Review of Environmental Factors

McGaws Rd causeway upgrade

Goulburn NSW 2580

Prepared for Goulburn Mulwaree Council | Locked Bag 22
Goulburn NSW 2580

6 February 2025

Ecology CONSULTING

ABOUT THIS DOCUMENT

This document has been prepared by Ecologist Emily Zouch and approved for release to client by Senior Ecologist Simon Vinson, Accredited Biodiversity Assessor NSW licence BAAS23004.

DISCLAIMER

This is a working document and has been prepared based on information available at the time. Final concurrence from NSW DPI Fisheries is required. The REF may require amendment subject to advice from NSW DPI Fisheries and may be modified on receival of the project contractors CEMP.

This document may only be used for the purposes for which it was commissioned. Ecology Consulting accepts no liability for any damages or loss incurred if this report is used for any other purpose, or because of any inaccuracies or omissions in information that is identified as having been obtained from a third party.

DOCUMENT TRACKING

Version	Type	Document Author	Reviewer	Date of review
v0.1	Draft - for client review	Emily Zouch	Simon Vinson	30 August 2024
v0.2	Draft - for client review	Emily Zouch	Simon Vinson	30 September 2024
v1.0	Issued for tender	Emily Zouch	Simon Vinson	14 November 2024
v1.1	Revision per client feedback	Emily Zouch		6 February 2025

ABOUT ECOLOGY CONSULTING

ACCREDITED

We are NSW-accredited Biodiversity Assessors, licensed to do scientific fieldwork in NSW, and accredited with the national Land for Wildlife program.

LOCAL KNOWLEDGE

We specialise in the ecosystems of southern NSW, so we can survey, assess, and document your site efficiently and accurately.

SOLUTIONS - NOT JUST SCIENCE

We have helped hundreds of landholders find information, contacts, events, and funding to achieve better environmental outcomes.

SUPPORT FOR MAJOR PROJECTS

We partner with business, government, and not-for-profit organisations to deliver major construction, species conservation, and site rehabilitation projects.

Executive summary

This Review of Environment Factors (REF) relates to a project to upgrade a causeway that has been damaged in recent years due to consecutive flooding events within the Goulburn Mulwaree Council (Council) Local Government Area (LGA).

McGaws Road causeway project area is in the rural locality of Windellama, where McGaws Road crosses Windellama Creek ~ 15.5 km northeast of the Tarago town centre. The creek crossing provides access and services to two residencies within the rural area to the local community and to the Goulburn region.

Council is the proponent for the proposal and is also the determining authority for the REF under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

THE PROPOSAL

Council, with use of Disaster Recovery Funding Arrangement (DRFA), seeks to replace the damaged causeway and associated infrastructure at the location to ensure long-term use for residents and the community. The project will involve a final culvert design with erosion control design and a construction plan to minimise impact to residents, the community and clearing footprints.

Key features of the proposal include:

- demolition and removal of current infrastructure,
- construct new culverts and associated road works,
- installation of scour protection areas, and
- other ancillary work required to support construction including the establishment of a stockpile site.

McGaws Road will experience short-term closures of approximately 3 days while construction on the culvert is completed.

Construction is proposed to be carried out during recommended standard hours for construction. Council advises that it is expected to take about three weeks to complete (subject to weather and approvals).

The proposed upgrade will include a work area and a stockpiling area for the project area. The project will have a direct impact area of approximately 0.04 ha.

NEED FOR THE PROPOSAL AND OBJECTIVES

Council identified the current infrastructure within the project area as damaged from recent flood events. The damaged infrastructure poses a risk to the safety of drivers and likely will continue to deteriorate with continued flooding. Current infrastructure also has caused erosion and sedimentation within the waterway, likely impacting aquatic ecosystems. Council has prioritised replacing damaged road assets to ensure safety, reliability and longevity of infrastructure.

The objective of the proposal is to:

- improve road safety,
- improve road accessibility to residents and the community in and after flood conditions, and
- mitigate the risk of erosion.

COMMUNITY AND STAKEHOLDER CONSULTATION

The construction of the culvert is in response to community concerns regarding the nature of the existing creek crossings and accessibility issues. Council has been in contact adjacent landholders and impacted residencies.

Consultation with NSW Department of Primary Industries (DPI) Fisheries has begun, commencing through the design and will continue through the implementation of the project. Additional key stakeholders such as other government agencies will be contacted as soon as reasonably practicable.

Council and their contractors also intend to produce a Community and Stakeholder Engagement Plan as a part of the project's Construction Environmental Management Plan (CEMP).

STATUTORY AND PLANNING FRAMEWORK

The proposal is to be carried out by Council for the purpose of road and road infrastructure facilities. In accordance with Chapter 2, Part 2.2, Division 1 within *State Environmental Planning Policy (Transport and Infrastructure) 2021* the proposal can therefore be assessed under Division 5.1 of the EPA Act. This REF fulfils the Council's obligation under section 5.5 of the EPA Act including to examine and consider to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

An assessment of the proposal concluded that it would not significantly impact on Matters of National Environmental Significance (MNES) protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) or significantly affect threatened species or ecological communities and their habitats under the NSW *Biodiversity Conservation Act* 2016 (BC Act) or the *Fisheries Management Act* 1994 (FM Act). Therefore, the proposal is a valid development to be assessed under Division 5.1 of the EPA Act and no further planning approval requirements would be triggered under the EPBC Act or BC Act.

ENVIRONMENTAL IMPACTS

LANDFORMS, GEOLOGY AND SOILS

The topography of the project area has experienced minor modifications previously due to causeway and ancillary works. The project area lays within generally depressed valley flat depressions associated with Windellama Creek. The proposal is not expected to result in any substantial changes to the topography of the site. Risk from erosion, sedimentation and dust emissions from the clearing of native riparian vegetation may contribute to minor topographic and soil changes.

However, these risks are to be avoided or otherwise minimised through appropriate and standard controls and other mitigation measures identified within this REF.

HYDROLOGY, FLOODING, GROUNDWATER, AND WATER QUALITY

The project has the potential to impact water quality within Windellama Creek as proposed works will occur within this waterway.

The removal of surrounding riparian vegetation and exposure of soils will increase the risk of erosion and sedimentation of the waterway and downstream areas. In-stream works must be managed by suitable measures such as silt curtains, and the migration of soils resulting from exposed surfaces are to be managed through the implementation of an Erosion and Sediment Control Plan (ESCP) to ensure sedimentation of the waterway and consequently impacts to water quality are avoided.

Further impacts could occur from pollution (spills and leaks of oils and chemicals). Water quality should be protected through the implementation of safeguard and management measures to ensure that spills are contained and removed correctly.

BIODIVERSITY

Proposed works involve the removal of up to 0.02 ha of native riparian vegetation. Native vegetation proposed for removal is not considered to be a Threatened Ecological Community (TEC) listed under the BC Act, the EPBC Act or the FM Act.

The project area did not have any specific habitat features that will be impacted by the proposed activities other than one tree, a Black Wattle (*A. decurrens*). Importantly, the project area has a small area of good quality riparian habitat which will be removed or otherwise disturbed by the proposed activities.

Two threatened bird species were observed within the project area during field inspection. Pink Robin (*Petroica rodinogaster*) and Scarlet Robin (*P. boodang*) were both observed utilising riparian vegetation in and around the works area.

Furthermore, four threatened flora species and 31 threatened fauna species were assessed as potentially occurring within or utilising habitats within the project areas. Commonwealth and NSW tests of significant impacts of the proposals assessed both EPBC Act and BC Act listed threatened species, concluding that the project is unlikely to have a significant and long-term adverse impact on any threatened flora or fauna.

Some weed species, including seven High Threat Exotic (HTE) weeds and two Weeds of National Significance (WoNS) were observed across the project area and the proposed activities may facilitate the introduction, spread, and establishment of weed species within the project area and surrounding landscape. To reduce this risk, weeds within the project area should be managed before construction with water safe herbicides or using mechanical removal and planning should include the development of a weed management sub-plan as part of the project CEMP.

Overall, the proposal is not likely to have long term adverse effects on local biodiversity or significantly impact threatened species, populations, ecological communities, or their habitats. It is recommended that a suitably qualified ecologist supervises native vegetation, habitat clearing and weed removal to minimise harm to the remaining native flora and fauna.

HERITAGE (ABORIGINAL AND NON-ABORIGINAL)

Past Traces completed an Aboriginal Cultural Heritage Due Diligence Assessment for the project area and did not identify on the Aboriginal Heritage Information Management System (AHIMS) the site as containing any known Aboriginal objects or places. Field survey of the site identified no areas of Aboriginal heritage in either the proposal site or in its immediate vicinity, and as such, impacts on Aboriginal heritage are not predicted.

The project site does not contain and is not within close proximity to any known heritage items or places.

TRAFFIC AND ACCESS

In the short term, the project will have some unavoidable adverse impacts on local traffic movement due to an increase in construction and staff vehicles entering the site. Property access to two local residents will be restricted for up to three days during the construction period at McGaws Road, which will be coordinated with residents to ensure they are informed and prepared.

Delays/disruptions will be minimised through preparation of a Traffic Management Plan for the project.

NOISE AND VIBRATION

In the short term, construction vehicles and machinery may increase in noise and vibrations in and around the project area, but lower speed limits for construction work may reduce the emissions. The proposal is not expected to result in any noticeable change in noise or vibration during operation.

AIR QUALITY

The project is likely to result in a short-term increase in emissions from construction vehicles and machinery, though the emissions are not likely to be significant considering the emissions associated with normal vehicle use and the very open nature of the site.

VISUAL AMENITY AND LANDSCAPE

In the short term, the project will involve setting up a construction site and materials stockpiles and the removal of a small amount of native vegetation. In the long term, the installation of the new culvert will have similar visual effect to what is consistent with the current infrastructure, while protecting the new structure and banks from erosion, which contributes to better creek views in the future.

Rehabilitation plantings and using locally appropriate native vegetation within the riparian and upper banks of any impacted area will contribute to remedying any impacts to visual amenity in the long-term.

CHEMICAL AND WASTE MANAGEMENT

Waste will inevitably be created and will need to be contained, to ensure it does not disperse across the site and into downstream/downwind areas. Among other things, waste materials must be managed in accordance with relevant EPA guidelines and disposed of at an appropriate waste management facility. Overall waste generated by the proposal is not expected to be in great volumes. No construction materials or any other kind of waste is to be placed, even temporarily, outside the defined works area.

CUMULATIVE ENVIRONMENTAL IMPACTS

The project is funded by the DRFA, a NSW Government initiative to assist LGAs affected by a declared natural disaster, including those with infrastructure damaged by fire, flood or storms. The project will likely have cumulative impacts due to the works involved in upgrading multiple infrastructural assets impacted by recent floods, including, increased traffic from heavy vehicle, noise and air quality impacts, vegetation clearance and disturbance of waterways.

As the proposed work only requires minimal native vegetation removal (0.02 ha), it is not deemed to significantly contribute to cumulative impacts on native vegetation and its associated habitat. Further plans to clear trees or native vegetation and habitat removal for the remainder of the project (other damaged infrastructure) will be carefully assessed taking into consideration the cumulative impacts of the DRFA within the Council LGA.

CONCLUSION

This REF recommends mitigation measures to ensure that the construction and operation McGaws Road causeway occurs without significant environmental impact.

This REF has identified the likely impacts of the proposal, grounded by the detailed design, which has been issued for construction, supplied by Council and other relevant documents and consultation with Council. The detailed design may be further refined during the detailed design phase and is subject to changes pending finalisation of the design and review of the projects Construction Environment Management Plan (CEMP). Changes to the design following completion of a detailed design may require amendments to this REF where impacts of the proposal have been subject to change and yet to be reported. Furthermore, the contractor's CEMP must clearly outline how the site will be managed during

construction and address all mitigation measures proposed to avoid environmental impacts. As the detailed design has been issued for construction, the CEMP will be completed by the principal contractor once procured by Council and sent to DPI Fisheries for approval. The completed CEMP may form part of this REF and mitigation measures with future updates to this document.

This REF will remain a working document until all construction mitigation measures are integrated and all phases of construction completed.

CONDITIONS OF APPROVAL TO BE CHECKED/MONITORED

Weed management is to be undertaken across the entire project area to control invasive plant species prior to any construction works being undertaken. Specific attention and care should be focussed on any areas containing WoNS, HTEs and Regional Priority Weeds (RPW) and any other invasive plant species identified in this REF.

Council has contacted NSW DPI Fisheries and started consultation regarding the application for permits for and the proposed works within Windellama Creek, as the site is mapped as Key Fish Habitat. Consultation with NSW DPI Fisheries will continue throughout the design and construction process, and conditions of the permit will be incorporated into the contractor's CEMP.

Provided the safeguards and mitigation measures recommended in **Section 6** are implemented, no additional permits or licenses appear to be required. This situation is, however, subject to change. If there are significant delays in the approval of the REF or commencement of construction work, this REF should be reviewed to ensure that it remains complete and accurate.

Table of contents

List of figures

List of tables

Abbreviations and common terms

agg.	aggregate
AHIMS	Aboriginal Heritage Information Management System
ALA	Atlas of Living Australia
AOBV	Area of Biodiversity Value declared under the NSW BC Act
AQI	Air Quality Index
AUSHD	Australian Heritage Database
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016* (NSW)
CE	denotes a species, population or ecological community listed as Critically Endangered under Commonwealth and/or State legislation
CEMP	Construction Environment Management Plan
Council	Goulburn Mulwaree Council
Cwlth	Commonwealth
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DECC	Department of Environment & Climate Change NSW
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
DRFA	Disaster Recovery Funding Arrangement
E	denotes a species, population or ecological community listed as Endangered under Commonwealth and/or State legislation
EPA Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPA	Environment Protection Authority (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EPI	Environmental planning instruments
ESCP	Erosion and Sediment Control Plan
FM Act	*Fisheries Management Act 1994*
GM LEP	Goulburn Mulwaree Local Environmental Plan 2009
ha	Hectare
HTE	High Threat Exotic – a type of declared weed in NSW
IBRA	Interim Biogeographic Region of Australia
Transport and Infrastructure SEPP	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
km	Kilometres
KTP	Key Threatening Process listed under Commonwealth and/or State legislation
LEP	Local Environmental Plan—a type of planning instrument made under the EPA Act
LGA	Local Government Area
LLS	Local Land Services
m	Metres
MNES	Matters of National Environmental Significance
NP&W Act	*National Parks and Wildlife Act 1974 (NSW)*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
OEH	Office of Environment and Heritage
PBP	Planning for Bushfire Protection 2019

PCT	Plant Community Type
PMST	Commonwealth Protected Matters Search Tool
POEO Act	*Protection of the Environment Operations Act 1997 (NSW)*
REF	Review of Environmental Factors
RF Act	*Rural Fires Act 1997 (NSW)*
RPW	South East Regional Priority Weed
SEPP	State Environmental Planning Policy—a type of planning instrument made under the EPA Act
SHR	State Heritage Register
sp./spp.	species (singular) / species (plural)
subsp.	Subspecies
TEC	Threatened Ecological Community or equivalent (terms may vary across jurisdictions)
TMP	Traffic Management Plan
UFP	Unexpected Finds Procedure
V	denotes a species, population or ecological community listed as Vulnerable under Commonwealth and/or State legislation
WIRES	Wildlife Information, Rescue and Education Service
WM Act	*Water Management Act 2000*
WONS	Weeds of National Significance

1. Introduction

1.1. Background

Ecology Consulting Pty Ltd has been commissioned by the proponent, Goulburn Mulwaree Council (Council) and Reliance Engineering (managing project) to prepare a Review of Environmental Factors (REF) for proposed road upgrades to a causeway within the Goulburn Mulwaree local government area (LGA).

Work will be carried out to replace the causeway on McGaws Road, which has been damaged over recent years in consecutive flood events. The causeway is susceptible to flooding, impacting local residents and the community, causing road closures and can lead to residents to not having access out of the only access road, McGaws Road. The proposed upgrade to the causeway will provide reliable and safe access for local traffic.

The proposed works will be carried out under Division 17 (Roads and road infrastructure facilities) of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* and are permitted without consent. The environmental assessment of the proposal has been undertaken in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* (EPA Act). For this proposal, the Council is both a public authority proponent (EPA Act s5.3) and the determining authority (EPA Act s5.1). **Table 1** presents the proponent contact details.

TABLE 1: PROPONENT DETAILS

Project name	McGaws Road
Proponent name	Goulburn Mulwaree Council
Project Manager	Ollie Anable - Reliance Engineering Services (Consultant)
Position	Project Coordinator
Contact details	ollie.anable@relianceengineering.com.au 0407 555 511

1.2. The site

1.2.1. LOCATION OF THE PROPOSED ACTIVITY

The site is located within the LGA of Goulburn Mulwaree Council (**Figure 1**). According to the Interim Biogeographic Regionalisation of Australia (IBRA), the proposed activity is located within Monaro sub-region of the South Eastern Highlands region.

The proposed activity is in the rural locality of Windellama, where McGaws Road crosses Windellama Creek. It is ~ 15.5 km northeast of the Tarago town centre and ~ 24.5 km southeast of Goulburn airport, NSW (GPS co-ordinates -35.019179, 149.813564) (**Figure 2**).

FIGURE 1: THE PROJECT AREA IN A REGIONAL CONTEXT

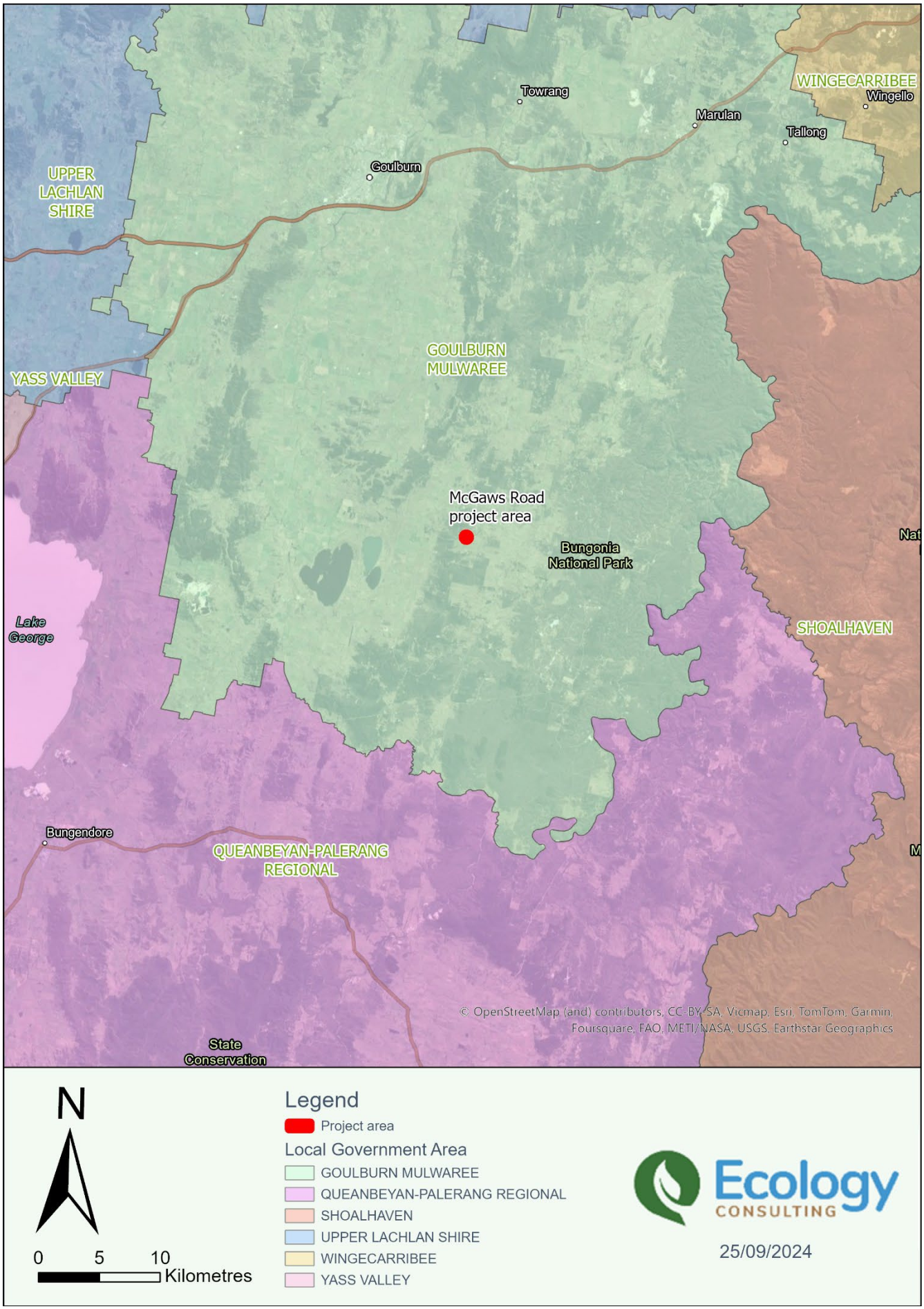


FIGURE 2: AERIAL VIEW OF PROJECT AREA

1.2.1. LANDSCAPE CONTEXT

The project area is located within undulating country with an elevation ~ 620 m above sea level with a local relief of 20 – 50 m, where McGaws Road crosses Windellama Creek. Windellama Creek is a perennial watercourse which flows in a generally easterly direction joining Nerrimunga Creek, and then flowing into the Shoalhaven River. The surrounding landscape is formed from Devonian volcanics, including tuff and siltstone with minor dolomite and siliceous limestone[1].

The surrounding landscape is rurally grazed land, however, there are large patches of native forest and woodland found to the north, west and south of the project area. These large patches of native forest and woodland have connectivity 14.5 km south to Nadgigomar Nature Reserve (**Figure 3**).

1.2.2. TRADITIONAL LANDS

The proposal is within the traditional lands of the Gandangara/Gundungurra nation and is within the area now administered by Pejar Local Aboriginal Land Council in Goulburn. A desktop search of the Native Title Tribunal Online Register revealed that the project site is not subject to a Native Title Claim and/or Freehold[2].

1.2.3. CURRENT LAND USE AND OWNERSHIP

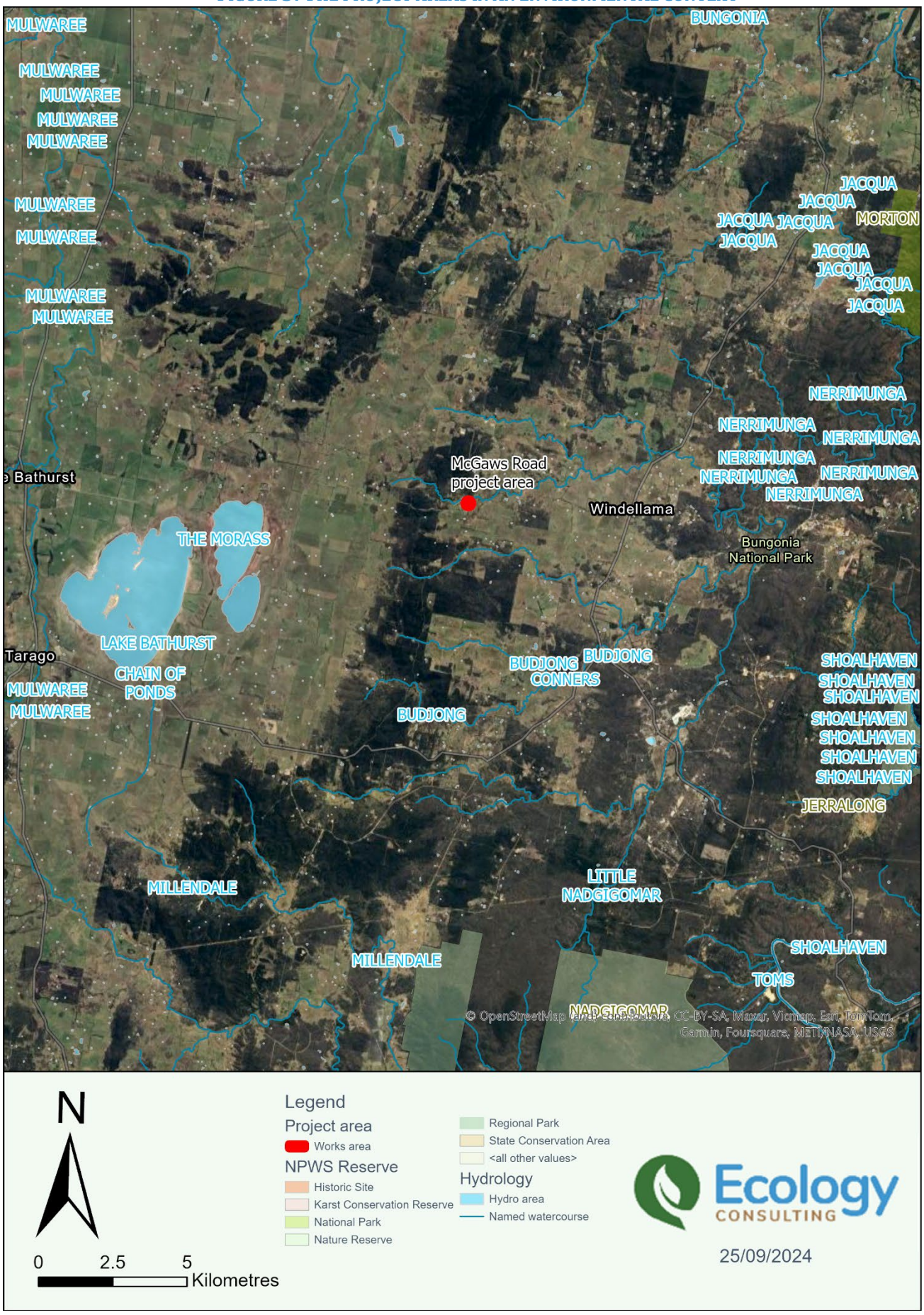
The existing crossing and road is within a Local Government Road Reserve managed by Council. All bordering properties are held in private ownership, however, it is not expected that any works will extend outside of Local Government Road Reserves. The stockpile area is similarly situated within Council managed Road Reserved areas.

No temporary arrangement or rental agreement from the landholder is necessary where construction work is confined within council managed lands.

The project area adjoins and services rural land that is zoned for Rural Landscape (R2).

[1] Descriptions for NSW (Mitchell) Landscapes. Department of Environment & Climate Change NSW, (2002).
[2] Search the NNTT Registers and Databases for native title information. National Native Title Tribunal. (2024). (Accessed: 20/08/2024).

FIGURE 3: THE PROJECT AREAS IN AN ENVIRONMENTAL CONTEXT



1.3. Project justification

McGaws Road causeway is a low-laying concrete causeway over Windellama Creek. Council plan to replace the causeway as it has been damaged over recent flood events, resulting in the erosion of road materials into the downstream waterway. The current infrastructure is impassable even during minor flooding events cutting off local residencies which poses a hazard to residents in emergency situations.

Council's main justification for the project is to provide a reliable and safe creek crossing for the local community. The project align with Council's mission statement "*To serve the community*" and Council's commitment to "*maintain and improve road infrastructure and connectivity*"[3].

1.4. Purpose of this report

The purpose of this REF is to facilitate the assessment of the proposed activity to be undertaken by Council. It describes the proposed works, relevant planning controls, the existing environment, the potential environmental impacts associated with the proposed works, and environmental mitigation measures to address any potential impacts identified.

The environmental assessment and determination of the proposal have been undertaken in accordance with Part 5 of the EPA Act. For this proposal, Council is both a public authority proponent (EPA Act s 5.3) and the determining authority (EPA Act s 5.1).

[3] Strategy IN3 in The Tablelands 2016 - 2036 Regional Community Strategic Plan. Goulburn Mulwaree Council, Upper Lachlan Shire Council and Yass Valley Council. (2016).

2. Project description

The proposal will require the removal of the current damaged causeway, construction of a new culvert, associated road approach maintenance and all associated works involved in the upgrading of the McGaws Road culvert at Windellama Creek. Council detailed designs for the new culvert are presented in **Figure 4** and **Figure 5**.

2.1. Scope of works

Proposed construction methodology for the project would involve the following general scope of works:

- Stage 1: Site establishment including:
  - preconstruction weed control,
  - establishment of site compound and stockpile areas,
  - delineation of construction site,
  - set-up of sediment and erosion control measures,
  - clearance of proposal site,
  - earthworks to level the site as required, and
- Stage 2: Construction of the new culvert, alignment and associated structures including:
  - road and shoulder widening,
  - demolition and removal of existing infrastructure,
  - site preparation, including compaction and filling,
  - pipes and wingwall installation and general culvert construction,
  - installation of scour protection,
  - road associated works, including compaction and filling,
  - installation of traffic signage and guide posts, and
  - flood advisory signage (depth markers)
- Stage 3: Site demobilisation involving:
  - removal of waste and surplus materials,
  - remediate exposed areas e.g., through seeding or planting of exposed soil, and
  - monitor and control weed emergence in disturbed areas for a period of 12 months.

Ongoing maintenance of the site will then be managed through Council's Asset Management and Maintenance Plan.

The proposed activities for this project will largely be confined to the works area, which has been assessed for this REF as having a total impact area of 0.03 ha, including McGaws Road and within/surrounding Windellama Creek, with an additional 0.015 ha stockpiling area (5 m x 30 m).

2.2. Machinery and equipment

A range of plant and equipment would be used during construction. An indicative list is provided below:

- crane,

- grader,
- excavator,
- roller,
- tipping trucks,
- flatbed trailers to transport precast units,
- concrete mixer trucks, and
- pumps and generators.

This is an indicative list and may change prior to construction depending on the agreed construction methodology. The final equipment and plant requirements for the site will be determined by the construction contractor.

2.3. Access and ancillary works

2.3.1. STOCKPILE SITE

To support the construction of the proposal, it is anticipated that a stockpile area will be necessary for the project. The proposed stockpile area is intended to be compact and situated within an area that has previously undergone clearing and significant modification, thereby minimising impacts on native vegetation.

Field inspections identified an area adjacent to the McGaws causeway approximately 40 m away, that is most suitable area for stockpiling materials for the proposal (**Figure 2**). The area has undergone historic clearing and is part of a modified roadside verge within the agricultural landscape.

2.3.2. TRAFFIC AND ACCESS

A detailed Traffic Management Plan (TMP) will be required for the proposal before construction commencement and must be reviewed by the Council before implementation on site.

Access to the project area will be unrestricted as it occurs on an accessible public road. However, during the construction, there will be a period when accessibility across Windellama Creek will be restricted. Communication and cooperation with local residents who rely on the causeway for access to their residences and to outside services must be planned and carried out to ensure the safety of impacted residents.

2.4. Duration and working hours

2.4.1. DURATION

Works are estimated to take 3 weeks depending on the final design and outcomes of contractor consultation.

2.4.2. CONSTRUCTION WORK HOURS

Where possible, construction would be undertaken during recommended standard hours[4]. The recommended standard hours for construction are:

- Monday to Friday: 7 am to 6 pm (proposed works expected to conclude by 5 pm),

[4] Draft Construction Noise Guidelines. State of NSW and the Environmental Protection Agency. (2020).

- Saturday: 8 am to 1 pm, and
- no work on Sundays or public holidays.

No works are intended to be required outside standard hours. However, in the case that noise-generating works are required outside these times, justification would be provided in accordance with the *Draft Construction Noise Guidelines*.

2.5. Changes to scope of work

It is advised that if any changes to the project's scope of works, including but not limited to additional likely impact areas are proposed, such as clearing outside of the assessed areas outlined in this REF becomes necessary, or if other discoveries are encountered, that additional inspections and assessments will be required. Protocols for such situations should be included in the project's CEMP.

FIGURE 4: CONCEPT DESIGN FOR PROJECT 2 (CLIENT SUPPLIED)

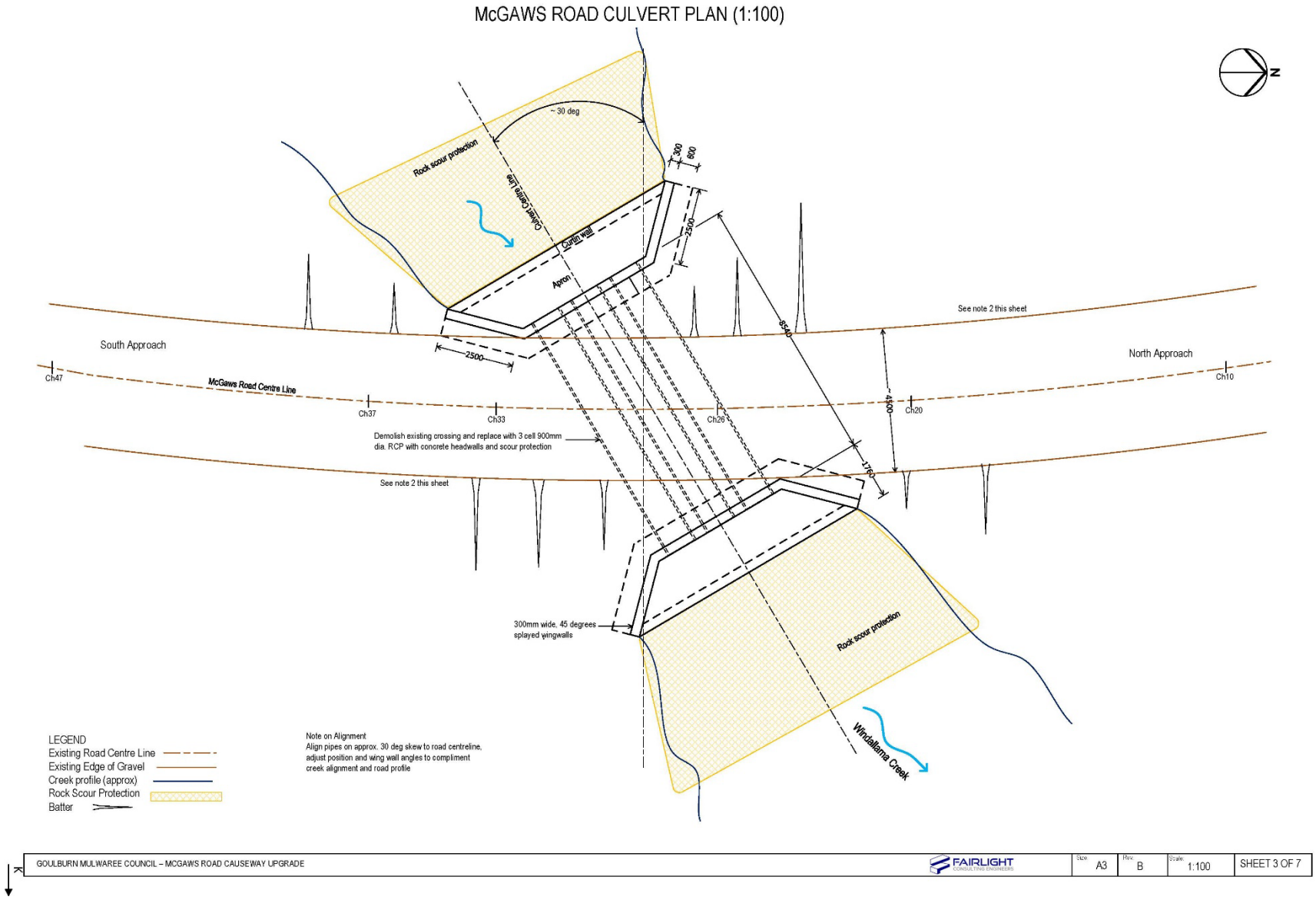
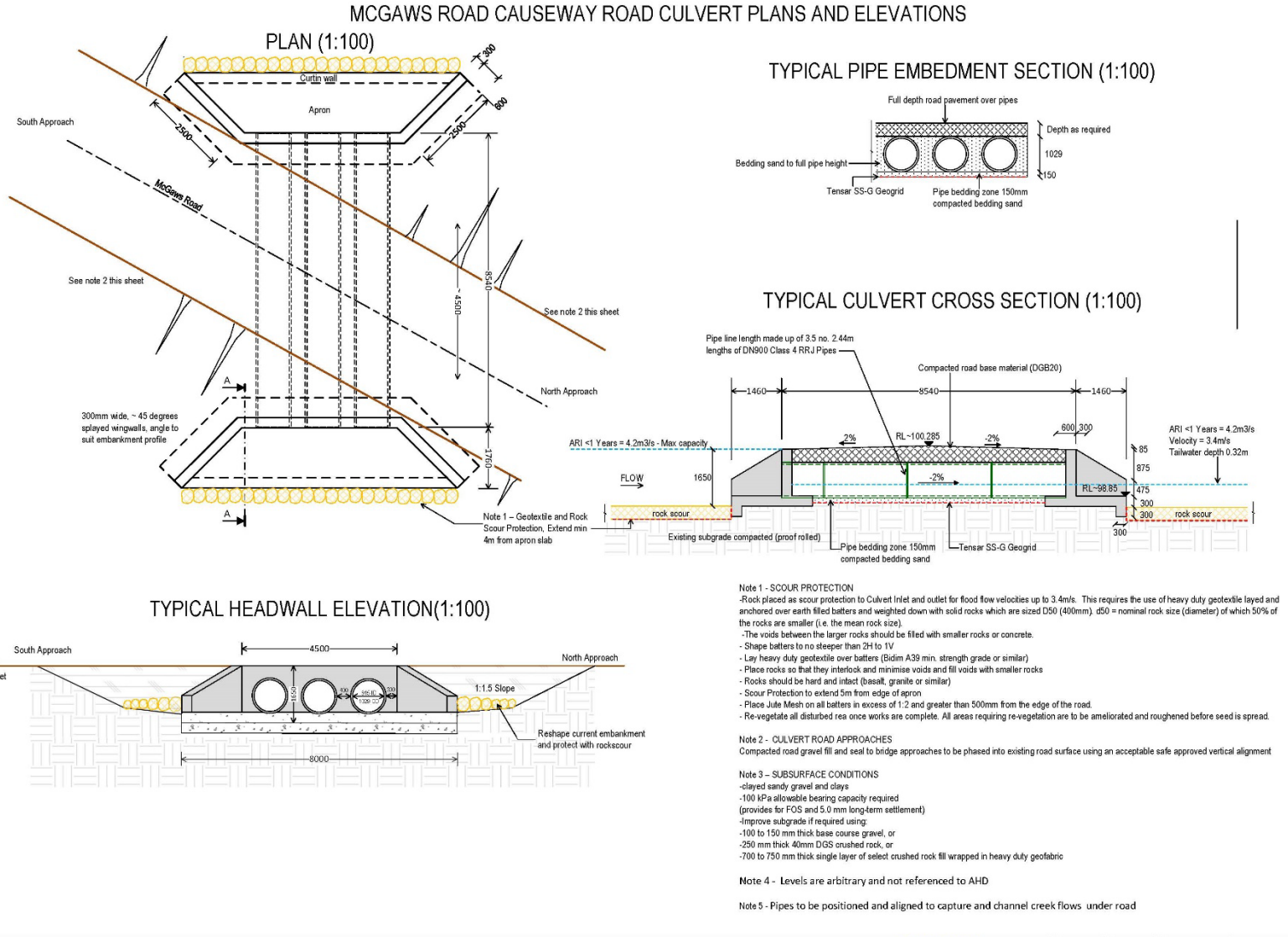


FIGURE 5: CONCEPT DESIGN FOR PROJECT 2 (CLIENT SUPPLIED)



3. Consultation

3.1. Community

The construction of the culvert is the response to long-standing complaints about the nature of the existing creek crossing and accessibility issues. Council has contacted adjacent landholders for the project to inform them of intended works, Council plans to keep adjacent landholders informed as the project progresses.

Council and their contractors also intend to produce a Community and Stakeholder Engagement Plan as a part of each project's Construction Environmental Management Plan (CEMP).

3.2. Government agencies

3.2.1. TRANSPORT FOR NSW

Transport for NSW is a key stakeholder in the project. It is suggested that Council contact Transport for NSW to keep them informed on the concept design and progress.

3.2.2. NSW DEPARTMENT OF PRIMARY INDUSTRIES (DPI) FISHERIES

Council has initiated contact with NSW Department of Primary Industries (DPI) Fisheries on possible issues regarding works within and in close proximity to Windellama Creek mapped as Key Fish Habitat (KFH) (see **Section 4.2.3**).

Consultation with NSW DPI Fisheries will continue throughout the design and construction process, including applying for a Part 7 Fisheries Permit for works associated with the proposal. Conditions of the permit/s are to be incorporated into the contractor's CEMP.

3.3. Transport and Infrastructure SEPP notification and consultation

Chapter 2, *State Environmental Planning Policy (Transport and Infrastructure) 2021*, contains provisions to consult with public authorities prior to the commencement of certain types of development if certain circumstances apply as outlined in Part 2.2, Division 1. An assessment of compliance with the consultation requirements of the Transport and Infrastructure SEPP is presented in **Table 2**.

TABLE 2: TRANSPORT AND INFRASTRUCTURE SEPP NOTIFICATION AND CONSULTATION

SEPP Clause	Substance	Consultation Required
2.10	Impacts on council-related infrastructure or services (1) Consultation is required if the public authority is of the opinion that the development: (a) will have a substantial impact on stormwater management services provided by a council, or (b) is likely to generate traffic to an extent that will strain the capacity of the road system in a local government area, or (c) involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council, or (d) involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council, or (e) involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential, or (f) involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the *Roads Act 1993* (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath).	**Yes**, and consultation has occurred or will occur as Council is the proponent.
2.11	Impacts on local heritage (1) Consultation is required if the development: (a) is likely to affect the heritage significance of a local heritage item, or of a heritage conservation area, which is not also a State heritage item, in a way that is more than minor or inconsequential, and (b) is development that this Chapter provides may be carried out without consent.	No. the project does not contain or is not expected to impact an item of heritage. (**Section 5.5**).
2.12	Impacts on flood liable land (1) (Repealed) (2) A public authority, or a person acting on behalf of a public authority, must not carry out, on flood liable land, development that this Chapter provides may be carried out without consent and that will change flood patterns other than to a minor extent unless the authority or person has– (a) given written notice of the intention to carry out the development (together with a scope of works) to the council for the area in which the land is located, and (b) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given.	Not applicable. The project area is not mapped as flood liable land by NSW Environmental planning instruments (EPI).
2.15	Consultation with public authorities other than councils (2) Consultation is required if the development is: (a) development adjacent to land reserved under the *National Parks and Wildlife Act 1974* or to land acquired under Part 11 of that Act–the Office of Environment and Heritage, (b) development on land in Zone C1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone, other than land reserved under the *National Parks and Wildlife Act 1974*– the Office of Environment and Heritage, (c) development comprising a fixed or floating structure in or over navigable waters– Transport for NSW, (d) development that may increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map– the Director of the Observatory, (e) development on defence communications facility buffer land within the meaning of clause 5.15 of the Standard Instrument–the Secretary of the Commonwealth Department of Defence, (f) development on land in a mine subsidence district within the meaning of the *Mine Subsidence Compensation Act 1961*–the Mine Subsidence Board. (g) development on, or reasonably likely to have an impact on, a part of the Willandra Lakes Region World Heritage Property– the World Heritage Advisory Committee and Heritage NSW, (h) development within a Western City operational area specified in the *Western Parkland City Authority Act 2018*, Schedule 2 with an estimated development cost of $30 million or more–the Western Parkland City Authority constituted under that Act.	No.

4. Statutory and planning framework

4.1. Commonwealth legislation

4.1.1. COMMONWEALTH ENVIRONMENT PROTECTION & BIODIVERSITY CONSERVATION ACT 1999

KEY PROVISIONS

The EPBC Act provides a framework to protect Matters of National Environmental Significance (MNES), including Commonwealth-listed threatened species and threatened ecological communities (TECs)[5]. Any actions that will or are likely to have a significant impact on MNES are likely to be considered a Controlled Action under the EPBC Act and require approval from the Minister for the Environment.

RELEVANCE TO THIS PROJECT

Desktop research using the Commonwealth Protected Matters Search Tool (the PMST) on 27 June 2024 for a 10 km buffer identified several potential MNES on or near to the site[6]. The project's expected impacts were assessed in accordance with the Significant Impact Guidelines 1.1[7]. The assessment found that a significant impact is not likely to result (**Table 3**) and therefore a referral to the Department that administers the EPBC Act is not required.

