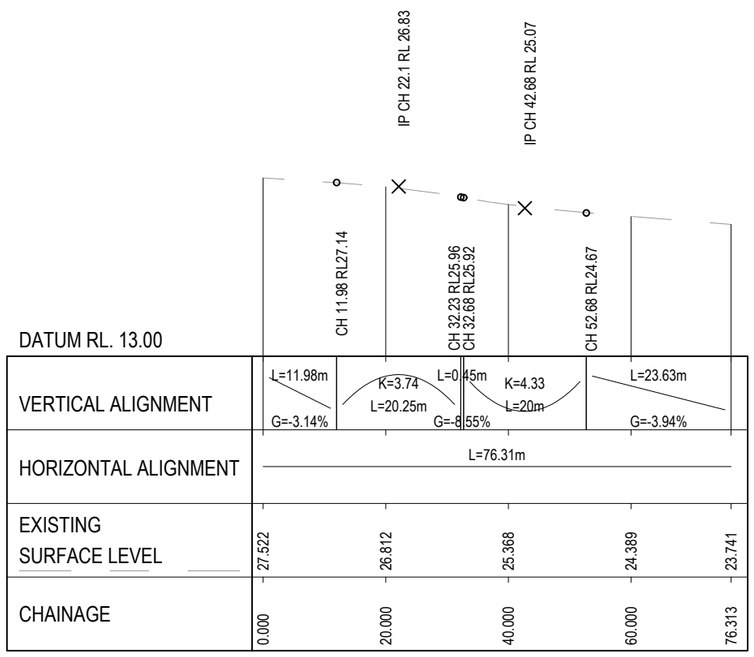
NOTES

1. ROAD GEOMETRY ESTIMATED BASED ON EXISTING SURFACE SURVEY. VERTICAL AND HORIZONTAL ALIGNMENT TO MATCH EXISTING.



LONGITUDINAL SECTION - MC20

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:500

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

VERTICAL SCALE 1:500 AT ORIGINAL SIZE 0 5 10 15m
HORIZONTAL SCALE 1:1000 AT ORIGINAL SIZE 0 10 20 30m

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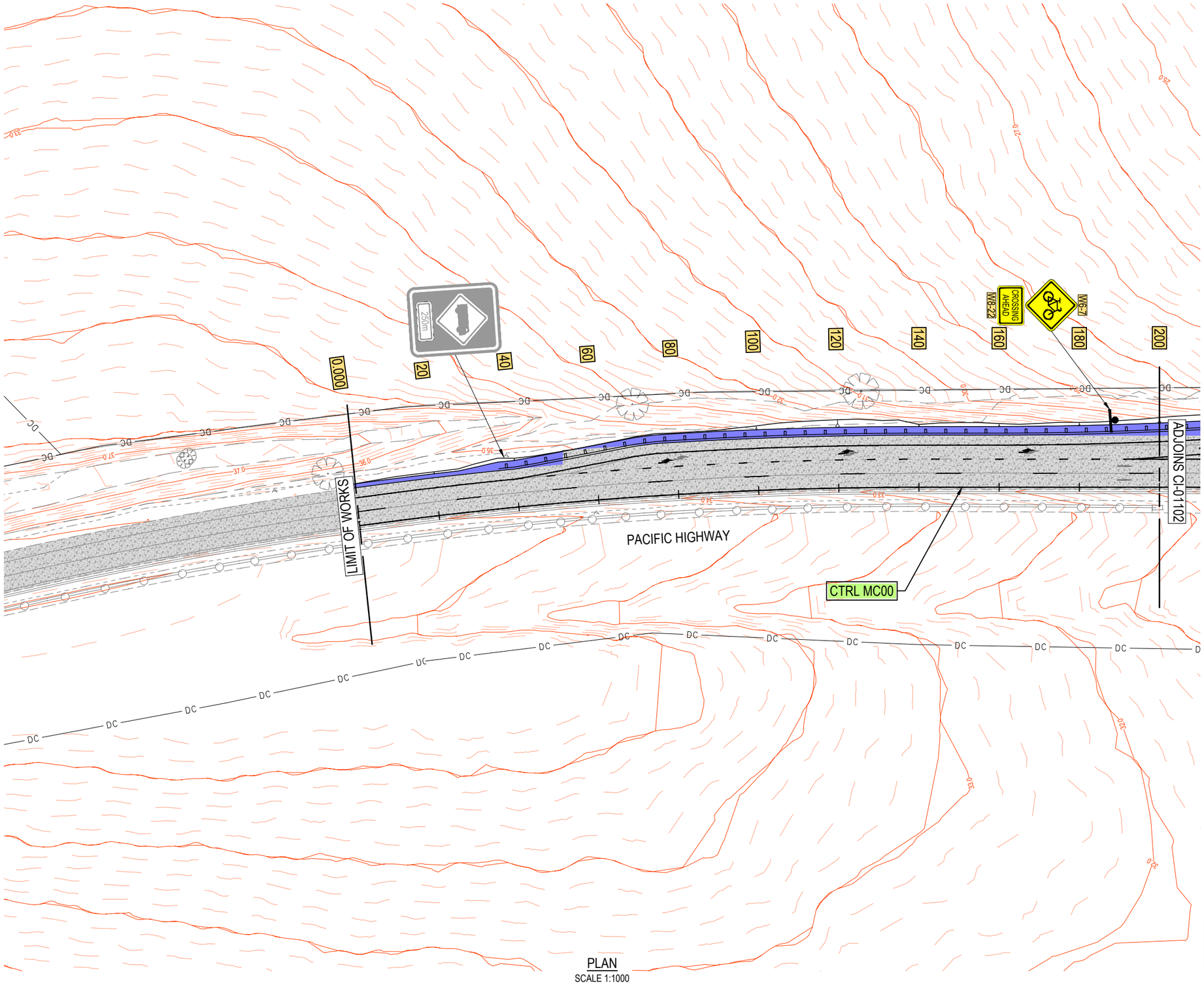
Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title LONGITUDINAL SECTIONS
SHEET 4 OF 4
Drawing No. 12599191-GHD-00-00-DRG-CI-01114
Size A3
Rev D

Plot Date: 27 July 2023 - 1:54 PM Plotted by: Blake Drew
File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01110.dwg



PLAN
SCALE 1:1000

LEGEND

GENERAL

- EXISTING CONTOUR MAJOR (1.0m)
- EXISTING CONTOUR MINOR (0.2m)
- DESIGN CONTOUR MAJOR (1.0m)
- DESIGN CONTOUR MINOR (0.2m)
- SURVEY
- DESIGN STRINGS
- DIGITAL CADASTRE
- EXISTING BRIDGE DECK
- PROPOSED BRIDGE DECK
- EZYGUARD 4 (OR SIMILAR) BARRIER
- RETAINING WALL WITH TYPE F BARRIER
- XX01 — BARRIER I.D. CALL UP

ROAD GEOMETRY & ALIGNMENT

- 40 — 60 — MASTER CONTROL LINE

ROADSIDE FURNITURE

- NEW SIGN LOCATION
- 60 / R4-1A — NEW SIGN (NOT TO SCALE); SIGN SIZE (WHERE APPLICABLE) SIGN NUMBER
- 60 — EXISTING SIGN (NOT TO SCALE)

DELINEATION

- 60 — NEW PAVEMENT MARKINGS

PAVEMENT

- PT1 - NEW CONCRETE PAVEMENT
- PT2 - NEW ASPHALT PAVEMENT.
- PT3 - NEW CONCRETE MEDIAN
- EXISTING CONCRETE PAVEMENT
- EXISTING FLEXIBLE PAVEMENT

NOTE

1. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01051 FOR OVERVIEW PLAN
2. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01111 FOR MC00 LONGITUDINAL SECTION
3. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01601 TO 12599191-GHD-00-00-DRG-CI-01606 FOR MC00 CROSS SECTIONS

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Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 10 20 30m
SCALE 1:1000 AT ORIGINAL SIZE

BORAL

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title ROADSIDE FURNITURE AND PAVEMENT PLAN SHEET 1 OF 3

Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01301

Rev D

Plot Date: 27 July 2023 - 1:55 PM Plotted by: Blake Drew

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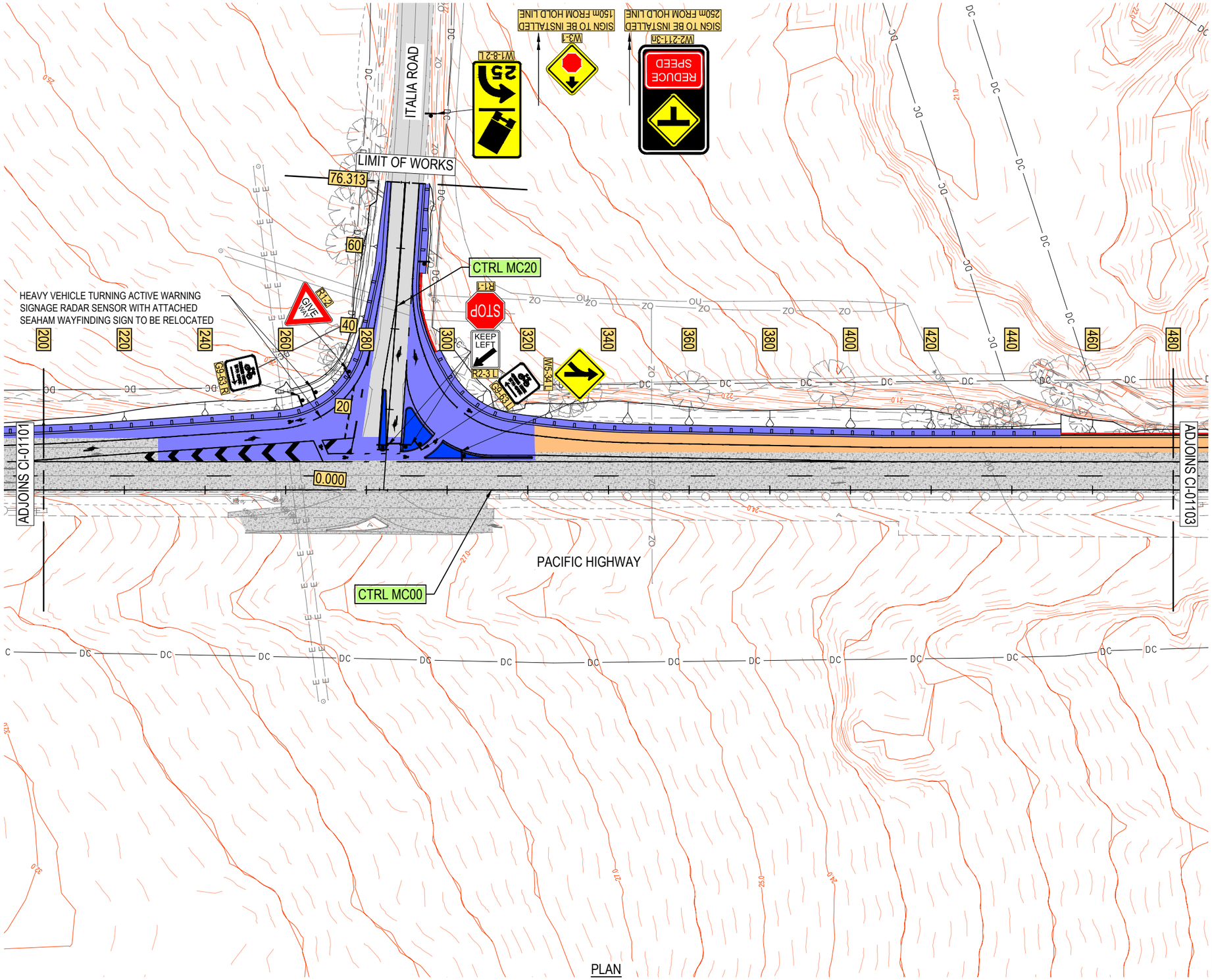

LEGEND

GENERAL

- EXISTING CONTOUR MAJOR (1.0m)
- EXISTING CONTOUR MINOR (0.2m)
- DESIGN CONTOUR MAJOR (1.0m)
- DESIGN CONTOUR MINOR (0.2m)
- SURVEY
- DESIGN STRINGS
- DIGITAL CADASTRE
- EXISTING BRIDGE DECK
- PROPOSED BRIDGE DECK
- EZYGUARD 4 (OR SIMILAR) BARRIER
- RETAINING WALL WITH TYPE F BARRIER
- XX01 — BARRIER I.D. CALL UP

ROAD GEOMETRY & ALIGNMENT

- 40 – 60 — MASTER CONTROL LINE

ROADSIDE FURNITURE

- NEW SIGN LOCATION
- 60 / R4-1A — NEW SIGN (NOT TO SCALE)
- SIGN SIZE (WHERE APPLICABLE) SIGN NUMBER
- 60 — EXISTING SIGN (NOT TO SCALE)

DELINEATION

- 60 — NEW PAVEMENT MARKINGS

PAVEMENT

- PT1 - NEW CONCRETE PAVEMENT
- PT2 - NEW ASPHALT PAVEMENT.
- PT3 - NEW CONCRETE MEDIAN
- EXISTING CONCRETE PAVEMENT
- EXISTING FLEXIBLE PAVEMENT

NOTE

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2. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01111 FOR MC00 LONGITUDINAL SECTION
3. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01601 TO 12599191-GHD-00-00-DRG-CI-01606 FOR MC00 CROSS SECTIONS

Rev	Description	Checked	Approved	Date
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Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 10 20 30m
SCALE 1:1000 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title ROADSIDE FURNITURE AND PAVEMENT PLAN SHEET 2 OF 3
Size A3
Drawing No. 12599191-GHD-00-00-DRG-CI-01302
Rev D

