Transport
for NSW

Newell Highway Flood Mitigation – West Wyalong to Forbes

Review of Environmental Factors

November 2026



NSW GOVERNMENT

transport.nsw.gov.au

Acknowledgement of Country

Transport for NSW acknowledges the Wiradjuri people, the traditional custodians of the land on which the Newell Highway Flood Mitigation – West Wyalong to Forbes project is proposed.

We pay our respects to Elders past and present and celebrate the diversity of Aboriginal people and their ongoing cultures and connections to the lands and waters of NSW.

Many of the transport routes we use today – from rail lines, to roads, to water crossings – follow the traditional Songlines, trade routes and ceremonial paths in Country that our nation's First Peoples followed for tens of thousands of years.

Transport for NSW is committed to honouring Aboriginal peoples' cultural and spiritual connections to the land, waters and seas and their rich contribution to society.



Executive summary

The proposal

Transport for NSW (Transport) proposes to upgrade a section of the Newell Highway at Marsden between West Wyalong and Forbes. The primary objective of the proposal is to reduce the number of days the Newell Highway between West Wyalong and Forbes is non-trafficable during and after flood inundation, compared to the 2022 flood event.

Key features of the proposal include:

- installing new bridge-sized box culverts
- replacing culverts that are nearing the end of their life
- extension of existing culverts
- raising the height of the existing road and installing heavy-duty pavement at identified locations
- safety improvements including shoulder widening and installation of a one-metre-wide centreline where feasible
- upgrading existing property accesses
- relocating and sealing an existing informal heavy vehicle stopping area.

The total length of the proposed works is 6.2 kilometres across four sections of the existing highway alignment between 6.4 kilometres north of the intersection with the Mid Western Highway and 1.8 kilometres south of the intersection with Wennings Road.

Need for the proposal

The Newell Highway is a major interstate transport connection and one of Australia's most important freight routes and a vital link to regional centres in western NSW. It is prone to flooding between West Wyalong and Forbes, particularly susceptible to flooding in the Lake Cowal / Bland Creek catchment at Marsden, and has a history of road closures during periods of heavy rain.

In 2022, about 20 kilometres of the highway flooded, forcing it to close for seven weeks. A flood event in 2016 closed the highway for six weeks. These extended closures resulted in significant losses in freight productivity, lengthy detours for road users, adverse impacts on local businesses and social challenges for the communities connected by the highway.

The proposal is needed to improve flood resilience and route reliability, save travel time by reducing road closures during and after flood events, keep freight moving, communities connected, and improve road safety.

Proposal objective

The primary objective of the proposal is to reduce the number of days the Newell Highway between West Wyalong and Forbes is non-trafficable during and after flood inundation, compared to the 2022 flood event.

Options considered

A staged and iterative options development process was undertaken between 2019 and 2026 to identify and develop a preferred flood mitigation solution for the proposal. The process included strategic investigations, flood and traffic modelling, stakeholder and community consultation, option development workshops, value management workshops and development of a concept design and subsequent refinement.

Early optioneering identified multiple flood mitigation opportunities along the Newell Highway. Following the strategic design process and detailed flood modelling, Transport refined the proposal to prioritise the Marsden area, where flooding was found to cause the longest road closure durations. An initial 2023 concept design proposed around 11 kilometres of flood mitigation treatments at Marsden. Following confirmation of a total funding commitment of $141 million ($50 million

Australian Government, $91 million NSW Government) for the proposal, Transport developed a revised scope focusing on 6.2 kilometres within the identified 11 kilometre section of the Newell Highway at Marsden.

The revised options assessment considered Option 1 - do nothing, Option 2 (Design option 1D) – constructing culverts at causeways J, A, B, C, D and E and Option 3 (Design option 6A) – constructing culverts at causeways J, A, B, C, D, E, G and H. The selected preferred option was Option 3 (Design option 6A). This option includes the construction of multi-cell box culverts at eight causeways and was determined to be the best option to meet the proposal objective of reducing the number of days the Newell Highway between West Wyalong and Forbes is non-trafficable during and after flood inundation, compared to the 2022 flood event.

Further design refinement will occur as the proposal progresses. This may include consideration of the number of culverts included, the extent of the proposal, and the construction method and staging.

Statutory and planning framework

The proposal is for a road and road infrastructure facilities and is to be carried out by Transport and can therefore be assessed under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). Development consent from council is not required.

An assessment of the proposal concluded that it would not significantly impact on the matters of national environmental significance protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or significantly affect threatened species or ecological communities and their habitats under the *Biodiversity Conservation Act 2016* (BC Act). A Biodiversity Development Assessment Report (BDAR) or Species Impact Statement is not required.

Community and stakeholder consultation

Transport has consulted with the community and stakeholders during the development of the proposal, including public consultation on the strategic options from 20 June to 27 July 2023.

Aboriginal community involvement and heritage impact was considered in accordance with Transport's *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI). Transport consulted with the West Wyalong Local Aboriginal Land Council (LALC) and invited Aboriginal people who hold cultural knowledge relevant to the proposal to register to be consulted in accordance with the PACHCI.

The proposal has benefited from input provided through targeted consultation during development of the concept design and preparation of the review of environmental factors (REF). The public display of the REF will broaden consultation by providing opportunities for the wider community and interested stakeholders to submit feedback on the proposal, with the aim to mitigate, minimise and manage impacts during the delivery phase.

Transport will continue to consult with the community and stakeholders as planning progresses. Information about the proposal is also available on the project webpage at: nswroads.work/ww2f

Environmental impacts

The proposal would have some environmental impacts. Where possible these impacts have been avoided through the design process. Impacts would be further managed by the implementation of safeguards and mitigation measures. Key impacts are discussed below with additional environmental factors assessed in Chapter 6 of the REF.

Biodiversity

Biodiversity assessments identified potential impacts to native vegetation, Threatened Ecological Communities (TECs) and fauna habitat. Residual impacts include:

- The removal of 55.37 hectares of native vegetation and nine scattered trees (generally isolated individual trees). This includes 1.74 hectares of vegetation commensurate with TECs listed under the BC Act, of which 0.66 hectares is also commensurate with a TEC listed under the EPBC Act.

- Direct impacts to threatened fauna habitat in the narrow band of disturbed habitat adjacent to the Newell Highway. No active breeding features for threatened species were detected within the construction boundary with direct impacts limited to foraging habitat.
- Removal of approximately 12 hollow-bearing trees.

Significant impact assessments concluded that the proposal is unlikely to have a significant impact on any NSW or nationally listed species or ecological community.

Further opportunities to avoid and minimise native vegetation or habitat removal would be investigated during detailed design and implemented where practicable and feasible. With the application of mitigation measures, it is anticipated that the level of impact to threatened fauna and flora would continue to be reduced.

The proposal would be carried out in accordance with Transport's *No Net Loss Guidelines* (Transport, 2024) and the *Tree and Hollow Replacement Guidelines* (Transport, 2024). The proposal has not triggered the NSW Biodiversity Offsetting Scheme, however, would require offsets for trees and hollows in accordance with the *Tree and Hollow Replacement Guidelines* (Transport, 2024). A Tree and Hollow Replacement Plan would be developed for the proposal.

Aboriginal heritage

An archaeological site inspection was completed in March 2026 as part of the Stage 2 PACHCI which identified five new Aboriginal sites. These sites were recorded as Aboriginal Heritage Information Management System (AHIMS) registered Aboriginal sites. These comprised of four stone artefacts sites and a possible scarred tree. Heat retainers were also associated with the stone artefact sites. Although several dozen heat retainers were identified across the study area, no hearth was identified. One additional area of sensitivity, a mature tree identified as containing cultural significance, was identified.

Construction of the proposal would directly impact two of the registered Aboriginal sites. Specifically, a low-density artefact scatter comprised of three stone artefacts and an isolated crystal quartz flake.

As impacts to Aboriginal cultural heritage cannot be avoided by the proposal, in accordance with the PACHCI guidelines, progression to a Stage 3 PACHCI is required. The PACHCI Stage 3 process has commenced.

Transport would obtain an Aboriginal Heritage Impact Permit (AHIP) for impacted sites prior to construction. Aboriginal heritage impacts would be managed in accordance with the conditions of the AHIP.

Surface water, groundwater and flooding

The proposal is located on a floodplain, with a manmade channel draining to Bland Creek located around 1.2 kilometres from the southern end of the study area, two farm dams and several culverts under the Newell Highway within the study area.

During construction there is the potential for impacts to surface water quality. These would be managed through the implementation of mitigation measures with impacts expected to be temporary and minor.

Works associated with construction of the proposal are unlikely to intercept regional groundwater systems or require significant dewatering. However, there is potential that construction works may locally encounter shallow seepage or wet ground conditions particularly following rainfall or flood events.

Modelling of the November 2022 historical flood event shows that the maximum inundation duration along the section of the Newell Highway subject to this proposal reduces from approximately 39.2 days under existing conditions to approximately 18.1 days with the proposal. The proposal is therefore likely to substantially improve the operational performance of this section of the Newell Highway during a flood event equivalent to the November 2022 historical flood event.

Overall, the broader hydraulic behaviour of the Lake Cowal floodplain remains relatively unchanged, with flooding being largely influenced by Lake Cowal. Flood modelling identified exceedances of the adopted criteria at one property during an event equivalent to the 2022 historical flood event, two properties during the 5% Annual Exceedance Probability (AEP) event and five properties during the 1% AEP event. These properties are already subject to flooding with existing flood depths

generally ranging between approximately 200 mm and 500 mm. While the proposal modelling indicates increases in flood levels at these locations, the increase is considered relatively small compared to existing flood depths and may not result in a material increase in flood impacts. Further assessment would be undertaken during detailed design to identify potentially impacted buildings and inform future design.

Traffic and transport

Construction of the proposal is expected to generate additional light and heavy vehicle movements. However, despite the proportional increase in traffic, impacts on the operation and safety of the Newell Highway and Bewleys Road are expected to be low, with no change in the level of service.

Lows Road between the Newell Highway and Lake Road is proposed to be temporarily closed during construction. Traffic would be detoured via nearby alternatives such as Wennings Road. Given the low existing traffic volumes, it is expected that limited traffic would be affected. Formal access would be maintained during construction with all informal access proposed to be closed during construction.

As the proposal does not add additional capacity to the Newell Highway or any other roads in the study area, and due to low traffic volumes, it is anticipated that free flow conditions with minimal congestion would be maintained.

Noise and vibration

The proposal is located in a rural acoustic environment. Construction noise modelling identified potential exceedances of management levels (NMLs) at five residential receivers during some construction scenarios. There is potential for sleep disturbance associated with some construction activities required to be undertaken at night. Mitigation of construction noise impacts would be through the implementation of feasible and reasonable mitigation measures in accordance with Appendix B and C of the *Construction Noise and Vibration Guideline (Roads)* (Transport, 2026).

Operational road traffic noise is not predicted to trigger requirements for noise mitigation in accordance with the *Road Noise Mitigation Guideline* (Transport, 2026).

Property

Most of the proposal is located within the existing road corridor of the Newell Highway, however some temporary construction works extend onto three Crown land lots and one private property requiring the temporary lease of 470,997 m^2 of land.

The proposal would require the acquisition of 328,660 m^2 of land from two NSW Government properties (Crown land lots). The partial acquisitions of land would be carried out in consultation with landowners and in accordance with the requirements of the *Land Acquisition Act 1991* and the supporting NSW Government Land Acquisition Reform 2016.

The proposal would impact two Travelling Stock Reserves (TSRs) managed by Central West Local Land Services (LLS). Transport has commenced engagement with Central West LLS and Department of Planning, Housing and Infrastructure (DPHI) Crown Lands.

Justification and conclusion

The Newell Highway between West Wyalong and Forbes is prone to flooding and has a history of road closures during periods of heavy rain. Extended closures of the Newell Highway result in significant losses in freight productivity, lengthy detours for road users, adverse impacts on local businesses and social challenges for the communities connected by the highway. The need to improve the flood resilience and reliability of this route has been identified as a key priority in strategies and plans at state, regional and local levels.

The proposal is unlikely to cause a significant impact on the environment or have a significant impact on Matters of National Environmental Significance (MNES), nor the environment of commonwealth land under the EPBC Act. Where minor impacts may arise, the safeguards and management measures detailed within this REF would ameliorate or minimise expected impacts.

Overall, the proposal is justified on the basis that it would improve route reliability on this section of the Newell Highway by reducing road closures during and after flood events, keeping freight moving and communities connected, and enhance safety for road users. The positive benefits of the proposal are considered to outweigh any adverse impacts.

Display of the review of environmental factors

This REF is on display for comment between Wednesday 18 November and Friday 18 December 2026. You can access the documents in the following ways:

Internet

The documents are available as pdf files on the Transport website at: nswroads.work/ww2f and on the online engagement portal at: www.haveyoursay.nsw.gov.au/ww2f

Printed copies

The documents can be viewed during the display period at the following locations:

- Bland Shire Library, 6 Shire Street, West Wyalong (10am-5pm Monday to Friday, 9.30am-12pm Saturday)
- Grenfell Community Hub, 88 Main Street, Grenfell (9.30am-5pm Monday to Friday, 9.30am-3pm Saturday, 10am-2pm Sunday)
- Forbes Shire Library, 2 Victoria Lane, Forbes (10am-12pm and 1pm-5.30pm Monday to Thursday, 10am-12pm and 1pm-5pm Friday, 10am-12pm Saturday).

Copies by request

Printed and electronic copies are available by contacting the project team on 1800 741 636 or via email at newell.upgrade@transport.nsw.gov.au, noting that there may be a charge for hard copies or USB.

Staffed displays

Drop-in consultation sessions will be held at the following locations:

- Grenfell Community Hub, 88 Main Street, Grenfell: Tuesday 1 December 2026 – drop in any time between 10.30am-12.30pm
- Bland Shire Library, 6 Shire Street, West Wyalong: Tuesday 1 December 2026 – drop in any time between 3pm-5pm
- Forbes Shire Library, 2 Victoria Lane, Forbes: Wednesday 2 December 2026 – drop in any time between 11am-1pm.

An online consultation session will also be held on Thursday 3 December 2026 – 6.30pm-7.30pm via MS Teams.

How can I make a submission?

To make a submission about this proposal, please send your written comments to:

Online: www.haveyoursay.nsw.gov.au/ww2f

Email: newell.upgrade@transport.nsw.gov.au

Mail: Newell Highway Flood Mitigation – West Wyalong to Forbes REF, 51-55 Currajong Street, Parkes NSW 2870

Submissions must be received by 18 December 2026. Submissions will be managed in accordance with the Transport for NSW Privacy Statement. A copy can be made available upon request.

What happens next?

Transport will collate and consider the submissions received during public display of the REF.

After this consideration, Transport will determine whether the proposal should; proceed; proceed with changes; or not proceed and will inform the community and stakeholders of this decision.

If the proposal is determined to proceed, Transport will continue to consult with the community and stakeholders prior to and during construction.

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1. Introduction

This chapter introduces the proposal and provides context for the environmental assessment. The proposal, the objectives and project development history are detailed and the purpose of the report provided.

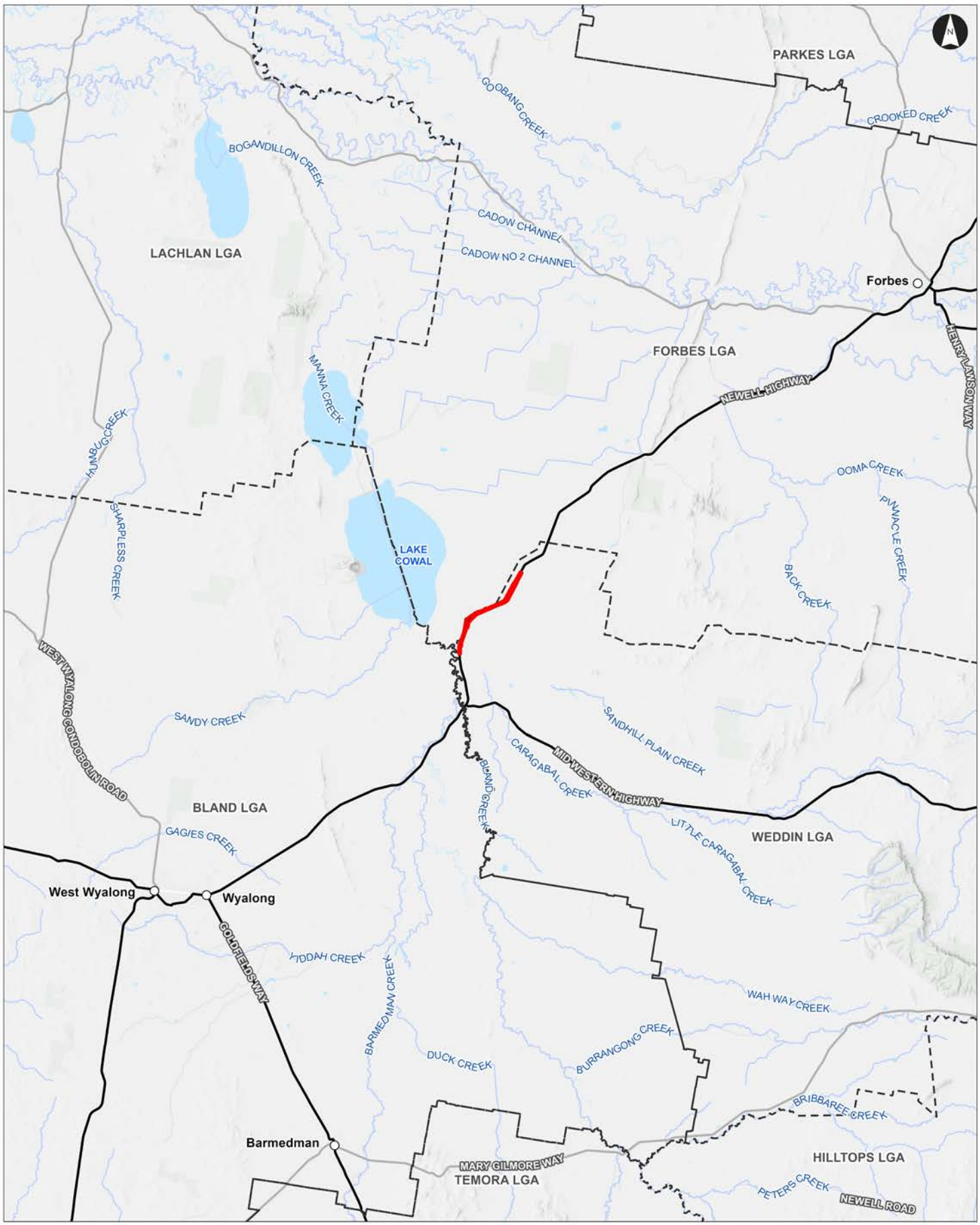
1.1 Proposal identification

Transport for NSW (Transport) proposes to upgrade a section of the Newell Highway at Marsden between West Wyalong and Forbes. The primary objective of the proposal is to reduce the number of days the Newell Highway between West Wyalong and Forbes is non-trafficable during and after flood inundation, compared to the 2022 flood event.

Key features of the proposal include:

- installing new bridge-sized box culverts
- replacing culverts that are nearing the end of their life
- extension of existing culverts
- raising the height of the existing road and installing heavy-duty pavement at identified locations
- safety improvements including shoulder widening and installation of a one-metre-wide centreline where feasible
- upgrading existing property accesses
- relocating and sealing an existing informal heavy vehicle stopping area.

The location of the proposal is shown in Figure 1-1 and an overview of the proposal is provided in Figure 1-2. Chapter 3 describes the proposal in more detail.



Proposal Locality

Newell Highway Road Upgrade
West Wyalong to Forbes, NSW

Figure 1-1

Project Code: 305001965_GS_06
Drawn By: MM, Checked By: TG
Revision : 01 | Date: 2026-10-20

Stantec

Legend

- Study Area
- Major Towns
- Major Watercourses
- State Roads
- Regional Roads
- Local Government Areas
- State Boundary
- Waterbody

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Basemap (Esri and third party suppliers).
2. Local Government Areas, Major Towns, Major Roads, Major Watercourses, Waterbodies (NSW SS, 2026)
3. State Boundary (ABS, 2022)

0 5 10 15 Kilometers
Scale at A3: 1:350,000



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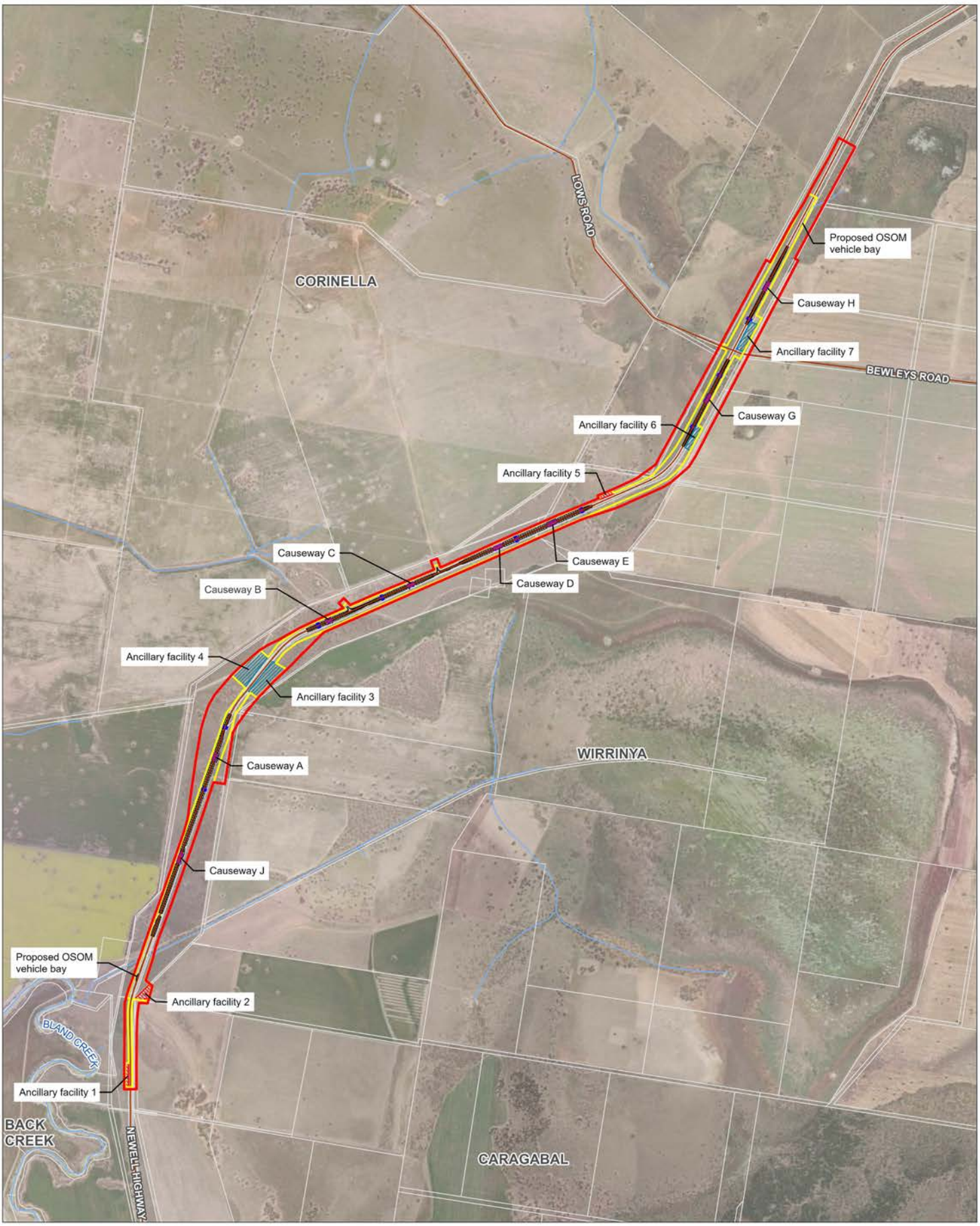

The proposal

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 1-2

Project Code: 304100217_ECO_001
Drawn By: MM, Checked By: AS
Revision: 03 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Watercourse
- Existing Road
- Cadastre
- Construction Boundary

Road alignment

- Permanent road

Culverts

- Existing culvert to be removed
- Existing culvert
- Non-bridge sized culvert
- Bridge-sized culvert

Construction compound

- Existing
- Proposed

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road & Waterbody & Watercourse (NSW SS, 2025)

0 250 500 750 1,000 Metres
Scale at A3: 1:30,000



\\au2012-ntap01_cifs02\shared_projects\304100217\FY21\091_NEWELL HWY WST WYALONG TO FORBES\Drawings\GIS | 304100217_ECO-001_ThePropsal 03 | Last updated 2026-10-20 By: mmostyn

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1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by Stantec Australia Pty Ltd (Stantec) on behalf of Transport. For the purposes of these works, Transport is the proponent and determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail mitigation and management measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in the context of sections 171 of the *Environmental Planning and Assessment Regulation 2021*, the factors in *Guidelines for Division 5.1 assessments* (DPHI, 2026), the *Roads and Related Facilities EIS Guideline* (DUAP, 1996), the *Biodiversity Conservation Act 2016* (BC Act), the *Fisheries Management Act 1994* (FM Act) and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act).

In doing so, the REF helps to fulfil the requirements of:

- Section 5.5 of the EP&A Act including that Transport examine and take into account matters affecting or likely to affect the environment by reason of the activity in a manner that is proportionate to the nature and risk of the activity.
- The strategic assessment approval granted by the Federal Government under the EPBC Act in September 2015, with respect to the impacts of Transport's road activities on nationally-listed threatened species, ecological communities and migratory species.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval sought from the Minister for Planning under Division 5.2 of the EP&A Act.
- The significance of any impact on threatened species as defined by the BC Act and / or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report (BDAR).
- The significance of any impact on nationally-listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and if offsets are required and able to be secured.
- The potential for the proposal to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Department of Climate Change, Energy, the Environment and Water for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2. Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It identifies the various options considered and the selection of the preferred option for the proposal.

2.1 Strategic need for the proposal

The Newell Highway is a major interstate transport connection and the longest highway in New South Wales (NSW), stretching more than 1,060 kilometres from the Queensland border to the Victorian border. It is one of Australia's most important freight routes and a vital transport link to regional centres in western NSW.

The Newell Highway is prone to flooding between West Wyalong and Forbes and has a history of road closures during periods of heavy rain. Studies have found that the highway is particularly susceptible to flooding in the Lake Cowal / Bland Creek catchment at Marsden. In 2022, about 20 kilometres of the highway in this area flooded, forcing the road to close for seven weeks. A flood event in 2016 closed the highway for six weeks.

These extended closures of the Newell Highway resulted in significant losses in freight productivity, lengthy detours for all road users, adverse impacts on local businesses and social challenges for the communities connected by the highway.

The proposal is needed to improve flood resilience and route reliability on the Newell Highway, save travel time by reducing road closures during and after flood events, keep freight moving and communities connected, and enhance safety in accordance with the *Newell Highway Corridor Strategy* (Transport, 2015).

2.1.1 Strategic planning and policy framework

Several national, state and regional strategic plans refer to the need for improving reliability, resilience and safety of roads and key freight corridors in NSW. The proposal is considered consistent with these strategic plans as discussed below.

National Freight and Supply Chain Strategy 2025 and Action Plan 2025-2029

The *National Freight and Supply Chain Strategy 2025* (Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts (DITRDCSA), 2025) acknowledges that Australia's freight movement is expanding and estimates that the volume of freight carried will increase by over 26 per cent between 2020 and 2050. The strategy outlines a comprehensive agenda for government and industry actions across all freight modes for the next 20 years and beyond.

Supported by the *National Freight Supply Chain Strategy National Action Plan 2025-2029* (DITRDCSA, 2025), the strategy details key actions for the government to achieve its goals and action areas. The proposal aligns with the following critical action areas under the strategy:

- improved efficiency, productivity and international competitiveness
- safe, secure and resilient supply chains.

The proposal would assist in fulfilling the requirements of the strategy as it would contribute to a safer and more reliable road freight network on the Newell Highway.

The *NSW Implementation of the National Freight and Supply Chain Strategy and National Action Plan* (Transport, 2019) includes a goal of delivering new infrastructure to increase road freight capacity and safety. The Newell Highway upgrades are included as targeted infrastructure for investment to achieve this goal.

NSW Long Term Transport Master Plan

The *NSW Long Term Transport Master Plan* (Transport, 2012) sets the framework for the NSW Government to deliver an integrated, modern transport system that puts the customer first. The master plan is principally focused on the following six key transport challenges:

- integrating modes to meet customer needs
- getting Sydney moving again
- sustaining growth in Greater Sydney
- providing essential access to regional NSW
- supporting efficient and productive freight
- statewide actions.

The master plan responds to these challenges through four types of action:

- integrate transport services
- modernise our system
- grow our networks to meet future demand (including the important tasks of corridor preservation)
- maintain important road and public transport assets.

The proposal addresses the key transport challenges of providing essential access to regional NSW and supporting efficient and productive freight and associated actions through reducing the amount of time the Newell Highway is closed between West Wyalong and Forbes during and after flood events. This supports efficient and productive freight movements and provides essential access to regional NSW.

State Infrastructure Strategy 2022-2042

The *State Infrastructure Strategy 2022-2042* (INSW, 2022) identifies the NSW Government's infrastructure vision for the State over the next 20 years, across all sectors. The strategy assesses infrastructure problems and solutions and provides recommendations to best grow the State's economy, enhance productivity and improve living standards for the community. The strategy is framed around nine long-term objectives and makes 57 recommendations (102 including sub-recommendations) to the NSW Government aimed at improving outcomes and living standards for the people of NSW.

The key objectives of the strategy applicable to the proposal are:

- Objective 1: Boost economy-wide productivity and competitiveness – this objective focuses on investments in infrastructure alongside policies to better utilise the State's existing and new assets.

  Recommendation 6 is to plan and deliver projects to increase the efficiency and reliability of freight networks in regional NSW. The proposal is consistent with the objective and recommendation as it would provide enhancements that improve resilience and safety of a key freight corridor.

- Objective 3: Embed reliability and resilience – this objective states that infrastructure assets need to be resilient to withstand shocks such as natural hazards, public health crises and cyber security threats.

  Recommendation 20 of this objective is to improve transport network response and recovery performance through service continuity planning, investment in evacuation and alternative routes, and infrastructure upgrades, guided by place-based strategies. The proposal aims to improve the recovery of the Newell Highway following flood events through reducing the duration of inundation and by providing flood resilient pavement in association with culvert works. It is consistent with the objective and recommendation.

2026 Road Safety Action Plan

The *2026 Road Safety Action Plan* (Transport, 2022) provides a detailed outline of the NSW Government's commitment to improving safety on roads across NSW. The plan sets clear road safety targets and outlines initiatives to continue to work towards zero deaths and serious injuries on NSW roads. It includes two targets; halving fatalities on NSW roads by 2030 and reducing serious injuries by 30 per cent on NSW roads by 2030. The road safety delivery framework includes five key priority areas:

- creating safer country roads and urban places
- enhancing road safety in local communities
- increasing the safety of light vehicles, heavy vehicles and protective equipment
- making safer choices on our roads
- ensuring the safety of vulnerable and other at-risk road users.

The proposal would incorporate various road safety improvements including allowance for a widened centreline median, widened shoulders and safety barriers. These improvements contribute to a safer and more efficient road network.

Newell Highway Corridor Strategy

The *Newell Highway Corridor Strategy* (Transport, 2015) was released in May 2015 to address the transport needs of the corridor. The Newell Highway is the longest highway in NSW and provides an essential road connection for central-western NSW. The corridor strategy sets a 20-year framework for the NSW Government’s long-term management of road transport along the Newell Highway.

The strategy recognises that the overall reliability of the Newell Highway corridor is considered adequate in terms of journey times but with low flood immunity at some locations reducing reliability. Marsden, the locality of the proposal, is identified as a location that is subject to flooding. The strategy notes that nuisance flooding and sheet flow flooding along the highway will be progressively addressed by providing more culverts and increasing capacity at priority locations. The proposal responds to this.

Central West and Orana Strategic Regional Integrated Transport Plan

The *Central West and Orana Strategic Regional Integrated Transport Plan* (Transport, 2026) provides a 20-year vision and defines the key transport priorities for the region to support community, land use and transport needs, now and into the future. Developed through extensive engagement, the plan identifies achievable actions to optimise the transport network and improve transport options in the region by 2041. The plan includes the three Local Government Areas (LGAs) located within and near the proposal (Weddin Shire, Forbes Shire and Bland Shire).

The objectives of the plan that are intended to guide future transport investment, services, policy and infrastructure are:

- starting with Country
- access to transport for all
- well-located housing and successful places
- a thriving and diversifying economy
- a safe transport network
- resilient transport networks
- net zero emissions.

The plan identifies reducing the Newell Highway's vulnerability, specifically flood-related closures, as a key opportunity for delivering a more resilient transport network. Short term, medium term and statewide initiatives to achieve the objectives are detailed in the plan. The proposal would incorporate measures that address the following initiatives listed in the plan:

- short term initiative 27 - Improved rest stop opportunities: Develop and deliver improved rest stop opportunities across the region to support the safe and efficient movement of heavy vehicles, including both heavy vehicle rest areas and green reflector sites (informal rest areas)
- short term initiative 30 - Corridor resilience planning: identifying critical fail points on the transport network and investigate options to reduce any resulting vulnerability.

Central West and Orana Regional Plan 2041

The *Central West and Orana Regional Plan 2041* (DPE, 2022) guides the NSW Government's land use planning priorities and decisions over the next 20 years for the region. It provides an overarching framework to guide subsequent and more detailed land use plans, development proposals and infrastructure funding decisions.

Objective 7 is to plan for resilient places and communities. This objective outlines that the changing climate is increasing the frequency, intensity and extent of known natural hazards including flooding. One of the initiatives listed by the objective to increase the region's resilience to natural hazards is floodproofing major infrastructure, including flood immunity for sections of the Newell Highway between West Wyalong and Forbes. The proposal addresses this initiative.

2.2 Limitations of existing infrastructure

The Newell Highway between West Wyalong and Forbes is prone to flooding during periods of heavy rain, resulting in long road closures and pavement damage from prolonged inundation.

Flood studies of the Lake Cowal/Bland Creek catchment have shown that the causeways in the Marsden section of the Newell Highway assessed in this REF are inundated first, have the deepest water across the road and are subject to the longest closures. In 2022, the highway was closed for seven weeks when around 20 kilometres of this section was flooded. The 2016 flood event closed the highway for six weeks.

These extended closures resulted in significant losses in freight productivity, lengthy detours for all road users, adverse impacts on local businesses, social challenges for communities connected by the highway and expensive repair works.

2.3 Proposal objectives and development criteria

2.3.1 Proposal objective

The primary objective of the proposal is to reduce the number of days the Newell Highway between West Wyalong and Forbes is non-trafficable during and after flood inundation, compared to the 2022 flood event.

2.3.2 Development criteria

The criterion for the proposal is to develop it in such a way that it:

- improves journey reliability for road users travelling along the corridor
- is considerate of road function, local land use activity and access needs
- is considerate of potential environmental impacts
- improves safety for all road users
- is a fit-for-purpose design that meets the required design life and minimises the proposal's whole of life cost
- meets applicable legislation and is safe, efficient and practical for workers and those in the vicinity during temporary construction traffic arrangements.

2.4 Options considered

2.4.1 Background

The proposal has been developed through an iterative design process which has involved investigating a range of strategic and concept design options to meet the primary proposal objective and available funding.

In 2019, Transport began investigating potential flood mitigation solutions between West Wyalong and Forbes in response to the 2016 flooding of the Newell Highway. This section of the Newell Highway is prone to flooding and has a long history of road closures during periods of heavy rain in the Lachlan catchment.

Strategic design – 2019-2023

A strategic options selection and design process was undertaken between 2019 and 2022 to identify potential upgrade options and establish the basis for further investigations and design development.

Comprehensive flood studies completed at this time found that the Newell Highway between West Wyalong and Forbes is particularly susceptible to flooding by the Lake Cowal/Bland Creek catchment at Marsden and identified the causeways that flooded first and stayed underwater the longest in the 2022 flood event.

Consultation with the community and key stakeholders on the strategic options was carried out in June and July 2023.

Initial concept design – 2023

Based on the findings of the strategic design process, Transport began preparing a concept design for around 11 kilometres of flood mitigation treatments at Marsden (approximately 41km to 53km north of West Wyalong).

The initial 2023 concept design involved raising and realigning the Newell Highway to the east to achieve flood immunity for a 1-in-20-year average recurrence interval (ARI) flood event. The initial concept design also included continuously reinforced concrete pavement as a flood resilient pavement solution, installation of new culverts, extension of existing culverts, an upgrade of the Newell Highway and Bewleys Road / Lows Road intersection, adjustment of utilities, signage and line marking as well as upgrades to existing property accesses.

Options reassessment – 2024

In late 2023, a total funding commitment of $141 million for the proposal was confirmed following independent reviews of the Australian and NSW government infrastructure programs.

From early 2024, Transport reassessed the scope of flood mitigation works that could be delivered within the available funding, on the basis that the works would remain on the existing alignment rather than follow the realignment proposed in the initial concept design. Multiple treatment configurations were assessed through iterative flood modelling against selected criteria including reduction in inundation duration, constructability, flood performance, afflux, environmental impacts and value for money.

Revised concept design – 2025 to 2026

In 2025, a revised option for the proposal was identified. The revised option involves constructing culverts at existing causeways in the Marsden section of the Newell Highway to reduce the duration of road inundation during and after a flood event compared with the 2022 flood event.

In 2026, the revised (preferred) option was developed and refined into the concept design that is detailed and assessed in this REF.

The design development process is shown in Figure 2-1.

Transport will continue to seek opportunities to enhance the design through further refinement of the proposal in the detailed design stage.



Figure 2-1 Design development process

2.4.2 Identified options for revised concept design

From early 2024, Transport began reassessing the scope of flood mitigation works that could be delivered within the funding commitment. The key parameters for the revised concept design included:

- The proposal objective was revised to reducing the number of days the Newell Highway between West Wyalong and Forbes is closed during and after flood inundation, compared to the 2022 flood event.
- All options to be assessed must be on the existing Newell Highway alignment.
- New culvert cross sections to include two metre wide shoulders, 3.5 metre wide lanes and a one metre wide centreline.

Transport identified causeway locations J, A, B, C, D, E, G and H at Marsden as the preferred causeways for assessment for constructing culverts. The location of these causeways is shown in Figure 2-2.

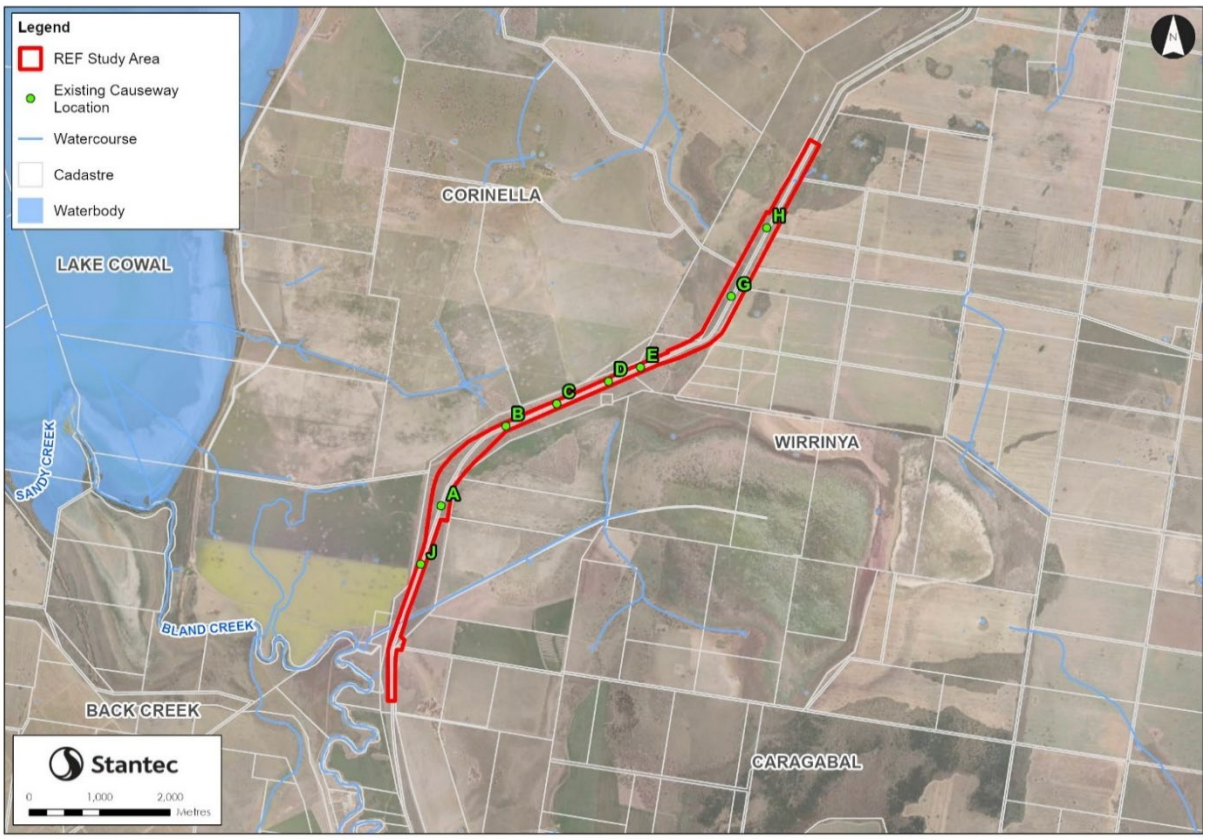


Figure 2-2 Existing causeway locations

Flood modelling was undertaken to assess different culvert arrangements at each of these causeways, and the combinations of causeways. Four viable options were developed, which had different combinations of causeways to be treated, and the extent of the culverts proposed (number and size of culvert cells).

Out of the four options developed, Options 1D and 6A were recommended for further consideration as they were able to demonstrate the greatest reduction in duration of inundation of the Newell Highway at Marsden. Both Options 1D and 6A included constructing bridge-sized box culverts at causeways J, A, B, C, D and E; Option 6A also included additional bridge-sized culverts at causeways G and H. Therefore, the options analysed and assessed for consideration for this REF included:

- Option 1: A 'do-nothing option' Assumes that no works are undertaken beyond routine maintenance activities and that the existing road infrastructure remains unchanged
- Option 2: Constructing culverts at causeways J, A, B, C, D and E (Design option 1D)
- Option 3: Constructing culverts at causeways J, A, B, C, D, E, G and H (Design option 6A).

2.4.3 Analysis of options

Option 1: Do nothing

While the 'do nothing' option has the lowest capital cost and no immediate environmental impact, it does not meet the proposal objective of reducing the number of days the Newell Highway between West Wyalong and Forbes is closed during and after flood inundation, compared to the 2022 flood event. This option would result in extensive detours during flood events and more frequent repairs post flooding, which would lead to increased vehicle emissions and unacceptable delays to road users.

Option 2: Constructing culverts at causeways J, A, B, C, D and E (Design option 1D)

This option involves raising the height of the road over causeways J, A, B, C, D and E, extension of existing culverts and construction of new culverts to reduce the number of days the Newell Highway is closed during and after a flood event, compared to the 2022 flood event. This option would have some environmental impacts, including impacts to native vegetation, Threatened Ecological Communities (TECs) and Aboriginal Heritage Sites. This option would have flooding impacts (afflux) on some surrounding properties. This option addresses the proposal objective of reducing the number of days the Newell Highway is closed during and after a flood event, compared to the 2022 flood event. In addition, the construction of new culverts at existing causeways would avoid lengthy detours during and after flood events, alleviate delay to road users as well as reduce maintenance requirements over the life of the pavement and culverts.

Option 3: Constructing culverts at causeways J, A, B, C, D, E, G and H (Design option 6A)

This option is identical to Option 2 (Design option 1D) except with the addition of culverts at causeways G and H. Subsequently, the additional culverts at causeways G and H would result in a larger construction footprint and associated impacts to the environment. Notably, works around culvert G would have impacts to TECs. This option would have flooding impacts (afflux) on some surrounding properties. However, this option results in a greater reduction of the duration of inundation of the Newell Highway at Marsden across a longer section of the highway. Flood modelling shows that not treating causeways G and H would result in an 'island effect' at Marsden during and after a flood event comparable to the 2022 flood event, whereby the road would be closed due to flood waters over causeways G and H even though the road is above flood levels immediately to the south at causeways J, A, B, C, D and E. Option 3 (Design option 6A) was selected as the preferred option at the October 2024 value management workshop as it achieved the longest reduction in duration of inundation of the Newell Highway at Marsden, across a longer section of the highway.

2.4.4 Preferred option

The selected preferred option from the options selection workshop was Option 3 (Design option 6A). This option includes the construction of multi-cell box culverts at eight causeways and was determined to be the best option to meet the proposal objective of reducing the number of days the Newell Highway is closed between West Wyalong and Forbes during and after flood events, compared to the 2022 flood event.

3. Description of the proposal

This chapter describes the proposal and provides descriptions of existing conditions, the design parameters including major design features, the construction method, and associated infrastructure and activities.