TABLE 3: OVERVIEW OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

MNES	Impacts	More information
World Heritage Properties	None	None, the project area is not within 10 km, nor does it contain a World Heritage Property.
National Heritage Places	None	None, the project area is not within 10 km, nor does it contain a National Heritage Place.
Wetlands of international importance (RAMSAR wetlands)	None	The project area does not contain, nor is it within 10 km of a RAMSAR wetland. The nearest RAMSAR wetlands are the Towra Nature Reserve near Sydney and the Ginini Flats Wetland Complex to the southwest of Canberra.
Nationally threatened ecological communities and species	**Potential, not likely significant.**	EPBC PMST reports flag a total of two TECs and 57 threatened species listed by the Commonwealth are known to or may occur within 10 km of the project area. A likelihood of occurrence assessment was undertaken with the following results for Commonwealth listed species (see **Appendix A5**). **TECs:** The project area does not contain any Commonwealth-listed TEC (**Appendix A5.1**). **Threatened Flora:** No threatened flora species were identified within the project area. The following Commonwealth listed flora species have the potential or are likely to occur within the project area: • Black Gum (*Eucalyptus aggregata*), and • Hoary Sunray (*Leucochrysum albicans* subsp. *Tricolor*). The project is considered unlikely to have a significant impact on either of the abovementioned nationally threatened flora species. This is predominantly due to no individuals being identified within the project area during field surveys, disturbed or degraded habitat available and small area of potential habitat

[5] Access Federal Register of Legislation, Environment Protection and Biodiversity Conservation Act 1999 Commonwealth of Australia. (2023). (Accessed: 06/08/2024).
[6] Desktop research on Protected Matters Search Tool. Commonwealth of Australia, Department of Climate Change, Energy, the Environment and Water. (2024). (Accessed: 06/08/2024).
[7] Access Matters of National Environmental Significance, Significant Impact Guideline 1.1. Commonwealth of Australia, Department of Environment. (2013). (Accessed: 06/08/2024).

MNES	Impacts	More information
		relative to the surrounding landscape. Each species is discussed in relation to conditions present at each site within **Appendix A5** and **A6**. **Threatened fauna:** The following 14 Commonwealth-listed threatened fauna species were assessed as having the potential to, or are likely to utilise habitat within the project area: • Southern Whiteface (*Aphelocephala leucopsis*), • Australasian Bittern (*Botaurus poiciloptilus*), • Sharp-tailed Sandpiper (*Calidris acuminata*), • Curlew Sandpiper (*Calidris ferruginea*), • Gang-gang Cockatoo (*Callocephalon fimbriatum*), • Latham's Snipe (*Gallinago hardwickii*), • White-throated Needletail (*Hirundapus caudacutus*), • South-eastern Hooded Robin (*Melanodryas cucullata cucullata*), • Australian Painted Snipe (*Rostratula australis*), • Diamond Firetail (*Stagonopleura guttata*), • Common Greenshank (*Tringa nebularia*), • Green and Golden Bell Frog (*Litoria aurea*), • Yellow-spotted Tree Frog (*Litoria castanea*), and • Spotted-tail Quoll (*Dasyurus maculatus*). The proposed works are not likely to have a significant impact on these species as the project will only require the removal or otherwise impact a small area of habitat relative to the surrounding landscape. Furthermore, mitigation measures discussed in **Section 6** will be employed to minimise potential impacts, with native remediation of the waterway made a priority.
Migratory species	**Potential, not likely significant.**	A total of 19 listed migratory species are known or likely to occur within 10 km of the project area. The following ten have the potential or are likely to utilise the site: • Satin Flycatcher (*Myiagra cyanoleuca*), • Sharp-tailed Sandpiper (*Calidris acuminata*), • Curlew Sandpiper (*Calidris ferruginea*), • Pectoral Sandpiper (*Calidris melanotos*), • Red-necked Stint (*Calidris ruficollis*), • Double-banded Plover (*Charadrius bicinctus*), • Latham's Snipe (*Gallinago hardwickii*), • White-throated Needletail (*Hirundapus caudacutus*), • Black-faced Monarch (*Monarcha melanopsis*), • Little Curlew (*Numenius minutus*), • Rufous Fantail (*Rhipidura rufifrons*), and • Common Greenshank (*Tringa nebularia*). The proposed works are not likely to have a significant impact on any listed migratory species as it is not likely to: • substantially modify (including by fragmenting, altering fire regimes, altering nutrient or hydrological cycles), destroy or isolate an area of important habitat, • result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or • seriously disrupt the lifecycle (breeding, feeding, migration or nesting behaviour) of an ecologically significant proportion of the population of a migratory species.
Commonwealth marine areas	None	None, the project area is not near and does not drain into any Commonwealth marine areas.
Great Barrier Reef Marine Park	None	None, the project area is not near and does not drain into the Great Barrier Reef Marine Park.
Nuclear actions including uranium mining	None	None, the project does not involve any nuclear actions.
A water resource, in relation to coal seam gas development/ large coal mining development	None	None, the proposed works do not involve water usage for any form of coal development.

4.2. NSW Legislation

4.2.1. NSW BIODIVERSITY CONSERVATION ACT 2016

KEY PROVISIONS[8]

The BC Act 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. Among other things, it identifies all the species and ecological communities that are listed as threatened or otherwise protected in NSW.

Under the BC Act, proponents of Part 5 activities must apply the 5-part Test of Significance under s 7.3 to assess whether the proposed activity is likely to significantly affect threatened species, ecological communities, their habitats, a declared Area of Outstanding Biodiversity Value (AOBV) or key threatening process (KTP). If the activity is likely to have a significant impact, or will be carried out in an AOBV, the proponent must either:

- undertake a Biodiversity Development Assessment Report (BDAR) and enter into the NSW Biodiversity Offsets Scheme and meet biodiversity offset credit obligations, or
- prepare a Species Impact Statement (SIS) that meets the requirements of clause 7.6 of the *BC Regulation 2017* and refer the project to the Environment Agency Head for approval[9].

Note: The environmental impact of activities that do not have a significant impact on threatened species must still be assessed under s 5.5 of the EPA Act.

RELEVANCE TO THIS PROJECT

Desktop research has been conducted to identify all the TECs and threatened/migratory species that are known, are likely, or may occur in, or within 10 km of the project area.

The likelihood of a particular TEC or species occurring on site has then been assessed considering:

- available scientific records,
- habitat present on site, and
- the known characteristics/preferences of individual TECs and species.

For more information about the assessment of likelihood of TEC/species occurrence within the project area and immediate surrounds, refer to **Appendix A5**.

The project's impact on species that are likely to occur on or within 1.5 km of the project area has been assessed using the Test of Significance set out in **Appendix A6**.

Based on the process described above, it has been assessed that the project is unlikely to:

- have an adverse impact on the lifecycle of a threatened species, such that a viable local population of the species is likely to be placed at risk of extinction (clause A),

[8] This content draws heavily on information accessed from the NSW register of legislation: Biodiversity Conservation Act 2016. The State of New South Wales. (2024). (Accessed: 06/08/2024).

[9] Biodiversity Conservation Regulation 2017. The State of New South Wales. (2024). (Accessed: 06/08/2024).

- have an adverse impact on the extent or modify the composition of a TEC such that its local occurrence is likely to be placed at risk of extinction (clause B),
- result in the removal, modification, fragmentation, or isolation of areas of habitat, especially habitat that is important to the long-term survival of the species or TEC in the locality (clause C),
- have an adverse impact on any declared Area of Outstanding Biodiversity Value, of which there are only four in NSW (clause D),
- contribute to or otherwise increase the impact of a Key Threatening Process (clause E), or

Furthermore, the project area falls within a section of Windellama Creek and the immediate surrounds which are mapped as "Biodiversity Riparian Land" on the NSW Biodiversity Values Map (**Figure 6,** discussed in **Section 5.3.1**). Impact of the proposed activity to this mapped biodiversity value is justified in **Section 5.3.2**.

4.2.2. NSW BIOSECURITY ACT 2015

KEY PROVISIONS[10]

The *Biosecurity Act 2015* aims to manage biosecurity risks from animal and plant pests and diseases, weeds, and contaminants by preventing their entry into NSW, eradicating them quickly wherever practical, and managing their impact if not.

RELEVANCE TO THIS PROJECT

Among other things, the *Biosecurity Act 2015* requires landholders including Councils to eliminate (or if this is not possible, control) pest, weed and pathogen species.

In NSW, all plants are regulated with a general biosecurity duty to prevent, eliminate, or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated, or minimised, so far as is reasonably practicable. Additional control measures are in place for 'regional priority weeds', which should not be sold or moved in certain Local Land Service regions of NSW.

Throughout the project area, a total of six High Threat Exotic (HTE) species were observed occurring which must be managed prior to any clearing of vegetation. These are listed in **Appendix A3.1**.

[10] This content draws heavily on information accessed from the NSW register of legislation: Biosecurity Act 2015. State of New South Wales. (2024). (Accessed: 06/08/2024).

FIGURE 6: BIODIVERSITY VALUES MAP FOR PROJECT AREA

4.2.3. NSW FISHERIES MANAGEMENT ACT 1994

KEY PROVISIONS[11]

The *Fisheries Management Act 1994* (FM Act) provides for the protection, conservation, and recovery of threatened species, populations and ecological communities of fish and marine vegetation and fish habitats, as well as promoting the development and sharing of fishery resources in NSW. A permit or consultation under the FM Act is required for the following activities:

- harm to marine vegetation such as mangroves, seagrass or any other marine vegetation declared by the regulations to be marine vegetation (s 205), and
- dredging of a creek bed, land reclamation, excavation of bed or bank or obstructing fish passage in an area mapped as Key Fish Habitat (s 199, s 200, s 218, s 219).

The FM Act states objectives of threatened species conservation under Part 7A, and lists threatened species, populations, and ecological communities under Schedule 4, 4A and 5. Schedule 6 lists key threatening processes for species, populations, and ecological communities in NSW waters.

RELEVANCE TO THIS PROJECT

Windellama Creek is a KFH mapped waterway through the Fisheries NSW Spatial Data Portal (**Figure 7**). The project will involve works within KFH mapped areas as follows.

- Demolition, removal of damaged causeway and construction of new culvert and associated infrastructure (Stage 2):
    - Permit required due to dredging, reclamation works and obstruction of fish passage. No works will commence until permit accepted.

Council have sought advice on the construction of a culvert over the Key Fish Habitat at Windellama Creek. A Part 7 permit is currently in the process of being completed between Council, contractors and Fisheries. This will contain conditions of approval and will be incorporated into the contractor's CEMP.

Despite Windellama Creek being mapped as KFH, it does not register on NSW DPI Fisheries Freshwater Fish Community Status, therefore it likely falls below what is considered "Very Poor" community status. The likelihood of occurrence assessment revealed that no threatened fish species, populations or ecological communities listed under the FM Act are considered likely to be present on the site or immediately downstream (**Appendix A5**). This is predominately based on its mapped distribution within the Species Profile and Threats Database and mapped indicative distributions available from Fisheries NSW Spatial Data Portal.

For more information about the project area's aquatic biodiversity and habitat assessment refer to **Appendix A2.5**.

[11]This content draws heavily on information accessed from the NSW register of legislation Fisheries Management Act 1994. State of New South Wales. (2024). (Accessed: 06/08/2024).

FIGURE 7: KEY FISH HABITAT PROJECT AREA

4.2.4. NSW HERITAGE ACT 1977

KEY PROVISIONS[12]

The *Heritage Act 1977* sets out the process by which items or places of State and Local Heritage Significance are protected and managed. Items are considered significant in relation to the historical, scientific, cultural, social, archaeological, architectural, natural, or aesthetic value of the item.

Approval is required when making changes to a heritage place listed on the State Heritage Register or covered by an interim heritage order, or when excavating any land in NSW where the excavations might disturb an archaeological relic.

If the works are only minor in nature and will have minimal impact on the heritage significance of the place, they may be exempted from the requirement to submit a section 60 application for approval or section 140 application for a permit.

RELEVANCE TO THIS PROJECT

Searches of relevant registers found that the proposed activity does not involve impacts to an item or place listed on the NSW State Heritage Register or the subject of an interim heritage order or listing and are therefore not a controlled activity. Approval of works on the site is therefore not required under Part 4 of the Heritage Act. For more information about the heritage of the site refer to **Section 5.4** and **Section 5.5**.

4.2.5. NSW LOCAL LAND SERVICES ACT 2013

KEY PROVISIONS[13]

The NSW *Local Land Services Act 2013* (LLS Act) establishes a framework for the management of natural resources including native vegetation and private native forestry. There are two broad categories of land under the LLS Act:

- Category 1 (Exempt) land, and
- Category 2 (Regulated, Vulnerable or Sensitive) land.

Approval for clearing native vegetation is not required under the LLS Act if the activity is carried out by or on behalf of a determining authority within the meaning of Part 5 of the EPA Act.

RELEVANCE TO THIS PROJECT

The clearing of native vegetation involved in this project is minimal and approval of the work by LLS is not required as it is being conducted under Part 5 of the EPA Act.

[12] This content draws heavily on information accessed from the NSW register of legislation: Heritage Act 1977. State of New South Wales. (2024). (Accessed: 07/08/2024).
[13] This content draws heavily on information accessed from the NSW register of legislation: Local Land Services Act 2013. State of New South Wales (2024). (Accessed: 07/08/2024).

4.2.6. NSW NATIONAL PARKS AND WILDLIFE ACT 1974

KEY PROVISIONS[14]

The NSW *National Parks and Wildlife Act 1974* (NP&W Act) aims to protect and control the natural and cultural heritage of NSW. Two key issues under the Act include activities on or near National Parks, Nature Reserves or Special Conservation Areas (NPWS land), and Aboriginal places and objects.

In the context of NPWS land, there is a requirement to engage with NSW NPWS planning decisions when the following may impact NPWS land:

- erosion or the movement of sediment cause by works,
- stormwater runoff attributed to works,
- wastewater impacts due to works,
- pests, weeds and edge effects attributed to the works,
- fire and asset protection measures,
- boundary encroachment or access through NPWS land,
- reduction of amenity,
- threat to ecological connectivity and groundwater dependent ecosystems,
- cultural heritage, and
- the access to parks[15].

In the context of Aboriginal heritage, a desktop assessment is required under NSW legislation[16]. Depending on the level of risk, further assessment may be required to identify and mitigate potential impacts to Aboriginal places or objects such as scar trees, including appropriate consultation with Aboriginal representatives and stakeholders.

If impacts to Aboriginal objects or places cannot be avoided, an Aboriginal Heritage Impact Permit must be obtained under Section 90 of the NP&W Act.

RELEVANCE TO THIS PROJECT

There is no requirement to consult NPWS regarding this project. The project area does not adjoin any NPWS land. The nearest NPWS land is as follows:

- Nadgigomar Nature Reserve, which is 14.5 km south of the project area,
- Morton National Park, which is ~ 16 km east of the project area,
- Jerralong Nature Reserve, which is ~ 16 km southeast of the project area.

Given the distance from the proposed work to the nearest NPWS land, the impact is minimal.

[14] This content draws heavily on information accessed from the NSW register of legislation: National Parks and Wildlife Act 1974 State of New South Wales. (2024). (Accessed: 07/08/2024).
[15] Guidelines for consent and planning authorities on Developments adjacent to NPWS lands. State of NSW and Department of Planning, Industry and Environment. (2020).
[16] Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW. State of New South Wales and the Department of Environment, Climate Change and Water NSW. (2010).

A Due Diligence assessment was undertaken by qualified heritage consultant Past Traces Pty Ltd to identify and mitigate potential adverse impacts on Aboriginal places and objects (**Attachment 2**) The results of which are discussed in **Section 5.4.1**.

4.2.7. NSW PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

KEY PROVISIONS[17]

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) is the key environmental protection and pollution statute. It is administered by the NSW Environment Protection Authority (EPA) and establishes a single licensing arrangement relating to air pollution, water pollution, noise pollution and waste management. The POEO Act contains a list of activities that require a licence, including any work potentially resulting in pollution.

RELEVANCE TO THIS PROJECT

A number of measures are to be put in place to avoid, minimise, and mitigate the risk of pollution and waste (**Section 6**). The expected impacts of the project will be managed through mitigation measures outlined in the CEMP and the risk of pollution and waste minimised. A licence under the POEO Act is therefore not required.

4.2.8. NSW ROADS ACT 1993[18]

KEY PROVISIONS

The *Roads Act 1993* regulates the carrying out of various activities on public roads. Roads and Maritime has jurisdiction over major roads, while local government has jurisdiction over minor roads, and the Land and Property Management Authority over Crown roads. Under s 138, consent from the appropriate road's authority must be received if there is a need to:

- erect a structure or carry out a work in, on or over a public road,
- dig up or disturb the surface of a public road,
- remove or interfere with a structure, work, or tree on a public road,
- pump water into a public road from any land adjoining the road, or
- connect a road (whether public or private) to a classified road, otherwise than with the consent of the appropriate road's authority.

Among other things, it provides that (s 88):

> *A roads authority may, despite any other Act or law to the contrary, remove or lop any tree or other vegetation that is on or overhanging a public road if, in its opinion, it is necessary to do so for the purpose of carrying out road work or removing a traffic hazard.*

RELEVANCE TO THIS PROJECT

Council has jurisdiction over McGaws Road and therefore does not require consent to undertake works. Efforts have been made to avoid, minimise, and mitigate the project's environmental impacts, refer to **Section 6** for further details.

[17] This content draws heavily on information accessed from the NSW register of legislation: Protection of the Environment Operations Act 1997. State of New South Wales. (2024). (Accessed: 07/08/2024).
[18] This content draws heavily on information accessed from the NSW register of legislation: Roads Act 1993. State of New South Wales. (2024). (Accessed: 07/08/2024).

4.2.9. NSW RURAL FIRES ACT 1997

KEY PROVISIONS[19]

The NSW *Rural Fires Act 1997* (RF Act) provides a statutory framework for the prevention, mitigation, and suppression of the threat of bushfire within NSW.

Part 4 of the RF Act contains provisions which relate to bushfire prevention and bushfire hazards reduction. Amongst other things, the RF Act requires approval (s.100B) for certain types of developments in areas mapped as bushfire prone land. The RF Act establishes the NSW Rural Fire Service (RFS) along with *Planning for Bush Fire Protection 2019* (PBP)[20] and provides the framework for development located on bushfire-prone land in NSW. The PBP 2019 advises that within a bushfire-prone area, road systems need to:

- provide firefighters with access to structures, for efficient use of firefighting resources,
- provide evacuation routes for firefighters and the public, and
- provide access to areas of bush fire hazard for firefighting and hazard mitigation purposes.

Additionally, access roads and any causeways must have the capacity to carry fully loaded firefighting vehicles (up to 23 tonnes) and causeways are to clearly indicate their load rating.

RELEVANCE TO THIS PROJECT

The project is not a part 4 development, so no formal approval is required under the RF Act. The project area is situated within a small area mapped by the NSW RFS for category 3 (grasslands) bushfire-prone land, surrounded by patches of category 1 (forest, woodlands) bushfire-prone land.

Proposed activities will require the closure of McGaws Road to two residencies for a short period of time, likely only 2 – 3 days, during which vehicles will not be able to cross Windellama Creek. For the safety of residents and the property, this activity must be coordinated with residents, and services and conducted during mild weather when minimal hazards are present to the community.

4.2.10. NSW WATER MANAGEMENT ACT 2000 (WM ACT)

KEY PROVISIONS[21]

The NSW *Water Management Act 2000* (WM Act) aims to manage NSW water in a sustainable and integrated manner that will benefit today's generations without compromising future generations' ability to meet their needs.

Section 91E of the Act establishes an approval regime for controlled activities within waterfront land, but clause 41 of the *Water Management (General) Regulation 2018* provides an exemption for public authorities in relation to all controlled activities on waterfront land[22].

[19]This content draws heavily on information accessed from the NSW register of legislation: Rural Fires Act 1997. State of New South Wales. (2024). (Accessed: 07/08/2024).
[20] Planning For Bush Fire Protection. State of New South Wales through the NSW Rural Fire Service. (2019).
[21] This content draws heavily on information accessed from the NSW register of legislation: Water Management Act 2000. State of New South Wales. (2024). (Accessed: 07/08/2024).
[22] Water Management (General) Regulation 2018. State of New South Wales. (2024). (Accessed: 07/08/2024).

RELEVANCE TO THIS PROJECT

The project is being undertaken by a public authority, so no approval is required under the WM Act. However, as each proposed activity involves works within a waterway, water flow and quality issues have been considered as part of this REF (**Section 5.2**).

4.3. Planning legislation and framework

4.3.1. ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

KEY PROVISIONS[23]

The EPA Act sets out the major concepts and principles for planning and development in NSW, including special rules for road and/or road infrastructure works carried out by or on behalf of a public authority (i.e., Part 5 activities).

The Act allows public authorities such as Councils to not only propose but also determine (approve) Part 5 activities without needing to seek additional consents, subject to certain conditions. Key requirements are that the works must be subject to an environmental assessment that considers:

- all matters affecting or relating to the environment, to the fullest extent possible (s 5.5 of the EPA Act), and
- the 18 factors listed in section 171 of *the EPA Regulation 2021*[24].

The assessment of all matters affecting or relating to the environment is usually taken to mean that all current planning laws and policies must be considered. These may include not only instruments made under the EPA Act, but also many other laws and policies as described throughout **Section 4**.

It is usual to document the assessment process in the form of a REF, to provide assurance to Council and other decision makers that all relevant laws and policies have been considered.

RELEVANCE TO THIS PROJECT

The project involves works carried out by or on behalf of a public authority, Goulburn Mulwaree Council, and is a Part 5 activity under the EPA Act.

This REF has been prepared to assist Council in demonstrating compliance with Part 5 of the Act and includes a clause-by-clause assessment against s 171 of the EPA Regulation 2021. That assessment suggests that the project is likely to have a neutral impact under the EPA Regulation (see **Appendix B**).

4.4. State Environmental Planning Policies

Several planning instruments have been made under the EPA Act regarding specific aspects of planning at the State or regional level. State Environmental Planning Policy (SEPPs) are environmental planning instruments made under the EPA Act that outline policy objectives relevant to planning at the State or regional level.

[23] This content draws heavily on information accessed from the NSW register of legislation: Environmental Planning and Assessment Act 1979. State of New South Wales. (2024). (Accessed: 07/08/2024).
[24] Environmental Planning and Assessment Regulation 2021. State of New South Wales. (2024). (Accessed: 07/08/2024).

On 2 December 2021, the Minister for Planning and Public Spaces announced 9 key principles and themes for the NSW planning system[25]. In effect from 1 March 2022, 45 former SEPPs were consolidated into 11 new SEPPs based on the theme-based project areas. No policy changes were made.

4.4.1. STATE ENVIRONMENTAL PLANNING POLICY (BIODIVERSITY AND CONSERVATION) 2021[26]

The *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) protect the biodiversity values of trees, vegetation and other amenity in non-rural areas, controls foreshores and waterways areas and provides provisions for Koala habitat protection.

Several chapters within the Biodiversity and Conservation SEPP do not apply to land within and/or adjoining the site. Those chapters with obvious relevance to this REF or the project are detailed below.

CHAPTER 2 – VEGETATION IN NON-RURAL AREAS

Key provisions

This chapter aims to protect the biodiversity value of trees and other vegetation in non-rural areas, which is defined as

- land in nominated Local Government Areas (not including Goulburn Mulwaree Council)
- land zoned for certain uses including but not limited to RU5, R1 – R5, B1 – B8, E1 – E5, IN1 – IN4, MU1, SP1 – SP5, RE1 & RE2 and C2 – C4.

Under s 2.7 the SEPP specifies that an authority to clear vegetation under the SEPP is not required if the clearing is authorised under s60(O) of the *Local Land Services Act 2013*. Section 60(O) provides an exemption for clearing required for activities under Part 5 of the EPA Act.

RELEVANCE TO THIS PROJECT

This project is an activity being undertaken under Part 5 of the EPA Act, therefore does not require consent under this SEPP.

CHAPTER 3 AND 4 – KOALA HABITAT PROTECTION 2020 AND 2021

Key provisions

Koala Habitat Protection 2020 and 2021 aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koala (*Phascolarctos cinereus*) to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. They specify that Councils must consider whether a development is likely to impact on potential Koala habitat or core Koala habitat.

RELEVANCE TO THIS PROJECT

The Koala SEPP only applies to 'development' under Part 4 EPA Act, specifically excluding Part 5 'activities' (which are primarily carried out by or on behalf of public authorities. This project is not a development under part 4 of the EPA Act so the Koala SEPP does not apply in any form.

[25] The Minister's Planning Principles NSW Department of Planning, Industry and Environment. (2021).
[26] This content draws heavily on information accessed from the NSW register of legislation: SEPP (Biodiversity and Conservation) 2021. State of New South Wales. (2024). (Accessed: 07/08/2024).

Nevertheless, as Koala is listed as threatened species, an assessment of the site's impact to Koala are included in this REF (see **Section 4.1.1** and **Appendix A5.3**).

4.4.2. STATE ENVIRONMENTAL PLANNING POLICY (TRANSPORT AND INFRASTRUCTURE) 2021[27]

The *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP) aims to facilitate the effective delivery of transport and infrastructure across the state.

A number of chapters within the Transport and Infrastructure SEPP do not apply to land within and/or adjoining the project site. One chapter with obvious relevance to this REF or project is detailed below.

CHAPTER 2 – INFRASTRUCTURE

Key provisions

Chapter 2 facilitates the delivery of infrastructure across NSW by identifying what types of infrastructure require consent. Part 2.3 Division 17 specifies that certain works for roads and road infrastructure facilities carried out by or on behalf of public authorities do not require consent or are otherwise exempt from this requirement. They include development for:

- development for the purpose of a road or road infrastructure facilities that are carried out subject to certain rules (s 2.109 to s 2.111), and
- ancillary works such as the installation, maintenance, reconstruction, and replacement of ancillary works such as safety barriers, signage, erosion control, landscaping, culverts, and more (s 2.113).

Part 2.2 Division 1 of the Chapter 2 also specifies situations in which developers (including public authorities such as Councils) must consult or do not need to consult with certain bodies. These consultation requirements apply even if Council does not require consent for works or the works are exempt.

RELEVANCE TO THIS PROJECT

The project does not appear to require consent under s 2.109 and s 2.113 of the Transport and Infrastructure SEPP but is still subject to its consultation requirements. These requirements and Council compliance with them have been in **Table 2**.

4.4.3. STATE ENVIRONMENTAL PLANNING POLICY (RESILIENCE AND HAZARDS) 2021[28]

The *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP) aims to provide a statewide planning approach to development and management of hazardous areas. A couple of chapters within the Resilience and Hazards SEPP do not apply to land within and/or adjoining the project area. One chapter with obvious relevance to this REF or project is detailed below.

[27] This content draws heavily on information accessed from the NSW register of legislation: SEPP (Transport and Infrastructure) 2021. State of New South Wales. (2024). (Accessed: 07/08/2024).
[28] This content draws heavily on information accessed from the NSW register of legislation: SEPP (Resilience and Hazards) 2021. State of New South Wales. (2024). (Accessed: 07/08/2024).

CHAPTER 4 – REMEDIATION OF LAND

Key provisions

Chapter 4 of Resilience and Hazards SEPP aims to establish a statewide planning approach to remediate contaminated land, primarily to mitigate risks to human health and environmental well-being or any other aspect of the environment. Clause 4.6 of Chapter 4 also specifies that when remediation is necessary for the purpose of development, the land must be adequately remediated before it is used for that purpose.

RELEVANCE TO THIS PROJECT

Chapter 4 could apply to the project area if an unexpected find of contaminated soil is identified during works, refer to **Section 6.**

4.5. Other relevant NSW legislation

No other NSW legislation relevant to environmental aspects of this project has been identified.

4.6. Council laws and plans

4.6.1. GOULBURN MULWAREE LOCAL ENVIRONMENTAL PLAN 2009 (GM LEP) [29]

PART 2 PERMITTED AND PROHIBITED DEVELOPMENT

Under the *Goulburn Mulwaree Local Environmental Plan 2009* (GM LEP), the land adjoining and serviced by the project area is zoned rural landscape (R2) and environmental management (C3). The development of roads is permitted without consent in these zones.

PART 5 MISCELLANEOUS PROVISIONS

Under the various provisions of this Part, s 5.22 applies to species flood considerations, stating that development consent must not be granted unless the following consideration has been applied to the development:

> *(a) will it affect the safe occupation and efficient evacuation of people in the event of a flood,*
> *(b) incorporates appropriate measures to manage risk to life in the event of a flood, and*
> *(c) will it adversely affect the environment in the event of a flood.*

This clause applies to sensitive and hazardous development, such as caravan parks, emergency facilities, hazardous industries and hospitals. The clause further applies to developments that are not sensitive, but the consent authority considers that in the event of a flood may cause a particular risk to life or require the evacuation of people or other safety considerations.

RELEVANCE TO THIS PROJECT

The application s 5.22 to the proposal, although it is not a not sensitive or hazardous development, in the event of a flood may cause risk to life or may require the evacuation of people or other safety considerations such as residents being isolated from services, as seen below in **Table 4** assessment of the project area.

[29] This content draws heavily on information accessed from the NSW register of legislation: Goulburn Mulwaree Local Environmental Plan 2009. State of New South Wales. (2023). (Accessed: 07/08/2024).

TABLE 4: APPLICATION OF PART S 5.22 ON THE PROJECT AREA

s 5.22	Assessment
(a) *will it affect the safe occupation and efficient evacuation of people in the event of a flood.*	The proposed activity will aim to improve the safe use to allow evacuation of people over infrastructure in minor flooding events and for the resilience of infrastructure to be maintained during flooding events. The activity will likely result in improved accessibility during minor flood events, but during major flood events, there may be a neutral outcome as the local residents may still be cut off from services.
(b) *incorporates appropriate measures to manage risk to life in the event of a flood.*	The proposed activity has incorporated multiple erosion protection measures to minimise risk to the infrastructure and surrounding banks from damage during flood events, this reduces risk of failure of infrastructure and risk life.
(c) *will it adversely affect the environment in the event of a flood.*	The proposed activity has incorporated multiple erosion protection measures to minimise risk to the infrastructure and surrounding banks from damage during flood events.

PART 7 ADDITIONAL LOCAL PROVISIONS

Many provisions of the GM LEP appear to be broadly consistent with Commonwealth and NSW laws on biodiversity. Within s 7.2 of the GM LEP, it states that development consent must not be granted for development on land identified as "Biodiversity" (mapped as Terrestrial Biodiversity on SEED portal[30]) unless the Council has considered the potential adverse impacts of the proposed development on any of the following:

(i) a native vegetation community,

(ii) the habitat of any threatened species, population, or ecological community,

(iii) a regionally significant species of plant, animal, or habitat,

(iv) a habitat corridor,

(v) a wetland,

(vi) the biodiversity values within a reserve, including a road reserve or a stock route.

Furthermore, development consent must not be granted unless the authority is satisfied that the development is designed to avoid potential impacts. If impacts cannot be avoided that they are minimised and that effective mitigation measures are incorporated to mitigate residual adverse impacts.

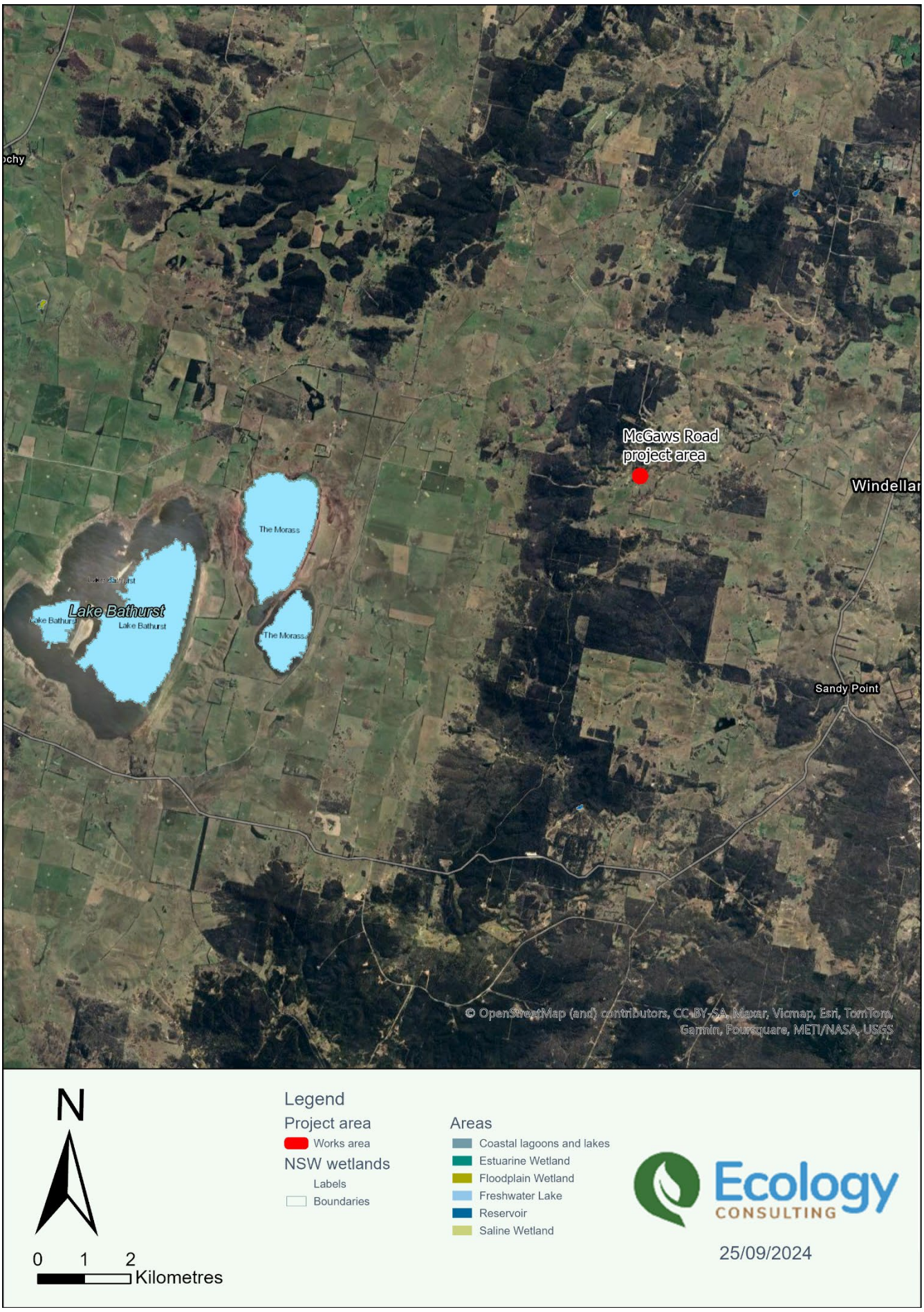
This report, which is based on an on-site field survey conducted by a qualified ecologist and detailed desktop research, serves as a reference for the Council to consider the potential impacts.

RELEVANCE TO THIS PROJECT

The proposed activity will not be carried out on land that is mapped as "Biodiversity" on the Terrestrial Biodiversity Map. Therefore, no assessment for consideration of the potential adverse impacts on abovementioned entities is required under the GM LEP. **Figure 8** presents nearby wetlands to the project area for consideration regardless.

[30] The Central Resource for Sharing and Enabling Environmental Data in NSW. State of New South Wales. (2024).

FIGURE 8: NSW WETLANDS NEAR TO PROJECT AREAS



5. Environmental Impact Assessment

This section of the report provides an assessment of the potential environmental impacts of the proposed activity. This chapter describes the existing characteristics, potential impacts for the following:

- landforms, geology, and soils,
- hydrology, flooding, groundwater, and water quality,
- biodiversity,
- aboriginal heritage,
- non-Aboriginal heritage,
- traffic and access,
- noise and vibration,
- air quality,
- visual amenity and landscape,
- waste and chemical management, and
- cumulative environmental impacts.

5.1. Landforms, geology, and soils

5.1.1. EXISTING ENVIRONMENT

The assessment of landforms, geology and soils has been based on a review of published topographic and geologic information. A desktop search of NSW Government environmental planning information layers using the SEED Portal[31] did not identify any issues in or near the project area relating to:

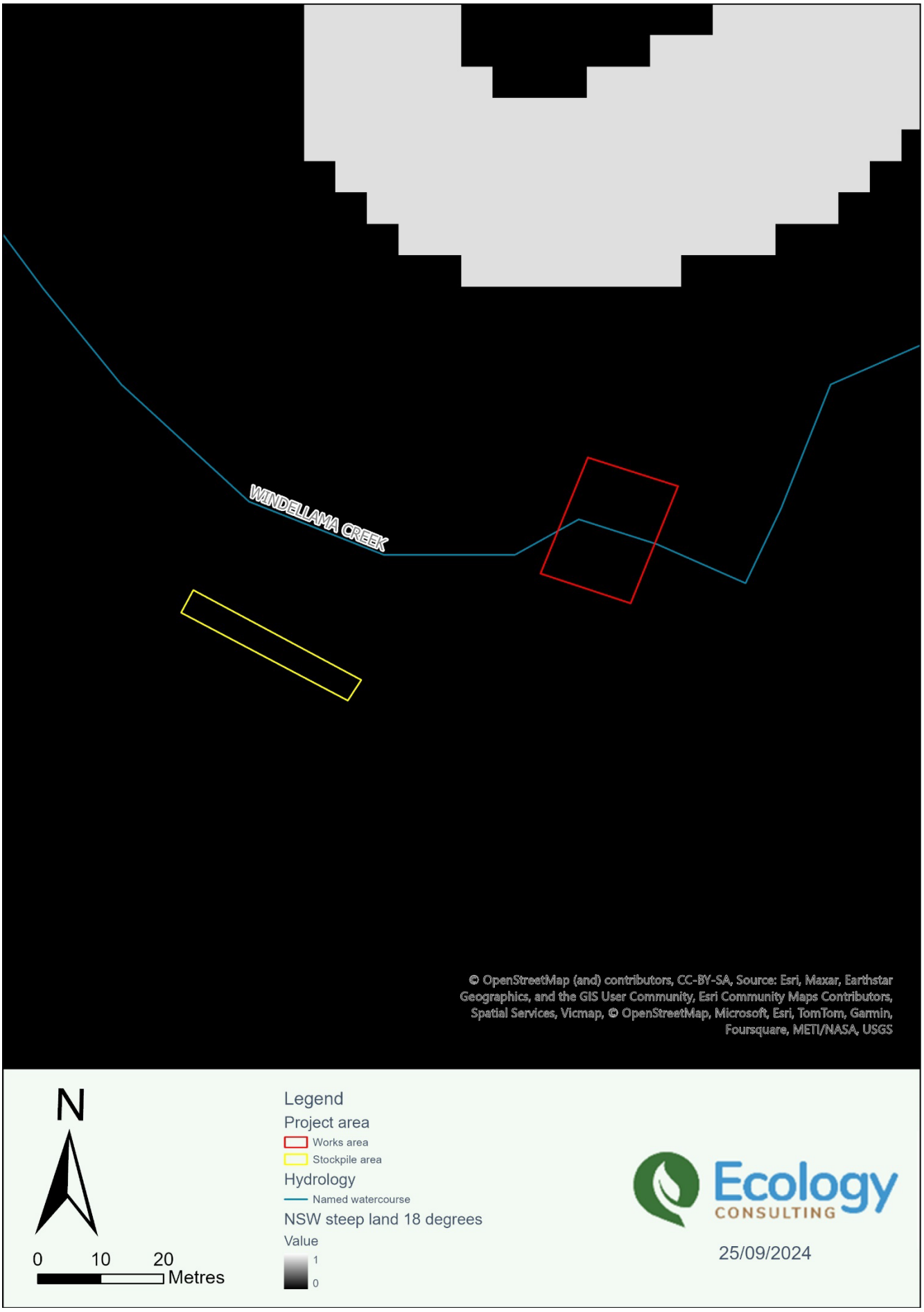
- erodible soils,
- salinity, or
- erosion in or near the project area.

Desktop research via eSPADE Portal[32] revealed that the land and soil of the project area have a capacity of "Severe Limitation" to sustain high impact land uses. However, the proposed activity does not involve changing the land use.

Mapping conducted by the NSW Department of Planning and Environment, accessed through the SEED Portal, the project area is classified as 'Not Steep' within the works area, and to the north of the project area there is what is classified as a 'Steep; area (**Figure 9**). This 'Steep' area is situated far enough away from works within the landscape that there should not be any additional implications for erosion. Nevertheless, despite the generally gentle slopes, the installation of erosion fences is advised for the proposed activities to prevent pollution into Windellama Creek.

[31] The Central Resource for Sharing and Enabling Environmental Data in NSW. State of New South Wales. (2024).
[32] eSPADE 2.0. State of New South Wales. (2024).

FIGURE 9: NSW STEEP LAND (18°) MAPPING FOR PROJECT AREA



TOPOGRAPHY

The project area is characterised by long, thin, generally less than 100 m wide valley flat and swampy depressions. There are minor flood plains and terrace units with little to no rock outcrops. Minor steam bank erosion and gully erosion are common. The topography and landscape features make these areas prone to waterlogging and flooding hazard. Due to the small area of the project area, the surrounding landscape outside of these valley flats can be seen to be more undulating and rolling hills.

GEOLOGY[33]

The project area is located within the Bungonia Tablelands and Gorge Mitchell Landscape, found to be a Tableland on Ordovician and Devonian slate, phyllite and quartzite, a small Carboniferous granodiorite stock, caps of Tertiary quarts sands and gravels and some limited basalts. No areas of geological significance (karsts, caves, crevices, or cliffs) are known or observed to be present within the project area.

SOILS

The project area is located within the Eastfields Creek Soil Landscape, comprised predominantly of moderately deep to very deep, poorly to very poorly Alluvial Soils (NSG) on older alluvium[34]. The dominant soil material is yellowish massive light clay topsoil on older alluvium areas, with younger alluvial topsoils comprised of bright yellowish brown, fine sandy loam. This soil landscape makes up narrow creek flat areas and is prone to waterlogging, localised water erosion hazards and flood hazards.

CONTAMINATED LAND AND ACID SULFATE SOILS

The project area has an extremely low probability of occurrence of Acid Sulfate Soils according to a desktop search of the CSIRO Atlas of Australian Acid Sulfate Soils and is considered unlikely to contain soils contaminated with acid sulfate[35].

A search conducted on the EPA Contaminated Land Record website for the Goulburn Mulwaree Council LGA indicated that no notices have been issued for the project area under the *Contaminated Land Management Act 1997*[36]. Furthermore, ecologists undertaking terrestrial survey work in and around the site in July 2024 reported no odours, staining, suspected asbestos-containing material, or other evidence of contaminated land.

5.1.2. IMPACT ASSESSMENT

The project is not expected to result in any substantial change to the topography of the project area. The project area is generally flat with a slight depression that follows the natural topography of Windellama Creek. The new alignment will continue to follow the existing topography with some potential, however minor, localised levelling of the land.

The project will involve some clearing of vegetation and movement of soil, particularly for the construction of the new culvert and associated approaches. Soil disturbance during earthworks would result in the exposure of soils and stockpiling of materials which may erode throughout the construction

[33] Information within this section sources Descriptions for NSW (Mitchell) Landscapes. Department of Environment & Climate Change NSW, (2002).
[34] Soil Landscapes – Eastfields Creek. State of New South Wales, Department of Climate Energy, the Environment and Water. (2024).
[35] Atlas of Australian Acid Sulphate Soils. v2. CSIRO. Data Collection. Fitzpatrick, Rob; Powell, Bernie; Marvanek, Steve. (2011).
[36] Access Contaminated Land – record of notices. State of New South Wales EPA. (2024). (Accessed: 12/08/2024)

period. This could result in increased sediment loads entering Windellama Creek which is located downslope of the new approach.

However, the plan is to avoid and minimise erosion by appropriate design and by implementing an Erosion and Sediment Control Plan (ESCP) and other safeguards/mitigation measures set out in **Table 5**. This is also important as any significant loss or movement of soil within or across the site could:

- generate dust emissions that impact on local air quality (**Section 5.7**),
- disperse into the creek and impact on local water quality (**Section 5.2**), and
- alter the site's ecological values and continued capacity to support biodiversity (**Section 5.3**).

The potential impact of contaminants such as asbestos-containing materials is unlikely due to the site's rural location and no known issues of contaminants in the locality. However, it is important that any fill that may need to be brought on site would be carefully chosen to ensure it is suitable and does not contain contaminants (see also **Section 5.8**).

An unexpected finds procedure (UFP) would also minimise potential impacts by specifying the procedures to follow if suspected contamination or acid sulphate soil is found on site. The procedure would include an immediate stop work for any and all works that may impact that material until:

- the situation has been assessed by a suitably qualified environmental consultant, and
- any mitigation measures recommended by that consultant are implemented.