Plot Date: 27 July 2023 - 1:55 PM Plotted by: Blake Drew
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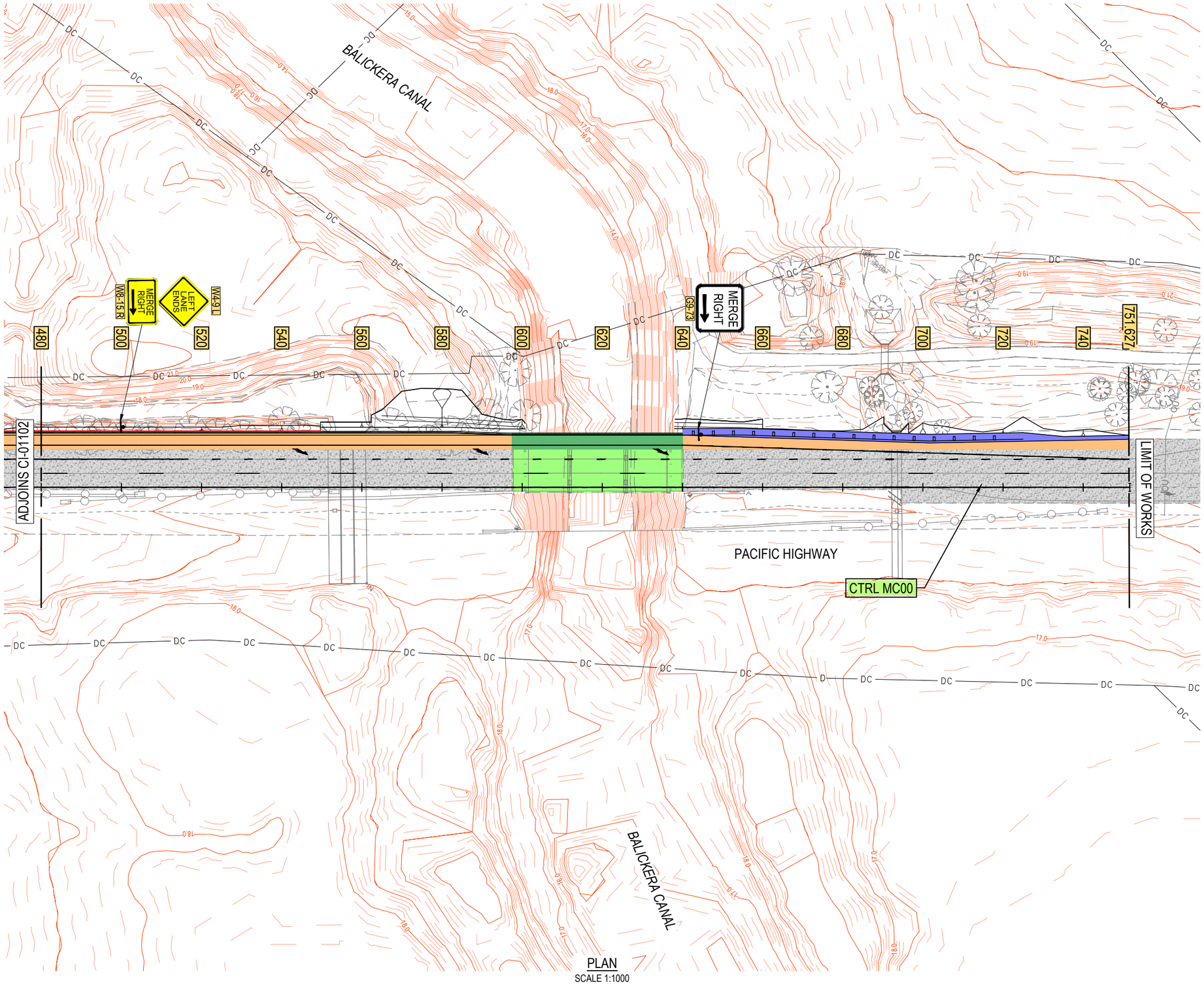

PLAN
SCALE 1:1000

LEGEND

GENERAL

- EXISTING CONTOUR MAJOR (1.0m)
- EXISTING CONTOUR MINOR (0.2m)
- DESIGN CONTOUR MAJOR (1.0m)
- DESIGN CONTOUR MINOR (0.2m)
- SURVEY
- DESIGN STRINGS
- DIGITAL CADASTRE
- EXISTING BRIDGE DECK
- PROPOSED BRIDGE DECK
- EZYGUARD 4 (OR SIMILAR) BARRIER
- RETAINING WALL WITH TYPE F BARRIER
- XX01 — BARRIER I.D. CALL UP

ROAD GEOMETRY & ALIGNMENT

- 40 – 60 — MASTER CONTROL LINE

ROADSIDE FURNITURE

- NEW SIGN LOCATION
- 60 / R4-1A — NEW SIGN (NOT TO SCALE)
- SIGN SIZE (WHERE APPLICABLE) SIGN NUMBER
- 60 — EXISTING SIGN (NOT TO SCALE)

DELINEATION

- 60 — NEW PAVEMENT MARKINGS

PAVEMENT

- PT1 - NEW CONCRETE PAVEMENT
- PT2 - NEW ASPHALT PAVEMENT.
- PT3 - NEW CONCRETE MEDIAN
- EXISTING CONCRETE PAVEMENT
- EXISTING FLEXIBLE PAVEMENT

NOTE

1. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01051 FOR OVERVIEW PLAN
2. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01111 FOR MC00 LONGITUDINAL SECTION
3. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01601 TO 12599191-GHD-00-00-DRG-CI-01606 FOR MC00 CROSS SECTIONS

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A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 10 20 30m
SCALE 1:1000 AT ORIGINAL SIZE

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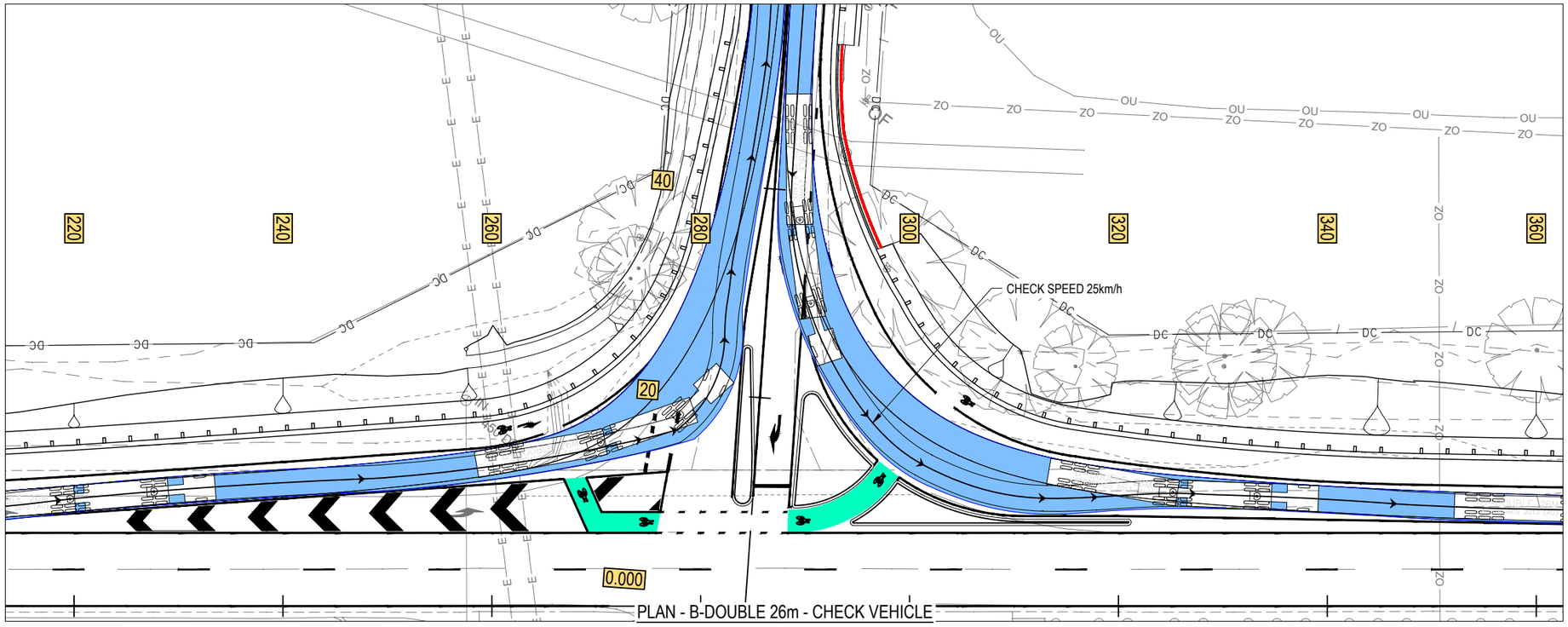
Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

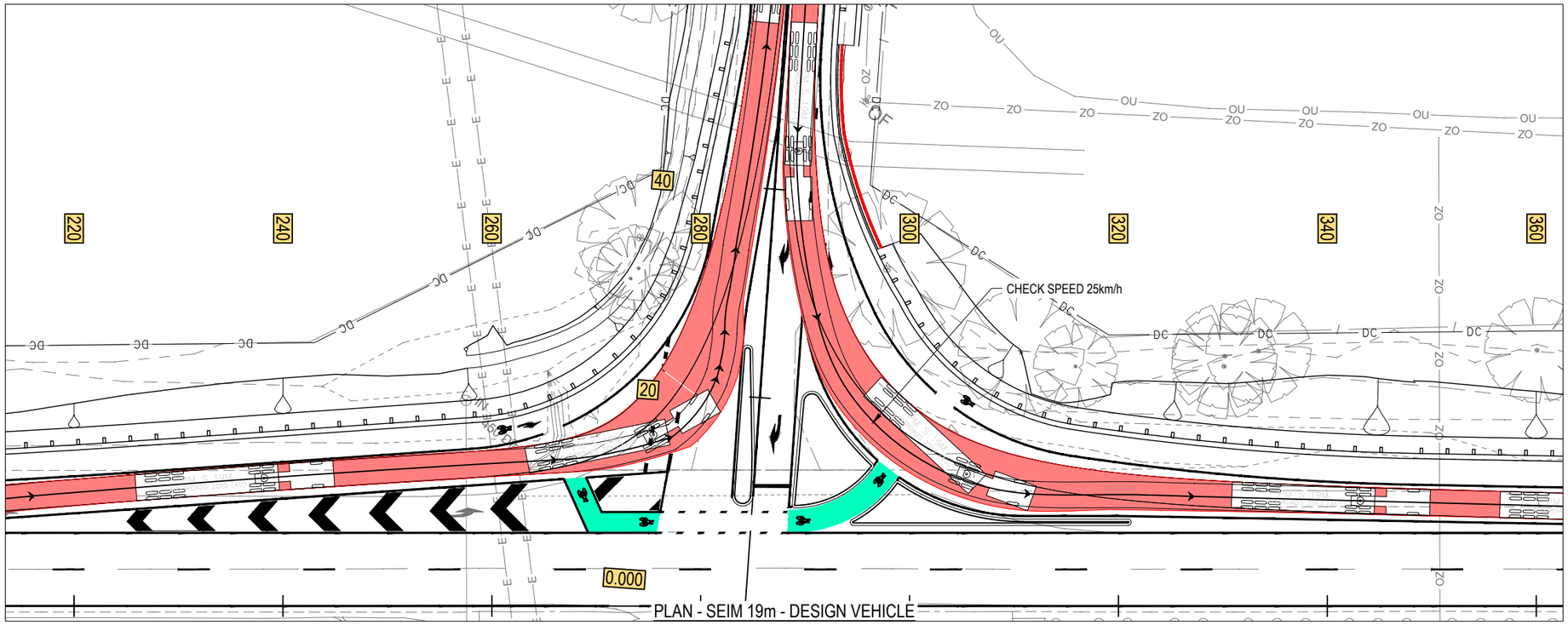
Drawing Title ROADSIDE FURNITURE AND PAVEMENT PLAN SHEET 3 OF 3
Size A3
Drawing No. 12599191-GHD-00-00-DRG-CI-01303
Rev D

Plot Date: 27 July 2023 - 1:55 PM Plotted by: Blake Drew
File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01300.dwg



PLAN - B-DOUBLE 26m - CHECK VEHICLE

SCALE 1:1000



PLAN - SEIM 19m - DESIGN VEHICLE

SCALE 1:1000

LEGEND

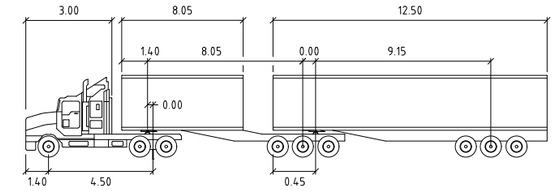
GENERAL

- EXISTING CONTOUR MAJOR (1.0m)
- EXISTING CONTOUR MINOR (0.2m)
- DESIGN CONTOUR MAJOR (1.0m)
- DESIGN CONTOUR MINOR (0.2m)
- SURVEY
- DESIGN STRINGS
- DIGITAL CADASTRE
- EZYGUARD 4 (OR SIMILAR) BARRIER

ROAD GEOMETRY & ALIGNMENT

- MASTER CONTROL LINE

CHECK VEHICLES



B-DOUBLE 26M

meters

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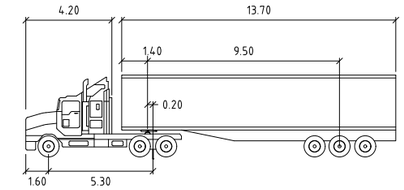
Trailer Width	: 2.50	Steering Angle	: 23.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		



PM S 19M

meters

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Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

NOTE

1. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01051 FOR OVERVIEW PLAN
2. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01111 FOR MC00 LONGITUDINAL SECTION
3. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01601 TO 12599191-GHD-00-00-DRG-CI-01606 FOR MC00 CROSS SECTIONS

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A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW **Drafting Check** C.PURDON

Designer C.BARTLEY **Design Check** N.HINCKS

0 10 20 30m

SCALE 1:1000 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title TURNING PATHS

Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01401

Rev D

Plot Date: 27 July 2023 - 1:55 PM Plotted by: Blake Drew

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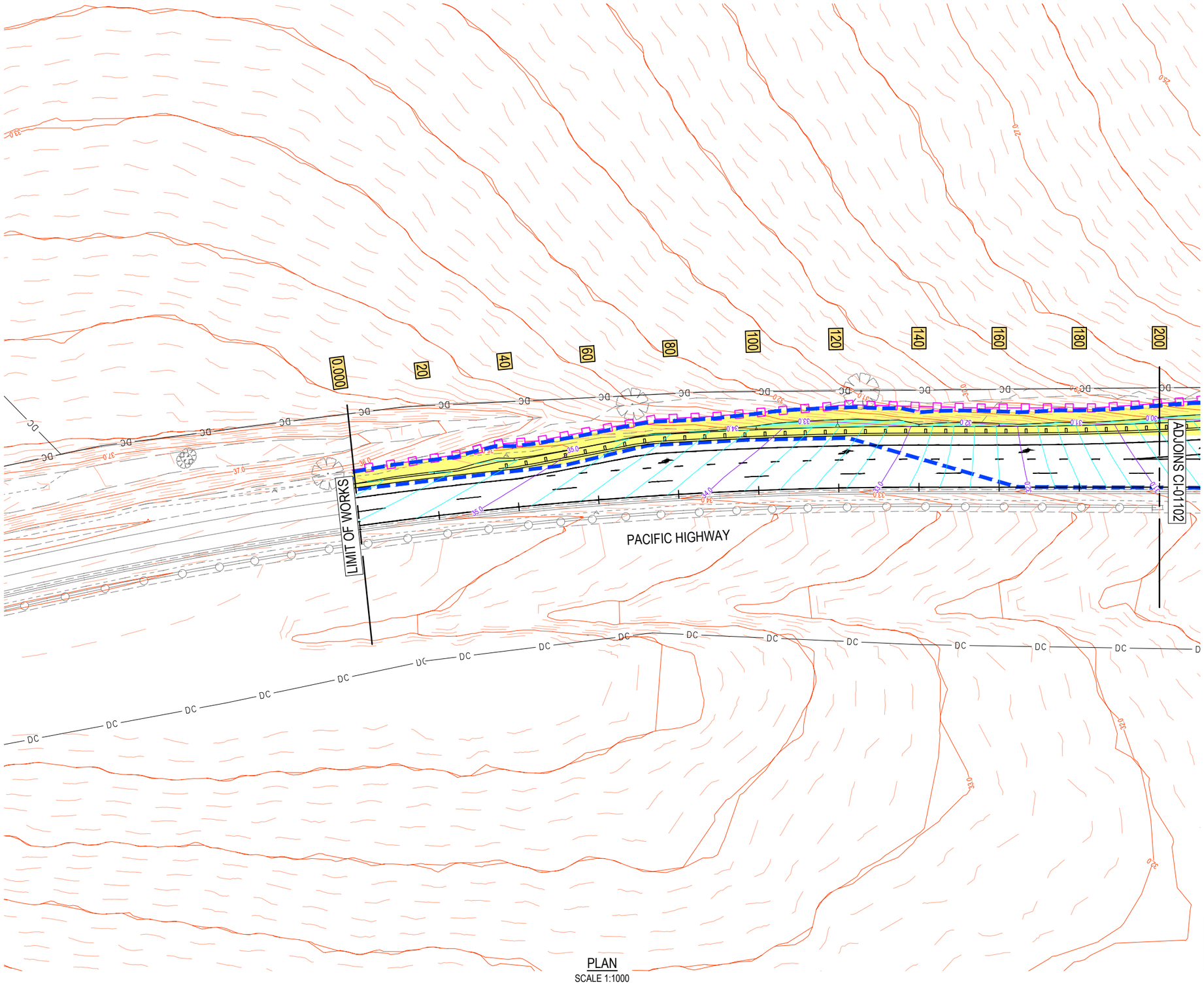

PLAN
SCALE 1:1000

LEGEND

GENERAL

- EXISTING CONTOUR MAJOR (1.0m)
- EXISTING CONTOUR MINOR (0.2m)
- DESIGN CONTOUR MAJOR (1.0m)
- DESIGN CONTOUR MINOR (0.2m)
- SURVEY
- DESIGN STRINGS
- DIGITAL CADASTRE

EROSION AND SEDIMENT CONTROL

- CATCHMENT BOUNDARY
- GEOFABRIC SILT FENCE
- CLEAN WATER FLOW PATH
- STRAW BALE SEDIMENT FILTER
- DISTURBANCE AREA

NOTE

1. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01051 FOR OVERVIEW PLAN
2. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01111 FOR MC00 LONGITUDINAL SECTION
3. REFER TO DRAWINGS 12599191-GHD-00-00-DRG-CI-01601 TO 12599191-GHD-00-00-DRG-CI-01606 FOR MC00 CROSS SECTIONS

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E	CONCEPT DESIGN FOR DA APPROVAL	A.S.		G.W.	27.07.23
D	CONCEPT DESIGN FOR DA APPROVAL				30.06.23
C	CONCEPT DESIGN FOR DA APPROVAL				26.06.23
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A	PRELIMINARY ISSUE FOR DISCUSSION				09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 10 20 30m
SCALE 1:1000 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title EROSION AND SEDIMENT CONTROL PLAN
SHEET 1 OF 3

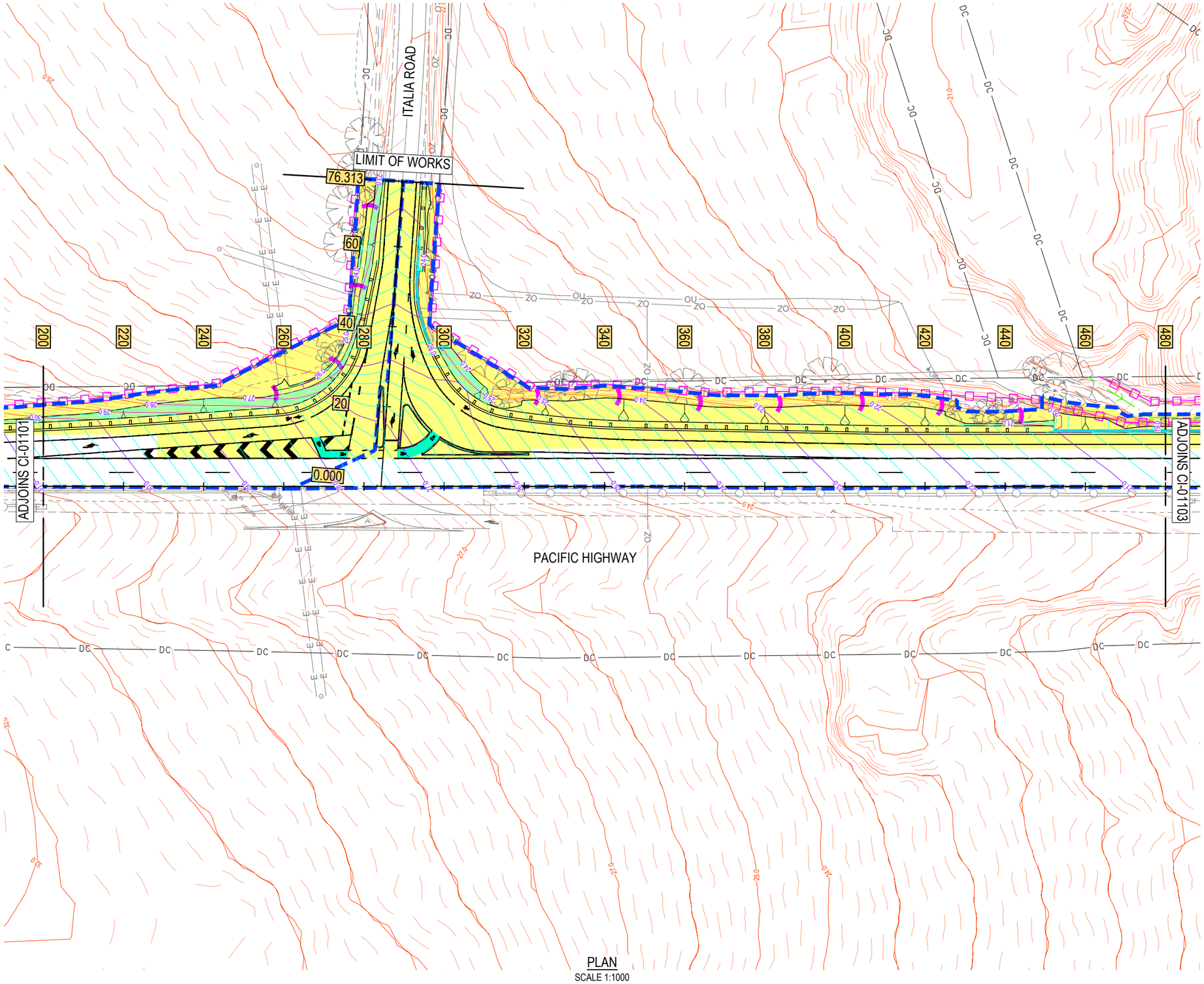
Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01501

Rev E

Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew

File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01500.dwg



PLAN
SCALE 1:1000

LEGEND

GENERAL

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- DISTURBANCE AREA

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Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 10 20 30m
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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title EROSION AND SEDIMENT CONTROL PLAN SHEET 2 OF 3

Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01502

Rev E

Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew

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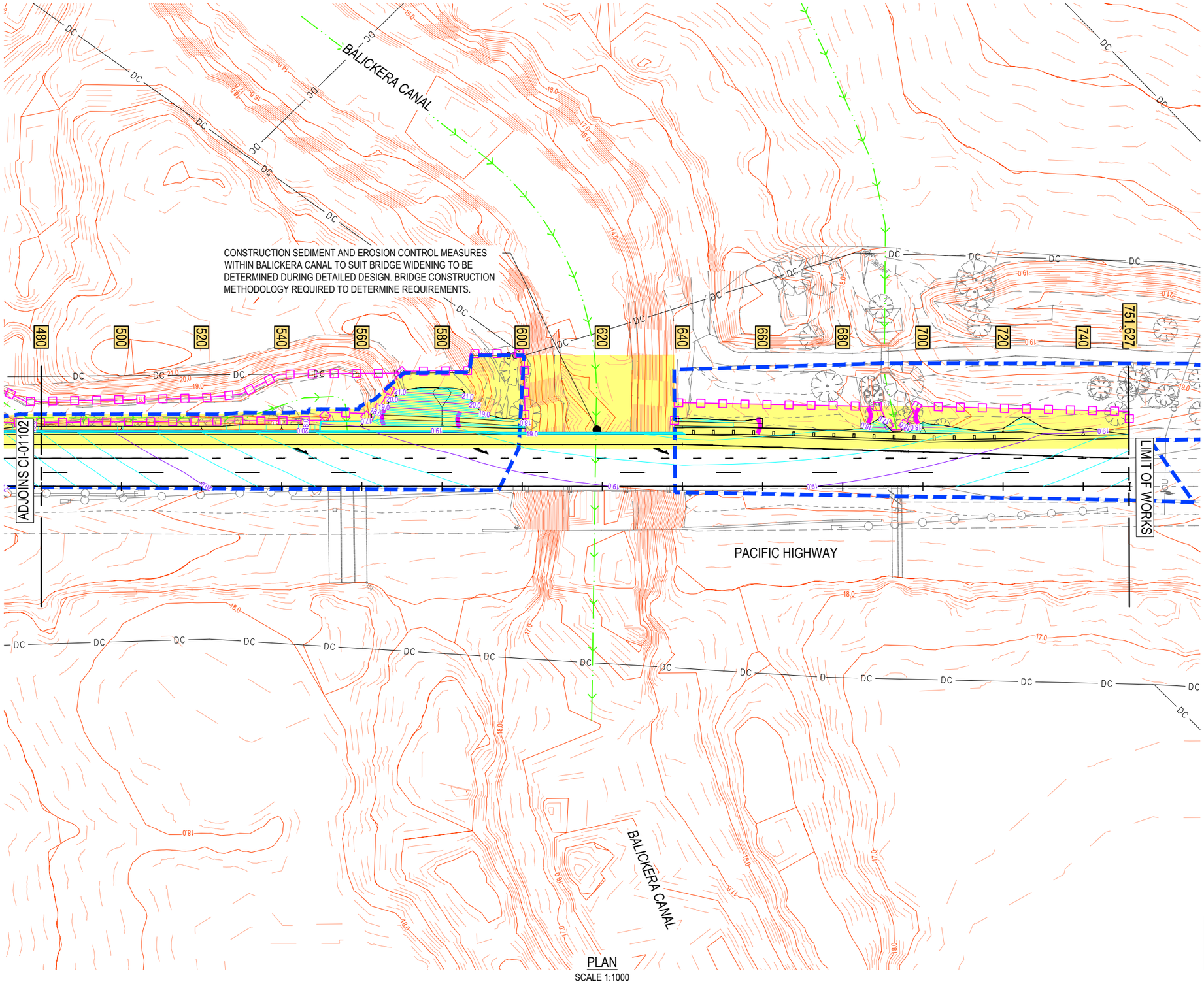

PLAN
SCALE 1:1000

LEGEND

GENERAL

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NOTE

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Author B.DREW Drafting Check C.PURDON
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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title EROSION AND SEDIMENT CONTROL PLAN SHEET 3 OF 3

Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01503

Rev E

Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew

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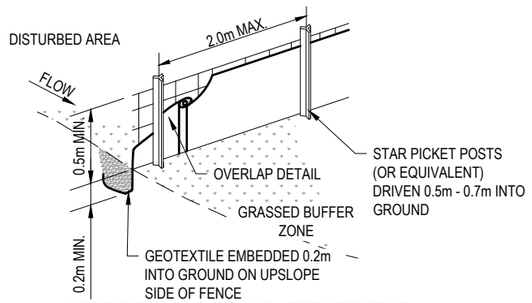
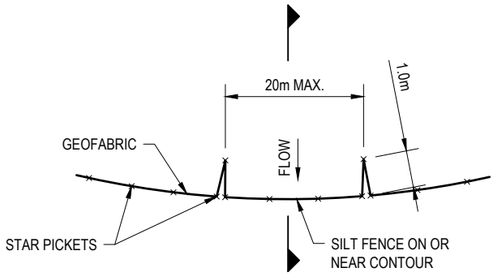


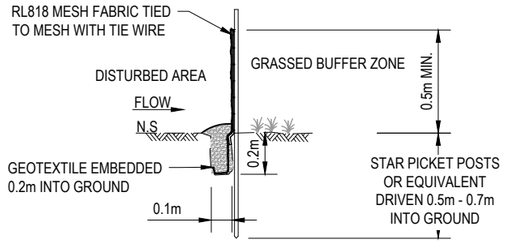
GEOFABRIC SILT FENCE - PERSPECTIVE

NOT TO SCALE



GEOFABRIC SILT FENCE - PLAN

NOT TO SCALE



GEOFABRIC SILT FENCE - SECTION

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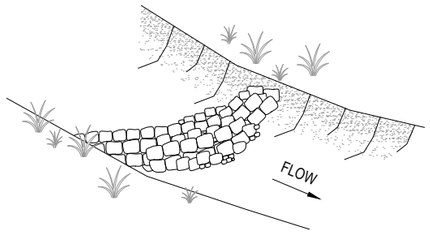

CHECK DAM - PERSPECTIVE

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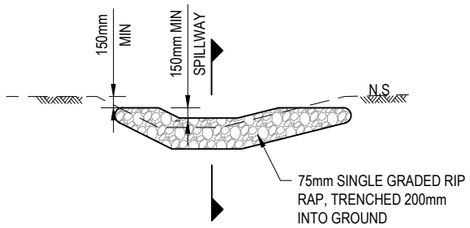


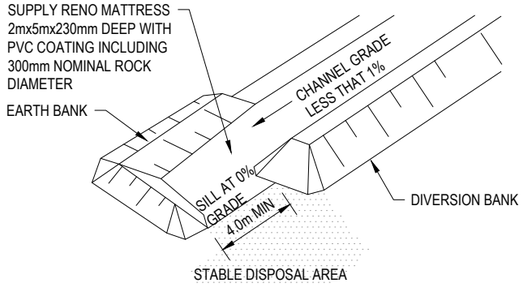
CHECK DAM - ELEVATION

NOT TO SCALE

SPACING OF CHECK DAMS ALONG CENTRELINE AND SCOUR PROTECTION BELOW EACH CHECK DAM TO BE SPECIFIED ON CONSTRUCTORS SWMP/ESCP.