3.1 The proposal

Transport proposes to upgrade a section of the Newell Highway at Marsden between West Wyalong and Forbes. The total length of the works is 6.2 kilometres. The primary objective of the proposal is to reduce the number of days the Newell Highway between West Wyalong and Forbes is non-trafficable during and after flood inundation, compared to the 2022 flood event. Figure 3-1 illustrates the key features of the proposal.

Key features of the proposal include:

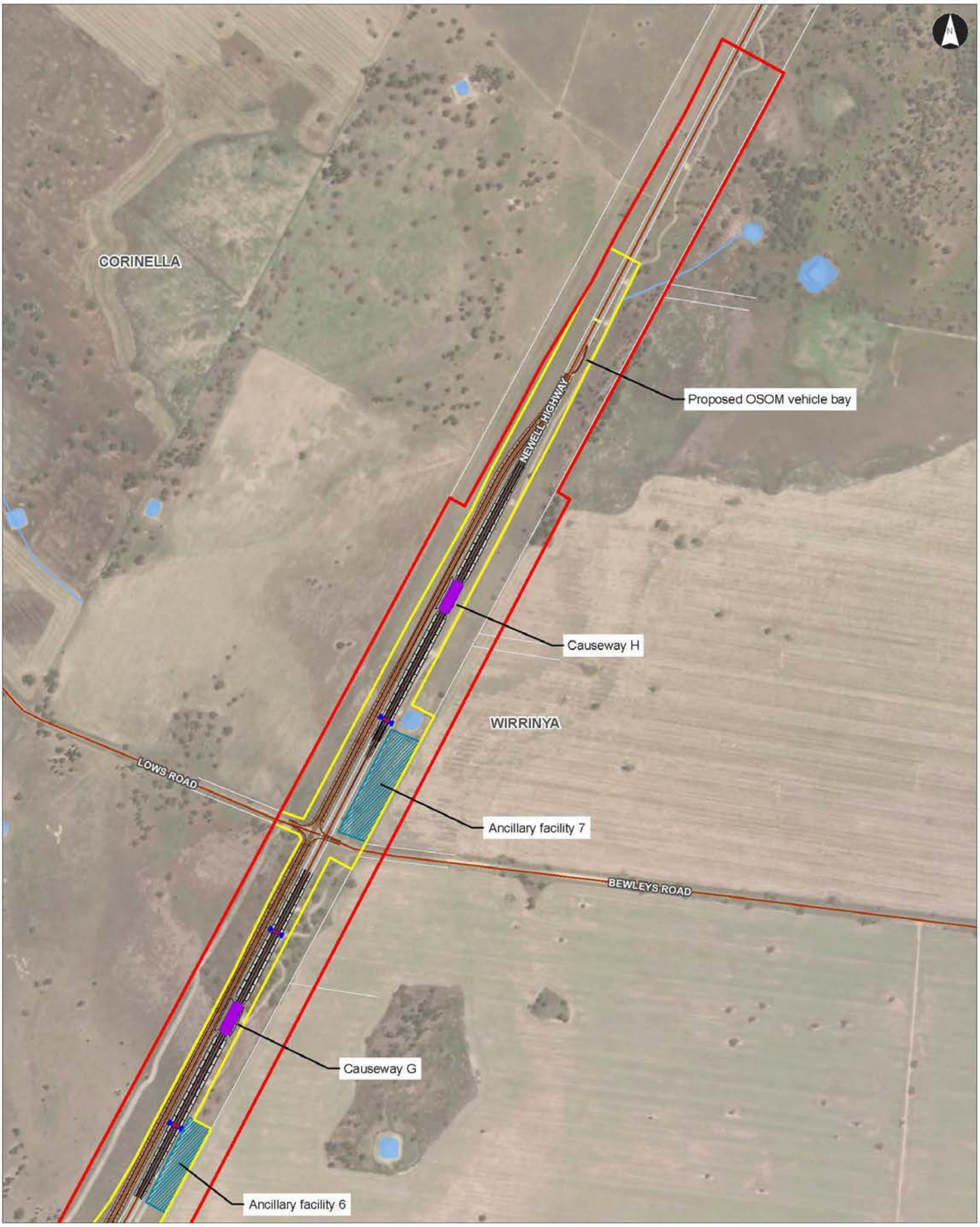
- installing new bridge-sized box culverts
- replacing culverts that are nearing the end of their life
- extension of existing culverts
- raising the height of the existing road and installing heavy-duty pavement at identified locations
- safety improvements including shoulder widening and installation of a one-metre-wide centreline where feasible
- upgrading existing property accesses
- relocating and sealing an existing informal heavy vehicle stopping area.

3.2 Design

This section provides a detailed description of the concept design for the proposal. This includes a summary of the adopted design criteria, key proposal constraints and major features, including raising of the highway at eight causeway locations, installation and extension of culverts, shoulder widening and installation of a one-metre-wide centreline where feasible, and upgrades to property accesses.

Several proposal specific constraints, such as flat topography, limits on culvert cover, proximity to critical utilities, TECs and culturally sensitive areas have informed the concept design.

Further refinement of geometric elements, drainage structures and access arrangements will occur as the proposal progresses. This may include consideration of the number of culverts included, the extent of the proposal, and the construction method and staging.



Key features of the proposal (Page 1 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 3-1

Project Code: 305001965_GS_06
Drawn By: MM, Checked By: AS
Revision: 03 | Date: 2026-10-19

Stantec

Legend

- REF Study Area
- Watercourse
- Existing Road
- Cadastre
- Waterbody
- Construction Boundary

Road alignment

- Permanent road
- Temporary diversion

Culverts

- Existing culvert to be removed
- Existing culvert
- Non-bridge sized culvert
- Bridge-sized culvert

Construction Compound

- Proposed

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Basemap (Esri and third party suppliers).
2. Watercourse (NSW SS, 2026).
3. Cadastre supplied by TfNSW (2026).

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Scale at A3: 1:8,000



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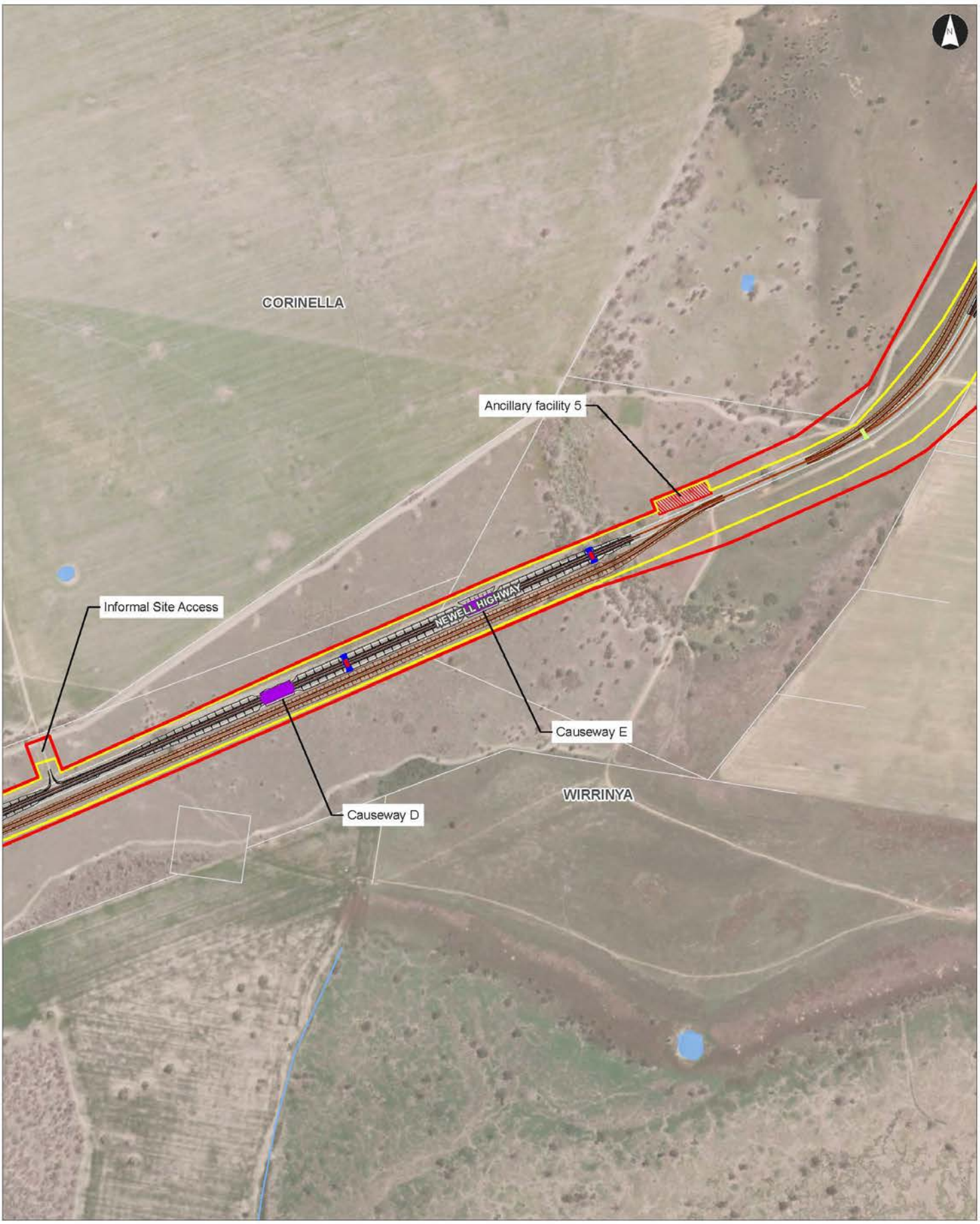

Key features of the proposal (Page 2 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 3-1

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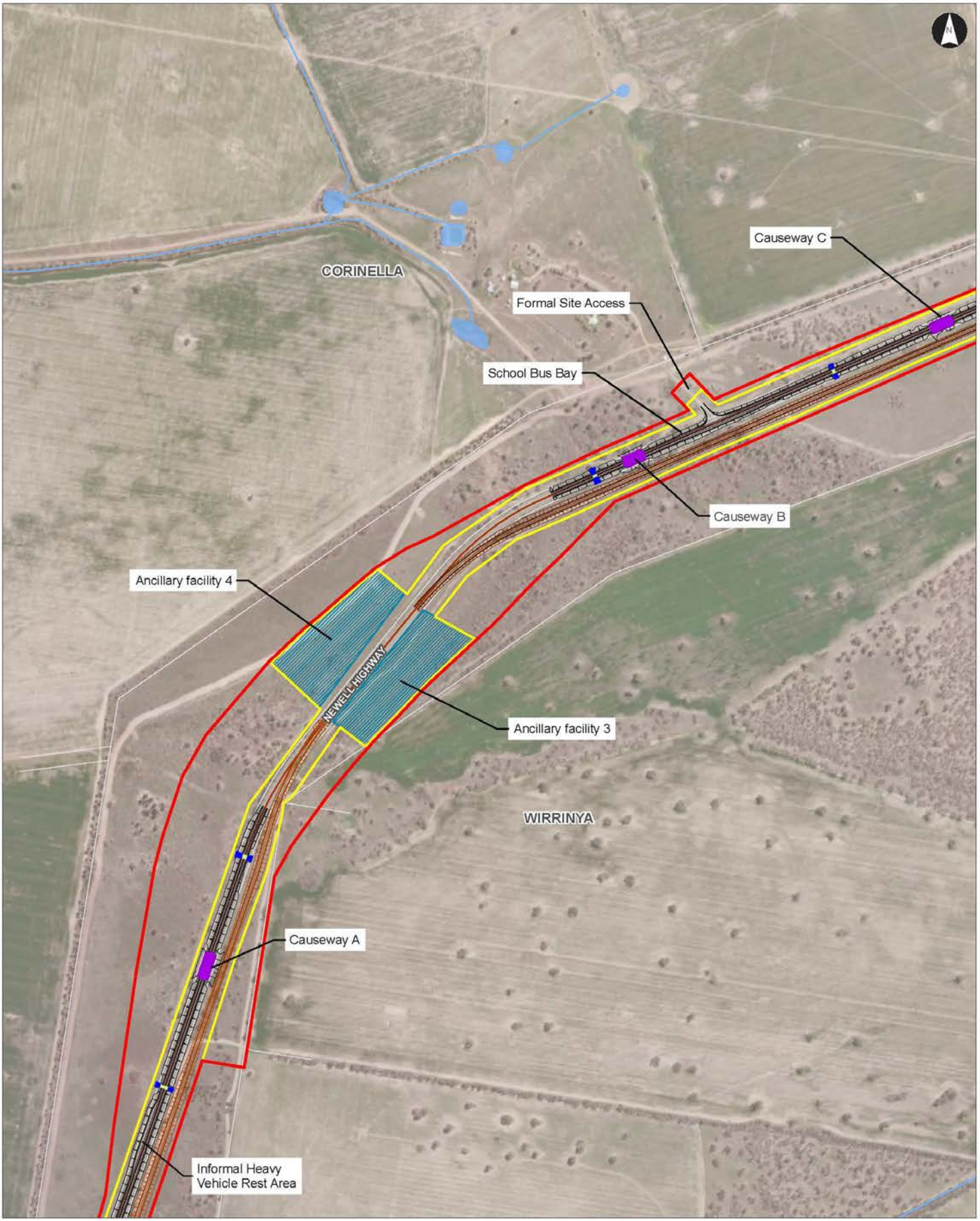

Key features of the proposal (Page 3 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 3-1

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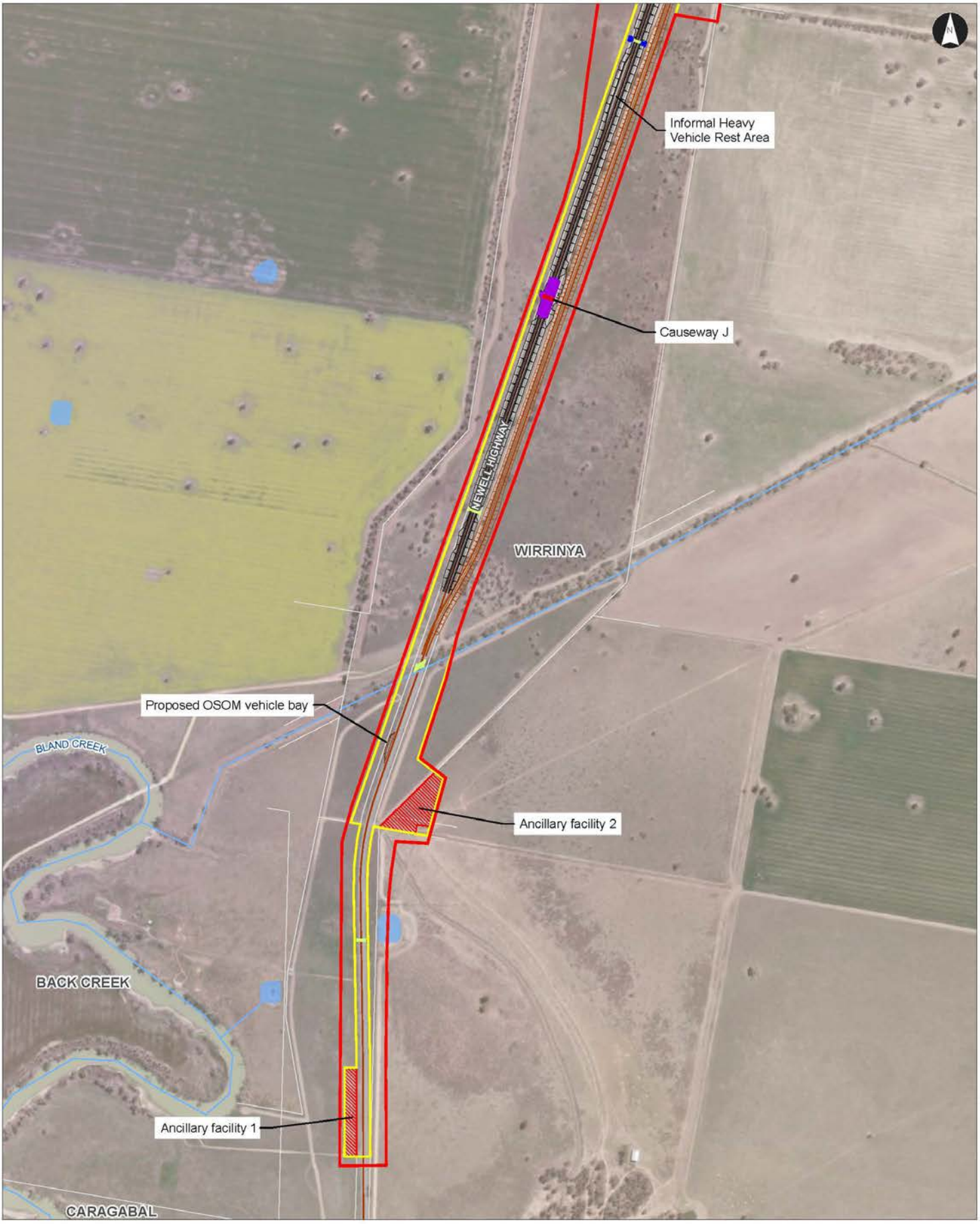

Key features of the proposal (Page 4 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 3-1

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3.2.1 Design criteria

The adopted design criteria for the proposal are summarised in Table 3-1.

Table 3-1: Design criteria

Design element	Minimum design criteria
Design speed	Design Speed – 120 km/hr Posted Speed – 110 km/hr
Design vehicle	PBS3A 36.5m A-B Triple
Lane width	3.5 m
Number of lanes	Two lanes – one in each direction
Shoulder width - nearside (outside) shoulder width	2.0 m
Median width	1.0 m
Verge width	1.0 m 1.5 m where safety barriers are located
Safety barriers	Safety barriers are provided where required by hazard assessment, including at the proposed culvert banks
Embankments and cuttings	Embankments – 6H:1V Transitional zones around headwalls and wingwalls – 2H:1V
Flood	Reduce the number of days the Newell Highway between West Wyalong and Forbes is non-trafficable during and after inundation compared to the 2022 flood event.
Pedestrian, cyclist and bus provisions	Due to the proposal's rural context and limited pedestrian/cyclist demand, no dedicated pedestrian or cycling facilities are included. An existing school bus service from Marsden runs along the Mid Western Highway to the south and then along the Newell Highway towards West Wyalong. Provision for a school bus bay would be provided to cater for any future extensions of the bus service (Figure 3-1).
Landscaping	Landscaping is minimal and consistent with the rural setting

3.2.2 Engineering constraints

Building and operating the proposal would be restricted by several engineering related constraints. These constraints were identified through design development, value engineering discussions, hydrology and utility investigations, Aboriginal heritage investigations, environmental investigations, and constructability considerations. The key engineering constraints and the corresponding design responses are summarised below in Table 3-2.

Table 3-2: Engineering constraints

Constraint	Design provision
Critical public utilities - APA high-pressure gas main	A DN200 high-pressure gas main (8–10 MPa) runs parallel to the western side of the Newell Highway and cannot be readily relocated. The horizontal alignment was therefore retained on the existing highway footprint and earthworks designed to avoid encroachment into the easements.

Constraint	Design provision
Critical public utilities – Telstra fibre optic cable	A Telstra fibre optic cable, the main inland optical fibre from Melbourne to Brisbane, is located along the western side of the Newell Highway for the full extent of the proposal works. Temporary and permanent earthworks associated with the proposal would not impact this cable. There is also a 'left in situ' optic fibre line parallel to the Newell Highway alignment. Based on advice received from Telstra, this is expected to be redundant. This would not be impacted by the proposal works.
Flat topography and broad floodplain	The proposal is located on very flat terrain associated within the Lake Cowal/Bland Creek floodplain. As a result, at many of the culvert locations the flat terrain hinders the provision of adequate inlet and outlet channels. To manage this, culvert inlet and outlet earthworks would extend beyond areas required for scour protection, to ensure no water ponding and impedance to culvert flows and to achieve minimum culvert grades of 0.5%.
Embankment height	At the eight causeways, the existing low points constrain the design due to the need to maintain tie-ins to the existing road and minimise flooding impacts. A requirement of the proposal is to minimise the overall height of the embankments while achieving the required reduction in duration of inundation and afflux impacts. The geometry of the design includes a combination of curves and straights to ensure a compliant geometric design while achieving minimal embankment heights and the required reduction in duration of inundation and flooding afflux impacts.
Culturally sensitive areas	Aboriginal heritage investigations undertaken in March 2026 identified six new Aboriginal sites and five additional areas of archaeological sensitivity. These included isolated artefacts, low-density artefact scatters, a possible scarred tree, a cultural tree and numerous heat retainers. The concept design is likely to impact on some of these Aboriginal sites therefore a Stage 3 Procedure for Aboriginal cultural heritage consultation and investigation (PACHCI) will be completed for the proposal. The concept design avoids impact to the possible scarred tree and the culturally sensitive tree. Avoidance or minimisation of impacts to other areas of cultural sensitivity have also been considered throughout the development of the concept design.
Biodiversity and TECs	Ecological investigations undertaken for the proposal identified the presence of two TECs, Plant Community Type (PCT) 26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion, and PCT 76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions. Impacts to the TECs have been avoided where possible, however will be impacted by proposal works. Opportunities to avoid and minimise impacts will continue to be explored throughout development of the detailed design. Habitat for threatened fauna has also been identified within the construction boundary. Impacts to this habitat has been avoided to the fullest extent reasonably practical.

3.2.3 Major design features

The proposal incorporates several major design features intended to reduce the amount of time the Newell Highway is closed between West Wyalong and Forbes during and after a flood event like that experienced in 2022, as well as features to enhance safety and maintain essential access along the Newell Highway during and after flood events. These features respond directly to the constraints of the Lake Cowal/Bland Creek floodplain and the operational needs of a high-volume freight route. The key elements of the concept design are summarised below.

Main Newell Highway alignment

The total length of proposed Newell Highway works, across four sections, is 6.2 kilometres. The works on the existing highway alignment extend from about 6.4 kilometres north of the intersection with the Mid Western Highway to about 1.8 kilometres south of the intersection with Wennings Road (refer Figure 3-1).

At the four sections shown in Figure 3-1, the proposal would raise the existing highway to achieve the proposal objective.

The upgraded highway retains the existing two-lane configuration. It would comprise 3.5-metre wide lanes, 2.0-metre sealed shoulders, and provision for a one-metre wide centreline treatment where feasible.

The alignment includes two property accesses and one informal heavy vehicle stopping bay. There are no intersection works as part of the proposal design.

Bridge-sized box culverts (major drainage structures)

The proposal includes the installation of bridge-sized box culvert banks at eight causeway locations. These structures would replace or augment existing minor culverts, increase floodplain connectivity and assist in achieving the proposal objective of reducing the number of days the Newell Highway between West Wyalong and Forbes is non-trafficable during and after flood inundation, compared to the 2022 flood event.

The road design includes four sections of work based on the location of the bridge-sized box culvert banks. The four sections and the causeways are listed below, noting that the chainage (CH) is the distance in metres north of West Wyalong.

- CH43530 to 45500 (Causeway J and A)
- CH46460 to 49070 (Causeway B, C, D and E)
- CH50000 to 50820 (Causeway G)
- CH51150 to 51890 (Causeway H).

Details of the bridge-sized box culverts are provided in Table 3-3 and shown in Figure 3-1.

Table 3-3: Bridge-sized box culverts

Culvert ID	Location (CH)*	Configuration along the road (###x denotes the number of cells) (L x H)
Causeway J (B12669)	44230	(55x) 1200 mm x 1200 mm reinforced concrete box culvert (RCBC)
Causeway A (B12670)	45120	(35x) 1200 mm x 1200 mm RCBC
Causeway B (B12671)	46660	(28x) 1200 mm x 1200 mm RCBC
Causeway C (B12672)	47410	(30x) 1200 mm x 900 mm RCBC
Causeway D (B12673)	48210	(45x) 1200 mm x 1200 mm RCBC
Causeway E (B12674)	48700	(45x) 1200 mm x 1200 mm RCBC
Causeway G (B12675)	50450	(45x) 1200 mm x 750 mm RCBC
Causeway H (B12676)	51510	(45x) 1200 mm x 600 mm RCBC

** Road chainage taken at the centreline of the proposed bank of box culverts with the CH being this distance in metres north of West Wyalong*

Upgraded and extended transverse drainage culverts

There are currently nine non-bridge-sized culverts within the construction boundary. The existing culverts were inspected and assessed for structural condition, with culverts in very poor, poor or fair condition to be decommissioned and/or replaced, while those in good condition are to be extended so the inlet and outlet headwalls sit outside the agreed clear zone.

The proposal would include extension of four existing culverts and the replacement of six culverts. The location of these is shown in Figure 3-1.

Property access upgrades

There is one informal and one formal access within the construction boundary that would be upgraded as part of the proposal (refer Figure 3 1). Formal accesses refer to main property accesses to residences or building complexes. Informal accesses refer to access to farm paddocks, stockpile sites and the like.

Details of the works proposed at these two access locations is provided in Table 3-4.

Table 3-4: Property access upgrades

Property access	Description
Formal access at CH46860 (western side)	This is a formal access to properties located to the west of the Newell Highway at CH46860. This formal access has been designed to include a 3.5 metre locally widened shoulder along the Newell Highway to accommodate a B-Triple design vehicle turning right out of the access. This would also allow passing on the left side of vehicles that are stopped to turn right into the property access. This would prevent queuing along the Newell Highway. This access consists of one 4-metre-wide travel lane with 1-metre-wide shoulders and 1-metre-wide verges. This access allows for all turning movements - left-in, left-out, right-in and right-out.
Informal access at CH47650 (western side)	This informal access is located adjacent to the Newell Highway at CH47650. This access has been designed to accommodate the turning movements of a 19 metre semi-trailer design vehicle. This access consists of one 4-metre-wide travel lane and 1-metre-wide verges. This access allows for all turning movements - left-in, left-out, right-in and right-out.

There are several existing informal tracks that run parallel to the Newell Highway that would be impacted by the proposed works. These will not be reinstated by the proposal.

Informal heavy vehicle rest area

A northbound informal heavy vehicle rest area would be reestablished as part of the proposal. The location is shown in Figure 3-1. The informal rest area, with green reflectors to identify the safe stopping zone, would be 100 metres in length and shifted approximately 160 metres south of the current location to avoid conflicts with a nearby culvert extension, while maintaining its functionality and sight distance requirements.

3.2.4 Other design features

Safety barriers

Safety barriers are proposed at the culverts where required based on the road hazard assessment completed for the proposal.

Bus bay

An existing school bus service from Marsden runs along the Mid Western Highway to the south and then along the Newell Highway towards West Wyalong. Provision for a school bus bay would be provided as part of the right-turn / left-turn treatment at the formal access at to cater for any future extensions of the bus service (Figure 3-1). Warning signage and amenities for the bus bay is not proposed as part of this proposal and would be considered once the school bus bay is operational.

3.3 Construction activities

This section provides a summary of the likely construction methodology, work hours, plant and equipment and associated activities that would be used to construct the proposal. The construction boundary is shown in Figure 3-1.

3.3.1 Work methodology

Construction activities would be carried out in accordance with a Construction Environmental Management Plan (CEMP) that would be prepared to ensure construction work meets Transport's specifications and legislative requirements. The contractor would confirm the final construction methodology in collaboration and agreement with Transport.

An indicative work methodology is described in Table 3-5 and has been used for the purposes of this environmental assessment. Should the work method substantially differ from what is proposed in this REF, the contractor would consult Transport to determine if an additional impact assessment is needed.

Table 3-5: Indicative construction activities

Construction activity	Typical activities
Enabling work	• Community notification of construction commencement • Obtain required Road Occupancy Licence (ROL) and access permits • Survey and installation of temporary fencing to define the construction footprint • Establishment of construction access points and haul routes • Installation of erosion and sediment controls, including diversion drains, sediment fencing and stabilised entry/exit pads • Protection of utilities where required; critical APA gas and Telstra optic-fibre assets would be protected rather than relocated • Construction of temporary access tracks to culvert locations and work areas • Installation of temporary construction signage and lighting, as required
Site establishment	• Establishment of site compounds and stockpile areas, located with consideration to flooding impacts and utility easements • Clearing of vegetation within the construction boundary and stockpiling of mulch for reuse where possible • Stripping and stockpiling of topsoil for later use • Implementation of temporary traffic management arrangements, including construction of a two-lane two-way temporary diversion to enable traffic flow during construction of the ultimate road formation, reduction to speed limits, and installation of temporary barriers, establishment of OSOM vehicle bays

Construction activity	Typical activities
Bulk earthworks	• Excavation of unsuitable materials, predominantly dispersive and low-strength clays • Construction of fill embankments to raise the highway at the causeways, using imported fill compacted in layers and shaped to 6H:1V batters • Stockpiling and reuse of structurally suitable materials where feasible, with unsuitable spoil placed elsewhere within the construction boundary, assessed for beneficial re-use, or disposed in accordance with the waste hierarchy and the *Environment Operations (Waste) Regulation 2014* • Preparation of foundations for culvert banks, including excavation and compaction
Drainage and structures	• Installation, extension or replacement of culverts • Construction of bridge-sized culvert banks at each of the eight causeways • Installation of scour protection at culvert inlets and outlets to manage flood flows • Construction of open drains and minor table drains where sufficient grades (0.1%) can be achieved
Pavement work	• Placement of select material, subbase and base layers across the raised alignment including sealed shoulders and verge stabilisation • Construction of pavement on culvert banks • Installation of the pavement wearing course • Line marking, including for a one-metre-wide centreline treatment consistent with other safety upgrades on the Newell Highway • Installation of safety barriers at locations where culvert embankments present roadside hazards
Finishing work	• Final line-marking and installation of signage • Batter and verge rehabilitation, including topsoil placement and stabilisation • Removal of temporary works, including construction compounds, access tracks and sediment controls, once areas are stabilised • Demobilisation of plant and equipment and restoration of disturbed areas to pre-construction condition where possible

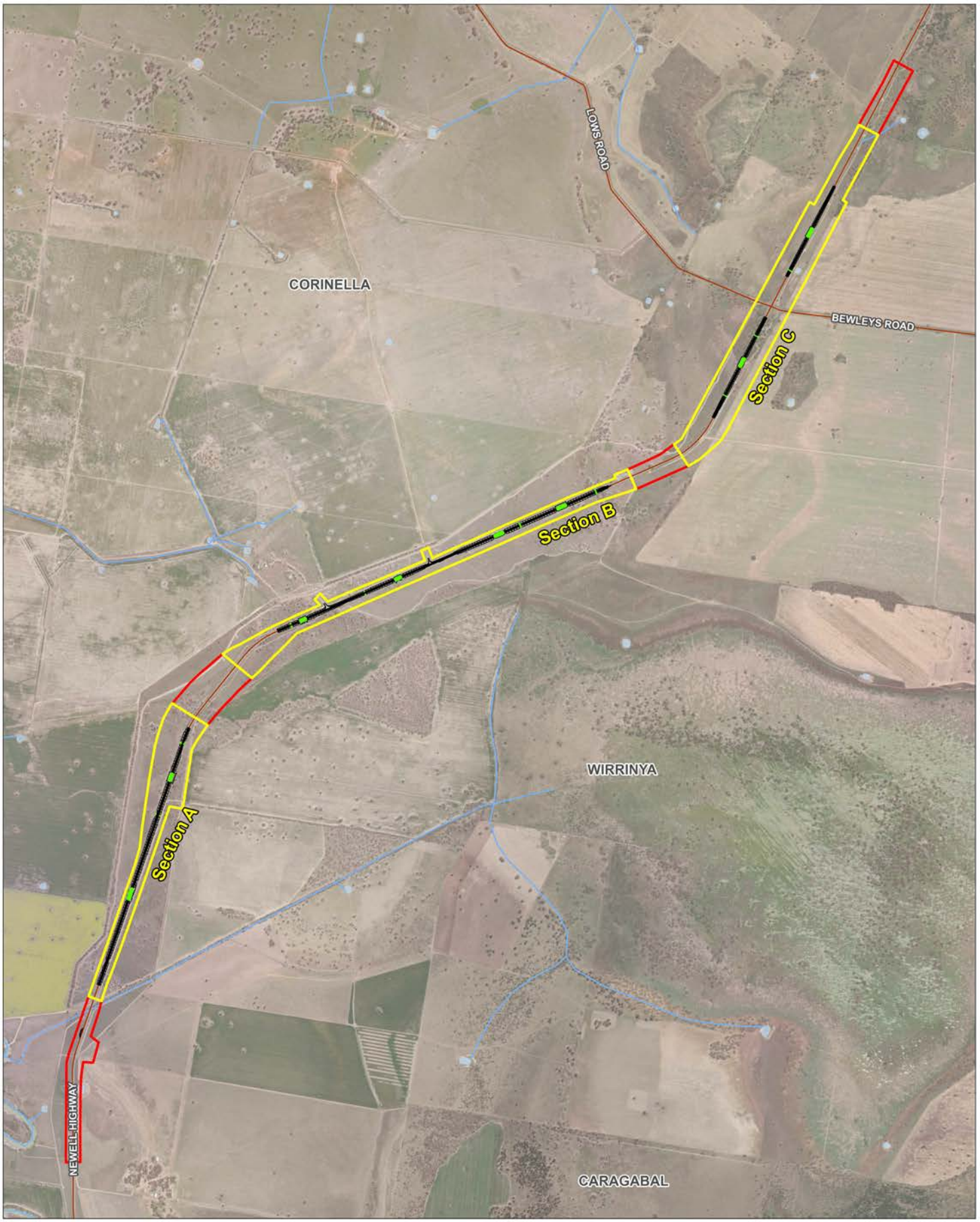
3.3.2 Construction staging

The construction of the proposal would be divided into three longitudinal sections, Section A, B and C, as shown in Figure 3-2.

The construction of multiple longitudinal sections simultaneously would ensure a shorter construction period, however the final construction staging would be confirmed by the contractor in collaboration and agreement with Transport

A temporary diversion is proposed to the east of the Newell Highway for Sections A and B to avoid impacts to the existing APA gas easement and property accesses. For Section C, the temporary diversion is proposed to be constructed to the west of the existing highway to avoid an existing dam. The typical cross section staging strategy would generally follow a three-stage process (Figure 3-3).

The construction activities for each of the construction sections and stages is described in Table 3-6.



Construction staging

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 3-2

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 01 | Date: 2026-10-20

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Legend

- REF Study Area
- Construction Stage Boundary
- Culvert
- Existing Road
- Watercourse
- Waterbody

Road alignment

- Permanent Road

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road, Waterbody & Watercourse (NSW SS, 2025)

0 250 500 750 1,000 Metres
Scale at A3: 1:25,845



\\au2012-ntap01_cifs02\shared_projects\304100217\PY21\091_NEWELL HWY WST WYALONG TO FORBES\Drawings\GIS | 304100217_ECO-003_ConstructionStaging 01 | Last updated 2026-10-20 By: mmoshyn

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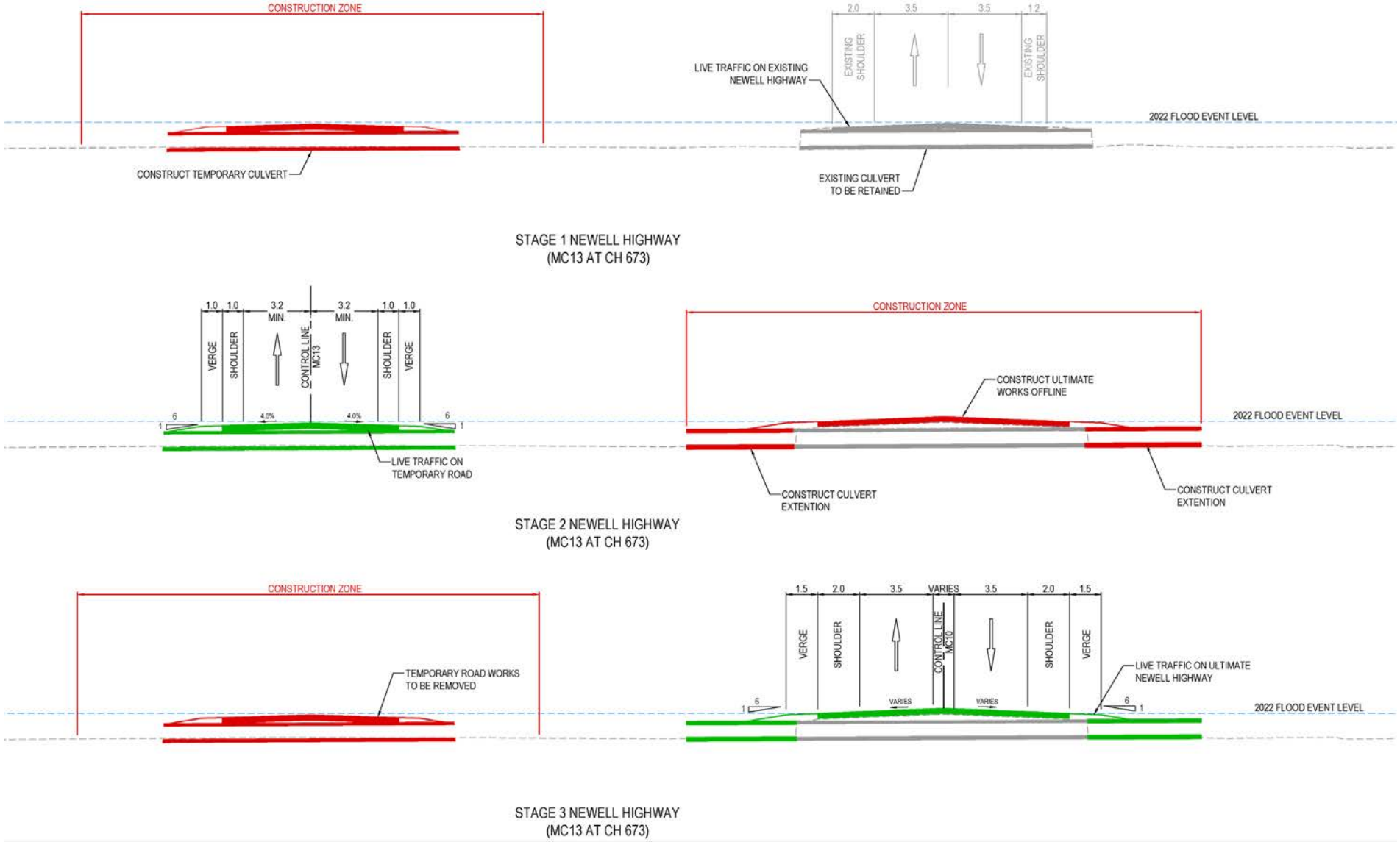


Figure 3-3: Construction typical cross section

Table 3-6: Construction staging

Section	Stage	Description
A	1	• Live traffic on existing highway • Installation of temporary barriers and line marking to shift traffic away from construction zone (at tie-ins) • Construction of temporary diversion including temporary culverts • Construction of temporary tie-ins • Construction of temporary OSOM vehicle bays required for traffic management
	2	• Live traffic on temporary diversion • Construction of ultimate road formation, pavement and embankments • Construction of bridge-sized culverts • Construction of ultimate road furniture and line marking • Removal of existing culverts (where applicable)
	3	• Removal of temporary diversion including temporary culverts • Removal of temporary tie-ins • Live traffic on completed Newell Highway
B	1	• Same as Section A, Stage 1
	2	• Same as Section A, Stage 2 except for the provision of an OSOM vehicle bay and construction of property accesses. This may require nightworks under traffic control to maintain property access.
	3	• Same as Section A, Stage 3 • Full closure of Lows Road
C	1	• Same as Section A, Stage 1 apart from the addition of the full closure of Lows Road for the construction of temporary pavement and embankments along Lows Road and construction and removal of the temporary diversion • Installation of temporary barriers and line marking to direct traffic away from the existing Newell Highway
	2	• Live traffic on temporary diversion • Construction of ultimate road, pavement and embankments • Construction of bridge-sized culverts • Construction of ultimate road furniture and line marking
	3	• Full closure of Lows Road • Removal of temporary diversion including temporary culverts and intersection • Removal of temporary tie-ins • Reinstate existing Lows Road and Bewleys Road • Live traffic on the completed Newell Highway

3.3.3 Traffic management and access

Construction of the proposal would require temporary traffic management measures along the Newell Highway for the safety of road users and construction personnel while maintaining traffic flow along this key freight corridor. Traffic management would be designed and implemented in accordance with Transport's *Traffic Control at Work Sites Manual* (Transport, 2026) and the *Transport for NSW Specification G10 Traffic Management* (Transport, 2026). A proposal specific Traffic Management Plan (TMP) would be developed prior to construction commencement.

Temporary traffic control and speed management

Temporary speed reductions would be required during construction. These speed reductions would be applied progressively along the alignment as construction moves. Traffic would generally be maintained in both directions, with lane shifts, shoulder closures, and stop/slow control used as required. To minimise traffic delays online works are only required at the construction section tie-ins with the remainder of the work proposed to be offline. Line marking would be adjusted temporarily to guide motorists through construction zones and temporary barriers would be installed in areas where work occurs adjacent to drop-offs or exposed batters.

While temporary delays could occur, the proposal is not expected to result in significant prolonged disruptions to highway users. With appropriate staging, lane management and temporary traffic control measures, traffic flow along the Newell Highway would be maintained throughout the construction period. The final construction traffic strategy would be confirmed through the TMP and refined as staging details are developed.

OSOM vehicle bays

Frequent movements of OSOM vehicles on the Newell Highway requires the provision of OSOM parking bays during construction to provide for the safe and efficient movement of these vehicles through the construction zone. Dedicated OSOM vehicle bays are proposed at the northern and southern ends of the construction works. The location of these is shown in Figure 3-1.

The OSOM vehicle bays would allow for OSOM vehicles to stop before being escorted through the construction site. OSOM vehicles less than six metres wide may be able to travel through the site without an escort.

There is an opportunity for the proposal to retain and re-purpose the OSOM parking bays as informal heavy vehicle stopping areas with green reflectors or as widened shoulders.

Construction vehicle movements

Construction of the proposal would generate heavy vehicle movements associated with the delivery of imported fill, precast culvert units, concrete, pavement materials and construction machinery and demobilisation activities. Additional light vehicle movements would involve construction personnel travelling to and from site. Construction vehicles would enter and exit the work zones via designated access points along the highway, with turning movements controlled by traffic controllers or temporary signals where required.

It is expected that construction related traffic would be modest in comparison to the existing traffic volumes of the Newell Highway and unlikely to represent a substantial increase to existing highway traffic volumes.

Property access

Two property accesses would be directly affected by the proposal.

During construction, access to these properties would be maintained wherever possible, although temporary restrictions or short duration closures may be required when embankment works or pavement tie-ins occur at these locations. Where temporary restrictions are unavoidable, alternative access arrangements would be developed in consultation with landowners.

Informal access tracks running parallel to the highway may be removed as part of the proposal. They would not be reinstated.

Interaction with utilities and easements

Traffic management would consider the presence of the APA high pressure gas main and the Telstra optic fibre telecommunications trunk line adjacent to the highway. Construction access and vehicle movements would be managed within the vicinity of these assets and their easements and materials would not be stockpiled near them.

Temporary alternate routes

Lows Road is proposed to be closed during Section C, Stages 1 and 3 for construction of temporary pavement and embankments along Lows Road and construction and removal of the temporary diversion. During these periods of road closure it is proposed to divert traffic travelling along the Newell Highway onto Wennings Road located north of the proposal, then onto Websters Road which provides access to Lows Road. This temporary alternate route is shown in Figure 3-4.