5.1.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to the directly impacted or surrounding landforms, geology or soils of the project area if the safeguards and mitigation measures outlined in **Table 5** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 5: LANDFORMS, GEOLOGY AND SOILS SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Non-compliance with this REF results in environmental damage	• Prepare a site-specific CEMP before any construction works commence that includes all the safeguards and mitigation measures set out in this REF. • Ensure all workers are made aware of site sensitivities and unexpected finds procedure/s as part of their site induction.
Earthworks and excavation may result increased erosion risk and sedimentation of downstream waterways	• Avoid and minimise erosion by appropriate design. • Minimise vegetation removal and soil disturbance within riparian zone. Ensure any disturbed soils within or near the riparian zone are stabilized immediately. • Implement an Erosion and Sediment Control Plan (ESCP), including strict sedimentation controls, such as silt curtains for each waterway. • Utilise best practices such as those found in the *NSW Government's 2004 Managing Urban Stormwater: Soils and Construction Guidelines* (the Blue Book)[37]. • Undertake appropriate riparian and terrestrial vegetation rehabilitation works as soon as possible after completion of construction.
Chemicals are released that can cause serious damage to human health and the local environment	This impact is considered unlikely, however, be alert to the possibility that hazardous materials such as Acid Sulfate Materials and Asbestos-Containing Materials may be encountered during excavation work, and/or accidentally brought onto the site hidden in fill or other construction materials. • Ensure all workers are made aware of the unexpected finds procedure/s as part of their site induction. Do not hesitate to stop work if there are any unexpected finds of this nature and to seek advice from a suitably qualified environmental professional). • Avoid bringing contaminated materials onto site: source materials such as fill from Council quarries, companies selling material certified as clean fill or other reputable suppliers.

5.2. Hydrology, flooding, groundwater, and water quality

5.2.1. EXISTING ENVIRONMENT

This proposed activity involves works in and around Windellama Creek, a perennial watercourse that flows in an easterly direction into Nadgigomar Creek and onto the Shoalhaven River. It forms part of the Shoalhaven River Catchment, which contains the Tallowa Dam system.

Windellama Creek is subject to flooding (as are most inland waterways in Australia) and is a part of the larger Nadgigomar Hydrogeological Landscape (HGL)[38]. This HGL is noted to exhibit extreme acidity, localised waterlogging, water erosion hazard and potential aluminium toxicity. Groundwater flows in unconfined and unconsolidated alluvial sediments, with local systems loosely defined by topographic catchments. Groundwater salinity is marginal to brackish with depth of water table typically deep.

A desktop search of NSW EPI did not find any known hazards in or near the project area with regards to:

- (severe) floods,
- salinity, or
- vulnerable groundwater resources (aquifers)[39].

[37] "the Blue Book" Managing Urban Stormwater: soils and construction -Volume 1. New South Wales Government. (2004).
[38] Hydrogeological Landscapes of New South Wales and the Australian Capital Territory. State Government of NSW and NSW Department of Climate Change, Energy, the Environment and Water. (2016). Best accessed through eSpade. (Accessed: 12/08/2024)
[39] EPI Planning/Hazard Mapping. State Government of NSW and NSW Department of Planning, Housing and Infrastructure. (2017). Best accessed through SEED. (Accessed: 12/08/2024)

At the time of inspection Windellama Creek was observed to be slowly flowing with permanent pools observes. For an assessment of aquatic biodiversity observed on site, see **Section 5.3**.

5.2.2. IMPACT ASSESSMENT

The proposed works are situated within and directly adjacent to a small waterway, Windellama Creek. Consequently, it is likely that the proposed work could impact the water quality within the creek system and the downstream local water communities.

Given the range of matters that could impact on water quality (e.g., a failure of erosion controls, dust controls, chemicals management etc.), close monitoring of water quality especially turbidity and surface appearance will be required to ensure any problems are quickly identified and mitigated.

No significant or long-term impact is likely if the safeguards and mitigation measures recommended in the REF are implemented (refer to **Table 6**).

Culvert and approaches

The project will require the exposure of soils during vegetation removal, earthworks for demolition and removal of current infrastructure, earthworks to construct culvert and erosion protection on the new infrastructure and associated road works. Erosion and sedimentation have a potential to impact the project area, surrounding environment and Windellama Creek. The development and implementation of strict CEMP and associated ESCP for the project will ensure sedimentation of the waterway is avoided (**Table 6**).

Impacts to water quality can also occur from spills and leaks of oils and other chemicals from plant and equipment operating in adjacent to the water bodies. As proposed works will be occurring within a waterway, should any pollution occur, this would migrate downstream. Impacts on water quality should be mitigated through the implementation of safeguards and management measures to ensure spills are contained and removed. Incorrect storage of fuel, oils and other chemicals could also result in impacts on water quality. These impacts are considered manageable through the implementation of safeguards and management measures outlined in **Table 6**.

Furthermore, given the range of matters that could impact on local water quality (e.g., a failure of erosion controls, dust controls, chemicals management etc.), close monitoring of water quality especially turbidity and surface appearance will be required to ensure any problems are quickly identified and mitigated. No significant or long-term impact is likely if the safeguards and mitigation measures recommended in the REF are implemented (refer to **Table 6**).

Stockpile area

A stockpile area will be located 40 m from proposed works area within Windellama Creek. The stockpile area has the potential to impact the aquatic water quality through stormwater runoff from the stockpile area entering Windellama Creek. The CEMP must include a strict plan to avoid potential impacts to water quality such as pollution and sedimentation of the nearby waterway. This includes plans to manage stockpiling, spills, chemicals etc. and largely prevent any impacts to any area outside the established site stockpile area.

5.2.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to occur to the directly impacted area or downstream watercourses, groundwater or hydrology of the project area if the safeguards and mitigation measures outlined in **Table 6** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 6: HYDROLOGY, FLOODING, GROUNDWATER, AND WATER QUALITY SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Change in flow and water quality of unnamed creeks and hydro lines and due to degradation of riparian vegetation, pollution, or sedimentation.	• Utilise best practices such as those found in the Blue Book. • Implement an Erosion and Sediment Control Plan (ESCP). • Closely monitor water quality, especially turbidity and surface appearance to ensure any problems are quickly identified and mitigated. • Stockpiles should be appropriately contained by sediment fencing or other materials prescribed in the Blue Book to ensure sediments do not enter waterways. • Stockpiles should also be located 40 m away from adjacent riparian areas and waterways. • Where stockpiles are unavoidably located within 40 m of riparian areas these are to be managed as follows: ▪ locate stockpiles at the furthest point from the waterway, ▪ use bunding or other controls to divert storm water and clean water around stockpiles, ▪ cover stockpiles when not in use, and ▪ monitor weather and plan for potential high rainfall and flooding.
Chemicals and/or waste are accidentally released from the site	Aim to locate the following facilities at least 50 m away from any drainage lines or water bodies (i.e. Windellama Creek): • fuel, oil, and other chemical stores. • refuelling, refilling, and maintenance areas. • wash down bays. Note: Any area where fuel or other chemicals are stored or transferred to/from containers must be placed in at least one impervious bund to manage the risk of spills.
Degradation of instream and riparian vegetation	• Minimise disturbance to instream and riparian vegetation during construction by appropriate design and planning. • Establish exclusion zones within aquatic habitats and riparian zones in accordance with Transport for NSW *Biodiversity Management Guideline*[40]. • Undertake appropriate aquatic and riparian vegetation rehabilitation works as soon as possible after construction. Council is in contact with NSW DPI Fisheries to apply for a permit to carry out construction within an area mapped as Key Fish Habitat.
Obstruction to fish passage	• Council to install silt curtains within the waterway to protect each downstream area from sedimentation, • Minimise instream works by appropriate design and construction methods. • If unavoidable, obtain permit to obstruct fish passage under NSW FM Act.

5.3. Biodiversity inspection

A biodiversity inspection of the project was undertaken, which involved investigations of the terrestrial and aquatic ecology, and biodiversity values associated with the area, including desktop literature review, database searches and multiple site inspections.

The below sections discuss and summarise the results of the biodiversity inspection by providing detail about the existing environment and an assessment of biodiversity impacts associated with the project. Safeguards to mitigate biodiversity impacts are detailed in **Section 6**.

Supplementary details of the biodiversity inspection are presented in **Appendix A**, which includes:

- detailed methodology,

[40] Biodiversity Management Guideline – Protecting and managing biodiversity on Transport for NSW projects. State of New South Wales through Transport for NSW. (2024).

- details of observed existing environments,
- list of species observed on site,
- systematic flora survey data,
- likelihood of occurrence assessment, and
- NSW Test of Significance.

5.3.1. EXISTING ENVIRONMENT

PLANT COMMUNITY TYPES

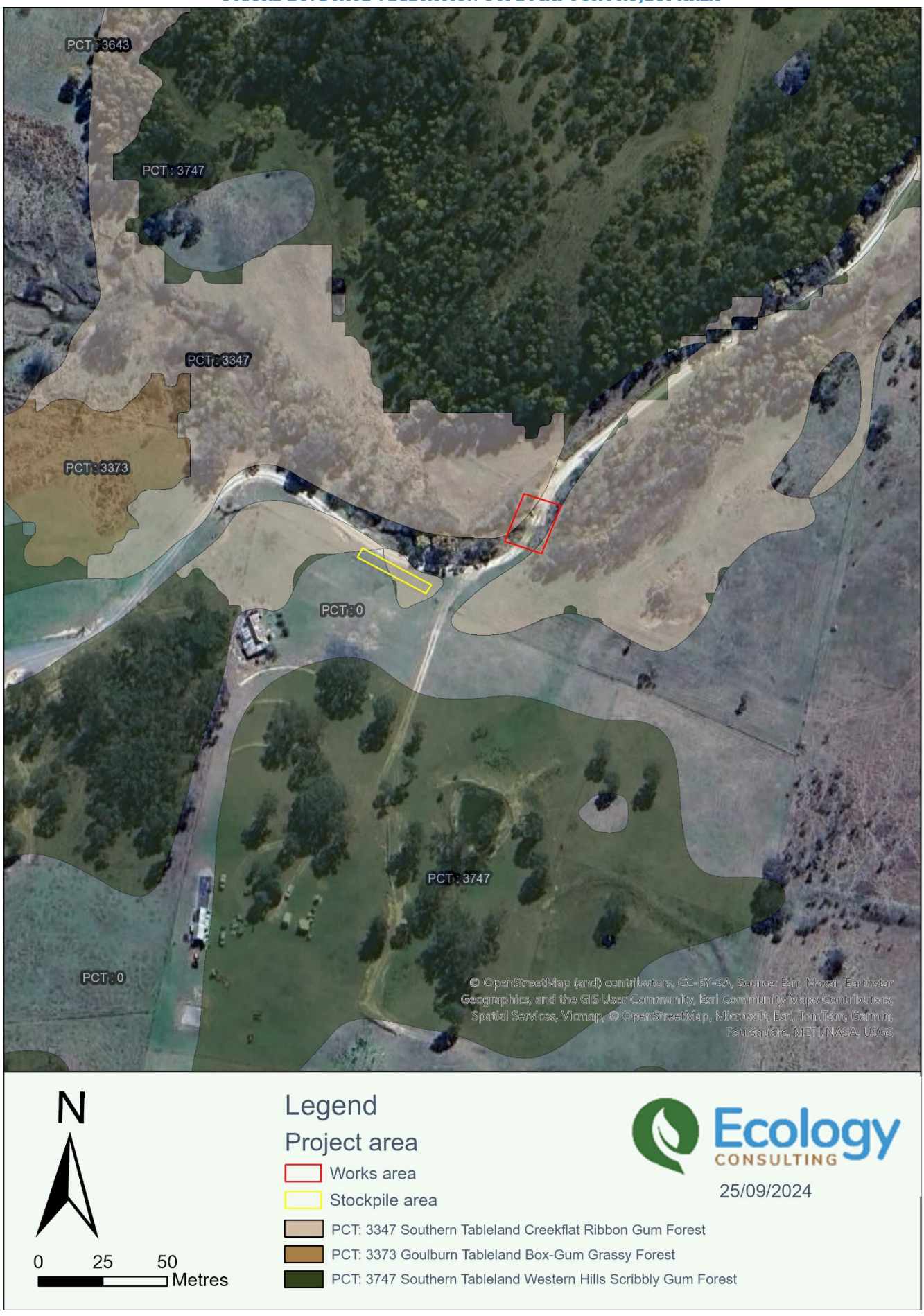
The works area and the stockpile area for the project are predicted mapped in the State Vegetation Type Map (SVTM) and determined to be NSW Plant Community Type (PCT) (refer to **Figure 10**):

- PCT 3347 Southern Tableland Creekflat Ribbon Gum Forest.

For further discussion of PCT selection refer to **Appendix A2.2.**

Vegetation within the project area does not align with any threatened ecological community (TEC) under NSW or Commonwealth biodiversity legislation. Further discussion of the presence of TECs and clearing condition thresholds can be found in **Appendix A5.2**.

FIGURE 10: STATE VEGETATION TYPE MAP FOR PROJECT AREA



FLORA

The vegetation within the works area and its surrounds exhibits historic disturbance through weed intrusion, however, there is a dominance of native grasses, rushes and trees (**Figure 11**). A total of 43 flora species, comprising of 18 exotic species and 25 native species were identified. Riparian vegetation comprises most of the impact area, with other notable species observed within the vicinity being Black Wattle (*Acacia decurrens*) and further up and downstream Ribbon Gum (*Eucalyptus viminalis*) and Candlebark (*E. rubida*).

Several weeds classified as Weeds of National Significance (WoNS) and High Threat Exotic (HTE) species were identified within the vicinity of the works area, such as Sheep Sorrel (*Acetosella vulgaris*), Paspalum (*Paspalum dilatatum*), Sweet Briar (*Rosa rubiginosa*), Blackberry complex (*Rubus fruticosus* sp. agg) and Serrated Tussock (*Nassella trichotoma*).

For further information on biodiversity inspection results, including information on stockpile areas, refer to **Appendix A2.1**.

A full list of the flora species detected during the field survey is contained in **Appendix A3.1**.

FIGURE 11: KEY HABITAT FEATURES AND NATIVE VEGETATION WITHIN THE WORKS AREA

FAUNA AND HABITAT

The proposed activity will occur within a riparian area with abundant riparian habitat, including native reeds and rushes. The waterway also has deep pools which likely provide habitat for various aquatic fauna. Habitat within the stockpile area was found to be limited due to historic degradation.

The works area is a small area of modified habitat that containing the following habitat:

- semi-submerged rocky habitat from the washed causeway itself.

Between the works area and the stockpile area, 21 native birds, one native mammal and one native frog species were observed from the project area. For a complete discussion on the habitat present refer to **Appendix A2.4** and a complete list of species observed see **Appendix A3.2.**

AQUATIC BIODIVERSITY AND HABITAT

Although the waterway is mapped as KFH, as discussed in **Section 4.2.3**, Windellama Creek does not register on NSW DPI Fisheries Freshwater Fish Community Status, therefore likely falling below what is considered "Very Poor" community status (refer to **Figure 7**). The likelihood of occurrence assessment (**Appendix A5**) revealed that no threatened fish species listed under the FM Act are considered likely to be present on the site or immediately downstream.

The works area falls within the NSW Biodiversity Values Map, as discussed in **Section 4.2.1** (**Figure 6**). A small area of impact from the proposed activities on this mapped biodiversity value are discussed in **Section 5.3.2**.

While the project area has been modified historically, it contains certain suitable habitats for various threatened species, particularly, flora, birds and frog species as detailed in the sections below. For further details on the site's observed aquatic habitat refer **to Appendix A2.5**.

THREATENED ECOLOGICAL COMMUNITIES (TECS)

A desktop search identified six threatened ecological communities (TECs) are known or predicted to occur within 10 km:

- Box-Gum Woodland,
- Monaro Tableland Cool Temperate Grassy Woodland,
- Montane Peatlands and Swamps,
- Natural Temperate Grassland,
- Tableland Basalt Forest, and
- Werriwa Tablelands Cool Temperate Grassy Woodland.

The results of the field survey indicate vegetation within the project area does not exhibit characteristics of any Commonwealth or NSW listed TEC. No foreseeable impacts are anticipated, and no further assessment beyond the designated project area was conducted. For discussion on the likelihood of a TEC being present within the project area, refer to **Appendix A5** and for further explanation of PCTs see **Appendix A2.6.**

THREATENED POPULATIONS

No endangered populations, as distinct from communities, listed under the BC Act were identified within the project area or surrounds (10 km radius).

THREATENED SPECIES

Threatened Flora

Desktop research identified a total of 23 threatened flora species potentially occurring within 10 km of the project area. No threatened flora species were identified within the project area during the field inspection. Based on the site's available habitat, including that within the stockpile area, the following threatened flora species were assessed to have a potential or higher likelihood of occurring within the following project areas (for details on each species, refer to **Appendix A5**).

- Michelago Parrot-pea (*Dillwynia glaucula*),
- Black Gum (*Eucalyptus aggregata*),
- Hoary Sunray (*Leucochrysum albicans* subsp. *tricolor*), and
- Matted Bush-pea (*Pultenaea pedunculata*).

Threatened fauna

Desktop research identified a total of 57 threatened fauna species potentially occurring within 10 km of the project area.

During field inspection, the following threatened fauna species were identified utilising riparian vegetation in and around the project area:

- Pink Robin (*Petroica rodinogaster*) - male observed, and
- Scarlet Robin (*P. boodang*) - male and female observed bathing in Windellama Creek within the project area.

Based on the site's available habitat, including that within the stockpile area, 31 threatened fauna species were assessed to have a potential or higher likelihood of occurring within the project area (for details on each species, refer to **Appendix A5.3**.

Threatened Aquatic Species

Threatened Fish

No threatened fish species listed under the Commonwealth EPBC Act, NSW BC Act or FM Act were assessed as likely to occur within the project area (see **Appendix A5.3**).

Threatened Frogs

Two threatened frog species were identified as potentially occurring within the vicinity of the project area, Green and Golden Bell Frog (*Litoria aurea*) and Yellow-spotted Tree Frog (*Litoria castanea*). For details on species inclusion, refer to **Appendix A2.8** and **Appendix A5.3** for likelihood assessment.

Threatened Waterbirds

A total of eight waterbirds listed under the EPBC Act and NSW BC Act were assessed as likely to occur within the project area (refer to **Appendix A2.8**). The likelihood of potential impacts occurring to these waterbirds had a greater risk weighting due to the proximity of the project area to known quality habitat found at nearby inland lakes, The Morass and Lake Bathurst (see **Figure 8**). For details on species inclusion, refer to **Appendix A5**.

For details into the impact assessment of each fauna species respectively, see **Appendix A6**.

5.3.2. IMPACT ASSESSMENT

VEGETATION IMPACTS

Culvert and associated works

The proposed works would result in removal of up to 0.02 ha of predominantly native riparian vegetation to construct a new culvert, erosion protection measures and associated road approaches.

Stockpile area

Up to 0.015 ha will be temporarily impacted for the use as a stockpile area to store culvert building materials. The area contains a mix of native and exotic vegetation and is historically degraded as part of a roadside verge.

The proposed works will aim to retain as much native vegetation as possible within the works area, particularly those of shrub or tree habit (Black Wattle), as their roots likely are providing support for the waterway embankments. The removal or otherwise impact of described native vegetation would be minimised by appropriate site rehabilitation and weed management post-construction, refer to **Table 7**.

Furthermore, the proposed works may result in potential indirect impacts on remaining vegetation within the project areas and their surroundings through disturbance and edge effects. Such impacts are likely low as the site already consists of a disturbed roadside verge, and impacts would be minimised by appropriate site rehabilitation and weed management in line with Council's roadside vegetation management plan.

Due to the small-scale nature of the proposed works and the mostly modified nature of the project area, it is unlikely that the project will significantly or adversely impact the extent of native vegetation within the locality. In addition, the proposed works are unlikely to contribute to the loss of landscape connectivity or further fragmentation.

WEED IMPACTS

Disturbance associated with vegetation clearing, vehicle traffic and general day-to-day operations during construction increases the potential for the spread, introduction, and establishment of weed and pest species. Some weed species can be highly invasive and have the potential to exclude native species and modify the composition and structure of vegetation communities.

To mitigate potential disturbance to native vegetation, strict weed management, monitoring and control practices should be implemented to minimise the spread of exotic species as outlined in **Section 7.1**. Weeds that must be managed carefully are Blackberry and Serrated Tussock, both highly invasive species found within and near the works area. Strict site hygiene, including the management, treatment or removal of weed-contaminated topsoils must be adhered to prevent the spreading of weeds throughout the site or down the waterway from disturbed soils and seeds.

It is highly likely that the project area will experience weed invasion, as the movement of vehicles and equipment during construction activities can spread seeds and disturb the soil, facilitating weed growth (refer to **Section 7.1**). As such, the project site is to be revisited post-construction for the purposes of weed management. Following construction, the works areas, particularly embankments to the waterway should be remediated with native species local to the region and ideally, from the vegetation community removed to prevent exotic and weed species from taking hold (refer to native species found in **Appendix A3.1**).

There is a risk of construction activities spreading invasive weeds and potentially new weeds further into adjoining vegetation. Recommended management involves a range of weed management actions and mitigation measures, including the incorporation of a weed management sub-plan as part of the project CEMP (refer to **Table 7**).

IMPACTS ON NATIVE FAUNA

The proposed activity is only expected to have a short-term, minor impact on native fauna during the construction phase.

No key habitat features such as stick nests were observed within the project area. Loud machinery may cause temporary disturbances; however, few habitat features are present within the project area, and the impact is considered minor. Pre-clearing inspections are advised due to the sensitive nature of riparian habitats and the potential for hidden fauna to be within dense vegetation. In the case where an ecologist is not on site and an unexpected discovery is made, protocols for such situations should be included in the project's CEMP.

DISEASES AND PATHOGENS

Construction activities attributed to the project may have the potential to introduce or spread pathogens such as Phytophthora (*Phytophthora cinnamomi*), Myrtle Rust (*Uredo rangelii*) and Chytrid fungus (*Batrachochytrium dendrobatidis*) into the project area or adjacent native vegetation through vegetation disturbance and increased site visitation. Phytophthora and Myrtle Rust may result in the dieback or modification of native vegetation and damage to fauna habitats. There is little available information about the distribution of these pathogens, however, records for Phytophthora can be found within the LGA, and within 7 km of the project area[41]. No evidence of these pathogens was observed during surveys.

[41] Accessed dataset: Phytophthora distribution. State Government of NSW and NSW Department of Climate Change, Energy, the Environment and Water. (2020). (Accessed: 27/08/2024)

Diseases and pathogens can be introduced or spread to the site via dirt or organic material attached to machinery, vehicles, equipment, and employees. The potential for significant or new impacts associated with these pathogens is relatively low, given the creation of exclusion zones to ensure limited access to areas outside the direct impact areas. To help mitigate the risk of pathogens being brought onto and/or spread through the site all machinery brought to the site should be washed down and inspected to be free of soils, seeds, and other organic material in accordance with **Table 7**.

IMPACTS TO TERRESTRIAL HABITAT AND WILDLIFE CORRIDORS

Native canopy, shrubs and grasses within the proposal's work area has the potential to provide foraging habitat for various native and threatened bird and mammal species. However, in the context of the remaining native vegetation surrounding the proposed site, the proposal would only remove a small portion of available foraging resources for local populations of native fauna compared to the habitat present in the surrounding landscape.

Overall, there is no indication that the project will have a significant impact on terrestrial habitat and wildlife corridors for threatened species.

AQUATIC IMPACTS

There is an abundance of aquatic habitat in relatively good condition within and in the close vicinity of the project area. The proposal has the potential to adversely impact this area through erosion, spills, runoff, sedimentation and increased visitation within the project area. Appropriate fencing, establishment of no-go zones and erosion and sediment controls are to be put in place to reduce any potential impacts to the surrounding aquatic environment. Furthermore, within the development of the project's ESCP, in water sedimentation controls should be used, such as silt curtains, in addition to ground controls. ESCP recommendations are outlined within **Table 7**.

Construction utilises machinery increasing the risk of chemical spills or leaks of construction materials, including fuels, lubricants and hydraulic oils from construction plant and equipment and increased sediment input into the project's waterway and further into the aquatic systems of the Shoalhaven River catchment. These impacts have been considered as part of the water quality and chemicals assessments in **Section 5.2** with potential impacts considered manageable through the implementation of rigorous safeguards and management measures outlined in **Table 7**.

Construction for the project will likely require the obstruction of the waterway, however, current infrastructure was observed to already be creating an obstruction to fish passage within Windellama Creek. Proposed activities and reclamation will aim to create unobstructed fish passage through the waterway, therefore planning to improve native fish dispersal.

Overall, the project is unlikely to have an adverse impact on the aquatic environment provided mitigation measures designed around water quality, soil and chemical management are implemented as recommended in **Table 7**.

IMPACTS TO BIODIVERSITY VALUES MAPPED AREA

The proposed activities will involve the direct impacts, such as removal of riparian vegetation, to small areas within Windellama Creek which is mapped as Biodiverse Riparian Land though the Biodiversity Values Map (see **Figure 6**). However, the majority of the works area likely has had its Biodiversity Values Map layer removed as it is part of the road reserve for council maintenance. The waterway is mapped as 'Biodiverse Riparian Land' on the Biodiversity Values Map in an east and west direction outside of the project area.

Although the project will very slightly directly impact Biodiversity Values mapped on either side of the works area and within the stockpile area, as Part 5 activities that has been assessed as not resulting in a significant impact on a threatened species, there are no specific requirements for entry into the Biodiversity Offset Scheme. Nevertheless, mitigation measures and rehabilitation efforts as outlined in **Table 7** are likely to ensure negligible impacts on Biodiversity Values mapped in areas within and surrounding to the project area.

IMPACTS TO THREATENED ECOLOGICAL COMMUNITIES

No TECs were observed in the project area and therefore the proposal will have no foreseen impact to TECs (see **Appendix A5.1**).

IMPACTS TO THREATENED SPECIES

Threatened terrestrial species

The proposal has the potential to adversely impact threatened flora and fauna species assessed as having a potential or greater likelihood of utilising the project area through the removal of the species' suitable habitat. As discussed previously, the vegetation to be removed is to be a small area of predominantly riparian vegetation with a mix of native and exotic species, with the site providing limited habitat features for terrestrial threatened species.

Pink Robin and Scarlet Robin were both observed within the project area during field inspection. Due to the small nature of the area being impacted, and the high-quality habitat for foraging that will remain available in the surrounds, it is unlikely that the proposed activity will significantly impact the observed Pink Robin or Scarlet Robin, particularly considering this is likely both species winter foraging area and not a summer breeding habitat.

A threatened species Test of Significance for impacts of the proposed activities on threatened flora and fauna species determined that there is not likely to be a significant impact on the extent and viability of these species in the local area. This is grounded by the relatively small area of habitat to be impacted in comparison to available habitat in the surrounding landscape. For details on the impact assessment of each threatened species respectively, see **Appendix A6.1**.

Threatened aquatic species

The project area and the surrounding waterway provide permanent pools of aquatic habitat in relatively good condition. No threatened aquatic species listed under the BC Act, FM Act and/or EPBC Act were observed within the project area during the field survey. The assessment of previous records and habitat requirements of potentially occurring threatened species found a total of 11 threatened aquatic species that were likely to occur within the project area (see **Appendix A5**).

A Test of Significance for the impacts of the proposed activity on threatened aquatic species concluded that there is unlikely to be a significant impact on the extent and viability of these species in the local area if strict mitigation measures outlined in **Table 7** are applied. This conclusion is supported by the relatively small area of habitat within the project area to be impacted compared to the available habitat in the surrounding landscape further up and downstream.

Furthermore, the proposed activity will aim to remedy the current obstruction that has been created by damaged infrastructure, improving fish passage, and with remediation as outlined in **Table 7**, support a return of habitat. For detailed information on the impact assessment of each threatened species, please refer to **Appendix A6.1**.

Overall, the project is considered unlikely to have significant adverse impacts on any listed aquatic threatened species, populations or communities.

5.3.3. KEY THREATENING PROCESSES

Key threatening processes (KTPs) are listed under both Commonwealth and State legislation. There are 22 Commonwealth-listed KTPs, 38 NSW-listed KTPs and eight under the FM Act. The lists overlap and include broad threats that are not immediately relevant to the site, such as climate change and specific threats relating to Lord Howe Island, shark control programs on beaches and longwall mining.

A detailed assessment of the impacts of the project in relation to NSW-listed KTPs concludes that the proposed activity is unlikely to significantly contribute to any KTPs provided appropriate measures are implemented as recommended in **Section 6** and **Section 7.1** (see **Appendix A6.5**).

5.3.4. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to occur to the directly impacted areas or on surrounding areas with biodiversity value if the safeguards and mitigation measures outlined in **Table 7** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 7: BIODIVERSITY SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Native vegetation removal	• Ensure the CEMP includes plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas. • Prior to the commencement of any works, a physical clearing boundary is to be demarcated and implemented. The demarcation of the exclusion zone will be in accordance with Transport for NSW *Biodiversity Management Guideline*[42]. • All vegetation removal should be limited to the minimum extent necessary to establishment of construction area, new causeway and approaches.
Introduction, spread and/or establishment of exotic species	Strict weed management, monitoring and control practices should be implemented to minimise the spread of exotic species as follows: • Follow appropriate guidelines on weed management within *South East Regional Strategic Weed Management Plan 2023 - 2027*[43]. • Undertake appropriate weed control measures within the project area prior to proposed works taking place. • All vehicles to be inspected and, if necessary, cleaned before their first entry to the proposal area. • All machinery should be cleaned of foreign soil and vegetative matter to avoid the spread of *Phytophthora cinnamomi* pathogenic fungus (Myrtle Rust) and dispersal of seeds of non-native plants. • Control the movement of vehicles, machinery, and workers to minimise the potential for spread of weeds within and outside the proposal area. • Control weeds prior to commencement of works. • Correct disposal of 'green waste' containing significant weeds. NOTE: Soil and vegetation collected during scraping off (site preparation) for construction of the site compound has a high weed seed load and either must be removed from site and transferred to a waste facility or kept within the boundaries of the established site compound. No soil or vegetation to be dumped on native grasslands surrounding the project footprint.

[42] Biodiversity Management Guideline – Protecting and managing biodiversity on Transport for NSW projects. State of New South Wales through Transport for NSW. (2024).
[43] South East Regional Strategic Weed Management Plan 2023 – 2027. State of New South Wales through Local Land Services. (2022).

Potential impact	Safeguards and mitigation measures
Native fauna at the site may be inadvertently injured during the course of construction works.	• Utilise best practices such as those set out in the Transport for NSW *Biodiversity Management Guideline*[44]. • Suitably qualified ecologists are to undertake a pre-clearing process as a final check for any threatened flora or fauna species that may have moved into the area since undertaking previous site inspections. • Clearing of any riparian vegetation will be completed prior to major earthworks, with vegetation carefully removed and placed aside overnight to allow any reside fauna to vacate. • Be careful around fauna, especially large animals (e.g. wombats), venomous animals (e.g. snakes, feral bees) or bats. • If any native fauna becomes injured during the course of construction works, the NSW Wildlife Information, Rescue and Education Service (WIRES) should be contacted immediately. • Implement a stop-works procedure if threatened species are encountered during construction. • Implement a stop-works procedure if any fauna species are encountered and at risk of harm during construction. If a habitat feature (stick nest, tree, man-made structure with potential bat roosting habitat) needs to be cleared: • ensure appropriate equipment/operator is available to lower trees to the ground gently, • implement staged habitat clearing, • ensure preclearing inspections occur prior to undertaking clearing works to check for any residing fauna (e.g. using a pole camera to inspect cavities), • have a licensed wildlife carer vaccinated against Australian Bat Lyssavirus or ecologist on site to supervise clearing/habitat removal and check for residing fauna, • determine relocation point for displaced fauna and plan for the care of any injured, orphaned, or sick wildlife, and • maintain appropriate records of inspection processes and wildlife outcomes.
Degradation of instream and riparian vegetation	• Minimise disturbance to instream and riparian vegetation during construction by appropriate design and planning. • Establish exclusion zones within aquatic habitats and riparian zones in accordance with Transport for NSW *Biodiversity Management Guideline*[45]. • Undertake appropriate aquatic and riparian vegetation rehabilitation works as soon as possible after construction. • Council is in contact with NSW DPI Fisheries to apply for a permit to carry out construction within an area mapped as Key Fish Habitat.
Obstruction to fish passage	• Council to install silt curtains within each waterway to protect each downstream area from sedimentation, • Minimise instream works by appropriate design and construction methods. • If unavoidable, obtain permit to obstruct fish passage under NSW FM Act.

[44] Biodiversity Management Guideline – Protecting and managing biodiversity on Transport for NSW projects. State of New South Wales through Transport for NSW. (2024).
[45] Biodiversity Management Guideline – Protecting and managing biodiversity on Transport for NSW projects. State of New South Wales through Transport for NSW. (2024).

5.4. Aboriginal heritage

5.4.1. EXISTING ENVIRONMENT

The Aboriginal custodians of the land within which the project lies are the Gandangara people and the Yuin people. Gandangara lands are a collection of tribal areas in southeastern NSW, encompassing Goulburn and Berrima, extending along the Nepean River into the vicinity of Camden. This territory includes the catchments of the Wollondilly and Coxs rivers, as well as some areas west of the Great Dividing Range. While Yuin lands extend from Nowra and Goulburn in the north and west, down the south coast encompassing Eden and lands east of Cooma.

The project area falls within the Pejar Local Aboriginal Land Council Boundary, which extends from Lake George in the south, Oberon to the north, Razorback Nature Reserve to the west and Morton National Park to the East. It is ~ 13 km west of the Nowra Local Aboriginal Land Council Boundary.

5.4.1. DUE DILIGENCE AND AHIMS

Desktop assessments were undertaken for the project, including searches of the NSW Department of Planning and Environment (DPE) Aboriginal Heritage Information Management System (AHIMS) database on 27 June 2024, to identify any heritage items near the site.

An AHIMS search area of approximate 2 km surrounding of the project area found to contain zero Aboriginal site within the search area, and no sites within the project area.

Due Diligence assessment

An archaeological and heritage consultant Past Traces Pty Ltd was engaged to perform a Due Diligence assessment for the project area in accordance with the NSW Due Diligence Code of Practice for the Protection of Aboriginal Objects[46] (**Attachment 2**).

Past Traces Pty Ltd undertook a field survey on 1 August 2024 in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW[47]. The field survey covered areas of open space areas surrounding the riparian area and current road culvert. Ground visibility was high within areas of the gravelled road, with grass cover outside of the immediate road areas lowering visibility. No heritage sites or areas of potential were identified during the field survey.

5.4.2. IMPACT ASSESSMENT

No recorded Aboriginal objects or places are known or are likely to occur within the project site, so no Aboriginal Heritage Impact Permit is legally required at this stage.

However, there is a risk that clearing and grubbing could uncover new finds. To avoid and minimise the risk of damage or loss of any such finds, the following procedures should be observed:

- an UFP should be implemented that incorporates the recommendations of the Due Diligence assessment. It should specify the procedures for workers to follow if they find human remains or potential Aboriginal finds (e.g. stone flakes or grinding stones), and

[46] Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW. State of New South Wales and the Department of Environment, Climate Change and Water NSW. (2010).
[47] Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales. State of NSW and the Department of Environment, Climate Change and Water NSW. (2010).

- further archaeological assessment should be conducted if the proposed activity extends beyond the area of the current investigation.

The proposed works are considered unlikely to have negative impacts on Aboriginal objects or places. Furthermore, no significant or long-term impacts are likely if the safeguards and mitigation measures recommended in this REF are implemented (refer to **Section 6**).

Note: Workers who handle or move a find may be guilty of an offence. Workers must leave suspected finds alone and report them immediately for professional investigation.

5.4.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to occur to the areas of Aboriginal heritage if the safeguards and mitigation measures outlined in **Table 8** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 8: ABORIGINAL HERITAGE SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Unexpected and previously unidentified Aboriginal Heritage objects may be uncovered during construction.	• An unexpected heritage finds procedure should be developed prior to construction works taking place. • Ensure all workers are made aware of unexpected finds procedures and potential cultural sensitivities as part of their site induction. In the case of Aboriginal cultural heritage sites or material being discovered: • all work must cease in the vicinity of the find and project manager notified immediately, • a buffer zone of 10 m should be fenced in all direction of the find and construction personnel made aware of the 'no go' zone, • NSW Heritage must be notified of the find and advice sought on the proper steps to be undertaken, and • after confirmation from NSW Heritage, a Cultural Heritage Consultant should be engaged to undertake assessment of the find and provide appropriate management recommendations to the proponent
Unexpected and previously unidentified archaeological relics may be uncovered during construction	If any unexpected archaeological relics are uncovered during construction, excavation must cease. An excavation permit or an exception notification may be required under the *Heritage Act 1977*[48]. • Ensure all workers are made aware of unexpected finds procedures as part of their site induction.

[48] Heritage Act 1977. State of New South Wales. (2024).

5.5. Non-Aboriginal heritage

5.5.1. EXISTING ENVIRONMENT

To ascertain the presence of heritage items and places within the project area, a search of relevant online heritage databases was undertaken on 27 June 2024. The statutory and non-statutory databases that were searched as part of the non-Aboriginal investigations include:

- State Heritage Register (SHR);
- Australian Heritage Database (AUSHD);
- Section 170 Heritage and Conservation Register, and
- *Goulburn Mulwaree LEP 2009*[49].

No heritage items listed on the AUSHD, SHR and Goulburn Mulwaree LEP registers or located in the broader locality were identified as in proximity (10 km or less) to the project area.

5.5.2. IMPACT ASSESSMENT

The proposed works are considered unlikely to have significant negative impacts on known heritage items or places as no heritage items were identified as being within close proximity to the works.

5.5.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to occur to other objects or areas of heritage if the safeguards and mitigation measures outlined in **Table 9** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 9: NON-ABORIGINAL HERITAGE SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Unexpected and previously unidentified Aboriginal Heritage objects may be uncovered during construction.	• An unexpected heritage finds procedure should be developed prior to construction works taking place. • Ensure all workers are made aware of unexpected finds procedures and potential cultural sensitivities as part of their site induction.
Unexpected and previously unidentified archaeological relics may be uncovered during construction	If any unexpected archaeological relics are uncovered during construction, excavation must cease. An excavation permit or an exception notification may be required under the *Heritage Act 1977*[50]. • Ensure all workers are made aware of unexpected finds procedures as part of their site induction.

5.6. Noise and vibration

5.6.1. EXISTING ENVIRONMENT

The project area is situated within a quiet rural area. The existing noise environment comprises intermittent road traffic noise from the current road network and natural sounds such as birds and wind which are typical for a rural environment.

[49] Schedule 5. Goulburn Mulwaree Local Environmental Plan 2009. State of New South Wales, (2023). (Accessed: 13/08/2024)
[50] Heritage Act 1977. State of New South Wales. (2024).

The nearest sensitive receptors to noise and vibration disturbances within each environment would be as follows:

- a residence located ~ 300 m west of the project area,
- a residence located ~ 650 m north of the project area,
- a residence located ~ 720 m south of the project area, and
- a residence located ~ 900 m north of the project area.

Ecologists undertaking biodiversity surveys in and around the crossing, reported no significant noise and vibrations are generated by either current infrastructure.

5.6.2. IMPACT ASSESSMENT

In the short term, construction vehicles and machinery may increase in noise and vibrations in and around the project area, but lower speed limits for construction work may reduce the emissions from passing traffic. The increase in noise and vibrations may disrupt surrounding residential areas, to mitigate these impacts, construction works will be limited to normal working hours, as specified in **Section 2.3**.

The potential for a temporary increase in emissions will be also mitigated by limiting construction work to normal work hours as specified in **Section 2.3**. Other safeguards and mitigation measures will be used to minimise noise and vibration emissions as detailed in **Table 10**.

No significant or long-term impact is likely given upgraded surfacing and if the safeguards and mitigation measures recommended in the REF are implemented (refer to **Table 10**).

5.6.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to occur to due to noise or vibration if the safeguards and mitigation measures outlined in **Table 10** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 10: NOISE AND VIBRATION SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Noise and vibration impacts affect the mental and physical health of nearby people and animals	Utilise best practices such as those found in Transport for NSW *Biodiversity Management Guideline*[51]. As part of this: • Engage with/notify the community early to manage expectations of residents etc. • Quantify the likely noise and vibration emissions of construction equipment/work. • Identify key stakeholders who may be affected by excessive noise and vibrations. • Do not work outside of approved work hours. • Where possible, give local residents at least 7 days' notice of very noisy activities e.g., through roadside signage, social media etc.

5.7. Air quality

5.7.1. EXISTING ENVIRONMENT

The project area lies within a rural area that likely have great air quality that are not impacted by development, residential areas or traffic. Goulburn has an accredited air quality monitoring station approximately 33 km north of the project area. Air quality for the area is consistently recorded as having

[51] Biodiversity Management Guideline – Protecting and managing biodiversity on Transport for NSW projects. State of New South Wales through Transport for NSW. (2024).

'Good' air quality index scores, with rare 'Moderated' scores associated with elevated levels of PM2.5 pollution (elevated in winter months likely due to emissions from burning firewood for heating)[52].

Air quality in the vicinity of the proposal is likely to be consistent with the rural locality and be of good quality. Considering the site's location within and next to roads, it would be impacted by vehicle emissions to a small but likely varying degree from the low volume of passing vehicle and dust emissions.

A search of the National Pollutant Inventory on 19 August 2024 no facilities in close proximity to the proposal which reported the emission of pollutants, with the nearest facility being Woodlawn Facility located west of Tarago and ~ 21.5 km west of the project area.

5.7.2. IMPACT ASSESSMENT

The project is likely to result in a short-term increase in emissions from construction vehicles and machinery. The emissions are likely to reduce air quality within the immediate area, however, it is not likely to be a significant impact as air quality within the region is in good condition with the largely open nature of the rural landscape for dispersal of any increased emissions.

The project is likely to impact air quality through the generation of dust during construction through earthworks, vehicle movement over exposed soils and stockpiling of materials (particularly if clearing of grubbing is carried out in high wind conditions). This issue is discussed earlier under **Section 5.1**.

No significant or long-term impact is likely if the safeguards and mitigation measures recommended in the REF are implemented (refer to **Table 11**).

5.7.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to occur to the local or surrounding air quality if the safeguards and mitigation measures outlined in **Table 11** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 11: AIR QUALITY SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Dust, smoke, or other potentially harmful emissions are generated on site	• Avoid/stop work during strong winds or in conditions where high levels of dust or air-borne particulates are likely (e.g., above 20 km/hr). • Areas of exposed surface are to be minimised through construction site planning and programming, to reduce the area of potential construction dust emission sources. • All working areas should be stabilised as soon as practicable in order to minimise the generation of dust. • Cover vehicles transporting fill, waste or other materials that may produce dust or odours.
Increased number of construction vehicles along local roads may impact on local air quality due to exhaust emissions	• Regular servicing of construction equipment is advised to help minimise exhaust emissions, and for the same reason, engines should not be left idling unnecessarily. • Where practicable, vehicles will be fitted with pollution reduction devices and switched off when not in use.

[52] Air quality concentration date -Southern Tablelands. State of New South Wales. (2024). (Accessed:13/08/2024)

5.8. Waste and chemical management

5.8.1. EXISTING ENVIRONMENT

The project area exists within a quiet rural landscape and consists of a roadway and agricultural land. As such, there are currently no known issues with chemicals or waste within the project area.

During assessment of the project area, ecologists undertaking terrestrial survey work in and around the site in July 2024 reported no odours, staining, suspected asbestos-containing material, or other evidence of contaminated land.

5.8.2. IMPACT ASSESSMENT

Waste will inevitably be created and will need to be contained to ensure it does not disperse across the site and into downstream/downwind areas. This waste may include:

- materials from removing existing causeway and associated infrastructures,
- waste and offcuts from construction of new culverts and associated infrastructure,
- surplus materials used during site establishment such as safety fencing and barriers which may include plastics and metal,
- excess fill/soil from works on the road approaches, including excess materials from deconstructing sidetrack,
- green waste from vegetation clearing,
- domestic waste including food scraps, aluminium cans, glass bottles, plastic and paper containers, and putrescible waste generated by site construction personnel, and
- fuel or other chemical spills on site.

Among other things, waste materials must be managed in accordance with relevant EPA guidelines and disposed of at an appropriate waste management facility. Waste produced during construction will be managed in accordance with the waste management hierarchy principles of the Waste Avoidance and Resource Recovery Act 2001, within which waste avoidance is a priority, followed by re-use and recycling/reprocessing, with disposal as a last resort[53].