CHECK DAM - SECTION

NOT TO SCALE



LEVEL SPREADER - PERSPECTIVE

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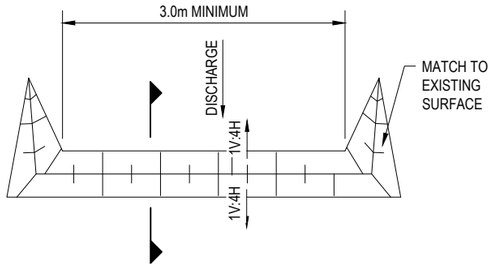
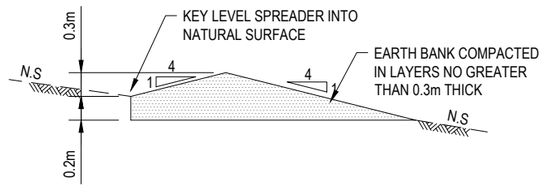


LEVEL SPREADER DETAIL - PLAN

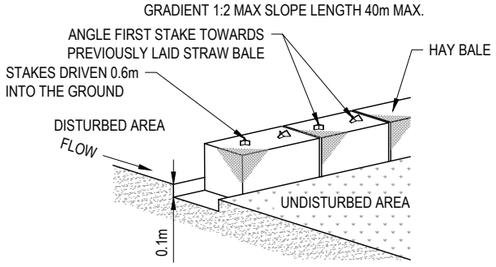
NOT TO SCALE



LEVEL SPREADER - SECTION

NOT TO SCALE

DRAINAGE AREA 0.4ha MAX. SLOPE
GRADIENT 1:2 MAX SLOPE LENGTH 40m MAX.



STRAW BALE SEDIMENT FILTER DETAIL

NOT TO SCALE

SEDIMENT AND EROSION CONTROL NOTES:

1. DRAWINGS ARE ISSUED AS EXAMPLE ONLY. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE 'BLUE BOOK', SOILS AND CONSTRUCTION LANDCOM 2004 VOLUME 1 AND DEC VOLUME 2D AND OTHER ENVIRONMENTAL PRACTICES.
2. DETAILS ON THESE PRELIMINARY EROSION AND SEDIMENT CONTROL PLANS (ESCP) ARE SCHEMATIC ONLY. ADDITIONAL CONTROLS AND CHANGES TO THIS PLAN WILL BE NECESSARY DURING THE PROCESS OF IMPLEMENTATION OF THE ESCP. IN CONJUNCTION WITH THE CONSTRUCTION STAGING PLANS AND SPECIFIC ON SITE CONSTRUCTION METHODOLOGY THE CONTRACTOR SHALL PREPARE PROGRESSIVE ESCP. THE ESCP IDENTIFY THE EROSION AND SEDIMENT CONTROLS NEEDED ON SITE, BUT ARE NOT CONSTRUCTION DRAWINGS AND ARE ISSUED FOR INFORMATION ONLY. ALTERNATIVE APPROVED PRIMARY EROSION SEDIMENT CONTROLS CAN BE USED TO SUIT THE METHOD AND SEQUENCE OF CONSTRUCTION.
3. FOR ADDITIONAL EROSION AND SEDIMENT CONTROL DETAILS REFER TO THE BLUE BOOK STANDARD DRAWINGS AS NOMINATED
4. THE SEQUENCE OF CONSTRUCTION SHALL BE AS FOLLOWS
   - 4.1. IDENTIFY LOCATION OF ALL YOUR NEW EROSION AND SEDIMENT CONTROL MEASURES.
   - 4.2. INSTALLATION OF BARRIER AND SEDIMENT FENCES.
   - 4.3. INSTALLATION OF TEMPORARY SEDIMENT BASIN AND ENERGY DISSIPATER AT OUTLET WITH SEDIMENT FENCES AT DOWN SLOPE.
   - 4.4. INSTALLATION OF ALL DIVERSION DRAINS AND LEVEL SPREADERS.
   - 4.5. INSTALLATION OF ALL REMAINING EROSION AND SEDIMENT CONTROLS.
   - 4.6. CLEARING AND REGRADING OF SITE FOR CONSTRUCTION.
5. REFER TO THE TFNSW TYPICAL DRAWINGS R0100-01 TO R0100-12 AND THE 2008 'BLUE BOOK' TYPICAL DETAILS SD 4-1 TO SD 6-15.
6. LOCATION OF TOPSOIL STOCKPILES TO BE DETERMINED BY THE CONTRACTOR AND STABILISED IN ACCORDANCE WITH SD4.1 AND SD6.8.
7. AFTER REGRADING THE SITE, SEDIMENT FENCES SHALL BE LAID ALONG THE CONTOURS AT INTERVALS NOT EXCEEDING 80m. THIS INTERVAL SHALL BE REDUCED TO 20m ON BATTERS STEEPER THAN H.V=4.1.
8. ALL DISTURBED AND REGRADED AREAS SHALL BE REHABILITATED WITHIN 20 DAYS POST CONSTRUCTION IN ACCORDANCE WITH REQUIREMENTS OF THE BLUE BOOK.
9. NEW OR EXISTING INFRASTRUCTURE USED TO CONVEY SITE RUNOFF DURING CONSTRUCTION SHALL BE FLUSHED CLEAN OF SEDIMENT AT COMPLETION OF THE PROJECT.
10. FIELD INSPECTIONS ARE TO BE UNDERTAKEN FOR ALL OPEN TRENCHES ON SITE TO ENSURE THAT ADEQUATE PROTECTION AGAINST EROSION IS PROVIDED AND THAT SAFETY MEASURES ARE ALSO PROVIDED IN PLACE AT THE END OF EACH DAY.
11. LOCATION OF ALL SERVICES TO BE CONFIRMED PRIOR TO COMMENCING WORK AND MANAGE THE COORDINATION OF TEMPORARY DRAINAGE AND OTHER EROSION AND SEDIMENT CONTROLS WITH THE EXISTING AND NEW UTILITIES.
12. ANY WORKS TO INSTALL UTILITIES OUTSIDE OF THE CONSTRUCTION AREAS SHOWN ON THESE PLANS ARE TO IMPLEMENT LOCAL EROSION AND SEDIMENT CONTROLS TO ENSURE ADEQUATE PROTECTION.
13. THE PROVISION OF ALL EROSION AND SEDIMENT CONTROL MEASURES REQUIRED FOR THE INSTALLATION OF ALL UTILITIES SHALL BE IN ACCORDANCE WITH VOLUME 2A 'INSTALLATION OF SERVICES" OF THE BLUE BOOK.
14. DIVERSION DRAINS MUST BE FULLY OPERATIONAL PRIOR TO ANY DISTURBANCE ON SITE.
15. TEMPORARY DIVERSION DRAINS SHOULD BE CONSTRUCTED TO AVOID TREES AND FENCES.
16. USE WOVEN POLYPROPYLENE AND COTTON/GEOTEXTILE THREAD WITH A FLOW RATE OF 15 L/s/m^2 TO AUSTRALIAN STANDARD AS 3706.9 WHEN INSTALLING SEDIMENT FENCES.
17. ALL BARRIER FENCES (PARAWEBBING) ARE TO BE INSTALLED TO AVOID SOIL DISTURBANCE OUTSIDE THE CONSTRUCTION AREA.

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Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01511

Rev D

Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew

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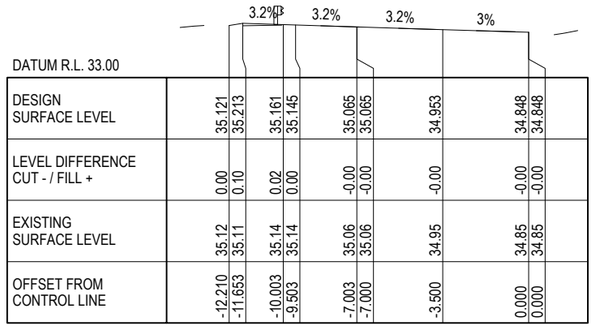

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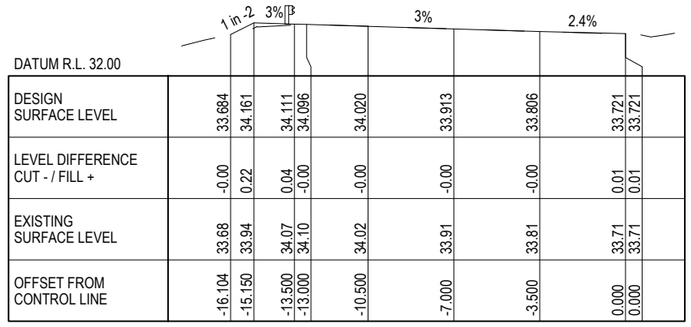
CH 40



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EXISTING SURFACE LEVEL	33.68	33.94	34.07	34.10	34.02	33.91	33.81	33.71	33.71				
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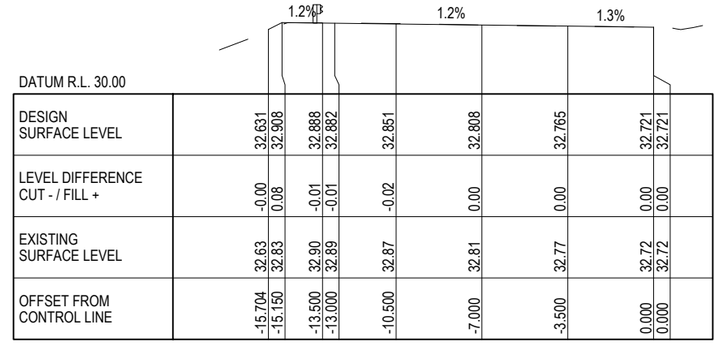
CH 100



DATUM R.L. 30.00													
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EXISTING SURFACE LEVEL	32.63	32.83	32.90	32.89	32.87	32.81	32.77	32.72	32.72				
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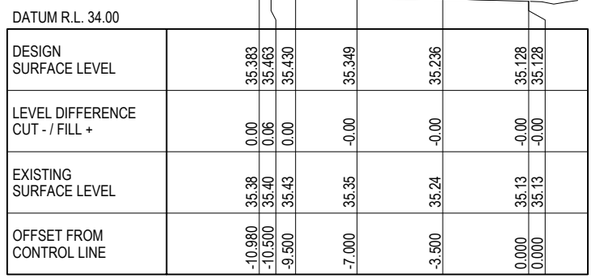
CH 141



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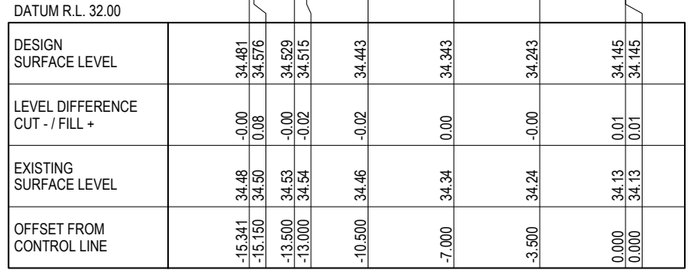
CH 20



DATUM R.L. 32.00													
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EXISTING SURFACE LEVEL	34.48	34.50	34.53	34.54	34.46	34.34	34.24	34.13	34.13				
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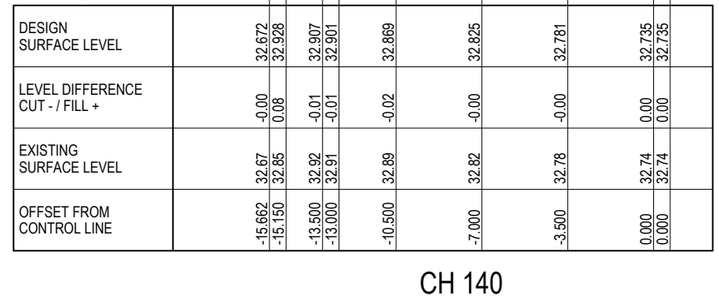
CH 80



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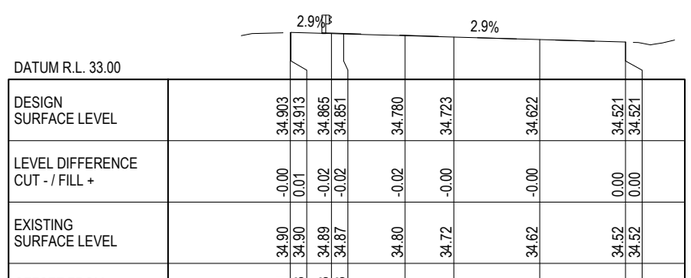
DESIGN SURFACE LEVEL	32.672	32.928	32.907	32.901	32.869	32.825	32.781	32.735	32.735				
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.08	-0.01	-0.01	-0.02	-0.00	-0.00	0.00	0.00				
EXISTING SURFACE LEVEL	32.67	32.85	32.92	32.91	32.89	32.82	32.78	32.74	32.74				
OFFSET FROM CONTROL LINE	-15.662	-15.150	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000				