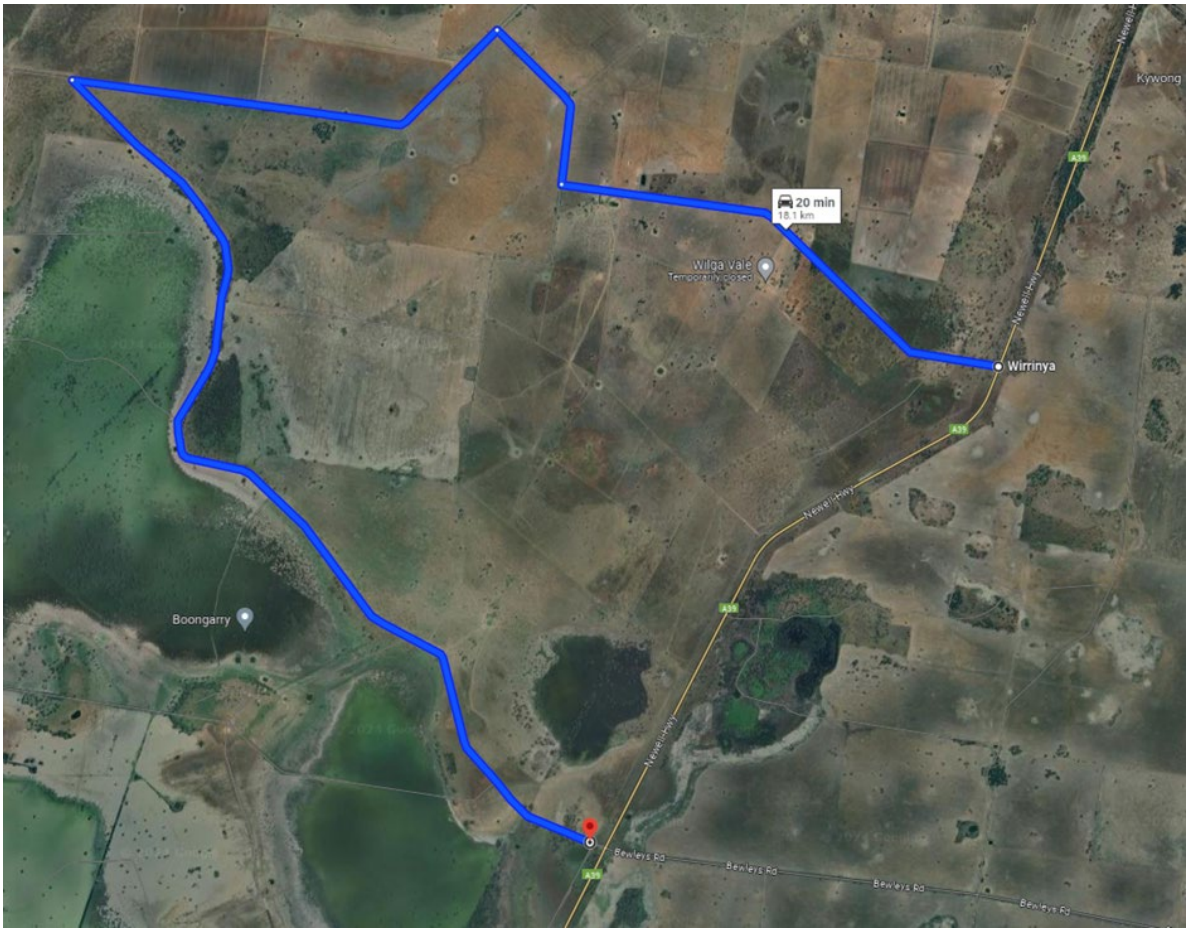


Figure 3-4: Lows Road temporary alternate route

Source: Google maps

3.3.4 Construction workforce

The construction workforce would vary throughout the duration of works, depending on the nature and intensity of construction activities being undertaken. Workforce demands would be higher during labour intensive periods such as bulk earthworks, installation of the bridge-sized culvert banks and pavement construction, and lower during preparatory and finishing works.

About 150 personnel at any given time are expected during the construction period. The final number of construction workers would be identified by the contractor to meet need and delivery timeframes.

3.3.5 Construction duration and work hours

The construction of the proposal would be undertaken in a staged manner. While detailed staging would be developed by the contractor, construction is expected to occur over a period of up to three-years. The final construction program, including detailed sequencing and staging durations, would be determined during detailed construction planning. The final timeframe would depend on:

- weather and flooding conditions across the Lake Cowal/Bland Creek floodplain
- availability of imported fill required for embankments
- availability of precast culvert units
- traffic management requirements to maintain safe operation of the Newell Highway during construction.

Most construction tasks including earthworks, culvert installation, embankment construction and pavement work would be undertaken within the standard daytime construction hours detailed in Table 3-7.

Table 3-7: Standard construction hours

Day	Start time	Finish time
Monday to Friday	7:00 am	6:00 pm
Saturday	8:00 am	1:00 pm
Sundays and public holidays	No regular work	

Out-of-hours work

While most work would occur during standard construction hours, some out of hours activities may be required, particularly where tasks cannot be safely completed under live traffic conditions. These may include:

- pavement tie ins
- temporary traffic switches
- night time delivery of oversized culvert units.

Any out of hours work would:

- be subject to a ROL
- be planned to minimise impacts to residents, road users and freight movements
- occur in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) and the *Construction Noise and Vibration Guideline (Roads)* (Transport, 2026)
- be communicated to affected stakeholders prior to commencement.

3.3.6 Plant and equipment

A range of plant and equipment would be required to construct the proposal. The specific equipment would vary depending on the construction stage and would be confirmed by the contractor during detailed construction planning. Given the scale of earthworks, culvert installation and pavement construction, the proposal is expected to require plant typical of major road and drainage works. An indicative list is provided in Table 3-8 with final plant and equipment selection and deployment to be detailed in construction documentation.

Table 3-8: Indicative construction plant and equipment

Construction activity	Indicative plant and equipment	
Site set-up and preparation	Excavator Front end loader Small cranes and lifting equipment Light vehicle Bulldozer Grader Watercart	Dump truck Fuel truck Road truck Pneumatic hammer/drill Concrete saw Small handheld equipment Generators
Earthworks and drainage works	Excavator Bulldozer Grader Mobile crane Watercart Front end loader Vibratory roller Dump truck Road truck	Utilities locating plant Fuel truck Light vehicle Concrete truck Concrete pump Concrete vibrators Compactors – including hand-held compactors and other small tooling
Road pavement construction	Grader Profiler Rollers Vibratory roller Asphalt / concrete paving equipment Excavator Bulldozer Watercart Front end loader Compactors	Road sweeper Roller Fuel truck Line marking machine Light vehicle Pneumatic hammer/drill Concrete saw Compactor Other small handheld equipment
Site clean-up	Generator Truck	Crane Light vehicle

3.3.7 Earthworks

Construction of the proposal would involve substantial earthworks due to the requirement to raise the Newell Highway formation and install new bridge-sized culverts in the four sections. Earthworks would occur during construction, and would include excavation, filling, foundation preparation and shaping of embankments.

Due to the extremely flat topography and the need to raise sections of the highway, the proposal would involve substantial fill requirements and comparatively limited cut volumes. The native floodplain soils (poorly drained and dispersive) are generally unsuitable for use as structural fill, necessitating the importation of large quantities of engineered fill from approved external sources.

The indicative volumes of the cut and fill earthworks for temporary and permanent works are provided in Table 3-9 with the final cut and fill quantities to be confirmed during detailed design.

Table 3-9: Indicative cut and fill balance volumes for temporary and permanent works

Cut / fill	Total volume (m^3)	Total weight (tonnes)*
Cut	14,765	22,148
Fill	209,265	313,867
Balance	194,499	291,749

** Estimate of weight based on a generalised weight of 1.5 tonnes / m^3*

Any surplus spoil unsuitable for reuse would be managed in accordance with the NSW Environment Protection Agency (EPA) *Waste Classification Guidelines* (EPA, 2014) and disposed of at licensed facilities, while suitable material would be reused on site for backfilling or shaping of batters.

3.3.8 Source and quantity of materials

Construction of the proposal would require a range of materials including quarry products such as select fill, subbase and basecourse aggregates for pavement construction; concrete and aggregates for precast culverts, headwalls and drainage components and steel for reinforcement, safety barriers and road furniture. These materials would be sourced from regional quarries, commercial concrete suppliers and approved fabricators, depending on local availability and technical requirements. Precast culvert units would need to be manufactured off site at specialised facilities and transported to the construction area due to their size and production requirements.

The exact quantities of fill, aggregates, concrete and steel would be confirmed during detailed design when embankment heights, pavement thicknesses and culvert configurations are finalised. Stockpiling and material laydown would occur within designated ancillary sites or within the construction boundary, avoiding utility easements, with consideration to flooding and avoiding impacts to environmentally sensitive land.

3.4 Ancillary facilities

Construction of the proposal would require the establishment of ancillary facilities, including construction compounds, stockpile sites and laydown areas. Where possible these have been situated in areas of previously cleared or on disturbed land. The proposed locations of the ancillary facilities are shown in Figure 3-1 and detailed in Table 3-10.

Table 3-10: Ancillary facilities

Facility	Status	Location (CH)	Area (m^2)
Ancillary facility 1	Existing	42240 to 42440	5370
Ancillary facility 2	Existing	42980 to 43120	8700
Ancillary facility 3	Proposed	45540 to 46560	35,490
Ancillary facility 4	Proposed	45750 to 46070	36,905
Ancillary facility 5	Existing	49120 to 49260	4120
Ancillary facility 6	Proposed	50040 to 50200	11,200
Ancillary facility 7	Proposed	50900 to 51299	17,280

The ancillary facilities would function as the primary base for construction management and would typically include hardstand surfaces for plant and equipment, site offices, crib rooms and amenities, workforce parking, fuel and chemical storage (bunded where required), vehicle wash down areas and designated areas for plant servicing and inspection. Access to these facilities would be provided via existing points along the Newell Highway or from temporary access tracks established during site establishment.

Vegetation clearing for compounds is expected to be minimal as they have, where possible, been situated in cleared areas. The facilities would operate during standard construction hours and during out-of-hours work as required. Following completion of construction activities, the facilities may be retained for future use by Transport or rehabilitated.

Stockpile sites would also be established to temporarily store imported fill, precast culvert units, drainage rock, stripped topsoil and any unsuitable material awaiting reuse or offsite disposal. Given the substantial fill requirements of the proposal, imported material could be sourced from licensed quarries, mines and/or regional road projects. Stockpiles would be located as close as practicable to work fronts to minimise haul distances.

3.5 Public utility adjustment

Utility investigations have identified utilities within the study area as outlined in Table 3-11. No adjustment to these is required by the proposal. There are no Weddin Shire Council owned utility assets located within the study area.

Table 3-11: Utilities near the proposal

Utility	Utility provider	Description
High-pressure gas main (DN200, 8–10 MPa transmission line)	APA Group	A DN200 high-pressure gas transmission main runs parallel to the western / northern side of the Newell Highway and is identified as a critical, non-relocatable utility. The proposal works, including ancillary sites, do not encroach into the easement. However, access across this easement will be required for construction vehicles to access a compound site. This access would be in accordance with APA requirements.
Optic fibre telecommunications trunk line (Melbourne to Brisbane route)	Telstra	A Telstra fibre optic cable, the main inland optical fibre from Melbourne to Brisbane, is located along the western side of the Newell Highway for the full extent of the proposal works. The proposal works, including ancillary sites, do not impact this cable. A redundant Telstra fibre optic trunk cable runs along the western side of the highway. Telstra has indicated the asset should remain in situ. The proposal does not impact on this utility asset.

3.6 Property acquisition

The proposal would require partial property acquisition of Crown land to accommodate the proposed works and compulsory leases to facilitate construction as shown in Figure 3-5.

The acquisition boundary would be based on the works footprint and aims to provide sufficient land area to accommodate the required permanent infrastructure. The proposed acquisition boundary has been reduced along the western side of the proposal to avoid encroachment into the existing APA gas easement.

A temporary lease boundary allows for construction activities, access to construction facilities and temporary basins.

Property adjustments and any required temporary leasing arrangements would be undertaken in accordance with the:

- *Land Acquisition (Just Terms Compensation) Act 1991*
- Land Acquisition Reform 2016 policy framework.

3.6.1 Property acquisitions

No full property acquisitions are proposed. Two Crown land lots would be subject to partial acquisition as detailed in Table 3-12 and shown in Figure 3-5. Together these comprise 328,660 m² of land zoned RU1 Primary Production.

Table 3-12: Proposed partial property acquisitions

Property ID	Lot and DP	Description	Total area (m²)
1	Lot 7302 DP1151770	Permanent works	173,500
2	Lot 7300 DP1152259	Permanent works	155,160

3.6.2 Temporary leases

There are properties that may require some parts of their land to be leased to allow for construction compounds, stockpiles, and ancillary facilities or construction activities. These are detailed in Table 3-13 and shown in Figure 3-5. The land to be leased would be reinstated after completion of the proposal works.

Table 3-13: Proposed temporary leases

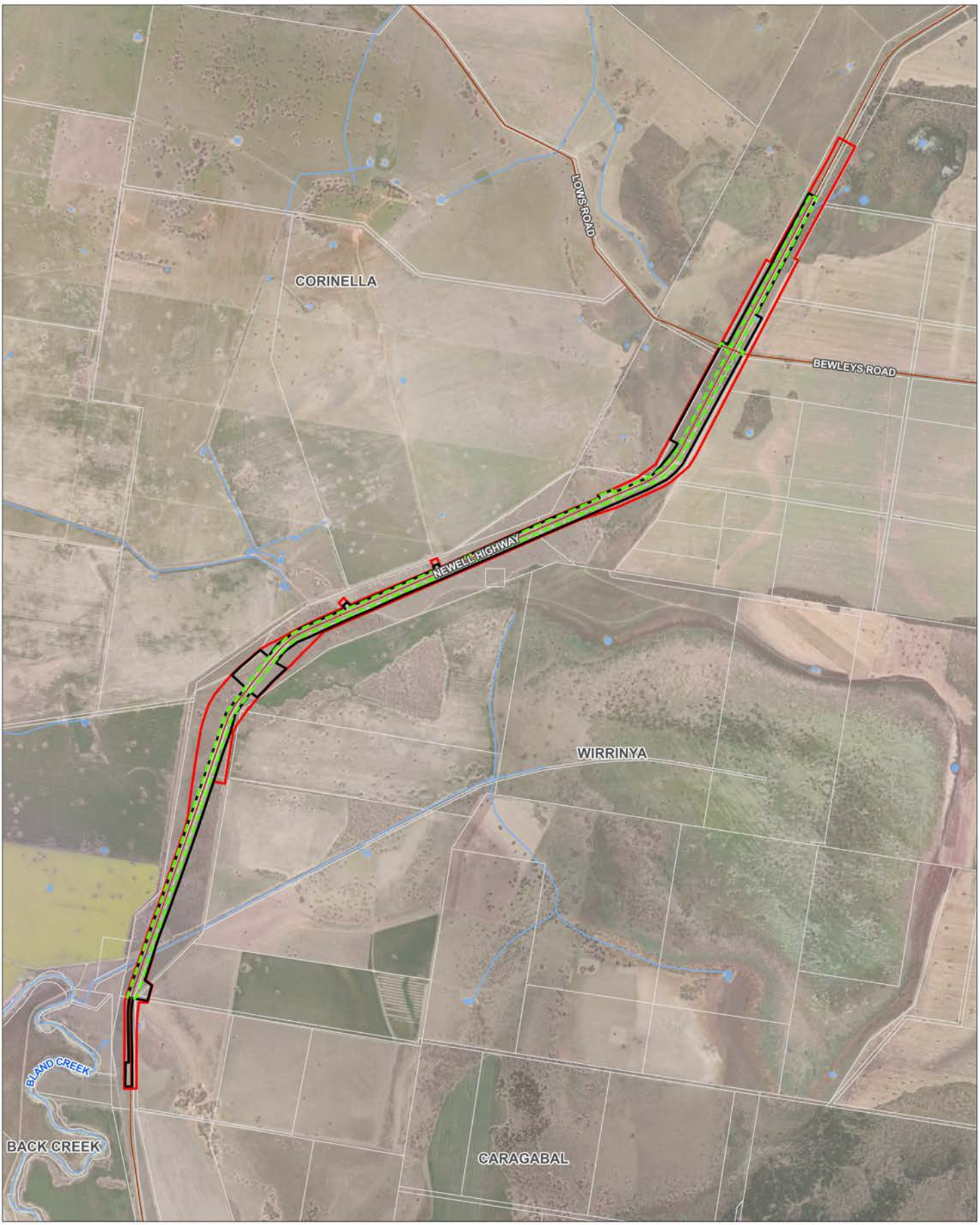
Property ID	Lot and DP	Description	Total area (m²)	Current owner
1	Lot 7302 DP1151770	To allow for ancillary sites, stockpiles, ancillary facilities and construction activities	223,282	Crown land
2	Lot 7300 DP1152259	To allow for ancillary sites, stockpiles, ancillary facilities and construction activities	236,092	Crown land
3	Lot 7301 DP1151770	For use of an existing ancillary site	5369	Crown land
4	Lot 43 DP753100	For use of an existing ancillary site	6254	Private

3.6.3 Access tracks

There are existing access tracks that run parallel to the Newell Highway that may need to be removed to allow for the proposal works. Most of these existing access tracks are located within Crown land and are informal in nature. The access tracks proposed to be impacted by the proposal are detailed in Table 3-14. These would not be reinstated.

Table 3-14: Access tracks impacted by the proposal

Lot and DP	Chainage	Description
Lot 7302 DP1151770	43500 to 44900 46450 to 48500	Existing access track on the eastern and western side of the proposed alignment may be impacted to facilitate construction of the proposal works.
Lot 7300 DP1152259	48500 to 48900 49900 to 50700 51300 to 51900	Existing access track on the eastern side of the proposed alignment may be impacted to facilitate construction of the proposal works. There is also an access track that may be used to access the existing basin at CH51200.



Proposed partial property acquisitions & temporary leases

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 3-5

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 01 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Temporary Lease Boundary
- Proposed Acquisition Boundary
- Existing Road
- Watercourse
- Cadastre
- Waterbody

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road & Waterbody & Watercourse (NSW SS, 2025)

0 250 500 750 1,000 Metres
Scale at A3: 1:30,000



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\\au2012-ntap01_cifs02\shared_projects\304100217\FY21\091_NEWELL HWY WST WYALONG TO FORBES\Drawings\GIS | 304100217_ECO-003_PropertyAquisitions 01 | Last updated 2026-10-20 By: mmostyn

4. Statutory and planning framework

This chapter provides the statutory and planning framework for the proposal and considers the provisions of relevant state environmental planning policies, local environmental plans and other legislation.

4.1 Environmental Planning and Assessment Act 1979

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021

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

Section 2.109 of SEPP (Transport and Infrastructure) permits development for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent on any land. However, on land reserved or acquired under the *National Parks and Wildlife Act 1974* (NPW Act) such development can only be carried out without consent if subject to an existing interest or easement. The proposal is not located on land reserved or acquired under the NPW Act.

As the proposal is for a road and is to be carried out on behalf of Transport, it can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

The proposal does not require development consent or approval under:

- State Environmental Planning Policy (Resilience and Hazards) 2021
- State Environmental Planning Policy (Planning Systems) 2021
- State Environmental Planning Policy (Precincts – Central River City) 2021
- State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021
- State Environmental Planning Policy (Precincts – Regional) 2021
- State Environmental Planning Policy (Precincts – Western Parkland City) 2021

Section 2.10 to 2.15 of SEPP (Transport and Infrastructure) contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by SEPP (Transport and Infrastructure) (where applicable), is discussed in Chapter 5 of this REF.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapters 3 and 4 of the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (SEPP (Biodiversity and Conservation) relate to koala habitat protection as follows:

- Chapter 3 'Koala habitat protection 2020' applies to rural zoned land (RU1 Primary Production, RU2 Rural Landscape and RU3 Forestry) in 74 LGAs listed in Schedule 2 (denoted with an asterisks)
- Chapter 4 'Koala habitat protection 2021' applies to the remaining zones in 74 LGAs and within rural zone land for 9 LGAs listed in Schedule 2.

These chapters aim to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

The proposal is in land zoned RU1 Primary Production and located within the Weddin LGA which is identified as one of the 74 LGAs denoted with an asterisk in Schedule 2 of the SEPP (Biodiversity and Conservation), and therefore Chapter 3 of the SEPP (Biodiversity and Conservation) applies to the land. However, the koala habitat protection requirements under

Chapter 3 of the SEPP (Biodiversity and Conservation) apply to the assessment of development applications under Part 4 to the EP&A Act and to Councils preparing Koala Plans of Management. Therefore, these requirements do not apply to the assessment of this proposal under Part 5 to the EP&A Act.

The potential impacts on Koalas have been considered in section 6.1 and Appendix C of this REF. Although suitable habitat for the species occurs within the study area, the species was considered to have a low likelihood of occurrence as it has not been recorded in the locality and was not detected during targeted surveys.

State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 4 of the *State Environmental Planning Policy (Resilience and Hazards) 2021* (SEPP (Resilience and Hazards)) provides a statewide planning approach to the remediation of contaminated land. The SEPP (Resilience and Hazards) specifies when remediation needs development consent, lists matters to consider in rezoning land and assessing development applications, and sets standards for remediation work and notification. The SEPP (Resilience and Hazards) defines two categories of remediation work being Category 1 (work needing consent) and Category 2 (work not needing consent).

The Preliminary Site Investigation (PSI) prepared for the proposal identified some potential sources of contamination within the study area. However, the PSI did not identify contamination in the study area that would preclude the proposed land use of road infrastructure. Refer to section 6.5 for further information.

4.2 Local Environmental Plans

Weddin Local Environmental Plan 2011

The proposal is located within the Weddin LGA and on land subject to the *Weddin Local Environmental Plan 2011* (WLEP 2011). As the proposal is permitted without consent under the SEPP (Transport and Infrastructure), the consent requirements of the WLEP 2011 do not apply to the proposal.

However, the WLEP 2011 is useful in identifying the proposal's consistency with the land use and planning policy. The proposal is within the zones SP2 Infrastructure (Classified Road) along the existing Newell Highway and RU1 Primary Production adjacent to the road. These land use zones, their corresponding objectives and a description of the consistency of the proposal to the zone objectives are provided in Table 4-1. A map of the zoning is provided in Figure 6-22.

Table 4-1: Relevant WLEP 2011 land zones

Zone	Objectives of the zone	Proposal consistency
SP2	• To provide for infrastructure and related uses. • To prevent development that is not compatible with or that may detract from the provision of infrastructure.	The proposal is for the upgrade of the Newell Highway to reduce the amount of time the Newell Highway is closed between West Wyalong and Forbes during and after flood events. It is consistent with the objectives of the zone.
RU1	• To encourage sustainable primary industry production by maintaining and enhancing the natural resource base • To encourage diversity in primary industry enterprises and systems appropriate for the area • To minimise the fragmentation and alienation of resource lands • To minimise conflict between land uses within this zone and land uses within adjoining zones	The proposal does not conflict with these objectives as it would encourage diversity in primary industry enterprises and systems by providing a more reliable and resilient freight network, while minimising the fragmentation of land, protecting agricultural potential of rural land and maintaining the rural landscape character of the land in the long-term.

4.3 Other relevant NSW legislation

4.3.1 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes a regulatory framework for the protection and restoration of the environment. Chapter 5 of the POEO Act relates to environment protection offences around water pollution, land pollution, noise pollution, air pollution, and waste. Under section 148 of the POEO Act, any pollution incidents causing or threatening material harm must be notified to the relevant authority. Potential impacts related to these offences are discussed in sections 6.4, 6.5, 6.7, 6.8 and 6.12 respectively.

Schedule 1 to the POEO Act lists those activities for which an Environmental Protection License (EPL) is required. Activities requiring an EPL are referred to as "scheduled activities". Section 35 of Schedule 1 to the POEO Act prescribes the thresholds for a road construction activity that is declared a scheduled activity:

- The extraction or processing of more than 50,000 tonnes of materials in the regulated area, or 150,000 tonnes of materials in any other case, or
- The existence of four or more lanes of traffic for one kilometre of freeway or tollway in a metropolitan area, or three kilometres of main road (but not a freeway or tollway) in a metropolitan area, or five kilometres of main road, freeway or tollway not in a metropolitan area.

The approximate cut and fill volumes for the proposal would exceed 150,000 tonnes. However, the current proposal would involve importing suitable fill material to site, rather than processing material onsite. Therefore, the proposal would not meet the criteria for a scheduled activity under the POEO Act as less than 150,000 tonnes of materials would be extracted or processed (refer to section 3.3.7). The need for an EPL would be reviewed at detailed design and prior to construction once the methodology has been confirmed.

4.3.2 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share aquatic resources for the benefit of present and future generations.

Any species, populations and ecological communities listed on Schedules 4, 4A and 5 of the FM Act likely to occur in the study area, or known to use habitat in the study area, are subject to an assessment of significance. In determining the significance of the potential impacts, the determining authority must consider the matters listed in section 220ZZ of the FM Act. No threatened species, populations or ecological communities or their habitats listed under the FM Act were considered to have a moderate or higher likelihood of occurrence. As such, an assessment of significance was not carried out.

The carrying out, without a licence, of activities that damage habitats or harm threatened species, populations or ecological communities is prohibited under Part 7A Division 4 of the FM Act.

The study area is in the Bland Creek / Lake Cowal catchment. The construction boundary includes Key Fish Habitat (KFH) mapped as Type 3, Class 4 minimally sensitive KFH (unnamed wetland). Culvert upgrades would be undertaken within this floodplain wetland. The construction boundary does not intersect Bland Creek which is mapped as Type 1, Class 1 highly sensitive KFH.

The Department of Primary Industries and Regional Development (DPIRD) Fisheries would be formally notified under section 199 of the FM Act during detailed design. Any matters received within 21 days of the notification would be considered by Transport.

The floodplain wetland has been classified by Department of Primary Industries (DPI) - Fisheries as Class 4 waterway. Fish passage is currently provided through culverts and pipes under the Newell Highway and the movement of water would be maintained during construction of the proposal through culverts under the temporary diversion. The floodplain wetland would therefore not be blocked during construction activities and a permit under section 219 of the FM Act would not be required.

Further details of the biodiversity assessment carried out are in section 6.1 and Appendix C.

4.3.3 Roads Act 1993

The *Roads Act 1993* (Roads Act) provides for the classification of roads and the declaration of public authorities for both classified and unclassified roads. It also regulates the carrying out of various activities in, on and over public roads, the process for acquisition of land for the purposes of road widening and dedication of land for roads.

Section 138 of the Roads Act requires consent from the relevant roads' authority for the erection of a structure, or the carrying out of work in, on or over a public road, or the digging up or disturbance of the surface of a road.

The Newell Highway is a classified State road managed by Transport. Transport would obtain a ROL for work on this road and the closure of traffic lanes and the movement of over-sized vehicles during the construction. A ROL would be sought from Weddin Shire Council for affected non-classified roads, being Bewleys Road and Lows Road.

Under section 72 (1)(b) of the Roads Act, Transport can carry out work on unclassified roads if the proposed activity would be of benefit to the classified roads in the vicinity of the road in which the work is carried out.

4.3.4 Crown Lands Management Act 2016

The *Crown Land Management Act 2016* provides the legislative framework for the administration of land that is vested in the Crown in NSW, for environmental protection, natural resource conservation, and public use and enjoyment. Ministerial approval is required to grant a 'lease, licence, permit, easement or right of way over a Crown Reserve'.

The Crown Reserves that intersect the construction boundary are:

- Lot 7300 DP1152259 (R2744)
- Lot 7301 DP1151770 (R33513)
- Lot 7302 DP 1151770 (R29714).

These Crown Land Reserves are for the purposes of travelling stock and are managed by the Local Land Services.

Transport would need to secure the required lease and/or land acquisition in accordance with the *Crown Land Management Act 2016* prior to the commencement of construction activities (refer to section 3.6).

4.3.5 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) provides the primary framework for the conservation of biodiversity in NSW. The BC Act provides for the protection of threatened species, populations or ecological communities, or their habitats, and delivers a strategic approach to biodiversity conservation in NSW whilst supporting improved farm productivity and sustainable development. If an activity potentially affects any flora or fauna species, populations or ecological communities listed by the BC Act, a test of significance under section 7.3 of the BC Act is required. If the proposal is likely to significantly impact threatened species, then Transport would need to prepare a Species Impact Statement or a Biodiversity Development Assessment Report (BDAR).

Two TECs and seven threatened species listed under the BC Act were recorded in the study area, were assumed present or were assigned a moderate to high likelihood of occurrence. For these TECs and threatened species, assessments of significance under the BC Act were completed. Based on these tests of significance, it is considered that the proposal would not result in a significant impact. As such a Species Impact Statement or a BDAR is not required. Section 6.1 and Appendix C provides further details.

4.3.6 Biosecurity Act 2015

The primary objective of the *Biosecurity Act 2015* is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

Part 22, Division 2 of the *Biosecurity Act 2015* defines local control authorities for priority weeds and Schedule 1 outlines special provisions relating to weeds, including the duty of land occupiers to control and manage weeds.

There is a total of 62 exotic species recorded in the study area, two of which are listed as priority weeds for the Central West region under *Biosecurity Act 2015*. These weeds would be managed and controlled to prevent, eradicate, contain and/or minimise their economic, environmental and / or social impacts during the implementation of the proposal. This is considered further in section 6.1 and Appendix C.

4.3.7 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides for the conservation and management of nature and objects, places and features of cultural value within the landscape. It is the primary legislation for the protection of Aboriginal cultural heritage in NSW.

Part 6 of the NPW Act provides protection for all Aboriginal objects and Aboriginal places in NSW. Under Section 90 of the NPW Act, where harm to an Aboriginal object or Aboriginal place cannot be avoided, an Aboriginal Heritage Impact Permit (AHIP) is required before the disturbance of Aboriginal objects or places.

Aboriginal heritage investigations undertaken as part of a Stage 2 process in accordance with Transport's *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (Transport, 2025) in March 2026 identified five new Aboriginal sites and one additional site of archaeological sensitivity within the study area. As two of these sites would be impacted during construction of the proposal an AHIP under section 90 of the NPW Act would be required. An assessment in accordance with Stage 3 of the PACHCI is currently being completed including consultation with Registered Aboriginal Parties (RAPs) and reparation of an Aboriginal Cultural Heritage Assessment Report (ACHAR). The ACHAR would support the AHIP.

Section 6.2 and Appendix D provides further details.

4.3.8 Heritage Act 1977

The *Heritage Act 1977* provides for the protection, conservation and re-use of items of state and local heritage significance in NSW and establishes the Heritage Council of NSW. Approval from the Heritage Council would be sought before the potential disturbance or excavation of items, relics and artefacts with historic heritage significance.

The heritage investigation for the proposal identified that the study area does not contain any non-Aboriginal heritage values of significance at a State or local level and the study area has nil to low potential to contain significant archaeological relics. Any previously unrecorded archaeological relics found during construction would be managed in accordance with Transport's *Unexpected Heritage Items Procedure* (Transport, 2022) which includes all necessary obligations under the *Heritage Act 1977*.

Section 6.3 and Appendix E provides further details.

4.3.9 Land Acquisition (Just Terms Compensation) Act 1991

The *Land Acquisitions (Just Terms Compensation) Act 1991* applies to the acquisition of land (by agreement or compulsory process) by a public authority authorised to acquire the land by compulsory process. It provides a guarantee that, when a public authority requires the acquisition of land, the amount of compensation will not be less than the market value of the land.

The proposal would require the partial acquisition of two Crown land lots, and the temporary lease of four properties. Land acquisition requirements for the proposal are discussed in section 3.6.

The final property acquisition needed for the proposal would be confirmed by Transport during detailed design and in consultation with landowners.

4.3.10 Water Management Act 2000

The *Water Management Act 2000* (WM Act) provides for the sustainable and integrated management of the water sources in NSW for the benefit of both present and future generations.

The study area is covered by the *Water Sharing Plan for the Lachlan Unregulated River Water Sources 2026*. This water sharing plan was prepared in accordance with Chapter 2, Part 3, Division 2 of the WM Act and applies to the proposal. The recommended management strategies in this REF are consistent with this Water Sharing Plan.

Licences and approvals under the WM Act are required for:

- Water access licence (section 56, 60A) – to take surface or ground water where a statutory water sharing plan is in place. Under section 45 and Schedule 4, Part 2 of the *Water Management (General) Regulation 2025* (WM Regulation), a public authority, is exempt (subject to conditions) from the need to obtain a water access licence in relation to water required for construction and maintenance of essential infrastructure which includes roads.
- Water use approval (section 89, 91A) - using extracted water for the proposal. Under Schedule 4, section 21 of the WM Regulation, a person who is exempt under section 45 of the WM Regulation is also exempt in relation to the use of water in the same circumstances.
- Water management work approval (section 90) - undertaking any work involving water supply, drainage or flood works. The need for water management work approvals would be determined during detailed design.
- Activity approvals (section 91) – undertaking a controlled activity within waterfront land or aquifer interference activity during excavations. In accordance with section 64 of the WM Regulation, public authorities are exempt from the need to obtain a Controlled Activity Approval under the WM Act. Groundwater is not anticipated to be intersected as part of the proposal.

Transport would consult with the NSW Department of Climate Change, Energy and the Environment and Water (NSW DCCEEW) to ensure that all applicable licences and / or approvals for any impacts to surface and ground water are obtained prior to construction.

An assessment of the potential impacts to surface water and groundwater, and measures to manage potential impacts, are provided in section 6.4.5.

4.3.11 Local Land Services Act 2013

Provisions of the *Local Land Services Act 2013* (LLS Act) apply to clearing native vegetation in rural parts of the State and to clearing that is authorised under other legislation. Pursuant to Section 60O (clearing authorised under other legislation) as the proposal is an activity carried out by a determining authority within the meaning of Part 5 of the EP&A Act, vegetation clearing is authorised by way of compliance with that part of the EP&A Act.

The LLS Act also served to establish 11 regional Local Land Services (LLS) who are responsible for the integrated management of Traveling Stock Reserves (TSR). The LLS can manage TSRs and issue use permits. Where the proposed use of a TSR sits outside of the authorities afforded to a LLS under the LLS Act, consultation with, and the approval of, the Department of Planning, Housing and Infrastructure (DPHI) Crown Lands is needed. This is considered under provisions of the *Crown Lands Management Act 2016*.

The study area falls within TSRs managed by the Central West LLS. The LLS Act provides for a level of delegated statutory management, protection and sustainable use of TSRs. This focuses on retaining TSRs for their intended use and function. Despite these provisions, the LLS does not have the delegated powers to allow the TSR to be developed as a road with this is afforded to the Minister of Lands and Property and therefore approval of the Department of Planning, Housing and Infrastructure (DPHI) Crown Lands.

The proposal would impact on a TSR and Transport will engage with Central West LLS and DPHI Crown Lands regarding necessary approvals required for the proposal.

4.3.12 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* recognises the traditional ownership and occupation of the land by Aboriginal peoples and the importance of their connection to land. Through the *Aboriginal Land Rights Act 1983*, vacant Crown land not lawfully used or occupied, or required for an essential purpose or for residential land, can be acquired and managed by Aboriginal Land Councils. In accordance with Section 42B of the *Aboriginal Land Rights Act 1983*, land vested in an Aboriginal Land Council can only be acquired by Transport through an Act of Parliament.

The proposal intersects Crown land lots and there is a need to consider if there are any existing claims, or potential claims to be lodged under the *Aboriginal Land Rights Act 198*3.

4.3.13 Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (CLM Act) establishes a process for the NSW Environmental Protection Authority (EPA) to identify, investigate and (where appropriate) order the remediation of land if the EPA considers the land to be significantly contaminated under division 2, part 3, Section 60 of the CLM Act outlines the duty to report contamination requirements.

The PSI prepared for the proposal identified some potential sources of contamination within the REF study area. However, the PSI did not identify contamination in the study area that would preclude the proposed land use of road infrastructure. Refer to section 6.5 for further information.

If contaminated land is encountered during the works that meet the 'duty to report contamination requirements' under section 60 of the CLM Act, the EPA must be notified.

4.3.14 Waste Avoidance and Resource Recovery Act 2001

The *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) provides for the avoidance and reduction of waste and resource management. The WARR Act establishes a waste hierarchy, which requires that resource management options are considered against a hierarchy of the following order avoidance of unnecessary resource consumption, resource recovery (including reuse, reprocessing, recycling and energy recovery) and disposal.

Waste generation and disposal reporting would be carried out during the construction of the proposal. As the proposal would generate waste, it is required to consider the waste management hierarchy referred to in the WARR Act. A Waste Management Plan (WMP) would be prepared and implemented as part of the CEMP.

Section 6.12 provides further details.

4.4 Commonwealth legislation

4.4.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance (MNES) or the environment of Commonwealth land. These are considered in Appendix A and Chapter 6 of the REF.

A referral is not required for proposed road activities that may affect nationally-listed threatened species, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

Potential impacts to these biodiversity matters are also considered as part of Chapter 6 of the REF and Appendix A.

Findings – matters of national environmental significance

The assessment of the proposal's impact on MNES and the environment of Commonwealth land, found that there is unlikely to be a significant impact on relevant MNES or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the EPBC Act.

Findings - nationally-listed biodiversity matters (where the strategic assessment applies)

The assessment of the proposal's impact on nationally-listed threatened species, endangered ecological communities and migratory species found that there is unlikely to be a significant impact on relevant MNES. Chapter 6 of the REF describes the mitigation measures to be applied.

4.4.2 Native Title Act 1993

The *Native Title Act 1993* (NT Act) recognises and protects native title. The NT Act covers actions affecting native title and the processes for determining whether native title exists and compensation for actions affecting native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims and the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the Act, a future act includes proposed public infrastructure on land or waters that affects native title rights or interest.

Native title rights and interests exist on all Crown land unless they have been extinguished. The NT Act covers actions affecting native title, the processes for determining whether native title has been extinguished, and compensation for actions affecting native title.

The proposal requires a partial acquisition of two NSW Crown Land Lots, being part Lot 7300 in Deposited Plan 1152259, and part Lot 7302 in Deposited Plan 1151770. The proposal also requires temporary occupation of some adjoining NSW Crown Lands.

Although, no Native Title claims have been identified on the above lands, Transport will have regard to the Federal Government's NT Act. Details of the proposed road upgrade and associated works will be sent to NTSCORP Limited, who are the official Native Title Service Provider in NSW.

The road construction project team will respond and engage with any response received from NTSCORP in regard to the proposed works, and are defined by the NT Act as future works.

4.5 Confirmation of statutory position

The proposal is categorised as development for the purpose of a road and is being carried out by or on behalf of a public authority. Under section 2.109 of SEPP (Transport and Infrastructure) the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Division 5.1 of the EP&A Act.

Transport is the determining authority for the proposal. This REF fulfils Transport's obligation under section 5.5 of the EP&A Act including the requirement to examine and take into account matters affecting or likely to affect the environment by reason of the activity in a manner that is proportionate to the nature and risk of the activity.

5. Consultation

This chapter discusses the consultation undertaken to date for the proposal and the consultation proposed for the future.

5.1 Consultation strategy

An overarching Community and Stakeholder Engagement Plan was prepared to guide consultation on the proposal. The plan establishes communication and engagement objectives, describes the engagement approach, identifies key stakeholders, and outlines the communication and engagement tools and activities used during development of the proposal.

Throughout the proposal lifecycle, the aim of community engagement is to foster an open, two-way communicative relationship between Transport and its stakeholders by engaging meaningfully, transparently, appropriately, inclusively and flexibly.

The proposal's communication and engagement objectives include:

- to increase community and stakeholder understanding of the Newell Highway Flood Mitigation – West Wyalong to Forbes proposal and its objectives
- to build a database of key stakeholders and interested community members and groups to engage with as the proposal progresses
- to keep the local community and other key stakeholders regularly informed of project progress
- to ensure that all information released is accurate and distributed in an effective and timely manner
- to provide clear information about what Transport is seeking feedback on, when and why
- to listen to community and stakeholder feedback, investigate suggestions and report back
- to ensure that community and stakeholder enquiries about the proposal are managed and resolved efficiently.

5.2 Community and stakeholder involvement

5.2.1 Strategic options consultation

Transport carried out public consultation on the strategic options for the proposal from 20 June 2023 to 27 July 2023. Residents, businesses and stakeholders in the Weddin Shire, Forbes Shire and Bland Shire LGAs were invited to provide feedback on the strategic design. Flood-affected residents in the proposal footprint were also asked to consider sharing records from the 2022 and / or previous flood events to assist with Transport's continuing flood studies.

Aims of the strategic options consultation included:

- to inform the community and stakeholders that flood mitigation for a section of the Newell Highway at Marsden had been prioritised, why Marsden had been prioritised, and what treatments were proposed
- to seek community and stakeholder feedback on the proposed flood mitigation plans to help inform the strategic design
- to encourage the community and key stakeholders to sign up for eNewsletter updates to stay informed about the proposal.

Key consultation tools and activities included:

- distribution of a printed Community Update and survey to all residences in Weddin Shire (2,271), Forbes Shire (4,863) and Bland Shire (3,128) LGAs via Australia Post's unaddressed mail service
- an online engagement portal with an interactive map, online survey and an ideas / feedback board
- a media release distributed to local media outlets and uploaded to the project webpage
- briefings to Weddin Shire Council, Bland Shire Council and Forbes Shire Council

- meetings with key stakeholders including Marsden property owners, West Wyalong Local Aboriginal Land Council (LALC), the Condobolin LALC and freight industry bodies
- face-to-face consultation sessions in West Wyalong and Forbes, and an online consultation session
- posters promoting the consultation in key community locations in West Wyalong, Grenfell and Forbes
- social media posts on Transport's Facebook page over the six week consultation period.

During the strategic options consultation the project team interacted with 105 people, including 67 people in stakeholder meetings, 25 attendees at face-to-face consultation sessions, and 13 phone calls. A total of 88 written responses were received: 57 online surveys, 15 pins on the online interactive map, 15 hard copy surveys and one emailed letter.

Valuable feedback, information and flood records were provided by a range of stakeholder groups including councils, LALCs, property owners, business owners, freight industry, emergency services and individual community members.

Issues raised included timing for the proposal, funding, design, construction impacts, economic and social impacts from extended road closures, Aboriginal cultural heritage, emergency response considerations and consultation.

Further information about how consultation was done and issues raised is available in the Newell Highway Flood Mitigation – West Wyalong to Forbes Strategic Options Consultation Report (October 2023).

5.2.2 Concept design and REF consultation

The proposal has benefited from input provided through targeted consultation during development of the concept design and preparation of the REF, which has helped to identify issues, potential mitigation strategies and opportunities to improve proposal outcomes.

The public display of this REF will broaden consultation by providing opportunities for the wider community and interested stakeholders to submit feedback on the proposal, with the aim to mitigate, minimise and manage impacts during the delivery phase.

5.3 Aboriginal community involvement

Aboriginal community involvement and heritage impact were considered in accordance with Transport's PACHCI (Transport, 2025).

Transport recognises that the development and delivery of its projects has the potential to impact Aboriginal cultural heritage and that effective consultation with Aboriginal people is an important step in identifying and minimising cultural heritage impacts.

The PACHCI was developed to provide a consistent means of effective consultation with Aboriginal communities regarding activities which may impact on Aboriginal cultural heritage and a consistent assessment process for Transport activities across NSW. The aim of consultation is to integrate cultural and archaeological knowledge and ensure RAPs have information to make decisions on Aboriginal cultural heritage. The PACHCI assists Transport in meeting its legislative responsibilities regarding consultation and investigation of the potential impacts on Aboriginal cultural heritage.

The stages of the PACHCI for the proposal are summarised in Table 5-1.

Table 5-1: Summary of Transport's PACHCI stages for the proposal

Stage	Description
Stage 1: Initial assessment by Transport	A desktop assessment was carried out by Transport in 2023 as part of the initial scoping to determine if the proposal is likely to harm Aboriginal cultural heritage. The initial proposal was assessed as being unlikely to have an impact on Aboriginal cultural heritage based on due diligence considerations. However, as the design progressed it was determined further assessment was required due to the features in the surrounding landscape.

Stage	Description
Stage 2: Further assessment and site survey	A Stage 2 PACHCI was completed in July 2026 by Extent Heritage and involved further assessment and a site survey to assess the proposal's potential to harm Aboriginal cultural heritage, and to determine whether formal Aboriginal community consultation and a cultural heritage assessment report would be required. The West Wyalong LALC were consulted as part of the Stage 2 PACHCI and a representative of the West Wyalong LALC participated in an archaeological survey of the study area carried out over two days in March 2026. The Stage 2 PACHCI assessment concluded that Aboriginal sites or areas of archaeological sensitivity could not be effectively avoided by the proposed works. Therefore, it was recommended that the proposal proceed to Stage 3 of the PACHCI.
Stage 3: Formal consultation and preparation of a cultural heritage assessment report	Formal consultation including identifying RAPs and preparation of an ACHAR for the proposal will take place in accordance with Stage 3 of the PACHCI.
Stage 4: Implement project mitigation measures	Stage 4 of the PACHI is to undertake any salvage and / or project implementation in accordance with an AHIP and / or a project approval or determination under the EP&A Act. During stage 4, Transport would continue to consult with RAPs in accordance with the PACHCI process.

5.3.1 Stakeholder identification and registration of interest

As impacts to Aboriginal cultural heritage cannot be avoided by the proposal (refer to section 6.2.3), in accordance with the PACHCI guidelines, progression to a Stage 3 PACHCI is required. The PACHCI Stage 3 process has commenced.

5.4 SEPP (Transport and Infrastructure) consultation

Consultation regarding the proposal as per the requirements of sections 2.10, 2.12, and 2.13 of SEPP (Transport and Infrastructure) has been undertaken. The following consultation was undertaken:

- Weddin Shire Council – 24 January 2024 and 3 February 2026
- Forbes Shire Council - 24 January 2024 and 3 February 2026
- Bland Shire Council - 16 February 2024 and 3 February 2026
- State Emergency Services (SES) – 24 January 2024 and 3 February 2026.

No responses were received from the councils in the 2026 consultation. The issues raised in response to the 2024 consultation is detailed in Table 5-2 along with the response received from the SES in 2026.

Appendix B contains a SEPP (Transport and Infrastructure) consultation checklist that documents how SEPP (Transport and Infrastructure) consultation requirements have been considered for this proposal.