Overall waste generated by the proposal is not expected to be in great volumes and no significant or long-term impact is expected if the safeguards and mitigation measures recommended in the REF are implemented (refer to **Table 12**).

5.8.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to occur to due to impacts from chemical or waste management attributed to the project if the safeguards and mitigation measures outlined in **Table 12** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

[53] Waste Avoidance and Resource Recovery Act 2001. State of New South Wales. (2022). (Accessed: 13/08/2024)

TABLE 12: CHEMICAL AND WASTE MANAGEMENT SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Chemicals and/or waste are accidentally released from the site	Aim to locate the following facilities at least 50 m away from any drainage lines or water bodies (i.e. Windellama Creek): • fuel, oil, and other chemical stores. • refuelling, refilling, and maintenance areas. • wash down bays. Note: Any area where fuel or other chemicals are stored or transferred to/from containers must be placed in at least one impervious bund to manage the risk of spills.
Waste material would be generated during construction activities	• A resource and waste management plan will be prepared and implemented as part of the CEMP. • All waste should be assessed, classified, managed, and disposed of in accordance with the EPA's Waste Classification Guidelines . • All waste materials removed from the site directed to a waste management facility lawfully permitted to accept the materials. • Reuse and recycling options should be identified for materials generated during construction. • An unexpected finds protocol should be established and included in management plans for the construction phase to address risks posed by fill or other potentially contaminated materials which may be encountered during construction works. **DO NOT:** • Burn waste on site as this may create air quality and other hazards. • Contaminate green "waste" with weeds, brambles, willows, or other materials that are likely to prevent it being used as mulch/spread weeds post-construction. • Leave any waste on the site on the completion of works.

5.9. Traffic and access

5.9.1. EXISTING ENVIRONMENT

McGaws Road is an unsealed, no-through rural road that services a small number of residences within the Windellama area. It is approximately 1.9 km long, connecting to Windellama Road, approximately 4.9 km from the Windellama Road and Oallen Ford Road intersection.

The proposed activities will require the closing of traffic access to two residences at the termination of McGaws Road.

5.9.2. IMPACT ASSESSMENT

The proposed activities will require the closing of traffic access to two residences at the termination of McGaws Road. This closing of access will be coordinated with local residents to ensure that they are suitably prepared.

In the short term, the project will have some unavoidable adverse impacts on local traffic movement due to an increase in construction and staff vehicles entering the site. However, safeguards/mitigation measures set out in **Table 13**, and the preparation of a TMP for the project would minimise delays/disruptions where possible.

In the longer term, the project is expected to deliver an improvement in road safety, improved access during and after flooding events, and improved road conditions for local and regional traffic with new surfacing reducing wear and tear on vehicles. Improvements to infrastructure will ensure the longevity of infrastructure, and reduce the risk of further damage to the current causeway.

No adverse or significant impact to traffic and access is likely if the safeguards and mitigation measures recommended in the REF are implemented (refer to **Table 13**).

5.9.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to occur to due to changed traffic conditions attributed to the project if the safeguards and mitigation measures outlined in **Table 13** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 13: TRAFFIC SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Road works create traffic delays, hazards, and community complaints	A Traffic Management Plan (TMP) should be prepared and should address measures to limit the potential of extended delays to road users during construction. Ensure the TMP is developed and implemented so that it enables: • road workers to work safely, • road users to travel around, past or through the work site safely, • separation of road workers and road users wherever possible, • timely notification of changed arrangements to road users, including freight operators e.g., through Live Traffic, social media etc, • inspect temporary traffic management arrangements at least weekly to ensure the work site is operating safely and efficiently, and • where residents may be temporarily isolated by works (McGaws Road) the TMP should have measures in place to ensure that residents needs are meet if accessibility is restricted for longer than expected.
Non-compliance with this REF results in environmental damage	• Include a community complaints procedure and register in the CEMP and ensure a response to all complaints within a reasonable timeframe.

5.10. Visual amenity and landscape

5.10.1. EXISTING ENVIRONMENT

The landscape in which the project area is generally situated is an agricultural landscape surrounded by areas of native forest. The surrounding vegetation has varying degrees of modification, with some areas exhibiting a native structure and composition, while other areas being cleared for agriculture. The project area is situated within road reserve and was found to be predominantly native riparian areas with canopy species present. Key receivers include:

- road users, and
- residences.

Surrounding landscapes have areas of higher abundant remnant vegetation, mostly in better condition. However, even though the project area occurs within a previously modified waterway, it is likely sensitive to further modification and degradation.

5.10.2. IMPACT ASSESSMENT

In the short term, the project will involve setting up a construction site, setting up a stockpile area, and the removal of native vegetation. These have the potential to temporarily affect views for residents and road users within the vicinity of the project area.

Minimal vegetation clearing will be required and planned construction is largely limited to upgrading the existing causeway and associated facilities, therefore the majority of works occur within the current roadway, resulting in minimising changes to the natural amenities. Impacts to native vegetation, and potential erosion from soil exposure, will be mitigated through rehabilitation of each area disturbed by proposed activities.

Overall, no significant or long-term impact is likely if the safeguards and mitigation measures recommended in the REF are implemented (refer to **Table 14**).

5.10.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term impacts are likely to occur to the visual amenity or landscape of the project if the safeguards and mitigation measures outlined in **Table 14** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 14: VISUAL AMENITY SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Works create an eyesore and community complaints	• Construction activities should be undertaken during the day. Outside of construction hours, all machinery/ equipment should be removed from the embankments and housed in temporary laydown areas. • The site should be kept neat and clean of general litter for the duration of works. • Rehabilitate and revegetate the site as appropriate. **DO NOT** • use exotic (pasture) grass seed in areas dominated by native grasses unless they are sterile – invasion of native plant communities by exotic perennial grasses is a Key Threatening Process under NSW law. Check with project Ecologist prior to using any non-local/native seed.

5.11. Socio-economic considerations

5.11.1. EXISTING ENVIRONMENT

The project aims to replace a damaged causeway which is subject to flooding and closures (refer to **Section 1.3)**. McGaws Road provides services to residents within a no-through road within the Windellama village area. The project has consequences for residents, local businesses, industries and visitors. The capacity of emergency services to respond effectively to incidents such as motor vehicle accidents, bushfires or health emergencies is also impaired.

5.11.2. IMPACT ASSESSMENT

Construction of the project may result in minor access and service impacts on the local community, tourists and freight servicing varying industries which include the following:

- approximately three days or restricted access during closure of McGaws causeway crossing, limiting movements of two residencies,
- potential increase in construction traffic due to the delivery of plant, materials, and construction personnel,
- increases in noise due to the operation of construction plant and equipment,
- visual impacts associated with construction work, and
- potential dust disturbance due to exposed soils.

However, the magnitude of such impacts is likely to be low compared to the long-term community benefits of having an upgraded road to connect residents to their properties, local businesses and industries. Impacts would be localised, minor, coordinated and temporary and would be managed through the relevant mitigation measures provided in **Table 15**.

5.11.3. SAFEGUARDS AND MITIGATIONS

No significant or long-term socio-economic impacts are likely to attributed to the project if the following safeguards and mitigation measures outlined in **Table 15** are implemented. For the full list of recommended safeguards and mitigation measures, refer to **Section 6**.

TABLE 15: SOCIO-ECONOMIC SAFEGUARDS AND MITIGATIONS

Potential impact	Safeguards and mitigation measures
Isolating residents on McGaws Road	• Coordination of construction activities with impacted residents to allow for preparation for closed roads. • Construction and road closure subject to appropriate conditions, i.e. road closures will not be instated around potentially hazardous weather events such as 'extreme' or higher fire danger rating periods.

5.12. Cumulative environmental impacts

5.12.1. EXISTING ENVIRONMENT

An activity may not have a significant impact in its own right but, when combined with similar activities over a broader scale, can create significant cumulative impacts on one or more environmental matters. Both existing and likely future activities need to be considered under clause 171 (2) of the EPA Regulation.

5.12.2. IMPACT ASSESSMENT

The project is funded by the Disaster Recovery Funding Arrangement (DRFA), a NSW Government initiative to assist LGAs affected by a declared natural disaster, including those with infrastructure damaged by fire, flood or storms. The project likely has cumulative impacts due to the works involved in upgrading multiple infrastructural assets impacted by recent floods. Such impacts might include:

- increased traffic including heavy vehicles,
- noise emissions and air quality impacts,
- vegetation clearance, and
- disturbance of waterways.

The temporary increase in traffic, noise emissions and air quality impacts would be localised and limited to the project site. The proposed project within this REF is to be upgraded under the same program, with other roads throughout the Council area likely meeting requirements to receive the funding.

CUMULATIVE VEGETATION IMPACTS

This project will require the removal or disturbance of up to 0.02 ha of native riparian vegetation, contributing to the cumulative impacts of the DRFA throughout NSW. Council is using the funding from the DRFA to upgrade multiple areas of damaged road infrastructure throughout the LGA, the cumulative impacts of which is considered to be small when weighed against the necessary need for safe and serviceable roads for the community. The required clearance of vegetation results in a reduction in the amount of native vegetation within the locality, however, is not considered to contribute to the cumulative impacts in any substantial way due to the relatively small area.

The proposal has not been found to impact any threatened communities and therefore would not contribute to the cumulative impact on any threatened communities.

The impact of vegetation and other habitat within the project area would result in a cumulative decrease in habitat for threatened fauna. However, as with the clearance of native vegetation, the proposal is not considered to contribute significantly to the loss of habitat within the broader Windellama locality area due to its small scale compared to the available habitat within the surrounding landscape.

6. Environmental safeguards and mitigation measures

A range of environmental safeguards and mitigation measures are recommended and required to avoid, minimise, and mitigate the project's short and long-term environmental impacts.

6.1. Key stakeholders

Key stakeholders for each project will include:

- Project Manager,
- Site Supervisor,
- individual construction workers, who will need to be inducted into the actions that are appropriate or necessary on this site, and
- impacted residents.

6.2. Key documents

Key documents for each project will include the following site-specific plans:

- Construction Environmental Management Plan (CEMP), and
- Traffic Management Plan (TMP).

An Unexpected Finds Procedure (UFP), which can be of a more general nature, is also required to ensure a timely and effective response to matters including:

- suspected contaminated soils and Acid Sulfate Soils,
- chemical spills,
- threatened species or habitat, and
- the discovery of human remains, or suspected Aboriginal heritage finds.

All of these documents will need to:

- align with, and be incorporated into this REF,
- be put in place before work begins, and
- inform induction training for construction workers.

6.3. Key safeguards and mitigation measures

Safeguards and mitigation measures are recommended and required to avoid, minimise, and mitigate the short and long-term environmental impacts from the project.

For ease of reference, the mitigation measures for the project are presented in **Table 16** and are structured around the categories of environmental impact in **Section 5** of this REF .

TABLE 16: SAFEGUARDS AND MITIGATION MEASURES FOR THE PROJECT AREA

Impact type	Potential impact	Safeguards and mitigation measures
General	Non-compliance with this REF results in environmental damage	• Prepare a site-specific CEMP before any construction works commence that includes all the safeguards and mitigation measures set out in this REF. • Include a community complaints procedure and register in the CEMP and ensure a response to all complaints within a reasonable timeframe. • Ensure all workers are made aware of site sensitivities and unexpected finds procedure/s as part of their site induction.
Landforms, Geology and Soils (Erosion)	Earthworks and excavation may result increased erosion risk and sedimentation of downstream waterways	• Avoid and minimise erosion by appropriate design. • Minimise vegetation removal and soil disturbance within riparian zone. Ensure any disturbed soils within or near the riparian zone are stabilized immediately. • Implement an Erosion and Sediment Control Plan (ESCP), including strict sedimentation controls, such as silt curtains for each waterway. • Utilise best practices such as those found in the *NSW Government's 2004 Managing Urban Stormwater: Soils and Construction Guidelines* (the Blue Book)[54]. • Undertake appropriate riparian and terrestrial vegetation rehabilitation works as soon as possible after completion of construction.
Contaminated Land/ Acid Sulfate Soils	Chemicals are released that can cause serious damage to human health and the local environment	This impact is considered unlikely, however, be alert to the possibility that hazardous materials such as Acid Sulfate Materials and Asbestos-Containing Materials may be encountered during excavation work, and/or accidentally brought onto the site hidden in fill or other construction materials. • Ensure all workers are made aware of the unexpected finds procedure/s as part of their site induction. Do not hesitate to stop work if there are any unexpected finds of this nature and to seek advice from a suitably qualified environmental professional). • Avoid bringing contaminated materials onto site: source materials such as fill from Council quarries, companies selling material certified as clean fill or other reputable suppliers.
Water Quality/ Hydrology	Change in flow and water quality of unnamed creeks and hydro lines and due to degradation of riparian vegetation, pollution, or sedimentation.	• Utilise best practices such as those found in the Blue Book. • Implement an Erosion and Sediment Control Plan (ESCP). • Closely monitor water quality, especially turbidity and surface appearance to ensure any problems are quickly identified and mitigated. • Stockpiles should be appropriately contained by sediment fencing or other materials prescribed in the Blue Book to ensure sediments do not enter waterways. • Stockpiles should also be located 40 m away from adjacent riparian areas and waterways. • Where stockpiles are unavoidably located within 40 m of riparian areas these are to be managed as follows: ▪ locate stockpiles at the furthest point from the waterway, ▪ use bunding or other controls to divert storm water and clean water around stockpiles, ▪ cover stockpiles when not in use, and ▪ monitor weather and plan for potential high rainfall and flooding.
Biodiversity - aquatic	Degradation of instream and riparian vegetation	• Minimise disturbance to instream and riparian vegetation during construction by appropriate design and planning. • Establish exclusion zones within aquatic habitats and riparian zones in accordance with Transport for NSW *Biodiversity Management Guideline*[55]. • Undertake appropriate aquatic and riparian vegetation rehabilitation works as soon as possible after construction. • Council is in contact with NSW DPI Fisheries to apply for a permit to carry out construction within an area mapped as Key Fish Habitat.

[54] "the Blue Book" Managing Urban Stormwater: soils and construction -Volume 1. New South Wales Government. (2004).
[55] Biodiversity Management Guideline – Protecting and managing biodiversity on Transport for NSW projects. State of New South Wales through Transport for NSW. (2024).

Impact type	Potential impact	Safeguards and mitigation measures
	Obstruction to fish passage	• Council to install silt curtains within each waterway to protect each downstream area from sedimentation, • Minimise instream works by appropriate design and construction methods. • If unavoidable, obtain permit to obstruct fish passage under NSW FM Act.
Biodiversity– terrestrial 	Native vegetation removal	• Ensure the CEMP includes plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas. • Prior to the commencement of any works, a physical clearing boundary is to be demarcated and implemented. The demarcation of the exclusion zone will be in accordance with Transport for NSW *Biodiversity Management Guideline*[56]. • All vegetation removal should be limited to the minimum extent necessary to establishment of construction area, new causeway and approaches.
	Introduction, spread and/or establishment of exotic species	Strict weed management, monitoring and control practices should be implemented to minimise the spread of exotic species as follows: • Follow appropriate guidelines on weed management within *South East Regional Strategic Weed Management Plan 2023 - 2027*[57]. • Undertake appropriate weed control measures within the project area prior to proposed works taking place. • All vehicles to be inspected and, if necessary, cleaned before their first entry to the proposal area. • All machinery should be cleaned of foreign soil and vegetative matter to avoid the spread of *Phytophthora cinnamomi* pathogenic fungus (Myrtle Rust) and dispersal of seeds of non-native plants. • Control the movement of vehicles, machinery, and workers to minimise the potential for spread of weeds within and outside the proposal area. • Control weeds prior to commencement of works. • Correct disposal of 'green waste' containing significant weeds. NOTE: Soil and vegetation collected during scraping off (site preparation) for construction of the site compound has a high weed seed load and either must be removed from site and transferred to a waste facility or kept within the boundaries of the established site compound. No soil or vegetation to be dumped on native grasslands surrounding the project footprint.
	Native fauna at the site may be inadvertently injured during the course of construction works.	• Utilise best practices such as those set out in the Transport for NSW *Biodiversity Management Guideline*[58]. • Suitably qualified ecologists are to undertake a pre-clearing process as a final check for any threatened flora or fauna species that may have moved into the area since undertaking previous site inspections. • Clearing of any riparian vegetation will be completed prior to major earthworks, with vegetation carefully removed and placed aside overnight to allow any reside fauna to vacate. • Be careful around fauna, especially large animals (e.g. wombats), venomous animals (e.g. snakes, feral bees) or bats. • If any native fauna becomes injured during the course of construction works, the NSW WIRES should be contacted immediately. • Implement a stop-works procedure if threatened species are encountered during construction. • Implement a stop-works procedure if any fauna species are encountered and at risk of harm during construction. If a habitat feature (stick nest, tree, man-made structure with potential bat roosting habitat) needs to be cleared: • ensure appropriate equipment/operator is available to lower trees to the ground gently, • implement staged habitat clearing,

[56] Biodiversity Management Guideline – Protecting and managing biodiversity on Transport for NSW projects. State of New South Wales through Transport for NSW. (2024).
[57] South East Regional Strategic Weed Management Plan 2023 – 2027. State of New South Wales through Local Land Services. (2022).
[58] Biodiversity Management Guideline – Protecting and managing biodiversity on Transport for NSW projects. State of New South Wales through Transport for NSW. (2024).

Impact type	Potential impact	Safeguards and mitigation measures
		• ensure preclearing inspections occur prior to undertaking clearing works to check for any residing fauna (e.g. using a pole camera to inspect cavities), • have a licensed wildlife carer vaccinated against Australian Bat Lyssavirus or ecologist on site to supervise clearing/habitat removal and check for residing fauna, • determine relocation point for displaced fauna and plan for the care of any injured, orphaned, or sick wildlife, and • maintain appropriate records of inspection processes and wildlife outcomes.
Heritage (both Aboriginal & Shared) 	Unexpected and previously unidentified Aboriginal Heritage objects may be uncovered during construction.	• An unexpected heritage finds procedure should be developed prior to construction works taking place. • Ensure all workers are made aware of unexpected finds procedures and potential cultural sensitivities as part of their site induction. In the case of Aboriginal cultural heritage sites or material being discovered: • all work must cease in the vicinity of the find and project manager notified immediately, • a buffer zone of 10m should be fenced in all direction of the find and construction personnel made aware of the 'no go' zone, • NSW Heritage must be notified of the find and advice sought on the proper steps to be undertaken, and • after confirmation from NSW Heritage, a Cultural Heritage Consultant should be engaged to undertake assessment of the find and provide appropriate management recommendations to the proponent.
	Unexpected and previously unidentified archaeological relics may be uncovered during construction	If any unexpected archaeological relics are uncovered during construction, excavation must cease. An excavation permit or an exception notification may be required under the *Heritage Act 1977*[59]. • Ensure all workers are made aware of unexpected finds procedures as part of their site induction.
Noise and Vibration 	Noise and vibration impacts affect the mental and physical health of nearby people and animals	Utilise best practices such as those found in Transport for NSW *Biodiversity Management Guideline*[60]. As part of this: • Engage with/notify the community early to manage expectations of residents etc. • Quantify the likely noise and vibration emissions of construction equipment/work. • Identify key stakeholders who may be affected by excessive noise and vibrations. • Do not work outside of approved work hours. • Wherever possible, give local residents at least 7 days' notice of very noisy activities e.g., through roadside signage, social media etc.
Air Quality 	Dust, smoke, or other potentially harmful emissions are generated on site	• Avoid/stop work during strong winds or in conditions where high levels of dust or air-borne particulates are likely (e.g., above 20 km/hr). • Areas of exposed surface are to be minimised through construction site planning and programming, to reduce the area of potential construction dust emission sources. • All working areas should be stabilised as soon as practicable in order to minimise the generation of dust. • Cover vehicles transporting fill, waste or other materials that may produce dust or odours.
	Increased number of construction vehicles along local roads may impact on local air quality due to exhaust emissions	• Regular servicing of construction equipment is advised to help minimise exhaust emissions, and for the same reason, engines should not be left idling unnecessarily. • Where practicable, vehicles will be fitted with pollution reduction devices and switched off when not in use.
Chemical and waste management	Chemicals and/or waste are accidentally released from the site	Aim to locate the following facilities at least 50 m away from any drainage lines or water bodies (i.e. Windellama Creek): • fuel, oil, and other chemical stores. • refuelling, refilling, and maintenance areas. • wash down bays.

[59] Heritage Act 1977. State of New South Wales. (2024).
[60] Biodiversity Management Guideline – Protecting and managing biodiversity on Transport for NSW projects. State of New South Wales through Transport for NSW. (2024).

Impact type	Potential impact	Safeguards and mitigation measures
		Note: Any area where fuel or other chemicals are stored or transferred to/from containers must be placed in at least one impervious bund to manage the risk of spills.
	Waste material would be generated during construction activities	• A resource and waste management plan will be prepared and implemented as part of the CEMP. • All waste should be assessed, classified, managed, and disposed of in accordance with the EPA's Waste Classification Guidelines . • All waste materials removed from the site directed to a waste management facility lawfully permitted to accept the materials. • Reuse and recycling options should be identified for materials generated during construction. • An unexpected finds protocol should be established and included in management plans for the construction phase to address risks posed by fill or other potentially contaminated materials which may be encountered during construction works. **DO NOT:** • Burn waste on site as this may create air quality and other hazards. • Contaminate green "waste" with weeds, brambles, willows, or other materials that are likely to prevent it being used as mulch/spread weeds post-construction. • Leave any waste on the site on the completion of works.
Traffic 	Road works create traffic delays, hazards, and community complaints	A Traffic Management Plan (TMP) should be prepared and should address measures to limit the potential of extended delays to road users during construction. Ensure the TMP is developed and implemented so that it enables: • road workers to work safely, • road users to travel around, past or through the work site safely, • separation of road workers and road users wherever possible, and • timely notification of changed arrangements to road users, including freight operators e.g., through Live Traffic, social media etc. • inspect temporary traffic management arrangements at least weekly to ensure the work site is operating safely and efficiently. • ensure that impacted residents who will be temporarily isolated by construction activities will have needs met if accessibility is restricted for longer than expected.
Visual Amenity/ Landscape 	Works create an eyesore and community complaints	• Construction activities should be undertaken during the day. Outside of construction hours, all machinery/ equipment should be removed from the embankments and housed in temporary laydown areas. • The site should be kept neat and clean of general litter for the duration of works. • Rehabilitate and revegetate the site as appropriate. **DO NOT** • use exotic (pasture) grass seed in areas dominated by native grasses unless they are sterile – invasion of native plant communities by exotic perennial grasses is a Key Threatening Process under NSW law. Check with project Ecologist prior to using any non-local/native seed.
Socio-Economic Factors 	(Not required)	• Coordination of construction activities with impacted residents to allow for preparation for closed roads, • Construction and road closure subject to appropriate conditions, i.e. road closures will not be instated around potentially hazardous weather events such as 'extreme' or higher fire danger rating periods.

6.4. Additional remediation activities

6.4.1. Works area remediation

On completion of construction and decommissioning of the project area, remediation of the work areas that has experienced clearing and has not been subject to permanent installation of a scour protection area will be carried out to further protect against erosion and weed establishment. It is recommended that a site rehabilitation plan be prepared and includes measures such as initial and ongoing weed management, installation of native upper, mid and groundcover plantings, and ongoing monitoring to ensure efforts are suitable to mitigate the overall short and long-term impacts of the works.

Remediation of the project area is to return impacted areas to previously native condition or better, this will involve the establishment of native endemic tree species, midstory species and local grass species through direct seeding, seed-bearing hay, and/or planting of tube stock. It is recommended that trees and shrubs to be planted be in alignment with the riparian landscape in any areas of disturbance on upper banks of the creek areas.

This should include canopy and midstory species such as:

- Ribbon Gum,
- Candlebark,
- Black Wattle (*Acacia decurrens*),
- Various wattle's (*Acacia* sp.), and
- Native Blackthorn (*Bursaria spinosa*).

It is also recommended that native grasses, rushes and sedges be utilised throughout all impacted areas of the riparian corridor, using species which include:

- Weeping Grass (*Microlaena stipoides*),
- Kangaroo Grass (*Themeda triandra*),
- Wallaby Grass (*Rytidosperma* spp.),
- River Tussock (*Poa labillardieri* var. *labillardieri*),
- Tall Sedge (*Carex appressa*), and
- Rushes (*Juncus* sp.).

6.4.2. Stockpile area remediation

It is recommended that after the stockpile area has ceased being used ongoing weed management occurs to ensure no long-term impacts associated with the activity occur within this area. Long-term monitoring of the management of this area can be carried out as baseline vegetation integrity scores for the stockpile location has been collected.

To confirm the proposed activity has not caused the degradation of the stockpile area and weed management practices are effective, it is recommended that a repeat monitoring of the stockpile site occurs six months after completion of works.

7. Action required before work commences

This is a working document and has been prepared based on information available at the time. Final concurrence from NSW DPI Fisheries is required. The REF may require amendment subject to advice and may be modified on receival of the project contractor's CEMP.

7.1. Weed management

As discussed in **Section 6**, prior to any construction works being undertaken, the site should be managed to control invasive plants (e.g., Goulburn Mulwaree Council priority weeds[61], WoNS, HTEs, RPW[62] and other invasive plant species). Specific attention and care should be focussed on any areas containing the following invasive weeds:

- Sheep Sorrel,
- Spear Thistle (*Cirsium vulgare*),
- Patterson's Curse (*Echium plantagineum*),
- Serrated Tussock,
- Paspalum,
- Onion Grass (*Romulea rosea*),
- Sweet Briar, and
- Blackberry.

As the work takes place in a riparian area, and there are a limited number of herbicides registered for use around waterways due to the requirements to minimise impacts on water quality, it is recommended that, where possible, physical/mechanical removal of weeds is likely better suited.

7.2. Conditions of approval to be checked/monitored

7.2.1. FISHERIES PERMIT

Council is in contact with NSW DPI Fisheries on possible issues regarding the application for a permit to carry out construction within areas mapped as Key Fish Habitat for the project area. Council has initiated application of a Part 7 Fisheries Permit, for the project which includes applications for dredging, reclamation works and obstruction to fish passage at Windellama Creek. No construction works are to be conducted until a permit for the project is received, and conditions incorporated into the contractor's CEMP.

7.2.2. ADDITIONAL CONDITIONS

Provided the safeguards and mitigation measures recommended in **Section 6** are implemented, no other permits or licenses appear to be required. This situation is, however, subject to change if, for example:

- relevant laws and policies change, or
- the project design undergoes significant change, or

[61] Local Weed Management Plan. Goulburn Mulwaree Council. (2019).
[62] South Easte Regional Strategic Weed Management Plan 2023 – 2027. State of New South Wales through Local Land Services. (2022).

- there are significant unexpected finds on site during the construction process.

If there are significant delays in the approval of the REF or commencement of construction work, this REF should be reviewed to ensure that it remains complete and accurate.

Please contact Ecology Consulting if this REF needs to be updated. You must not alter any report or plan we provide without our prior written consent.

8. REF determination

This Review of Environmental Factors has assessed the likely environmental impacts of a proposal by Goulburn Mulwaree Council for the proposed shared path upgrades at McGaws Road, Goulburn, NSW.

Council has considered the potential environmental effects of the proposal and the effectiveness and feasibility of measures for reducing or preventing detrimental effects. It is determined that:

1. The proposed mitigation measures will be adopted and implemented;
2. Implementation of these mitigation measures will reduce the potential environmental impact of the proposed activity; and
3. An Environmental Impact Statement is not required for the proposed works if all mitigation measures in this REF are implemented by Council and its contractors.

8.1. Assessor declaration

This REF provides a true and fair review of the project in relation to its likely effects on the environment. It fully addresses all possible matters affecting or likely to affect the environment as a result of the project and provides sufficient information to determine whether there is likely to be a significant impact on the environment as a result of the project.

I have considered all environmental impacts and safeguards to the best of my knowledge and have sought advice where required.

TABLE 17: ASSESSOR DECLARATION FOR MCGAWS ROAD PROJECT

Project name	McGaws Road project
REF approved for release to client by Senior Ecologist Simon Vinson, Accredited Biodiversity Assessor NSW licence BAAS23004 Ecology Consulting Pty Ltd simon@ecologyconsulting.au	Signature: S Vinson Date: 14 November 2024
REF endorsed by Director Assets and Operations McGaws Road Causeway Upgrad Goulburn Mulwaree Council email address	Signature:  Date: 06 February 2025

8.2. Determiner declaration and approval

I have reviewed this REF. This document will remain a working document until the CEMP and Fisheries report, mitigation measures and recommendations are incorporated. I consider that the project will not have a significant impact and can proceed subject to the controls outlined in this REF.

Determiner *Director of Assets and Operations* Goulburn Mulwaree Council	Signature: Date:

Appendix A: Biodiversity Inspection Report

A1 Methodology

This report was prepared based on a biodiversity inspection, which involved investigations of the terrestrial and aquatic ecology, and biodiversity values associated with the site, including a desktop literature review, database searches (accessed July 2024) and site inspections for data collection (July 2024).

A1.1 DESKTOP ASSESSMENT

Desktop research involved the search of relevant databases, including the following resources:

- Commonwealth EPBC Act Protected Matters Search Tool,
- National Atlas of Living Australia,
- Atlas of NSW Wildlife,
- NSW Threatened Biodiversity Profile tool,
- NSW Biodiversity Values Map,
- Fisheries NSW Spatial Data Portal,
- NSW eSPADE 2.0 soil and land information database,
- NSW SEED environmental data portal, and
- eBird hotspots in; the Morass, Nadgigomar Nature Reserve--Sunset Mountain Section, Sunset Mountain Trail, and Windellama Hall and Showground.

All marine species and listed marine habitats were excluded from the search results as the project area does not contain any marine habitat.

A1.2 SITE INSPECTION

In order to assess the impacts of the proposed works, the site was visited on 17 July 2024 (see **Table A 1**). While on-site, ecologists:

- undertook a BAM plot survey in accordance with the NSW Government's BAM method to assess the vegetation integrity of the site's proposed stockpile area,
- undertook surveys to collect vegetation data from rapid BAM assessment,
- undertook a random meander search for threatened flora and threatened ecological communities (TECs),
- recorded incidental diurnal fauna records,
- undertook macroinvertebrate sampling of the waterways, and
- undertook a habitat suitability assessment for threatened fauna known and with a likelihood of occurring in the area.

TABLE A 1: WEATHER CONDITIONS BEFORE AND DURING THE FIELD INSPECTION

Data from Bureau of Meteorology for the nearest weather station to the site (25 km away), at Goulburn Airport {station 070330}. Fieldwork dates are in bold.

Date	Specific survey	Min Temp ° C	Max Temp ° C	Rainfall (mm)	Max Wind Gust (km/h)
11 July 2024	-	-1	10.3	0.2	28
12 July 2024	-	-0.6	13.1	0	24
13 July 2024	-	0.2	12.9	0	39
14 July 2024	-	4.2	9	0	52
15 July 2024	-	1.6	7.6	0	65
16 July 2024	**Preliminary site inspection**	**3.2**	**9.1**	**0.6**	**74**
17 July 2024	**Biodiversity inspection**	**3.9**	**13.2**	**0.6**	**35**

A1.3 SURVEY LIMITATIONS

The ecological dataset provided for the site was restricted to what was observed by ecologists from Ecology Consulting during site assessments.

The timing of the survey may not have coincided with the emergence times of some species of flora and fauna, such as seasonally flowering herbs, seasonal migratory fauna, or nocturnal fauna. Conditions at the time of fieldwork were suitable to enable most plant species in the project areas to be identified with confidence. However, the results of fieldwork may not be complete because some plants and animals are only detectable during certain times of year or after weather events, and some species can only be identified to species when in flower (refer to **Table A 2**).

Surveys were completed during winter and therefore were not completed at the most opportune time to observe seasonal flowering herbs or migratory fauna. Nevertheless, survey work was considered appropriate given the modified nature of the proposed works area of each site and unseasonal wet conditions allowing a greater than usual detection of native grasses and forbs.

For fauna, it should also be noted that fieldwork was not intended to provide a comprehensive survey of all the animal species that may utilise the site over time. However, habitat surveys were undertaken for the quantity and quality of habitat that may be suitable for different species within the project site.

TABLE A 2: OPTIMAL SURVEY PERIODS FOR KEY THREATENED FLORA SPECIES

Threatened flora species were targeted based on those with a potential to likely likelihood of occurrence (see **Appendix A7.2**). Site inspection and targeted survey period is indicated by solid box and bold letters.

Legend

O = optimal survey period
S = sporadic flowering/other identifiable features
U = unsuitable for most survey work (species may be dormant or not identifiable)

Species name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Comments
Michelago Parrot-pea (*Dillwynia glaucula*)	U	U	U	U	U	U	U	U	**O**	**O**	**O**	**O**	An erect shrub with yellow and red pea-like flowers clustered towards the ends of branchlets.
Black Gum (*Eucalyptus aggregata*)	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	**O**	Identifiable throughout year by a number of features such as epicormic growth or juvenile foliage.
Hoary Sunray (*Leucochrysum albicans* subsp. *tricolor)*	**O**	**O**	**O**	**O**	**S**	**S**	**S**	**S**	**O**	**O**	**O**	**O**	Distinguished from the other subspecies within *L. albicans* by its white involucral bracts and narrow, linear-oblanceolate leaves.
Matted Bush-pea (*Pultenaea pedunculata*)	U	U	U	U	U	U	U	U	**O**	**O**	**O**	U	Use peduncles to identify. Small, fragmented populations vulnerable to stochastic events, road works, rural subdivisions that will further fragment the populations.

A2 Existing environment

A2.1 VEGETATION

Works area

The vegetation of the works area is made up of a small area of riparian vegetation of a creek adjacent to the partially submerged road crossing. The surrounding vegetation exhibits historic disturbance through weed intrusion, however, there is a dominance of native grasses, rushes and trees. A total of 43 flora species, comprising of 18 exotic species and 25 native species were identified. The limited diversity of vegetation recorded within the works area is likely due to the small area of assessment, largely confined to the impact area of the works.

A moderately dense canopy containing Black Wattle could be observed in the vicinity of the works area, with Ribbon Gum and Candlebark observed further down the creek line. A sparse to moderately dense midstory comprised of Sifton Bush (*Cassinia arcuata*) was observed within the works area assessed.

Ground layer vegetation composition was observed to be a mixture of exotic grasses and forbs and native grasses, rushes, sedges, reeds and forbs. A native grassy understory was dominated by different native species in patches, these species include:

- Common Couch (*Cynodon dactylon*),
- Weeping Grass,
- Kangaroo Grass, and
- Yanganbil (*Austrostipa bigeniculata*).

A diverse range of riparian vegetation within the creek waterline includes Broad-leaved Cumbungi (*Typha orientalis*), Finger Rush (*Juncus subsecundus*), Tall Sedge, Thread Rush (*Juncus filicaulis*) and Alpine Joint-Leaf Rush (*Juncus sandwithii*). A low diversity of forbs was observed within the vicinity of the works area, including Kidney Weed (*Dichondra repens*), Swamp Dock (*Rumex brownii*), Variable Raspwort (*Haloragis heterophylla*) and Indian Pennywort (*Centella asiatica*).

Several weeds classified as WoN and HTE species were identified within the vicinity of the works area, such as Sheep Sorrel, Paspalum, Sweet Briar, Blackberry complex and Serrated Tussock.

Stockpile area

Vegetation within the stockpile area is largely degraded as a roadside verge within an agricultural area, exhibiting exotic forbs and grasses mixed with native grasses and few native forbs. A BAM plot was used to record vegetation present within the area and area immediately adjacent. A total of 42 flora species were identified within the floristics plot, comprised of 16 native species and 26 exotic species.

No canopy or midstory was present within the floristic plot, with the closest canopy species being nearby Black Wattle. Ground layer vegetation within the stockpile area is comprised largely of exotic forbs such as Catsear (*Hypochaeris radicata*), Lamb's Tongues (*Plantago lanceolata*) and the exotic grass Goose Grass (*Eleusine tristachya*). Native grasses are present within the stockpile area, however, they mostly comprise a moderate percentage cover in the floristic plot in the areas adjacent to the stockpile area, they include:

- Kangaroo Grass,
- Brown's Lovegrass (*Eragrostis brownii*),
- Hairy Panic (*Panicum effusum*),

- Windmill Grass (*Chloris truncata*),
- Common Wheatgrass (*Anthosachne scabra*), and
- Weeping Grass.

Few native forbs were observed, they include Kidney Weed, Common Everlasting (*Chrysocephalum apiculatum*), a Fuzzweed (*Vittadinia muelleri*), Trailing Speedwell (*Veronica plebeian*) and Wood Sorrel (*Oxalis perennans*)

A high number of weed species, including three classified as WoNS and HTE species, were identified within the stockpile area. Blackberry Serrated Tussock and Paspalum were all recorded, with Serrated Tussock in moderate abundance in the floristics plot but observed to be prevalent in the low-laying landscape.

A2.2 PLANT COMMUNITY TYPE

The works area is situated within the creek line exhibiting the floristic composition characteristics in alignment with the expected riparian vegetation with a native canopy, midstory and ground layer with various native grasses, rushes, reeds and sedges. The works location and the stockpile area are predicted mapped in the State Vegetation Type Map (SVTM) as the same NSW Plant Community Type (PCT), this PCT is:

- PCT 3347 Southern Tableland Creekflat Ribbon Gum Forest.

The observed landscape position, the floristic composition and structure of the works area are in alignment with the predicted SVTM. Although degraded and without a canopy, the low laying landscape position, present native species composition and proximity to canopy species suggest that the stockpile area also is PCT 3347. Vegetation within these areas do not align with any threatened ecological community (TEC) under NSW or Commonwealth biodiversity legislation.

Further discussion of the presence of TECs can be found in **Appendix A7.1**.

A2.3 BAM PLOT RESULTS

BAM plot data was used to determine the PCT and as a measure for impacts attributed to the development. A modified BAM plot (10 x 100 m) was utilised in the stockpile area, noting that the BAM plot and floristic plot are both larger than the proposed stockpile area.

BAM_1 data and calculated vegetation integrity score (VIS) do not necessarily reflect the observed degraded vegetation condition within the stockpile area. Rather capturing elements of higher native composition, structure and function from areas adjacent to the stockpile area recorded within the BAM plot. Particularly, utilising modified BAM plots a small amount of regeneration was captured in near the 100 m end of the plot, likely contributing to a higher function score and therefore a VIS of 34.1.

The BAM plot was used to inform and describe vegetation zones and PCT mapping within the stockpile area, while rapid BAMs were used to inform works areas, refer to **Table A 3**. Two condition classes (vegetation zones) were defined based on the broad conditions described below:

- Zone 1‑ PCT 3347: Low to moderate condition degraded grassland, stockpile area, and
- Zone 2 ‑ PCT 3347: Canopied area of intact riparian vegetation and associated native vegetation areas as mapped in the works area (refer to **Figure 11**).

Details on the BAM plot, rapid BAM, supporting data and photos can be found in **Appendix A4**.

TABLE A 3: VEGETATION ZONES AND BAM PLOT CALCULATIONS

Zone	Plots	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score
1	BAM_1	39.6	65.6	15.2	34.1
2	Rapid BAM	N/A	N/A	N/A	N/A

A2.4 FAUNA AND HABITAT

The works area is a small area of modified habitat that contains habitat largely associated with the riparian habitat present and semi-submerged rocky habitat in the form of washed road materials from the causeway itself (**Figure A 1**). The area contains no large hollow-bearing trees or large stick nests. One mistletoe (*Amyema* sp.) was identified in a nearby Black Wattle, however, there are no other key food tree resources in the immediate area. Course wooden debris and rough bark Black Wattles can also be found on the northeast bank of the creek. The area exhibits complex strata for foraging, including small trees, debris, small shrubs and Broad-leaved Cumbungi which were observed to be used by a large multi-species winter flock of small birds.

The stockpile area is situated within a degraded roadside verge and had no observable habitat that would likely be utilised by native species.

Between the works area and the stockpile area 21 native birds, one native mammal and one native frog species were observed, noting that it was outside optimal survey time to observe many species by call and that there are likely many more common native species utilising the area. A complete list of species observed is provided in **Appendix A3.2.**

A2.5 AQUATIC BIODIVERSITY AND HABITAT

A diverse range of riparian vegetation within the Windellama Creek habitat includes Broad-leaved Cumbungi, Finger Rush, Tall Sedge, Thread Rush and Alpine Joint-Leaf Rush. Habitat observed includes emergent vegetation, semi-submerged rocks from eroded culvert road material and outside of the project area larger natural rock features can be seen submerged and along the banks of the creek.

Macroinvertebrate surveys in Windellama Creek found no evidence of Mosquito Fish. Macroinvertebrates observed were identified to their order level of identification, they included Shrimp (*Decapoda*), Side swimmers (*Amphipoda*) and Mayflys (*Ephemeroptera*), with specimens observed indicating a reasonably high quality of ecosystem health.

Incidental surveys of the site did not record any Mosquitofish (*Gambusia* sp.) while also observing a reasonably diverse assemblage of macroinvertebrates suggesting that the waterway is reasonably healthy and do not exclude the presence of several native aquatic and riparian species.

A2.6 THREATENED ECOLOGICAL COMMUNITIES (TEC)

A desktop search identified six threatened ecological communities (TECs) are known or predicted to occur within 10 km of the project area:

- Monaro Tableland Cool Temperate Grassy Woodland,
- Montane Peatlands and Swamps,
- Natural Temperate Grassland,
- Tableland Basalt Forest,
- Werriwa Tablelands Cool Temperate Grassy Woodland, and
- Box-Gum Woodland.

The results of the field survey indicate that the vegetation condition within the project area does not exhibit characteristics of any Commonwealth-listed or NSW-listed TEC community. Based on the NSW SVTM and identifiable trees (Blakely's Red Gum [*E. blakelyi*]) in the adjoining farmland, it is likely that the neighbouring PCT to the south of the stockpile area is PCT 3373 Goulburn Tableland Box-Gum Grassy Forest, which is associated with this TEC. Due to the low laying landscape position within the creek flat area and the proximity of PCT 3347 canopy species, it is most likely that the stockpile area is PCT 3347 as outlined in this report.

No TEC listed under the FM Act were observed to be or assessed as likely to be present within Windellama Creek.

For a detailed discussion on the likelihood of the presence of a TEC within the project area, please refer to **Appendix A5.1**.

A2.7 THREATENED POPULATIONS

No endangered populations, as distinct from communities, listed under the BC Act were identified within the project area or surrounds (10 km radius).

A2.8 THREATENED ENTITIES

Threatened Fauna

Two threatened fauna species were identified within the project area during the field inspection. Pink Robin and Scarlet Robin were both observed utilising riparian vegetation in and around the works area. A male Pink Robin was observed hopping between Broad-leaved Cumbungi reeds, while a male and female Scarlet Robin were observed bathing in Windellama Creek and perching in the Black Wattles surrounding the project area. Both threatened species were observed flying within a mixed winter flock of other small foraging birds.

Threatened Flora

Desktop research identified a total of 23 threatened flora species potentially occurring within 10 km of the project site. No threatened flora species were identified within the project area during the field inspection. Based on the site's available habitat, including that within the stockpile area, four threatened flora species were assessed to have a potential or higher likelihood of occurring within the project area (for details on each species, refer to **Appendix A5.2**).

Threatened Fauna

Desktop research identified a total of 57 threatened fauna species potentially occurring within 10 km of the project site. Based on the site's available habitat, including that within the stockpile areas, a total of 31 of the 57 potential threatened fauna species listed under Cwlth (EPBC Act), and NSW (BC Act) law were assessed to have a potential or higher likelihood of occurring within the project area (for details on each species, refer to **Appendix A5.3**).

Threatened Fish

No threatened fish species listed under the Commonwealth EPBC Act, NSW BC Act or FM Act were assessed as likely to occur within the project area (see **Appendix A5.3**).

A search of the EPBC PMST (10 km radius) identified Macquarie Perch (*Macquaria australasica*) as potentially occurring within the vicinity of the project area. There are no records within 10 km of the project area.

Threatened Frogs

A desktop research and habitat constraints identified Green and Golden Bell Frog and Yellow-spotted Tree Frog as potentially occurring within the vicinity of the project area. There is one known record of Green and Golden Bell Frog within 10 km of the project area, and no known records of Yellow-spotted Tree Frog within 10 km of the project area.