CH 140

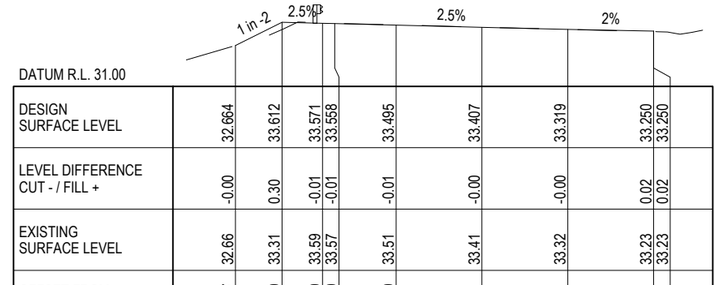
DATUM R.L. 34.00													
DESIGN SURFACE LEVEL	35.641	35.641	35.659	35.580	35.469	35.361	35.361						
LEVEL DIFFERENCE CUT - / FILL +	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00						
EXISTING SURFACE LEVEL	35.64	35.64	35.65	35.58	35.47	35.36	35.36						
OFFSET FROM CONTROL LINE	-10.500	-10.500	-9.500	-7.000	-3.500	0.000	0.000						

CH 0



DATUM R.L. 33.00													
DESIGN SURFACE LEVEL	34.903	34.913	34.865	34.851	34.780	34.723	34.622	34.521	34.521				
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.01	-0.02	-0.02	-0.02	-0.00	-0.00	0.00	0.00				
EXISTING SURFACE LEVEL	34.90	34.90	34.89	34.87	34.80	34.72	34.62	34.52	34.52				
OFFSET FROM CONTROL LINE	-13.671	-13.643	-11.993	-11.493	-8.993	-7.000	-3.500	0.000	0.000				

CH 60



DATUM R.L. 31.00													
DESIGN SURFACE LEVEL	32.664	33.612	33.571	33.558	33.495	33.407	33.319	33.250	33.250				
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.30	-0.01	-0.01	-0.01	-0.00	-0.00	0.02	0.02				
EXISTING SURFACE LEVEL	32.66	33.31	33.59	33.57	33.51	33.41	33.32	33.23	33.23				
OFFSET FROM CONTROL LINE	-17.047	-15.150	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000				

CH 120

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

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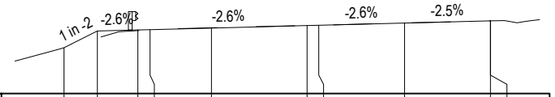
Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

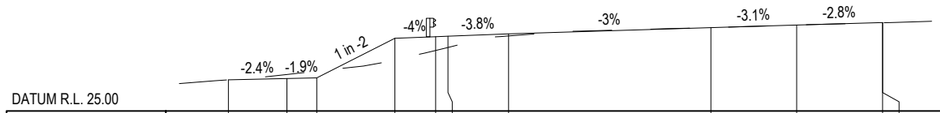
Drawing Title CROSS SECTIONS
SHEET 1 OF 6
Drawing No. 12599191-GHD-00-00-DRG-CI-01601
Size A3
Rev D

Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew
File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01600.dwg



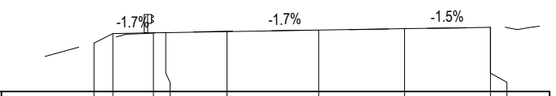
DATUM R.L. 28.00													
DESIGN SURFACE LEVEL	29.867	30.548	30.591	30.604	30.669	30.771	30.784	30.875	30.962	30.962			
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.28	0.03	0.01	-0.01	-0.00	0.00	0.00	-0.00	-0.00			
EXISTING SURFACE LEVEL	29.87	30.26	30.56	30.59	30.68	30.77	30.78	30.88	30.96	30.96			
OFFSET FROM CONTROL LINE	-17.387	-16.027	-14.377	-13.877	-11.377	-7.477	-7.000	-3.500	0.000	0.000			

CH 200



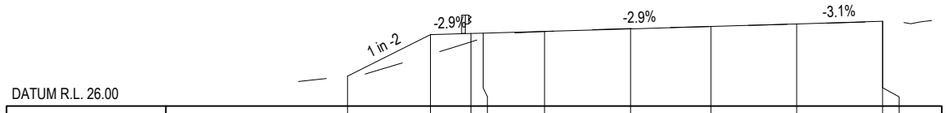
DATUM R.L. 25.00													
DESIGN SURFACE LEVEL	26.267	26.324	26.346	27.961	28.029	28.048	28.143	28.394	28.502	28.601	28.601		
LEVEL DIFFERENCE CUT - / FILL +	0.00	-0.16	-0.28	0.87	0.56	0.46	0.09	0.00	0.00	0.01	0.01		
EXISTING SURFACE LEVEL	26.27	26.49	26.62	27.09	27.47	27.59	28.06	28.39	28.50	28.59	28.59		
OFFSET FROM CONTROL LINE	-26.672	-24.284	-23.066	-19.884	-18.221	-17.719	-15.247	-7.000	-3.500	0.000	0.000		

CH 260



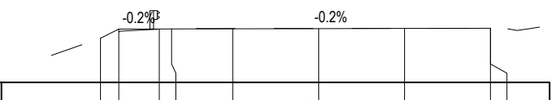
DATUM R.L. 29.00													
DESIGN SURFACE LEVEL	30.978	31.364	31.391	31.400	31.442	31.505	31.563	31.617	31.617				
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.17	0.01	-0.01	-0.02	0.00	0.00	0.00	0.00				
EXISTING SURFACE LEVEL	30.98	31.19	31.38	31.41	31.46	31.50	31.56	31.61	31.61				
OFFSET FROM CONTROL LINE	-16.160	-15.389	-13.739	-13.239	-10.739	-7.000	-3.500	0.000	0.000				

CH 180



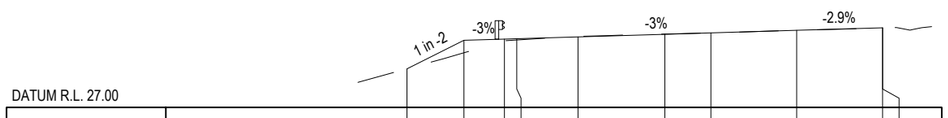
DATUM R.L. 26.00													
DESIGN SURFACE LEVEL	27.219	28.909	28.958	28.972	29.045	29.147	29.243	29.345	29.455	29.455			
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.80	0.34	0.21	0.01	-0.01	0.00	0.00	0.01	0.01			
EXISTING SURFACE LEVEL	27.22	28.11	28.62	28.77	29.04	29.16	29.24	29.35	29.44	29.44			
OFFSET FROM CONTROL LINE	-21.814	-18.433	-16.783	-16.283	-13.783	-10.274	-7.000	-3.500	0.000	0.000			

CH 240



DATUM R.L. 30.00													
DESIGN SURFACE LEVEL	31.799	32.171	32.175	32.177	32.183	32.191	32.200	32.205	32.205				
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.11	0.01	-0.02	-0.01	0.00	0.00	0.00	0.00				
EXISTING SURFACE LEVEL	31.80	32.06	32.17	32.19	32.20	32.19	32.20	32.20	32.20				
OFFSET FROM CONTROL LINE	-15.897	-15.152	-13.502	-13.002	-10.502	-7.000	-3.500	0.000	0.000				

CH 160



DATUM R.L. 27.00													
DESIGN SURFACE LEVEL	28.571	29.734	29.784	29.799	29.874	29.980	30.036	30.141	30.242	30.242			
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.51	0.08	0.05	-0.02	-0.01	0.00	0.00	0.00	0.00			
EXISTING SURFACE LEVEL	28.57	29.22	29.70	29.75	29.89	29.99	30.04	30.14	30.24	30.24			
OFFSET FROM CONTROL LINE	-19.392	-17.066	-15.416	-14.916	-12.416	-8.876	-7.000	-3.500	0.000	0.000			

CH 220

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

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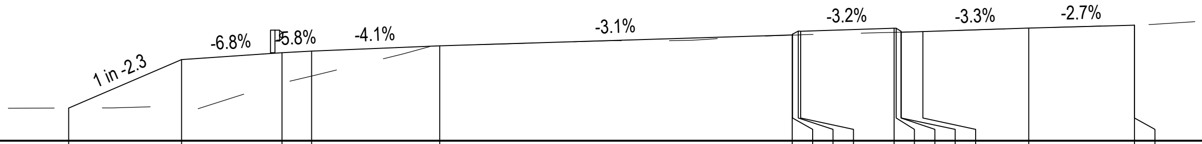
Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title CROSS SECTIONS
SHEET 2 OF 6

Size A3
Drawing No. 12599191-GHD-00-00-DRG-CI-01602
Rev D

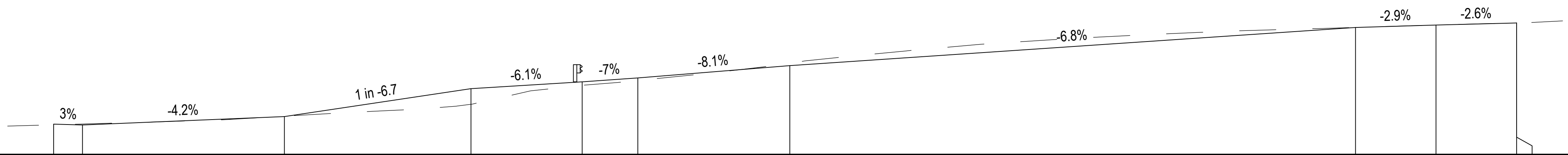
Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew
File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01600.dwg



DATUM R.L. 23.00

DESIGN SURFACE LEVEL	24.078	25.683	25.907	25.964	26.137	26.494	26.523	26.621	26.620	26.718	26.718	26.618	26.588	26.607	26.722	26.817	26.817
LEVEL DIFFERENCE CUT - / FILL +	0.00	1.60	1.00	0.83	0.00	0.00	0.03	0.12	0.12	0.14	0.13	0.03	0.00	0.00	0.00	-0.01	-0.01
EXISTING SURFACE LEVEL	24.08	24.08	24.90	25.14	26.13	26.49	26.49	26.50	26.50	26.58	26.58	26.59	26.59	26.61	26.72	26.82	26.82
OFFSET FROM CONTROL LINE	-35.264	-31.527	-28.201	-27.226	-22.988	-11.323	-11.312	-11.126	-11.044	-7.955	-7.885	-7.725	-7.715	-7.000	-3.500	0.000	0.000

CH 300



DATUM R.L. 22.00

DESIGN SURFACE LEVEL	23.315	23.278	23.644	24.854	25.150	25.319	25.855	27.514	27.617	27.709	27.709
LEVEL DIFFERENCE CUT - / FILL +	0.03	-0.04	-0.02	0.68	0.15	0.11	-0.11	0.00	0.00	0.00	0.00
EXISTING SURFACE LEVEL	23.29	23.32	23.66	24.18	25.00	25.21	25.97	27.51	27.62	27.71	27.71
OFFSET FROM CONTROL LINE	-63.567	-62.311	-53.538	-45.431	-40.600	-38.184	-31.579	-7.000	-3.500	0.000	0.000

CH 280

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD
Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION
Status FOR APPROVAL

Drawing Title CROSS SECTIONS
SHEET 3 OF 6

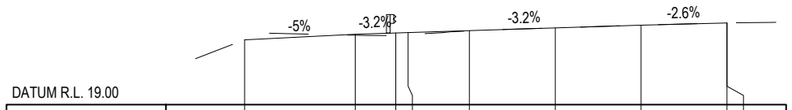
Size A3
Drawing No. 12599191-GHD-00-00-DRG-CI-01603
Rev D

Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01600.dwg

DATUM R.L. 21.00

DESIGN SURFACE LEVEL	23.638		23.863		23.913	23.928	24.003		24.109	24.136	24.241		24.340	24.340		
LEVEL DIFFERENCE CUT - / FILL +	0.00		0.03		0.10	0.12	0.09		0.00	0.00	0.00		-0.00	-0.00		
EXISTING SURFACE LEVEL	23.64		23.84		23.81	23.81	23.91		24.11	24.14	24.24		24.34	24.34		
OFFSET FROM CONTROL LINE	-20.545		-16.050		-14.400	-13.900	-11.400		-7.900	-7.000	-3.500		0.000	0.000		

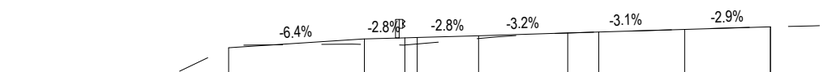
CH 360



DATUM R.L. 19.00

DESIGN SURFACE LEVEL	21.643		21.869		21.921	21.937	22.016		22.127		22.238		22.329	22.329		
LEVEL DIFFERENCE CUT - / FILL +	0.00		0.04		0.09	0.08	0.01		0.00		0.00		-0.01	-0.01		
EXISTING SURFACE LEVEL	21.64		21.83		21.83	21.86	22.00		22.13		22.24		22.34	22.34		
OFFSET FROM CONTROL LINE	-19.668		-15.150		-13.500	-13.000	-10.500		-7.000		-3.500		0.000	0.000		

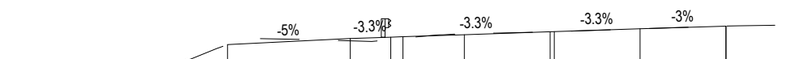
CH 420



DATUM R.L. 22.00

DESIGN SURFACE LEVEL	24.263		24.620		24.666	24.680	24.750		24.865	24.904	25.011		25.114	25.114		
LEVEL DIFFERENCE CUT - / FILL +	-0.00		0.22		0.29	0.26	0.11		0.00	0.00	0.00		-0.00	-0.00		
EXISTING SURFACE LEVEL	24.27		24.40		24.37	24.42	24.64		24.86	24.90	25.01		25.12	25.12		
OFFSET FROM CONTROL LINE	-22.092		-16.560		-14.908	-14.407	-11.904		-8.267	-7.000	-3.500		0.000	0.000		

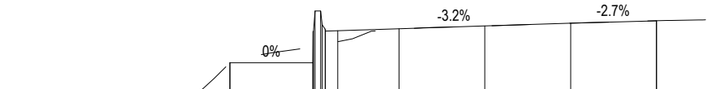
CH 340



DATUM R.L. 20.00

DESIGN SURFACE LEVEL	22.195		22.445		22.501	22.517	22.601		22.718	22.724	22.841		22.947	22.947		
LEVEL DIFFERENCE CUT - / FILL +	0.00		0.09		0.10	0.06	-0.05		-0.00	0.00	0.00		-0.01	-0.01		
EXISTING SURFACE LEVEL	22.19		22.35		22.40	22.45	22.65		22.72	22.72	22.84		22.95	22.95		
OFFSET FROM CONTROL LINE	-20.324		-15.317		-13.667	-13.167	-10.667		-7.167	-7.000	-3.500		0.000	0.000		