Table 5-2: Issues raised through SEPP (Transport and Infrastructure) consultation

Group	Issue raised	Response / where addressed in REF
Weddin Shire Council	Council requested that the Marsden Concrete Area (located around 5 kilometres south of the proposal along the Newell Highway) be reviewed noting the concern that this is usually	During development of the options, it was assessed that upgrades between CH23600 and CH58000 would be the priority due to significant flooding impacts in the Marsden

Group	Issue raised	Response / where addressed in REF
	the first place to be impacted during flooding. This area historically is where Council first closes lanes during flooding. Noted that this may be part of a different upgrade due to it being concrete and that the assets team have identified a culvert in that area for replacement.	area. Upgrades to this section of the highway would greatly increase the trafficability of the Newell Highway. Detail of the identification of options, the assessment process, and selection of the preferred option is provided in section 2.4.
Forbes Shire Council	Council did not note any concerns with the proposal.	-
Bland Shire Council	Council noted that proposed culverts are not located within their LGA, however the catchment areas for the proposed culverts would be. They state that the proposal would improve water flow and would positively impact on local farming and local infrastructure. No council works were noted as being within the area that may affect proposed culvert work.	Details of the flood modelling undertaken for the proposal and associated potential impacts are provided in section 6.4.
SES	The proposals should consider impacts of flooding on infrastructure and people using the road up to and including the Probable Maximum Flood (PMF), along with the impact of climate change on the flood risks. Workers and road users during and after upgrades should be made aware of the flood risk. If there is a risk of riverine flooding, consideration should be made to close the worksite and securing materials and equipment. The Bureau of Meteorology (BoM) website should be checked prior to the start of the working day for any Flood Warnings. Notify NSW SES where there are likely to be significant delays in the operation of the roads affected by the upgrades, due to potential impacts to emergency vehicle's ability to use the route. SES is in support of the proposal noting improvements to flood resilience help reduce flood risk will benefit the community.	Flood modelling and potential impacts for the 20%, 10%, 5% and 1% AEP design events are provided in section 6.4. This modelling included climate change sensitivity scenarios. At this stage, the PMF event was excluded as the roadway is expected to be submerged, with flood levels governed by Lake Cowal, limiting the value of further hydraulic assessment. Flood risk would be considered as part of the construction staging and planning for the proposal. A Flood Response Management Plan would be prepared and implemented as part of the CEMP to address flood risk. This mitigation measure has been included in section 6.4.5. Emergency services (including the SES) would be notified of temporary traffic diversions or road closures. This mitigation measure has been included within section 6.6.4.

5.5 Government agency and stakeholder involvement

Transport has commenced consultation with government agencies and stakeholders regarding the proposal. This consultation will continue through the design and implementation of the proposal.

Initial discussions have been undertaken with LLS and have been focused on the potential impacts to TSR.

During preparation of the REF specialist studies advice was requested from the DPI – Fisheries on the mapping of key fish habitat for the floodplain wetland and the requirements for fish passage. DPI - Fisheries confirmed that Class 4 classification for this wetland is appropriate and that there are no fish passage considerations required. It is addressed in section 6.1 with the email advice attached as Appendix C of the Biodiversity Assessment Report (BAR) provided in Appendix C of this REF.

5.6 Consultation with utility and other asset owners

Consultation with potentially affected utility authorities commenced was undertaken during the development of the concept design. Project communication has been carried out with Telstra and APA. Ongoing discussions relating to their assets will continue during future design stages.

5.7 Ongoing or future consultation

Transport is committed to continued engagement with the community and stakeholders throughout the proposal lifecycle. Following the public display of this REF, Transport will collate and consider the submissions received, then determine whether the proposal should proceed as described in the REF, or whether any changes are required.

A determination report summarising the issues raised during consultation and providing Transport's responses will be published on Transport's project webpage at nswroads.work/ww2f and the community will be informed of any major design changes that are required to address concerns raised in submissions.

A consultation report to summarise the community and stakeholder engagement carried out during the display of the REF and concept designs will also be prepared and published on the project webpage.

Following the determination of the REF, the community would continue to be updated about the progress of construction and would be notified of any road closures or night works in advance of the works occurring. Direct consultation would continue with affected property owners and stakeholders.

To effectively manage engagement during the construction stage of the proposal, a Community and Stakeholder Engagement Plan would be developed to establish the communication and engagement objectives, identify stakeholders, and outline the communication and engagement tools and activities to be used throughout construction.

6. Environmental assessment

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment, potentially impacted upon by the proposal, are considered. This includes consideration of:

- Potential impacts on MNES under the EPBC Act.
- The factors specified in the *Guideline for Division 5.1 assessments* (DPHI, 2026) and as required under section 171 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) and the *Roads and Related Facilities EIS Guideline* (DUAP, 1996). The factors specified in section 171 of the EP&A Regulation are also considered in Appendix A.

Site-specific mitigation measures are provided to address the identified potential impacts.

6.1 Biodiversity

A BAR has been carried out to assess the potential impacts on biodiversity during construction and operation of the proposal. A summary of the assessment is presented in the following sections. Further information is provided in Appendix C.

6.1.1 Methodology

The following provides a summary of the methodology used in the BAR:

- Background research: a desktop assessment of the study area and wider locality, including a review of existing literature and databases was carried out to understand biodiversity values and determine the likelihood of occurrence of threatened species, populations and ecological communities.
- Vegetation mapping: a vegetation survey and assessment was completed in accordance with Chapter 4 of the Biodiversity Assessment Method (BAM) (DPIE, 2020). This involved:
  - a review of vegetation mapping relevant to the study area
  - on-ground vegetation mapping in October 2023 and January / February 2024 by meanders through the study area to verify the PCT, as described in the BioNet Vegetation Classification database, and their extents. Rapid data points were collected with the following:
    - structure and species composition
    - characteristic floristics at each vegetation strata
    - landscape characteristics.
- Vegetation assessment: Vegetation and floristic plots to verify PCT, the presence of TECs, broad condition classes and extents was completed. The location of the vegetation plot surveys is shown in Figure 2-1 of Appendix C.
- Threatened species assessment: targeted flora and fauna field surveys were completed between September 2023 and November 2025. The threatened flora survey locations are shown in Figure 2-2 of Appendix C and the threatened fauna species survey locations are shown in Figure 2-3 of Appendix C. This involved:
  - A habitat suitability assessment to assess the likelihood of occurrence of each threatened or migratory species, threatened population or ecological community identified with the potential to occur within the study area.
  - Habitat transects to map important habitat features and evidence of fauna activity. Features collected included hollow-bearing trees, stags, burrows, aquatic habitat, culverts, and signs of fauna activity (such as feeding evidence, claw marks, scats).
  - Targeted flora and fauna surveys for all threatened flora species identified as requiring survey following the habitat suitability assessment. All flora species identified as having a moderate likelihood of occurrence and identified by the BAM-C were included for targeted surveys. Targeted fauna surveys were completed for all species-credit fauna species identified as requiring survey following the habitat suitability assessment. The fauna survey methods included aural-visual surveys, diurnal habitat flushes and bird surveys, call playback surveys,

searches for signs of breeding, stag watch at suitable sized hollow-bearing trees, spotlighting and call playback. Koala surveys were also conducted using the Koala spot assessment technique. Ultrasonic echolocation detectors (ANABATs) were used in the microbat surveys.

- Aquatic assessment: field survey completed on 6-8 November 2023 at four sites (refer Figure 2-4 of Appendix C) within the study area to assess aquatic biodiversity including fish, riparian and aquatic habitat and water quality. The riparian and aquatic habitat condition assessment was completed in accordance with the riparian channel and environment (RCE) inventory method. This method assigns a score from 13 to 52, with higher scores indicating more intact and less disturbed stream conditions.

6.1.2 Existing environment

The study area is located within the Lower Slopes Interim Biogeographic Regions of Australia (IBRA) subregion of the NSW South Western Slopes IBRA bioregion. The Lower Slopes IBRA subregion is characterised extensive red-brown earths in undulating plains (DPE, 2021).

The study area is located within the 'middle sub-catchment' of the Lachlan River Catchment mostly within the Lachlan-Bland Channels and Floodplains NSW (Mitchell) landscapes region, with a small part within the Cowal Lakes, Swamps and Lunettes NSW (Mitchell) landscapes region. The land consists of gently undulating plains, often sloping along the edges of the existing road corridor. The topography of the study area ranges from approximately 207 m to 210 m above sea level (asl).

No conservation reserves occur within the study area with the closest being the Carawandool State Forest (approximately 11.8 kilometres northeast of the study area) and Lachlan Valley National Park (approximately 17.4 kilometres north of the study area).

Vegetation types

PCTs

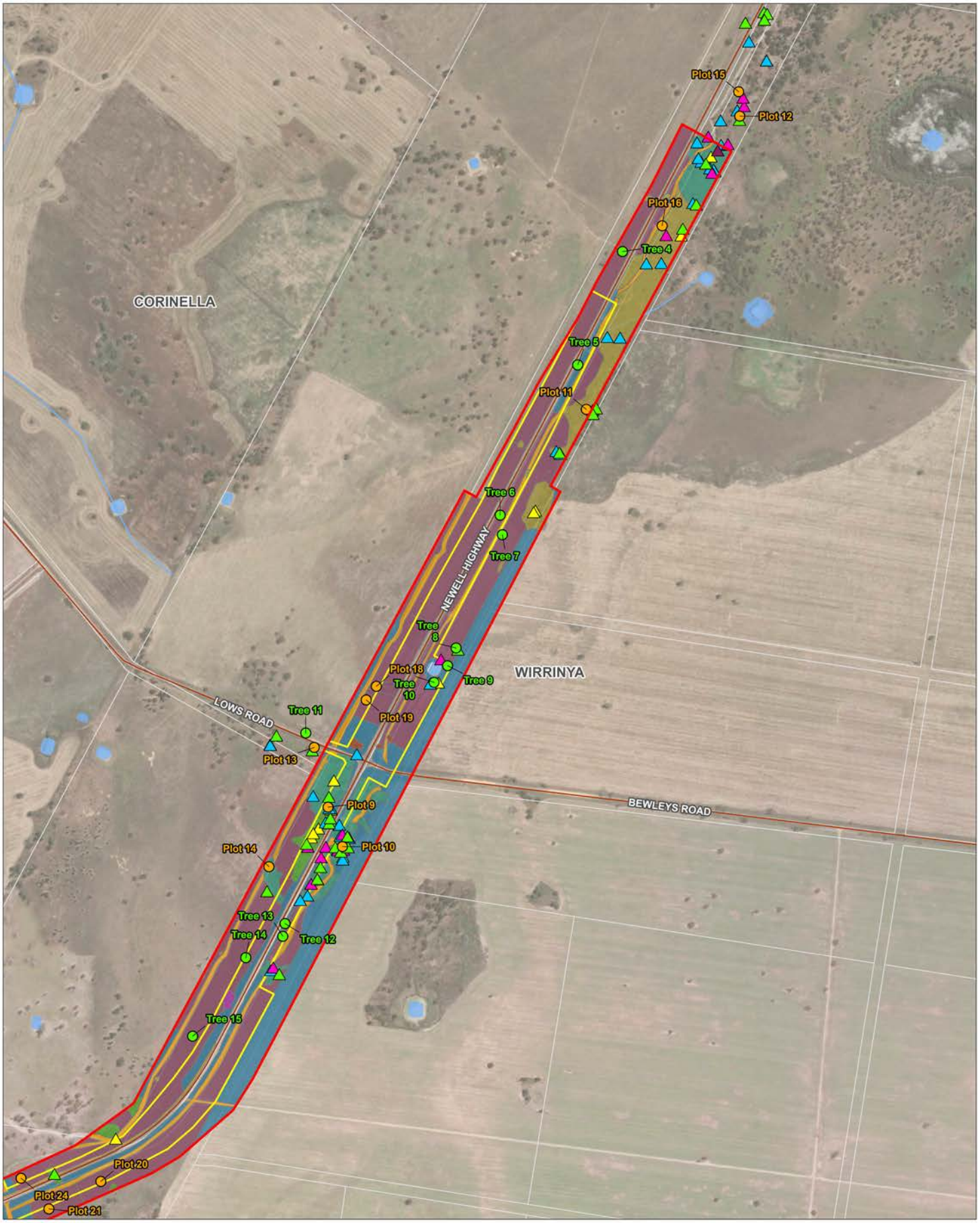
The vegetation types within the study area are listed in Table 6-1 and shown in Figure 6-1. The table includes the PCTs within the study area.

Table 6-1: PCTs within the study area

Plant community type (PCT)	Condition	Area (ha)		Photograph
		Construction boundary	Study area	
PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Moderate-Good	0.39	0.58	

Plant community type (PCT)	Condition	Area (ha)		Photograph
		Construction boundary	Study area	
PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Moderate-Good	14.81	25.54	
	Good	17.41	39.34	
PCT 53: Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains	Low	13.52	23.51	
PCT 55: Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Moderate	0.35	6.49	

Plant community type (PCT)	Condition	Area (ha)		Photograph
		Construction boundary	Study area	
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Moderate	0.69	3.11	
	Moderate-Good	0.66	2.58	
PCT 244: Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt).	Moderate	0.13	0.13	
PCT 249: River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW	Moderate	7.41	13.12	
Total		55.37	114.40	



PCTs and habitat features (Page 1 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-1

Project Code: 304100217_ECO_002
Drawn By: MM, Checked By: AS
Revision: 03 | Date: 2026-10-20

Stantec

Legend

- Study Area
- Scattered Tree
- BAM Plot
- Watercourse
- Existing Road
- Cadastre
- Waterbody
- Construction Boundary

Fauna Habitat

- Burrow
- Hollow Bearing Tree
- Log
- Nest
- Other

Ground-truthed Vegetation

- Exotic
- PCT 244
- PCT 249
- PCT 26
- PCT 45
- PCT 55
- PCT 76
- Scattered Tree
- Track/ Cleared Area

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)

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Scale at A3: 1:10,000



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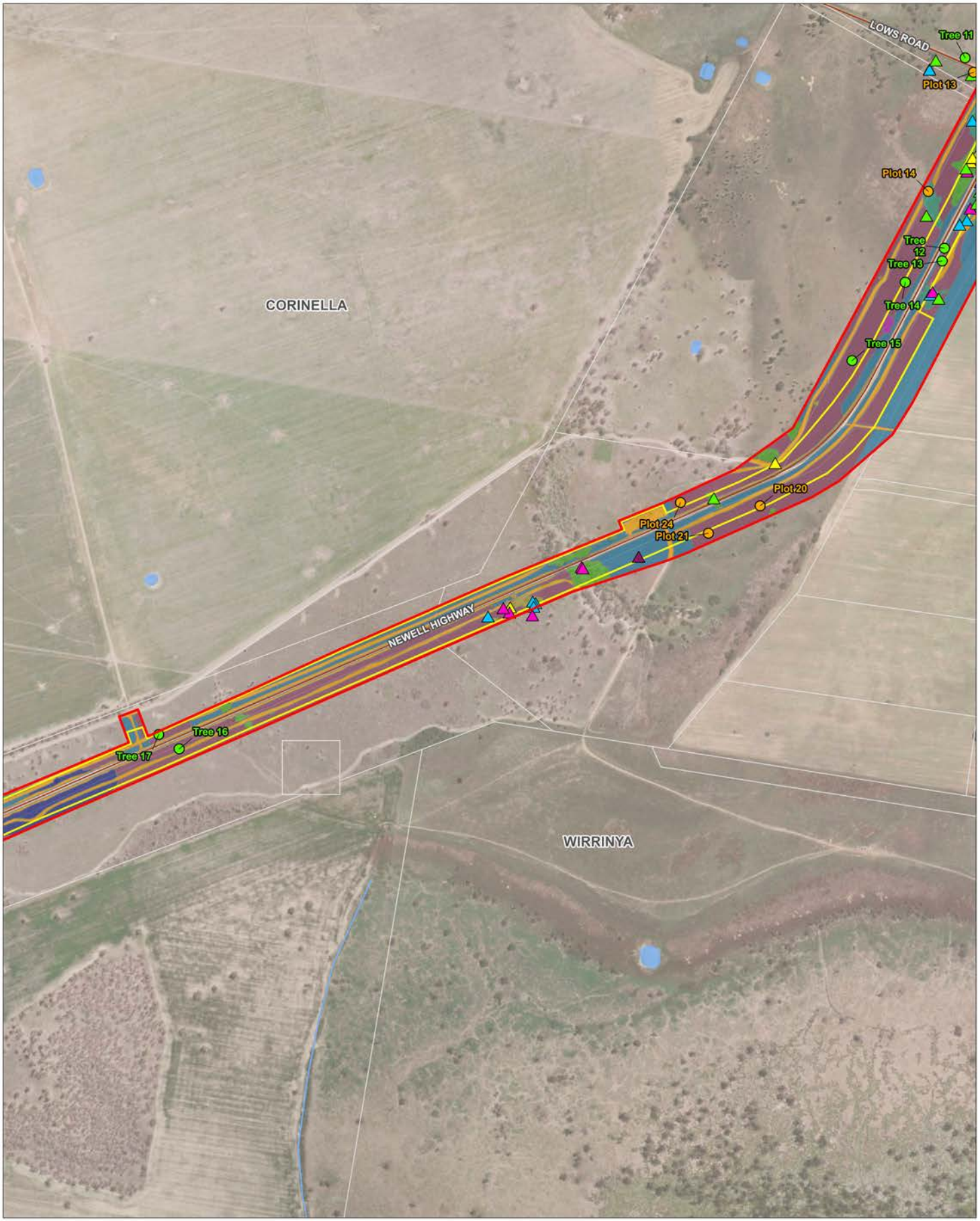

PCTs and habitat features (Page 2 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-1

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- Waterbody
- Construction Boundary

Fauna Habitat

- Burrow
- Hollow Bearing Tree
- Log
- Nest
- Other

Ground-truthed Vegetation

- Exotic
- PCT 249
- PCT 26
- PCT 45
- PCT 53
- PCT 55
- PCT 76
- Scattered Tree
- Track/ Cleared Area

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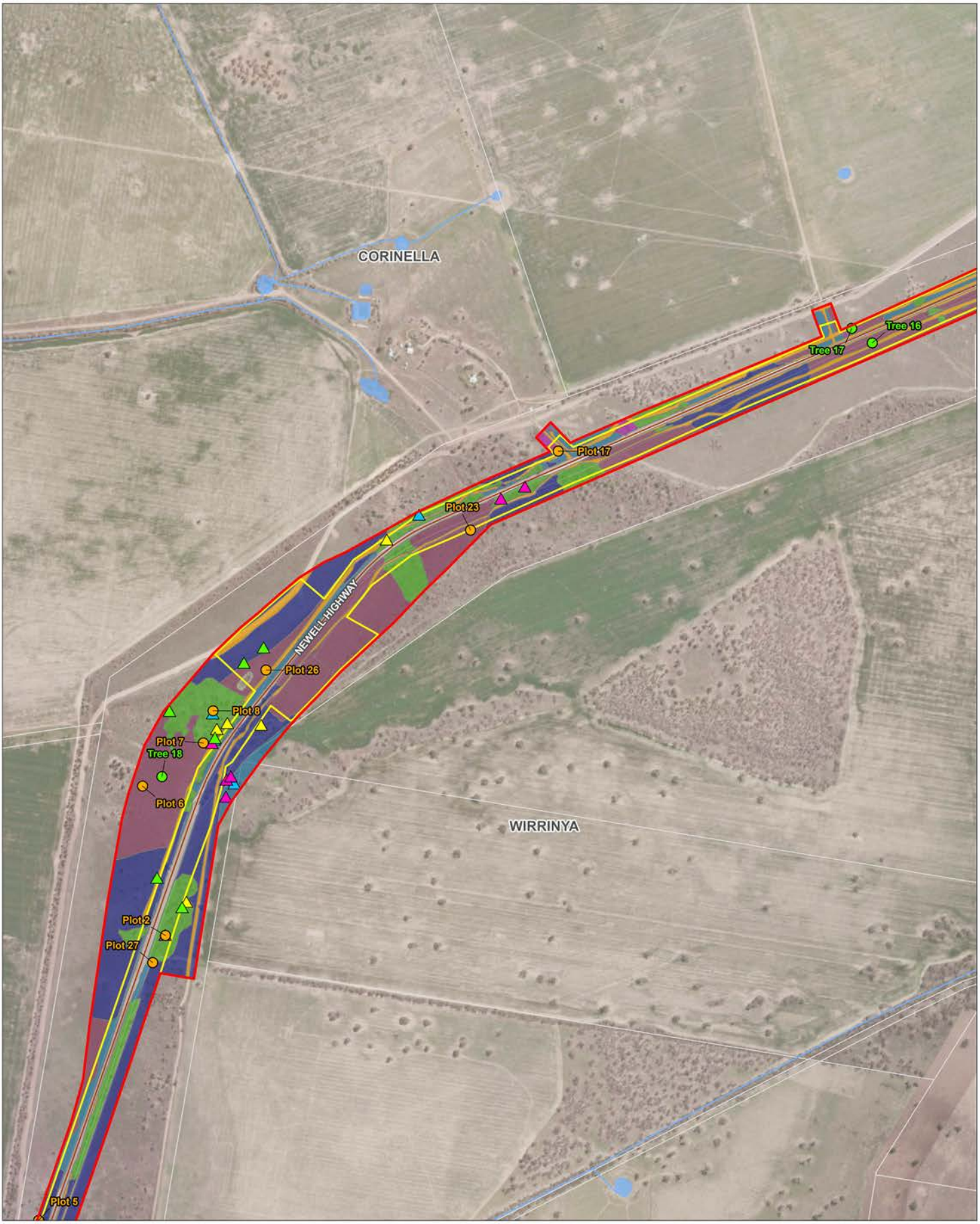

PCTs and habitat features (Page 3 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-1

Project Code: 304100217_ECO_002
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Revision: 03 | Date: 2026-10-20

Stantec

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- Cadastre
- Waterbody
- Construction Boundary

Fauna Habitat

- Hollow Bearing Tree
- Log
- Nest
- Other

Ground-truthed Vegetation

- Exotic
- PCT 249
- PCT 26
- PCT 45
- PCT 53
- Scattered Tree
- Track/ Cleared Area

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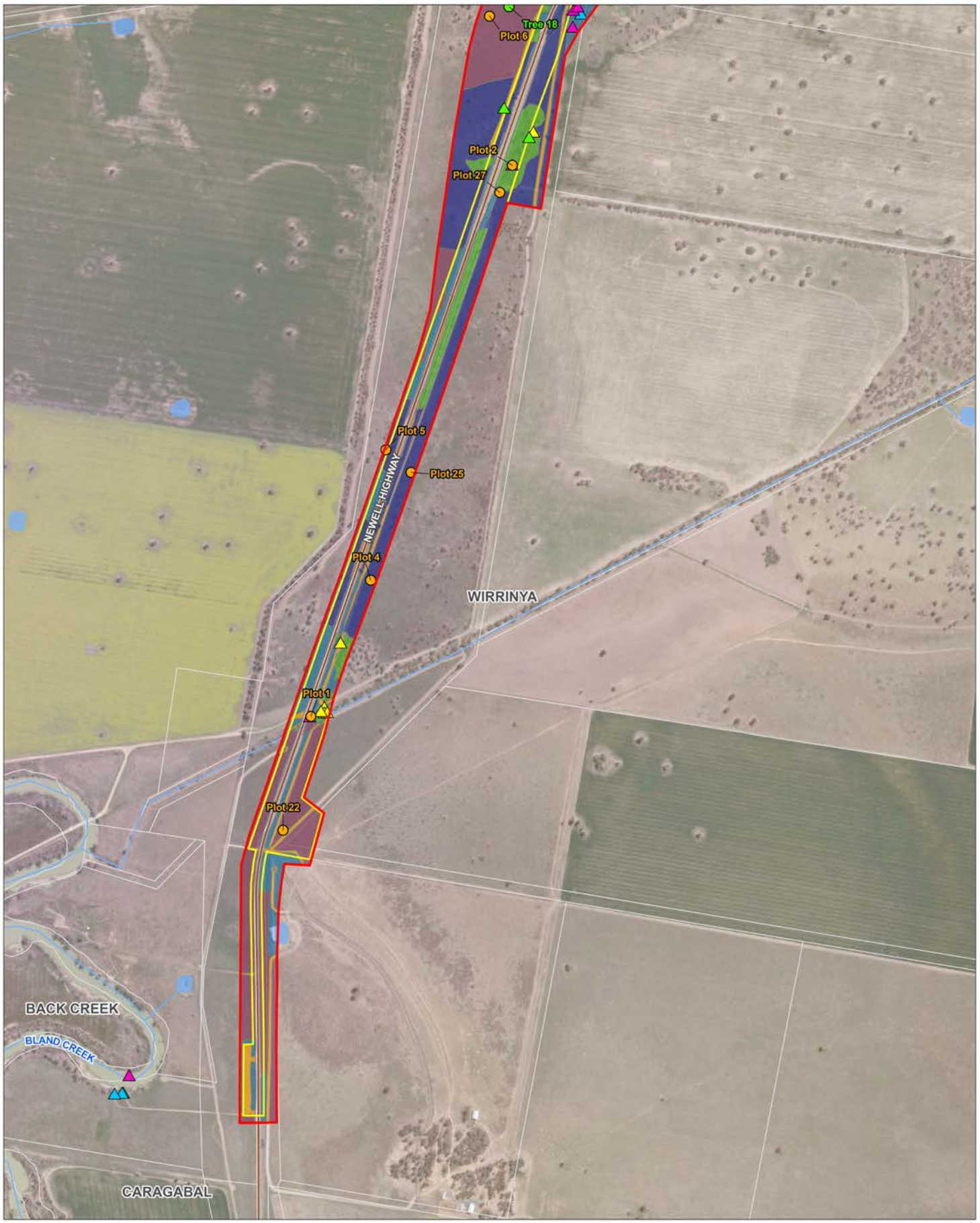

PCTs and habitat features (Page 4 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-1

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Stantec

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- Construction Boundary

Fauna Habitat

- Hollow Bearing Tree
- Log
- Nest
- Other

Ground-truthed Vegetation

- Exotic
- PCT 249
- PCT 45
- PCT 53
- Scattered Tree
- Track/ Cleared Area

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Scattered trees

Scattered trees are present in some areas of PCT 45 and exotic vegetation (Photograph 1). These trees cannot be assigned to any PCT given they are more than 50 metres away from any living tree greater than or equal to five centimetres diameter at breast height (DBH) that could be assigned to a PCT.

In accordance with the *Tree and Hollow Replacement Guidelines* (Transport, 2024), trees and hollows that are not part of a recognisable PCT or are below the offset area thresholds are required to be replaced. An inventory of scattered trees within the study area is provided in Table 3-16 of Appendix C with their location shown in Figure 6-1.



Photograph 1: Scattered tree

Exotic

There are areas of vegetation within the study area that do not conform to any known native PCT due to exotic species abundance. A total of 62 exotic species were recorded in the study area (see Appendix A of the BAR attached as Appendix C to this REF). Eleven of the exotic species recorded within the study area have a listing at National, State and/or local level as:

- Weed of National Significance (WoNS): the national weed strategy (Invasive Plants and Animal Committee, 2017) recognises WoNS as species that are a current or future threat to Australia, which require coordinated and strategic management to prevent, eradicate contain and/or minimise their economic, environmental and/or social impacts;
- High threat weeds (HTWs): are exotic species listed considered in the BAM and listed under the BC Act. HTWs are plants not native to Australia that, if not controlled, will invade and outcompete native species (DPIE, 2020). These exotic plants are required to be managed and controlled; or
- Priority weeds (PWs): are exotic species recognised as part of the NSW *Biosecurity Act 2015* as requiring specific management. The management of PWs is identified in the weed strategy for each LLS region. The study area falls within the Central West LLS region.

Threatened ecological communities

Two of the PCTs within the study area are associated with TECs under the BC Act. The PCTs under the BC Act and the assessment of if they are commensurate with a TEC are listed in Table 6-2 with their locations shown in Figure 6-2.

Table 6-2: BC Act listed TECs associated with PCTs within the study area

PCT ID	PCT Name	Associated TEC (BC Act)	TEC Status (BC Act)	Vegetation within study area commensurate with TEC?*
26	Weeping Myall open woodland of the Riverina	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar	Endangered	Yes

PCT ID	PCT Name	Associated TEC (BC Act)	TEC Status (BC Act)	Vegetation within study area commensurate with TEC?*
	Bioregion and NSW South Western Slopes Bioregion	Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions		
45	Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Artesian Springs Ecological Community in the Great Artesian Basin	Critically Endangered	No
53	Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains	Artesian Springs Ecological Community in the Great Artesian Basin	Critically Endangered	No
55	Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions	Endangered	No
		Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions	Endangered	No
		Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Endangered	No
		Native Vegetation on Cracking Clay Soils of the Liverpool Plains	Endangered	No
76	Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Endangered	Yes
244	Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt)	Artesian Springs Ecological Community in the Great Artesian Basin	Critically Endangered	No
		Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	Endangered	No

PCT ID	PCT Name	Associated TEC (BC Act)	TEC Status (BC Act)	Vegetation within study area commensurate with TEC?*
249	River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW	Artesian Springs Ecological Community in the Great Artesian Basin	Critically Endangered	No

**Justification for association of the PCT with a TEC is provided in Appendix C*

Groundwater dependent ecosystems

The level of groundwater dependence of PCTs within the construction boundary has been determined using the *Atlas of Groundwater Dependent Ecosystems* (BoM, 2026). This provides broad-scale mapping of potential groundwater dependent ecosystems (GDEs) and has been used with contemporary, location-specific data collected as part of this BAR to determine the presence of GDEs.

The Lachlan River is considered a high potential aquatic GDE that occurs throughout a large portion of the study area. Three low potential terrestrial GDEs are also identified in the study area:

- Derived tussock grassland of the central western plains and lower slopes of NSW
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW.

GDEs mapped within in the study area are shown in Figure 6-3.



Threatened ecological communities (Page 1 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-2

Project Code: 304100217_ECO_002
Drawn By: MM, Checked By: AS
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- Study Area
- Watercourse
- Existing Road
- Cadastre
- Waterbody
- Construction Boundary

Fauna Habitat

- Burrow
- Hollow Bearing Tree
- Log
- Nest
- Other

Ground-truthed Vegetation

- PCT76 Moderate
- PCT76 Moderate - Good

BC Act TEC

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
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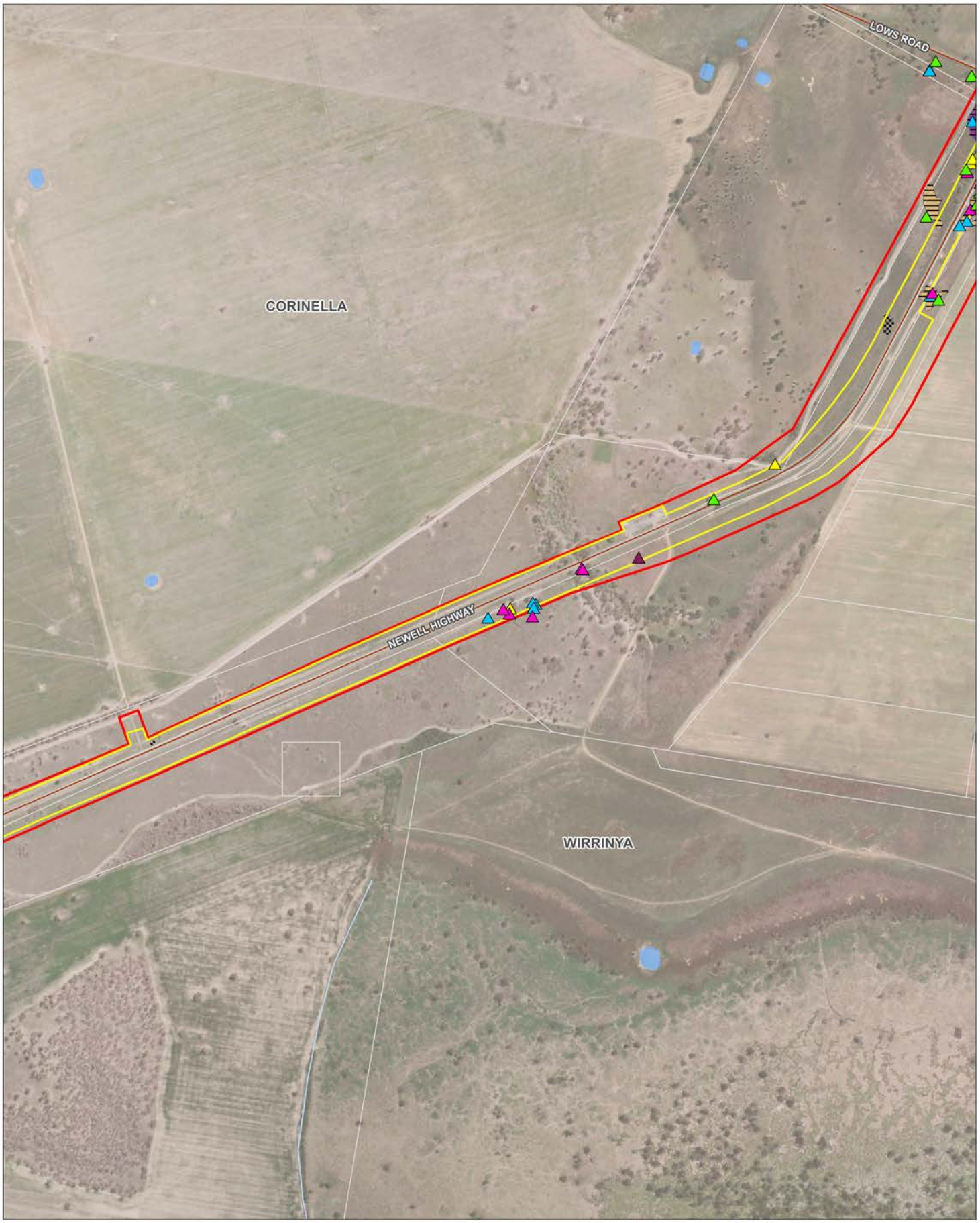

Threatened ecological communities (Page 2 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-2

Project Code: 304100217_ECO_002
Drawn By: MM, Checked By: AS
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- Burrow
- Hollow Bearing Tree
- Log
- Nest
- Other

Ground-truthed Vegetation

- PCT76 Moderate
- PCT76 Moderate - Good

BC Act TEC

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions

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Threatened ecological communities (Page 3 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

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Stantec

Legend

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- Cadastre
- Waterbody
- Construction Boundary

Fauna Habitat

- Hollow Bearing Tree
- Log
- Nest
- Other

BC Act TEC

- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions

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Threatened ecological communities (Page 4 of 4)

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West Wyalong to Forbes, NSW

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- Other

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References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)

0 100 200 300 400 Metres
Scale at A3: 1:10,000



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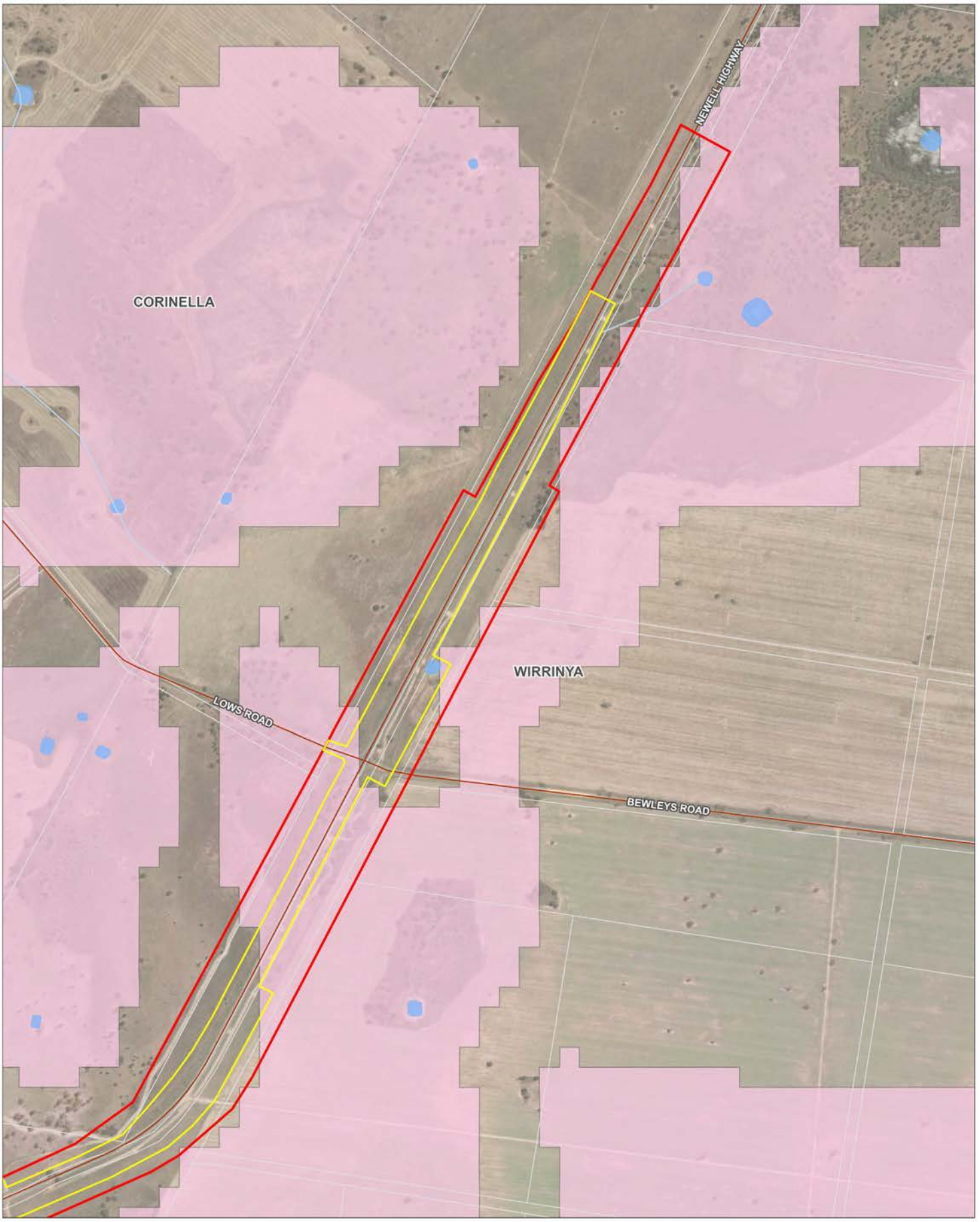

Groundwater dependent ecosystems (Page 1 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-3

Project Code: 304100217_ECO_002
Drawn By: MM, Checked By: AS
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Construction Boundary
- Watercourse
- Existing Road
- Waterbody
- Cadastre

Groundwater Dependent Ecosystems

- Aquatic GDE

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)
3. Groundwater Dependent Ecosystems (BOM)

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Scale at A3: 1:10,000



\\au2012-ntap01_cifs02\shared_projects\304100217\FY21\091_NEWELL HWY WST WYALONG TO FORBES\Drawings\GIS | 304100217_ECO-002_GDEs 02 | Last updated 2026-10-20 By: mmostlyn

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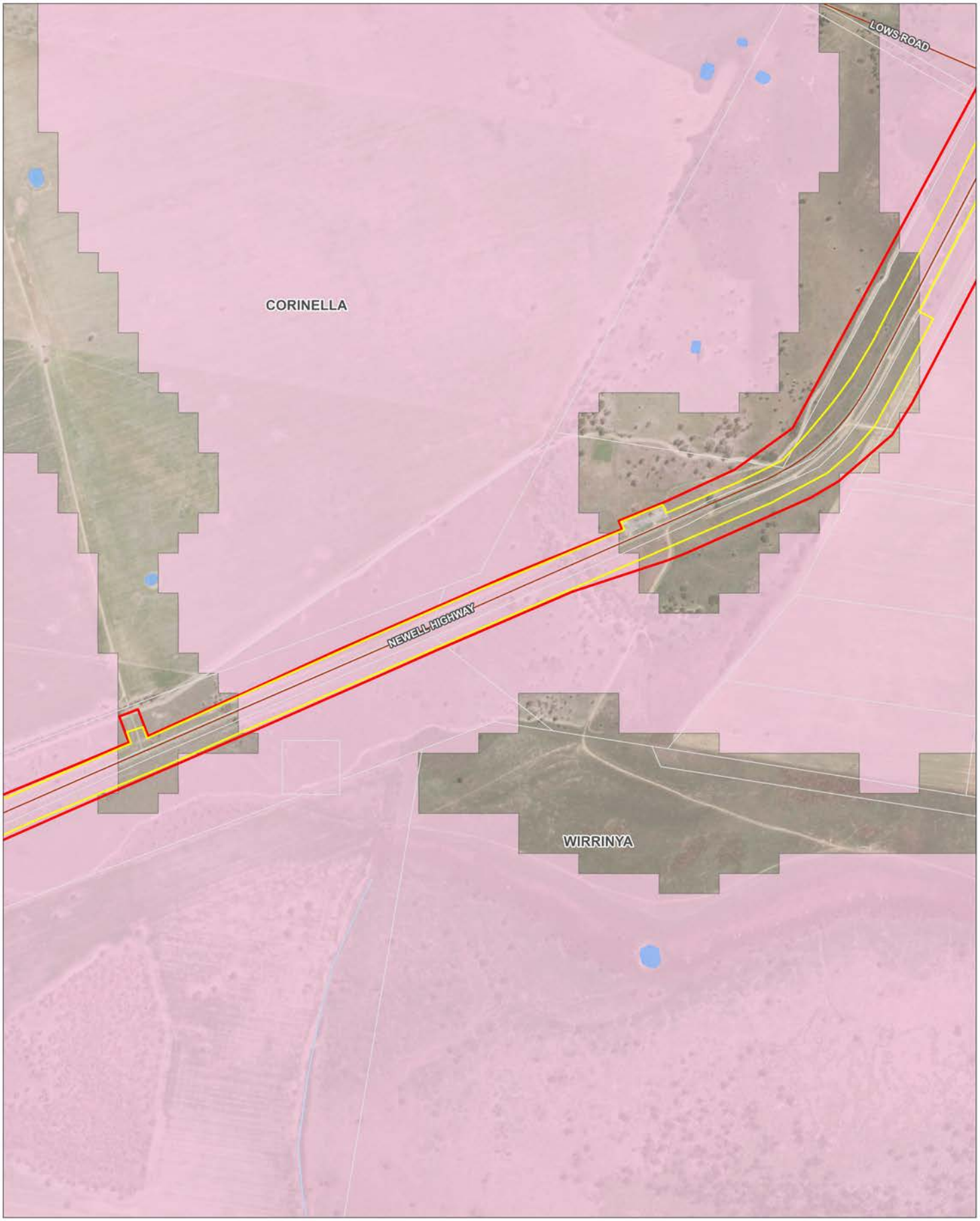

Groundwater dependent ecosystems (Page 2 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-3

Project Code: 304100217_ECO_002
Drawn By: MM, Checked By: AS
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Construction Boundary
- Watercourse
- Existing Road
- Waterbody
- Cadastre

Groundwater Dependent Ecosystems

- Aquatic GDE

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)
3. Groundwater Dependent Ecosystems (BOM)

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Scale at A3: 1:10,000



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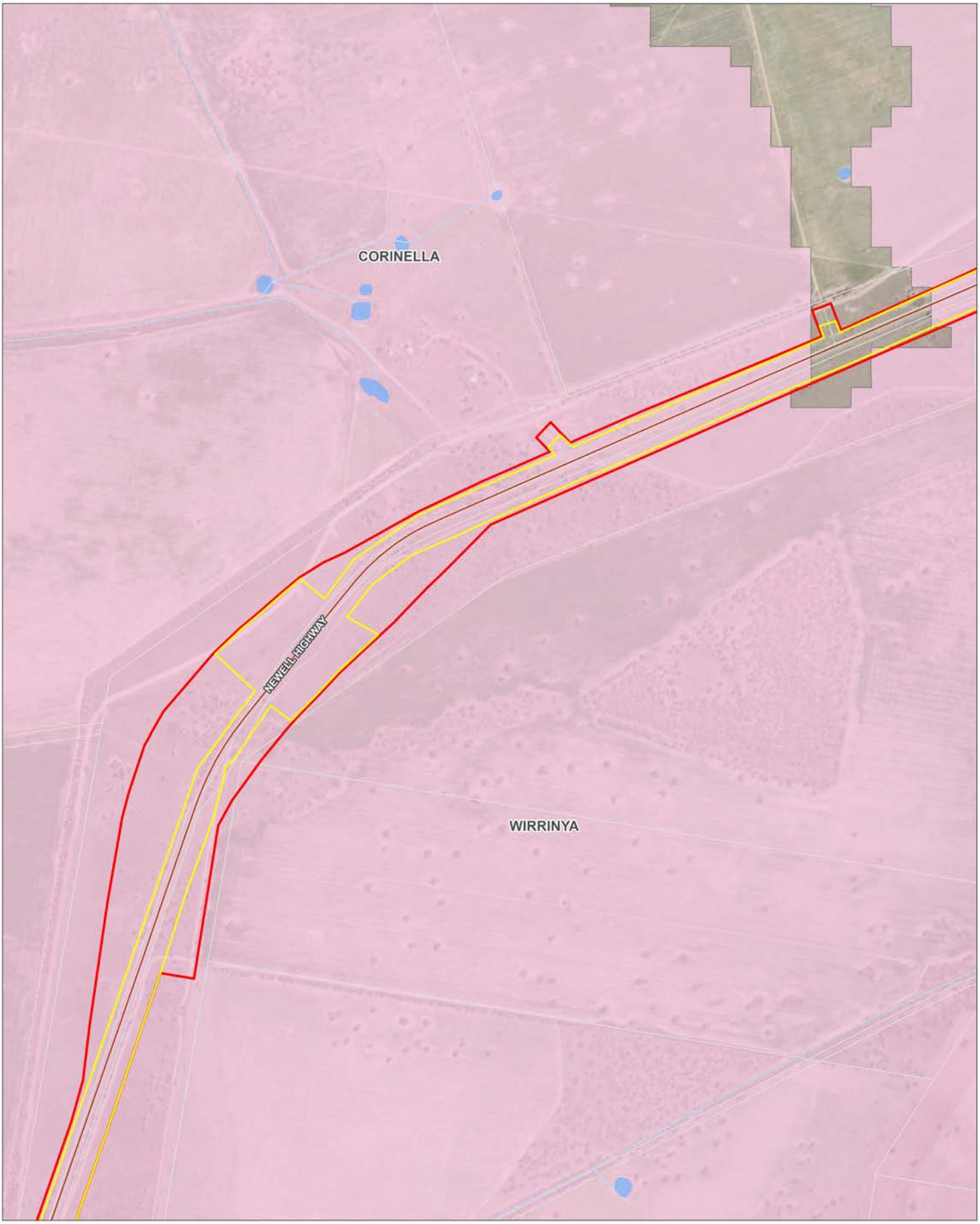

Groundwater dependent ecosystems (Page 3 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-3

Project Code: 304100217_ECO_002
Drawn By: MM, Checked By: AS
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Construction Boundary
- Watercourse
- Existing Road
- Waterbody
- Cadastre

Groundwater Dependent Ecosystems

- Aquatic GDE

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)
3. Groundwater Dependent Ecosystems (BOM)

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Scale at A3: 1:10,000



\\au2012-ntap01_cifs02\shared_projects\304100217-FY21\091_NEWELL-HWY WST WYALONG TO FORBES\Drawings\GIS | 304100217_ECO-002_GDEs 02 | Last updated 2026-10-20 By: mmoshyn

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Groundwater dependent ecosystems (Page 4 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-3

Project Code: 304100217_ECO_002
Drawn By: MM, Checked By: AS
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Construction Boundary
- Watercourse
- Existing Road
- Waterbody
- Cadastre

Groundwater Dependent Ecosystems

- Aquatic GDE
- Terrestrial GDE

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)
3. Groundwater Dependent Ecosystems (BOM)

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Scale at A3: 1:10,000



\\au2012-ntap01.cifs02\shared_projects\304100217\FY21\091_NEWELL HWY WST WYALONG TO FORBES\Drawings\GIS | 304100217_ECO-002_GDEs 02 | Last updated 2026-10-20 By: mmoshyn

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Threatened species

A review of the NSW DPE BioNet Atlas, NSW DPIRD Fisheries Spatial data portal, the Australian DCCEEW Protected Matters Search Tool and BAM-C identified 86 threatened species with the potential to occur in the study area. Species were inclusive of 18 flora, 50 birds, nine mammals, two amphibians, two reptiles and five fish species.