Although the project area has been modified, the site contains suitable habitat in the form of reeds, emergent vegetation and pooling water for both species. In the case of Green and Golden Bell Frog, which have been known to be found within disturbed environments that contain suitable vegetation in and around water, such as abandoned quarries, the site provide suitable habitat[63] (refer to **Appendix A5.3**).

Threatened Waterbirds

A total of eight waterbirds listed under the EPBC Act and NSW BC Act were assessed as likely to occur within the project area (refer to **Appendix A5.3**). The likelihood of potential impacts occurring to these waterbirds had a greater risk weighting due to the proximity of the project area to known quality habitat found at nearby inland lakes, The Morass and Lake Bathurst. The habitat present within the site would generally provide suitable foraging or transitory habitat for the species.

In addition, the listing of threatened species under the FM Act was reviewed. Based on known/predicted ranges of threatened aquatic species, and characteristics of the project area, no habitat for threatened species, populations or communities listed under the FM Act is considered likely to occur at the site.

[63] Best practice guidelines Green and Golden Bell Frog habitat. State of NSW and Department of Environment and Climate Change NSW. (2008).

FIGURE A 1: RIPARIAN HABITAT WEST OF CAUSEWAY WITHIN PROJECT AREA

A3 Species observed during field survey

A3.1 PLANT SPECIES OBSERVED

The following codes denote the status of a species:

N	Native
P	Protected species (not listed as a threatened species but subject to special protections)
T	Threatened species (may be Vulnerable, Endangered or Critically Endangered)
W	Weed of National Significance
H	High Threat Exotic (NSW)
X	Other exotic species

*Species incidentally found within the project area but not in BAM plots

TABLE A 4: FLORA SPECIES LIST FROM PROJECT AREA

Scientific name	Common name	Family	Status
Trees			
*Acacia decurrens**	Black Wattle	Fabaceae (Mimosoideae)	N
Shrubs			
*Cassinia arcuata**	Sifton Bush	Asteraceae	N
*Rosa rubiginosa**	Sweet Briar	Rosaceae	H
Grasses and Grasslike			
*Austrostipa bigeniculata**	Yanganbil	Poaceae	N
*Carex appressa**	Tall Sedge	Cyperaceae	N
Chloris truncata	Windmill Grass	Poaceae	N
Cynodon dactylon	Common Couch	Poaceae	N
Dactylis glomerata	Cocksfoot	Poaceae	X
*Dichelachne crinita**	Longhair Plumegrass	Poaceae	N
Digitaria sp.	A Finger Grass	Poaceae	N
Eleusine tristachya	Goose Grass	Poaceae	X
Elymus scaber	Common Wheatgrass	Poaceae	N
Eragrostis brownii	Brown's Lovegrass	Poaceae	N
Festuca sp.	A Festuce	Poaceae	X
*Juncus filicaulis**	Thread Rush	Juncaceae	N
*Juncus sandwithii**	Alpine Joint-Leaf Rush	Juncaceae	N
*Juncus subsecundus**	Finger Rush	Juncaceae	N
Microlaena stipoides	Weeping Grass	Poaceae	N
Nassella trichotoma	Serrated Tussock	Poaceae	W
Panicum effusum	Hairy Panic	Poaceae	N
*Paspalum dilatatum**	Paspalum	Poaceae	H
Phalaris aquatica	Phalaris	Poaceae	X
Rytidosperma spp.	A Wallaby Grass	Poaceae	N
Setaria sp.	A Foxtail Grass	Poaceae	X
Themeda triandra	Kangaroo Grass	Poaceae	N

Scientific name	Common name	Family	Status
*Typha orientalis**	Broad-leaved Cumbungi	Typhaceae	N
Forbs			
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	H
Arctotheca calendula	Capeweed	Asteraceae	X
Centaurium erythraea	Common Centaury	Gentianaceae	X
*Centella asiatica**	Indian Pennywort	Apiaceae	N
Chrysocephalum apiculatum	Common Everlasting	Asteraceae	N
Cirsium vulgare	Spear Thistle	Asteraceae	X
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	X
Dichondra repens	Kidney Weed	Convolvulaceae	N
Echium plantagineum	Patterson's Curse	Boraginaceae	X
Facelis retusa	Trampweed	Asteraceae	X
Gamochaeta purpurea	Purple Cudweed	Asteraceae	X
*Gonocarpus tetragynus**	Poverty Raspwort	Haloragaceae	N
*Haloragis heterophylla**	Variable Raspwort	Haloragaceae	N
Hypochaeris glabra	Smooth Catsear	Asteraceae	X
Hypochaeris radicata	Catsear	Asteraceae	X
Lactuca serriola	Prickly Lettuce	Asteraceae	X
Lysimachia arvensis	Scarlet Pimpernel	Myrsinaceae	X
Modiola caroliniana	Red-flowered Mallow	Malvaceae	X
Oxalis perennans	Wood Sorrel	Oxalidaceae	N
Paronychia brasiliana	Chilean Whitlow Wort, Brazilian Whitlow	Caryophyllaceae	X
Plantago coronopus	Buck's-horn Plaintain	Plantaginaceae	X
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	X
Romulea rosea	Onion Grass	Iridaceae	H
*Rumex brownii**	Swamp Dock	Polygonaceae	N
Sherardia arvensis	Field Madder	Rubiaceae	X
Tragopogon sp.	A Goatsbeard	Asteraceae	X
Trifolium arvense	Haresfoot Clover	Fabaceae (Faboideae)	X
Trifolium repens	White Clover	Fabaceae (Faboideae)	X
Trifolium subterraneum	Subterranean Clover	Fabaceae (Faboideae)	X
Veronica plebeia	Trailing Speedwell	Plantaginaceae	N
*Viola odorata**	Sweet Violet	Violaceae	X
Vittadinia muelleri	A Fuzzweed	Asteraceae	N
Others			
Amyema sp.*	Mistletoe	Loranthaceae	N
Rubus fruticosus sp. *agg.*	Blackberry complex	Rosaceae	W

A3.2 FAUNA SPECIES OBSERVED IN THE PROJECT AREA

The following codes denote the status of a species:

K	Species that is associated with a Key Threatening Process
P	Protected species (not listed as a threatened species but subject to special protections)
T	Threatened species (may be Vulnerable, Endangered or Critically Endangered)
X	Other exotic species

TABLE A 5: FAUNA SPECIES LIST FROM PROJECT AREA

Scientific name	Common name	Family	Status	Observation type
Birds				
Acanthiza nana	Yellow Thornbill	Acanthizidae	P	Visual
Acanthiza sp.	Unidentified Thornbill		P	Visual
Sericornis frontalis	White-browed Scrubwren		P	Aural
Dacelo novaeguineae	Laughing Kookaburra	Alcedinidae	P	Aural
Gymnorhina tibicen	Australian Magpie	Artamidae	P	Visual
Strepera graculina	Pied Currawong		P	Aural
Cacatua galerita	Sulphur-crested Cockatoo	Cacatuidae	P	Visual
Eolophus roseicapilla	Galah		P	Visual
Cormobates leucophaea	White-throated Treecreeper	Climacteridae	P	Aural
Corvus coronoides	Australian Raven	Corvidae	P	Aural
Malurus cyaneus	Superb Fairy-wren	Maluridae	P	Visual
Anthochaera carunculata	Red Wattlebird	Meliphagidae	P	Aural
Caligavis chrysops	Yellow-faced Honeyeater		P	Aural
Grallina cyanoleuca	Magpie-lark	Monarchidae	P	Aural
Colluricincla harmonica	Grey Shrike-thrush	Pachycephalidae	P	Visual
Petroica boodang	Scarlet Robin	Petroicidae	T	Visual
Petroica rodinogaster	Pink Robin		T	Visual
Platycercus elegans	Crimson Rosella	Psittaculidae	P	Visual
Platycercus eximius	Eastern Rosella		P	Visual
Rhipidura albiscapa	Grey Fantail	Rhipiduridae	P	Aural
Acridotheres tristis	Noisy Miner	Sturnidae	P	Aural
Mammals				
Vulpes vulpes	Red Fox	Canidae	K	Scat
Oryctolagus cuniculus	European Rabit	Leporidae	K	Diggings
Vomatus ursinus	Bare-nosed Womat	Vombatidae	P	Scat
Frogs				
Crinia signifera	Common Eastern Froglet	Myobatrachidae	P	Aural

A4 Systematic flora survey data

This appendix section summarises the results of systematic flora survey work across the project area.

A4.1 RAPID BAM ASSESSMENT

Rapid BAM assessments were utilised within the works area to understand composition and structure of the vegetation due to the limited area available for assessment.

Four rapid BAM assessments were completed which identified 43 species, comprising of 18 exotic species and 25 native species. The native composition of species observed include:

- Canopy:
  - Black Wattle.
- Midstory:
  - Sifton Bush.
- Ground layer:
  - Common Couch,
  - Weeping Grass,
  - Yanganbil,
  - Kangaroo Grass,
  - Broad-leaved Cumbungi,
  - Finger Rush,
  - Kidney Weed, and
  - Swamp Dock.

Weed species of concern observed during rapid BAMs include Sheep Sorrel, Sweet Briar, Paspalum, Blackberry complex and Serrated Tussock.

A4.2 BAM PLOT

As the proposed activity does not trigger the NSW Biodiversity Offsets Scheme, there was no formal requirement to set up and survey using BAM plots. However, one BAM plot was conducted across the project area for the purposes of calculating offsets (refer to **Table A 6**).

In the interests of calculating accurate PCTs and assuring Council of potential significant biodiversity values within the project area, one BAM plot was set up in the stockpile area. As part of this process:

- the attributes of the plot were surveyed in accordance with the NSW Government's BAM method;
- each plot was assigned a Plant Community Type (PCT) based on the native species present; and
- plot data was entered into the NSW Government's Biodiversity Offsets Calculator to enable calculation of vegetation integrity.

The plant community type (PCT) observed in BAM plot were as follows:

- PCT 3347: Southern Tableland Creekflat Ribbon Gum Forest

This PCT was chosen based on updated State Vegetation Type Map (SVTM) and PCT filtering within the BioNet PCT Filter Tool. The BioNet PCT Filter Tool and field validation allowed for confirmation of

predicted SVTM PCT 3347 through the alignment of observed floristic composition, landscape position and nearby canopy species.

TABLE A 6: DETAILS OF BAM_1 PLOT

	BAM_1 Plot
Date of survey	17 July 2024
Location	
Easting (UTM 55H)	756684.40
Northing (UTM 55H)	6121180.77
Aspect	276 W
BAM ATTRIBUTE - 10x40m plot	
Species richness (count)	
Native tree	0
Native shrub	0
Native forb	6
Native grass and grasslike species	10
Native fern	0
Other native vascular plant	0
Total native vascular plants	16
Cover abundance %	
Native tree	0
Native shrub	0
Native forb	1.2
Native grass and grasslike species	59.2
Native fern	0
Other native vascular plant	0
Total native vascular plants	60.4
High Threat Exotics	0
BAM ATTRIBUTES - 1x1m quadrats	
Litter cover %	
10m	5
30m	5
50m	5
70m	5
90m	5
Average	5
Bare ground cover (%)	
10m	0

30m	2
50m	4
70m	15
90m	50
Average	14.2
Cryptogam cover %	
10m	0
30m	0
50m	0
70m	0
90m	0
Average	0
Rock cover %	
10m	0
30m	0
50m	0
70m	0
90m	0
Average	0

FIGURE A 2: BAM_1 PHOTOS

100m transect line

Plot BAM_1-1 (10m)

Plot BAM_1-2 (30m)

Plot BAM_1-3 (50m)

Plot BAM_1-4 (70m)

Plot BAM_1-5 (90m)

FIGURE A 3: SOUTHERN TABLELAND CREEKFLAT RIBBON GUM FOREST (PCT 3347) WITHIN PROJECT AREA

Top: Black Wattle (*A. decurrens*) with high abundance of Kangaroo Grass to the southeast of the project area, Bottom: Black Wattle and mixture of native and exotic grasses to the east of the project area

A5 Likelihood of Occurrence assessment

Due to its small size, the proposed activities are unlikely to have a significant impact on wildlife habitat availability and connectivity, and hence the diversity and abundance of native plants and animals in the local area. The proposal's impacts will, however, vary from species to species because different species utilise different habitats and are vulnerable to different threats.

Threatened species that have specialised habitat requirements, may be less likely to find permanent suitable habitat within the site. Rather, they may utilise habitat in the project area opportunistically, or in transit.

The following analysis works through each threatened species listed as under the Commonwealth EPBC Act, NSW BC Act and/or the FM Act. For ease of reference, the following acronyms are used to indicate the status of a community or species according to each jurisdiction:

CE	Critically Endangered
E	Endangered
V	Vulnerable
M	Listed Migratory (EPBC Act only)
-	Not listed

The following analysis also incorporates data accessed (27 June 2024) from a variety of sources including:

- threatened community/species profiles published by the NSW Department of Climate Change, Energy, the Environment and Water,
- Atlas of Living Australia (ALA) records for the area within a 10 km buffer of the study area
- BioNet Atlas of NSW Wildlife records for the area within a 10 km buffer of the study area, and
- Reference sites:
    - eBird hotspots in; the Morass, Nadgigomar Nature Reserve--Sunset Mountain Section, Sunset Mountain Trail, and Windellama Hall and Showground.

The terms for likelihood of occurrence are defined below:

- Known = the species was or has been observed on the site.
- Likely = a medium to high probability that a species uses the site.
- Potential = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur.
- Unlikely = a very low to low probability that a species uses the site.
- No = only applicable to Threatened Ecological Communities.

A5.1 THREATENED ECOLOGICAL COMMUNITIES (TECS)

TABLE A 7: LIKELIHOOD OF OCCURRENCE OF THREATENED ECOLOGICAL COMMUNITIES

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and characteristics	Likelihood of Occurrence
Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion	Monaro Tableland Cool Temperate Grassy Woodland	CE	-	This TEC occurs between Captains Flat in the north and Bombala in the south, as far east as the crest of the Great Dividing Range and west towards Adaminaby. The TEC is characterised by a sparse to very sparse tree layer dominated by Snow Gum, either as a single species or in a mix with any of these species as co-dominants: • Blackwood, • Candlebark, • Black Sallee (*E. stellulata*), and • Ribbon Gum. The TEC is also characterised by a certain grass and forb species that tend to persist on sites even if the tree canopy is removed. Such derived native grassland may still be protected under relevant laws and can regenerate to woodland under the right conditions.	**No.** This community was not identified within the site during field survey. The site does not contain the characteristic grassy woodland and associated Snow Gum canopy component associated with this community.
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands, and Australian Alps bioregions	Montane Peatlands and Swamps	E	-	Found across a wide range of bioregions, the plant community is characterised by the peat accumulate on poorly drained flats in the headwaters of streams. It occurs on undulating tablelands and plateaux, above 400-500 m elevation, on generally basic volcanic or fine-gained sedimentary soils or occasionally granite. The assemblage comprises of sedges, grasses, forbs and shrubs and small trees may be present. It is the only wetland in which more than trace amounts of *Sphagnum* sp. may be present.	**No.** This community was not identified within the site during field survey. The site does not contain a peatland or swamp.
Natural Temperate Grassland of the South Eastern Highlands	Natural Temperate Grassland	-	CE	Confined to the Southern Tablelands, a region bounded by the ACT, Yass, Boorowa, the Abercrombie River, Goulburn, the Great Eastern Escarpment, the Victorian border, and the eastern boundary of Kosciusko National Park. It is a naturally treeless grassland community dominated by a range of perennial grass species and, in highly intact sites, containing a large range of herbaceous species in many plant families. Particular condition criteria must be met for an area of grassland to be considered natural temperate grassland.	**No.** This community was not identified within the site during field survey. The site does not contain highly intact perennial grassland characteristic associated with this community.
Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	Tableland Basalt Forest	E	-	This TEC is currently found in the Eastern Highlands and Southern and Central Tablelands. It occurs on loam or clay soils associated with basalt, but sometimes on other substrates that produce relatively fertile soils. It occurs at elevations of 600 – 900 m above sea level and is characterised by an open forest dominated by pure stands or varying combinations of the following eucalypt species:	**No.** This community was not identified within the site during field survey. The site does not contain characteristic of open

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and characteristics	Likelihood of Occurrence
				• Ribbon Gum, • Narrow-leaved Peppermint (*E. radiata*), • Mountain Gum or Broad-leaved Ribbon Gum (*E. dalrympleana* subsp. *dalrympleana*), and/or • Snow Gum.	forest associated with this community.
Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions	Werriwa Tablelands Cool Temperate Grassy Woodland	CE	-	This TEC occurs on the eastern slopes of the Great Dividing Range, between Golspie in the north and Majors Creek in the south and between Carwoola in the west and Marulan in the east. It is characterised by a sparse to very sparse tree layer dominated by Snow Gum, sometimes with Candlebark as a co-dominant. The TEC is also characterised by a certain grass and forb species that tend to persist on sites even if the tree canopy is removed. Such derived native grassland may still be protected under relevant legislation and can regenerate to woodland under the right conditions.	**No.** This community was not identified within the site during field survey. The site does not contain the characteristic grassy woodland associated with this community.
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	Box Gum Woodland	CE	CE	Found from the Queensland border in the north, to the Victorian border in the south. It occurs in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions. This TEC is characterised by the presence or prior occurrence of White Box (*E. albens*), Yellow Box (*E. melliodora*) and/or Blakely's Red Gum (*E. blakelyi*) and a generally grassy understory. Legal definitions of this TEC vary slightly by jurisdiction. The Commonwealth listing for this TEC is slightly different to the NSW listing, in that either the tree layer or the ground layer must be intact to quality for Commonwealth protection. Both definitions have been considered for the purposes of this report.	**Unlikely.** This community was identified as being associated with a PCT adjacent to the stockpile area. The present stockpile area could be characterised as a transitional area between lower laying areas, PCT 3347, into the PCT 3373 which is associated with this community. However, considering the low laying position of stockpile area it is most likely that the area is PCT 3347 and therefore not this TEC.
EEC count		**5**	**2**		

A5.2 THREATENED PLANT SPECIES

TABLE A 8: LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Bossiaea oligosperma	Few-seeded Bossiaea	V	V	**Yes (6)**	**Yes (52)**	Known from two disjunct areas - the lower Blue Mountains in the Warragamba area (Wollondilly, Allum, Tonalli River catchments) and the Windellama area in Goulburn Mulwaree Shire, where it is locally abundant. Occurs on stony slopes or ridges on sandstone in the Yerranderie area and in low woodland on loamy soil in the Windellama area.	**Unlikely**. Habitat within project area is sub-optimal habitat and landscape position, not consisting of stony slopes or ridges. Records within 10 km.
Calochilus pulchellus	Pretty Beard-orchid	E	E	No	No	Terrestrial orchid with a single upright sublinear leaf which sheaths the flowering stem. This species is endemic to NSW. It is known from the Sydney Basin Bioregion, where a total of less than 30 adult plants have been recorded in three sites over a 40 km range between altitudes 20 - 560 m above sea level.	**Unlikely**. Habitat within project area is degraded and sub-optimal. No records within 10 km.
Calotis glandulosa	Mauve Burr-daisy	V	V	No	No	Found on Monaro and Kosciuszko regions. There are three known sites in the upper Shoalhaven catchment, Kybeyan-Gourock, Monaro and Oberon. Occurs in subalpine grassland and montane or natural temperate grassland and Snow Gum Woodlands on the Monaro and Shoalhaven area. Appears common on roadside in colonises though it does not persist for long.	**Unlikely**. Habitat within project area is sub-optimal. No records within 10 km.
Commersonia prostrata	Dwarf Kerrawang	E	E	**Yes (8)**	**Yes (4)**	Known in the Southern Highlands and Southern Tablelands. Population was found near the Corang, at Rowes Lagoon, at Thirlmere Lakes, on the North Coast, and in Victoria. Occurs on sandy, sometimes peaty soils in a wide variety of habitat. Appears to respond positively to some forms of disturbance, however, there are conflicting reports about the species response to fire.	**Unlikely**. Habitat within project area is degraded and sub-optimal. Records within 10 km from suitable habitat found in The Morass lake and wetland.
Dillwynia glaucula	Michelago Parrot-pea	–	E	**Yes (14)**	**Yes (43)**	Occurs on exposed patches of clay or on rocky outcrops in eucalypt woodland often dominated by Scribbly Gum (*Eucalyptus rossii*), Snow Gum, Broad-leafed Peppermint (*E. dives*) and Red Stringybark (*E. macrorhyncha*). The understorey may be either grassy or shrubby.	**Potential**. Habitat within works area is sub-optimal, however, habitat within stockpile area potentially suited. Records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Dodonaea procumbens	Creeping Hop-bush	V	V	**Yes (2)**	**Yes (1)**	Found in the dry areas of the Monaro, between Michelago and Dalgety. One population was found at Lake Bathurst. Grows on sandy-clay soils, on or near vertically-tilted shale outcrops. Occurs in Natural Temperate Grassland or fringing eucalypt woodland of Snow Gum. Often occurs in disturbed or exposed locations such as roadsides or outcrops of rocks.	**Unlikely**. Habitat within project area is sub-optimal. Records within 10 km from Lake Bathurst.
Eucalyptus aggregata	Black Gum	V	V	No	No	Known to occur in the NSW Central and Southern Tablelands, with small, isolated populations occurring in ACT and VIC. Grows in the lowest parts of the landscape, on alluvial soils in poorly drained flats and hollows near creeks and small rivers.	**Potential**. Habitat within works area is suited, however, no evidence of eucalyptus canopy species in works area was observed during field surveys. No records within 10 km.
Eucalyptus recurva	Mongarlowe Mallee	CE	CE	**Yes (4)**	**Yes (7)**	Many-stemmed shrub (mallee) confined to the NSW Southern Tablelands where it is known from only four locations, one of which is near Windellama. The total known population of this species is thus only six individuals. Found in shallow soils on gentle slopes in low heathland and in some cases at the margins of the heathland and adjacent low woodland.	**Unlikely.** Highly geographically restricted species. Works area provides sub-optimal habitat and no eucalyptus species observed in field survey.
Haloragis exalata subsp. *exalata*	Wingless Raspwort	V	V	No	No	Shrub that reaches 1.5 m occurring in 4 widely scattered localities along coastal eastern NSW. Appears to require protected and shaded damp situations in riparian habitats.	**Unlikely**. Habitat within project area is sub-optimal. No records within 10 km.
Hibbertia acaulothrix	A Guinea Flower	E	–	No	No	Known from Wadbilliga National Park in the Southern Tablelands, through the Nattai-Wollondilly area in the southern Central Tablelands, to the Mt Baker and Mt Coricudgy (Wollemi) area in northern part of the Central Coast and Tablelands. Grows on sedimentary rocks in Silvertop Ash (*E. sieberi*) woodland or associated with Black She-oak (*Allocasuarina littoralis*), Red Bloodwood (*Corymbia gummifera*), Flaky-barked Tea-tree (*Leptospermum trinervium*).	**Unlikely**. Project area does not contain associated overstory species. Habitat within is sub-optimal. No records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Lepidium aschersonii	Spiny Peppercress	V	V	No	No	Occurs in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). Found on ridges of gilgai clays dominated by Brigalow, Belah, Buloke and Grey Box. In the south has been recorded growing in Bull Mallee. Found on ridges of gilgai clays dominated by Brigalow (*Acacia harpophylla*), Belah (*Casuarina cristata*), Buloke (*Allocasuarina luehmannii*) and Grey Box (*E. microcarpa*). The species grows in where vegetation structure varies open to dense with sparse grassy understory dominated by introduced plants and occasional heavy litter.	**Unlikely**. Project area does not contain associated overstory species. Habitat within is sub-optimal. No records within 10 km.
Lepidium hyssopifolium	Basalt Pepper-cress	E	E	No	No	Only known from three areas (Bathurst, Bungendore, and Crookwell) in NSW. Medium perennial forb recorded in a variety of native habitats as well as heavily modified, weed-infested areas such as roadsides, suggesting it may require disturbance to establish. Similar in appearance to other species of related exotic peppercress, easiest to identify when in flower (optimal survey months: October- December).	**Unlikely**. Habitat within project area is sub-optimal. No records within 10 km.
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	E	E	No	**Yes (23)**	Endemic to south-eastern Australia, where it is currently known from three geographically separate areas in Tasmania, Victoria and south-eastern NSW and ACT. In NSW it currently occurs on the Southern Tablelands adjacent areas in an area roughly bounded by Albury, Bega, and Goulburn, with a few scattered localities know from beyond this region. Small clump-forming forb that grows well in disturbed roadside verges. Occurs in a wide variety of grassland, woodland, and forest habitats, generally on relatively heavy soils. Can occur in modified habitats such as semi-urban areas and roadsides. It does not tolerate heavy competition.	**Potential.** Suitable habitat in the stockpile area. Several records within 10 km. Not observed during survey however and species is easily identifiable, even when not in flower.
Pelargonium sp. *Striatellum*	Omeo Stork's-bill	E	E	No	No	Known from only four locations within NSW, found on the lakebeds of the Monaro and one at lake Bathurst. Found in a narrow habitat usually just above the high-water level if ephemeral or irregularly inundated lakes, in transitional zones between the aquatic or wetland community and surrounding grasslands. A tufted perennial forb with leaves in a basal rosettes with an often extensive rhizome base which form colonies up to several metres wide.	**No.** Highly restricted by habitat suitability. Works area provides unsuitable habitat. No records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	**Yes (2)**	No	Known from the Nungatta area, northern Kosciuszko National Park, the Tantawangalo area in South-East Forests National Park and adjoining freehold land, Badgery's Lookout near Tallong, Bungonia State Conservation Area, the Yerranderie area, Kanangra-Boyd National Park, the Canyonleigh area and Ettrema Gorge in Morton National Park. Little known about its ecology, habitat recorded is predominantly forested with deep, friable soil, amongst rock beside a creek, on rocky slopes and in steep gullies between sandstone cliffs.	**Unlikely**. Habitat within project area is sub-optimal, with no rocky slopes and forests present. Records within 10 km from known population.
Pomaderris delicata	Delicate Pomaderris	CE	CE	**Yes (19)**	**Yes (44)**	Only known from two sites between Goulburn and Bungonia and south of Windellama (Cullula). Grows in dry open forest dominated by Silvertop Ash with a dense she-oak understory. Soils are shallow and derived from sandstone and siltstone.	**Unlikely.** Project area does not contain associated overstory species. Habitat within the project area is sub-optimal. No evidence of this species observed during field surveys. Records within 10 km from known population.
Pomaderris pallida	Pale Pomaderris	V	V	No	No	Has been recorded from near Kydra Trig, Tinderry Nature Reserve, the Queanbeyan River, the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park. Usually growing in shrub communities surrounded by Brittle Gum and Red Stringybark or *Callitris* spp. woodland.	**No.** Project area does not contain associated overstory species. Habitat is sub-optimal. No evidence of this species observed during field surveys. No records within 10 km.
Prasophyllum petilum	Tarengo Leek Orchid	E	E	No	No	Natural populations are known from a total of five sites in NSW: near Boorowa, Queanbeyan area, Ilford, Delegate, and a newly recognised population 10 km west of Muswellbrook. Grows in grassy woodland, highly susceptible to grazing and only known on little grazed sites. Not visible outside flowering period (October–December).	**No.** Project area is outside the known natural population sites. Habitat within the project area is unsuitable. No records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Pultenaea pedunculata	Matted Bush-pea	–	E	**Yes (10)**	**Yes (14)**	Occurs in a range of habitats. NSW populations are generally among woodland vegetation, but plants have also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area. Southern Tablelands populations are at 560-620m ASL and on friable loam soils underlain by Tertiary basalt and Quaternary sediments. While in creek lines and broad valleys, the soils are not usually waterlogged.	**Potential.** Habitat within project area is suitable for the species. No evidence of this species observed during field surveys. Records within 10 km.
Rhizanthella slateri	Eastern Underground Orchid	E	V	No	No	In NSW, currently known from near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Flowers from September to November. Little known about its habitat requirements as it almost grows below the soil surface and only found when the soil is disturbed.	**Unlikely**. Habitat within project area is degraded and sub-optimal. No records within 10 km.
Rutidosis leptorhynchoides	Button Wrinklewort	E	E	No	No	In the Canberra - Queanbeyan region Button Wrinklewort primarily occurs in the ecotone between the treeless Kangaroo Grass, Poa tussocks (*Poa* spp.), and Spear Grass (*Austrostipa* spp.) dominated grasslands and the open grassy Yellow Box - Blakely's Red Gum woodlands. Flowers between December and April. Grows on soils that are usually shallow, stony red-brown clay loams; tends to occupy areas where there is relatively less competition from herbaceous species.	**Unlikely**. Habitat within project area is degraded and sub-optimal. No records within 10 km.
Senecio macrocarpus	Large-fruit Groundsel	V	–	No	No	In NSW, one population has been discovered near Gundaroo. Occurs in partly cleared dry forests and Box Gum woodlands which transition to Brittle Gum Forest with a relatively undisturbed understory of native grasses, forbs, and subshrubs.	**Unlikely**. Habitat within project area is degraded and sub-optimal. No records within 10 km.
Thesium australe	Austral Toadflax	V	V	No	No	Found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Grows in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass.	**Unlikely.** Habitat within project area is degraded. No record within 10 km and no evidence of this species observed during field surveys.
	Species Count	**21**	**21**			**Total species: 23**	

A5.3 THREATENED ANIMAL SPECIES

TABLE A 9: LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Birds								
Anseranas semipalmata	Magpie Goose	–	V	**Yes (2)**	No	No	Common in the Australian northern. Increasing number of records in central and northern NSW since 1980s. Mainly found in wetlands less than 1 m deep with dense growth rushes or sedges. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands, and floodplains. Nests in trees over deep water. Breeding is strongly influenced by water level and unlikely in south-eastern NSW.	**Potential.** Suitable foraging habitat present within works area; however, the species is unlikely to breed within the area. Records within 10 km.
Anthochaera phrygia	Regent Honeyeater	CE	CE	No	No	No	Found in inland slopes of south-east Australia and drier coastal area. In NSW, the distribution is very patchy and mainly confined to the Capertee Valley and the Bundarra-Barraba region. Very distinctive woodlands specialist that inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak (*Casuarina cunninghamiana*). Displays preference for old growth sites with abundant mistletoe.	**Unlikely.** Very few suitable habitat features are present in or near project area i.e. flowering eucalypts or mistletoe as an available foraging resource. Suggests that project area does not provide ideal conditions for the species.
Aphelocephala leucopsis	Southern Whiteface	V	V	**Yes (22)**	**Yes (1)**	**Yes (2)**	Occurs across most of mainland Australia south of the tropics, from the northeastern edge of the Western Australian wheatbelt, east to the Great Dividing Range. Occurs in a wide range of open woodlands and shrublands where there is an understory of grasses or shrubs, or both. Almost exclusively forage and feeds on the ground.	**Likely**. Suitable foraging habitat present within project area It has been recorded multiple times within 10 km.
Arenaria interpres	Ruddy Turnstone	V (M)	–	No	No	No	During Australian summer, the species is widespread for its non-breading season. Found mostly in coastal regions, preferring rocky shores, beaches and occasionally recorded in inland populations.	**Unlikely.** Habitat within project area provides sub-optimal habitat. No records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Artamus cyanopterus cyanopterus	Dusky Woodswallow	–	V	**Yes (19)**	**Yes (1)**	**Yes (no count provided)**	Widespread in eastern, southern, and south western Australia. The species occurs throughout most of New South Wales. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understory of eucalypt saplings, acacias and other shrubs, and groundcover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	**Likely**. Suitable foraging habitat present within project area. Recorded within 10 km.
Botaurus poiciloptilus	Australasian Bittern	E	E	No	No	No	Widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Wetland specialist that favours permanent freshwater wetlands with tall, dense vegetation especially Bullrushes (*Typha* spp.) and Spike-rushes (*Eleocharis* spp.).	**Potential.** Suitable foraging habitat present within works area; however, the species is unlikely to breed within the area. No records within 10 km
Calidris acuminata	Sharp-tailed Sandpiper	V (M)	–	**Yes (14)**	No	**Yes (1)**	Spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh, or other low vegetation.	**Potential.** Some suitable foraging and transitory habitat present within works area. Records from nearby lakes.
Calidris canutus	Red Knot	V (M)	—	**Yes (1)**	No	No	Species typically inhabits intertidal mud and sandflats, sandy beaches of sheltered coasts, estuaries as well as a range of other aquatic and marine habitats. Species mostly has a coastal distribution within NSW but is at times recorded inland.	**Unlikely.** Limited suitable foraging habitat present within project area, as characterised by riparian habitat not mudflats. Records within 10 km from nearby lakes.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Calidris ferruginea	Curlew Sandpiper	CE (M)	E	**Yes (2)**	No	No	Annual migratory shorebird to and from Siberia. Recorded in all states in Australia during non-breeding seasons as well as breeding season when many one-year-old birds remain in Australia. Most often found around the coasts and widespread inland with small numbers. Mainly occur in littoral and estuarine habitats. Sometimes found in inland swamps and lakes during annual migration.	**Potential.** Some suitable foraging and transitory habitat present within works area. Records from nearby lakes.
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	**Yes (17)**	**Yes (2)**	No	Distinctive parrot found from southern Victoria through south- and central-eastern New South Wales. In Spring and summer, generally found in tall mountain forests and woodlands especially wet sclerophyll forests. In autumn and winter often moves to lower altitudes in drier and more open forests and woodlands. Prefers to roost in old growth forests and to nest in hollows with a 10+ cm diameter at least 9 m above ground level.	**Likely.** Utilisable transitory habitat within project area, no foraging or breeding habitat within works area. Records within 10 km.
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	**Yes (106)**	**Yes (4)**	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 She-oak occur. Black She-oak (*Allocasuarina littoralis*) and Forest She-oak (*A. torulosa*) are important foods.	**Likely.** Utilisable transitory habitat within project area, no foraging or breeding habitat within the project area. Records within 10 km.
Chthonicola sagittata	Speckled Warbler	–	V	**Yes (5)**	No	No	The species has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. Ground-dwelling bird living in a wide range of Eucalyptus dominated communities with a grassy understory, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth, and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees.	**Potential.** Utilisable foraging habitat within project area and records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Circus assimilis	Spotted Harrier	–	V	**Yes (5)**	No	**Yes (1)**	Occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment, and ranges. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland. Most commonly found in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree. Preys on terrestrial mammals (e.g. bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.	**Unlikely.** Project area is likely sub-optional habitat for species to forage and unsuited for breeding, species records are from nearby lakes.
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)	V	V	No	No	No	Endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. Mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understory, Hollows in standing dead or live trees and tree stumps are essential for nesting.	**Unlikely**. Habitat within project area is unsuited to species, not containing preferred canopy species, with no eucalypts within project area, and smooth barked species in surrounding landscape. No known records within 10 km.
Daphoenositta chrysoptera	Varied Sittella	–	V	**Yes (3)**	**Yes (1)**	No	Sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Acrobatic woodland specialist that lives in eucalypt forests and woodland, mallee, and Acacia woodland. Feeds on slaters and other arthropods extracted from crevices in bark and dead wood.	**Potential.** Works area has utilisable habitat for the species, and known records within 10 km.
Epthianura albifrons	White-fronted Chat	–	V	**Yes (21)**	**Yes (1)**	No	Found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 m above sea level. Usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	**Potential.** Project area has utilisable habitat for the species, and known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Falco hypoleucos	Grey Falcon	V	V	No	No	No	Medium-sized raptor 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. Sometimes found in open woodlands near the coast and near wetlands where surface water attracts prey.	**Unlikely.** Habitat within project area sub-optimal for the species. No known records.
Falco subniger	Black Falcon	—	V	**Yes (3)**	No	**Yes (1)**	Widely, but sparsely, distributed in New South Wales, mostly occurring in inland region. Habitat is usually in the arid and semi-arid zones. Inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses, and agricultural land with scattered remnant trees. It hunts over open wooded grasslands, saltbush plains, bluebush plains and other low vegetation.	**Potential.** Project area has utilisable foraging habitat for the species, and known records within 10 km
Gallinago hardwickii	Latham's Snipe	V (M)	—	**Yes (2)**	No	**Yes (no count provided)**	Non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia. Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level, usually inhabiting open, freshwater wetlands with low, dense vegetation. However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	**Potential.** Some suitable foraging and transitory habitat present within works area. Records from nearby lakes.
Grantiella picta	Painted Honeyeater	V	V	No	No	No	Occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria, and southern Queensland. Distinctive nomadic species that is a specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias especially *Amyema* sp.	**Unlikely**. Habitat within project area has very limited important feeding species. No records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Haliaeetus leucogaster	White-bellied Sea-Eagle	—	V	**Yes (8)**	No	**Yes (1)**	Large eagle distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest).	**Unlikely.** Project area is likely sub-optional habitat for species to forage and unsuited for breeding, species records are from nearby lakes.
Hieraaetus morphnoides	Little Eagle	—	V	**Yes (5)**	No	No	Found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland, or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	**Potential.** Utilisable foraging habitat within project area, however no suitable breeding habitat. Records within 10 km.
Hirundapus caudacutus	White-throated Needletail	V (M)	V	**Yes (4)**	**Yes (2)**	No	Widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. Almost exclusively aerial species that forages for insects up to 1 km above ground, usually in large flocks. Only occurs in Australia between late spring and early autumn, breeds in north Asia.	**Likely.** Species may forage above project area with multiple known records within 10 km.
Lathamus discolor	Swift Parrot	CE	E	No	No	No	Distinctive parrot that breeds in Tasmania during spring and summer and migrates to the mainland for autumn and winter, where they are found in areas with eucalypts that flower profusely in winter or that have abundant lerp (sap-sucking bugs) infestations. Some favourite flowering trees include but not limited to Swamp Mahogany (*E. robusta*,), and Spotted Gum (*Corymbia maculata)*, Red Bloodwood (*C. gummifera*).	**Unlikely** Habitat within project area does not provide foraging opportunities, may only provide transitory habitat. No records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Melanodryas cucullata cucullata	South-eastern Hooded Robin	E	E	**Yes (2)**	No	No	Widespread, found across Australia, except for the driest deserts and the wetter coastal areas. Prefers 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.	**Potential.** Works area has utilisable habitat for the species, and known records within 10 km.
Neophema chrysostoma	Blue-winged Parrot	V	V	No	No	No	Inhabits a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. Tends to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones. Species breeds south of the Great Dividing Range, through southern Victoria and South Australia, and in parts of Tasmania. Partially migratory as variable numbers of individuals migrate across the Bass Strait during winter.	**Unlikely.** Habitat within project area provides sub-optimal habitat for species. No records within 10 km.
Neophema pulchella	Turquoise Parrot	—	V	**Yes (1)**	No	No	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges, and creeks in farmland. Nests in tree hollows, logs, or posts, from August to December.	**Unlikely.** Habitat within project area provides sub-optimal habitat. One records within 10 km.
Ninox strenua	Powerful Owl	—	V	No	No	No	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. Roosts by day in dense vegetation.	**Potential.** Utilisable foraging habitat within project area, however no suitable breeding habitat. No records within 10 km.
Oxyura australis	Blue-billed Duck	—	V	**Yes (15)**	No	**Yes (2)**	Endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover.	**Potential.** Utilisable transitory and foraging habitat within works area. Known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Petroica boodang	Scarlet Robin	—	V	**Yes (10)**	**Yes (4)**	**Yes (1)**	Found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. A season altitudinal migrant, breeding in high altitude forests in the spring and summer and migrating to lower open woodlands for autumn and winter. Prefers sites with abundant logs and fallen timber, though sometimes found in grazed paddocks with scattered trees.	**Present.** Male and female of the species observed in field survey utilising works area and surrounds.
Petroica phoenicea	Flame Robin	—	V	**Yes (13)**	No	**Yes (1)**	Endemic to south eastern Australia, and ranges from near the Queensland border to south east South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. Species is generally seasonally migratory between their more alpine and subalpine ranges. Breeds in upland tall moist eucalypt forests during spring and summer and moving to open grasslands and open woodlands in the autumn and winter. The species forages for insects from perched positions from course woody debris, logs or other favoured perches.	**Likely.** Utilisable habitat within project area and multiple known records within 10 km.
Petroica rodinogaster	Pink Robin	—	V	No	No	No	Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. The nest is a deep, spherical cup made of green moss bound with cobweb and adorned with camouflaging lichen, and is lined with fur and plant down. It is situated in an upright or oblique fork, from 30cm to 6m above the ground, in deep undergrowth. Can be a resident, migratory or exhibit dispersive behaviour, moving north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW.	**Present.** Male of the species observed in field survey utilising works area and surrounds.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Polytelis swainsonii	Superb Parrot	V	V	No	No	No	Found throughout eastern inland NSW. Inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. They nest in the hollows of large trees (dead or alive). May forage up to 10 km from nesting sites, primarily in grassy box woodland.	**Unlikely.** Small amount of utilisable transitory habitat within project area, however, minimal foraging and no suitable breeding habitat for the species. On the edges of the species' distribution and no record within 10 km.
Pycnoptilus floccosus	Pilotbird	V	—	No	No	No	Widely distributed throughout the south-eastern region of Australia. Ground foraging species that occupies a variety of different habitats. Strictly terrestrial species, living on the ground in dense forests with heavy undergrowth. Habitat critical to their survival includes wet sclerophyll forests in temperate zones in moist gullies with dense undergrowth, and dry sclerophyll forests and woodlands occupying dry slopes and ridges.	**Unlikely.** Habitat within project area is degraded and sub-optimal. No records within 10 km.
Rostratula australis	Australian Painted Snipe	E	E	No	No	No	In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. A small freshwater wader. Prefers fringes of swamps, dams, and nearby marshy areas where there is a cover of grasses, lignum, low scrub, or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks, or reeds.	**Potential.** Suitable foraging habitat present within works area; however, the species is unlikely to breed within the area. No records within 10 km.
Stagonopleura guttata	Diamond Firetail	V	V	**Yes (19)**	**Yes (1)**	**Yes (3)**	Endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Distinctive ground-feeding bird found in grasslands and grassy eucalyptus woodlands, riparian areas, and sometimes lightly wooded farmland. Has been recorded in some towns and near farmhouses.	**Likely.** Utilisable habitat within project area and many known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Stictonetta naevosa	Freckled Duck	—	V	**Yes (36)**	No	**Yes (1)**	Primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. Prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move to lakes, reservoirs, farm dams and sewage ponds. Generally, rest in dense cover during the day, usually in deep water. Nests are usually located in dense vegetation at or near water level.	**Potential.** Utilisable transitory and foraging habitat within works area. Known records within 10 km.
Tringa nebularia	Common Greenshank	E (M)	—	**Yes (4)**	No	**Yes (1)**	This species occurs across most of coastal NSW. It is also widespread west of the Great Dividing Range, particularly between the Murray and Lachlan Rivers and the Darling River drainage basin, as well as the Macquarie Marshes.	**Potential.** Utilisable transitory and foraging habitat within works area. Known records within 10 km from nearby lakes.
Fish								
Macquaria australasica	Macquarie Perch	E	E (FM Act)	No	No	n/a	Found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury/Nepean and Shoalhaven catchments. Occurs in waters with lots of cover such as aquatic vegetation, snags, boulders, and overhanging banks.	**Unlikely.** Not a watercourse that is part of the known indicative distribution of the species in NSW, furthermore no known records within 10 km.
Frogs								
Litoria aurea	Green and Golden Bell Frog	V	E	No	**Yes (1)**	n/a	Since 1990 the species has only been recorded at an approximate 50 locations in NSW, most of which are small, coastal, or near coastal populations. Only a single population is known to exist in the NSW Southern Tablelands. Found in marshes, dams, and stream-sides, particularly those containing bullrushes or spike-rushes. A relatively large species that can reach 100 mm in length and usually vividly pea coloured, splotched with a near metallic brown or golden. However, colouration is variable in the species.	**Potential.** Utilisable habitat within works area. One known record within 10 km from Lake Bathurst.
Litoria castanea	Yellow-spotted Tree Frog	CE	CE	No	No	n/a	Long-lived and mostly aquatic tree frogs. Require large permanent ponds or slow flowing 'chain-of-ponds' streams with abundant emergent vegetation such as bulrushes and aquatic vegetation.	**Potential.** Utilisable habitat within works area. No known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Mammals—bats								
Chalinolobus dwyeri	Large-eared Pied Bat	E	V	No	No	n/a	Small-medium bat mainly found in well-timbered areas with extensive cliffs and caves from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. Breeds in breeds in sandstone caves/overhangs and will return to same nursery sites over many years.	**No**. Habitat within project area and its vicinity is unsuitable. No known records within 10 km.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	—	V	**Yes (1)**	**Yes (1)**	n/a	Found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally, roosts in eucalypt hollows but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils, and other flying insects above or just below the tree canopy.	**Potential.** Utilisable foraging habitat within project area and known records within 10 km.
Miniopterus orianae oceanensis	Large Bent-winged Bat	—	V	No	No	n/a	Occurs along the east and north-west coasts of Australia. Prefers to roost in caves but may also use derelict mines, storm-water tunnels, and similar man-made structures. Breeding or roosting colonies can number from 100 to 150,000 individuals. Nearby maternity located in Drum Cave in Bungonia State Recreation Area is approximately 30 km to the north-east of the project area.	**Potential.** Utilisable foraging habitat within project area and nearby (30 km) maternity roost.
Myotis macropus	Southern Myotis	—	V	**Yes (1)**	**Yes (1)**	n/a	Fishing bat mainly found on the coast from the north-west of Australia, across the top-end and south to western Victoria. Rarely found more than 100 km inland, except along major rivers. Roosts in groups of 10-15 close to water in caves, mine shafts, hollow-bearing trees, storm-water tunnels, bridges, and dense foliage.	**Potential.** Small amount of utilisable foraging habitat within works area; one record within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	**Yes (1)**	No	n/a	Largest bat in Australia, generally found within 200 km of the east coast. Roosts communally in large camps often located in a gully close to water under dense canopy cover. May travel 20–50 km when foraging for foods, with a home range is ~785,000 ha. Favourite food plants include flowering native trees (Eucalyptus, Melaleuca and Banksia), fruiting rainforest trees and vines, urban gardens, and cultivated fruit crops.	**Unlikely.** Limited utilisable foraging habitat within project area, may be utilised in transitory nature. One record within 10 km.
Mammals—other								
Dasyurus maculatus	Spotted-tail Quoll	E	V	**Yes (1)**	**Yes (1)**	n/a	Found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. Mostly nocturnal predator that forages across a range of habitat types, including rainforest, open forest, woodland, coastal heath, and inland riparian forest, from the sub-alpine zone to the coastline. Lives in hollow-bearing trees, fallen logs, other animal burrows, caves, and rocky outcrops. Often hunts densely vegetated creek lines but may also consume carrion.	**Potential.** Key habitat features for habitation not present within project area, area may be utilised for foraging, or in transitory nature. One record within 10 km.
Dasyurus viverrinus	Eastern Quoll	E	E	No	No	n/a	The mainland population of this species, previously believed to have disappeared from NSW by the 1990s, shows genetic signs of persistence. Credible reports suggest a potential small population still exists across its former range, offering hope for conservation efforts. Displays adaptable habitat preferences, inhabiting diverse environments including dry sclerophyll forests, scrublands, heathlands, pastures, and cultivated areas. Roosts in burrows, hollow logs, rock formations, and even man-made structures.	**Unlikely.** Key habitat features for habitation not present within project area, area may be utilised for foraging, or in transitory nature. No records within 10 km.
Petauroides volans	Greater Glider	E	E	No	No	n/a	Largest glider in Australia. Prefers old growth forests with many hollows and may den in up to 18 hollows across their home range, which averages just 1–3 ha. Favourite foods including leaves from the Ribbon Gum, Mountain Gum and Narrow-leaved Peppermint as well as mistletoe, *Acacia* foliage and young pinecones (*Pinus radiata*).	**No.** Habitat within project area unsuited for the species. No records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Petaurus australis	Yellow-bellied Glider	V	V	No	No	n/a	Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.	**No.** Habitat within project area unsuited for the species. No records within 10 km.
Petaurus norfolcensis	Squirrel Glider	—	V	No	No	n/a	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 midstory. Requires abundant tree hollows for refuge and nest sites.	**No.** Habitat within project area unsuited for the species. No records within 10 km.
Phascolarctos cinereus	Koala	E	E	**Yes (9)**	**Yes (7)**	n/a	Fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. Iconic tree-dweller that inhabits eucalypt woodlands and forests, feeding on the foliage of 70+ Eucalyptus species and 30+ other species.	**Unlikely.** This species may utilise the project area in transit between areas of suitable habitat in the surrounding landscape. However habitat within project area is unsuited for the species as there is no eucalypt canopy present let alone key feed or use trees.
Reptiles								
Aprasia parapulchella	Pink-tailed Worm-lizard	V	V	No	No	n/a	Primarily known from the Central and Southern Tablelands and the South Western Slopes, with a confirmed outlier record on the Hay Plains north of Hay. Species inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks.	**Unlikely.** Habitat within project area is sub-optimal or degraded. No known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Delma impar	Striped Legless Lizard	V	V	No	No	n/a	Occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Mainly found in and around Natural Temperate Grassland but has also been captured in grasslands with a high exotic component and in open Box-Gum Woodland.	**Unlikely.** Habitat within project area is sub-optimal or degraded. No known records within 10 km.
Varanus rosenbergi	Rosenberg's Goanna	—	V	No	No	n/a	Occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. Found in heath, open forest, and woodland. Associated with termites, shelters in hollow logs, rock crevices and in burrows.	**Unlikely.** This species may utilise the project area in transit between areas of suitable habitat in the surrounding landscape. However habitat within project area is unsuited for the species it is sub-optimal or degraded with no key habitat features for the species present. No known records within 10 km.
Invertebrates								
Keyacris scurra	Key's Matchstick Grasshopper	E	E	**Yes (2)**	**Yes (2)**	n/a	Usually found in native grasslands but it has also been recorded in other vegetation associations containing a native grass understory. Associated with Kangaroo Grass and known to feed on Asteraceae species. Disturbance appears to be an important determinant of site occupancy and it appears to be absent from sites that are disturbed during inappropriate times of the year (and interrupt the short non-overlapping lifecycle) or have been subjected to erratic management (e.g. periods of over and under grazing).	**Unlikely.** Habitat within works area is sub-optimal and within stockpile area is degraded. No known records within 10 km.
Synemon plana	Golden Sun Moth	V	V	No	No	n/a	NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. Medium-sized day-flying moth that requires native grassland dominated by Kangaroo Grass, Wallaby Grass and (exotic) Chilean Needle Grass. Spends much of its lifecycle underground and adult females are flightless.	**Unlikely.** Habitat within works area is sub-optimal and within stockpile area is degraded. No known records within 10 km.
	Species count	36	51				57 species across all jurisdictions	

A5.4 THREATENED POPULATIONS

Threatened populations are geographically defined groups of native plants and animals likely to become extinct in NSW in the near future. A population is a group of organisms of the same species occupying a particular area. A search of the BioNet Atlas of NSW Wildlife found no threatened populations exist or may exist within 10 km of the project area.