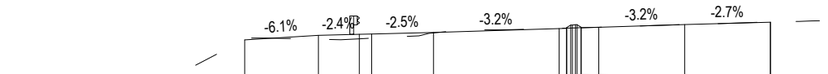
CH 400



DATUM R.L. 17.00

DESIGN SURFACE LEVEL	19.542	19.542	19.542	20.817	20.817	20.817	21.653	21.653	21.093	20.913	20.833	20.848	20.929	21.042	21.155	21.249	21.249
LEVEL DIFFERENCE CUT - / FILL +	0.00	0.00	-0.65	0.62	0.62	0.61	1.44	1.39	0.82	0.62	0.53	0.45	0.02	0.00	0.00	-0.01	-0.01
EXISTING SURFACE LEVEL	19.54	19.54	20.20	20.20	20.20	20.20	20.21	20.26	20.27	20.30	20.30	20.40	20.91	21.04	21.16	21.25	21.25
OFFSET FROM CONTROL LINE	-17.396	-17.396	-14.015	-14.005	-13.995	-13.985	-13.925	-13.695	-13.635	-13.510	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 460



DATUM R.L. 23.00

DESIGN SURFACE LEVEL	25.223		25.405		25.446	25.456	25.520		25.682	25.692	25.722	25.822	25.822	25.841	25.841	25.741	25.711	25.734	25.844	25.940	25.940
LEVEL DIFFERENCE CUT - / FILL +	0.00		0.16		0.18	0.17	0.02		-0.01	-0.01	0.02	0.12	0.12	0.13	0.13	0.02	-0.01	0.00	0.00	-0.01	-0.01
EXISTING SURFACE LEVEL	25.22		25.25		25.27	25.29	25.50		25.69	25.70	25.70	25.70	25.71	25.71	25.71	25.72	25.72	25.73	25.84	25.95	25.95
OFFSET FROM CONTROL LINE	-21.435		-18.431		-16.766	-16.261	-13.739		-8.617	-8.317	-8.307	-8.147	-8.077	-7.957	-7.887	-7.727	-7.717	-7.000	-3.500	0.000	0.000

CH 320

DATUM R.L. 21.00

DESIGN SURFACE LEVEL	22.960		23.152		23.201	23.216	23.291		23.395	23.411	23.516		23.617	23.617		
LEVEL DIFFERENCE CUT - / FILL +	0.00		0.14		0.18	0.15	-0.01		-0.00	-0.00	0.00		-0.00	-0.00		
EXISTING SURFACE LEVEL	22.95		23.01		23.02	23.07	23.30		23.40	23.41	23.52		23.62	23.62		
OFFSET FROM CONTROL LINE	-19.713		-15.684		-14.034	-13.534	-11.034		-7.534	-7.000	-3.500		0.000	0.000		

CH 380

DATUM R.L. 19.00

DESIGN SURFACE LEVEL	21.049	21.321	21.371	21.386	21.460	21.565	21.669	21.763	21.763							
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.29	0.18	0.15	0.05	0.00	0.00	-0.00	-0.00							
EXISTING SURFACE LEVEL	21.05	21.04	21.19	21.23	21.41	21.56	21.67	21.77	21.77							
OFFSET FROM CONTROL LINE	-15.695	-15.150	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000							

CH 440

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW Drafting Check C.PURDON
Designer C.BARTLEY Design Check N.HINCKS

0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

BORAL

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title CROSS SECTIONS

SHEET 4 OF 6

Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01604

Rev D

Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew

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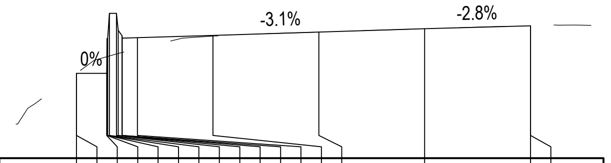
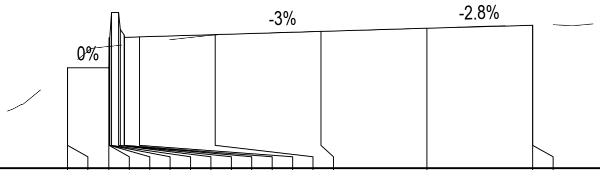
DATUM R.L. 16.00



DESIGN SURFACE LEVEL	18.807	18.807	18.807	19.951	19.951	19.952	20.787	20.787	20.227	20.047	19.967	19.982	20.060	20.170	20.280	20.377	20.377
LEVEL DIFFERENCE CUT - / FILL +	0.00	0.00	-0.55	0.59	0.59	0.59	1.41	1.34	0.76	0.55	0.47	0.37	0.02	0.00	0.00	-0.00	-0.00
EXISTING SURFACE LEVEL	18.81	18.81	19.35	19.36	19.36	19.36	19.38	19.45	19.46	19.49	19.50	19.61	20.04	20.17	20.28	20.38	20.38
OFFSET FROM CONTROL LINE	-15.015	-15.015	-14.015	-14.005	-13.995	-13.985	-13.925	-13.695	-13.635	-13.510	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 500

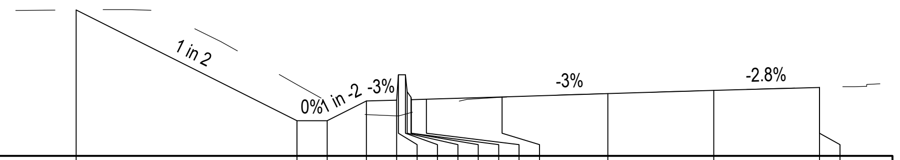
DATUM R.L. 15.00



DESIGN SURFACE LEVEL	18.308	18.309	18.309	19.300	19.300	19.300	20.135	20.135	19.575	19.395	19.315	19.330	19.405	19.510	19.616	19.713	19.713
LEVEL DIFFERENCE CUT - / FILL +	0.00	0.00	-0.71	0.28	0.28	0.28	1.11	1.08	0.52	0.32	0.24	0.20	0.01	0.00	0.00	-0.02	-0.02
EXISTING SURFACE LEVEL	18.31	18.31	19.02	19.02	19.02	19.02	19.02	19.05	19.06	19.07	19.07	19.13	19.39	19.51	19.62	19.73	19.73
OFFSET FROM CONTROL LINE	-15.383	-15.383	-14.015	-14.005	-13.995	-13.985	-13.925	-13.695	-13.635	-13.510	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 540

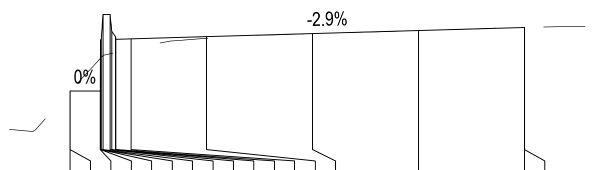
DATUM R.L. 17.00



DESIGN SURFACE LEVEL	21.814	18.162	18.162	18.810	18.841	19.676	19.676	19.116	18.936	18.856	18.871	18.947	19.054	19.160	19.257	19.257
LEVEL DIFFERENCE CUT - / FILL +	0.00	-1.19	-0.63	0.45	0.52	1.36	1.30	0.72	0.51	0.42	0.32	0.01	0.00	0.00	-0.01	-0.01
EXISTING SURFACE LEVEL	21.81	19.35	18.79	18.36	18.32	18.32	18.38	18.39	18.43	18.43	18.55	18.93	19.05	19.16	19.27	19.27
OFFSET FROM CONTROL LINE	-24.583	-17.280	-16.280	-14.985	-13.985	-13.925	-13.695	-13.635	-13.510	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 580

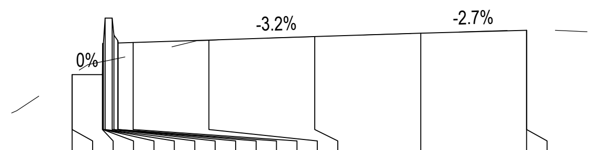
DATUM R.L. 16.00



DESIGN SURFACE LEVEL	18.688	18.688	18.688	20.382	20.382	20.382	21.217	21.217	20.657	20.477	20.397	20.412	20.484	20.584	20.685	20.787	20.787
LEVEL DIFFERENCE CUT - / FILL +	0.00	0.00	-1.07	0.61	0.60	0.59	1.36	1.30	0.72	0.51	0.43	0.33	0.05	0.00	0.00	-0.01	-0.01
EXISTING SURFACE LEVEL	18.69	18.69	19.76	19.77	19.78	19.80	19.86	19.92	19.93	19.96	19.97	20.08	20.43	20.58	20.68	20.79	20.79
OFFSET FROM CONTROL LINE	-15.015	-15.015	-14.015	-14.005	-13.995	-13.985	-13.925	-13.695	-13.635	-13.510	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 480

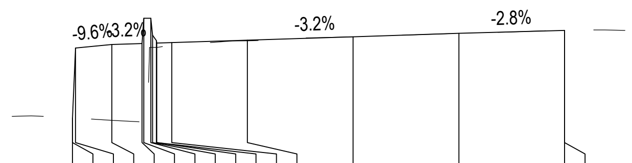
DATUM R.L. 16.00



DESIGN SURFACE LEVEL	18.562	18.562	18.562	19.587	19.587	19.587	20.422	20.422	19.862	19.682	19.602	19.617	19.698	19.811	19.924	20.019	20.019
LEVEL DIFFERENCE CUT - / FILL +	0.00	0.00	-0.43	0.60	0.60	0.59	1.42	1.37	0.80	0.59	0.51	0.42	0.01	0.00	0.00	-0.02	-0.02
EXISTING SURFACE LEVEL	18.56	18.56	18.99	18.99	18.99	18.99	19.01	19.05	19.07	19.09	19.09	19.20	19.69	19.81	19.92	20.03	20.03
OFFSET FROM CONTROL LINE	-15.015	-15.015	-14.015	-14.005	-13.995	-13.985	-13.925	-13.695	-13.635	-13.510	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 520

DATUM R.L. 15.00



DESIGN SURFACE LEVEL	16.561	16.561	18.877	18.993	19.025	19.860	19.860	19.300	19.120	19.040	19.055	19.136	19.248	19.361	19.459	19.459
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.00	2.32	2.51	2.59	3.43	0.96	0.40	0.22	0.14	0.10	0.02	0.00	0.00	-0.01	-0.01
EXISTING SURFACE LEVEL	16.56	16.56	16.56	16.49	16.43	16.43	18.90	18.90	18.90	18.90	18.96	19.12	19.25	19.36	19.47	19.47
OFFSET FROM CONTROL LINE	-16.285	-16.285	-16.185	-14.985	-13.985	-13.925	-13.695	-13.635	-13.510	-13.500	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 560

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW **Drafting Check** C.PURDON
Designer C.BARTLEY **Design Check** N.HINCKS

0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title CROSS SECTIONS

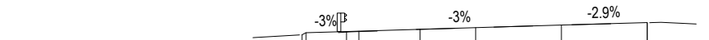
SHEET 5 OF 6

Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01605

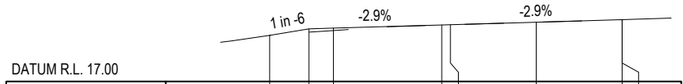
Rev D

Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01600.dwg



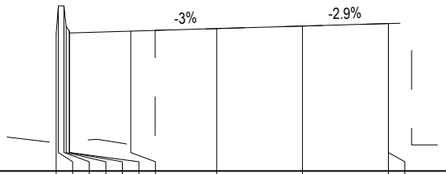
DATUM R.L. 17.00								
DESIGN SURFACE LEVEL	18.532	18.616	18.665	18.680	18.754	18.821	18.925	19.028	19.028
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.07	0.03	0.02	0.00	0.00	0.00	0.01	0.01
EXISTING SURFACE LEVEL	18.53	18.54	18.64	18.66	18.75	18.82	18.93	19.02	19.02
OFFSET FROM CONTROL LINE	-14.080	-13.911	-12.261	-11.761	-9.261	-7.000	-3.500	0.000	0.000

CH 680



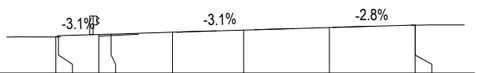
DATUM R.L. 17.00								
DESIGN SURFACE LEVEL	18.874	19.141	19.170	19.299	19.310	19.412	19.515	19.515
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.13	0.10	0.00	0.00	0.00	-0.00	-0.00
EXISTING SURFACE LEVEL	18.87	19.01	19.07	19.30	19.31	19.41	19.52	19.52
OFFSET FROM CONTROL LINE	-14.371	-12.770	-11.770	-7.351	-7.000	-3.500	0.000	0.000

CH 740



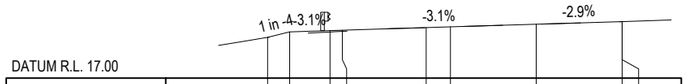
DATUM R.L. 13.00								
DESIGN SURFACE LEVEL	18.605	19.725	19.725	18.885	18.705	18.625	18.699	18.802	18.906	19.009	19.009
LEVEL DIFFERENCE CUT - / FILL +	4.43	5.54	5.53	4.68	4.49	4.41	4.62	0.00	-0.00	0.01	0.01
EXISTING SURFACE LEVEL	14.18	14.18	14.20	14.20	14.21	14.21	14.08	18.80	18.91	19.00	19.00
OFFSET FROM CONTROL LINE	-13.545	-13.455	-13.225	-13.135	-13.010	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 620



DATUM R.L. 17.00								
DESIGN SURFACE LEVEL	18.483	18.535	18.586	18.601	18.677	18.766	18.873	18.970	18.970
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.05	0.06	0.06	0.01	0.00	0.00	0.00	0.00
EXISTING SURFACE LEVEL	18.48	18.48	18.52	18.54	18.66	18.77	18.87	18.97	18.97
OFFSET FROM CONTROL LINE	-14.652	-14.548	-12.898	-12.398	-9.898	-7.000	-3.500	0.000	0.000

CH 660

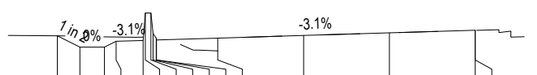


DATUM R.L. 17.00								
DESIGN SURFACE LEVEL	18.660	18.884	18.936	18.951	19.058	19.089	19.198	19.301	19.301
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.08	0.06	0.04	0.00	0.00	0.00	-0.00	-0.00
EXISTING SURFACE LEVEL	18.66	18.80	18.88	18.91	19.06	19.09	19.20	19.30	19.30
OFFSET FROM CONTROL LINE	-14.455	-13.556	-11.906	-11.406	-7.988	-7.000	-3.500	0.000	0.000