An assessment of the likelihood of occurrence of all threatened species, based on habitat within the study area, was carried out to determine the potential for these species to occur within the study area. Due to the presence of suitable habitat in the study area, 37 species were considered to have a moderate to high likelihood of occurrence prior to survey. These species are outlined in Table 3-20 of Appendix C.

Following field surveys, seven species listed under the BC Act, FM Act or EPBC Act were considered to have a moderate to high likelihood of occurring within the study area (see Appendix B and D of the BAR attached as Appendix C to this REF). These are:

- Magpie Goose (*Anseranas semipalmata*) - listed as vulnerable under the BC Act
- Australasian Bittern (*Botaurus poiciloptilus*) - listed as endangered under the BC Act and EPBC Act
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*) - listed as vulnerable under the BC Act
- Superb Parrot (*Polytelis swainsonii*) - listed as vulnerable under the BC Act and EPBC Act
- Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) - listed as vulnerable under the BC Act
- Olive Perchlet (Western Population) (*Ambassis agassizii*) – listed as endangered under the BC Act
- Flathead galaxias (*Galaxias rostratus*) – listed as critically endangered under the BC Act and EPBC Act.

One threatened fauna species, the Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*), listed as vulnerable under the BC Act, was recorded within the study area during the field surveys (Photograph 2). The species was observed foraging in small groups, of approximately 3-6 individuals, across the study area. No Grey-crowned Babbler nests were observed within the study area during field surveys.



Photograph 2: Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) observed within the study area

No threatened flora species were recorded in the study area.

Fauna habitat features present within the study area are shown in Figure 6-1.

Aquatic environment

The study area lies over a mapped floodplain wetland which connects to Lake Cowal during flooding events. These is one small unnamed artificial drainage line which drains into Bland Creek within the study area. This drains under the Newell Highway via an existing concrete culvert.

Aquatic habitat

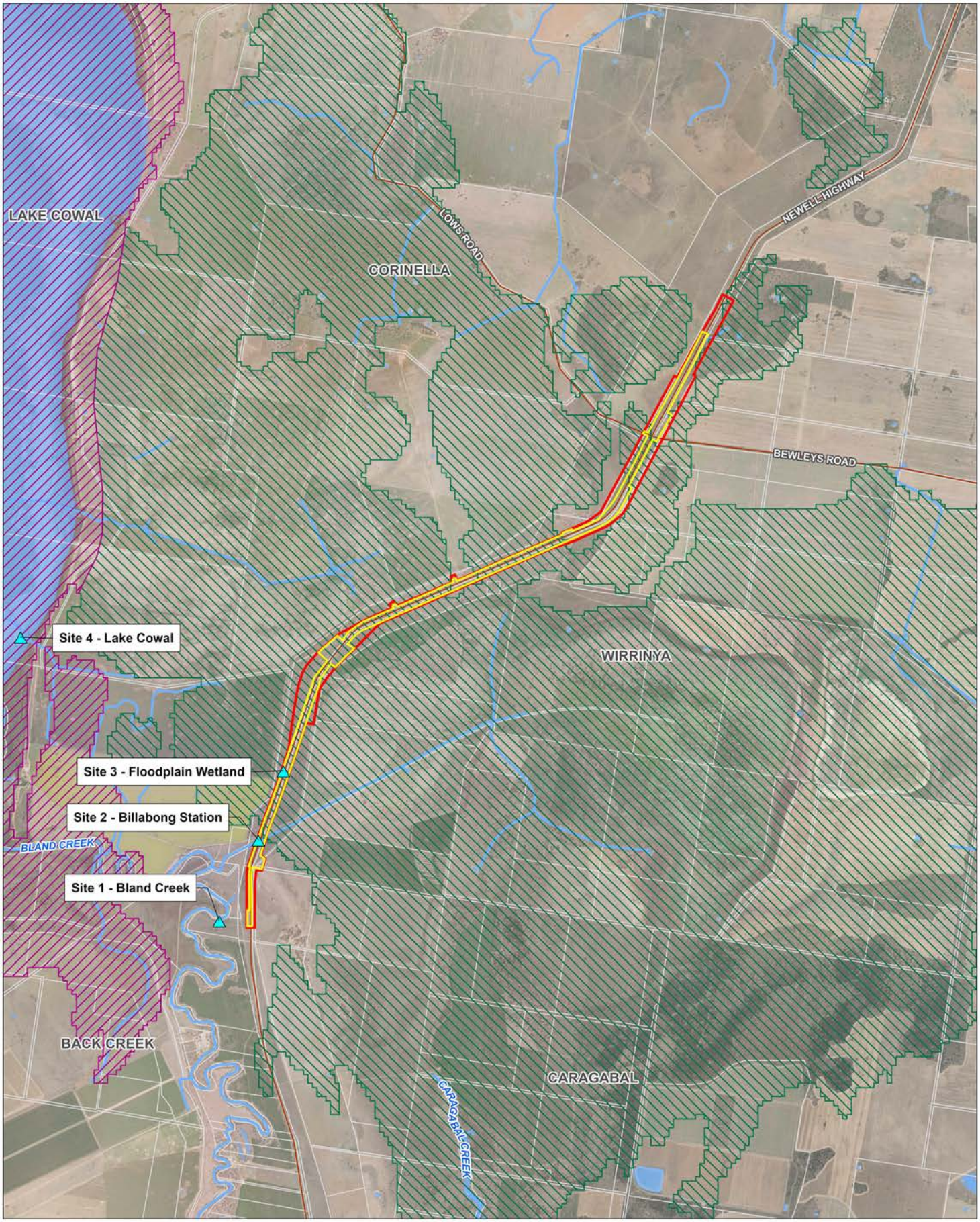
Four sites were assessed for aquatic habitat and biodiversity during the field survey. The sites are described in Table 6-3 with the locations shown in Figure 6-4.

Table 6-3: Aquatic habitat assessment sites

Site	Description	Photograph
1	Bland Creek Site 1 is located to the west of the study area. It consisted of a large brown turbid creek with a mean wetted width of 50 metres. The water level was slightly higher than the watermark based on some submerged vegetation along the creek edge however little to no flow was observed during the survey. The creek bed substrate was difficult to determine visually during the survey due to poor water clarity however the substratum along the edges was mostly clay with some organic debris (leaf litter and small wood debris). Minimal accumulation of detritus was observed at the site however, sticks a leaf litter were more prominent around larger trees on bank and some wood debris from drowned tree or fallen logs. A minimal amount (~5%) of filamentous algae was identified on the shallow edge of the creek. The riparian zone was of good condition and dominated by River Red Gums (*Eucalyptus camaldulesis*) and Acacia sp. with sparse to moderate tree coverage from mature and juvenile trees. The vegetation provided a low amount of shading over the river (20%) and lined the bank with brakes at intervals 10-50 metres. Site 1 scored 36 out of a possible 52 in the RCE assessment and was identified as a Type 1 Class 1 waterway.	 Looking upstream from Site 1 on Bland Creek

Site	Description	Photograph
2	Billabong Station Site 2 is a soft substrate overflow stream located approximately 600 metres upstream of Bland Creek. This unnamed artificial drainage line extends through a concrete box culvert under e thNewell Highway. The watercourse was characterised by dry exposed waterbed with a series of small shallow pools which was similar on both sides of the highway. There was little to no flow due to low water levels however the culvert structure under the Newell Highway would allow for water flow and fish passage during high flow conditions. The average width of the channel was around 2-3 metres upstream, widening out to 4-5 metres at the culvert and narrowing back to 2 metres in the downstream direction. The water clarity within the shallow pools on both sides of highway was poor, appearing brown in colour from turbidity and filamentous algal growth (5-15%). The substratum was predominantly clay and silt with organic detritus (branches and leaves) accumulation. The riparian zone was of good condition with sparse to moderate tree coverage from mature to juvenile with River Red Gums (*Eucalyptus camaldulesis*) and Acacia sp. These trees provided moderate shading (40%) and lined the bank with brakes at intervals 10-50 metres. The sides of the bank were sloped gently down at a height of 2-3 metres and were dominated by exotic herb and grass species. Throughout the site there were a few areas patches of native Tangled Lignum (*Duma florulenta*) within the watercourse causing a minor damming effect. Overall, Site 2 scored 36 out of a possible 52 in the RCE assessment and was identified as a Type 3 Class 3 waterway.	 Upstream (eastern side of the Newell Highway) looking downstream towards culvert. One small shallow pool with algal growth

Site	Description	Photograph
3	Floodplain Wetland Site 3 is situated within the floodplain wetland area however at the time of the survey no water was present and the environment was very dry. The substratum is predominately clays and silts with large amounts of organic litter. The vegetation within the floodplain wetland is a mix of native trees (juvenile and mature in ages) consisting of River Red Gum (*Eucalyptus Camaldulesis*) and Acacia sp. scattered amongst the floodplain and near the road. Other vegetation in the floodplain included scattered Tangled Lignum (*Duma florulenta*) and groundcover dominated by exotic and native herbs and grasses with wetland species dispersed amongst including Tussock Rush (*Juncus aridicola*). There were also remnants of dead sedge plants potentially Eleocharis sp. scattered throughout the floodplain. There is an existing concrete box culvert structure under the Newell Highway at Site 3 which is concrete lined along the substratum. Vegetation surrounding the culvert on both sides of the road was predominantly exotic grasses and herbs.	 Vegetation within floodplain wetland
4	Lake Cowal Site 4 is situated on the eastern edge of a large expanse freshwater lake located to the west of the study area. The substratum varied between areas dominated by clays with some cobbles and pebbles and areas with a combination of soft silts and clays along the water's edge. The water was highly turbid and brown in colour with a moderate amount of filamentous algal growth along the exposed edge of the lake and the presence of some organic detritus. Minor detritus and organic matter were observed but at an approximation of <5%. The exposed mud flat suggests that water levels within the lake are lower than the watermark however, as the lake sits on a floodplain, water levels are more likely to fluctuate. There was also the presence of some large holes within the mud on the edges of the water suggesting habitat for aquatic fauna. The riparian zone was similar to the other sites consisting of River Red Gums (*Eucalyptus camaldulensis*) and Acacia sp. within the lake and then further out along the edges. Some Eucalyptus trees were also identified within the lake either as dead trunks or alive but largely inundated. The vegetation lining the lake at the survey site provided minimal shading of the lake (~5%).	 Lake Cowal view from the south east side looking north west with varied substratum along the lake edge



Aquatic habitat assessment sites

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-4

Project Code: 304100217-AQU-001
Drawn By: MM, Checked By: TH
Revision: 03 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Aquatic Habitat Assessment Site
- Watercourse
- Existing Road
- Cadastre
- Waterbody
- LGA Boundary
- Construction Boundary

Wetlands

- Floodplain Wetland
- Freshwater Lake

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)
3. LGA Boundary (NSW SS)
4. Wetlands (OEH, 2013)

0 450 900 1,350 1,800 2,250 Metres

Scale at A3: 1:45,000



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Key fish habitat

One of the objectives of the FM Act is to conserve KFH. A review of KFH mapping on the NSW DPI Fisheries NSW Spatial Data Portal showed that the floodplain wetland area is mapped as KFH. Bland Creek, to the west of the study area, is also mapped as a KFH. The KFH mapping is provided in Figure 6-5.

The floodplain wetland that connects to Lake Cowal on the west side of the Newell Highway and includes Gum Swamp on the eastern side of the Newell Highway, crosses the southern section of the study area (refer Figure 6-5). It is a Type 3, Class 4 minimally sensitive KFH as it is an unnamed wetland with intermittent flow that only occurs after extensive rainfall. The floodplain wetland connects to Lake Cowal during flooding events is ephemeral in nature with water flow fluctuating depending on rain and flooding of the Lachlan catchment. It was dry and without aquatic life during field surveys. There were also no mapped threatened species within the wetland or significant Strahler Order stream crossings.

Bland Creek watercourse, to the west of the study area is a Type 1, Class 1 highly sensitive KFH as it is a permanently flowing watercourse that has been mapped as habitat for three threatened fish species. This KFH does not intersect with the study area.

Fish biodiversity

At Site 1, a large fish presence was observed from the edge of the creek with surface feeding and regular breaches occurring during the assessment. The behavioural and physiological characteristics led to the determination that the fish were likely to be European Carp (*Cyprinus carpio*). One Eastern mosquitofish (*Gambusia holbrooki*) was caught in a bait trap deployed at this site during the survey (Photograph 3).

On the eastern side of the Newell Highway at Site 2 approximately five European carp (*Cyprinus Carpio*) varying from 20-30 centi-metres in length were recorded in one of the shallow pools.

Remnant Yabby (Cherax sp.) exoskeletons (Photograph 4) were found at Site 3. These were scattered around the floodplain showing evidence of aquatic fauna within the survey area confirming that the currently dry floodplain supports habitat for aquatic species during high flow conditions.



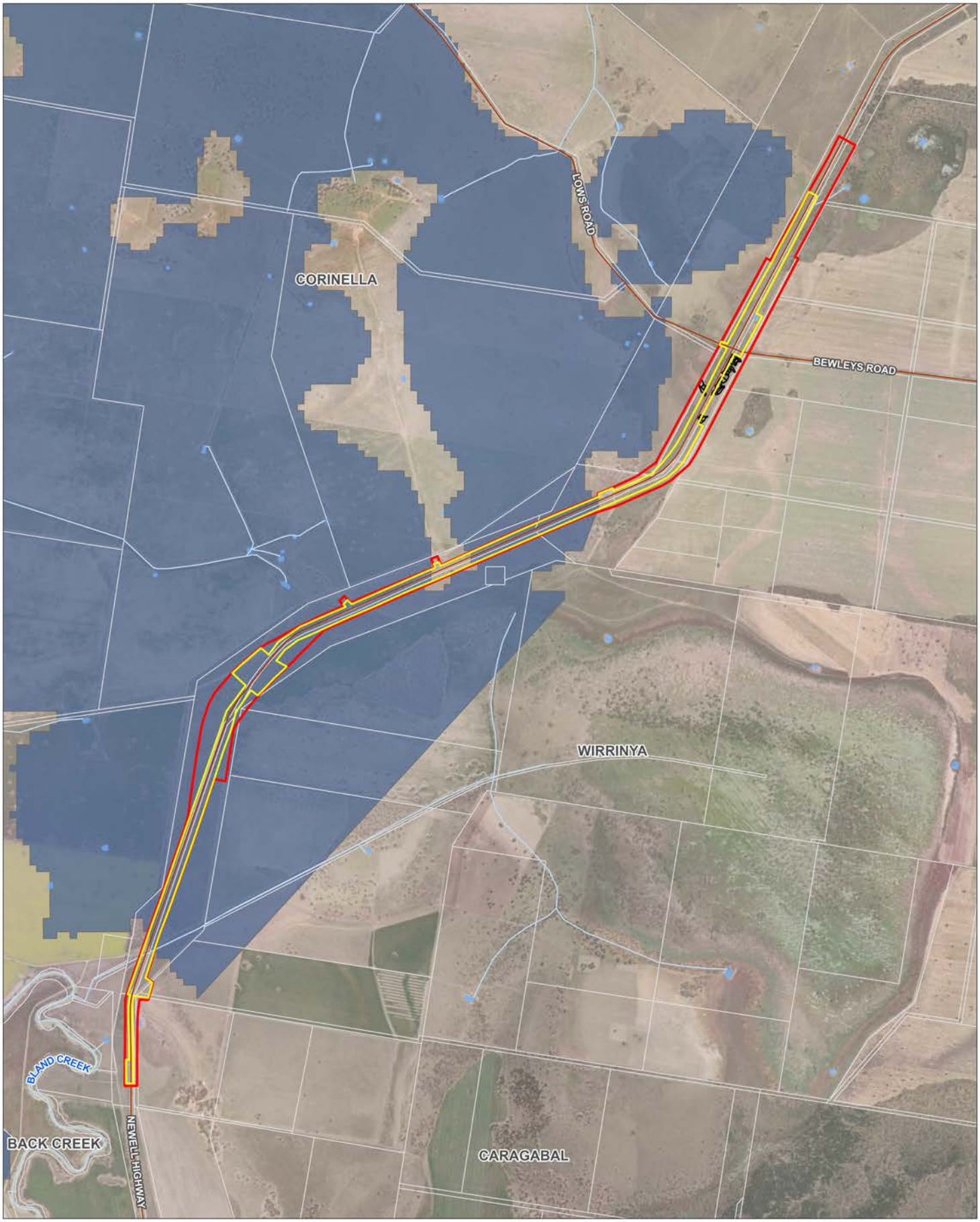
Photograph 3: Eastern mosquitofish caught in bait trap at Site 1



Photograph 4: Yabby exoskeletons found at Site 3

Water quality

The water quality results at each of the aquatic habitat survey sites is provided in section 6.4.3.



Key fish habitat

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-5

Project Code: 304100217_ECO_002
Drawn By: MM, Checked By: AS
Revision: 01 | Date: 2026-10-20

Stantec

Legend

- Study Area
- Construction Boundary
- Watercourse
- Existing Road
- Cadastre
- Waterbody
- Key Fish Habitat

EPBC Act TEC

- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)
3. Key Fish Habitat (DPIRD, Sept 2026)

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Metres
Scale at A3: 1:30,000



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Wildlife connectivity corridors

Connectivity is provided in the study area by vegetated road reserves and riparian corridors adjacent to the existing road corridor. In some locations, vegetation within the study area connects to larger tracts of vegetation within the locality, providing connectivity corridors for the movement of terrestrial fauna. Isolated patches of vegetation within the study area, including isolated paddock trees, provide 'stepping stones' for the movement of mobile fauna, such as birds, between more intact patches of vegetation.

The study area includes a mapped floodplain wetland which connects to Lake Cowal during flooding events. This area is ephemeral in nature and water flow fluctuates depending on rain and flooding of the Lachlan catchment, with the floodplain predominately dry and without aquatic life. There is one unnamed artificial drainage line which drains into Bland Creek. This drains under the Newell Highway through an existing concrete culvert. Bland Creek is a perennial river that runs along the western side of the Newell Highway and to the west of the study area. It drains into Lake Cowal and has been mapped as habitat for three threatened fish species.

Areas of outstanding biodiversity value

Areas of Outstanding Biodiversity Value (AOBV) are special areas with irreplaceable biodiversity values that are important to NSW, Australia or globally. Declared AOBV in NSW are included within the Register of Declared AOBV. There are four declared AOBV in NSW none of which are within, or near, the study area with the closest being Wollemi Pine population in Wollemi National Park, located more than 250 kilometres to the east.

Matters of national environmental significance

Threatened species and ecological communities and migratory species listed under the EPBC Act are considered MNES. Based on the PMST the applicable MNES to the proposal are:

- four TECs are predicted as likely or may occur within 10 kilometres of the construction boundary
- 37 listed threatened species were predicted to occur within 10 kilometres of the construction boundary
- 10 migratory species were predicted to occur within 10 kilometres of the construction boundary.

Table 6-4 outlines the TECs, under the EPBC Act, which are associated with PCTs occurring within the study area. It provides an assessment of the commensuration of PCTs within the study area with the definition of each TEC. The location of TECs is shown in Figure 6-6.

Table 6-4: EPBC Act listed TECs associated with PCTs within the study area

PCT ID	PCT name	Associated TEC (EPBC Act)	TEC status (EPBC Act)	Vegetation within the study area commensurate with TEC?*
26	Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Weeping Myall Woodlands	Endangered	No
45	Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Natural Grasslands of the Murray Valley Plains	Critically Endangered	No
76	Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands	Endangered	Yes (2.58 ha)

PCT ID	PCT name	Associated TEC (EPBC Act)	TEC status (EPBC Act)	Vegetation within the study area commensurate with TEC?*
	Western Slopes and Riverina Bioregions	and Derived Native Grasslands of South-eastern Australia		
244	Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt).	Poplar Box Grassy Woodland on Alluvial Plains	Endangered	No

**Justification for association of the PCT with a TEC is provided in Appendix C*

No threatened species or populations listed under the EPBC Act have been recorded in the study area. Following targeted surveys, three threatened species listed under the EPBC Act were considered to have a moderate to high likelihood of occurring within the study area:

- Australasian Bittern (*Botaurus poiciloptilus*) - listed as endangered under the BC Act and EPBC Act
- Superb Parrot (*Polytelis swainsonii*) - listed as vulnerable under the BC Act and EPBC Act
- Flathead galaxias (*Galaxias rostratus*) – listed as critically endangered under the FM Act and EPBC Act.

No listed migratory species were detected within the study area during field surveys and no migratory species were considered to have a moderate or higher likelihood of occurrence within the study area.



Matters of national significance

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-6

Project Code: 304100217_ECO_002
Drawn By: MM, Checked By: AS
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- Study Area
- Construction Boundary
- Watercourse
- Existing Road
- Cadastre
- Waterbody

EPBC Act TEC

- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)

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Metres
Scale at A3: 1:30,000



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6.1.3 Potential impacts

Construction

Removal of vegetation

The proposal would require the removal of 55.37 hectares of native vegetation as summarised in Table 6-5, and nine scattered trees. This includes 1.74 hectares of vegetation commensurate with TECs listed under the BC Act, 0.66 hectares of which is also commensurate with a TEC listed under the EPBC Act.

Table 6-5: Summary of direct impacts on native vegetation

Plant community type (PCT)	Broad condition class	TEC	Area to be impacted (ha)[1]
PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Moderate-Good	Endangered (BC Act)	0.39
PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Moderate-Good	Not a TEC	14.81
	Good	Not a TEC	17.41
PCT 53: Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains	Low	Not a TEC	13.52
PCT 55: Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions	Moderate	Not a TEC	0.35
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Moderate	Endangered (BC Act)	0.69
	Moderate - Good	Endangered (BC Act and EPBC Act*)	0.66
PCT 244: Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt).	Moderate	Not a TEC	0.13
PCT 249: River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW	Moderate	Not a TEC	7.41

[1] Area to be cleared based on ground-truthed vegetation mapping within the subject land

** Where a patch of moderate-good condition PCT 76 is >0.5 ha in size. In this vegetation zone 0.64 ha meets this criterion*

The removal of native vegetation relates to several key threatening processes listed under the BC Act, including clearing of native vegetation, bushrock removal, invasion of native plant communities, loss of hollow-bearing trees and removal of dead wood and dead trees. Similar key threatening processes are also listed under the EPBC Act, including land clearance.

Removal of threatened fauna habitat

Five avian species were considered to have a moderate or higher likelihood of occurrence within the study area. This included one species, the Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*), listed as vulnerable under the BC Act, which was recorded within the study area during the field surveys.

Direct impacts to threatened fauna habitat would be limited to the narrow band of disturbed habitat adjacent to the Newell Highway. No active breeding features for these species were detected within the construction boundary with direct impacts limited to foraging habitat and hollow bearing trees not occupied during surveys by any threatened species. Approximately 12 detected hollow-bearing trees would be impacted by the proposal. An abundance of higher quality foraging habitat for nectivorous birds and arboreal mammals is present in the locality. Impacts to these species have also been considered and are assessed further in Appendix D and Appendix E of the BAR attached as Appendix C to this REF.

Two aquatic species were also considered to have a moderate likelihood of occurrence within the study area, however direct impacts to these species are considered unlikely due to the nature of the proposal.

A summary of direct impacts on threatened fauna and habitat from the proposal is provided in Table 6-6.

Table 6-6: Summary of direct impacts on threatened fauna and habitat

Species name	BC Act	EPBC Act	Potential occurrence (Moderate, High, Recorded)	Impact (ha)
Magpie Goose *(Anseranas semipalmata)*	V	-	Moderate	Up to 53.15 hectares of associated PCTs, noting the species would be most likely to utilise this habitat at times of flooding. Other areas in the locality, including around Lake Cowal, would provide more constant habitat for the species.
Australasian Bittern *(Botaurus poiciloptilus)*	E	E	Moderate	Up to 20.93 hectares of associated PCTs, noting the species would be most likely to utilise this habitat at times of flooding. Other areas in the locality, including around Lake Cowal, would provide more constant habitat for the species.
White-bellied Sea-Eagle *(Haliaeetus leucogaster)*	V	-	Moderate	Up to 54.85 hectares of associated PCTs, representing potential foraging habitat for the species.
Superb Parrot *(Polytelis swainsonii)*	V	V	Moderate	Up to 41.33 hectares of associated PCTs, representing potential foraging habitat for the species. No active breeding features were detected during the field survey, however six hollow bearing trees suitable for this species were identified, representing potential breeding habitat for the species will be removed.
Grey-crowned Babbler (eastern subspecies) *(Pomatostomus temporalis temporalis)*	V	-	Known	Up to 54.85 hectares of associated PCTs, representing known foraging habitat and potential breeding habitat for the species, noting no nesting activity was observed during field surveys.

Removal of threatened flora

None of the threatened flora species identified for the field survey were detected within the study area. No direct impacts to threatened flora species are anticipated from the proposal.

Fish habitat and fish passage

The proposal requires the installation of new culverts and extension of existing culverts under the Newell Highway. Waterway crossings such as culverts can have impacts on the health of aquatic systems through altering natural flow patterns, affecting instream habitat conditions, impacting fish passage via physical blockages, changes to hydrology and creating artificial conditions that may alter fish behaviour. Fairfull and Witheridge (2003) produced guidelines that provide a comprehensive overview of the appropriate measures required to plan, design and construct waterway crossings to minimise impacts on fish passage and aquatic habitats (DPI, 2013).

Under current NSW legislation consideration for fish passage needs to be incorporated into the design of all instream structures over waterways classified as KFH. For construction of permanent or temporary barriers in Class 1 and 2 waterways adequate fish passage needs to be provided and barriers designed based on Fairfull & Witheridge's guidelines (2003).

The floodplain wetland is mapped as KFH (Figure 6-5) and would be impacted by the installation of culverts. Based on the field survey and desktop review, the floodplain wetland was classified as Class 4 waterway. Fish friendly waterway crossings within Class 4 waterways are potentially unwarranted. Consultation was undertaken with DPI Fisheries to confirm the classification of the wetland and whether fish passage would need to be considered for culvert design. The response from DPI Fisheries was that culvert design would not need to consider fish friendly passage (see Appendix C of the BAR attached as Appendix C to this REF).

Potential impacts of the proposal on water quality are assessed in section 6.4.4

Injury and mortality of fauna

The proposal has potential to cause injury and mortality to fauna during the construction phase. Risks to fauna are associated with vegetation clearing and the mobilisation of plant. It is expected that mobile fauna would relocate to undisturbed areas during construction activities, however less mobile fauna may be directly impacted during these activities. Fauna injury and mortality impacts would be managed through the implementation of mitigation measures, outlined in section 6.1.4.

Invasion and spread of weeds, pests, pathogens and disease

The introduction and spread of weeds have the potential to occur during the construction phase of the proposal. This can occur by the spread of opportunistic exotic vegetation from adjacent private properties or new species can be introduced via equipment, plant and footwear. Weed cross-contamination and spread can be avoided and minimised by implementing weed management as per the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects (EMF-BD-GD-0039)* (Transport, 2024).

Pest fauna species could use disturbed areas to increase their movement across the landscape. Edges provide opportunities for invasive pest animals to move into newly accessible areas. Given the minimal scale of the proposed clearing, it is not expected that the proposal would facilitate invasive species incursion.

There is the potential for pests to spread as 'hitchhikers' on earthmoving equipment, machinery or materials being moved to site. The risk of spread of pests can be avoided and minimised by implementing appropriate mitigation measures.

Any foreign equipment or materials brought onto the construction site also has potential to introduce diseases such as Phytophthora (*Phytophthora cinnamomi*), Myrtle Rust (*Puccinia psidii*) and Chytrid Fungus (*Batrachochytrium dendrobatidis*). The risk of spread of pathogens and disease can be avoided and minimised by implementing appropriate mitigation measures.

Groundwater dependent ecosystems

One high potential GDE (the Lachlan River) is mapped within study area and an additional three low potential terrestrial GDEs are mapped in the south-western potion of the study area (section 6.1.2). Three low potential terrestrial GDEs are also identified in the south-western portion of the study area.

The proposal has the potential to impact on groundwater quantity and quality through:

- erosion and sedimentation
- sealing of land surface in recharge zones
- changes in land drainage

- excavation and shaping of the upper soil profile
- removal of overlying vegetation, altering hydrological linkages
- incidental contamination from construction activities.

The proposal is unlikely to intercept the deeper regional shallow alluvial aquifer, which is expected to occur at depths greater than approximately 15 metres below ground level (mbgl). However, review of the geotechnical investigation indicates that localised perched groundwater may occur within the upper 4.5 metres of the soil profile. It is recommended that shallow groundwater conditions are confirmed during the next stage of design and investigation. This has been addressed further in section 6.4.5.

Noise, light, dust and vibration

Construction activities may produce levels of noise and vibration at higher than ambient levels. These increases in noise and vibration generation from the proposal would be temporary and localised to the work location during construction. The study area is subject to existing noise disturbance from vehicles and therefore it is expected that any fauna utilising the area would be adapted to a high level of disturbance and will not be significantly impacted due to additional disturbances related to the construction phase of the proposal.

Certain work activities would also likely take place at night to minimise any traffic-related impacts. Increased light and noise levels may deter fauna species from the immediate area for the duration of works. This is not considered to be a substantial impact on fauna in the study area and it is expected that fauna would return once this disturbance is removed.

Increased dust levels can reduce photosynthesis in flora and respiratory capability in fauna. It is expected the proposal would cause minimal dust generation which is unlikely to result in significant impacts to flora or fauna.

Operation and indirect

Indirect impacts occur when the proposal or activities relating to the construction, operation and general change in land-use patterns of the proposal affect native vegetation, TECs, threatened species and their habitats beyond the construction boundary (direct impact area).

Edge effects on adjacent native vegetation and habitat

Edge effects occur at the boundary of vegetated areas due to changes in level of protection and exposure to disturbance factors. Generally, edges of vegetation have reduced protection for flora and fauna species and increased effects of environmental (e.g., wind, artificial light, dust) and biological (e.g., more exposure to predators, increased weed colonization and increased competition with exotic species) factors when compared with conditions found further into a vegetation patch.

Clearing of native vegetation for the proposal would result in the removal of up to 55.37 hectares of native vegetation. This clearing would be restricted to a narrow, linear patch of vegetation located close to the existing alignment of the Newell Highway. Vegetation within the study area is already exposed to edge effects and disturbances from human activity. It is expected that edge effects, because of the proposal, would be minimal.

Wildlife connectivity and habitat fragmentation

Potential impacts to wildlife connectivity may occur where roads affect the movement of plants and animals between habitats. Currently, wildlife connectivity in the area is limited by the existing road corridor and adjacent land uses. Some connectivity is provided in the study area by vegetated road reserves and riparian corridors adjacent to the existing road corridor however it is not anticipated that the proposal would result in landscape scale impacts to connectivity.

Injury and mortality of fauna

Injury and mortality can occur during operation through vehicle strike. As the proposal does not include road realignment or duplication it is expected that the proposal will not result in increased operational traffic and subsequent increases in vehicle strike of fauna species. Roadkill observed along the existing road alignment during field surveys were Eastern Grey Kangaroo (*Macropus giganteus*) and raptor species (likely secondary roadkill).

Kangaroo and other larger, common species, such as Emus, represent the fauna species with the highest likelihood of dispersal across the road corridor. Additional culvert structures would generally provide increase safe fauna passage.

Changes to hydrology

A hydrological assessment has been completed for the proposal and is provided as Appendix F to the REF. The concept design represents a significant improvement over the existing highway configuration while maintaining acceptable hydraulic performance across the broader floodplain. The broader flood behaviour of the Lake Cowal floodplain remains largely unchanged, with flood recession continuing to be governed primarily by the storage and recession characteristics of Lake Cowal. As the design progresses to the detailed design stage, further optimisation of the proposed hydraulic openings may be undertaken to refine hydraulic performance.

Fish passage

Waterway crossings such as culverts can have impacts on the health of aquatic systems including by altering natural flow patterns, affecting instream habitat conditions, impacting fish passage via physical blockages, changes to hydrology and creating artificial conditions that may alter fish behaviour. DPI Fisheries advised that culvert design would not need to consider fish friendly passage (see Appendix C of the BAR attached as Appendix C to the REF).

Conclusion on significance of impacts

The proposal not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the BC Act or FM Act and therefore a Species Impact Statement or BDAR is not required.

The proposal is not likely to significantly impact threatened species, ecological communities or migratory species, within the meaning of the EPBC Act.

6.1.4 Mitigation measures

Table 6-7 lists the biodiversity mitigation measures that would be implemented by the proposal.

Table 6-7: Biodiversity mitigation measures

Impact	Mitigation measures	Responsibility	Timing	Reference
General biodiversity	A Flora and Fauna Management Plan (FFMP) will be prepared in accordance with Transport's *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (Transport, 2024) and implemented as part of the CEMP. The Flora and Fauna Management Plan will include but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones and protected habitat features • pre-clearing survey requirements • procedures for unexpected threatened species finds and fauna handling • procedures addressing relevant matters specified in the DPI *Policy and guidelines for fish habitat conservation and management* (DPI, 2013) • protocols to manage weeds and pathogens • procedures for management of construction activities that may result in fire (for example hot work).	Contractor	Detailed design, Pre-construction, Construction	Section 4.8 of *QA G36 Environmental Protection*

Impact	Mitigation measures	Responsibility	Timing	Reference
Vegetation, habitat removal and impact to threatened flora and fauna	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Transport	Detailed design	Additional safeguard
Vegetation removal	Pre-clearing surveys will be undertaken in accordance with *Guide 1: Pre-clearing process* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Pre-construction	Additional safeguard
Vegetation removal and removal of fauna habitat	Vegetation and habitat removal will be undertaken in accordance with *Guide 4: Clearing of vegetation and removal of bushrock* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard
Vegetation removal	The unexpected species find procedure is to be followed under *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024) if TECs, threatened flora or fauna not assessed in the biodiversity assessment, are identified in the construction boundary.	Contractor	Construction	Additional safeguard
Vegetation removal	Native vegetation will be re-established in accordance with *Guide 3: Re-establishment of native vegetation* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Post-construction	Additional safeguard
Vegetation removal	A Tree and Hollow Replacement Plan will be developed in accordance with the *Tree and Hollow Replacement Guidelines* (Transport, 2024). Seed for propagation of replacement plantings will be harvested or otherwise sourced from the local area, where possible.	Transport	Pre-construction	Additional safeguard
Groundwater dependent ecosystems	Interruptions to water flows associated with groundwater dependent ecosystems will be minimised through detailed design.	Transport	Detailed design	Additional safeguard
Removal of fauna habitat	Habitat will be replaced or re-instated in accordance with *Guide 5: Re-use of woody debris and bushrock* and *Guide 8: Artificial hollows* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard

Impact	Mitigation measures	Responsibility	Timing	Reference
Fauna handling and injury and mortality of fauna	Fauna will be managed in accordance with *Guide 9: Fauna* handling of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard
Aquatic impacts	Impacts to aquatic habitat will be minimised through detailed design.	Transport	Detailed design	Additional safeguard
Fragmentation of habitat corridors	Connectivity measures will be considered for impacts not considered a landscape scale connectivity impact in accordance with *the Draft Wildlife Connectivity Guidelines for Road Projects* (RTA, 2011) or equivalent updated NSW Transport Guidelines. Any connectivity measures implemented will be installed under the supervision of an experienced ecologist.	Transport	Detailed design	Additional safeguard
Edge effects	Exclusion zones will be set up at the limit of clearing in accordance *with Guide 2: Exclusion zones* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard
Aquatic habitat	Aquatic habitat will be protected in accordance with *Guide 10: Aquatic habitats and riparian zones* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024) and Section 3.3.2 *Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013* (DPI (Fisheries NSW), 2013).	Contractor	Construction	Additional safeguard
Construction water	Where water is being pumped from a water body water pumps to be fitted with appropriate fish screen/mesh attachment prior to use. Water to be discharged into a bunded or screened site to allow any fish caught to be rescued and immediately released back into the aquatic environment	Contractor	Construction	Additional safeguard
Invasion and spread of weeds	Weed species will be managed in accordance *with Guide 6: Weed management* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard
Construction lighting	Artificial light impacts will be minimised through detailed design. During nightwork, it is recommended that all artificial lighting be directed	Contractor	Construction	Additional safeguard

Impact	Mitigation measures	Responsibility	Timing	Reference
	away from sensitive receivers (i.e. adjacent habitat etc.) to limit indirect impacts to biodiversity values.			

Other mitigation measures that would contribute to the management of potential biodiversity impacts are included in the following sections:

- section 6.4.5, which outlines mitigation measures regarding surface water, groundwater and flooding
- section 6.5.4, which outlines safeguards and management measures regarding soils and contamination.

6.1.5 Biodiversity offsets

This section considers requirements for the provision of biodiversity offsets, conservation measures and tree and hollow replacement in accordance with:

- *No Net Loss Guidelines* and supporting resources (Transport, 2024)
- *Tree and Hollow Replacement Guidelines* and supporting resources (Transport, 2024).

Thresholds

Native vegetation clearing and impacts to threatened species within construction boundary are required to be assessed against offset thresholds. Offset thresholds are set out in the *No Net Loss Guidelines* (Transport, 2024). Residual impacts that do not exceed offset thresholds must then consider the requirements of the *Tree and Hollow Replacement Guidelines* (Transport, 2024).

Table 6-8 identifies the direct impacts of the proposal that require offsetting under the *No Net Loss Guidelines* (Transport, 2024). Preliminary estimates of trees and hollow replacement requirements for vegetation zones that do not trigger offset thresholds are provided in Table 6-9.

Table 6-8: Assessment of vegetation impacts against offset thresholds

Plant community type (PCT)	Condition	TEC	Impact area (ha)	Threshold triggered?*
PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Moderate-Good	Endangered (BC Act)	0.39	No. Clearing is not ≥ 2 ha in 'moderate to good' condition. Preliminary tree and hollow replacement calculations are provided in Table 6-9.
PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Moderate-Good	Not a TEC	14.81	No. Clearing area is not within a TEC. Tree and hollow replacement not required due to vegetation form.
	Good	Not a TEC	17.41	
PCT 53: Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains	Low	Not a TEC	13.52	No. Clearing area is not within a TEC. Tree and hollow replacement not required due to vegetation form.
PCT 55: Belah woodland on alluvial plains and low rises in	Moderate	Not a TEC	0.35	No. Clearing area is not within a TEC.

Plant community type (PCT)	Condition	TEC	Impact area (ha)	Threshold triggered?*
the central NSW wheatbelt to Pilliga and Liverpool Plains regions				Preliminary tree and hollow replacement calculations provided in Table 6-9.
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Moderate	Endangered (BC Act)	0.69	No. Clearing is not ≥ 2 ha in 'moderate to good' condition. Preliminary tree and hollow replacement calculations are provided in Table 6-9.
	Moderate - Good	Endangered (BC Act and EPBC Act*)	0.66	
PCT 244: Poplar Box grassy woodland on alluvial clay-loam soils mainly in the temperate (hot summer) climate zone of central NSW (wheatbelt).	Moderate	Not a TEC	0.13	No. Clearing area is not within a TEC. Preliminary tree and hollow replacement calculations provided in Table 6-9.
PCT 249: River Red Gum swampy woodland wetland on cowals (lakes) and associated flood channels in central NSW	Moderate	Not a TEC	7.41	No. Clearing area is not within a TEC. Preliminary tree and hollow replacement calculations provided in Table 6-9.

** Trigger thresholds are provided in Table 7-1 of Appendix C*

Offset calculation

Using the average counts of native trees and data collected in the field by counting isolated and amenity trees the preliminary tree and hollow replacement requirements for all tree removal for vegetation zones that do not trigger offset thresholds that does not require offsetting has been estimated and are shown in Table 6-9.

Table 6-9: Preliminary estimates of trees and hollow replacement requirements

Category	Estimated number of trees impacted		Replacement requirement per tree/hollow removed[1]		Estimated number to be replaced[2]		Estimated equivalent payment to Transport conservation fund[2]
	Native trees	Amenity trees	Planting required	Contribution required	Native trees	Amenity trees	
Very large tree (DBH ≥100cm)	0	0	Plant minimum 16 trees	$2,500	0	0	$0
Large tree (DBH ≥50 to <100cm)	80.68	0	Plant minimum 8 trees	$1,000	645.44	0	$80,680.00
Medium tree (DBH ≥20 to <50 cm)	175	0	Plant minimum 4 trees	$500	700	0	$87,500.00

Category	Estimated number of trees impacted		Replacement requirement per tree/hollow removed[1]		Estimated number to be replaced[2]		Estimated equivalent payment to Transport conservation fund[2]
	Native trees	Amenity trees	Planting required	Contribution required	Native trees	Amenity trees	
Small tree (DBH ≥ 5cm to <20 cm)	116.7	0	Plant minimum 2 trees	$125	233.40	0	$14,587.50
Hollow	7		Provide 3 artificial hollows for every occupied hollow removed*	$500	21		$3,500.00
Totals				1,599.84			$186,267.50

1 As per the Transport Tree and Hollow Replacement Guidelines

2 An equivalent payment to the Transport Conservation Fund can be used where replanting is not feasible or fully achievable within the project boundary or adjacent land.

Biodiversity offset strategy/tree and hollow replacement plan

Biodiversity offsetting thresholds have not been reached for the proposal under the *No Net Loss Guidelines* (Transport, 2024) so the preparation of a Biodiversity Offset Strategy has not been included in the proposed mitigation measures.

Tree and hollow replacement are required under the *Tree and Hollow Replacement Guidelines* (Transport, 2024) and the preparation of a Tree and Hollow Replacement Plan has been included as mitigation measure for this proposal (Table 6-7). The Tree and Hollow Replacement Plan is the only requirement for addressing biodiversity compensation obligations for this proposal.

6.2 Aboriginal heritage

Stage 1 and Stage 2 of the PACHCI have been completed for the proposal in accordance with the methodology detailed in the Transport PACHCI (Transport, 2025). The Stage 3 PACHCI process has commenced and will include the preparation of an ACHAR to assess the potential Aboriginal heritage impacts during construction and operation of the proposal. A summary of the assessment completed at the time of display of this REF is presented in the following sections. The PACHCI Stage 2 is attached as Appendix D.

6.2.1 Methodology

Stage 2 PACHCI

The Aboriginal cultural heritage assessment for the proposal under the Transport PACHCI (Transport, 2025) completed for the proposal included:

- Search of the Heritage NSW Aboriginal Heritage Information Management System (AHIMS) to identify if there are any known Aboriginal Objects, Places, potential archaeological deposits (PADs), or other site recordings within the study area.