A5.5 MIGRATORY SPECIES

TABLE A 10: LIKELIHOOD OF OCCURRENCE OF LISTED MIGRATORY SPECIES

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Marine birds								
Apus pacificus	Fork-tailed Swift	(M)	—	No	No	No	Non-breeding visitor to all states and territories of Australia. Recorded in all regions of NSW, with many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. Almost exclusively aerial and feeds on insects in mid-air, only landing occasionally where it nests on mountain cliffs and cliff faces.	**Unlikely.** Habitat within project area is degraded and sub-optimal. No known records within 10 km.
Terrestrial birds								
Hirundapus caudacutus	White-throated Needletail	V (M)	V	**Yes (4)**	**Yes (2)**	No	Widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. Almost exclusively aerial species that forages for insects up to 1 km above ground, usually in large flocks. Only occurs in Australia between late spring and early autumn, breeds in north Asia.	**Likely.** Species may forage above project area with multiple known records within 10 km.
Monarcha melanopsis	Black-faced Monarch	(M)	—	No	No	No	Widespread in eastern Australia. In New South Wales and the Australian Capital Territory, the species occurs around the eastern slopes and tablelands of the Great Divide, inland to Wombeyan Caves and Canberra. Mainly occurring in rainforest ecosystems, also sometimes found in nearby open eucalypt forests (mainly wet sclerophyll forests), especially in gullies with a dense, shrubby understory as well as in dry sclerophyll forests and woodlands, often with a patchy understory.	**Potential.** Some suitable foraging and transitory habitat present within works area. No records within 10 km.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Motacilla flava	Yellow Wagtail	(M)	—	No	No	No	Has an extremely large range, extending from Europe, east through Siberia to west Asia and northwestern China; and south through the Arabian Peninsula to Egypt. Important habitat is mostly well watered open grasslands and the fringes of wetlands. Roosts in mangroves and other dense vegetation.	**No**. Habitat within project area and vicinity is unsuitable. No known records within 10 km.
Myiagra cyanoleuca	Satin Flycatcher	(M)	—	No	No	No	Widespread in eastern Australia and vagrant to New Zealand. In NSW, they are widespread on and east of the Great Divide and sparsely scattered on the western slopes. Inhabits heavily vegetated gullies in eucalypt forests near water and may forage through a diverse range of ecosystems nearby.	**Potential.** Works area provides small amount of habitat, Although no known records within 10 km.
Rhipidura rufifrons	Rufous Fantail	(M)	–	No	No	No	Occurs in coastal and near coastal districts of northern and eastern Australia. Mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*E. microcorys*), Mountain Grey Gum (*E. cypellocarpa*), Narrow-leaved Peppermint, Mountain Ash (*E. regnans*), Alpine Ash, Blackbutt (*E. pilularis*) or Red Mahogany (*E. resinifera*); usually with a dense shrubby understory often including ferns.	**Potential.** Some suitable foraging and transitory habitat present within works area. No records within 10 km.
Wetlands birds								
Actitis hypoleucos	Common Sandpiper	(M)	—	No	No	No	Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. Utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats.	**Unlikely.** Limited suitable foraging habitat present within project area, as works area characterised by riparian habitat. No records within 10 km.
Arenaria interpres	Ruddy Turnstone	V (M)	—	No	No	No	During Australian summer, the species is widespread for its non-breading season. Found mostly in coastal regions, preferring rocky shores, beaches and occasionally recorded in inland populations.	**Unlikely.** Habitat within project area provide sub-optimal habitat. No records within 10 km.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Calidris acuminata	Sharp-tailed Sandpiper	V (M)	–	**Yes (14)**	No	**Yes (1)**	Spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh, or other low vegetation.	**Potential.** Some suitable foraging and transitory habitat present within works area. Records from nearby lakes.
Calidris canutus	Red Knot	V (M)	—	**Yes (1)**	No	No	Species typically inhabits intertidal mud and sandflats, sandy beaches of sheltered coasts, estuaries as well as a range of other aquatic and marine habitats. Species mostly has a coastal distribution within NSW but is at times recorded inland.	**Unlikely.** Limited suitable foraging habitat present within project area, as characterised by riparian habitat not mudflats. Records within 10 km from nearby lakes.
Calidris ferruginea	Curlew Sandpiper	CE (M)	E	**Yes (2)**	No	No	Annual migratory shorebird to and from Siberia. Recorded in all states in Australia during non-breeding seasons as well as breeding season when many one-year-old birds remain in Australia. Most often found around the coasts and widespread inland with small numbers. Mainly occur in littoral and estuarine habitats. Sometimes found in inland swamps and lakes during annual migration.	**Potential.** Some suitable foraging and transitory habitat present within works area. Records from nearby lakes.
Calidris melanotos	Pectoral Sandpiper	(M)	—	No	No	No	Widespread, but scattered in NSW with records existing east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. Prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains, and artificial wetlands.	**Potential.** Some suitable foraging and transitory habitat present within works area. No records within 10 km.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Calidris ruficollis	Red-necked Stint	(M)	—	**Yes (5)**	No	**Yes (1)**	Annual migratory bird from Siberia arriving in Australian from August for non-breeding summer, the species can be found in south-east Australia in October. Mosly found in coastal areas, including estuaries and mudflats, but also can occasionally be found in inland in freshwater lagoons, swamps, lakes or even flooded paddocks.	**Potential.** Some suitable foraging and transitory habitat present within works area. One record within 10 km.
Charadrius bicinctus	Double-banded Plover	(M)	—	**Yes (8)**	No	**Yes (8)**	Breeding occurs in New Zealand, in non-breeding season part of the population migrates to Australia and part remains. The species is found on a variety of littoral, estuarine, fresh or saline ecosystems. Outside of breeding season it commonly roosts in flocks.	**Potential.** Some suitable foraging and transitory habitat present within works area. Records within 10 km at nearby lake.
Gallinago hardwickii	Latham's Snipe	V (M)	—	**Yes (2)**	No	**Yes (no count provided)**	Non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia. Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level, usually inhabiting open, freshwater wetlands with low, dense vegetation. However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	**Potential.** Some suitable foraging and transitory habitat present within works area. Records from nearby lakes.
Numenius minutus	Little Curlew	(M)	—	No	No	No	This species has a mostly coastal distribution within NSW. Most records have been recorded from between Casino in the north and Greenwell Point in the south. Scattered records also occur west of the Great Dividing Range. Most often occupies grassy habitats such as grassland and sedgeland, floodplains, mud and sandflats, open woodland and a range of aquatic habitats.	**Potential.** Some suitable foraging and transitory habitat present within works area. No records within 10 km.
Pluvialis fulva	Pacific Golden Plover	(M)	—	No	No	No	Breeding mostly in northern Siberia, this species migrates to Australia, Asia, Melanesia and Polynesia for its non-breeding season. In Australia it inhabits diverse coastal habitats or occasionally inland wetlands. The species preferably forages on sandy or muddy shores but can be seen to forage on rocky shores.	**Unlikely.** Limited suitable foraging habitat present within project area, as characterised by riparian habitat not mudflats. No known records 10 km.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Tringa nebularia	Common Greenshank	E (M)	—	**Yes (4)**	No	**Yes (1)**	This species occurs across most of coastal NSW. It is also widespread west of the Great Dividing Range, particularly between the Murray and Lachlan Rivers and the Darling River drainage basin, as well as the Macquarie Marshes.	**Potential.** Utilisable transitory and foraging habitat within works area. Known records within 10 km from nearby lakes.
Tringa stagnatilis	March Sandpiper, Little Greenshank	(M)	—	No	No	No	A migratory bird breeding in east Europe, southern Siberia and northern China which migrates to Africa southern Asia and Australia for its non-breeding season. Lives on permanent or ephemeral wetlands of varying salinity foraging in shallow water at the edge/ they probe wet mud of mudflats or feed among marshy vegetation.	**Unlikely.** Limited suitable foraging habitat present within project area as characterised by riparian habitat not mudflats. No known records 10 km.
	Species count:	**19**	**2**					

A5.6 PEST SPECIES ASSOCIATED WITH KEY THREATENING PROCESSES (KTPS)

TABLE A 11: LIKELIHOOD OF OCCURRENCE OF KEY PEST SPECIES

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Comment about species preferences and habitat in the project area	Likelihood of Occurrence
Birds								
Acridotheres tristis	Common Myna	Yes	—	**Yes**	No	No	Typically found in open woodland, cultivation, and around human habitation.	**Likely–** Species has been recorded within 10 km and potential habitat is present throughout the study area.
Alauda arvensis	Skylark	Yes	—	**Yes**	**Yes**	No	Found in cultivated grasslands and crops, wastelands, and coastal dunes.	**Likely–** Species has been recorded within 10 km and potential habitat is present throughout the study area.
Anas platyrhynchos	Mallard	Yes	—	No	No	No	Prefers still, shallow water with abundant plant life and is most often found on artificial lakes, ponds, and wetlands in urban and farm areas.	**Potential –** Potential habitat within the study area, however species has not been recorded within 10 km.
Carduelis carduelis	European Goldfinch	Yes	—	**Yes**	No	**Yes**	Fairly common to common in open woodland, parks, gardens, and farmland and open country with hedges and weedy patches; often feeds on seeding thistles.	**Potential –** Species has been recorded within 10 km and potential habitat is present throughout the study area.
Columba livia	Rock Dove	Yes	—	No	No	No	Common in most built-up areas.	**Unlikely –** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Comment about species preferences and habitat in the project area	Likelihood of Occurrence
Passer domesticus	House Sparrow	Yes	—	**Yes**	No	**Yes**	Occurs in and around human habitation, as well as cultivated areas and some wooded country.	**Likely –** Species has been recorded within 10 km and potential habitat is present throughout the study area.
Passer montanus	Eurasian Tree Sparrow	Yes	—	No	No	No	Relative to the House Sparrow, although typically found in small flocks, often in more natural areas than House Sparrow.	**Potential –** Potential habitat within the study area, however species has not been recorded within 10 km.
Pycnonotus jocosus	Red-whiskered Bulbul	Yes	—	No	No	No	Occurs mainly in built-up areas, inhabiting parks, gardens, and streetscapes, though they are occasionally recorded in orchards. They especially favour areas infested with weeds, especially lantana, privet, and blackberry.	**Unlikely –** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.
Streptopelia chinensis	Spotted Turtledove	Yes	—	No	No	No	Common around human habitation and can easily be seen in parks, gardens, and agricultural areas.	**Unlikely –** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.
Sturnus vulgaris	Common Starling	Yes	—	**Yes**	**Yes**	**Yes**	Short-grassed habitats are favoured foraging habitats, and they may feed in association with livestock.	**Likely –** Species has been recorded within 10 km and potential habitat is present throughout the study area.
Turdus merula	Common Blackbird	Yes	—	**Yes**	No	No	Most often found in urban areas and surrounding localities but has successfully moved into bushland habitats.	**Likely –** Species has been recorded within 10 km and potential habitat is present throughout the study area.
Mammals								

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Comment about species preferences and habitat in the project area	Likelihood of Occurrence
Canis lupus	Wild dog	—	Yes	**Yes**	**Yes**	n/a	Found across NSW but most common in the eastern ranges, the coastal hinterland, and tablelands. Prefers areas where human disturbance is limited and where shelter, food and water are abundant.	**Potential –** Species has been recorded within 10 km and potential habitat is present in the study area.
Capra hircus	Goat	Yes	Yes	**Yes**	No	n/a	Found in many areas of NSW. They have benefited from sheep grazing practices and the provision of artificial water points throughout the dryer regions of NSW.	**Potential –** Species has been recorded within 10 km and potential habitat is present in the study area.
Felis catus	Cat	Yes	Yes	**Yes**	No	n/a	Found all over Australia in all habitats, including forests, woodlands, grasslands, wetlands, and arid areas.	**Likely –** Species has been recorded within 10 km and potential habitat is present throughout the study area.
Lepus capensis	Hare	Yes	—	No	No	n/a	Preferred habitat is open country with the presence of tussock or rocks to hide amongst.	**Unlikely –** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.
Mus musculus	House mouse	Yes	—	No	No	n/a	Associated with human habituation, nest behind rafters, in woodpiles, storage areas, or any hidden spot near a source of food.	**Likely –** No known records within 10 km; however, potential habitat is present in the study area.
Oryctolagus cuniculus	Rabbit	Yes	Yes	**Yes**	**Yes**	n/a	Densities are greatest around non-arable rough country. This includes creeks, riverbanks, erosion gullies and rocky outcrops.	**Known –** This species was confirmed during surveys and confirmed present.
Rattus rattus	Black Rat	Yes	—	**Yes**	No	n/a	Very closely associated with humans and common in urban areas.	**Likely –** Species has been recorded within 10 km and potential habitat is present throughout the study area.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Comment about species preferences and habitat in the project area	Likelihood of Occurrence
Sus scrofa	Feral Pig	Yes	Yes	**Yes**	No	n/a	Need moist areas providing adequate food and water and enough shelter to protect against extremes of temperature.	**Likely –** Species has been recorded within 10 km and potential habitat is present throughout the study area.
Vulpes vulpes	Fox	Yes	Yes	**Yes**	**Yes**	n/a	Common in fragmented landscapes and areas with shelter, food, and den sites. Highest densities include temperate grazing lands and peri-urban/urban areas where food is abundant.	**Known –** This species was confirmed during surveys and confirmed present.
various species	Deer	Yes	Yes	**Yes**	**Yes**	n/a	Live predominantly in grassy forests. They occupy rainforests, eucalypt forests and farmlands. Preferred food is grass, though they also eat the leaves of shrubs, trees and herbs, bark, and some fruit.	**Likely –** Species has been recorded within 10 km and potential habitat is present throughout the study area.
	Species count	**21**	**7**				**21 species total**	

A5.7 WEED SPECIES

This list incorporates Commonwealth recognised Weeds of National Significance (WoNS) and South East Regional Priority Weeds (RPW)[64].

TABLE A 12: LIKELIHOOD OF OCCURRENCE OF KEY WEED SPECIES

Scientific name	Common name	Cwlth EPBC Act	RPW	ALA records within 10 km	BioNet records within 10km	Comment about species preferences and habitat in the project area	Likelihood of Occurrence
Asparagus asparagoides	Bridal Creeper	WONS	No	No	No	As well as a wide range of natural habitats, bridal creeper grows well in citrus orchards and pine plantations. It can grow in most soils but is most common close to the coast where it invades woodlands and other open coastal vegetation.	**Potential –** No known records within 10 km; however, potential habitat is present in the study area.
Chrysanthemoides monilifera	Bitou Bush	WONS	No	No	No	Found mostly in coastal areas but does not tolerate waterlogged soils. Grows best on sandy or medium textured soils.	**Unlikely –** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.
Cytisus scoparius, and *various Genista* spp.	Broom spp.	WONS	No	No	No	Evergreen shrub 1–4 m tall with bright yellow pea-like flowers, tends to form dense thickets. All species prefer cool temperate areas especially the tablelands.	**Likely –** No known records within 10 km; however, potential habitat is present in the study area.
Lycium ferocissimum	African Boxthorn	WONS	No	No	No	Drought tolerant species growing in temperate, subtropical, and semi-arid regions. It can grow on all soil types, though it grows best on well-drained, sandier soils along dry creek beds.	**Potential –** No known records within 10 km; however, potential habitat is present in the study area.
Nassella neesiana	Chilean Needle Grass	WONS	No	No	No	Resembles native spear grasses (*Austrostipa* spp.) but has a distinctive corona of 'little teeth' where the awn joins the seed. Has a major impact on grassland productivity and animal health.	**Likely –** No known records within 10 km; however, potential habitat is present in the study area.
Nassella trichotoma	Serrated Tussock	WONS	No	No	**Yes**	Drought tolerant grass with exceptionally low feed value that can completely take over a new area within 4 years. Prefers cool temperate conditions and does not grow well in wet areas, heavy shade, or heavily vegetated areas.	**Known –** This species was confirmed during surveys and confirmed present.

[64] South East Regional Strategic Weed Management Plan 2023 – 2027. State of New South Wales through Local Land Services. (2022).

Scientific name	Common name	Cwlth EPBC Act	RPW	ALA records within 10 km	BioNet records within 10km	Comment about species preferences and habitat in the project area	Likelihood of Occurrence
Opuntia spp.	Prickly Pears	WONS	No	No	No	Present in all regions of NSW from the coast to the far west. See DPI Weeds for details of individual Opuntia species.	**Unlikely –** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.
Rubus fruticosus aggregata	Blackberry	WONS	No	No	**Yes**	Prickly scrambler with edible purplish berries. Grows 7 m long canes that touch the ground and take root, forming dense thickets. Prefers cool temperate climate with >700 mm annual rainfall but will grow in drier areas if has access to water e.g., along riverbank.	**Known –** This species was confirmed during surveys and confirmed present.
Sagittaria platyphylla	Delta Arrowhead	WONS	No	No	No	An aquatic weed capable of aggressive growth and rapid spread. Establishment is favoured by slow moving or static shallow water. The smaller channels provide ideal conditions for infestation, as the water is generally warmer, shallower, and slower moving.	**Potential –** No known records within 10 km; however, potential habitat is present in the study area.
Salix spp. except *S. babylonica, S.* x *calodendron & S.* x *reichardtii*	Willows except Weeping Willow, Pussy Willow, and Sterile Pussy Willow	WONS	No	No	No	Deciduous trees or shrubs that form large, dense root mats on the surface of the soil or in shallow. Historically planted for erosion control, but had had a major impact on the amount, speed and quality of water flows especially when they drop leaves in autumn.	**Potential –** No known records within 10 km; however, potential habitat is present in the study area.
Salvinia molesta	Salvinia	WONS	Yes	No	No	Aquatic weed growing along the NSW coast. It is common in the Tweed, Richmond, Clarence, and Macleay catchments, the central coast and Sydney metropolitan areas. There are heavy infestations in the Hawkesbury–Nepean system.	**Unlikely –** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.
Senecio madagascariensis	Fireweed	WONS	No	No	No	A widely naturalised forb of pastures, open woodlands, grasslands, suburban bushland, roadsides, disturbed sites, waste areas, parks, and coastal environments in sub-tropical and warmer temperate regions.	**Potential –** No known records within 10 km; however, potential habitat is present in the study area.
Ulex europaeus	Gorse	WONS	Yes	No	No	Evergreen shrub 1–2.5 m tall with spiny leaves and bright yellow peak-like flowers with coconut scent. Forms dense thickets. Prefers cool temperate areas.	**Potential –** No known records within 10 km; however, potential habitat is present in the study area.
	Species count	**13**				**13 species total**	

A6 NSW Test of Significance

The NSW *Biodiversity Conservation Act 2016* (BC Act) sets out a five-part Test of Significance "for the purposes of determining whether a proposed activity or activity is likely to significantly affect threatened species or ecological communities, or their habitats" (s7.3). The five-part test also applies to aquatic species and ecological communities listed as threatened or otherwise protected in NSW under the *Fisheries Management Act 1994* (FM Act).

The NSW five-part Test of Significance focuses on NSW-listed species (BC Act and FM Act). Impacts on species that are only listed under Commonwealth (EPBC Act), no NSW laws are assessed in the MNES table (**Table 3**).

The following assessment considers all of the potential impacts of the proposed works on species and communities listed as threatened under the NSW law, that are known or have been assessed as having a potential of higher likelihood of occurring in the project area. Depending on what is proposed, these impacts may include:

- direct impacts, such as the loss of hollow-bearing trees;
- indirect impacts, such as loss of native seed bank due to soil erosion/deposition.
- cumulative impacts, such as fragmentation of wildlife corridors; and
- key threatening processes, such as the removal of dead wood and dead trees.

A6.1 THREATENED SPECIES

In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

A6.1.1 THREATENED PLANTS

Desktop searches identified four threatened plants listed under the BC Act as potentially occurring within the project area. These six plants are:

- Michelago Parrot-pea (*Dillwynia glaucula*),
- Black Gum (*Eucalyptus aggregata*),
- Hoary Sunray (*Leucochrysum albicans* subsp. *tricolor*), and
- Matted Bush-pea (*Pultenaea pedunculata*),

Michelago Parrot-pea occurs on exposed patches of clay or on rocky outcrops in eucalypt woodland often dominated by Scribbly Gum, Snow Gum, Broad-leafed Peppermint and Red Stringybark. The understorey may be either grassy or shrubby. There are records with 10 km.

Black Gum grows in the lowest parts of the landscape, on alluvial soils in poorly drained flats and hollows near creeks and small rivers and known to the Southern Tablelands. Records within 10 km.

Hoary Sunray occurs in a wide variety of grassland, woodland, and forest habitats, generally on relatively heavy soils. The species can occur in modified habitats such as semi-urban areas and roadsides. Highly dependent on the presence of bare ground for germination. Hoary Sunray is known to occur within 10 km.

Matted Bush-pea occurs in a range of habitats. NSW populations are generally among woodland vegetation, but plants have also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area. Records known to be within 10 km.

Assessment

The project area was assessed as potentially having four threatened flora species present. The proposed activity will require the removal of up to 0.02 ha of riparian vegetation within the works area, it is in this impact area where the species Black Gum is considered potentially at risk. No threatened species, nor any eucalyptus species, were observed within the works area during field inspection. Due to the species not being detected the disturbance of the potential habitat is not considered likely to have a significant impact such that a local population of the species is to be placed at risk of extinction.

Three of the following threatened species; Michelago Parrot-pea, Hoary Sunray and Matted Bush-pea were assessed as potentially occurring at the stockpile area for the site based on the potentially suitable habitat conditions. However, no threatened species were observed during field inspection and the area has been historically cleared and degraded. Due to this, it is deemed unlikely that the habitat is suitable for the threatened species. Additionally, there will be no removal of vegetation and mitigation measures (e.g. no-go demarcation) will be in place to prevent stockpiling impacts from extending outside of the already degraded stockpile area.

Due to the threatened species not being detected within the proposed stockpiling area is unlikely that the area provides suitable habitat, due to degradation, to the potential threatened species and therefore it is not considered likely to have a significant impact on the above threatened species such that a viable local population is likely to be placed at risk of extinction.

A6.1.2 THREATENED BIRDS

Small grassland/woodland birds:

- Southern Whiteface (*Aphelocephala leucopsis*),
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*),
- Speckled Warbler (*Chthonicola sagittata*),
- Varied Sittella (*Daphoenositta chrysoptera*),
- White-fronted Chat (*Epthianura albifrons*),
- South-eastern Hooded Robin (*Melanodryas cucullata cucullata*),
- Scarlet Robin (*Petroica boodang*),
- Flame Robin (*P. phoenicea*),
- Pink Robin (*P. rodinogaster*), and
- Diamond Firetail (*Stagonopleura guttata*).

Southern Whiteface is a small passerine inhabitant in arid open woodlands with a shrubby or grassy understory, as well as on grass plains. It is known to occur within 10 km of the project area.

Dusky Woodswallow is a medium-sized woodland specialist typically located in grassy eucalypt forests and woodlands. It favours locations abundant with logs and fallen timber but is also observed to utilize farmland on the periphery of forests or woodlands. It is known to occur within 10 km of the project area.

Speckled Warbler is a ground-dwelling bird that inhabits a variety of Eucalyptus-dominated communities with a grassy understory, often preferring rocky ridges or gullies. Typical habitat for the

species includes scattered native tussock grasses, a sparse shrub layer, some regrowth of eucalypts, and an open canopy. It is known to occur within 10 km of the project area.

Varied Sittella is an acrobatic woodland specialist that lives in lives in eucalypt forests and woodland, mallee, and Acacia woodland. It prefers rough-barked trees such as stringybarks and ironbarks, as well as mature trees containing hollows or dead branches. It is known to occur within 10 of the project area.

White-fronted Chat found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. It is known to occur within 10 km of the project area.

South-eastern Hooded Robin requires structurally diverse habitats featuring mature eucalypts, saplings, acacia scrub, some small shrubs and a ground layer of moderately tall native grasses. It is known to occur within 10 km of the project area.

Scarlet Robin is an iconic robin that prefers sites with abundant logs and fallen timber but is also known to utilise more open woodland, grasslands, pastures with scattered trees and even gardens. It breeds in grassy eucalypt forests and woodlands where it nests in tree forks > 2 m above ground level. It is known to occur within 10 km of the project area. The species was observed within the works area during field inspection and is known to occur within 10 km of the project area.

Flame Robin is a small Australian robin that breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. It prefers clearings or areas with open understory. It is known to occur within 10 km of the project area.

Pink Robin is a small attractive robin that inhabits rainforests and tall, open eucalypt forests, particularly in densely vegetated gullies. The species disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW. The species was observed within the works area during field inspection, no records occur within 10 km of the project area.

Diamond Firetail is a large finch that is found in grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland and in secondary grassland derived from other communities. It feeds exclusively on the ground, on ripe and partly ripe grass and herb seeds, green leaves, and insects. It is known to occur within 10 km of the project area.

Assessment

Habitat for these threatened small grassland/woodland birds were observed in and around the works area in the form of riparian habitat with native midstory abundant, diverse structures such as fallen timber present, and native understory vegetation such as reeds, rushes and grasses providing additional habitat. Two threatened species were observed utilising the works area, Scarlet Robin and Pink Robin. Although other small grassland/woodland threatened birds were not observed during field surveys, they can generally be predicted to utilise the works area. Habitat within the stockpile area would be characterised as degraded, with no beneficial habitat present for the mentioned threatened species.

The proposed works will see the removal of up to 0.02 ha of riparian vegetation. The proposed works will be impacting what is considered a small area within the surrounding landscape, with one Black Wattle to be impacted, however, Council aims to retain these wherever possible for bank stabilisation. Mitigation measures will be in place to prevent impacts disrupting surrounding native vegetation. Due to the small nature of the area being impacted, and the high-quality habitat for foraging that will remain available in the surrounds, it is unlikely that the development will significantly impact the observed Pink Robin or Scarlet Robin, particularly considering this is likely both species' winter foraging area and not a summer

breeding area. As such it is considered unlikely that the proposed development will have an adverse impact on the life cycle of the above species to the extent that a viable local population is at risk of extinction.

Remediation of works areas with native species will support a return to quality habitat, prevent erosion, and help prevent weed invasion while offsetting some of the potential impacts and increasing habitat availability in the area (see **Section 6**).

Wetland birds:

- Magpie Goose (*Anseranas semipalmata*),
- Australasian Bittern (*Botaurus poiciloptilus*),
- Sharp-tail Sandpiper (*Calidris acuminata*),
- Curlew Sandpiper (*Calidris ferruginea*),
- Latham's Snipe (*Gallinago hardwickii*),
- Blue-billed Duck (*Oxyura australis*),
- Australian Painted Snipe (*Rostratula australis*),
- Freckled Duck (*Stictonetta naevosa*), and
- Common Greenshank (*Tringa nebularia*).

Magpie Goose is a large, distinctive black and white waterbird. It is often found in shallow wetlands with dense rushes and sedges. It feeds on grasses, bulbs, rhizomes and roosts in tall vegetation. It often breeds in monsoonal areas. The species is known to occur within 10 km of the project area.

Australasian Bittern is a large stocky bird with a long, thick neck and straight, brownish-yellow bill. It lives in permanent freshwater wetlands with tall, dense vegetation. It hides in dense reeds or rushes during the day and feed mainly at night on frogs, fish, yabbies, spiders, insects, and snails. Australasian Bittern is not known to occur within 10 km of the project area.

Sharp-tail Sandpiper is a wader with a flat back and pot bell with slightly decurved bill. It can be found foraging at the edge of wetlands or intertidal mudflats, among inundated vegetation or saltmarshes, grass or sedge lands or can be found in sewage or hypersaline environments. Records of the species is known to occur within 10 km of the project area.

Curlew Sandpiper is a migratory shorebird most often found in littoral and estuarine habitats. Sometimes found in inland swamps and lakes during annual migration to and from Siberia. The species is known to occur within 10 km of the project area.

Latham's Snipe is a wetlands specialist spending its breeding season in Japan and regions of eastern Russia, before migrating to Australia and other areas in the south-pacific for the non-breeding season. The species is known to occur within 10 km of the project area.

Blue-billed Duck is a small and compact duck with stiff tails. During summer breeding season, the male's bill turns bright blue. It prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. It is completely aquatic and can fly if disturbed but prefers to dive if approached. The species is known to occur within 10 km of the project area.

Australian Painted Snipe is a small freshwater wader with a long bill. It roosts in fringes of swamps, dams, and nearby marshy areas with tall vegetation cover such as grass, lignum, low scrub, or open timber. It forages on mud flats and in shallow waters. Australian Painted Snipe is not known to occur within 10 km of the project area.

Freckled Duck is a dark, greyish-brown bird characterized by its dark, greyish-brown plumage and distinctive narrow, slightly upturned bill. It prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. The species is known to occur within 10 km of the project area.

Common Greenshank a widespread species occurs across most of coastal NSW in all types of wetlands. It is found in soft mud on mudflats, in channels, or within shallows around the edge of waterbodies in sparse, emergent or fringing vegetation such as sedges or saltmarsh. The species is known to occur within 10 km of the project area.

Assessment

Habitat for these species was observed in the form of riparian habitat and aquatic habitat within and near to the works area of the project area. Most of the above species are wetlands species that have an increased likelihood of presence due to records from nearby Lake Bathurst and The Morass. Although none of these threatened species were observed within the works area, they may be generally predicted to utilise the works area in at least a transitory nature to access these nearby lakes.

The proposal will require the removal of up to 0.02 ha of riparian vegetation and disturbance of aquatic habitat within the local area, which may impact the foraging and transitory habitat of some of the species mentioned above. Due to the higher-quality habitat found in the surrounding nearby landscape, and the small area of impact of the proposed development, it is not considered likely the works have a significant impact on the above-mentioned species such that a viable local population is likely to be placed at risk of extinction.

Furthermore, measures recommended in **Section 6** such as erosion mitigation, remediation work, and replanting of native species will further reduce the extent of impacts and the chance of a significant impact.

Parrots:

- Gang-gang Cockatoo (*Callocephalon fimbriatum*), and
- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*).

Gang-gang Cockatoo is a distinctive parrot found from southern Victoria through south- and central-eastern New South Wales. In Spring and summer, it is generally found in tall mountain forests and woodlands especially wet sclerophyll forests. In autumn and winter, it often moves to lower altitudes in drier and more open forests and woodlands. It prefers to roost in old-growth forests and to nest in hollows with a 10+ cm diameter at least 9 m above ground level. Gang-gang Cockatoo has been recorded within 10 km of the project area.

South-eastern Glossy Black-Cockatoo is the smallest of the black cockatoos, inhabiting open forest and woodlands of the coast and the Great Dividing Range where stands of Sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. South-eastern Glossy Black-Cockatoo has been recorded within 10 km of the project area.

Assessment

A small amount of transitory habitat is present within the works area for the abovementioned species. There are areas of native forest observed to the north and west of the works area, which may provide habitat to better support the two mentioned species.

The proposed works will only require the removal of up to 0.02 ha of riparian vegetation and potentially a Black Wattle. The resources are not likely utilised by the two mentioned species other than in a transitory nature and it is therefore not likely that the proposed development will have a significant

impact on the above-mentioned species such that a viable local population is likely to be placed at risk of extinction.

Swifts:

- White-throated Needletail (*Hirundapus caudacutus*).

White-throated Needletail is an almost exclusively aerial species that forages for insects up to 1 km above ground, usually in large flocks. Only occurs in Australia between late spring and early autumn, breeds in north Asia. The species is known to occur within 10 km.

Assessment

Although the species is almost exclusively an aerial foraging species, it forages on insects that are often more abundant around certain terrestrial habitats, such as forests, mudflats, coastlines and waterways. The project area is an area that would be characterised as an area that would likely produce abundant foraging opportunities for the White-throated Needletail as a riparian area with water and multi-strata of native vegetation.

The proposed works will require the removal of up to 0.02 ha of riparian vegetation including one a Black Wattle . The proposed works will be impacting what is considered a small area within the surrounding landscape with surrounding Black Wattles being retained and mitigation measures in place to prevent impacts disrupting surrounding native vegetation. As such it is considered unlikely that the proposed development will have an adverse impact on the life cycle of the above species to the extent that a viable local population is at risk of extinction.

Raptors and owls:

- Black Falcon (*Falco subniger*),
- Little Eagle (*Hieraaetus morphnoides*), and
- Powerful Owl (*Ninox strenua*).

Black Falcon is a large dark falcon which favours open environments where it is exhibits aggressive aerial hunting. It is usually found near watercourses or utilizing patches of isolated trees and can be seen to hunt over open wooded grasslands, saltbush plains, bluebush plains and other low vegetation. There are records of the species within 10 km of the project area.

Little Eagle is a medium-sized bird of prey. It occupies open eucalypt forest, woodland, open woodland, or riparian woodlands. It nests in tall living trees within a remnant patch and builds large stick nests. Little Eagle is known to occur within 10 km of the project area.

Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forests to tall open wet forests and rainforests. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. Roosts by day in dense vegetation. The species is known to occur within 10 km of the project area.

Assessment

A small amount of habitat for the above species was observed in the project area, mostly in the form of riparian areas and the adjacent native vegetation, including Black Wattles. Although these areas would not likely habit the above species themselves, they would be considered to have the potential to provide suitable foraging habitat for prey species that the above threatened species can hunt within or above the works or stockpile areas.

The proposal does not involve the removal of habitat for the above species. Given the small size of the work area, it is not considered to provide a large area of foraging habitat for these species. The project area exhibits relatively higher-quality habitat outside the work area and in the surrounding landscape, characterized by large native forests nearby, additional riparian habitat along Windellama Creek and higher-quality habitat near waterbodies in the form of lakes at Lake Bathurst and The Morass where observations of the species have occurred.

For the reasons above, the proposed development is considered unlikely to have an adverse effect on the life cycle of the species such that a viable local population of these species is likely to be placed at risk of extinction.

A6.1.3 THREATENED FISH

No threatened fish species are considered likely to be present on site based on mapped indicative distribution within the Species Profile and Threats Database and Fisheries NSW Spatial Data Portal, along with the presence of the invasive fish species.

A6.1.4 THREATENED FROGS

- Green and Golden Bell Frog (*Litoria aurea*), and
- Yellow-spotted Tree Frog (*Litoria castanea*).

Green and Golden Bell Frog is characterized by a distinctive gold or creamish white stripe along its sides. It favours habitats such as marshes, dams, and stream-sides that are open, lack predatory fish, and have nearby grassy areas for shelter, along with available diurnal sheltering sites. It has been found in human-disturbed areas containing vegetation in and around water. Green and Golden Bell Frog are known to occur within 10 km of the project area.

Yellow-spotted Tree Frog is a long-lived and mostly aquatic tree frog. Require large permanent ponds or slow-flowing 'chain-of-ponds' streams with abundant emergent vegetation such as bulrushes and aquatic vegetation. The Yellow-spotted Tree Frog is not known to occur within 10 km of the project area.

Assessment

Potential habitat for both species occurs within the works area, mainly the riparian habitat of Windellama Creek and areas of inundation with aquatic fringing and submerged and emergent vegetation in and around this water source. This area may provide breeding and foraging habitat for both species, particularly since there is prevalence of tall reeds.

No evidence of either threatened frog was found within the project area during field inspection. However, the scope of this assessment cannot definitively exclude the presence of either frog on site, as surveys were conducted during the day, which is not the optimal time to detect the species.

The proposed works will require the removal of up to a total of 0.02 ha of riparian vegetation which is a potential habitat for both threatened species. Because either species presence cannot be excluded, the proposed works may have a significant impact on one or both species such that a viable local population is likely to be placed at risk of extinction. The targeted survey period for the Green and Golden Bell Frog (Nov – Mar) and Yellow-spotted Tree Frog (Nov – Dec) may not be suited to the project timeline.

When works proceed, suitable habitat will remain available in the surrounding areas outside of the works area, reducing the likelihood of local population extinction. Strict mitigation measures, including sediment and erosion control measures, will be implemented to prohibit the proposed works from accessing and disturbing areas close to the waterway where the species may occur (see **Section 6**).

On request, Ecology Consulting is pleased to offer night-time surveys during the appropriate seasons to ascertain the presence or absence of Green and Golden Bell Frogs and Yellow-spotted Tree Frog within the works area.

A6.1.5 THREATENED INSECTS

No threatened insect species are considered likely to be present on site based on the lack of records within 10 km and unsuitable habitat within the project area.

A6.1.6 THREATENED BATS

- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*),
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*), and
- Southern Myotis (*Myotis macropus*).

Eastern False Pipistrelle typically roosts in eucalypt hollows approximately 20 cm above the ground. However, it has also been observed under loose bark on trees or in buildings. It primarily hunts beetles, moths, weevils, and other flying insects above or just below the tree canopy. It is known to occur within 10 km of the project area.

Large Bent-winged Bat primarily roots in caves but also use man-made structure such as derelict mines, storm-water tunnels, and buildings. It hunts in forested areas, catching moths and other flying insects above the tree tops. The species has no known records within 10 km of the project area.

Southern Myotis is a fishing bat feeding on aquatic insects and small fish, flying close to the surface of waterbodies such as streams, lakes and reservoirs. They roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm-water tunnels, bridges, and dense foliage. The species is known to occur within 10 km of the project area.

Assessment

A small amount of habitat for the above species was observed in the project area, mostly in the form of riparian areas and the adjacent native vegetation, including Black Wattles. Although there are no roosting features for the species themselves, the works and stockpile area would be considered to have the potential to provide a suitable foraging habitat for each species.

The proposal does not involve the removal of roosting habitat for the above species. Given the small size of the works area, it is not considered to provide a large area of foraging habitat for these species. The project area exhibits relatively higher-quality habitat outside the works area and in the surrounding landscape, characterized by large native forests nearby and additional riparian habitat along Windellama Creek.

For the reasons above, the proposed development is not likely to have an adverse effect on the life cycle of the species such that a viable local population of these species is likely to be placed at risk of extinction.

A6.1.7 THREATENED MAMMALS OTHER THAN BATS

- Spotted-tail Quoll (*Dasyurus maculatus*).