CH 720

DATUM R.L. 17.00											
DESIGN SURFACE LEVEL	18.387	18.387	18.387	18.654	18.685	19.805	19.805	18.965	18.785	18.705	18.782	18.889	18.997	19.107	19.107
LEVEL DIFFERENCE CUT - / FILL +	-0.00	-0.00	0.08	0.37	0.44	1.56	1.57	0.74	0.56	0.48	0.63	0.00	0.00	0.01	0.01
EXISTING SURFACE LEVEL	18.39	18.39	18.31	18.29	18.25	18.24	18.23	18.23	18.22	18.22	18.15	18.89	19.00	19.10	19.10
OFFSET FROM CONTROL LINE	-16.921	-16.921	-15.080	-14.545	-13.545	-13.455	-13.225	-13.135	-13.010	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 600



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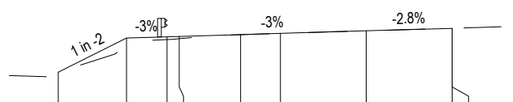
DESIGN SURFACE LEVEL	18.733	18.273	18.273	18.511	18.544	19.664	19.664	18.824	18.644	18.564	18.641	18.748	18.855	18.963	18.963
LEVEL DIFFERENCE CUT - / FILL +	0.00	-0.45	-0.42	-0.17	-0.14	0.98	0.98	0.14	-0.04	-0.13	0.52	0.00	0.00	0.01	0.01
EXISTING SURFACE LEVEL	18.73	18.73	18.69	18.69	18.68	18.68	18.69	18.69	18.69	18.69	18.12	18.75	18.86	18.96	18.96
OFFSET FROM CONTROL LINE	-17.041	-16.121	-15.121	-14.645	-13.545	-13.455	-13.225	-13.135	-13.010	-13.000	-10.500	-7.000	-3.500	0.000	0.000

CH 640



DATUM R.L. 16.00								
DESIGN SURFACE LEVEL	17.351	18.743	18.793	18.808	18.884	18.933	19.039	19.138	19.138
LEVEL DIFFERENCE CUT - / FILL +	-0.00	0.34	0.11	0.09	0.00	0.00	0.00	-0.00	-0.00
EXISTING SURFACE LEVEL	17.35	18.41	18.68	18.72	18.88	18.93	19.04	19.14	19.14
OFFSET FROM CONTROL LINE	-16.059	-13.275	-11.625	-11.125	-8.625	-7.000	-3.500	0.000	0.000

CH 700

Rev	Description	Checked	Approved	Date
D	CONCEPT DESIGN FOR DA APPROVAL	A.S.	G.W.	27.07.23
C	CONCEPT DESIGN FOR DA APPROVAL			26.06.23
B	PRELIMINARY ISSUE FOR DISCUSSION			13.06.23
A	PRELIMINARY ISSUE FOR DISCUSSION			09.06.23

Author B.DREW **Drafting Check** C.PURDON
Designer C.BARTLEY **Design Check** N.HINCKS

0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

BORAL

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title CROSS SECTIONS

SHEET 6 OF 6

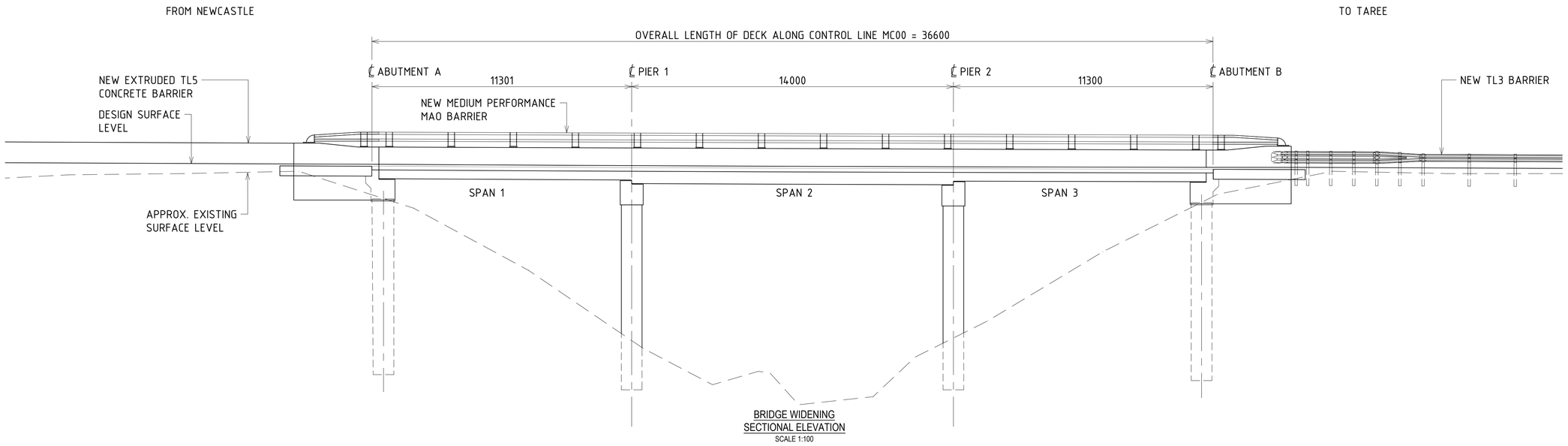
Size A3

Drawing No. 12599191-GHD-00-00-DRG-CI-01606

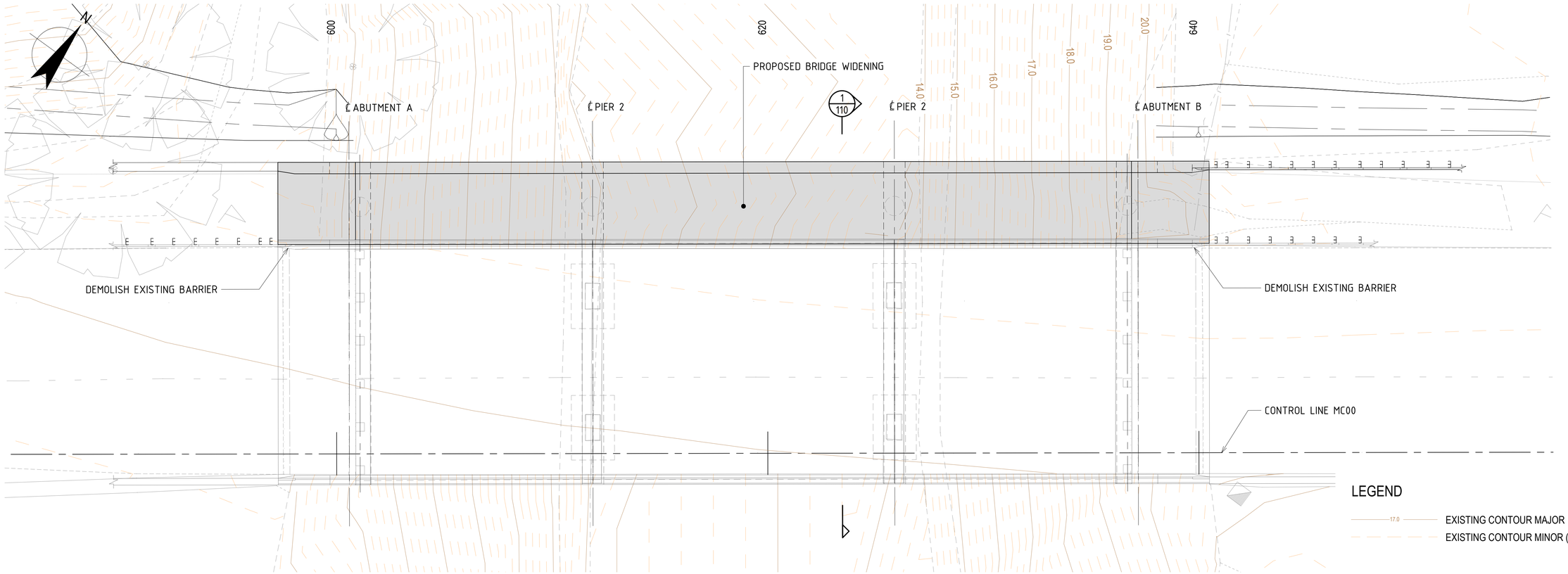
Rev D

Plot Date: 27 July 2023 - 1:56 PM Plotted by: Blake Drew

File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-CI-01600.dwg



BRIDGE WIDENING
SECTIONAL ELEVATION
SCALE 1:100



Rev	Description	Checked	Approved	Date
B	CONCEPT DESIGN FOR DA APPROVAL			23.06.23
A	PRELIMINARY FOR DISCUSSION			13.06.23

Author C.GARDINER **Drafting Check** B.GELLATLY
Designer B.GELLATLY **Design Check** N. GANHAO

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title BRIDGE WIDENING

GENERAL ARRANGEMENT

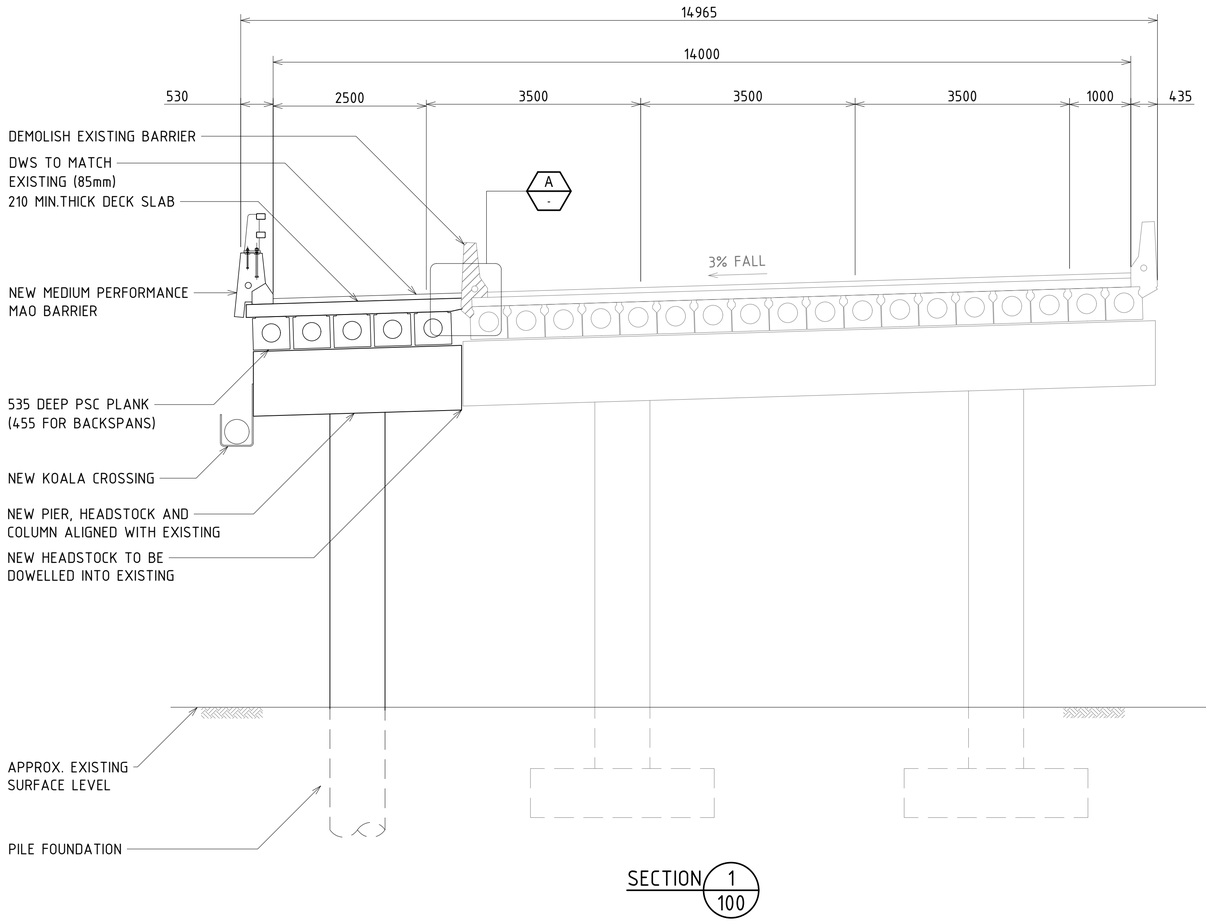
Size A1

Drawing No. 12599191-GHD-00-00-DRG-ST-00100

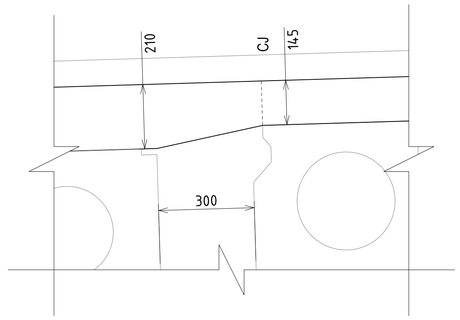
Rev B

Plot Date: 22 June 2023 - 1:24 PM Plotted by: Cameron Gardiner

File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-ST-00100.dwg



SECTION 1/100



RC DECK SLAB TRANSITION / TAPER

A - DETAIL
SCALE 1 :10

Rev	Description	Checked	Approved	Date
B	CONCEPT DESIGN FOR DA APPROVAL			23.06.23
A	PRELIMINARY FOR DISCUSSION			19.06.23

Author C.GARDINER **Drafting Check** B.GELLATLY
Designer B.GELLATLY **Design Check** N. GANHAO

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 AT ORIGINAL SIZE

0 0.1 0.2 0.3 0.4 0.5m
SCALE 1:10 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title BRIDGE WIDENING