- Search of the World, National and Commonwealth heritage lists under the EPBC Act and a search of the Commonwealth Government Gazette for any relevant Declarations under the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.
- Desktop review of key regional Aboriginal heritage studies and any previous studies in the subject land to understand local Aboriginal site patterning and implications for archaeological potential within the subject land. The desktop review also sought to identify any previously documented Aboriginal cultural, social or intangible values that may be relevant to the study area.
- Desktop review of geological mapping, soil landscape mapping, NearMap high resolution aerial photographs and historical aerial photographs of the subject land to identify landforms and environmental features within the study area. The review also sought to identify previous disturbance and landscape modifications that have occurred within the study area that may have affect its archaeological potential.
- Site inspection, undertaken on foot, on 5 and 6 March 2026 with representatives of Extent Heritage, Transport and the West Wyalong LALC to identify any Aboriginal sites visible on current exposed ground surfaces and any old growth native trees with potential to retain cultural scars or carving. The site inspection also included documentation of previous ground disturbance and modification.
- Preliminary consultation with key Aboriginal stakeholders to identify and record Aboriginal cultural values within the study area.
- Identification of whether the project should proceed to a Stage 3 PACHCI assessment, as outlined in the PACHCI guidelines (Transport, 2025).

Stage 3 PACHCI

As impacts to Aboriginal cultural heritage cannot be avoided by the proposal (refer to section 6.2.3), in accordance with the PACHCI guidelines, progression to a Stage 3 PACHCI is required. The PACHCI Stage 3 process has commenced.

6.2.2 Existing environment

Environmental context

The REF study area is located on Wiradjuri Country, approximately 3.5 kilometres east of Lake Cowal and within the Lachlan River catchment, part of the Murray-Darling Basin near the eastern edge of the Riverine Plain. The geology of the study area is of Cenozoic and Quaternary age, primarily composed of alluvial deposits and partly comprised of dunes. Pardoe (2013, 2015) undertook analysis of the availability and suitability of rock types in the locality for stone artefact manufacture, including quartz, quartzite, volcanic rock, and laminated sandstone/siltstone. Overall, the geological formations present within the study area suggest that only quartz may have been readily available within the study area for stone tool production. However, raw materials such as sandstone, quartzite, basalt, and tuffs are available within geological formations approximately 10 kilometres to the east; cherts are also available in formations 20 kilometres to the west.

The study area is approximately 600 metres from Bland Creek, a perennial freshwater creek that runs into Lake Cowal and less than 200 metres east of Gum Swamp, a seasonal wetland prone to inundation. Swamps, whilst not providing reliable fresh drinking water or favourable camping locations, would have been relied upon as a source of aquatic resources including birds, plants, insects, fish, and possibly shellfish and minerals. Wiradjuri have long used other sources of water in the region, as drier periods often critically deplete lakes, streams, and creeks.

The position of the study area between reliable sources of freshwater (Lake Cowal and Bland Creek) and Gum Swamp suggest that transit across the study area was probable as Aboriginal people would have moved between these important landscape features suggesting that the presence of Aboriginal objects is likely.

The natural resources of region surrounding the study area, prior to the arrival of Europeans, would have provided ample sources of food, medicine, minerals, and other materials for seasonal use by Aboriginal people. Lake Cowal continues to support a large population of grey kangaroos (*Macropus giganteus*) and emu (*Dromaius novaehollandiae*), which Wiradjuri

hunted for food. Malleefowl (*Leipoa ocellata.*) eggs were collected particularly near Ungarie to the west of the study area on the other side of Lake Cowal, the mallefowl being an important totem species for some Wiradjuri (Clarke, 2023).

Plants observed during a 2023 cultural survey in the locality (Clarke, 2023) and their traditional Wiradjuri use is provided in Table 6-10.

Table 6-10: Traditional Wiradjuri use for plants in the study area's locality (Clarke, 2023)

Wiradjuri name	English name	Species	Traditional use
Barrinan	Austral indigo	*Indigofera australis*	Fish poison
Barrinan	Ruby saltbush	*Enchylaena tomentosa*	Edible fruit
Biilaa, ngany	Belah	*Casuarina cristata*	Wood for artefacts
Boree, Myall and Mulga	Wyalong wattle	*Acacia cardiophylla*	Dry seeds ground on stone for making into an edible paste
Budhaay	Sneezeweed	*Centipeda cunninghamii*	Foliage used medicinally as a panacea
Burradhaa, Garraa	White cypress pine	*Callitris glaucophylla*	Wood for artefacts
Dhin	Kurrajong	*Brachychiton populneus*	Seeds are edible after irritating hairs removed; the 'yam' of young saplings are eaten
Dhingarang	Butterbush or wild apricot	*Pittosporum angustifolium*	A 'birthing medicine'
Gaymaan	Kangaroo grass /	*Themeda triandra*	Edible seed for grinding
Guwandang	Quandong	*Santalum acuminatum*	Edible fruit flesh and kernel ground to make flour
Mambarra	Native cherry	*Exocarpos cupressiformis*	Edible fruit
Murrung	Grey box	*Eucalyptus microcarpa*	Wood and bark for artefacts
Ugaru, Bunguwiny, gungil	Windmill grass	*Chloris truncata*	Edible seed
Wilburgil	Snotty gobbles or mistletoe	*Amyema species*	Edible fruit
Yadhandha	Long-leaved emu bush or berrigan	*Eremophila longifolia*	Edible fruit; foliage for medicine

The natural resources that would have been available close the study area demonstrates that Aboriginal people would have frequently visited the area to gather specific resources, increasing the potential for Aboriginal sites to be present.

Archaeological context

A search of the Heritage NSW AHIMS database was undertaken on 6 February 2026 (Client ID: 1089501). AHIMS includes registrations of Aboriginal Objects and Places that are legally protected under the NPW Act and it also includes other recordings that are not considered to be Aboriginal Objects or Places as defined by the NPW Act.

An extensive search was conducted with a search area of 10 x 10 kilometre centred on the study area. This search results included one restricted site (AHIMS 43-5-0079). On 9 February 2026 Heritage NSW confirmed that the proposal works within the study area would not impact AHIMS 43-5-0079.

At the time of the AHIMS search, there were no registered Aboriginal sites within the study area (Figure 6-7). Two Aboriginal sites were located within 2 kilometres of the study area, 13 within 5 kilometres, and 69 within 10 kilometres. The most common site features recorded at the 69 sites were artefact sites, with the search also including sites identified as Modified Trees (Carved or Scarred), PAD and Aboriginal Ceremony and Dreaming, and Hearths.

A search of the registers established under the EPBC Act indicates the study area does not include any listed items. A search of the Commonwealth Government Gazette indicates that there are no Section 9 (emergency declaration) or Section 10 (other declaration) declarations currently applicable to the study area.



AHIMS locations

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-7

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 01 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Existing Road
- Watercourse
- Cadastre
- Waterbody

AHIMS

- Aboriginal Ceremony and Dreaming
- Artefact
- Artefact - Modified Tree (Carved or Scarred)
- Artefact - Potential Archaeological Deposit (PAD)
- Hearth
- Modified Tree (Carved or Scarred)

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road & Waterbody & Watercourse (NSW SS, 2025)

0 1,000 2,000 3,000 4,000 Metres

Scale at A3: 1:100,000



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Archaeological site inspection

The archaeological site inspection was completed in March 2026 (Photograph 5 to Photograph 10) with the following noted:

- ground surface visibility was variable across the surveyed area, being lowest where low grasses and shrubs were present in addition to detritus, and highest in areas where recent ploughing had taken place
- no naturally occurring rock formations were observed
- the study area is located across a disturbed floodplain landscape including the Newell Highway, gas infrastructure and land uses associated with pastoralism (i.e., fencing, ploughing)
- being part of a floodplain landform it is considered 'natural' for the purposes of this assessment.



Photograph 5: View north over the proposed temporary construction area on the western side of the highway.



Photograph 6: View south of the proposed temporary construction area on the western side of the highway.



Photograph 7: View south over the proposed temporary construction area on the eastern side of the highway.



Photograph 8: View west over the proposed temporary construction area on the eastern side of the highway.



Photograph 9: View south over the proposed temporary construction area on the western side of the highway.



Photograph 10: View west over the proposed temporary construction area on the eastern side of the highway.

The survey identified six new Aboriginal sites and areas of Aboriginal sensitivity (Table 6-11), five of which are located within the construction boundary (Figure 6-8). A culturally sensitive tree was identified within the study area but outside the construction boundary. The newly recorded sites were comprised of stone artefacts in isolated contexts and in low-density scatters, and a possible scarred tree. Heat retainers were also associated with the stone artefact site. All sites, except the possible scarred tree and the culturally sensitive tree, are in disturbed archaeological contexts; ploughed sections of the study area. Although several dozen heat retainers were identified across the study area, no hearth was identified. One additional area of sensitivity was a cultural tree, being a mature tree identified as containing cultural significance but without modifications and heat retainers.

A summary of the five new sites , registered on the AHIMS, are detailed in Table 6-11 and shown in Figure 6-8 with further information provided in Appendix D. It is noted that new Aboriginal sites (or additional components of existing sites) may be identified during the Stage 3 PACHCI. The final Stage 3 PACHCI ACHAR will provide management recommendations and mitigations for all AHIMS registered Aboriginal sites within the REF study area (including those where no impacts are proposed).

Table 6-11: New recorded Aboriginal archaeological sites

Site	Description
Newell Hwy Gum Swamp – AS 1 (AHIMS ID: 43-5-0093)	A low-density artefact scatter comprised of three stone artefacts within a 220 metre x 85 metre scatter on a floodplain landform. The stone artefacts were a volcanic flake, a chert flake, and a fine-grained siliceous core. Several heat retainers were also identified across the boundaries of the scatter. The objects were all located within a disturbed archaeological context, being ploughed exposures or scalded exposures.
Newell Hwy Gum Swamp – AS 2 (AHIMS ID: 43-5-0094)	A low-density artefact scatter comprised of three stone artefacts within a 155 metre x 30 metre scatter on a floodplain landform. The stone artefacts were a fine-grained siliceous flake, a quartz flake, and a quartz core. Several heat retainers were also identified across the scatter. The objects were all located within a disturbed archaeological context, being ploughed exposures or scalded exposures.
Newell Hwy Gum Swamp – IF 1 (AHIMS ID: 43-5-0095)	Identified as an isolated crystal quartz flake identified within a scalded erosional patch within a floodplain landform. A heat retainer was identified close to the site as well as a tree identified as cultural by the LALC representative.

Site	Description
	The site is located within a disturbed archaeological context.
Newell Hwy Gum Swamp – IF 2 (AHIMS ID: 43-5-0096)	Identified as fine-grained siliceous flake fragment isolated crystal quartz flake within a scalded erosional patch in the floodplain landform. A heat retainer and cultural tree were identified close to the site. The site is located within a disturbed archaeological context.
Newell Hwy Gum Swamp – ST 1 (AHIMS ID: 43-5-0097)	Identified as possible scarred tree. The scar measures 138 cm (L) x 22 cm (W) x 15 cm (D) and ends approximately 25 cm above the ground surface. The scar was determined to contain some potential due to the generally parallel edges of the scar and tapered ends; the scar ends above the ground surface and is located on a mature epicormic regrowth trunk. The site location potentially corresponds to a lone standing tree surrounded by regrowth in 1963 historical imagery

Consultation

Consultation with Aboriginal people is currently being undertaken by Transport (as part of the Stage 3 PACHCI) in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010) and the requirements of Clause 60 of the National Parks and Wildlife Regulation 2019. Consultation will continue as part of the Stage 3 assessment for the proposal. Further detail is provided in section 5.3.



Recorded Aboriginal archaeological sites (Page 1 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-8

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Construction Boundary
- Culvert
- Existing Road
- Watercourse
- Cadastre
- Waterbody

Road Alignment

- Permanent Road

Recorded Aboriginal Archaeological Sites

- Recorded Archaeological Site

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road & Waterbody & Watercourse (NSW SS, 2025)

0 100 200 300 400 Metres
Scale at A3: 1:10,000



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Recorded Aboriginal archaeological sites (Page 2 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-8

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Construction Boundary
- Culvert
- Existing Road
- Watercourse
- Cadastre
- Waterbody

Road Alignment

- Permanent Road

Recorded Aboriginal Archaeological Sites

- Recorded Archaeological Site

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road & Waterbody & Watercourse (NSW SS, 2025)

0 100 200 300 400 Metres
Scale at A3: 1:10,000



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Recorded Aboriginal archaeological sites (Page 3 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-8

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Construction Boundary
- Culvert
- Existing Road
- Watercourse
- Cadastre
- Waterbody

Road Alignment

- Permanent Road
- Temporary Road
- Recorded Archaeological Site
- Cultural Tree

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road & Waterbody & Watercourse (NSW SS, 2025)

0 100 200 300 400 Metres
Scale at A3: 1:10,000



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SENSITIVE INFORMATION REMOVED FROM PUBLIC DISPLAY

Recorded Aboriginal archaeological sites (Page 4 of 4)

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-8

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Construction Boundary
- Culvert
- Existing Road
- Watercourse
- Cadastre
- Waterbody

Road Alignment

- Permanent Road
- Temporary Road

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road & Waterbody & Watercourse (NSW SS, 2025)

0 100 200 300 400 Metres
Scale at A3: 1:10,000



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6.2.3 Potential impacts

Construction

The construction of the proposal would be unable to avoid impact to Aboriginal cultural heritage at some of the sites listed in Table 6-12. Therefore, in accordance with the PACHCI guidelines, progression to a Stage 3 PACHCI is required. This is currently being undertaken.

Table 6-12: Impact to Aboriginal archaeological sites

Aboriginal archaeological site	Type of harm	Degree of harm	Consequence of harm
Newell Hwy Gum Swamp – AS 1 (AHIMS ID: 43-5-0093)	Direct	Total	Complete loss of value
	AHIMS 43-5-0093 is located within the construction boundary and would be impacted by the construction of the proposal. This site will be further investigated as part of the PACHCI Stage 3. Management and mitigation actions will be detailed in the ACHAR.		
Newell Hwy Gum Swamp – AS 2 (AHIMS ID: 43-5-0094)	No harm This site is located within the REF study area but outside the construction boundary. It will not be directly or indirectly harmed by the proposal construction or permanent works.		
Newell Hwy Gum Swamp – IF 1 (AHIMS ID: 43-5-0095)	Direct	Total	Complete loss of value
	AHIMS 43-5-0095 is located within the construction boundary and would be impacted by the construction of the proposal. This site will be further investigated as part of the PACHCI Stage 3. Management and mitigation actions will be detailed in the ACHAR.		
Newell Hwy Gum Swamp – IF 2 (AHIMS ID: 43-5-0096)	No harm This site is located within the REF study area but outside the construction boundary. It will not be directly or indirectly harmed by the proposal construction or permanent works.		
Newell Hwy Gum Swamp – ST 1 (AHIMS ID: 43-5-0097)	No harm This scarred tree located within the construction boundary and close to project works. Mitigation measures to avoid impact from the temporary construction works and permanent works will be incorporated into the detailed design of the proposal.		

Operation

Operation of the proposal would not impact Aboriginal heritage as ground disturbance and excavation would be restricted to the construction phase. Should maintenance and/or repairs of infrastructure require excavation beyond the impact area assessed in this REF, potential impacts may require further consideration.

6.2.4 Mitigation measures

Table 6-13 lists the Aboriginal heritage mitigation measures that would be implemented by the proposal.

Table 6-13: Aboriginal heritage mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Impact on Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the *Procedure for Aboriginal cultural heritage consultation and investigation* (Transport, 2025) and *Unexpected*	Contractor	Pre-construction, Construction	Section 4.9 of *QA G36 Environmental Protection*

Risk	Mitigation measures	Responsibility	Timing	Reference
	Heritage Items Procedure (Transport, 2022) and implemented as part of the CEMP. It will provide specific measures and controls to be implemented for managing impacts on Aboriginal heritage and the long term storage or reburial of recovered artefacts. The AHMP will be prepared in consultation with all relevant Aboriginal groups.			
Impact on Aboriginal heritage	Complete a stage 3 Aboriginal cultural heritage assessment and associated reporting for the proposal under the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (Transport, 2025), *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010).	Transport	Detailed Design, Pre-construction	Additional safeguard
Impact on Aboriginal heritage	An application for an AHIP will be made under section 90A of the NPW Act for the specified Aboriginal sites and Aboriginal objects contained within the following sites: • AHIMS ID: 43-5-0093 • AHIMS ID: 43-5-0095. If any additional sites (or components to existing sites) are identified during the Stage 3 PACHCI, they may be included in the AHIP application. Management of identified or salvaged artefacts will be carried out in accordance with the AHIP.	Transport	Pre-construction	Additional safeguard
Impact on Aboriginal heritage	An ACHAR report must be completed in support of an AHIP application to Heritage NSW.	Transport	Pre-construction	Additional safeguard
Impact on Aboriginal heritage	Establish and maintain exclusion zones and protective fencing around the relevant AHIMS sites to prevent indirect impacts from construction activities such as vehicle movement, stockpiling, and vibration.	Contractor	Pre-construction, Construction	Additional safeguard
Aboriginal heritage	Update the ACHAR and AHIMS search if more than 12 months has passed since the last assessment to ensure all heritage data is current and accurate.	Transport / Contractor	Pre-construction	Additional safeguard
Impact on Aboriginal heritage	Deliver a heritage induction to all site personnel, including information on Aboriginal cultural heritage values, obligations of all site contractors under the conditions of the AHIP, legislative obligations under the NPW Act, and site-specific sensitivities.	Contractor	Construction	Additional safeguard

Risk	Mitigation measures	Responsibility	Timing	Reference
Impact on Aboriginal heritage	The Unexpected Heritage Items Procedure (Transport, 2022) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport for NSW does not have approval to disturb the object/s or where a specific measure for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Section 4.9 of *QA G36 Environmental Protection*

6.3 Non-Aboriginal heritage

A Statement of Heritage Impact (SoHI) has been prepared by Artefact Heritage and Environment to assess the potential non-Aboriginal heritage impacts during construction and operation of the proposal. A summary of the assessment is presented in the following sections. Further information is provided in Appendix E.

6.3.1 Methodology

Preparation of the SoHI included the following tasks:

- Background research to understand the existing environment with respect to heritage values.
- Searches of relevant statutory and non-statutory heritage registers to identify heritage listed items within and surrounding the study area:
  - World Heritage List
  - Commonwealth Heritage List
  - National Heritage List (NHL)
  - Register of the National Estate
  - National Trust of Australia (NSW) Register
  - State Heritage Register
  - Section 170 Heritage and Conservation Registers (s170)
  - NSW State Heritage Inventory database
  - WLEP 2011.
- Inspections of the study area were completed on 7 and 8 November 2023. The aim of the visit was to inspect the area of impact, inform a preliminary assessment of archaeological potential, and to identify heritage items and heritage significant fabric within the study area and in the vicinity that may be affected by the proposal.
- Determination of the historical archaeological potential and significance assessment of historical archaeological sites and items and assessment of the potential impacts from the proposal. This significance assessment follows the NSW Heritage Branch (now Heritage NSW) *Assessing Significance for Historical Archaeological Sites and 'Relics'* (DoP, 2009) heritage criteria and groupings.
- Determination of the heritage approval pathways and make recommendations for mitigation and ongoing management of non-Aboriginal heritage.

The SoHI was also informed by the following guiding documents:

- *Assessing Heritage Significance* (NSW Heritage Office, 2001)
- *Statements of Heritage Impact* (NSW Heritage Office and DUAP, 2002)
- *Design in Context: Guidelines for Infill Development in the Historic Environment* (NSW Heritage Office and Royal Australian Institute of Architects, 2005)
- *The Burra Charter* (Australia ICOMOS, 2013)
- *NSW Heritage Manual* (NSW Heritage Office and Department of Urban Affairs and Planning NSW Heritage Manua, 1996)
- *Commonwealth of Australia, Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (Department of the Environment, 2003).

6.3.2 Existing environment

Historical background

Early European land use: 1788 – 1814

In the late 18th century, the British established the colony of NSW. Land grants were a fundamental part of the plan to establish a viable settlement. In 1814 under Governor Macquarie's expansion strategy for the NSW colony George Evans explored and mapped the area west of Sydney and Bathurst (Weatherburn, 1966). In 1815 Europeans began settling west of the Blue Mountains in the Oxley Plains however, the government did not grant title to lands in the central west of NSW, instead issuing permits for use of land for pastoral purposes. In addition to land grants and leaseholds, individuals could purchase land through freehold title, which gave them outright ownership and complete control.

Land grants and pastoral leaseholds: 1821 – 1930s

From as early as 1821, the public route which ran north-south through the parishes of Marsden, Cadalgulee, Tregalana, and Carawandool was reserved from sale by the NSW Department of Lands. On 12 August 1899, the NSW Government Gazette proclaimed that land "within the resumed and leasehold areas of Tregalana Holding No. 75" be reserved from sale for the travelling stock route. The road has a historical connection linking the gold fields to settlements in the south.

With the introduction of the Crown Lands Alienation Act 1861, large squatting pastoral runs and parcel lands were systematically broken up into smaller freehold farms. Land ownership in early NSW was subject to changing government policies and regulations, including the system of land tenure, which evolved as the colony grew and adapted to the needs of its inhabitants. By 1928, although considered a public road well used by travellers, representations were made to Weddin Shire Council by neighbouring councils and other interested parties for the road condition to be improved.

Dr Andrew Gibson and family

Several of the pastoral leases in the central west within proximity to the study area were occupied by the Gibson family. In 1828, Dr. Andrew Gibson, a naval surgeon, first acquired 2560 acres of land to the southeast of the study area, to be known as "Tiranna', where he pursued pastoral land activities, establishing a large sheep and cattle stock holding. He married Alice Faithfull, daughter of William Pitt Faithfull who had acquired 1280 acres of land in the Goulburn district, called "Cooraganennoc". On 27 September 1848 the New South Wales Government Gazette reported Crown Land leases, stating that Alice Gibson claimed the Bland run, which was estimated to be 44,800 acres of cattle grazing land.

J.B. (John Bloyd) Donkin

J.B. Donkin was a prominent and pioneer pastoralist in New South Wales, who ran a cattle station situated nearby Lake Cowal on the eastern side of Bland Creek. In 1888, he had an inland telephone service installed to the station residence, one of the first in the area. The homestead is said to have been located "near Fisherman's Bend where the Bland Creek turns north-west to empty into Lake Cowal" (Bland Historical Society, 2003).

Tregalana pastoral run

The largest pastoral run which is located either side of the study area was called 'Tregalana'. In 1842, Levi Stonestreet was the Lessee for the Tregalana pastoral run. In 1861, an advertisement in The Argus Melbourne listed Tregalana and Caragabal for sale on the Lachlan, which consisted of 160 square miles. Then in 1863, Caragabal, Tregalana and Tregalana East transferred from John Heylin to Alice Gibson. T.J. Hawkins Esq. was appointed in 1865 to notify lessees of the re-valuation of squatting runs in the Upper Lachlan district, which included to Alice Gibson of Tregalana.

In 1873, Mrs Alice Gibson transferred the runs Boga Bogalong, Tregalana, Tregalana East, Caragabal and Bland East to her sons. The Wagga Wagga Advertiser and Riverine Reporter free selections records indicate that Stuart Donaldson also held 320 acres at the 'Tragalana' run. In 1885, pursuant to the Crown Lands Act 1884, Holding No. 75 'Tregalana' was reserved from sale and leased to protect the Crown land. From 1886 Andrew Faithful Gibson (1831-1910) held the "Tregalana" pastoral holdings which expanded over 32,800 acres. Renewal of the occupation leases was successful in 1894. No major structures were located within the study area at this time and in 1899 it continued to be used as the main stock route.

Billabong pastoral run

The Billabong pastoral run was one of the main stations, established by John Rodd in 1842 at Lake Cowal, and is adjacent to and west of the study area. To the south of Lake Cowal, the creek widened and was thus known as the "Billabong" or Billabong Creek. The run was thought to extend through the Mallee Plains to the areas now occupied by Wyalong and West Wyalong. By 1852, the Billabong run had been taken up by James Marsden, and a small village established in about 1866 directly south of the study area, called Marsdens.

State Highway No.17 (Newell Highway): 1938 -present

State Highway No. 17 was proclaimed by Government Gazette in March 1938. It formed part of the highway network managed by the Department of Main Roads. In 1941 the State highway was renamed Newell Highway in memory of the late H. H. Newell, Commissioner for Main Roads. Within the study area, the Newell Highway follows the route of the early travelling stock route, and has been subject to continuous improvements, such as sealing of the road with bitumen to reduce dust.

In 1992 the Newell Highway became part of the federally funded National Highway network under the Australian *Land Transport Development Act 1988*. Today, the Newell Highway is the longest highway in NSW, spanning over 1,000 kilometres from Tocumwal at the Victorian border to Goondiwindi on the Queensland border.

Assessment of historical archaeological potential and significance

The identifiable phases of development for the study area, which may be present in the archaeological record, are:

- Phase 1: Earliest land use (1788-1820)
- Phase 2: Land clearance (1821-1930s)
- Phase 3: Foundations of the Newell Highway (1938-present),

There are no listed or potential heritage items or elements of significant fabric located within the study area. During the site inspection, no buildings, features, or objects within the study area were determined to be unlisted heritage items or moveable heritage of significance at a local level or above. As the study area has limited potential to contain an intact archaeological resource associated with former historical land use, remains are unlikely to reach the local significance threshold. The archaeological assessment is summarised in Table 6-14.

Table 6-14: Historical archaeological potential and significance

Phase	Description	Anticipated remains	Potential for survival	Significance
Phase 1 Earliest land use (1788-1820)	It is unlikely that the study area was subject to any major development during this period. The establishment of early land grants is unlikely to have an archaeological footprint.		Low	Nil

Phase	Description	Anticipated remains	Potential for survival	Significance
Phase 2 Land clearance (1821-1930s)	From as early as 1821, the study area was used as a public travelling route. This route is likely to have been informal. The study area may have undergone land clearance and tree stumping to facilitate the early road corridor. The first pastoral land grant adjacent to the study area was granted to Andrew Gibson in 1828, being the 2560-acre *Tiranna* located to the southeast of the study area. The study area may have been utilised for the movement of livestock into nearby grazing pastures. Although temporary campsites/pens may have been utilised by travelling stockmen, these activities are unlikely to have a substantial archaeological footprint.	Evidence of: • vegetation removal/landscape modification such as tree boles, road grading marks, guttering • fence lines/boundaries i.e., postholes • modification of water courses/water management in the form of drains, dams, wells and tanks • structures associated with pastoral activities • formalisation of road corridor and property boundaries • utilities and services.	Low	Nil
Phase 3 Foundations of the Newell Highway (1938 to present)	In 1938 the study area became part of the NSW State highway network. It continues to be part of the NSW Crown reserve travelling stock network. During this phase the study area adjacent to the road corridor has continued to be utilised for pastoral purposes as part of the travelling stock reserves of NSW, with additional cultivation of adjacent land for agricultural purposes. Additional fencing structures may have been constructed, likely using timber post and rail fencing. Upgrades to the Newell Highway and associated infrastructure has resulted in modification to the original landform through earthworks for the build-up of the road and for construction of culverts to manage the flow of drainage and water courses.	Evidence of: • vegetation removal/landscape modification such as tree boles, road grading marks, guttering • fence lines/boundaries i.e., postholes • modification of water courses/water management in the form of drains, dams, wells and tanks • structures associated with pastoral activities • formalisation of road corridor and property boundaries • utilities and services • culverts associated with modification of water course for drainage purposes • construction of the road, utilities, and landscape modifications.	Extant / not archaeological	N/A

6.3.3 Potential impacts

Construction

The construction phase of the proposal would not result in adverse impact to the heritage value of any listed heritage items or heritage conservation areas, given that none are located within the study area.

Operation

The operational phase of the proposal is unlikely to impact heritage fabric or archaeological relics as no heritage items or relics have been located and the archaeological potential has been rated as low.

6.3.4 Mitigation measures

Table 6-15 lists the non-Aboriginal heritage mitigation measures that would be implemented by the proposal.

Table 6-15 Non-Aboriginal heritage mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Impact on unexpected Non-Aboriginal heritage	The S*tandard Management Procedure - Unexpected Heritage Items* (Transport, 2022) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Section 4.9 of *QA G36 Environmental Protection*

6.4 Surface water, groundwater and flooding

A Hydrology and Hydraulic Assessment and Stage 1 Preliminary Site Investigation and Soils, Surface and Groundwater Assessment (PSI+SSG) have been completed to assess potential surface, groundwater and flooding impacts during the construction and operation of the proposal. Further information is provided in Appendix F. A summary of these assessments is provided in this section.

6.4.1 Methodology

Surface water

The methodology for the surface water assessment included:

- A desktop assessment which included reviews of local and regional surface water mapping.
- A field survey conducted on the 7-8 November 2023 which involved:
  - Recording of physio-chemical parameters as well as visual and olfactory observations at two sampling locations, including pH, electrical conductivity (EC), redox potential (ORP), dissolved oxygen (DO), and temperature with a calibrated water quality meter. Two additional sites were proposed for sampling as part of the aquatic ecology assessment however these were dry during the site inspection and samples were unable to be collected.
  - Collecting water samples at site WS1/WS2 on Bland Creek using a telescopic sampler. The surface water samples were sent to a National Association of Testing Authorities (NATA) accredited laboratory for analysis against contaminants of potential concern (CoPC). Contaminants for analysis were identified based on surrounding land-uses and construction specification requirements. The categories of contaminates analysed were total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAH),

metals, inorganics, organic carbon, asbestos, phenol, perfluorocarbons (including Perfluorooctane sulfonic acid (PFOS), pesticides, organochlorine pesticides (OCP), organophosphorous pesticides (OPP), herbicides, miscellaneous pesticides and insecticides. A full list of the contaminants analysed is provided in Appendix G.

- The location of the sampling sites is shown in Figure 6-9. Two additional sites were proposed for sampling as part of the aquatic ecology assessment however these were drying during the site inspection and samples were unable to be collected.

- Developing a conceptual site model to identify potential impacts to surface water receptors from the proposal.

Groundwater

The groundwater assessment involved a high-level desktop investigation to identify potential impacts to groundwater, groundwater users, and GDEs from the proposal. A hydrogeological conceptual site model was built using geotechnical data, and publicly available groundwater and environmental data.

Flooding

The Hydrology and Hydraulic Assessment Report assessed existing flood behaviour within the hydrology and hydraulic study area and evaluated the performance of the concept design under a range of flood scenarios. The assessment included the following key tasks:

- collecting and reviewing background data including topographic and survey data, stormwater infrastructure, rainfall and evaporation data and historical flood events
- undertaking hydrologic modelling using the Watershed Bounded Network Model (iWBNM) (version 2019) software
- delineating the sub-catchments for the hydrology and hydraulic study area using Catchments (version 3.58)
- undertaking hydraulic modelling using the modelling program TUFLOW to simulate overland flow, channel flows and flooding
- calibrating and verifying the hydrological model and hydraulic model
- assessing the baseline 20%, 10%, 5% and 1% AEP design flood events, and 2030 and 2100 climate change sensitivity scenarios using the calibrated models.

6.4.2 Criteria

Surface water quality

The assessment of surface water quality has been undertaken in the framework of a tier one risk assessment as outlined in *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM), amended 2013 (NEPC, 2013). The criteria used for the assessment are:

- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG) (2018) Freshwater 95% / 99% Ecosystem Protection Default Guideline Values (DGVS)
- National Health and Medical Research Council (NHMRC) (2011) Drinking Water Guidelines – Aesthetic
- Australian and New Zealand Environment and Conservation Council (ANZECC) (2000) Irrigation Water
- ANZG (2018) Livestock Drinking Water
- *PFAS National Environmental Management Plan* (NEMP) 3.1 (EPA, 2026) Human Health and Ecological Criteria.

As part of the aquatic ecology assessment completed for the project physio-chemical parameters were assessed against the Australian Water Quality Guidelines (ANZECC/ARMCANZ, 2000) default trigger values (DTV) for slightly disturbed freshwater streams in South-east Australia.

Flooding assessment

The flooding assessment completed for the proposal used the Austroads Guide for Road Design - Part 5 hydraulic performance criteria (Austroads, 2025) tailored to proposal specific requirements including exclusion of the PMF from the assessment and the inclusion of the November 2022 historical flood event. A summary of the adopted criteria is provided in Table 6-16. PMF and 0.05% AEP modelling were excluded as agreed with Transport, as the proposed structures are RCBCs rather than bridges. Under PMF conditions, the roadway is expected to be submerged, with flood levels governed by Lake Cowal, limiting the value of further hydraulic assessment.

Table 6-16: Flooding assessment criteria

	Residential buildings (mm)	Residential yards (mm)	Industrial and Commercial buildings (mm)	Industrial and commercial yards (mm)	Non habitable structures (sheds)	Agricultural (mm)	Open Space/ Forest (mm)
Flood levels - afflux	25 mm (general) 10-20 mm (sensitive receivers including hospitals, schools and Critical infrastructure)	50 mm	50 mm	100 mm	100 mm	200-400 mm	400 mm
Flood levels – public roads	AGRD Part 5 Table 6.19 does not nominate a specific acceptable afflux limit for public roads. Potential impacts to the Newell Highway and other roads have therefore been considered based on the predicted changes in flood level, depth, velocity, hazard, flood immunity and inundation duration, together with the project-specific design requirements.						
Change in duration of inundation	No more than the larger of 10% of the existing duration of inundation or 1hr whichever is largest for durations over 2 hours						
Flow distribution	No more than 10% change						
Velocities	Velocity increases to keep velocities less than 1 m/s or if existing >1 m/s then no more than 10% change						
Flooding of carriageway and increased flood hazard	Austroads Table 6.19 does not provide a specific acceptable-impact criterion for changes in flood hazard classification. Changes in the H1–H6 flood hazard classification between existing and proposed conditions were assessed for the project, with particular consideration given to increases into higher hazard categories and potential consequences for road users, people and surrounding areas.						

6.4.3 Existing environment

Surface water

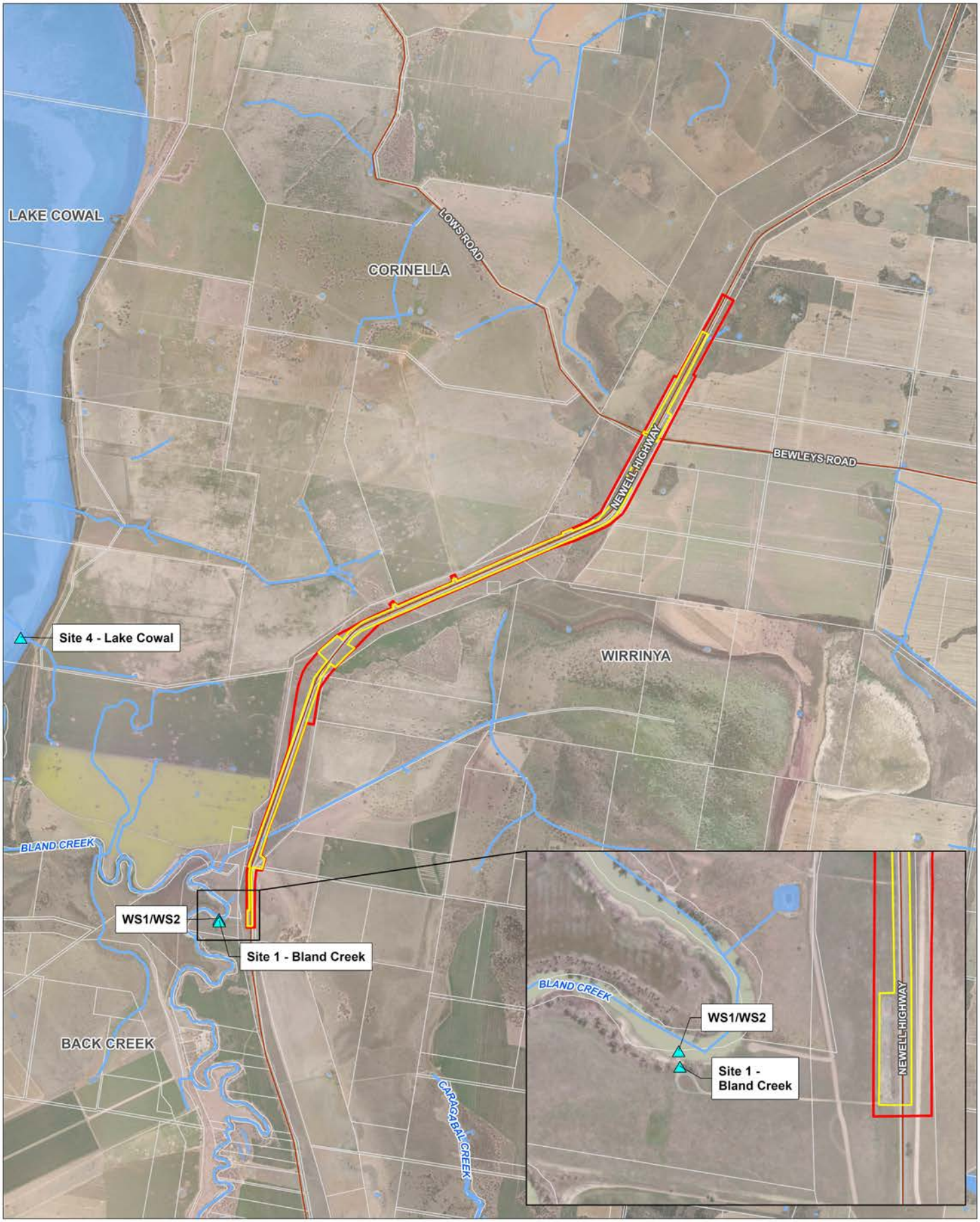
The proposal and surrounding areas are located on a floodplain with no significant hills or rises. Located approximately 1.2 kilometres from the southern end of the study area is a manmade channel which drains from east to west into Bland Creek. Bland Creek drains to Lake Cowal which is located approximately 3.2 kilometres west of the study area. Two farm dams and several culverts under the Newell Highway were identified within the study area.

Physicochemical parameters were recorded from the surface water sampling at three sites. The results are provided in Table 6-17 and the sampling locations shown in Figure 6-9.

Table 6-17: Field recorded physicochemical parameters

Site	Ecosystem type	Temperature (°C)	Electrical Conductivity (µS/cm)	Salinity (ppt)	pH	ORP (mV)	Dissolved oxygen (% saturation)	Turbidity (NTU)
ANZECC/ ARMCANZ 2000 DTV	Lowland River	-	125-2200	-	6.5-8	-	85-110	6-50
Site 1	Lowland River	21.58	2005	1.02	8.48	56.9	90.1	13.6
Site 4	Lake	21.65	570.5	0.28	8.81	67.7	94.15	191.7
WS1/WS2	Lowland River	21.90	1808	-	7.6	206	56.8	-

Note: coloured values represent exceedances of criteria



Water quality sampling locations

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-9

Project Code: 304100217-AQU-001
Drawn By: MM, Checked By: TH
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Water Quality Sampling Location
- Watercourse
- Existing Road
- Cadastre
- Waterbody
- LGA Boundary
- Construction Boundary

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Road & Waterbody & Watercourse (NSW SS, 2025)
3. LGA Boundary (NSW SS)
4. Wetlands (OEH, 2013)

0 450 900 1,350 1,800 2,250 Metres

Scale at A3: 1:45,000



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The pH for Site 1 and Site 4 exceeded the lowland river DTV. Turbidity levels were within range for Site 1 but highly elevated in Site 4, although no turbidity value was recorded for site WS1/WS2. Dissolved Oxygen was outside the DTV for site WS1/WS2.

Laboratory analysis was undertaken for the surface water samples collected from site WS1/WS2 on Bland Creek. The samples met all adopted criteria for human and ecological health. However, exceedances of aesthetic and irrigation criteria were noted and as described below:

- Manganese concentrations (0.21 mg/L) were found to exceed the adopted aesthetic criteria (0.1 mg/L) and irrigation screening criteria (0.2 mg/L). Above this criteria level manganese can cause taste and staining issues.
- Phosphorous concentration (0.09 mg/L) were found to exceed the adopted irrigation screening criteria (0.05mg/L). Above this criteria bioclogging of irrigation equipment can occur assuming other conditions for algal growth are adequate.

It is noted that no exceedances of Transport's *Construction of Unbound And Modified Pavement Course* (Transport, 2020) criteria were recorded however chloride and sulphate were not measured as part of the assessment.

Samples were analysed for trace levels of pesticides with no analytes detected above the laboratory limit of reporting (LOR) however some LOR were not below the adopted criteria. LOR in this context meaning smallest concentration of a substance that a laboratory can reliably measure and report with confidence. Mercury was not detected at standard LOR however concentrations for the LOR are above the adopted criteria for 99% species protection. These exceedances of criteria were noted however not investigated further as part of this assessment. The exceedances of the criteria for Blank Creek are not considered to limit use of this water for construction should it be considered, however further assessment is warranted to measure risk and impacts if water is to be used during the construction of the proposal.

The full list of laboratory results for the samples collected at Site WS1/WS2 is provided in Appendix G.

Groundwater

The proposal is located within the Lachlan catchment and is mapped within the Upper Lachlan Alluvium groundwater system. The Upper Lachlan Alluvium includes sands and gravels within the alluvial sediments. Groundwater flows are typically parallel to the Lachlan River system (east to west) however, nearby pumping has resulted in local groundwater level drawdowns and flow direction diversions.

There are nine bores recorded within 1.5 kilometres of the proposal, three of which are recorded as functioning and two as proposed. Two bores are recorded as abandoned and two as unknown. The bores are all more than 80 metres deep. The borelog summary (Appendix A of the PSI+SSG report attached as Appendix G to the REF) indicates a water bearing zone of gravel and sand between the overlying clays at a depth of 92 metres and 114 metres below ground level (mbgl). The water bearing layer is present in the three bores closest to Bland Creek (10100704, 10147794, and 10068997) and bore 10077402 to the northeast of the proposal. Given the geology in the remaining bores of clay dominant sediments down to the bedrock, they are unlikely to be intercepting sufficient groundwater for use.

The groundwater systems likely to be present beneath or near the proposal have been interpreted from the desktop assessment and review of the geotechnical investigation. They are:

- Shallow Perched Groundwater: Geotechnical test pit logs indicate that shallow groundwater may occur locally within the upper 4.5 metres of the soil profile with perched groundwater encountered at depths between approximately 2.7 metres and 4.4 mbgl. This observed groundwater is interpreted to represent localised perched groundwater rather than a laterally continuous regional aquifer. The depth and occurrence of this groundwater is expected to vary seasonally depending on rainfall and flood events.
- Shallow alluvium: The water table is approximately 15 mbgl near the proposal with groundwater flow being generally from west to east within the Quaternary alluvium. The system may connect to Lachlan River, although given the distance, recharge would be mostly from surface infiltration and more local water bodies.
- Deeper alluvium aquifer: Semi-confined to confined aquifer associated with Bland Creek alluvium with flow occurring predominantly southwards following the creek path through sandy gravel and gravel. The aquifer is found between a depth of 92 mbgl and 114 mbgl in the proposal area. There are significant low permeable layers above making a hydraulic connection between this aquifer and local surface water bodies or GDEs unlikely.

- Fracture rock aquifer: Deeper than 106 mbgl in this location. There is possibly hydraulic connection with the alluvium aquifer above however, as the rock formation does not outcrop near the proposal it is unlikely to be in hydraulic connection with any nearby water surface body or GDEs.

Flooding

The proposal is located withing the upstream Lachlan River catchment which forms part of the Murray-Darling Basin. The total catchment area is just greater than 25,200 km^2 and makes up approximately 2.4% of the Murray-Darling Basin. Within the catchment area are multiple major rivers and creeks including the Lachlan River and Bland Creek which are the main waterways contributing to flooding at the study area. Downstream of the study area is Lake Cowal, which is fed by Bland Creek.

Based on previous flooding events within the catchment, it was determined that overtopping of Lachlan River downstream of Forbes, results in flow progressing south-west through a gap in an elevated range (the Jemalong Gap) that is located north of the proposal. This flow enters Lake Cowal, which is generally constrained at the outlet, resulting in ponding of water to levels that can impact the Newell Highway. Previous flood models also indicate that direct flows from the local Lake Cowal catchment area including Bland Creek contribute to elevated water levels within Lake Cowal that can impact the Newell Highway.

During elevated water levels in Lake Cowal there is the potential for flows from the upstream catchment to the east of the highway to be affected. This leads to the capacity of the cross drainage along the highway being impacted.

As a result of these current conditions, the proposal section of the Newell Highway is subject to inundation during relatively frequent flood events such as the November 2022 flood. Figure 6-10 shown the modelled extent and depth of flooding during the November 2022 flood.

6.4.4 Potential impacts

Construction

Surface water quality

Construction of the proposal would involve the temporary storage and handling of hydrocarbons (e.g. fuel, oil and grease) posing a risk of accidental spills and increased turbidity in nearby surface water. During construction soils would be temporarily exposed, increasing the risk of erosion. During rainfall events sediment laden run-off from stockpiles or construction sites could enter surface water resulting in impacts. Such pollution could degrade water quality, impacting ecological values, visual amenity and downstream uses.