Spotted-tail Quoll forages across a range of habitat types, including rainforest, open forest, woodland, coastal heath, and inland riparian forest. It lives in hollow-bearing trees, fallen logs, other animal burrows, caves, and rocky outcrops. Spotted-tail Quoll is known to occur within 10 km of the project area.

Assessment

A small amount of habitat for the above Spotted-tail Quoll was observed in the project area, mostly in the form of native vegetation and riparian habitat which would provide potential habitat for foraging and habitat for use in a transitory nature.

The proposed activity does not proposed to remove any habitat-bearing trees, large course wooden debris, burrows or rocky habitat that the species may utilise. Additionally, less disturbed habitat exists and will remain in the landscape beyond the project area in the nearby large native forest. As such, the proposed development is not likely to have an adverse effect on the life cycle of the Spotted-tail Quoll such that a viable local population of this species is likely to be placed at risk of extinction.

A6.1.8 THREATENED REPTILES

No threatened reptile species are considered likely to be present based on limited habitat within the project area.

A6.2 THREATENED ECOLOGICAL COMMUNITIES

In the case of a critically endangered or endangered ecological community, whether the action proposed:

1. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
2. Is likely to modify the composition substantially and adversely such that its local occurrence is likely to be placed at risk of extinction.

No threatened ecological communities are known or considered likely to be present in the project area given its dominant tree species and other characteristics as discussed in **A5.1**. As no TEC was observed within the project area, there are no foreseen adverse or significant impacts to a TEC.

A6.3 HABITAT FOR A THREATENED SPECIES, POPULATION OR ECOLOGICAL COMMUNITY

In relation to the habitat of a threatened species, population, or ecological community;

1. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and
2. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
3. The importance of the habitat to be removed, modified, fragmented, or isolated to the long-term currently interconnecting or proximate areas of habitat for a threatened species, population, or ecological community.

The works area requires the removal or otherwise disturbance of up to 0.02 ha of riparian habitat.

No threatened populations are known to occur within 10 km of the project area as listed on BioNet as of July 2024. No TECs were found to be within the project area, or likely to be impacted as a result of works from the project.

As discussed above in **A6.1,** the project is not considered to have a significant impact such that a viable local population of any abovementioned threatened species is likely to be placed at risk of extinction. It is also unlikely that threatened species' habitat is to become fragmented or isolated from other areas of habitat as a result of works.

The required removal and impact on the area of riparian vegetation is considered to be small-scale works, as such, the habitat for threatened fauna will not be modified, fragmented, or isolated (see **A6.1**).

It is recognised that works may require minimal disturbance to the surrounding vegetation, notably in each stockpiling area. The project is of a small scale and unlikely to require significant impact or modification to the habitat of a threatened species, population, or ecological community.

A6.4 DECLARED AREAS OF OUTSTANDING BIODIVERSITY VALUE

Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).

The proposed development is unlikely to have an adverse impact on any declared Area of Outstanding Biodiversity Value (AOBV) in NSW due to its very small scale and distance from any such area. There are currently four declared AOBVs in all of NSW. The closest to the project area is the Wollemi Pine habitat more than 150 km away in the Blue Mountains; the remainder all involve marine habitats even further

away. For more information about such areas, see the NSW Government's Area of Outstanding Biodiversity Value register[65].

A6.5 KEY THREATENING PROCESSES

Whether the proposed development or activity is or is part of a Key Threatening Process or is likely to increase the impact of a Key Threatening Process.

Key threatening processes (KTPs) are listed under both Commonwealth and State legislation. There are 22 Commonwealth-listed KTPs, 38 NSW-listed KTPs and eight under the FM Act. The lists overlap and include broad threats such as climate change as well as specific threats relating to Lord Howe Island, shark control programs on beaches and longwall mining. The NSW-listed KTPs most relevant to the project are as follows.

A6.5.1 FERAL ANIMALS

A number of KTPs are associated with feral animals, which may have impacts including predation, habitat degradation, competition, and disease transmission. Most of the feral animals assessed occupy vast areas of NSW and are extremely difficult to control without a concerted effort at the landscape level. The proposed activity is considered unlikely to increase the impact of KTP's associated with feral animals. For details of all the feral animal species considered as part of the field inspection and this test of significance, see **A5.6**.

A6.5.2 WEEDS

Invasion and establishment of exotic vines and scramblers

The following exotic vine and scrambler was observed within the project area:

- Blackberry complex.

Scattered patches of Blackberry were observed to be present in varying degrees of abundance across the site, found predominantly in the works area or just outside of the works area. There is a potential that this species could unknowingly be transported into an unaffected area of the works area and the surrounds through contaminated machinery. Controlling this potential impact will significantly mitigate the potential of Blackberry to be potentially transferred into the site or the surrounds. Physical removal of the weed species prior to the commencement of works is recommended to prevent herbicides from entering the adjacent waterway.

It is unlikely that the proposed activity will significantly contribute to this KTP provided appropriate measures are implemented as recommended in **Section 6** and **Section 7.1**.

Invasion and establishment of Scotch Broom (Cytisus scoparius)

No evidence of Scotch Broom was observed during the field inspection. The proposed activity is not likely to result in an increase in the impact of this KTP within the locality provided appropriate measures are implemented as recommended in **Section 6** and **Section 7.1.**

Invasion of native plant communities by exotic perennial grasses

Several perennial exotic grasses invade and may dominate native plant communities by competing with and displacing, many native species. Many of the perennial exotic grasses are established following

[65] Access Areas of Outstanding Biodiversity register. State of New South Wales, Environment and Heritage. (2022). (Accessed: 07/08/2024)

disturbances such as overgrazing, road works and management of roadside areas. The spread of these grasses is often exacerbated by slashing, weed control, forestry and mining operations, movement or addition of fertilisers and nutrients, and changes to drainage and fire regimes.

Several perennial exotic grasses as listed in the NSW Scientific Committee's final determination for this KTP were observed to be present throughout the project area in low - moderate abundance. One Weed of National Significance, Serrated Tussock, and one High Threat Exotic species, Paspalum were also observed within the works area. The presence of these exotic perennial grasses is likely due to use in pasture improvement in neighbouring farmland, vehicle transportation of seeds and the dispersal of seeds down the waterway.

These exotic perennial grasses have the potential to adversely affect native plant communities and remaining native species. Impacts are to be mitigated by appropriate weed control measures prior to any planned construction in the future to ensure construction does not lead to the introduction or further establishment of exotic species on site, and in ongoing rehabilitation efforts.

Overall, it is unlikely that the project will significantly contribute to this KTP if strict mitigation measures set out in **Section 6** and **Section 7.1** are implemented.

Loss/degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants

Field inspection found evidence of only one escaped garden plant that within the works area.

Provided strict mitigation measures set out in **Section 6** and **Section 7.1** are implemented it is unlikely that the project will significantly contribute to this KTP.

A6.5.2 HABITAT MODIFICATION

Alteration to the natural flow regimes of rivers, streams, floodplains, and wetlands

The project will likely require the temporary alteration to the current flow regime of Windellama Creek. The current infrastructure at the site has historically created impediments to the natural flow regimes of the creek, with the proposed works aiming to improve the flow and connectivity of the creek.

During works, the site will include strict ESCP and associated erosion control devices, including a silt curtain to be installed at the site to minimise downstream sedimentation impacts. Design of new infrastructure for the project includes concrete and rock scour protection and erosion protection design to prevent erosion and sedimentation after installation.

Sedimentation and erosion issues (discussed in **Section 5.1** and **Section 5.2**) during construction have the potential to alter the natural flow of the site's waterway, however, these are considered unlikely, given mitigation measures as set out in **Section 6** are implemented.

Clearing of native vegetation

Clearing is defined in section 3 of the BC Act as:

> *"the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long-term modification, of the structure, composition and ecological function of stand or stands" .*

Clearing of native vegetation for the proposed works is estimated to be minimal, impacting 0.02 ha riparian vegetation. It is not considered likely to substantially contribute to this KTP due to the small area of impact. As well, if mitigation measure outlined in **Section 6** are adhered to, the area should be

supported in regenerating natively so that no long-term modification occurs. Furthermore, the impact area is of a small scale and does not constitute “a sufficient proportion”.

Appendix B: Clause 171 of the EPA Regulation

Clause 171 of the EPA Regulation 2021 sets out 16 factors that need to be considered when assessing environmental impact under Part 5 of the EPA Act. The impact of proposed works is described below.

Positive | Neutral | Negative

Relevant clause	Impact	Reason
Any environmental impact on a community?	Neutral	The project is not expected to have an adverse environmental impact on vegetation communities at Windellama.
Any transformation of a locality?	Neutral	Any transformation will be limited to McGaws Road at Windellama Creek crossing and its immediate approaches/surrounds. No transformation of the broader locality is expected. Detail Traffic Management Plans for the works, including accessibility planning for residents during construction.
Any environmental impact on the ecosystem of the locality?	Neutral	Ecosystems can be impacted by any activity that involves soil or vegetation disturbance, or where there is any potential for changes to surface water quality and flows. A number of safeguards and mitigation measures are proposed to reduce (avoid and minimise) the likelihood and consequences of this risk occurring, see **Section 6**.
Any reduction of the aesthetic, recreational, scientific, or other environmental quality or value of a locality?	Neutral	Any reduction in aesthetic, recreational, scientific, or other environmental quality values will be limited to the project area and its immediate approaches/surrounds. No longer-term or broader impacts are expected, and the area should be remediated after completion of works.
Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific, or social significance or other special value for present or future generations?	Neutral	As discussed in various parts of **Section 5.4** and **Section 5.5**, the project is not expected to have any effect on a listed or otherwise special place. Mitigation measures including an unexpected finds procedure are recommended to ensure any unexpected heritage or other finds are protected pending an assessment of their significance, see **Section 6**.
Any impact on the habitat of protected animals (within the meaning of the *Biodiversity Conservation Act 2016*)?	Neutral	As discussed in **Section 5.3** and related Appendices, the project is not expected to have a significant impact on the habitat of protected animals.
Any endangering of any species of animal, plant or other form of life whether living on land, in water or in the air?	Neutral	As detailed in **Section 5.3** and related Appendices, the project is not expected to endanger any species of animal, plant, or other form of life.
Any long-term effects on the environment?	Neutral	As detailed in **Section 5**, the project is not expected to have any long-term adverse effects on the environment.
Any degradation of the quality of the environment?	Neutral	As detailed in **Section 5.7**, the project may have short term minor effects on air quality, noise, and vibrations. However, there is no foreseen adverse or significant degradation on the quality of the environment.
Any risk to the safety of the environment?	Neutral	No significant risks to the safety of the environment are likely if effective mitigation measures are put in place as recommended in **Section 6**.
Any reduction in the range of beneficial uses of the environment?	Neutral	No reduction in the range of beneficial uses of the environment are likely if effective mitigation measures are put in place as recommended in **Section 6**.
Any pollution of the environment?	Neutral	As discussed in **Section 5,** the project may have short term, very minor impacts on matters including air quality, noise, and vibrations. However, no pollution of the environment is likely if effective mitigation measures are put in place as recommended in **Section 6**.
Any environmental problems associated with the disposal of waste?	Neutral	No environmental problems associated with the disposal of waste are likely if effective mitigation measures are put in place as recommended in **Section 6**.

Relevant clause	Impact	Reason
Any increased demand on resources (natural or otherwise) which are, or are likely to become, in short supply?	Neutral	The project will utilise standard road building materials and does not utilise any resources that are, or that are likely to become, in short supply.
Any cumulative environmental effect with other existing or likely future activities?	Neutral	As discussed in **Section 5.12**, the project might have cumulative effects due to the maintenance or replacement of other damaged infrastructure within the program, however, the cumulative effects are considered negligible.
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?	Neutral	The project is not in a coastal management area.
Is the project applicable to local strategic planning statements made under the Act, Division 3.1?	Neutral	The Goulburn Mulwaree Local Strategic Planning Statement outlines 10 planning priorities for a 20-year vision. The proposed project aligns with Priority 1, Infrastructure, which focuses on access to community in rural area.
Other relevant environmental factors	Neutral	No other environmental factors relevant to this project have been identified.

Attachment 1: Proposal's plans

Goulburn Mulwaree Council - McGaws Road Causeway Upgrade, Issue 2. Fairlight Consulting Engineers. Date: 4 April 2024

FAIRLIGHT
CONSULTING ENGINEERS

ABN : 70 654 541 214
P.O. Box 30 Gerringong NSW 2534
Ph : 0439 999 286
Email : steve@fairlight-engineers.com.au

GOULBURN MULWAREE COUNCIL

DRAWING LIST	TITLE	REVISION
SHEET 1	TITLE SHEET	B
SHEET 2	CIVIL WORKS SPECIFICATIONS	B
SHEET 3	GENERAL ARRANGEMENT PLAN	B
SHEET 4	CULVERT LONG SECTION	B
SHEET 5	CULVERT PLAN AND ELEVATIONS	B
SHEET 6	CULVERT TOP AND BOTTOM SLAB REINFORCEMENT	B
SHEET 7	CULVERT WINGWALL AND APRONS REINFORCEMENT	B
SHEET 8	CATCHMENT AND HYDRAULICS	B

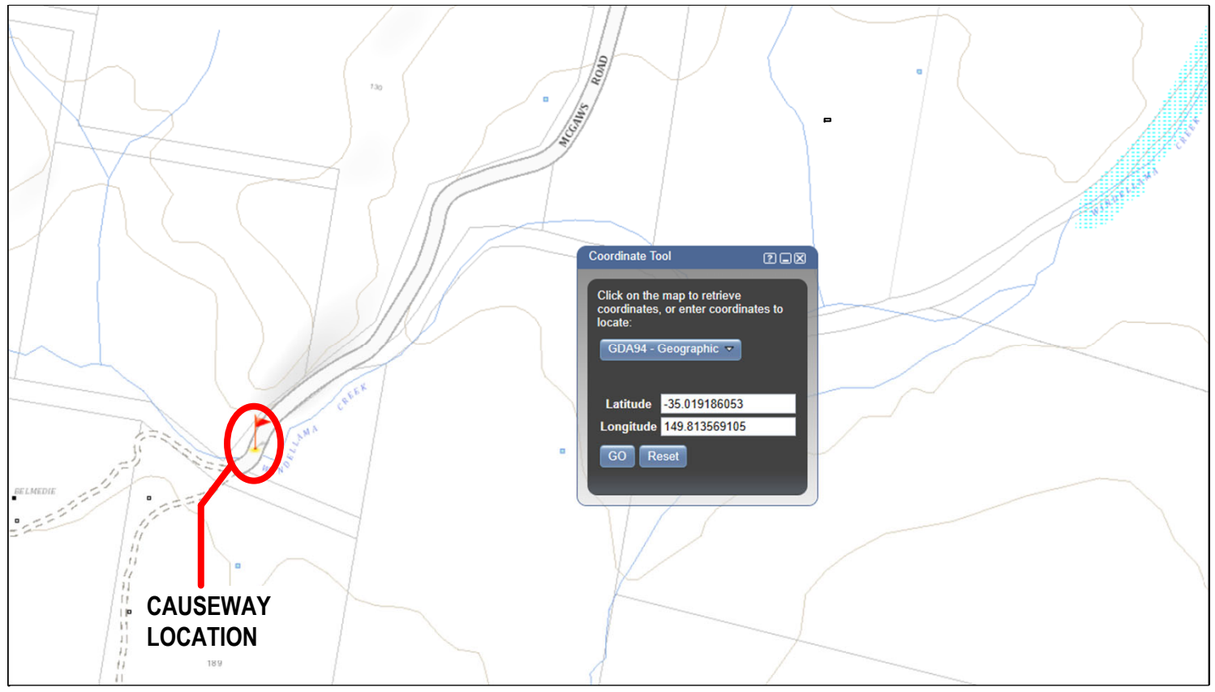
ISSUE 1	13/03/2024
ISSUE 2	04/04/2024

STRUCTURAL PLANS & DETAILS

CLIENT : GOULBURN MULWAREE COUNCIL

LOCATION : MCGAWS ROAD CAUSEWAY UPGRADE

CAUSEWAY ON MCGAWS ROAD OVER WINDELLAMA CREEK - SITE LOCATION PLAN



DESIGNED BY

Stephen Debeck
(BEng,MIEa, NER (Civil)

GENERAL SPECIFICATION

GENERAL NOTES

1. All Dimensions on these plans should be checked on site by the builder and verified using other contract documents. Discrepancies should be referred to the Engineer.
2. It is not implied or guaranteed that all structural designs and details shown in these plans are complete. The scope of work has been determined by the engineer based on the information supplied by the client or the clients consultants. Further designs may be required.
3. Do not Scale from these plans
4. Design loads in accordance with AS 1170 and AS5100 Bridge Design Code
5. Roadways W80/A160/S1600/M1600 vehicular loadings

EXCAVATIONS FOR EXTERNAL CONSTRUCTIONS

-excavate and/or fill as required for external area slabs and footings
consolidate ground under all paths, pads or paved areas.

EXISTING FOOTINGS

Maintain support to existing footings as required to ensure integrity of existing buildings.

CERTIFICATE

Provide a practising civil or structural Engineer's Certificate for bearing pressure of foundation material.

SOIL AND WATER MANAGEMENT

Ensure that soils from the site are not transported beyond the boundaries. Site clearing and soil retention measures must comply with the Act. Refer to PRELIMINARIES: Environmental Protection – Soil and Water Management

GROUND WORKS

Benchmark

Relate all levels to the survey benchmark

Foundation Test Pits/Bore logs

Where foundation test pits/bore logs have been carried out
- re-excavate pits found under footings, slabs or pavements or within the "zone of influence"
- angle of zone of influence below horizontal:
- 30^0 for sand foundation material
- 45^0 for clay foundation material
- replace the backfill material in compacted layers. (SEE COMPACTION)

SUPERVISION AND TESTING

Arrange for the site filling and compacting to be supervised by a qualified geotechnical engineer: .
-tests to be undertaken by a NATA registered laboratory
-provide 2 copies of test results to the Superintendent.

rejection:

-if compacting is not up to the standard specified: carry out further compacting uniformly over the whole area until the specified standard is achieved and provide a further series of tests.
-Provide certificate from practising soil laboratory or engineer for compaction of fill.**SITE**

CLEARING

GENERAL

- clear and remove all stumps & other impediments and retain good ground cover where possible
- remove old pavings, footings, rubbish and debris from the whole of the site

noxious plants :

- eradicate from whole of the site blackberries, onion &oxalis weeds, nut grass & any other plant classified by Pastures Protection Board for the area as a "Proclaimed Noxious Plant or Weed"
- remove by grubbing out roots and/or by poison spray if such treatment is approved as effective

removal of trees and stumps: remove trees only as noted on the drawings and grub all stumps including those of trees previously removed

TOPSOIL, STORAGE AND REMOVAL

- remove topsoil from those areas of the site to be built upon and/or excavated including buildings, carparks, driveways, driving areas, paving and stockpile on site ready for re-spreading. Protect stockpile from contamination
- remove 100mm minimum depth of the surface layer of the natural ground
- remove from site and replace any contaminated topsoil. Refer to PRELIMINARIES:

Environmental Protection Disposal of Contaminants and Refuse :

- remove surplus excavated material on completion

SITE EXCAVATIONS

GENERAL

Excavate in material "as found". No variation to the contract will be allowed with respect to the type of material excavated
- backfill excavations taken below contract depth with concrete of equivalent strength to work immediately above at no variation to the contract
- remove surplus excavated material from the site
- provide a minimum clearance of 400mm to the underside of timber floor structures

rock excavation : where rock or shale is encountered scabble surface to level and solid bearing. Remove loose boulders and treat holes as above in backfilling

trenches : provide and maintain all necessary planking and strutting to excavations in sand or any other loose formation:
- where bearing capacity is affected by the removal of tree stumps, fence posts, rock floaters, etc. , excavate to solid bearing and backfill with concrete.

SERVICE TRENCHES

Excavate trenches to required depths to allow regulation cover over service lines:
- maintain sides of excavations vertical
- generally maintain straight runs between access holes, inspection points, and the like
- grade bottoms of trenches to provide uniform bearing. Dig bell holes after grading trench bottom
- keep trench base free of objects greater than 75mm
- keep main runs 600mm minimum clear of footings and concrete paths.

sewer and stormwater drainage:

Refer to PLUMBING AND SANITARY PLUMBING and DRAINAGE.

underground electrical mains: Refer to ELECTRICAL WORKS.

underground water mains and gas lines: Refer to DRAINAGE and GAS SERVICE.**FILLING MATERIALS**

GENERAL

Provide filling free from organic matter, from soil recovered from the site excavations or imported onto the site from an approved source. Filling must be in accordance with Engineer's drawings.

FILLING TYPES

hardcore fill: Fill with hardcore, made up of broken brick or stone, not larger than 75mm gauge.

crushed rock fill: Fill with crushed igneous rock, not larger than 40mm gauge with a minimum clay content.

granular fill: Fill with loose granular fill with minimum clay content.

SITE PREPARATION AND BULK FILLING

AREAS UNDER CONSTRUCTION WORKS

Where cut and fill is required under the building areas, carparks, driveways and pavings:
-carry out filling in accordance with Engineer's drawings
-grade area to solid and undisturbed bearing before filling
-fill in layers not exceeding 200mm loose thickness and each layer compacted.

AREAS OTHER THAN THOSE UNDER CONSTRUCTION WORKS

Filling is to be clean sandy loam fill taken from site excavations, and clean imported fill.

imported fill:

-is to be a friable, sandy loam
-comprise not less than 65% sand and not more than 15% silt and clay
-to have a pH between 5.5 to 6.5.

GRADES AND FALLS

Carry out grading and filling of site to finished levels on drawings:
-grade site to fall from buildings & paths, having a fall of 1:100 at least one metre from building
-maximum slope for grassed areas is 1:4 (25%) and mowable.

backfilling: backfill as required and consolidate to level of surrounding area.

batters: cut and fill as required to banks and retaining walls to form batter.

FINISHED TOPSOIL AREAS

Fill in with approved topsoil. Refer to LANDSCAPE WORKS -Materials.

FINISH LEVELS

Grade site so that grassed and planting areas finish flush with paths and paving, or as detailed.

COMPACTION

GENERAL

-provide compaction to filled areas in accordance with Engineer's drawings
-under buildings, roads, carparks, driveways and paving and within zone of influence of footings (except for loose granular filling used as formwork) to 98% minimum dry density ratio
-In areas where excessive settlements create tripping hazards or result in the formation of differential levels (such as backfill around manholes, at back of kerbs and against other minor concrete structures (i.e., pits, headwalls, retaining walls, etc) or places where the extent of differential settlements justifies future maintenance by topping up backfill (sewer and drainage trenches), compact to 95% dry density ratio.
-over other areas including loose granular filling used as formwork to 85% minimum dry density ratio.

DRAINAGE

1. Cover Levels given are to be used as a guide only. Actual levels to be determined on site
2. All survey set out shall be undertaken by a qualified &appropriately experienced surveyor
3. The contractor shall not disturb any existing benchmarks
4. All existing and finished surface levels are to Australian Height Datum AHD UNO
5. Connection of new stormwater pipes to existing pipes and stormwater structures to be undertaken by the contractor
6. Where new work abuts existing work the contractor shall ensure that a smooth even profile free from abrupt changes is attained
7. All earthworks batters and trench lines in non paved areas are to be top soiled with 100mm site topsoil , dry land grassed and bitumen straw mulched
8. All reinforced concrete pipes shall be rubber ring jointed class 2 UNO
9. The contractor is required to liaise with affected lessees regarding any disruption to of vehicle access to their properties and to program the works in such a way as minimise the affects of disruptions however access for emergency vehicles should be maintained at all times
10. Sawcut through A.C. and Concrete surfaces where trenching is required
11. All abandoned stormwater, sewer and water supply pipes are to be sealed with 100mm minimum thickness concrete UNO
12. Allow for placement of heavy duty covers and seating rings for all structures in paved areas. Allow for standard covers and seating rings for all other structures UNO.

WATER AND SEWERAGE WORKS

1. All sewer pipes to be of UPVC and to have a maximum length of 3 metres
2. All sewer pipes at a depth of 3 metres or more to be "S.E.H."(super extra heavy)
3. All sewer manholes within the road reserve to be "H.T.R." (heavy type roadway)
4. All laying off gravitation sewers and rising mains shall be in accordance with Auspec standard specifications and local Council requirements
- Up to 1.5% Grade - Bedding to Auspec standard specifications and local Council requirements
- 1.5 to 10% Grade - Bedding and trench stops or aggregate bedding to Auspec standard specifications and local Council requirements
- 10 to 15% Grade - Bedding and concrete bulkheads to Auspec standard specifications and local Council requirements
- 15 to 50% Grade - Concrete bedding and concrete bulkheads to Auspec standard specifications and local Council requirements
- Over 50% Grade - Concrete encasing and concrete bulkheads to Auspec standard specifications and local Council requirements

Trench stops or bulkheads are to be located and recessed in accordance with Auspec standard specifications and local Council requirements
5. All sewer manhole covers in areas prone to stormwater inundation shall be "gatic" or approved water tight covers
6. All concrete anchor and thrust blocks are to be constructed in accordance with Auspec standard specifications and local Council requirements.
7. All hydrants and stop valves to be installed in accordance with Auspec standard specifications and local Council requirements.
8. Provide hydrant and valve markers etc as per Auspec standard specifications and local Council requirements
9. All water main road crossing to be in DICL or minimum class 12 UPVC unless otherwise directed by the engineer.
10. For UPVC road crossings, the compaction of sand bedding under, around and over the pipe is important. An extra inspection by council is required for all road crossings while bedding is being placed and pipes are being laid and covered. Minimum cover to apply from the subgrade level. These works are to be completed in accordance with Auspec standard specifications and local Council requirements
11. All testing and flushing of mains to be carried out in full, under council supervision in accordance with:
    Testing sewer
    Mains/manholes - Auspec standard specifications and local Council requirements
    Testing water mains - Auspec standard specifications and local Council requirements
    Flushing water mains - Auspec standard specifications and local Council requirements
12. Contractors shall comply with the requirements of the work cover authority in regard to all excavations greater than 1.5 metres in depth.
13. Council to be given 7 working days notification in writing before any construction starts in accordance with Auspec standard specifications and local Council requirements. Council to be given one (1) day's notice for inspection. Notification to council's work depot by telephone will be accepted.

Note These specifications are general only and shall be read and applied in conjunction with Auspec standard specifications and local Council requirements

FOUNDATIONS

1. Footings design based on minimum allowable soil bearing pressure of 150KPa or as otherwise specified on plans where higher magnitude bearing pressures are required.
2. The design only applies for ground and foundation levels as shown on the drawings
3. Backfill foundation walls so that the level of fill on one side of the wall is never more than 450 above the level on the other side except where detailed retaining walls are used

CONCRETE

1. All concrete work in accordance with AS 3600-2018 and all bridge/culvert construction work to be in accordance with AS5100-2004
2. Concrete to be formed as required by AS 3610 and compacted in accordance with AS 3600 and AS 3610 to achieve specified or relevant density durability and strength
3. All reinforcing fabric to be lapped one mesh panel minimum and reinforcement bars lapped 40 bar diameters U.N.O.
4. Provide concrete strengths below to relevant structural items
   Pad Footings f'c = 32 MPa Strip footings f'c = 32 MPa
   Ground Slab f'c = 32 MPa Slabs Beams and Columns f'c = 32 MPa
   Other Specify Slabs & Concrete Panels exposed to open environment within 1 km of coast f'c=40 MPa
   Maximum slump of 75mm Maximum aggregate size 20mm
5. Sizes of concrete elements do not include thickness of applied finishes
6. Do not make any construction joints, holes or chases in the concrete elements unless shown or approved by the Engineer
7. Do not place pipes or conduits within the concrete cover to reinforcement
8. Reinforcement notation
   N = Grade 500 deformed bar to AS 4671 T = Top of element TM = Trench Mesh
   R = Grade 250 plain round bar to AS 4671 B = Bottom of element EW = Each Way
   SL = Grade 500 square mesh to AS 4671 UNO = Unless Noted Otherwise
   CTS = Centres C/S = Courses
   RL = Grade 500 rectangular mesh to AS 46 L = Grade 500 trench mesh to AS 4671
   eg 8 N16 @ 200T = 8 deformed bars 16 diameter at 200 centres placed at top of element
9. Provide clear concrete cover to reinforcement as follows: UNO

ELEMENT	INTERIOR	EXTERIOR	EXTERIOR(against ground)
Footings	NA	NA	45mm
Columns, Pedestals	30mm	50mm	45mm
Slabs, Walls	30mm	50mm	45mm
Beams	25mm	50mm	45mm
Block work	20mm from appropriate outside face		

10. Recommend using maximum bar chair spacing of 60 diameters for supporting bars and 75 diameters for fabric
11. Provide laps only at locations shown unless otherwise approved by the Engineer
12.Reinforcement lap splice lengths (UNO on drawings) as follows

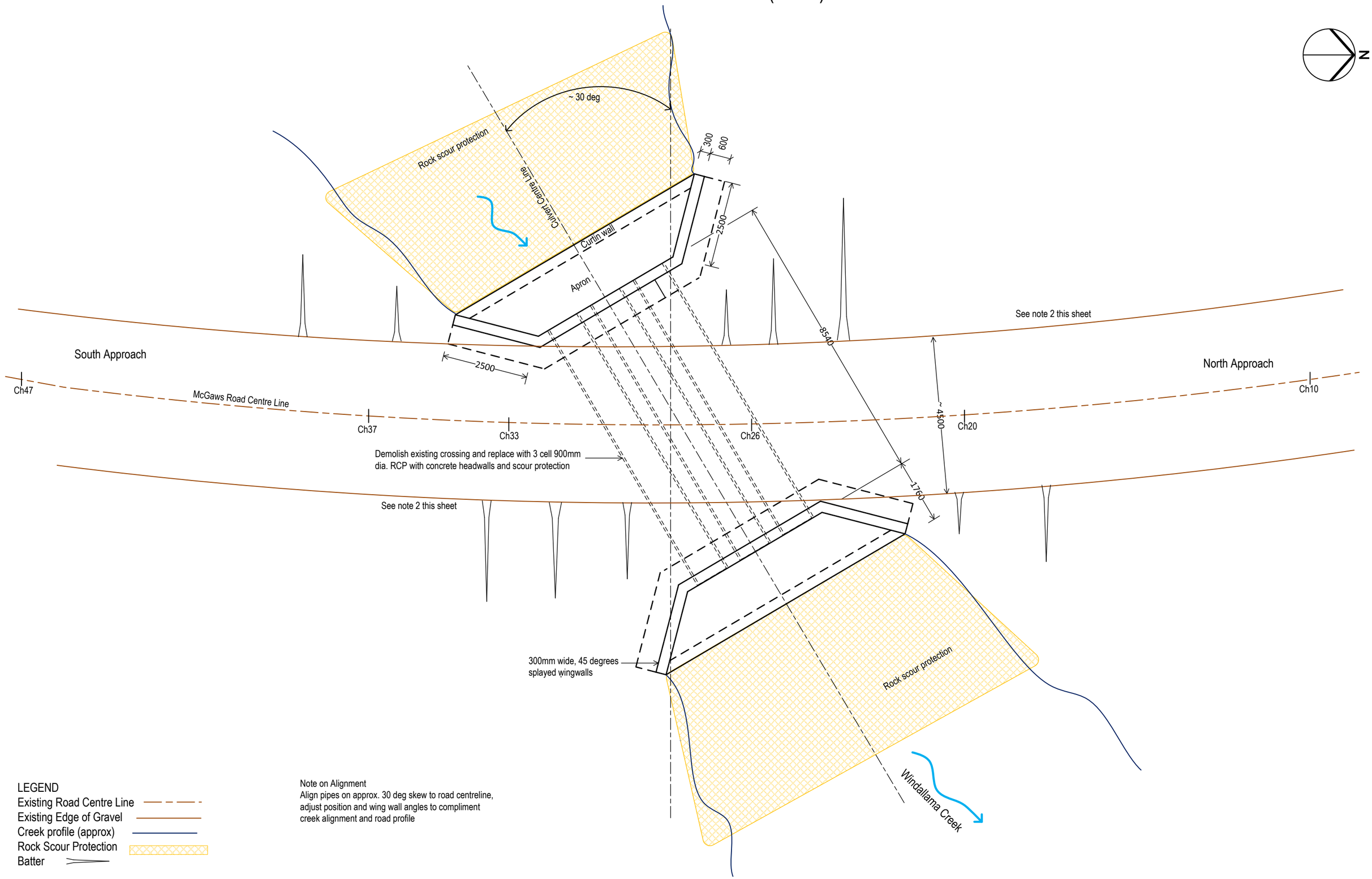
EXPOSURE CLASSIFICATION	F'C (Mpa)	DEFORMED BAR DIAMATER								
		N10	N12	N16	N20	N24	N28	N32	N36	N40
B1	32	450	550	800	1000	1250	1500	1800	2100	2400
B2	40	400	500	700	900	1100	1350	1600	1850	2150
	50	400	500	650	800	1000	1200	1450	1700	1950
C,C1 & C2	50	400	500	650	800	1000	1200	1450	1700	1950

13. For rectangular fabrics place top fabric main wires uppermost and bottom fabric main wires lowermost in direction of arrows
14. Supply and lay fabric in flat sheets., overlap 1st and 2nd cross wires of each sheet by 30mm at laps
15. Do not weld reinforcement unless shown or approved by the Engineer
16. Reinforcement is shown diagrammatically and not necessarily in true position
17. All concrete shall be placed and cured in accordance with Section 19 AS 3600. Where curing compound is used it must be applied (A) onto slabs within 2 hrs of finishing operation and (B) onto walls and columns immediately after removal of framework

BITUMINOUS PAVINGS

Where bituminous pavings are required, all work must be carried out in accordance with an approved construction specification

McGAWS ROAD CULVERT PLAN (1:100)

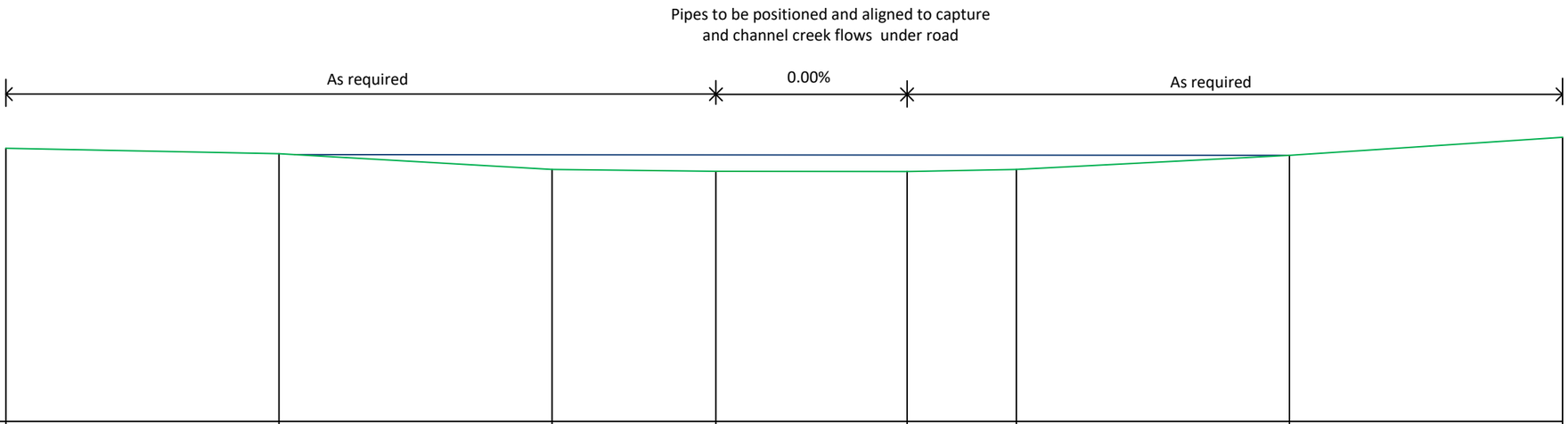


LEGEND
- Existing Road Centre Line
- Existing Edge of Gravel
- Creek profile (approx)
- Rock Scour Protection
- Batter

Note on Alignment
Align pipes on approx. 30 deg skew to road centreline, adjust position and wing wall angles to compliment creek alignment and road profile

MCGAWS ROAD CAUSEWAY LONG SECTION (1:100)

Road Approachs – Compacted road gravel fill to culvert approaches to be phased into existing road surface using an acceptable safe approved vertical alignment



Datum RL 90								
Design Level		100.285	100.285	100.285	100.285	100.285	100.285	
Existing Level	99.965	99.8	99.225	99.155	99.155	99.225	99.74	100.14
Chainage	0	10	20	26	33	37	47	57

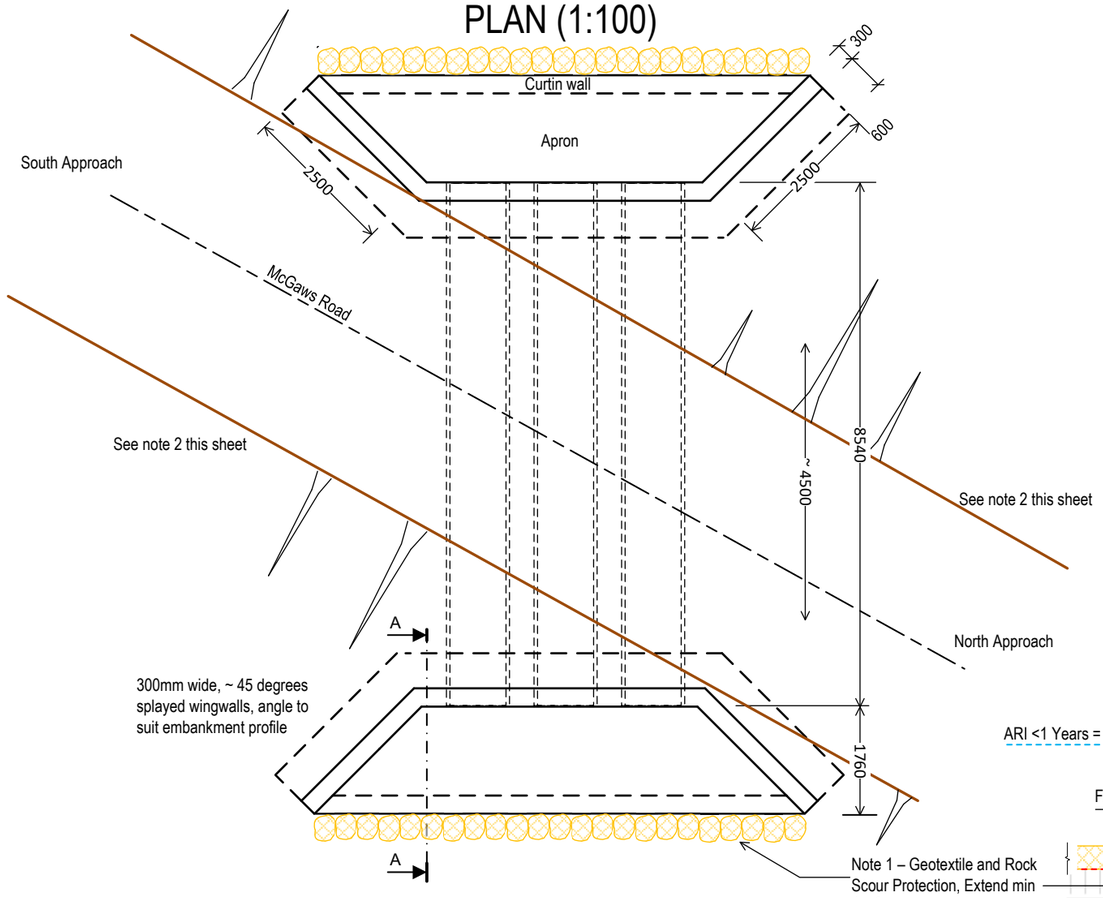
99.8

LONG SECTION
H-1:100 V-1:100

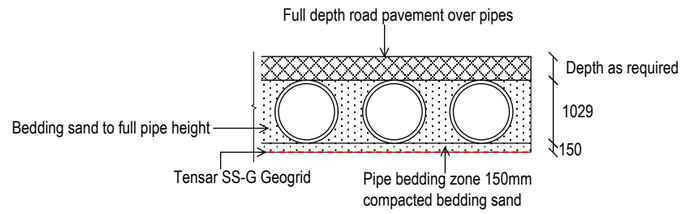
Note: Levels are arbitrary and not referenced to AHD

MCGAWS ROAD CAUSEWAY ROAD CULVERT PLANS AND ELEVATIONS

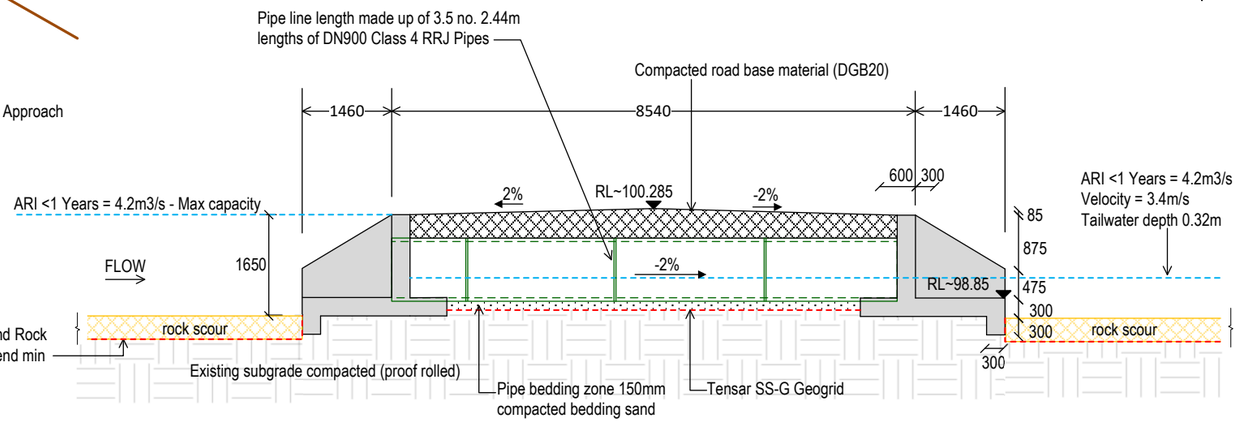
PLAN (1:100)



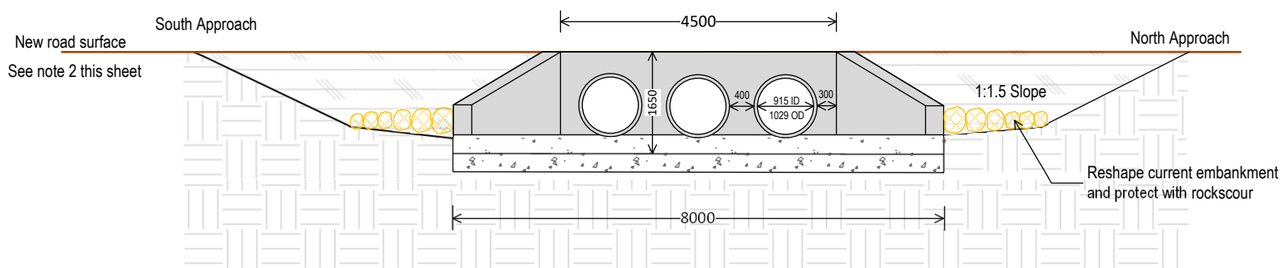
TYPICAL PIPE EMBEDMENT SECTION (1:100)



TYPICAL CULVERT CROSS SECTION (1:100)



TYPICAL HEADWALL ELEVATION(1:100)



Note 1 - SCOUR PROTECTION
-Rock placed as scour protection to Culvert Inlet and outlet for flood flow velocities up to 3.4m/s. This requires the use of heavy duty geotextile layed and anchored over earth filled batters and weighted down with solid rocks which are sized D50 (400mm). d50 = nominal rock size (diameter) of which 50% of the rocks are smaller (i.e. the mean rock size).
-The voids between the larger rocks should be filled with smaller rocks or concrete.
- Shape batters to no steeper than 2H to 1V
- Lay heavy duty geotextile over batters (Bidim A39 min. strength grade or similar)
- Place rocks so that they interlock and minimise voids and fill voids with smaller rocks
- Rocks should be hard and intact (basalt, granite or similar)
- Scour Protection to extend 5m from edge of apron
- Place Jute Mesh on all batters in excess of 1:2 and greater than 500mm from the edge of the road.
- Re-vegetate all disturbed rea once works are complete. All areas requiring re-vegetation are to be ameliorated and roughened before seed is spread.