SECTION AND DETAILS

Size A1

Drawing No. 12599191-GHD-00-00-DRG-ST-00110

Rev B

Plot Date: 22 June 2023 - 10:43 AM Plotted by: Cameron Gardiner

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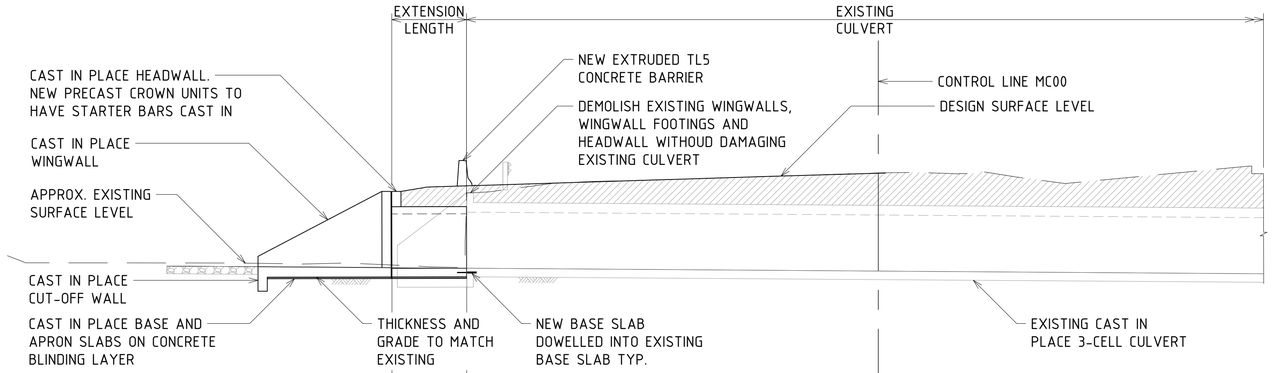


DATUM 12.000

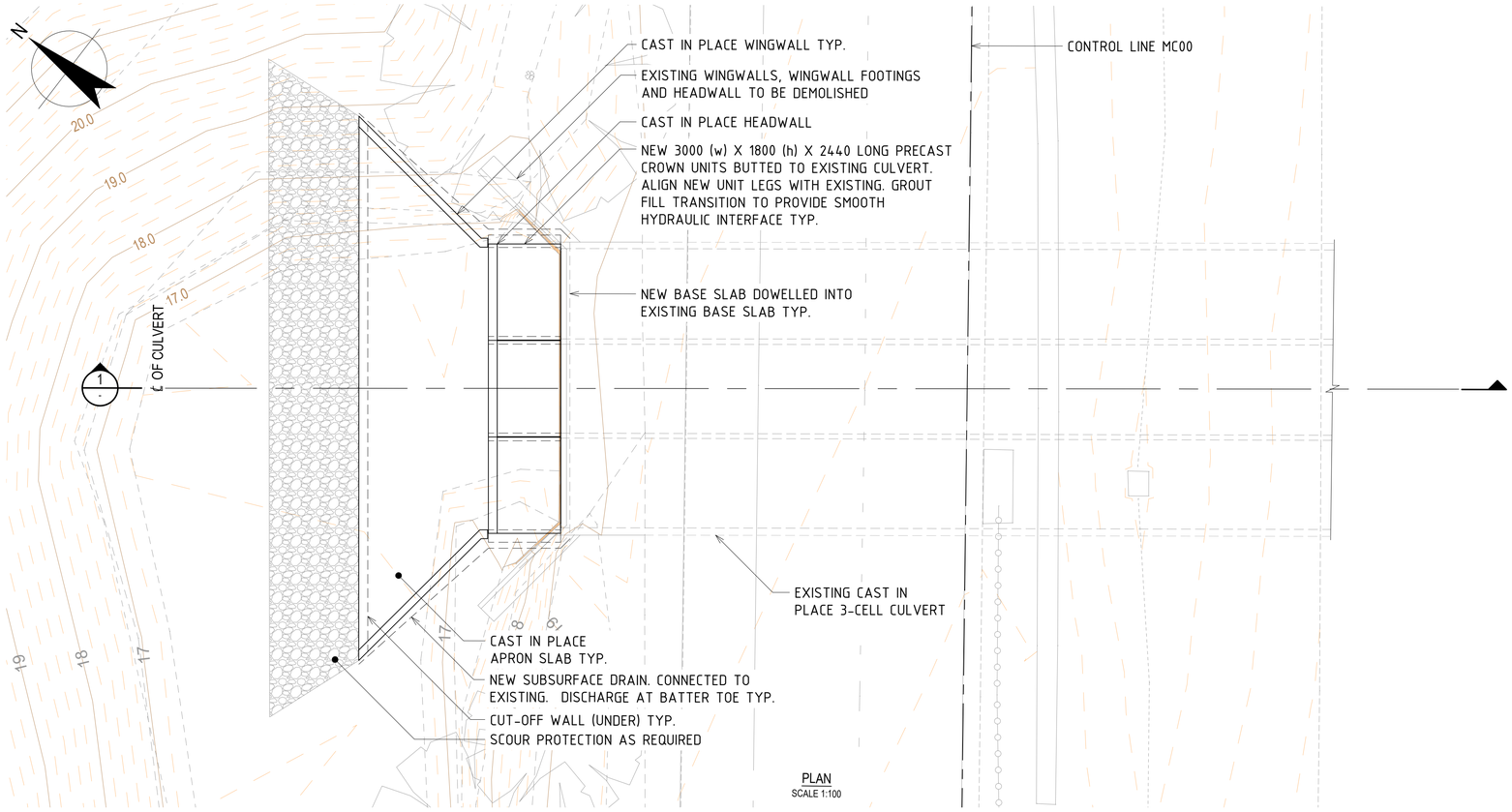
INVERT LEVEL ON CENTRELINE	16.432	16.415	16.320
EXISTING SURFACE LEVEL ON CENTRELINE	16.519	18.876	19.532
CHAINAGE ON CENTRELINE	00.000	2.450	15.880

SECTION 1
SCALE 1 : 100

LEGEND

17.0 EXISTING CONTOUR MAJOR

EXISTING CONTOUR MINOR (0.2m)



PLAN
SCALE 1:100

Rev	Description	Checked	Approved	Date
B	CONCEPT DESIGN FOR DA APPROVAL			23.06.23
A	PRELIMINARY FOR DISCUSSION			19.06.23

Author C.GARDINER **Drafting Check** B.GELLATLY
Designer B.GELLATLY **Design Check** N. GANHAO

0 1 2 3 4 5m
SCALE 1:100 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title CULVERT EXTENSION

GENERAL ARRANGEMENT SHEET A

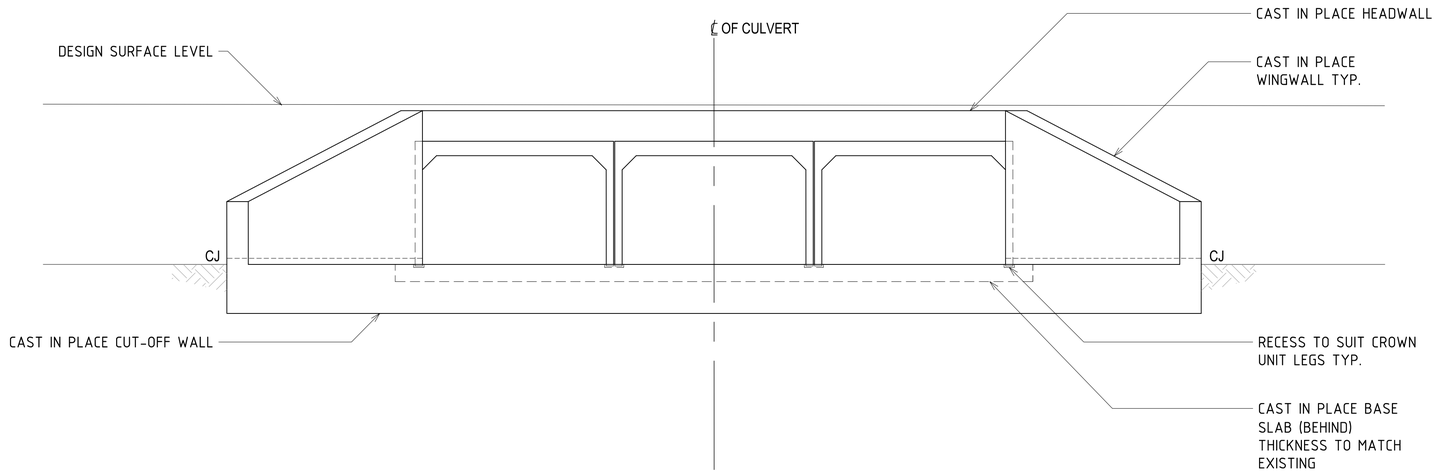
Drawing No. 12599191-GHD-00-00-DRG-ST-00200

Size A1

Rev B

Plot Date: 22 June 2023 - 1:31 PM Plotted by: Cameron Gardiner

File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-ST-00200.dwg



ELEVATION

SCALE 1:50

Rev	Description	Checked	Approved	Date
B	CONCEPT DESIGN FOR DA APPROVAL			23.06.23
A	PRELIMINARY FOR DISCUSSION			19.06.23

Author C.GARDINER **Drafting Check** B.GELLATLY

Designer B.GELLATLY **Design Check** N. GANHAO

0 0.5 1.0 1.5 2.0 2.5m

SCALE 1:50 AT ORIGINAL SIZE

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Project No. 12599191

Client BORAL RESOURCES (NSW) PTY LTD

Project BORAL QUARRY SEAHAM
ITALIA ROAD INTERSECTION

Status FOR APPROVAL

Drawing Title CULVERT EXTENSION

GENERAL ARRANGEMENT
SHEET B

Drawing No. 12599191-GHD-00-00-DRG-ST-00201

Size A1

Rev B

Plot Date: 22 June 2023 - 10:33 AM Plotted by: Cameron Gardiner

File Name: C:\12d\SW\data\P-00-12D-001\22-12599191 - Boral Quarry - Italia Rd Int_2538\CADD\Drawings\DRG\12599191-GHD-00-00-DRG-ST-00200.dwg

APPENDIX 9. STAFF CONTRIBUTIONS

The following staff were involved in the producing this BDAR:

Name	Qualifications	Title	Contribution
Ashley Owen	BSc (Ecology) Accredited BAM Assessor	Ecologist	Vegetation mapping, flora surveys, preparation of report
George Plunkett	BSc (Hons) PhD Accredited BAM Assessor	Senior Ecologist	Vegetation mapping, flora surveys and preparation of report. Case party owner.
Mark Dean	BEnvSc & Mgt Accredited BAM Assessor	Senior Ecologist	Flora and fauna assessments, Assistance with report
Marie Duffy	BEnvSc & Mgt	Senior Ecologist	Flora surveys
Jake Mauger	BEnvSc & Mgt	Ecologist	Flora and fauna surveys (Amphibian Surveys)
Olivia Szekelyhidy	B Zoology	Ecologist	Fauna Surveys and reporting
Kane Blundell	Grad Dip Spatial Science	GIS Analyst	Preparation of figures and area calculations
Keryn Dowding	B.Env.Sci.(Hons) PhD	GIS Analyst	Preparation of figures and area calculations
Samara Schulz	BEnvSc & Mgt (Hons) Accredited BAM Assessor	Principal Botanist	Report Review
Adam Blundell	BEnvSc & Mgt	Principle Advisor / Fauna Ecologist	Fauna habitat assessments
Carla Robertson	BEnvSc & Mgt	Ecologist	Fauna assessments (Amphibian Surveys)
David Martin	MSc BEnvSc & Mgmt and MSc Accredited BAM Assessor	Senior Ecologist	Koala habitat assessments, Assistance with report
Rachael Neal	BBSc (Hons)	Ecologist	Flora and fauna assessments (Amphibian Surveys)

The following staff undertook assessments according to the Port Stephens Council CKPoM and their qualifications and experience are listed in the table below.

Name & title	Qualification	Experience
David Martin **(Senior Ecologist)**	Accredited Assessor BAAS21021 Bachelor of Environmental Science and Management. Master of Science (First Class Honours) – Management of the overabundant koala population on French Island, Victoria.	Has lead research on the overabundant Koala population on French Island, undertaking a large amount of Koala population surveys, Spot Assessment Technique surveys, and assessments on Koala feed tree condition. Has completed Koala surveys locally in the Port Stephens LGA and the Central Coast of NSW with familiarity of suitable Koala habitat and the identification of Koala scats. Has a botany background and has completed vegetation mapping and assessments throughout NSW and Victoria, including the identification of Koala feed trees.
Ashley Owen **(Ecologist)**	Bachelor of Science	Ashley has 11 years experience working as an ecologist and has very well-developed plant and fauna identification skills.
Dr. George Plunkett **(Senior Ecologist)**	Accredited Assessor BAAS19010 PhD. Bachelor of Science (Hons.)	George has 12 years of experience as a plant taxonomist, flora ecologist and botanist, including a PhD in plant systematics, ecology and evolution, and has a very well-developed understanding of the Australian flora. George has authored many BDARs and Flora and Fauna Assessments as an Accredited Assessor under the BAM.

APPENDIX 10. SCIENTIFIC LICENCING AND PERMITS

Wedgetail employees involved in the current study are licensed or approved under the *Biodiversity Conservation Act 2016* (License Number: SL102506, Expiry: 28 February 2024) and the *Animal Research Act 1985* to harm/trap/release protected native fauna and to pick for identification purposes native flora and to undertake fauna surveys.

APPENDIX 11. LETTER OF SUPPORT FROM LOWER HUNTER LANDCARE

From:	Ashley Owen
To:	Stacy Mail
Cc:	George Plunkett
Subject:	Re: planting koala feed trees
Date:	Monday, 17 June 2024 5:28:16 PM
Attachments:	image001.png image002.png image001.png image002.png

Thanks very much Stacy. Talk soon

Get Outlook for iOS

From: Stacy Mail <lowerhunterlandcare@gmail.com>
Sent: Monday, June 17, 2024 4:26 PM
To: Ashley Owen <aowen@wedgetail.com.au>
Subject: Re: planting koala feed trees

Hi Ashley,

Further to our discussion regarding finding an appropriate site for koala feed tree revegetation,
I am happy to work with you to negotiate this process.
I have a brief expression of interest from 6 landholders- located at Dungog, Vacy, Fosterton, Bandon Grove, Woodlville and Clarencetown.

Please let me know next steps when the final requirements are available. Thanks.

Kind Regards,

Stacy Mail
Local Landcare Coordinator - Lower Hunter
Phone: 0429 444 305
M Science Civil Envir Engineering, Dipl Conservation & Land Mgmt
Email: lowerhunterlandcare@gmail.com
Facebook: www.facebook.com/hunterregionlandcare

We acknowledge the Traditional Owners of the Country on which we work across the Hunter region, and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past, present and emerging.

Office: Hunter Wetlands Centre, 1 Wetlands Place, Shortland, NSW, 2307

This initiative is made possible by the NSW Landcare Program. A collaboration of Local Land Services and Landcare NSW supported by the NSW Government.

On Thu, 13 Jun 2024 at 10:01, Ashley Owen <aowen@wedgetail.com.au> wrote:

> Hi Stacy,