The impact on surface water quality during the construction of the proposal through accidental spills or release of polluted waters is expected to be temporary and minor in nature. Additional assessment in the detailed design phase of the proposal and the preparation of a site specific erosion and sediment control plan (ESCP) prior to any site disturbance and progressive ESCPs for each stage of work during construction would ensure that surface water impacts during construction are temporary and would not worsen the water quality of the receiving waters in the long term.

With these measures in place, impacts to surface water quality are expected to be temporary and minor.

Initial screening of water collected from Bland Creek for a broad suite of contaminants identified exceedances against adopted site criteria for manganese and phosphorous. While these results do not preclude the use of the water from Bland Creek for construction activities, if it is considered for use further assessment is warranted to measure risk and impacts of this water is used.



Figure 6-10: November 2022 flood event peak flood depths

Groundwater

The potential impacts on groundwater have been assessed in accordance with Table 1 of the *Groundwater Assessment Guideline* (Transport, 2024) as outlined in Table 6-18.

Table 6-18: Potential impact to groundwater (Table 1 of the guideline)

Questions	Response Yes/No	Comments to support decision
Could the proposal Intersect Groundwater?	Yes, locally	The deeper regional shallow alluvial aquifer is expected to occur at depths greater than approximately 15 mbgl; however, geotechnical test pit logs indicate localised perched groundwater within the upper 4.5 metres of the soil profile, with seepage observed at approximately 2.7 mbgl to 4.4 mbgl. The perched groundwater is expected to be discontinuous and seasonally variable.
Could activities required to construct the proposal intersect groundwater?	Yes, locally	Construction activities may locally encounter perched groundwater or wet ground conditions where excavations extend into the upper 4.5 metres of the soil profile, particularly following rainfall or flood events. Interception of the deeper regional aquifers is unlikely. Temporary management of seepage may be required at some locations, but significant dewatering is not expected.

Proposed works associated with construction of the proposal are unlikely to intercept the deeper regional shallow alluvial aquifer, which is expected to occur at depths greater than approximately 15 mbgl. However, from the geotechnical information collected for the proposal a localised perched groundwater may occur within the upper 4.5 metres of the soil profile. Groundwater seepage was recorded in 21 of the 62 test pits at depths of approximately 2.7 mbgl to 4.4 mbgl, and orange mottling within grey silty clay indicates periodic saturation in parts of the shallow soil profile. The perched groundwater is interpreted to be discontinuous, seasonally variable and of limited lateral extent due to the low hydraulic conductivity of the silty clay.

Construction works may locally encounter shallow seepage or wet ground conditions, particularly following rainfall or flood events however are unlikely to require significant dewatering or to interfere with the regional aquifer system. Targeted shallow monitoring or standpipe piezometers in areas where culvert works or excavations may extend below approximately 2.5 mbgl, particularly at low-lying flood-prone locations would inform detailed design and construction of the proposal. If any excavation works are proposed to a depth of 15 mbgl or greater, a monitoring bore should be installed near the proposed works into the deeper regional shallow alluvial aquifer, to confirm depth to groundwater and assess potential impacts.

Flooding

Construction of the proposal has the potential to affect the flood behaviour within and surrounding the study area. While overall flood conveyance is unlikely to be altered more than a negligible amount, inundation during storm events could damage plant, equipment and partially constructed infrastructure, and mobilise pollutants.

Recommendations for managing the risk of flooding during construction include placing sediment controls above the 50% AEP flood level (e.g. basins, sediment fences, etc.), stabilising lands using temporary ground cover whenever rain is falling or imminent and scheduling works for lower-risk times of year, based on historical rainfall figures.

Operation

Surface water quality

Water quality has the potential to be impacted during operation of the road from contaminant-laden runoff particularly during significant rain events where water runoff increases. This is not expected to be substantially different to the runoff from the existing road surface.

Groundwater

The increase in impervious surface area has the potential to reduce the infiltration of rainfall into the underlying groundwater system, however given the minor increase in sealed surface area of the road and the extensive surrounding areas of permeable land, any reduction in groundwater recharge is expected to be negligible.

Flooding

The concept design was assessed against the November 2022 historical flood event, the 20%, 10%, 5% and 1% AEP design events, and 2030 and 2100 climate change sensitivity scenarios. The November 2022 flood event is the key benchmark for assessing the proposal objective of reducing the amount of time the Newell Highway is closed between West Wyalong and Forbes during and after flood events. The additional flood events and climate change scenarios provided further assessment of the hydraulic performance and impacts of the proposal with consideration to flood levels, afflux, velocity, hazard and inundation durations.

Flood level impacts vary between events. No residential property impacts are identified for the 20% and 10% AEP events. Localised exceedances of the adopted residential afflux criteria are identified for the 5% and 1% AEP design events and the November 2022 historical flood event. Identified exceedances of the adopted criteria are modelled to occur at one property during an event equivalent to the November 2022 historical flood event, two properties during the 5% AEP event and five properties during the 1% AEP event (refer Figure 6-11). These affected properties are currently subject to flooding with existing flood depths generally ranging between approximately 200 mm and 500 mm. While the proposal modelling indicates increases in flood levels at these locations, the increase is considered relatively small when compared to the existing flood depths and it may not result in a material increase in flood damages. During detailed design Transport will undertake further investigations to identify potentially impacted buildings and their floor levels. Figure 6-11 shows the modelled change in flood water depth from the proposal during an event equivalent to the November 2022 historical flood event and a 1% AEP flood event. The flood depth difference for the 20%, 10% and 5% AEP design events is shown in Figure 8-2 of Appendix F.

Elsewhere, increases are predominantly within existing flood-affected agricultural land and generally remain within the applicable 200–400 mm criteria. No specific flood-level afflux criterion is nominated for public roads; changes along the Newell Highway have therefore been considered together with inundation duration, velocity, hazard and trafficability. Overall, the broader floodplain response remains largely unchanged.

The inundation duration assessment has been considered together with the flood hazard and trafficability assessment to understand the overall effect of the proposal on highway operability. Highway inundation duration is substantially reduced, although localised increases occur adjacent to some hydraulic openings and beyond the proposal due to changes in local flood behaviour.

For the 20%, 10% and 5% AEP design events and the November 2022 historical flood event, these localised increases have been considered in the context of the timing and duration of inundation and the associated trafficability conditions along the route. The duration at these locations is generally less than the overall controlling duration along the highway and generally occurs within periods when other sections of the route are already inundated or subject to trafficability constraints. Accordingly, the localised increases do not materially change the overall period of constrained highway operation or the improvement in highway operability achieved by the proposal.

For the 1% AEP event, continuous highway trafficability remains constrained by inundation and higher hazard conditions at other sections of the route in between proposed causeways. Modelling of the November 2022 historical flood event shows that the maximum inundation duration along the section of the Newell Highway subject to this proposal reduces from approximately 39.2 days under existing conditions to approximately 18.1 days with the proposal. The proposal is therefore likely to substantially improve the operational performance of the Newell Highway subject to this proposal during a flood event equivalent to the November 2022 historical flood event. The identified localised impacts may nevertheless be considered for further refinement during subsequent design stages where practicable to maintain operability of the proposal.

The proposal redistributes flood flows through the increased hydraulic openings beneath the Newell Highway. Changes are most evident around the proposed crossings and adjoining flow paths, with corresponding changes extending into parts of the adjacent floodplain. These changes represent the intended increase in hydraulic connectivity and do not materially alter the broader Lake Cowal floodplain response.

Across the majority of the assessed area, velocity changes remain within the adopted criteria. Localised exceedances occur predominantly around the proposed hydraulic openings and associated flow paths, where flood flows are concentrated through the crossings. Smaller changes also extend into the adjacent floodplain and along existing drainage channels. The broader flood velocity characteristics remain generally comparable with the existing condition.

The overall distribution of flood hazard remains broadly comparable with the existing condition, with localised changes occurring around the proposed hydraulic openings and associated flow paths. For the 5% AEP event and the November 2022 historical flood event, upgraded causeway sections become flood free. Where inundation remains along intervening sections of the Newell Highway outside the proposal, hazard is generally H1 (generally safe for people, buildings and vehicles) with localised areas of H2 (unsafe for small vehicles). These conditions may remain trafficable for larger vehicles, subject to Transport's operational requirements and the prevailing flood conditions. For the 1% AEP event, inundation and higher hazard conditions remain at some intervening sections and continue to constrain continuous route trafficability.

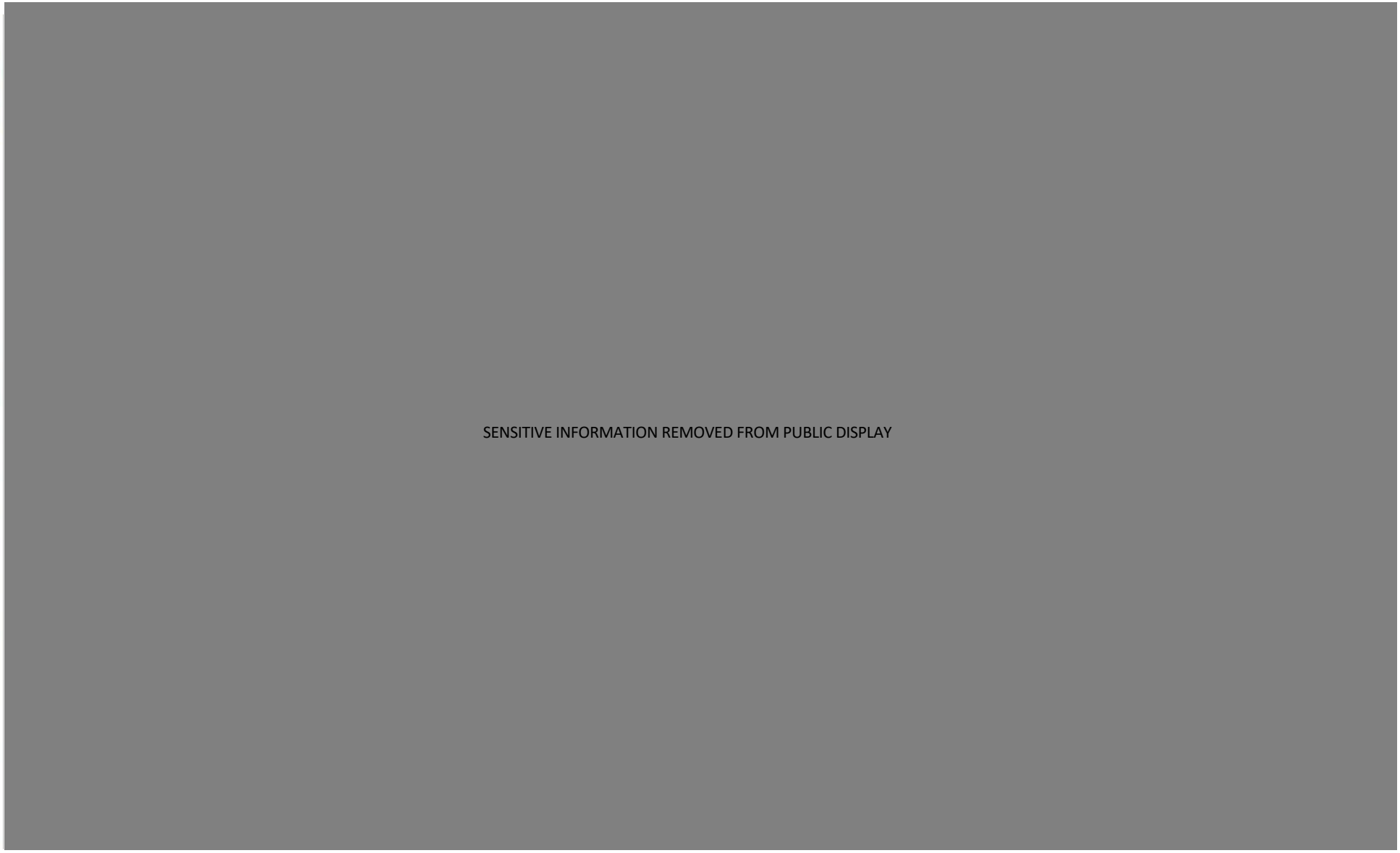


Figure 6-11: November 2022 and 1% AEP flood afflux and properties impacted

6.4.5 Mitigation measures

Table 6-19 lists the surface water and groundwater mitigation measures that would be implemented by the proposal.

Table 6-19: Surface water and groundwater mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Soil and water management	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Detailed design, Pre-construction, Construction	Section 2.1 of *QA G38 Soil and Water Management*
Erosion and sedimentation	A site specific erosion and sediment control plan (ESCP) and progressive ESCPs for each stage of work during will be prepared and implemented prior to site disturbance and each stage of work commencing. The ESCP will include (but not limited to): • runoff, diversion, and drainage points for separation of clean offsite water and dirty onsite water • sediment fences and basins • installation of measures at work entry and exit points to prevent the loss of soil • regular inspections of the site to identify potential problems and allow for rectification or repair • measure to stabilise concentrated flows • measures to manage sediment tracking on to public roads • engagement of suitably qualified erosion and sediment control specialist to advise on erosion and sediment control issues and undertake inspections.	Contractor	Pre-Construction, Construction	Section 2.2 of *QA G38 Soil and Water Management*
Erosion and sedimentation	Erosion and sediment control measures applying to any works below the 2-year ARI flood level will be designed in accordance with *Managing Urban Stormwater: Soils and Construction. Volume 1* (Landcom, 2004).	Contractor	Construction	Additional safeguard
Erosion and sedimentation	Stabilisation of disturbed lands will be carried out progressively as construction stages are completed, ensuring rehabilitation is effective to reduce the erosion hazard.	Contractor	Construction	Additional safeguard
Accidental spills	A spill management plan will be developed as part of the CEMP and communicated to workers on site. Appropriate aquatic spill kits are to be maintained on site. These spills kits	Contractor	Construction	Additional safeguard

Risk	Mitigation measures	Responsibility	Timing	Reference
	must be specific for working within a freshwater environment.			
Bland Creek water quality	If Bland Creek waters are to be used for construction purposes, additional water quality monitoring should be undertaken closer to the commencement of construction to assess the suitability for use.	Contractor	Pre-construction, Construction	Additional safeguard
Flooding	A Flood Response Management Plan will be prepared as part of the CEMP to address the risks associated with the flooding during earthworks. The Flood Response Management Plan will include (but limited to): • Flood risk mapping and identification of flood prone areas. • Procedures for monitoring flood conditions and mitigating associated risks. • Triggers for action based on rainfall thresholds and flood warnings. • Pre-flood preparation such as securing of loose material, equipment, fuels and chemicals and identification of flood-free storage areas. • Measures to stabilise and secure work areas and compounds in the event of flooding.	Contractor	Construction	Additional safeguard
Groundwater	Targeted shallow monitoring or standpipe piezometers should be undertaken in areas where construction works including excavation may extend below approximately 2.5 mbgl, particularly at low-lying flood-prone locations would inform detailed design and construction of the proposal.	Transport	Detailed design	Additional safeguard
Groundwater	If any excavation works are proposed to a depth of 15 mbgl or greater, a monitoring bore should be installed near the proposed works into the deeper regional shallow alluvial aquifer, to confirm depth to groundwater and assess potential impacts.	Transport	Detailed design, Pre-construction	Additional safeguard

6.5 Soils and contamination

A Stage 1 PSI+SSGW was prepared by Stantec and a concept ESCP prepared by SEEC for the proposal. A summary of the PSI+SSGW and ESCP (provided as Appendix F of the PSI+SSGW) is presented in the following sections with the PSI+SSGW report provided in Appendix G.

6.5.1 Methodology

The methodology for the PSI+SSGW assessment included:

- a desktop assessment with reviews of:
  - local and regional geology, soil types and landscape, hydrogeology, topography and hydrology mapping
  - naturally occurring asbestos (NOA), acid sulfate soils (ASS) and acid sulphate rocks risk mapping
  - available groundwater data
  - historic aerial photographs
  - NSW Environment Protection Authority (NSW EPA) public registers
- a site walkover by a senior environmental scientist
- laboratory analysis of asphalt and rock collected during the site walkover to assess for contamination risk and NOA
- assessment of potential impacts of construction and operational activities on the soil environment
- assessment of the erosion hazard, erosion and sediment controls and mitigation measures as required.

The Preliminary Hydrogeological Assessment was completed by Stantec as part of the PSI+SSG assessment with this addressed in section 6.4.1.

6.5.2 Existing environment

Topography

The study area is located on a floodplain with a generally flat topography with an elevation of 206 to 209 m Australia Height Datum. The lowest elevation is associated with Gum Swamp, approximately the middle of the study area.

Geology

Geological mapping from the NSW Seamless Geology dataset (DPIRD, 2024) shows that the regional surface geology is predominantly Quaternary sediments consisting of alluvial deposits (clay, silt, sand, and gravel) and aeolian deposits (sands). These sediments are underlain by Cenozoic alluvial deposits consisting of clay, silts, sands, and gravel, that in turn, unconformably overlie Devonian units as shown in Figure 6-12. The descriptions for each geological units intersected by the study area are as follows:

- Alluvium (CZ_a): Cenozoic (0 to 66 Ma) – Unconsolidated alluvial clay, silt, sand, and gravel deposits.
- Source-bordering dunes (CZ_dds): Pleistocene (0.0117 to 0.126 Ma) – Red-brown to light-brown poorly sorted to bi-modal, very fine- to medium-grained feldspathic quartz sand.
- Alluvium (Q_a): Quaternary (0 to 2.58 Ma) – Gravel, sand, silt and clay predominantly transported and deposited by alluvial processes.
- Alluvial floodplain deposits (Q_af): Quaternary (0 to 2.58 Ma) – Silt, very fine- to medium-grained lithic to quartz-rich sand, clay.
- Alluvial floodplain deposits, swamp facies (Q_afs): Quaternary (0 to 2.58 Ma) – Unconsolidated grey to grey-brown silty clay, sporadic very fine-grained sand.

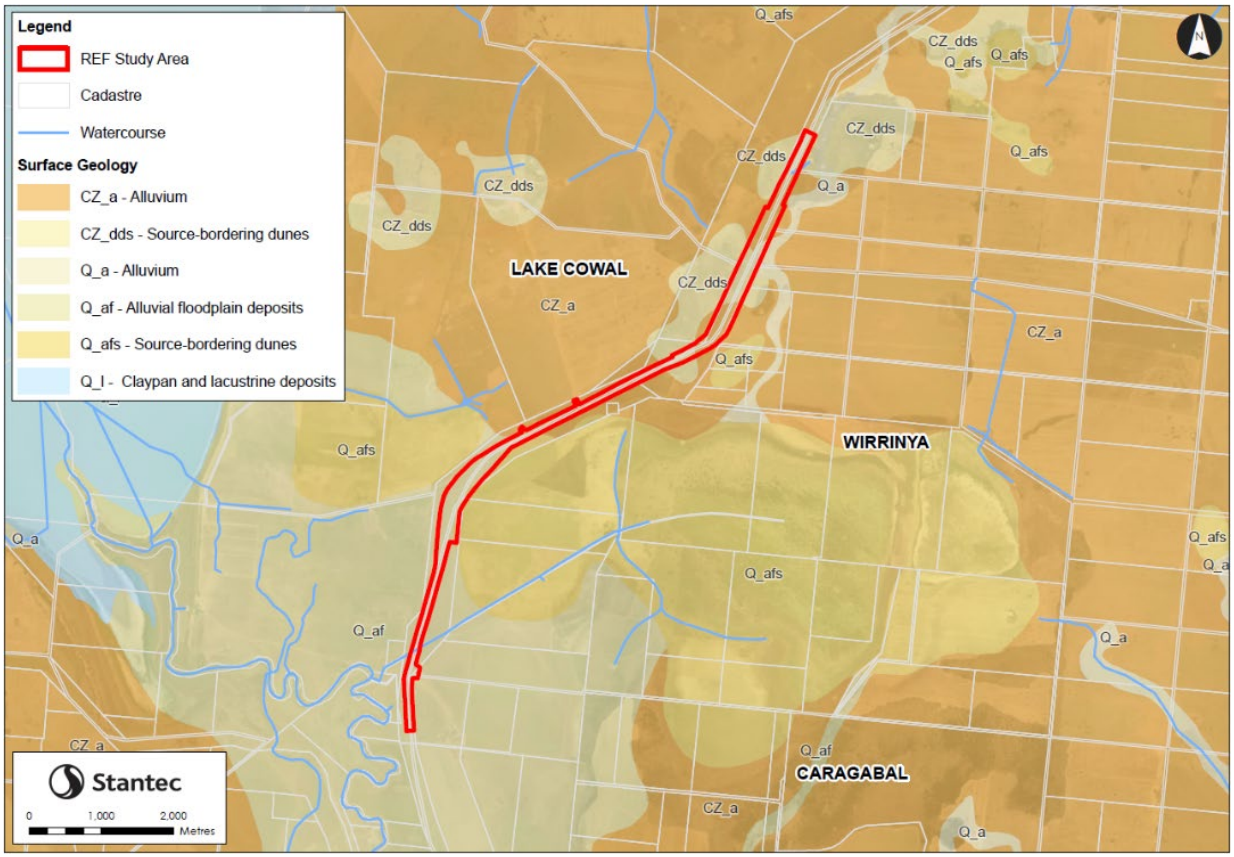


Figure 6-12: Surface geology

Source: Surface geology (DPIRD, 2024), cadastre and watercourses (NSW Spatial Services, 2026)

Soils

Soil landscapes

Based on the Soil Landscape Mapping from the eSPADE online portal (DCCEEW, 2025), the study area traverses three soil landscapes, Ruby Swamp, Scrubby Plains and Wah Way (Figure 6-13). Table 6-20 provides a description and an overview of possible development limitation for each of these soil landscapes.

Table 6-20: Soil landscapes

Soil landscape	Approximate extent of the proposal	Description	Development limitations
Rusby Swamp	10%	• Level, open drainage depressions including Rusby and Gum Swamp on Quaternary alluvium • Soils are deep, poorly drained Grey Clays. Minor areas of gilgai soils (sodic, self-mulching and Epipedal Grey Vertosols) are present.	• Foundation hazard • Seasonal waterlogging • Flood hazard • Sodic, highly plastic, dispersible soils of low permeability with high shrink swell potential and localised subsoil salinity
Scrubby Plains	80%	• Level plains of the Jemalong Wyldes Plains District	• Foundation hazard • Flood hazard (localised) • Seasonal waterlogging (localised)

Soil landscape	Approximate extent of the proposal	Description	Development limitations
		• Deep poorly drained Grey Clays and Brown Clays are the dominant soils • Deep, poorly drained Red Clays occur on some slightly more elevated plains	• Sodic, highly plastic, dispersible soils with low permeability' high shrink-swell potential and localised subsoil salinity
Wah Way	10%	• On the Wah Way Plain and plains country extending westwards to parts of the Barmedman Creek floodplain. • Soils are predominately very deep, poorly drained clays with Red Clays, Grey Clays and Brown Clays present. Localised small areas of gilgia soils occur. Very deep imperfectly drained Red Brown Earths/Red Clays intergrades occur on some slightly more elevated plains.	• Flood hazard • Water erosion hazard • Foundation hazard • Sodic/dispersible alkaline, highly plastic soils of low permeability and low fertility with localised high shrink-well, subsoil salinity, hardsetting surfaces, soil structure decline hazard and high erodibility

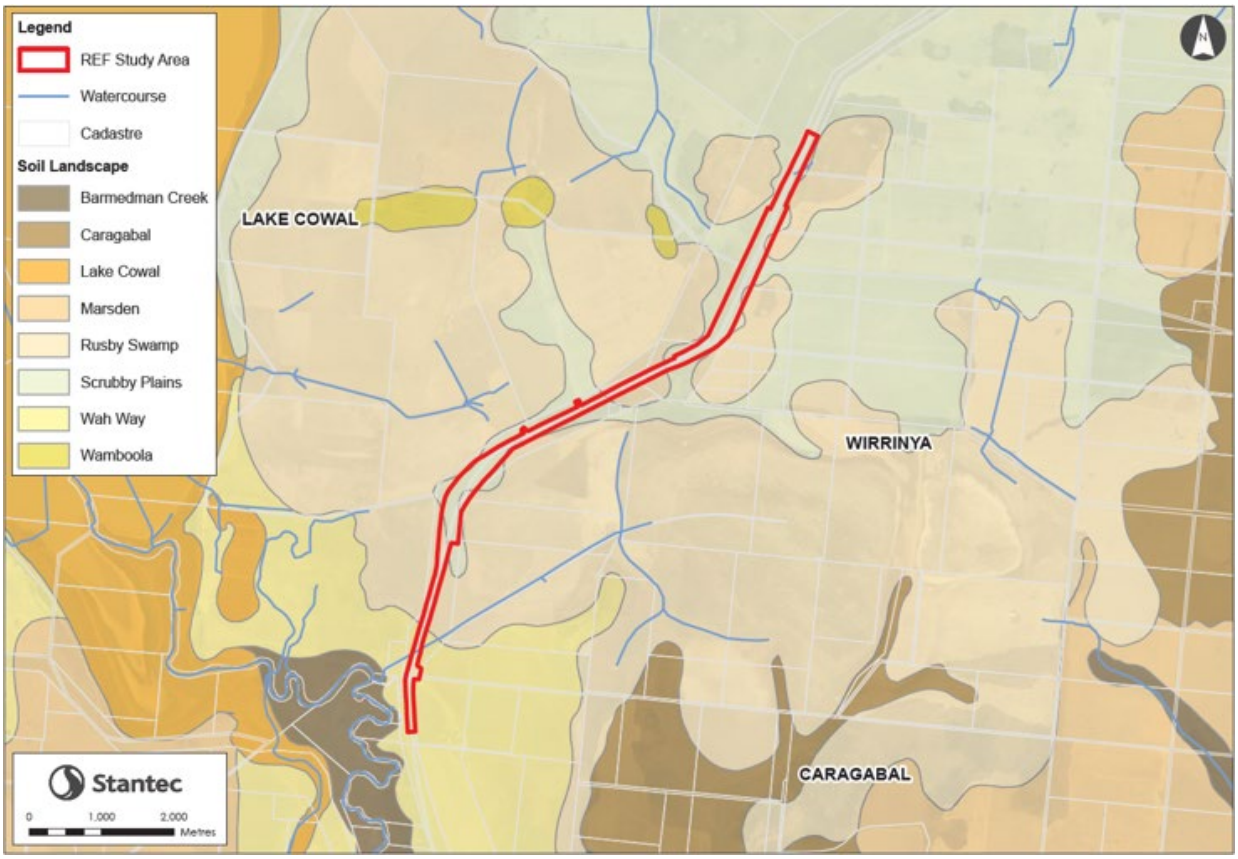


Figure 6-13: Soil landscapes

Source: Soil (DCCEEW, 2026), cadastre and watercourses (NSW Spatial Services, 2026)

Salinity

The soils landscapes within the study area are described as having localised subsoil salinity as a constraint. However, the *Salinity Hazard Report for Catchment Action Plan Upgrade – Lachlan Catchment Management Authority* prepared by the NSW Department of Primary Industries (DPI, 2013) notes that the study area is within an area of low risk for salinity.

Acid sulfate soils (ASS)

The *Atlas of Australian Acid Sulfate Soils* (CSIRO, 2013) mapping shows the study area within an area of low confidence for classification regarding ASS risk. ASS probability mapping however indicates that the proposal lies across areas of low probability of occurrence in the north and very low probability of occurrence in the south (Figure 6-14). Areas of high risk of occurrence are associated with Lake Cowal and Rusby Swamp to the west and east of the proposal.

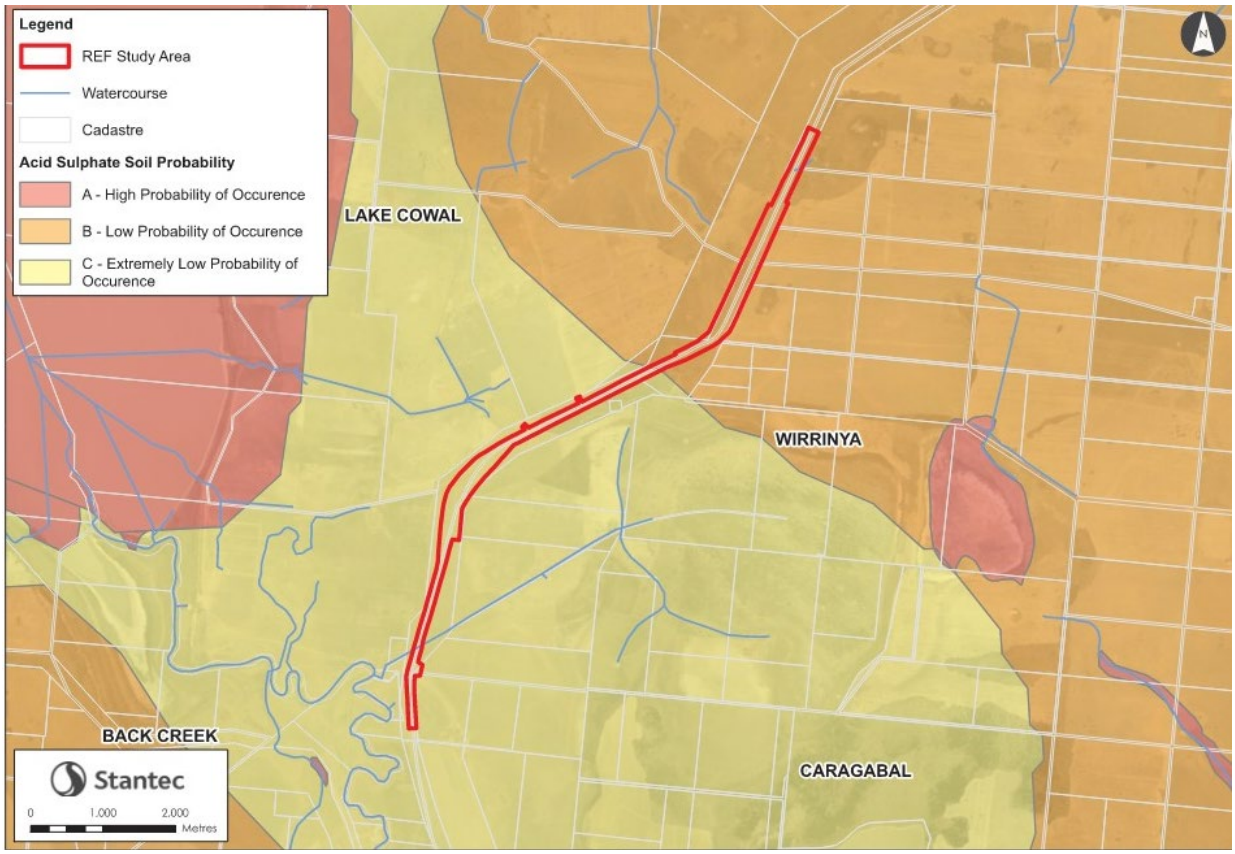


Figure 6-14: Acid sulfate soil probability

Source: Acid sulfate Soil Probability (DPIRD, 2026), cadastre and watercourses (NSW Spatial Services, 2026)

A review of ASS risk maps developed for the proposal from categorisation of surface geology (Bridgement, 2017) identifies that the geology in the vicinity of the study area as having a low risk of acid sulphate rock occurrence.

Geotechnical investigations undertaken for the proposal included analysis of ASS. The results were generally inconclusive and may indicate acid soils and potential ASS at some locations (Stantec, 2023). Further assessment was recommended to inform detailed design and construction of the proposal.

Contamination

A site walkover and inspection were undertaken on 7 - 8 November 2026. No clear or obvious sources of actual or potential contamination, including stains, odours or phytotoxic effects were identified that would present a substantial risk to human health and the environment. No evidence of filling, other than associated with the road and no illegal dumping was noted. There was evidence or roadside litter. A per- and polyfluoroalkyl substances (PFAS) probability of occurrence desktop survey was completed for the proposal based on information provided in the *PFAS national environmental management plan* (EPA, 2026). The likelihood of occurrence of PFAS was assessed as being Low.

Based on the findings of the site walkover and PFAS probability of occurrence desktop survey no sampling of soils for contaminants was undertaken.

Asphalt grab samples were collected from stockpiled material within the study area. Laboratory screening of these samples did not identify any coal tar, PAH or phenols.

NOA has been identified in geology approximately 32 kilometres south-west of the proposal and geology with a low potential of NOA occurrence identified within 22 to 87 kilometres from the study area (DRNSW, 2015). Analysis of rock fragments in surface soils collected from the study area were inferred to be from underlying geology was undertaken. The analysis did not identify any asbestos and asbestiform minerals, or evidence that the rock having been in metamorphic conditions likely to create asbestos. Based on this information, the likelihood of encountering NOA minerals within the study area is assessed as low to very low.

Potential sources of contamination that may be encountered within the study area are outlined in Table 6-21. These potential sources of contamination were identified through a review of the historical site and surrounding land uses, searches of the relevant contamination registers / records and the site walkover inspections. Table 6-21 also outlines the CoPC and the likelihood of a complete exposure pathway.

Table 6-21: Potential sources of contamination

Potential source of contamination	Description	CoPC*	Likelihood of complete exposure pathway
Agricultural land uses – including cropping and grazing	Chemical use and application during agricultural activities can be based on broad application (e.g. spraying weeds and fertilisers) or associated with point sources (e.g. storage areas)	TRH (as pesticide solvent), nutrients, herbicides and pesticides, metals	**Low to nil** – no contaminants were identified at concentrations in exceedance of adopted criteria. No other notable contamination sources were noted within the site boundary, where unexpected finds arise or illegal dumping occurs up to and during construction these can be mitigated by appropriated controls in the CEMP and related management plans.
Naturally occurring asbestos (NOA)	Geological units associated with naturally occurring asbestos present within proximity to the site boundary	Naturally occurring asbestos	
Fly-tipping, uncontrolled filling, demolition of former structures, dam construction and stockpiling	Limited areas of filling and fly-tipping were observed throughout the alignment. Following historical aerial review, it appeared structures within proximity to the site had been demolished, stockpiles present, and dams constructed for agricultural purposes. The origin of stockpiles and dam wall materials are unknown.	TRH, BTEX, PAH, metals, phenol, OCP, OPP, PCB, PFAS, asbestos.	

6.5.3 Potential impacts

Construction

Soils

The following construction activities have the potential to result in soil erosion and sediment transport:

- establishment of the ancillary facilities
- removal of vegetation (clearing and grubbing) and associated disturbance and removal (and storage) of topsoil
- construction of culverts

- earthworks and transport of soils/materials
- temporary stockpiling of materials including topsoils
- stabilisation of disturbed areas.

These construction activities disturb and expose soil to erosion during rainfall events. Increased rate of erosion increases the sediment load in runoff, adversely affecting quality of the runoff and subsequently watercourses and waterbodies downstream.

With the implementation of appropriate erosion and sediment management measures, the potential impact of erosion of exposed soils is expected to be temporary and minor in nature.

Contamination

Any contamination in the soils may be a risk to receptors, both on and offsite, if contaminated material is exposed during construction activities: The receptors that may be exposed to risk from contamination include:

- ecological receptors dependent on-site soils in potentially impacted areas and ecological receptors downstream of the proposed work
- current and future site users and workers disturbing potentially impacted materials

The assessment identifies that the proposal may interact with potential contamination sources, however the likelihood of complete exposure pathways to human and ecological receptors is low to nil.

No other notable contamination sources were noted within the study area. If unexpected contaminated finds are encountered or illegal dumping occurs they can be managed through appropriate controls in the CEMP and related management plans.

The use of construction plant and ancillary facilities poses a potential risk of localised soil contamination from accidental chemical or fuel spills. These impacts are expected to be minor and temporary, provided that the mitigation measures outlined in Table 6-22 are effectively implemented.

Operation

Soils

The operation of the proposal would involve embankments which can be subject to erosion hazard and culvert structures which can cause localised erosion of soils.

The batter slopes of the road have been designed with appropriate slope ratios or revetment cover in accordance with relevant standards to avoid erosion during the operation of the proposal. The culverts have been designed with consideration for erosive velocities and appropriate scour protection would be provided.

As the proposal would be designed in accordance with current standards, erosion of soils during its operation are considered unlikely and negligible.

Contamination

During operation of the proposal, there is potential for contaminated run-off from the road which may arise from vehicles using the road corridor (fuel leak, tyre wear), an accidental spill or traffic accident.

6.5.4 Mitigation measures

Table 6-22 lists the soil and contamination mitigation measures that would be implemented by the proposal.

Table 6-22: Soil and contamination mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Unexpected Contamination	An Unexpected Finds Protocol will be prepared and included within the CEMP to manage unexpected occurrences of contaminated materials. If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW Senior Manager Environment and Sustainability and / or NSW EPA.	Contractor	Construction	Section 4.2 of *QA G36 Environmental Protection*
Accidental spill to land	A site-specific emergency spill plan will be developed and include spill-management measures in accordance with relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport and NSW EPA officers).	Contractor	Pre-construction, Construction	Additional safeguard
Soil stabilisation and restoration	The rehabilitation of disturbed areas will be carried out progressively as construction stages are completed, and in accordance with: • Landcom's Managing Urban Stormwater: Soils and Construction series • Roads and Maritimes' Guideline for Batter Stabilisation Using Vegetation (2015).	Contractor	Construction	Additional safeguard

6.6 Traffic and transport

A Traffic and Transport Impact Assessment has been carried out to assess the likely traffic and transport impacts during the construction and operation of the proposal. A summary of the assessment is presented below with additional information provided in Appendix H.

6.6.1 Methodology

A summary of the methodology for the traffic and transport assessment is presented in the following sections.

Identification of the study area

To understand the impact of the proposal on the road network surrounding the study area, this assessment considered an extended area, as discussed in this section of the REF.

Review of existing and future environment

The collation of background information included previous studies and strategies, including the *Newell Highway Corridor Strategy* (Transport, 2015), permanent traffic count stations in the vicinity of the project, automatic tube counts undertaken at four locations between 14 November 2023 and 4 December 2023, journey to work data, freight network restrictions, crash data, and active transport network information.

The review of the existing environment included current and future land uses and population data, seven NSW government travel zones and their projections, road network characteristics and hierarchy, and current transport networks (private vehicle, freight, public transport and active transport).

Figure 6-15 shows the tube count and permanent vehicle count locations, and travel zones.

Assessment of existing road network performance

The assessment of existing road network performance considered mid-block capacity, average speed, average travel time, vehicle kilometres travelled, vehicle hours travelled and annual average daily traffic using the existing traffic volumes and patterns. For the purposes of determining mid-block road capacity, traffic performance was assessed using criteria contained within the *Guide to Traffic Management Part 3: Transport Studies and Analysis Methods* (Austroads, 2020). Table 6-23 outlines the metrics that were used to quantify existing road network performance.

Table 6-23: Network performance metrics

Metric	Unit	Description
Annual average daily traffic (AADT)	vehicles per day (veh/day)	Total yearly traffic divided by number of days in the year.
Average speed	km/h	Average speed for all vehicles in the study area.
Average travel time	min	Average travel time is determined by the average speed of the corridor. Average travel time is calculated from the average travel speeds from the automatic tube counts (ATCs) for both the existing conditions and future conditions with and without the proposal.
Vehicle kilometres travelled (VKT)	km	The distance travelled by all vehicles in the study area. VKT is determined for this proposal based on the assumed yearly traffic with and without the proposal multiplied by the corridor length.
Vehicle hours travelled (VHT)	hrs	The total travel time of all vehicles that completed a trip. VHT is determined for this proposal based on the assumed yearly traffic with and without the proposal multiplied by the average travel time.

Construction assessment

The traffic impacts of the proposal during construction were assessed on a low-high scale based on the construction traffic as a percentage increase over the baseline daily traffic volume. For medium and high impact levels, interim mitigation and management measures have been recommended for drivers, pedestrians, cyclists and recreational users where appropriate, to minimise disruption during construction. The assessment considered:

- construction staging detail/length of construction works
- construction work hours
- construction traffic

- construction staff numbers
- public transport and active transport considerations.

Operational assessment

The future performance of the road network was assessed for two scenarios using modelled future traffic volumes and patterns:

- Do nothing (future base): this scenario includes only the existing infrastructure within the study area
- Proposal case: this scenario includes the upgrade of the Newell Highway as detailed in this REF.

The existing base is the existing road network infrastructure.

Two future-year models for the year of opening (2030) and a 10-year horizon (2040) were developed using future traffic volumes. Future traffic volumes were calculated using the existing AADT and the compound traffic growth rate along the Newell Highway obtained from the permanent count station. The scenarios assessed are provided in Table 6-24.

Table 6-24: Scenarios and years assessed

Year	Existing base	Do nothing (future base)	Proposal case
2023	✓		
2030		✓	✓
2040		✓	✓

The assessment of the future road network performance for Do nothing (future base) and the Proposal case scenarios considered the following performance measures: mid-block capacity, average speed, average travel time, vehicle kilometres travelled, vehicle hours travelled and annual average daily traffic using the future traffic volumes and patterns.

6.6.2 Existing environment

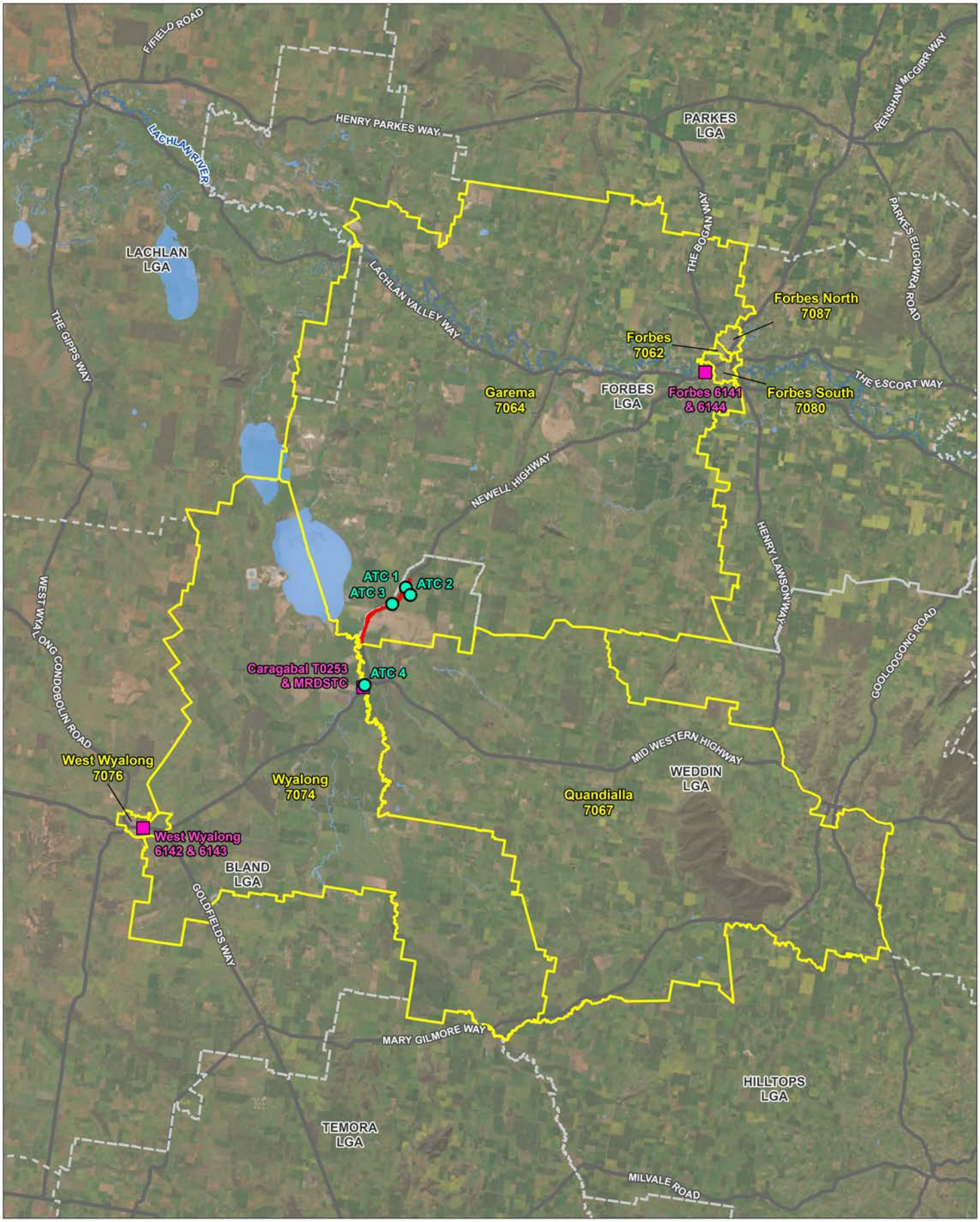
Existing road network

The existing road network hierarchy and their functional classifications are provided in Table 6-25with their locations shown in Figure 6-15.