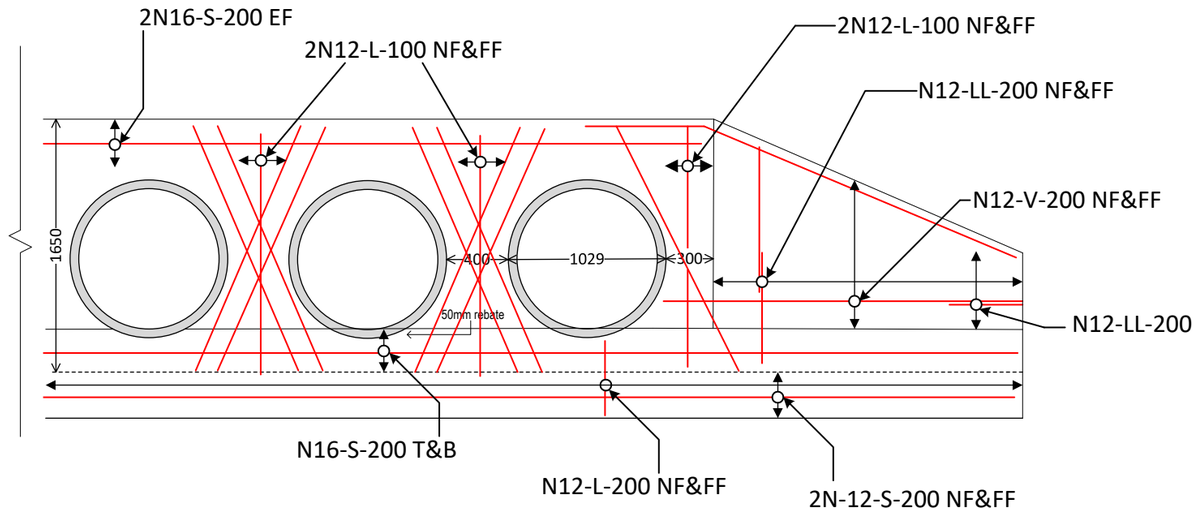
Note 2 - CULVERT ROAD APPROACHES
Compacted road gravel fill and seal to bridge approaches to be phased into existing road surface using an acceptable safe approved vertical alignment

Note 3 – SUBSURFACE CONDITIONS
-clayed sandy gravel and clays
-100 kPa allowable bearing capacity required
(provides for FOS and 5.0 mm long-term settlement)
-Improve subgrade if required using:
-100 to 150 mm thick base course gravel, or
-250 mm thick 40mm DGS crushed rock, or
-700 to 750 mm thick single layer of select crushed rock fill wrapped in heavy duty geofabric

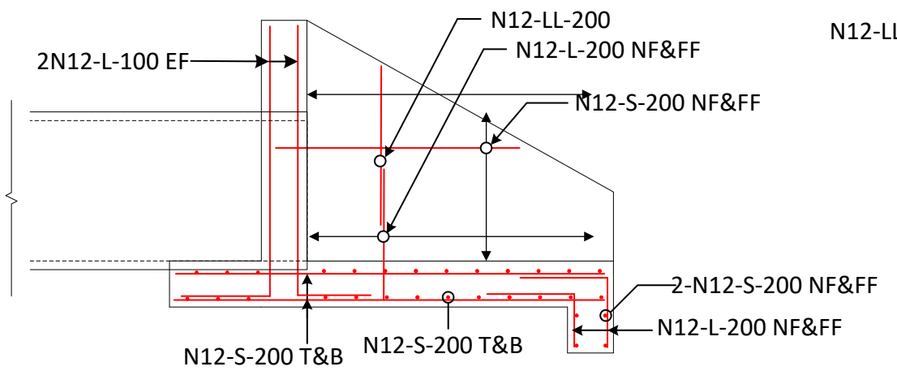
Note 4 - Levels are arbitrary and not referenced to AHD

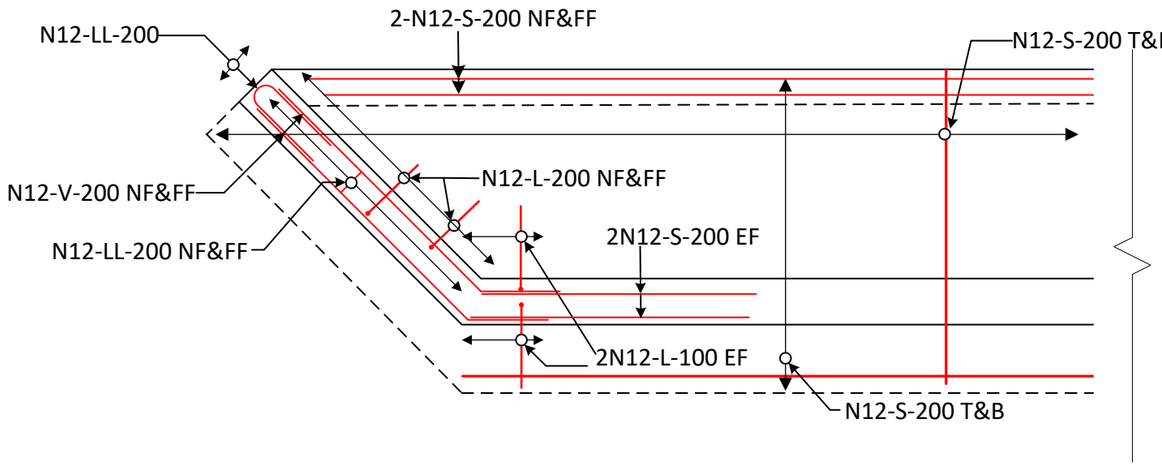
Note 5 - Pipes to be positioned and aligned to capture and channel creek flows under road

WINGWALL AND APRON REINFORCEMENT VIEW (1:40)



WINGWALL AND APRON REINFORCEMENT SECTION AA (1:40)





WINGWALL AND APRON REINFORCEMENT – PLAN (1:40)

Reinforcement Notes
Scales as shown
Clear cover to reinforcement nearest to the concrete surface 45 mm USO.

Abbreviations

FF Far Face	NF Near Face
EF Each Face	EW Each Way

USO unless specified otherwise.

Reinforcement Notation
10 - 16 – S – 2A – 300EF

- 300EF — information for placing
- 300 — spacing along limit line
- S — structure element denotation
- 2 — bar shape number in sequence
- A — bar shape code
- 16 — bar size in millimetres
- 10 — number of bars in set

Table 1 - Lap Splice Welds for Reinforcement

Bar Size	Single Lap Weld	Double Lap Weld
6	40	25
8	50	25
10	65	35
12	75	40
16	100	50

The minimum length of laps shall be as follows USO:

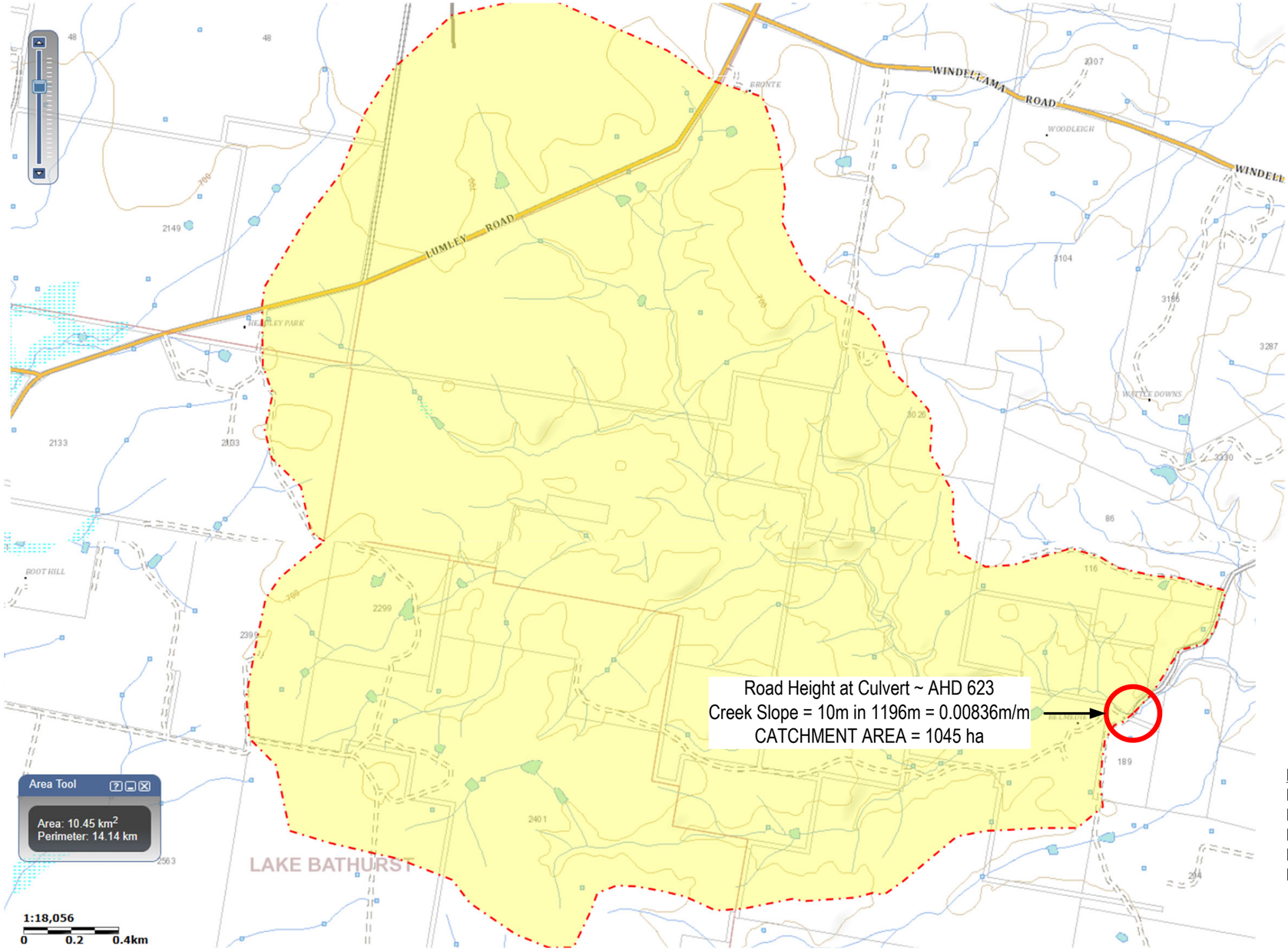
Bar Size	N12	N16	N20	N24	N28	N32
Horizontal bars with >300mm oc concrete cast below bar	375	500	700	900	1200	1500
Other bars	300	400	600	750	950	1200

Reinforcement may be displaced slightly to clear embedded objects, holes and recesses.
Tack welding of reinforcement for location purposes is to be in accordance with AS1554.3 clause 3.3.

General Notes
1. Australian standard bar shapes are in accordance with AS1100.501. Bar size is the nominal diameter in millimetres or the AS4671 fabric size.
2. Bars shall be deformed bar grade D500N to AS4671 USO.
3. W denotes plain bar grade D500L to AS4671.
4. Bars of diameter greater than 16mm shall not be rebent.
5. A welded lap may be used in lieu of stirrup hooks. See Table 1 for size and length of weld. Welding procedures to AS1554.3
6.Concrete mix: f/c = 32mpa unless noted otherwise

CATCHMENT AND FLOWS TO CAUSEWAY ON WINDELLAMA CREEK (scale as shown)

NOTE THESE DESIGN FLOWS HAVE BEEN DETERMINED FROM AN ESTIMATED CATCHMENT AREA OF 1045ha AND USING DATA FROM AUSTRALIAN RUNFALL AND RUNOFF



Flows at existing culvert Location (Catchment Area = 1045ha)
Flow at Causeway for ARI = 1 year = 15.7 m3/s
Flow at Causeway for ARI = 2 year = 21.0 m3/s
Flow at Causeway for ARI = 5 year = 28.0m3/s
Flow at Causeway for ARI = 10 year = 33.6 m3/s
Flow at Causeway for ARI = 20 year = 41.0 m3/s

Attachment 2: Project area due diligence

Aboriginal Cultural Heritage Due Diligence Assessment - McGaws Road, Windellama Creek - Past Traces Heritage Consultants. Date: 14 November 2024

PastTraces Heritage Consultants

Aboriginal Cultural Heritage Due Diligence Assessment

McGaws Road, Windellama Creek

Report Prepared for Ecology Consulting Pty Ltd

Date 14/11/2024

www.pasttraces.com.au

email: office@pasttraces.com.au

Document Control

Revision	Date	Author	Reviewed
V1	16/08/2024	E. Scorsini N. Cracknell	L. O'Brien
V2	14/11/2024	L OBrien	

Disclaimer

Past Traces Pty Ltd has undertaken this assessment in accordance with the relevant Federal, State and Local Government legislation. Past Traces accepts no liability for any damages or loss incurred as a result of use for any purpose other than that for which it was commissioned.

Restricted Information

Information contained within this report is culturally sensitive and should not be made publicly available. The information that is restricted includes (but is not limited to):

- Maps, Mapping Grid Reference Co-ordinates or images for Aboriginal heritage sites, places and objects.
- Location or detailed information regarding places of Aboriginal cultural significance, as expressed or directed by Representative Aboriginal Organisations, Aboriginal elders, or members of the wider Aboriginal community.
- Other culturally appropriate restricted information as advised by Aboriginal representatives and traditional knowledge holders.

Information in the report covered by the above categories should be redacted before being made available to the general public. This information should only be made available to those persons with a just and reasonable need for access.

www.pasttraces.com.au

email: office@pasttraces.com.au

CONTENTS

EXECUTIVE SUMMARY

This report provides Aboriginal heritage due diligence advice for the proposed preparation of an REF for culvert repairs and associated creek crossing works including a material stockpile. The project area is located along McGaws Road, Windellama and encompasses the concrete culvert crossing across Windellama Creek with a 50x20m material stockpile located along the southern road verge, 50m southwest of the culvert. The project area has been significantly impacted by the construction of McGaws Road and its ongoing use. The study area is shown on Figure 1 in a regional context with details of the proposed works in Figure 2.

This Due Diligence heritage assessment has been undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a).

The proposal would involve the following impacts:

- Sealing cracks and road repair
- Replacing sections of creek crossing if necessary
- A 50x20m material stockpile along the road verge

No heritage sites or areas of Potential Archaeological Deposit (PAD) were identified within the project area based on a review of previous reports and field survey of the project area.

Field survey was undertaken across the project area in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b). The field survey covered areas up to the road corridor. Ground visibility was exceptionally high during the field survey along the dirt and gravel roads, as well as the road verges. However, in the grass-covered areas beyond the verges, visibility ranged from low to moderate. No heritage sites or areas of potential were identified during the survey.

As a result of the field survey and background research completed for the project, the following recommendations have been developed:

- The development proposal should be able to proceed with no additional archaeological investigations. No areas of potential archaeological deposits or heritage sites have been identified within the development area and the potential for Aboriginal or historical heritage objects within the development area has been assessed as low.
- All Aboriginal objects are protected under the *NSW National Parks and Wildlife Act 1974*. It is an offence to disturb an Aboriginal site without a consent permit issued by NSW Heritage. Should any Aboriginal objects be encountered during works then works must cease and the find should not be moved until assessed by a qualified archaeologist.
- In the unlikely event that human remains are discovered during the construction, all work must cease. NSW Heritage, the local police and the appropriate Local Aboriginal Land Council (LALC) should be notified. Further assessment would be required to determine if the remains are Aboriginal or non-Aboriginal.

www.pasttraces.com.au

email: office@pasttraces.com.au

- Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation.

www.pasttraces.com.au

email: office@pasttraces.com.au

1 INTRODUCTION

This report provides Aboriginal heritage due diligence advice for the proposed preparation of an REF for culvert repairs and associated works including a material stockpile. The project area is located along McGaws Road, Windellama and encompasses the concrete culvert crossing across Windellama Creek with a 50x20m material stockpile located along the southern road verge, 50m southwest of the culvert. The project area has been significantly impacted by the construction of McGaws Road and its ongoing use. The study area is shown on Figure 1 in a regional context with details of the proposed works in Figure 2.

This Due Diligence heritage assessment has been undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a).

The proposal would involve the following impacts:

- Sealing cracks and road repair
- Replacing sections of creek crossing if necessary
- A 50x20m material stockpile along the road verge

These works are high impact and would have a negative impact if any heritage sites are located within the project boundary. Heritage sites may be located on the surface or subsurface in areas of high potential for the preservation of archaeological remains of historical events or past usage by Aboriginal groups.

To assess the potential impacts of the proposed works on heritage this Due Diligence Heritage Assessment has been undertaken.

This report, field survey and associated research has been conducted in accordance to the requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010a).

1.1 PROJECT OBJECTIVES

The due diligence assessment is being undertaken to complete the following objectives:

1. Review of the NSW Heritage Aboriginal Heritage Information Management System (AHIMS), to identify any recorded Aboriginal heritage sites within the project area.
2. Review of historic registers to identify any historic heritage.
3. Review of previous reports in area to develop predictive model of site location
4. Assess landforms present in project area against predictive model to determine potential for heritage sites and determine level of disturbance
5. Complete site visit to visually inspect impact areas or areas assessed as holding potential based on predictive model and record any identified heritage sites. The site visit will also document levels of disturbance within project area.

www.pasttraces.com.au

email: office@pasttraces.com.au

6. Complete due diligence report with management recommendations to avoid or minimise impacts within the project area.

1.2 ABORIGINAL CONSULTATION

Due to the small size of the project area no consultation with the local Aboriginal community has been undertaken. Consultation with the Aboriginal community is not a requirement of the Due Diligence Code of assessment, which is undertaken at the preliminary planning stage of the project.

If the assessment finds that impacts to Aboriginal heritage will occur as a result of the development then consultation will be undertaken with the Local Aboriginal Land Council (LALC) and the wider Aboriginal community, in accordance with the consultation guidelines required by NSW Heritage.

www.pasttraces.com.au

email: office@pasttraces.com.au

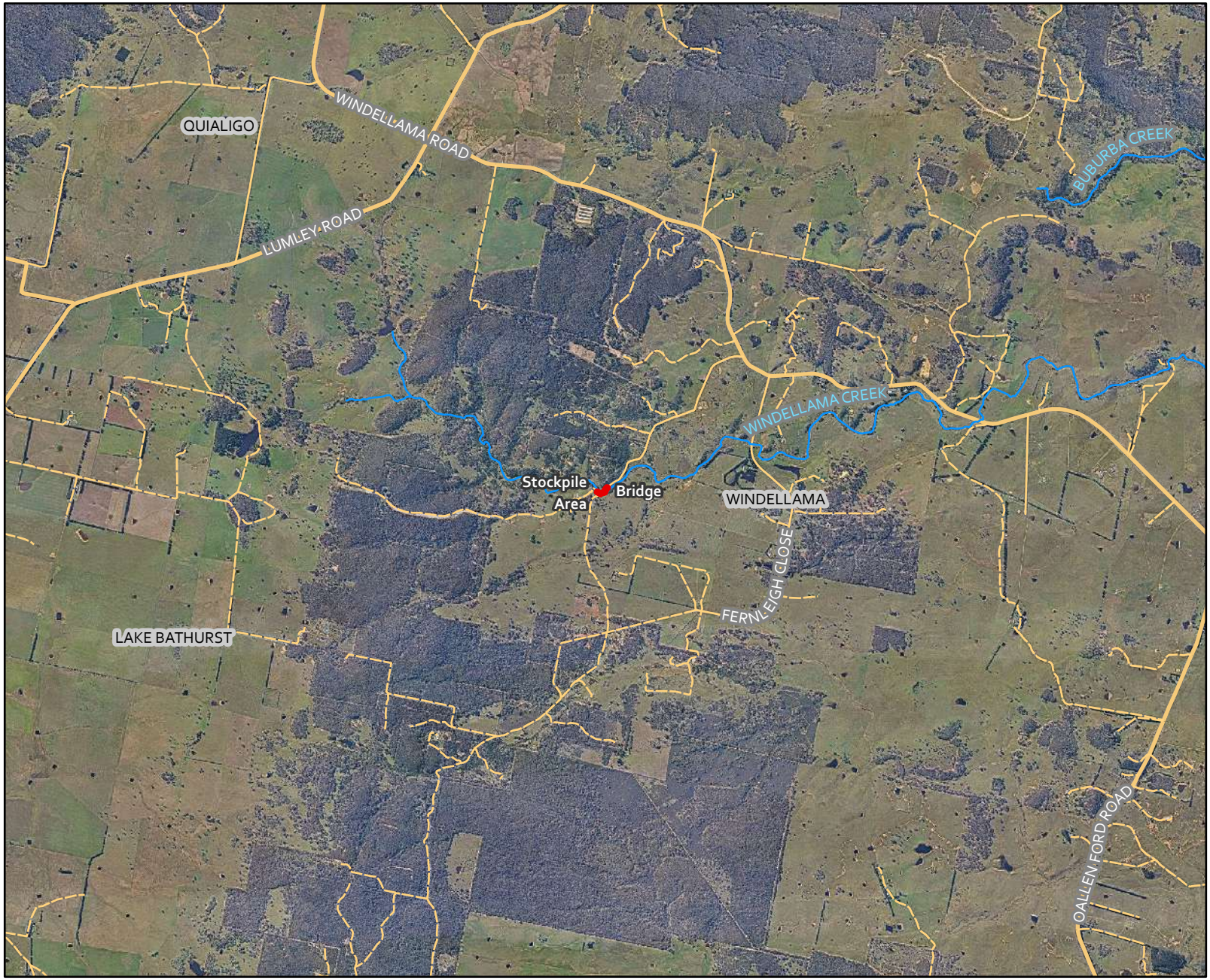


Figure 1: Regional Context

Legend

- Major Road
- Minor Road
- Track-Vehicular
- Watercourse
- Project Area

N

1:50,000

0 0.5 1 2

Kilometers
Coordinate System:
GDA 1994 MGA Zone 55

Imagery: © Nearmap

PastTraces Heritage Consultants

Figure 2: Study Area

Legend

- Contour -10m
- Watercourse
- Minor Road
- Track-Vehicular
- Project Area
- Cadastre

N

1:1,000

0 10 20 40

Meters
Coordinate System:
GDA 1994 MGA Zone 55

Imagery: © Nearmap

PastTraces Heritage Consultants

2 DESKTOP ASSESSMENT RESULTS

2.1 ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM (AHIMS) SEARCH

A search of the NSW Heritage AHIMS database was undertaken on the 1st August 2024 covering the 5km surrounding area centred on the project area. The extensive search revealed no previously recorded heritage sites within the project area and no sites within the wider 5km search area.

Heritage assessments have been undertaken in increasing frequency due to the level of increased development within the Goulburn/Bungendore region and increased legislative requirements within NSW. These studies have resulted in a site location model being developed for the region. This model predicts the majority of sites will consist of small artefact sites located on level ground or terrace features in proximity to water sources, with larger sites with subsurface deposits being present in proximity to water features such as a creek confluence or major water sources. This is directly applicable to the project area.

2.2 HISTORICAL HERITAGE SEARCH

Within NSW Local government is responsible for managing heritage items. This responsibility is mainly fulfilled by listing heritage items in the Local Environmental Plans (LEPs) under the Environmental Planning & Assessment Act 1979. Council approval is required to impact any listed item.

Heritage items can also be of 'state significance' in which case they are listed on the NSW Heritage Register by the NSW Heritage Council under the Heritage Act 1977. These items are usually substantial and consist of buildings, bridges or other structures that represent events in the local area.

A search of the NSW Heritage Register and the Goulburn-Mulwaree LEP 2009 was undertaken for the project. No historical items were located during these searches. A review of historical parish maps was also undertaken with no known structures or items identified within the project area.

2.3 ABORIGINAL GROUPS WITHIN THE PROJECT AREA

The two major language group identified in the Goulburn region by Norman Tindale in his seminal work on Aboriginal tribal boundaries are the Gundungurra (Gandangara) to the north of Goulburn and the Ngunnawal people, also known as the Yass tribe, Lake George Blacks or Molonglo tribe to the south. The boundaries of the Ngunawal ran to the southeast where they met the Ngarigo at the Molonglo and the Wiradjuri in the Yass region (Tindale 1974). This distribution with minor amendments is still accepted and the review of tribal boundaries undertaken in the 1990s (Horton 1996) confirmed these earlier linguistic divisions.

www.pasttraces.com.au

email: office@pasttraces.com.au

One of the best sources for observations of the Indigenous inhabitants of the Goulburn region is Charles MacAlister (1907) and William Govett (1844) who lived in the district from the 1830s and noted many features and traditions of Aboriginal life. Their observations must be viewed as from a white perspective and filtered through his cultural traditions as with all cross-cultural ethnography but despite these limitations their work is a valuable reference for the region. Their reflections on the Aboriginal life of the region provide a glimpse of a functioning hunter and gatherer lifestyle with a cycle of repeated visits to areas at times of seasonable resource availability and a ceremonial life that imposed duties and responsibilities on members of the group.

The flat, rolling topography of the region and the lack of natural physical barriers (such as impassable gorges or rivers) would have facilitated contact and movement through the region. Broad ridgelines were often used for travelling distances through country, avoiding steep valleys and river gorges to reach resource areas. An early recorder of Aboriginal life, Govett, recorded that the Wollondilly River frontage was a focus of activity with eels, swans, ducks and other water birds being staples along with kangaroos, wallabies, possums, bandicoots, and emus (Govett 1977:29). These observations on Aboriginal life and the role of the Wollondilly are consistent with the later remembering's of MacAlister (1907:88).

Disease followed the settlement of the area and may have preceded it with the smallpox epidemic originating in Sydney in 1789 possibly spreading throughout the region (Flood 1980:32). This disease would have decimated the Aboriginal population and was followed by Influenza in 1846. The notable decline of the number of the Aboriginal people was noted in 1845 at Bungonia and in 1848 at Goulburn by the Bench of Magistrates (Tazewell 1991:244).

2.4 PREVIOUS HERITAGE STUDIES

The Project Area is located in the Goulburn Plains within the Southern Tablelands. Regional models of Aboriginal landscape and resource use, along with models of intensity of utilization and number of Aboriginal occupants have been developed for the Goulburn region (Koettig and Lance 1986, Fuller 1989). There are no reports that cover the region of the Project Area with assessments namely undertaken for residential subdivisions and infrastructure projects. The most relevant reports for the current project are summarised below.

A detail analysis of a site on the southeast. corner of Lake Bathurst has been carried out by Dr I. McBryde of the ANU. This site occurred in a beach deposit at about 40 cm below the current land surface and just above one of two gravel bands recorded from this beach. Over 6000 artefacts have been recorded from this site with the maximum artefact density being 326 in a 100sqm area, ie. about 3/sqm.

Williams Barber Archaeological Services in 1994 undertook an archaeological survey of proposed clay extraction and landfill site at 'Minda' via Windellama near Lake Bathurst, NSW. The first concentration of artefacts from area A was located on the edge of a large but shallow pit. The site consisted mainly of grey and red/grey silcrete, flakes, flaked pieces and a very small grey silcrete blade core. The second

concentration was found eroding out of the inner edge of the same pit about 15km away. It consisted of a similar range of materials with silcrete most common.

Archaeological Heritage Surveys in 2007 completed a survey over a large area of land, to the south east of Lumley Road and to the north of the current project area. This survey was the first on the property and identified a number of open artefact scatters. The sites were concentrated on areas near tributary creeklines.

Navin Officer Heritage Consultants completed a survey for the Goulburn Aerodrome Park on Windellama Road in 2008. Field survey did not identify any heritage sites with one area of potential identified on a flat spurline west of Gundary Creek, a major tributary creekline for the region. The overall area was classified as holding low potential.

In 2022, Past Traces undertook a due diligence assessment of 684 Windellama Road, Gundary. The project area was situated in an area of low slope flats adjacent to a tributary to Gundary Creek. No heritage sites were identified and no areas of PAD.

In 2023, Umwelt undertook heritage investigations for the proposed Gundary Solar Farm located 500m south of the current project. This large project area covered an approximate 706ha that resulted in the identification of 18 Aboriginal heritage sites, consisting namely of artefact scatters located in conjunction with Quialigo, Bullamalito and Gundary Creeks.

Past Traces Pty Ltd undertook a Heritage Assessment at 138 Sunninghill Dr Windellama in 2023. No heritage sites or areas of Potential Archaeological Deposit (PAD) were identified within the project area based on a review of previous reports and field survey of the project area.

In 2024, Past Traces Pty Ltd undertook a Due Diligence Heritage Assessment at 877 Windellama Rd, Gundary. No Aboriginal heritage sites were identified within the project area based on a review of previous reports and field survey of the project area. An area of Potential Archaeological Deposit (PAD) was recorded (WR-Gundary PAD1) again near Gundary Creekline.

Based on these previous studies in the wider Gundary and southern Goulburn region, the landforms with the most potential for heritage sites would be located overlooking creek lines on lower slopes or level terrace features. These sites would most likely consist of isolated finds or small artefact scatters and may be associated with subsurface deposits in undisturbed areas.

2.4.1 Predictive Model

Based on the previous assessments completed through the region site locations and types can be summarised as follows:

- Most open artefact scatters are located near creek lines, particularly on reasonably level, elevated ground and low gradient basal slopes
- Relatively large artefact scatters occur most frequently within 100-150m of major drainage lines, with a possible preference for creek confluences,

- Artefact scatters occurring away from major creek lines tend to be small and sparse,

The following predictive model has been developed for the project area (Table 2) based on a review of topographic maps and aerial photography.

Table 1 Site Prediction Model

Probability	Site Type	Definition	Landform
Low to Moderate	Isolated finds and surface scatters of stone artefacts	Stone artefacts ranging from single artefact to high numbers	Any landform, but more common along creek lines and spur crests – Project area is highly disturbed, but adjacent to Windellama Creek
Low	Potential Archaeological Deposits (PADS)	Area considered on landform to hold higher potential for unidentified subsurface deposits	Varies, but most frequent on elevated terraces along creek lines and spurlines - Project area is highly disturbed, but adjacent to Windellama Creek
Low	Culturally Modified Trees (CMTs)	Trees which have been modified by scarring, marking or branch twining	May be present on old remaining trees - Most old growth trees have been removed
Nil	Rock Engravings	Images engraved on flat rock surfaces	Escarpments, rock platforms or rock shelters - not present
Nil	Stone arrangements	Arrangements of stones by human intention, including circles lines or patterns.	Crest lines or large ceremonial areas on creekflats, - not present
Nil	Stone quarries/Ochre sources	Quarry sites where resources have been mined.	Any landform that has not been disturbed – not present
Nil	Axe grinding grooves	Grooves in stone caused by the grinding of stone axes	Usually in creek lines, as water is used as abrasive with sand - not present
Nil	Burials	Burials of Aboriginal persons	Usually requiring deep sandy soils on eastern facing slopes – not present
Nil	Aboriginal places	A place that hold spiritual, traditional or historical significance to Aboriginal people	Any landform, identified through consultation with RAPs and historical sources

www.pasttraces.com.au

email: office@pasttraces.com.au

2.5 LANDFORM AND DISTURBANCE LEVEL ASSESSMENT

The landforms within the project area consist of a level area along the road verge considered under the predictive model for the area to hold low potential for heritage sites. Water sources are present in the form of Windellama Creek.

The area is heavily impacted by the construction of the creek crossings, landscaping and continued grading of roads and the deposition of road base and gravel materials. All of these landscape and soil impacts reduce the potential for archaeological or heritage sites to remain intact within the landscape.

Review of previous Aboriginal sites located in the vicinity indicates a site location model based on level areas in proximity to water resources such as creek lines with smaller sites located on hilltop ridgelines. The study area consists of an area adjacent to creek line but with high degree of disturbance and classified as holding low overall low potential for heritage sites.

As a result of the landform assessment the study area contains low potential to contain any unrecorded heritage sites or areas of PAD and has suffered a high degree of previous impact. An aim of the field survey will be to investigate the potential of the landforms, along with the degree of disturbance to verify the desktop findings.

3 FIELD SURVEY RESULTS

A field survey of the project area was undertaken on the 14th August 2024 to verify the findings of the desktop review of landforms and disturbance. The aim of the investigation was to identify heritage objects or places of potential archaeological Deposit (PAD). Based upon the background research, known Aboriginal site patterning, and current aerial photography, the areas of the creek crossing, material stockpile location and surrounding landforms were inspected.

All surveyed areas and items of interest were recorded on a topographic map of the study area (using a GPS and GDA94 MGA55 coordinates), along with levels of visibility, erosion, soil conditions, and evidence of land disturbance.

Ground surface visibility (GSV) is the percentage of ground surface that is visible during the field inspection. GSV increases in areas of exposures such as stock impact trails, roads, gates and along areas of erosion such as creek banks and dam walls. As a result, surveys undertaken in areas with high exposure rates result in a more effective survey coverage.

The site visit resulted in the following findings.

3.1.1 Ground Surface Visibility

GSV over most of the study area was high long the dirt/gravelled roads and road verges, with low to moderate GSV (30-40%) in the grass covered areas outside of the verges. Bare earth was visible in large exposures and in the waterlogged areas as result of the road gully. Across the project area the average GSV was estimated at 70%.

The conditions at the time of the field survey are shown in plates 1 to 6.

Plate 1. Northern extent of McGaws Road Windellama Creek crossing (Facing southwest)

Plate 2. View of highly disturbed banks of Windellama Creek (west)

www.pasttraces.com.au

email: office@pasttraces.com.au

Plate 3. Eroded bank of Windellama Creek

Plate 4. View across creek crossing project area (northeast)

Plate 5. View across McGaws Road verge and material stockpile location (northwest)

Plate 6. Western end of proposed material stockpile location and concrete culvert (southeast)

3.1.2 Disturbance

The degree of disturbance across the study area was high. The ground is predominantly shale, covered with a thin layer of topsoil, and scattered with shale gravel. Windellama Creek runs across the road, and the area has been extensively affected by the construction of the creek crossing, landscaping activities, ongoing road grading, and the deposition of road base and gravels.

Due to these impacts, the study area is considered to have undergone a high degree of disturbance. The exposed shale and thin soil layers suggest that no subsurface deposits are present, and the high GSV would likely have revealed any artefacts, had they been present in the area.

Disturbance across the remainder of the project area is high with disturbance present in the form of prior vegetation removal, the construction of the creek crossing, landscaping and continued grading of roads and the deposition of road base and gravel materials. The sites designated for the preparation of an REF for culvert repairs and related works, including material stockpiles, are not

situated on high-potential landforms and are therefore considered to have a low likelihood of containing heritage sites.

3.1.3 Results - Aboriginal Heritage Sites

No areas of Aboriginal heritage were identified during the field survey despite constant rate of exposures and low vegetation coverage. No known heritage sites will be affected by the proposed development.

3.1.4 Results - Areas of Potential Archaeological Deposit (PAD)

Areas of PAD are defined as landforms that hold higher potential than their surrounds to contain subsurface deposits of past Aboriginal occupation. Based on a review of previous studies completed for the region, areas of PAD would be located in association with waterways (1st or 2nd order streams) on level ground or along spur crest and ridge lines.

As a result, of the landforms and prior impacts, no areas of PAD have been identified and the project area is considered to hold low potential.

3.1.5 Summary

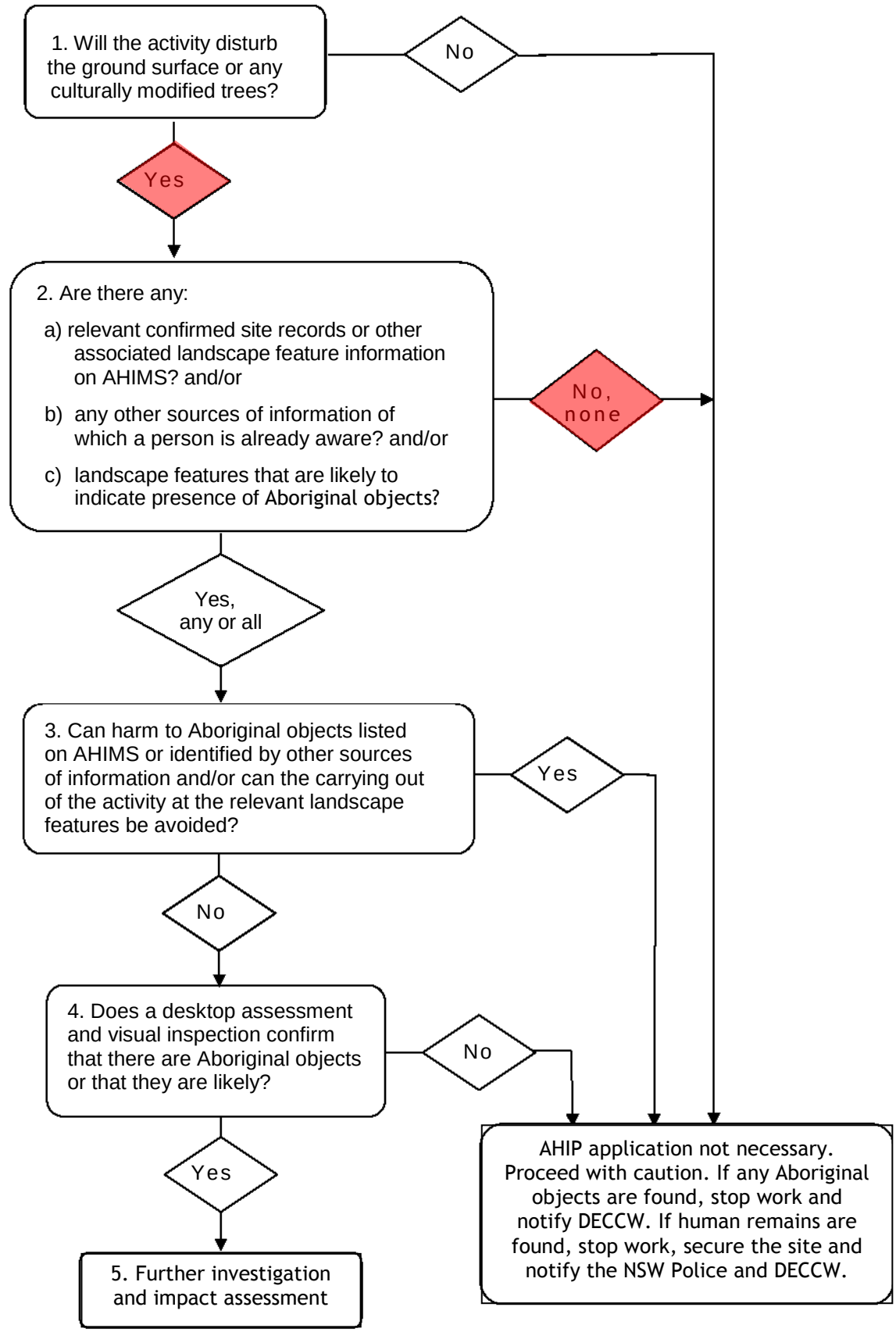
As a result of the field survey of impact areas and background research, it is considered that the project has low potential to impact on unrecorded Aboriginal heritage sites or areas of PAD. No Aboriginal heritage sites or areas of PAD were recorded or identified as a result of the assessment and no areas of high or moderate sensitivity are present in the development area based on previous research, modelling and the field survey assessment of disturbance and soils.

Based on the assessment the impacts from the project are as follows:

- No known Aboriginal objects or places will be impacted by the proposed works.
- No areas of high potential to contain unrecorded Aboriginal or historical objects or places are present in the project area.

The Aboriginal Due Diligence Code provides a flowchart of six questions to identify the presence of and potential harm to Aboriginal heritage. These questions and their applicability to the project are shown in Figure 4. The responses to these questions determine if further heritage investigations are required.

Figure 3. Due Diligence Flow Diagram (OEH 2010:10 – Due Diligence Code of Practice)



4 RECOMMENDATIONS

Based on this due diligence assessment the following actions are recommended for the project.

Recommendation 1: Works to proceed without further heritage assessment with caution.

The proposed works can proceed without further assessment as no Aboriginal or historical heritage sites (objects or places) have been identified within the project area. The potential for impacting on unrecorded heritage sites within the project area is assessed as extremely low, based on landform analysis and field survey.

Recommendation 2: Discovery of Unidentified Aboriginal cultural material during works.

Under the *NPW Act 1977* all Aboriginal places and objects are protected from harm, even if they have not been previously identified during the assessment process. If Aboriginal material is discovered during works then the steps as outlined below should be followed:

- All work must cease in the vicinity of the find and project manager notified immediately.
- A buffer zone of 10m should be fenced in all direction of the find and construction personnel made aware of the 'no go' zone.
- NSW Heritage must be notified of the find and advice sought on the proper steps to be undertaken.
- After confirmation with NSW Heritage a heritage consultation should be engaged to undertake assessment of the find and provide appropriate management recommendations to the proponent.

Recommendation 3: Discovery of Human Remains

In the highly unlikely event that human remains are discovered during any construction work, than all activity in the vicinity of the find must cease. As a first step the local police must be notified, followed by NSW Heritage and advice sought on appropriate next actions. No work can continue on the site until cleared with police and NSW Heritage.

Recommendation 4: Alteration of impact footprint

Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation.

Implementation of the above management recommendations will result in low potential for the project to impact on heritage values or result in damage to heritage sites.

www.pasttraces.com.au

email: office@pasttraces.com.au

5 REFERENCES

Archaeological Heritage Services 2007. Proposed Rural Subdivision at Lot 12 DP839842, Lot 146 DP750007 and Lot 1 D{215703 Lumley Road Bungonia Aboriginal Archaeological Assessment Report. Report to RJ Kell & Co.

Attembow V. & Hughes P. (1983). Welcome Reef Dam Prohject: Preliminary Investigations Into Aboriginal Archaeological Sites. Report to Metropolitan Sewerage and Drainage Board.

DECCW. (2010). Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales. Sydney: DECCW.

Flood, J. (1980). The Moth Hunters. Canberra: Australian Institute of Aboriginal Studies.

Fuller, N. (1989). Goulburn City-An Archaeological Investigation of Site Location. Report to Greater Argyle City Council.

Govett, W. (1977). Sketches of New South Wales: Written and illustrated for the Saturday Magazine in 1836-37. Melbourne: Gaston Renard.

Horton, D. (1996). The Encyclopidea of Aboriginal Australia: Aboriginal and Torres Strait Islander History, Society and Culture. Canberra: Aboriginal Press Studies.

Hughes,P., R.K.Barz & P.Hiscock. (1984). An Archaeological Investigation of the Bungendore Sand Quarry, Lake George NSW. Report to Corkhill Bros Pty Ltd.

Lance, A. and Koettig, M. (1986). An Aboriginal Resources Planning Study for the City of Goulburn NSW. Report to Goulburn City Council.

MacAlister, C. (1904). Old Pioneering Days in the Sunny South. Goulburn.

Navin Officer Heritage Consultants (2008). Goulburn Aeropark Windellama Road Goulburn.

Past Traces. (2022). Aboriginal Cultural Heritage Due Diligence Assessment: 684 Windellama Road, Gundary. Report to Laterals Planning.

Past Traces Pty Ltd. (2023). Aboriginal and Cultural Heritage Due Diligence Assessment 138 Sunninghill Dr Windellama, Report prepared for NSW SES.

Past Traces Pty Ltd. (2024). Aboriginal and Cultural Heritage Due Diligence Assessment 877 Windellama Rd, Gundary, Report prepared for Premise.

Tazewell, S. (1981). Early Goulburn History. Goulburn Historical Society Bulletin September .

Tindale, N. (1974). Aboriginal Tribes of Australia. Canberra: ANU Press.

Umwelt 2023. Gundary Solar Farm Scoping Report. Report for Lightsource BP.

Williams Barber Archaeological Services (1994). Archaeological Survey of proposed clay extraction and Landfill site at "Minda" via Windellama near Lake Bathurst NSW. Report for Hirst Consulting.

A.1 AHIMS SITE SEARCH

www.pasttraces.com.au

email: office@pasttraces.com.au

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Mcgaw

Client Service ID : 915825

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact	Recorders						Permits		

There are no sites found for given search criteria.

**** Site Status**

Valid - The site has been recorded and accepted onto the system as valid

Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.

Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground

Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 01/08/2024 for Elisa Scorsini for the following area at Datum :GDA, Zone : 55, Eastings : 752326.0 - 761321.0, Northings : 6116987.0 - 6123827.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 0

Ecology Consulting Pty Ltd | 42 Goulburn Street Crookwell NSW 2583
ecologyconsulting.au | ABN 68 647 633 163