Table 6-25: Existing road network

Road	Road network classification	Movement and connectivity	Speed limit
Newell Highway	State road	The A39 Newell Highway (HW17) state road is the primary inland route linking Victoria and Queensland. The southern terminus of the Newell Highway is its junction with the Goulburn Valley Way at Tocumwal on the border between New South Wales and Victoria. From here, the Newell Highway proceeds generally north for 1058 kilometres before terminating at its junction with the Leichhardt Highway in Goondiwindi, Queensland. To the south of the study area, the Newell Highway intersects with Mid-Western Highway to Bathurst. The highway is predominantly a single carriageway with one lane in each direction with some localised short lanes at intersections and overtaking lanes.	110 km/h

Road	Road network classification	Movement and connectivity	Speed limit
Bewleys Road	Local road	Bewleys Road is a local road that provides local access to the east of the Newell Highway. The road is configured as one lane in each direction. The road intersects the Newell Highway 13 kilometres north of the Mid-Western Highway.	100 km/h
Lows Road	Local road	Lows Road is a local road that provides local access to the west of the Newell Highway. The road is configured as one lane in each direction. The road intersects the Newell Highway 13 kilometres north of the Mid-Western Highway forming a four-way intersection with the Newell Highway/ Bewleys Road.	100 km/h



Vehicle count locations & travel zones

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-15

Project Code: 304100217_TRA_001
Drawn By: MM, Checked By: {Initials}
Revision: 02 | Date: 2026-10-20

Stantec

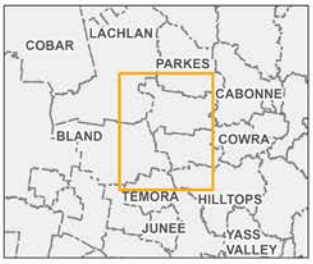
Legend

- REF Study Area
- Tube Count Location
- Permanent Count Location
- Major Road
- Watercourse
- Waterbody
- Travel Zones 2021
- LGA Boundary

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. {Basemap source credits}.

0 4,500 9,000 13,500 18,000 22,500 Metres
Scale at A3: 1:450,000



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\\au2028-ppfss01\workgroup\3045\miscellaneous\gis\305001965 - Newell Highway\GIS - Transport | 304100217_TRA_001_VehicleCountTravelZones 01 | Last updated 2026-10-20 By: mmostyn

Existing traffic volumes

The existing traffic volumes were determined from ATCs collected over a 10-day period (14 November 2023 to 4 December 2023) at four locations in the study area (Figure 6-15). The ATCs provided information on daily traffic volumes and traffic composition.

Table 6-26 details the daily bidirectional traffic demand along the Newell Highway through the study area as recorded by the ATCs. The vehicle classification by vehicle type is shown in Figure 6-16 (Austroads, 1994). The AADT along the Newell Highway in the proposal area is around 1700 veh/day and the importance of the Newell Highway as a freight route is evident with a high proportion of heavy vehicles (Table 6-26).

The Newell Highway traffic counts identified that that average traffic volumes were higher on weekdays when compared with weekends. The Bewleys Road location is the only one where average traffic volume is higher on weekends when compared to weekdays.

Table 6-26: Existing (2023) bidirectional traffic volumes

Location	Light vehicles (class 1-2)	Heavy vehicles (class 3-5)	Articulated vehicles (class 6-12)	AADT (veh/day)	Weekday peak (veh/h)	Weekend peak (veh/h)
Newell Highway north of Bewleys Road	876 (51.6%)	97 (5.7%)	722 (42.7%)	1695	127	120
Newell Highway south of Bewleys Road	908 (52.1%)	122 (7.0%)	711 (40.9%)	1741	135	121
Bewleys Road (east of Newell Highway)	53 (48.0%)	19 (17.0%)	38 (35.0%)	110	10	11

The average and 85th percentile traffic speed was determined from the ATCs. The average speed along the Newell Highway is 99 km/h and the 85th percentile speed is 108 km/h which is consistent and close to the posted speed limit of 110 km/h. This implies that most drivers are naturally travelling at or near the posted speed limit under normal conditions and that the speed limit is appropriate for the road condition and is being adhered to by most of the drivers.

Along Bewleys Road (east of the Newell Highway) the 85th percentile speed is lower than the speed limit of 100km/h as the measured location near the intersection requires drivers to slow down, as a result, the 85th percentile speed may be lower near intersections compared to straight segments of road.

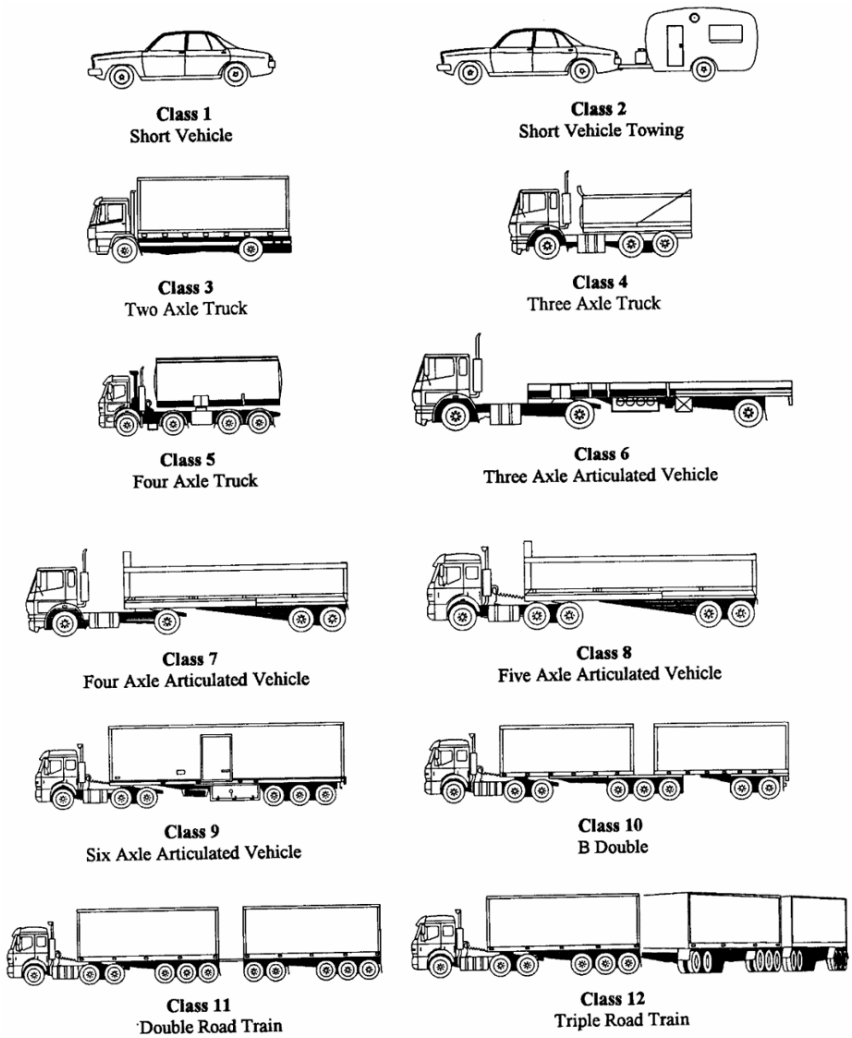


Figure 6-16: Vehicle classification (Austroads 1994)

Existing network performance

The existing midblock performance during weekday and weekend peak periods is shown in Table 6-27. Baseline traffic volumes are low and all assessed roads perform to an acceptable level of service.

Given the low traffic volumes, the Newell Highway / Bewleys Road / Lows Road intersection is expected to perform satisfactorily with efficient and smooth traffic flow as the vehicles arriving at the intersection can proceed without any significant delay since there is minimal conflicting traffic.

Table 6-27: Existing (2023) midblock performance

Location	Capacity (veh/h)	Speed limit (km/h)	Weekday peak hour (v/c ratio)	Weekend peak hour (v/c ratio)
Newell Highway (north of Bewleys Road)	3600	110	0.04	0.03
Newell Highway (south of Bewleys Road)	3600	110	0.04	0.03
Bewleys Road (east of Newell Highway)	3600	100	0.003	0.003

Traffic growth

The traffic growth rate was calculated using historical data from the permanent traffic count stations (Figure 6-15). The traffic growth rate which correlated best with the observed volume was 0.44 per cent per year.

Public transport network

Public transport service operates in West Wyalong and Forbes town centres catering for local and regional travel. There are no formal public bus stops within the study area and local bus services are not known to use this section of the Newell Highway.

The closest public bus service stop to the study area is about 6 kilometres north of the study area along the Newell Highway which is served by school bus S444 (Forbes Schools to Wirrinya) operated by Giraffe Bus. Another school bus service runs about 9.5 kilometres east of the study area at Battery Hill Road near Wirrinya Road which is served by school bus S457 (Forbes Schools to Battery Hill Road) operated by Kangaroo Bus. There is also an existing local school bus service operating along the Mid-Western Highway and then south towards West Wyalong.

Active transport network

Active transport infrastructure is minimal within the study area. There is no provision for walking or cycling provided along the Newell Highway. The *Weddin Active Transport Plan 2018* (Weddin Shire Council, 2018) does not include any current or proposed active transport facilities within the study area. No proposed pedestrian or cycling paths are included in the *Draft Forbes Active Transport Plan* (Forbes Shire Council, 2025) and *Bland Shire Active Transport Plan* (Bland Shire Council, 2023).

Freight network

Transport imposes limitations and route restrictions on heavy vehicle routes throughout NSW. Three tiers of mass limits are defined by Transport based on vehicle mass and axle group category:

- General Mass Limits (GML): heavy vehicles with unrestricted access to the road system
- Concessional Mass Limits (CML): increased mass limits for eligible vehicles, require accreditation
- Higher Mass Limits (HML): highest level of mass except for vehicles requiring special permits, requires accreditation and GPS tracking to manage access and compliance.

Within the study area the restrictions are:

- Newell Highway: The Newell Highway allows B-doubles up to 25/26 metres in length and road trains. The Newell Highway's status as a major interstate freight route is recognised through its inclusion in the National Land Transport Network (DITRDCSA, 2020).
- Bewleys Road: Approved for use by heavy vehicles up to a 25/26 metre B-double between the Newell Highway and Wirrinya Road.
- Lows Road: Not approved for 19 metre B-doubles or larger heavy vehicles.

Crash analysis

Crash data from 2020 to 2024 shows seven crashes were recorded during this period within the study area. Seven events resulting in injuries were recorded comprising two serious injuries, one moderate injury, and four non-casualty injuries. There were no fatalities and no reported crashes involving a pedestrian or a cyclist.

The crash data showed that six crashes took place at mid-block locations and one at the intersection. The crash analysis confirmed that the existing frequency of crashes within the study area is low.

6.6.3 Potential impacts

Construction

Access to the construction area would be largely closed to the public except for the Newell Highway, with one lane operational in each direction at all times. The exception being when night works required to construct the temporary and permanent tie ins. During night works, traffic would need to be reduced to single lane traffic and operate under traffic control. Roadwork changes, such as speed limit reductions, would be planned in accordance with the Transport *Traffic Control at Work Sites Manual* (Transport, 2026).

Construction traffic generation

Construction of the proposal is expected to generate both light and heavy vehicle movements. Vehicle movements associated with construction would include:

- delivery of construction materials (heavy vehicles)
- site compound construction (heavy vehicles)
- water delivery (heavy vehicles)
- spoil and waste removal (heavy vehicles)
- delivery and removal of construction equipment and machinery (heavy vehicles)
- workers travelling to, from and within the proposal's construction boundary (light vehicles).

The amount of construction-related traffic would vary throughout the construction period, depending on the specific requirements of each activity being undertaken and the section and stage of construction. Table 6-28 provides the expected heavy vehicle traffic generation for each of the construction sections.

Table 6-28: Construction traffic trips (heavy vehicles)

Construction section	No of daily trips (two-way)
Section A (stage 1 to 3)	175
Section C (stage 1 to 3)	218
Section C (stage 1 to 3)	143

It is assumed that most deliveries to the site will come from surrounding regions (Forbes, West Wyalong) via the Newell Highway. Workforce trips have been assumed to be distributed based on population data from the 2021 Census. Table 6-29 outlines the assumed distribution of construction traffic.

Table 6-29: Construction traffic distribution

Vehicles	Distribution		
	North (Newell Highway)	South (Newell Highway)	East (Bewleys Road)
Heavy vehicles (construction delivery)	50%	50%	-
Light vehicles (construction workforce)	60%	35%	5%

The construction traffic impact is assessed according to the percentage increase in traffic during the construction phase relative to the baseline volume. The following thresholds were adopted for the construction traffic impact assessment:

- Low impact: less than 5 per cent increase during construction
- Medium impact: 5 to 20 per cent increase during construction
- High impact: greater than 20 per cent increase during construction.

Table 6-30 summarises the increase in traffic volumes on key roads affected by the construction of the proposal, in comparison to the baseline traffic volumes in 2028. The traffic volume impact on the Newell Highway is expected to be medium to high. While the proportional increase in traffic volumes on the road network is medium-high, the existing traffic volumes on the Newell Highway is currently low and the increase in construction traffic is not considered to be detrimental to the operation or safety of the road. Traffic volumes on Bewleys are currently low. While the proportional increase in traffic volumes on this road is medium, the construction traffic represents an up to 8 vehicles per day increase, which is not considered to be detrimental to the operation or safety of the road.

Table 6-30: Construction traffic impacts on traffic volumes

Road	2028 Baseline daily traffic (veh/day)	Peak construction daily traffic (veh/day)	Increase during construction (veh/day)	Impact level
Newell Highway north of Bewleys Road	1733	358	21%	High
Newell Highway south of Bewleys Road	1780	321	18%	Medium
Bewleys Road east of Newell Highway	112	8	7%	Medium

Level of service impacts

The Newell Highway has an uninterrupted flow with a current speed limit of 110 km/h. During construction, the speed limit is proposed to be reduced to a maximum of 80 km/h and the side roads speed limit is proposed to be reduced to 50 km/h. The impact on the Newell Highway and Bewleys Road is expected to be low with no change in level of service from the addition of construction traffic.

Lows Road between the Newell Highway and Lake Road is proposed to be temporarily closed during construction. Traffic would be detoured via nearby alternatives such as Wennings Road. As the traffic volumes on this local road are low it is expected that limited traffic will be affected by the detour. Fencing and signage would be required to prevent road users from accessing Lows Road and direct them to alternate routes. A ROL would be required prior works on the road commencing. Detour signage would be installed to inform drivers the road is closed.

Public and active transport impacts

There are no permanent bus stops, including school bus stops in study area, therefore, temporary provision for buses is not required during construction.

There are no existing or proposed pedestrian and cyclist specific provisions as part of this proposal. Appropriate traffic controls would be implemented if a pedestrian or cyclist arrives during construction with a traffic controller or vehicle escorting them through the works.

Property access and access tracks

There are several informal and formal accesses along the Newell Highway. Formal access would be maintained during construction with all informal access proposed to be closed during construction.

Impacts to property access during construction are detailed in section 3.3.3.

Operation

The year of opening of the proposal is assumed to be 2030, and the future design year, 10 years after opening, 2040. Future AADT was calculated using the existing AADT and the compound traffic growth rate along the Newell Highway. The calculated future daily traffic demand for the Newell Highway is detailed in Table 6-31.

Table 6-31: Future daily traffic demand

Vehicle	Future Traffic Demand (veh/day)			Difference (compared to 2023)	
	2023 (existing)	2030 (year of opening)	2040 (10 - year design horizon year)	2030	2040
Light Vehicle	908	936	978	28 (+ 3%)	70 (+8%)
Rigid heavy vehicle	122	125	131	3 (+2%)	9 (+7%)
Articulated heavy vehicle	711	734	767	22 (+3%)	55 (+8%)
Total	1741	1796	1876	55 (+3%)	135 (+8%)

Traffic volumes on Newell are predicted to grow from 1741 vehicles per day in 2023 to 1796 vehicles per day in 2030, an increase of 55 vehicles. In 2040, traffic volumes on the Newell Highway are predicted to increase to 1876 vehicles resulting in an increase of 135 vehicles per day from existing.

Operational network performance

Flood mitigation proposals aim to reduce the duration of road closures caused by flood events. Therefore, the key performance metrics including VKT and VHT are based on a comparison of expected days flooded between the Base case and the Proposal case, considering an event equivalent to the 2022 flood.

Daily operational performance was assessed under a range of flood conditions to represent the types of disruption experienced during a flood event. During flood events, it is assumed that vehicles must take a detour, resulting in additional travel time and distance. To reflect the range of disruption that can occur during a flood event, several delay scenarios were developed and modelled, each representing increasing levels of detour length and travel time.

- Not flooded
- Flooded – no travel
- Flooded – 0.5 hr delay / 30 km detour
- Flooded – 1 hr delay / 60 km detour
- Flooded – 2 hr delay / 120 km detour

These scenarios illustrate the operational impact of flooding on a typical day, ranging from full closure (no travel) to progressively longer detours depending on flood severity and available alternative routes. It should be noted that longer delay scenarios could occur particularly for larger flood events.

Because the proposal does not change the physical road network or traffic capacity, the daily performance of the Base case/Do nothing and Proposal scenarios is identical. On any day that flooding occurs, both scenarios experience the same delays and

detours. The benefit of the proposal does not appear in the daily numbers themselves. Instead, the benefit arises from the reduction in the number of days these flood-related delays occur. This reduction is captured in the annualised performance, where improved flood immunity results in more operational days per year.

For the annual operational performance assessment, it is assumed that there will be one flood event equivalent to the 2022 flood event in any year and that no trips occur on days when the highway is flooded. Therefore, the annual vehicle kilometres travelled, and the vehicle hour travelled are driven by the number of days the highway remains open.

Under the Base case/Do nothing scenario, the highway is assumed to be operational for 327 days per year. The improved flood mitigation achieved by the proposal increases operational days to 348 days, providing 21 additional days of full network availability. The network performance results of Do nothing and Proposal case for all assessment years is provided in Table 6-32.

Table 6-32: Newell Highway network performance results (annualised)

Network results (All Vehicles)	Base case / Do Nothing			Proposal case			
	Results			Results		Compared to Do Nothing	
	2023	2030	2040	2030	2040	2030	2040
Annual Average Daily Traffic	1741	1796	1876	1796	1876	0	0
Days operational (annually)	327	327	327	348	348	21	21
Average vehicle kilometres travelled (annual)	3,814,357	3,934,856	4,110,128	4,187,554	4,374,082	252,697 (+6.4%)	263,953 (+6.4%)
Vehicles hour travelled (annual)	38,529	39,746	41,516	42,298	44,183	2552 (+6.4%)	2666 (+6.4%)

Compared with the base case scenario, with the proposal the VKT of the network increases due to the number of vehicles the highway serves increasing from reduced flood closures and the highway remaining open for a greater proportion of the year. This assessment has assumed that there will be one flood event like 2022 flood in a certain year, however, greater frequency of such events will result in more benefits from of the proposal.

Level of service

As the proposal does not add additional capacity to the Newell Highway or any other roads in the study area, and due to low baseline traffic volumes, the road midblock within the study area is anticipated to perform with an acceptable level of service. On a typical weekday and weekend, it is anticipated to be free flow conditions with minimal congestion.

Intersection performance

Given the low traffic volumes, the Newell Highway / Bewleys Road / Lows Road intersection is expected to perform satisfactorily where the vehicles arriving at the intersection can proceed without any significant delay since there is minimal conflicting traffic.

Public transport

There are no existing public transport services that operate in the study area. As a part of the proposal, provisions for a school bus bay would be provided for the service that runs along Newell and the Mid Western Highway south of the proposal. This would be provided as part of the right-turn / left-turn treatment at the formal access at CH46860 and would cater for any future extensions of the bus service.

There are no predicted operational impacts for public transport due to the proposal.

Active transport

The proposal would not provide any formal dedicated cycle path or pedestrian access and would not change current access arrangements.

Emergency services

The proposal will improve emergency services response in the study area by providing appropriate flood immunity on the Newell Highway.

6.6.4 Mitigation measures

Table 6-33 lists the traffic and transport mitigation measures that would be implemented by the proposal.

Table 6-33: Traffic and transport mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Traffic and transport	A Construction Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. TMP will be prepared in accordance with the *Transport Traffic Control at Work Sites Manual* (Transport, 2026) and *QA Specification G10 Control of Traffic* (Transport, 2026). The TMP will include: • confirmation of haulage routes • measures to maintain access to local roads and properties • site specific traffic control measures outlining measures (including signage) to manage and regulate traffic movement • access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • requirements and methods to consult and inform the local community of impacts on the local road network • a response plan for any construction traffic incident • monitoring, review, and amendment mechanisms.	Contractor	Pre-construction, Construction	Section 4.8 of *QA G36 Environmental Protection*
Construction site access	Construction site access will be designed and implemented in consideration of: • road design guidelines and turning paths for heavy vehicles • appropriate sight distances to allow traffic to safely enter and exit • visibility of compliant warning and way-finding signs • use of accredited traffic controllers, where appropriate, and/or other controls to	Contractor	Pre-construction, Construction	Additional safeguard

Risk	Mitigation measures	Responsibility	Timing	Reference
	separate, slow down, or temporarily stop traffic for safe entry/exit • minimising use of local roads, where practical.			
Traffic management measures	Any temporary traffic diversions or road closures will be implemented in accordance with Transport Management Centre and Council requirements and notified to emergency services.	Contractor	Construction	Additional safeguard
Property access	Property access will be maintained where feasible and reasonable and property owners will be consulted well in advance of work starting that may temporarily restrict or control access.	Contractor	Construction	Additional safeguard
Local road closures	Council will be consulted with prior to any local road closures to identify suitable mitigation measures such as detour routes.	Contractor	Pre-construction, Construction	Additional safeguard
Road closures	A ROL will be obtained prior on road works commencing.	Contractor	Pre-construction	Additional safeguard
Damage to local roads	Any damage to the local road network identified to be caused by construction vehicles for the proposal will be remediated by the contractor.	Contractor	Construction	Additional safeguard
Pedestrian and cyclist	Appropriate traffic controls would be implemented to manage pedestrian or cyclist movement during construction. This may include a traffic controller or vehicle escorting them through the construction works.	Contractor	Construction	Additional safeguard
Heavy vehicle	Traffic controllers should coordinate the movement of heavy vehicles through the work site	Construction contractor	Construction	Additional safeguard
Reduce speeds, traffic delays and disruptions during construction	Road users, local communities and the freight industry will be provided with timely, accurate, relevant and accessible information about changed traffic arrangements and delays owing to construction activities.	Transport and Construction Contractor	Construction	Additional safeguard
Traffic control devices	Traffic control devices should be installed in accordance with Australian Standards to protect the work areas.	Construction Contractor	Construction	Additional safeguard

6.7 Noise and vibration

A Noise and Vibration Assessment has been completed to assess the potential noise and vibration impacts during construction and operation of the proposal. A summary of the assessment is presented in the following sections with the report provided in Appendix I.

6.7.1 Methodology

Guidelines and standards

The assessment of potential noise and vibration impacts associated with the proposal has been carried out in accordance with the following guidelines:

- *NSW Road Noise Policy* (RNP) (DECCW, 2011)
- *Road Noise Criteria Guideline* (RNCG) (Transport, 2025)
- *Road Noise Mitigation Guideline* (Transport, 2026)
- *Construction Noise and Vibration Guideline* (Roads) (CNVG) (Transport, 2026)
- *Interim Construction Noise Guideline 2009* (ICNG) (DECC, 2009)
- *Assessing Vibration – A Technical Guideline* (DECC, 2006)
- *NSW Noise Policy for Industry* (EPA, 2017)
- *Environmental Noise Measurement Manual* (RTA, 2001)
- Relevant Australian Standards, British Standards, German Standards and ISO Standards.

Assessment area

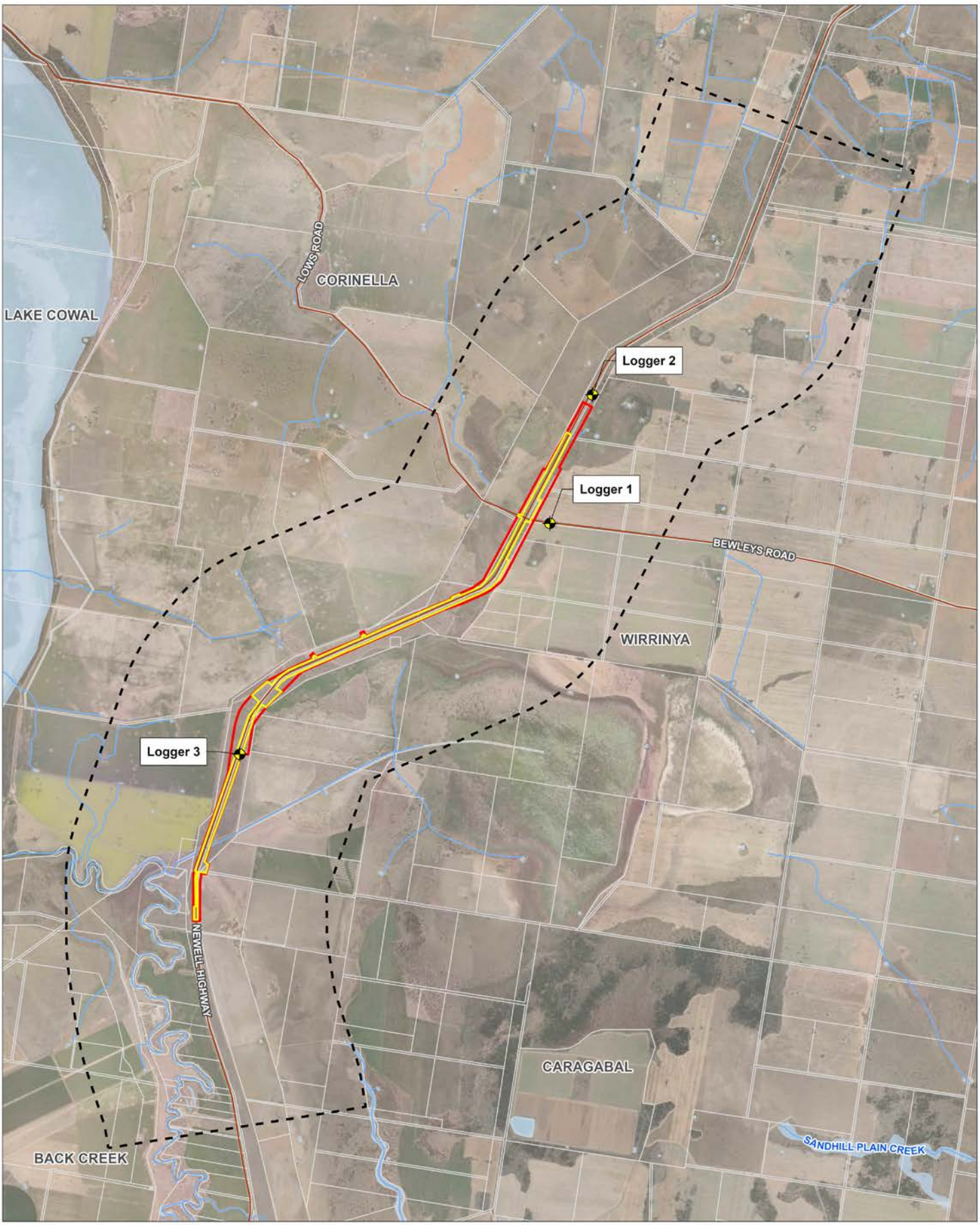
The operational noise assessment area was determined in accordance with the RNCG. Under the RNCG this is up to a maximum distance of 600 metres from the proposal works for urban areas and possibly greater than 600 metres for rural areas. Given there are few receivers are located within 600 metres of the proposal, the assessment area was expanded to two kilometres from the proposal works and treated as a single Noise Catchment Area (NCA) (Figure 6-17).

Existing ambient noise environment

Unattended noise monitoring was undertaken at three locations for a period of 10 days (11 November to 20 November 2023) to measure traffic and ambient noise levels. The noise logger locations are shown in Figure 6-17.

Monitoring was conducted in accordance with relevant Australian standard (AS), using 15-minute statistical intervals. The data captured included LA_{eq}, LA_{max}, LA_{1}, LA_{10}, and LA_{90} (refer Table 6-35: for information on descriptors).

These were used to characterise the existing noise environment and inform the noise management levels (NMLs) for assessing construction and operational noise impacts.



Operation noise assessment area and unattended noise logger locations

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-17

Project Code: 304100217_ACO_001
Drawn By: MM, Checked By: TH
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Acoustic Assessment Area (2km)
- Unattanded Noise Logger
- Existing Road
- Watercourse
- Cadastre
- Waterbody
- Construction Boundary

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road, Waterbody & Watercourse (NSW SS, 2025)

0 500 1,000 1,500 2,000 Metres
Scale at A3: 1:55,000



\\au2012-ntap01_cfs02\shared_projects\304100217\FY21\091_NEWELL HWY WST WYALONG TO FORBES\Drawings\GIS | 304100217_ACO_001_UnattendedNoiseLoggers 02 | Last updated 2026-10-20 By: mmostyn

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Construction noise and vibration assessment

The construction noise and vibration assessment involved the following:

- establishing the construction noise and vibration assessment criteria for the proposal
- identifying the likely construction activities and corresponding sound power levels
- developing a model to predict the potential noise impacts on the surrounding sensitive receivers for the representative construction scenarios. Results were compared against the construction NMLs and sleep disturbance criteria
- screening assessment to determine whether construction traffic is predicted to increase existing traffic noise levels by more than 2dB(A)
- assessing the potential construction vibration impacts to sensitive receivers.

For the purposes of this assessment, the following plant with the potential to generate the most vibration were considered:

- rollers and compactors
- under-boring machines
- excavating equipment
- loaded truck movements.

The review of potential construction vibration impacts was conducted in accordance with the CNVG, *Assessing Vibration – A Technical Guideline* (DECC, 2006), and relevant standards.

- identifying receivers that qualify for consideration of mitigation measures
- identifying mitigation measures where required.

Noise modelling was conducted to determine the predicted level of construction noise impact at sensitive receivers (Figure 6-18) with the potential to be impacted by the proposal. To assess construction noise impacts, models were developed for five construction scenarios and their associated activities. The scenarios and their associated activities are outlined in Table 6-34.

Table 6-34: Modelled construction scenarios

Scenario	Construction phase	Description
1	Site preparation	• Establishment of site compounds, setup of equipment storage, fencing, and accesses • Vegetation clearing, tree trimming, grubbing of scrub • Implementation of erosion and sedimentation controls and drainage for stormwater management
2	Earthworks, Drainage and Structures	• Excavation of material • Construction of fill embankments • Stockpiling and reuse construction materials • Preparation of foundations for major culvert banks, including excavation and compaction • Installation of drainage devices, pipes, and culverts • Installation of scour protection, at culvert inlets and outlets • Construction of open drains and minor table drains where possible
3	Road Formation	• Placement of material, subbase and base layers across the raised alignment including shoulders and verge stabilisation • Construction of pavement above culverts

Scenario	Construction phase	Description
		• Installation of the pavement wearing course • Line marking • Installation of safety barriers
4	Line marking	• Installation of the ultimate line marking (proposed as night works) • Installation of signage
5	Site clean-up, finishing work	• Batter and verge rehabilitation, including topsoil placement and stabilisation • Removal of temporary works, including ancillary sites, access tracks and sediment controls, once areas are stabilised • Demobilisation of plant and equipment

The modelling assumed that works for each stage would occur along the full length of the construction boundary. This ensured the worst case for the predicted noise levels would be identified at each sensitive receiver.

The construction plant included for the noise model and their associated sound power levels sourced from Australian Standard *AS 2436-2010: Guide to Noise Control on Construction, Maintenance and Demolition Sites* (Australian Standards, 2010) and the CNVG are outlined in the Noise and Vibration Assessment in Appendix I.

The predicted noise levels for each scenario were compared against the construction NMLs and the sleep disturbance criteria outlined in section 6.7.2 to identify the required mitigation measures for construction of the proposal.

Operational noise assessment

The operational noise assessment involved the following:

- establishing the operational noise assessment criteria based on land use and road classification
- establishing current and predicted traffic volumes for year of opening (2030) and design year (2040)
- modelling operational road traffic noise by predicting noise levels for the year of opening (2030) and design year (2040), both with and without the proposal to determine if the proposal would increase traffic noise impact by more than 2.0 dBA. Each modelled scenario included iterations for both the day period (LAeq, 15h) and the night period (LAeq, 9h)
- identifying mitigation measures where required.

The noise modelling was conducted using SoundPLAN 8.2 with a digital terrain model calculated from existing ground levels. The road traffic noise levels were calculated based on the *Calculation of Road Traffic Noise* (CoRTN, UK Department of Transport, Welsh Division, 1988) assessment methodology algorithms.

Measurement parameters

The common descriptors used to describe environmental noise are provided in Table 6-35.

Table 6-35: Environmental noise descriptors

Measurement descriptor	Details
LA_{max}	the A-weighted maximum noise level measured during the measurement period
LA_1	the A-weighted noise level exceeded for 1% of the measurement period

Measurement descriptor	Details
LA_{10}	the noise A-weighted level exceeded for 10% of the measurement period, generally referred to as the average maximum sound pressure level
LA_{90}	the A-weighted noise level exceeded for 90% of the measurement period, generally referred to as the average minimum sound pressure level or background noise level
LA_{eq}	the equivalent continuous noise level over the measurement period, generally referred to as the energy averaged sound pressure level over the measurement period

6.7.2 Criteria

Construction noise criteria

The ICNG provides guidance for assessing construction noise impacts. The NMLs for residential receivers are derived from the existing background noise levels, or rating background levels (RBL), with the relevant criteria applied in accordance with the ICNG for work during recommended standard hours and work outside these hours.

The ICNG defines standard construction hours, where most of the work is to occur, as:

- Monday to Friday: 7am-6pm
- Saturday: 8am-1pm
- no work on Sundays or public holidays.

The CNVG further defines the out of hours work (OOHW) as follows:

- OOHW Period 1: Monday – Friday (6pm–10pm), Saturday (7am–8am and 1pm–10pm), Sunday/Public Holiday (8am–6pm)
- OOHW Period 2: Monday – Friday (10pm–7am), Saturday (10pm–8am), Sunday/Public Holiday (6pm–7am).

Based on the measured background noise levels, and in in accordance with the NSW *Noise Policy for Industry* (EPA, 2017), the minimum RBLs applicable for the assessment of construction noise NMLs are:

- Day RBL: 35 dB(A)
- Evening RBL: 30 dB(A)
- Night RBL: 30 dB(A).

Based on the RBLs, the applicable NMLs for construction work during standard hours and for OOHW Period 1 and OOHW Period 2 are detailed in Table 6-36.

Table 6-36: Construction NMLs – residential premises

NML, dB(A)				Sleep Disturbance: $LA_{1, 1\ min}$ Mon-Sun: 10pm to 7am
Standard Hours (RBL + 10)	Outside Standard Hours (RBL + 5)			
Day: Monday-Friday: 7am to 6pm Sat: 8am to 1pm	Day: Sat: 1pm to 6pm Sun: 7am to 6pm	Evening: Mon-Sun: 6pm to 10pm	Night: Mon-Sun: 10pm to 7am	
45	40	35	35	50 (Internal) 60 (external)*

**For this assessment, it is assumed that residential receivers have openable windows. External noise levels are typically 10 dB higher than internal noise levels when windows are open, therefore an external noise level of LA1,1min 60 dB(A) has been adopted to represent the Sleep Disturbance criteria.*

Sleep disturbance

No definitive method exists for assessing when noise will cause sleep disturbance, however, the NSW EPA confirm that a sleep disturbance criterion of $L_{A1, 1min} \leq L_{A90,15min} + 15$dB(A) can be used for initial assessments. If the criteria are exceeded, a more detailed analysis is required to be incorporated into the detailed design and a Construction Noise and Vibration Management Plan.

Construction traffic

For Transport projects, an initial screening test should first be applied by evaluating whether noise levels will increase by more than 2dBA due to construction traffic or a temporary reroute due to a road closure. Where increases are 2dBA or less then no further assessment is required. Where noise levels increase by more than 2dBA (2.1dBA) further assessment is required based upon Transport's RNCG.

Construction vibration criteria

Vibration from construction activities associated with the proposal could potentially impact on the amenity of the occupants of dwellings or buildings located close to the construction works. Generally, vibration impacts can be summarised into two categories:

- effect on human comfort
- structural or cosmetic damage to buildings.

The CNVG provides a framework for the assessment of vibration during construction phase of a project including recommended minimum separation distances between vibration intensive plant and sensitive receivers for minimising the risk of cosmetic damage. The minimum working distances are summarised in Table 6-37.

Table 6-37: Recommended minimum work distances for vibration intensive plant from sensitive receivers

Plant item	Rating/description	Minimum working distance		
		Cosmetic damage (BS 7385)	Cosmetic damage (DIN 4150) Heritage and other sensitive structures	Human response (OH&E Vibration Guideline)
Vibratory roller	< 50 kN (Typically 1-2 tonnes)	5 m	14 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	16 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	33 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	41 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	54 m	100 m
	> 300 kN (> 18 tonnes)	25 m	68 m	100 m
Small	(300 kg - 5 to 12t excavator)	2 m	5 m	7 m
Medium	(900 kg – 12 to 18t excavator)	7 m	19 m	23 m
Large	(1600 kg – 18 to 34t excavator)	22 m	60 m	73 m
Vibratory Pile	Sheet Piles	2 m to 20 m	50 m	20 m
Pile Boring	≤ 800 mm	2 m (nominal)	40 m	4 m
Jackhammer	Hand Held	1 m (nominal)	2 m	2 m

Operation noise criteria

Operational road traffic noise has been assessed in accordance with the RNP (DECCW 2011). The RNCG (Transport 2025) provides guidance on the implementation of the RNP.

The RNP and RNCG provide the criteria for residential land use. The criteria are based on the road development type and a residence is affected by due to the road project. The proposal consists of redevelopment of an existing freeway/arterial road and sub arterial road. The criterion for residences is provided in Table 6-38.

Table 6-38: Road traffic noise assessment criteria for residential land uses

Road category	Type of project/land use	Assessment criteria, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/arterial/ sub-arterial roads	1. Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	$LA_{eq,\ (15\ hour)}$ 55 (external)	$LA_{eq,\ (9\ hour)}$ 50 (external)
	2. Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads	$LA_{eq,\ (15\ hour)}$ 60 (external)	LAeq, (9 hour) 55 (external)

Road category	Type of project/land use	Assessment criteria, dB(A)	
	3. Existing residences affected by noise from a transition zone between new and redeveloped roads	$LA_{eq, (15\ hour)}$ 55 - 60 (external)	$LA_{eq, (9\ hour)}$ 50 - 55 (external)
Local roads	4. Existing residences affected by noise from new local road corridors 5. Existing residences affected by noise from redevelopment of existing local roads 6. Existing residences affected by additional traffic on existing local roads generated by land use developments	$LA_{eq, (1\ hour)}$ 55 (external)	$LA_{eq, (1\ hour)}$ 50 (external)

Any increase in the total traffic noise level at a location due to a proposal is required to be considered. The total traffic noise increase level applicable to the proposal is provided in Table 6-39. As the proposal consists of redeveloped road segments and does not contain any new road segments, the resulting criteria will be the more stringent of the redeveloped road criteria (Table 6-38) or the relative increase criteria (Table 6-39).

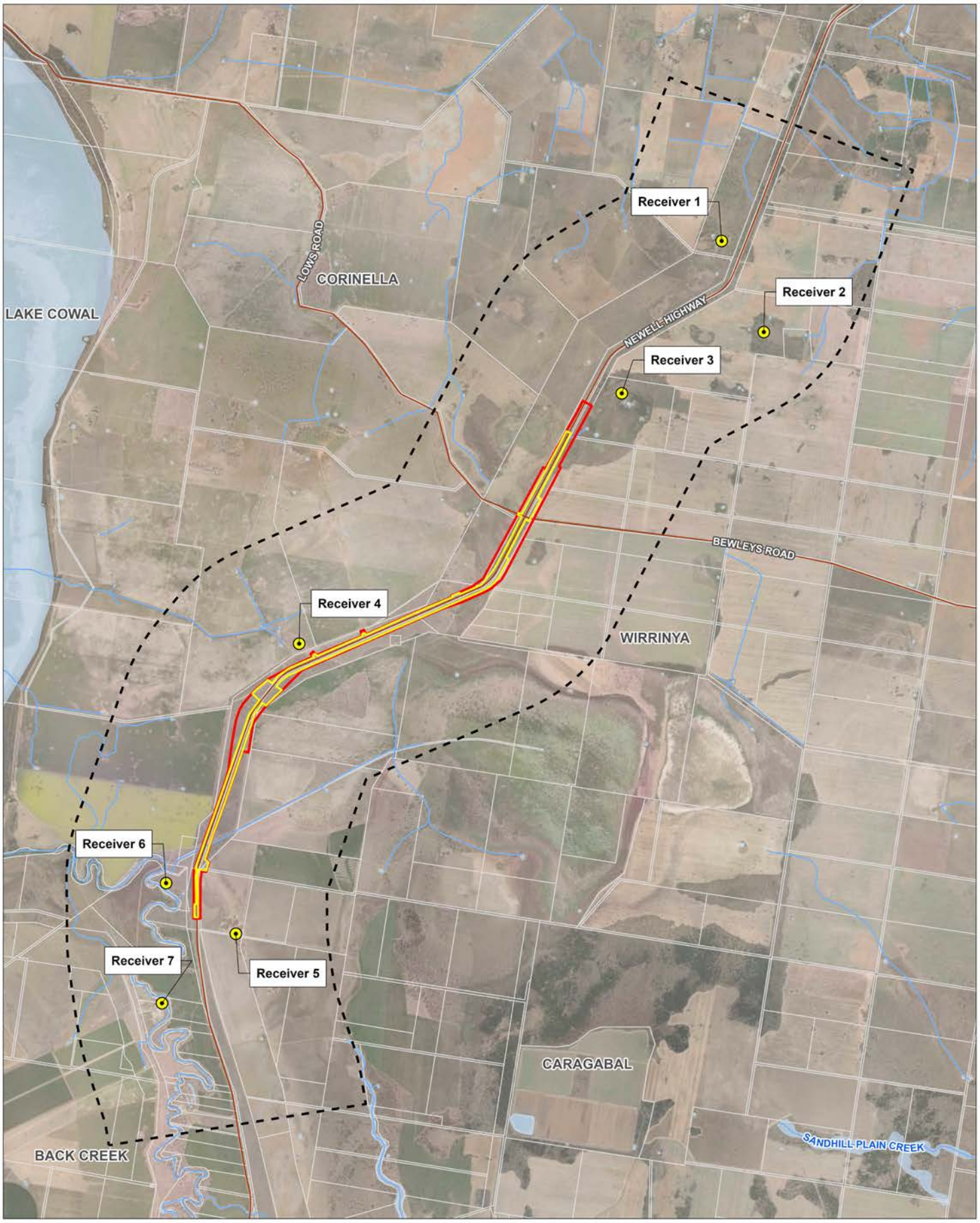
Table 6-39: Total traffic noise increase criteria

Road category	Type of project/land use	Total traffic noise increase, dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/arterial/sub-arterial roads and transit ways	New road corridor/redevelopment of existing* road/land use development with the potential to generate additional traffic on existing road	Existing $LA_{eq, (15\ hour)}$ + 12 dBA (external)	Existing $LA_{eq, (9\ hour)}$ + 12 dBA (external)

6.7.3 Existing environment

Sensitive receivers

Given the rural setting there are limited sensitive receivers in proximity to the proposal and these include only residential receivers. The closest sensitive receiver is located approximately 300 metres from the Newell Highway. The seven sensitive receivers for the proposal are shown in Figure 6-18.



Noise and vibration sensitive receivers

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-18

Project Code: 304100217_ACO_001
Drawn By: MM, Checked By: TH
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Sensitive Receivers
- Acoustic Assessment Area (2km)
- Existing Road
- Watercourse
- Cadastre
- Waterbody
- Construction Boundary

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road, Waterbody & Watercourse (NSW SS, 2025)

0 500 1,000 1,500 2,000 Metres
Scale at A3: 1:55,000



\\au2012-ntap01_cifs\02\shared_projects\304100217\FY21\091_NEWELL HWY WST WYALONG TO FORBES\Drawings\GIS | 304100217_ACO_001_VibrationSensitiveReceivers 02 | Last updated 2026-10-20 By: nmostyn

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Existing ambient noise levels

The proposal is in a sparsely populated rural setting with the Newell Highway has relatively low traffic volumes, especially during the night period. In the absence of noise from the Newell Highway, the acoustic environment is typical of a rural area, with noise consisting of fauna (including insects and birds), wind in vegetation, and agricultural activities.

Unattended noise monitoring was carried out for the REF at three locations within the study area (Figure 6-17) for a period of 10 days between 11 November and 20 November 2023. The measured noise level results from the noise monitoring loggers are presented in Table 6-40 details the measured noise levels at each logger location.

Table 6-40: Measured noise levels

Logger	Location	MNLs, dB(A)				
		LAeq, 15hr 07:00-22:00	LAeq, 9hr 22:00-07:00	Rating Background Level (RBL)		
				Day 07:00-18:00	Evening 18:00-22:00	Night 22:00-07:00
1	Bewleys Road	53	50	27	32	24
2	Newell Highway	60	58	29	40	26
3	Newell Highway	62	60	27	41	26

Note: Review of the data charts shows that insect noise was affecting the background noise levels during parts of the evening and night time periods for most of the monitoring period. However, in relation to the LAeq (15h) and LAeq (9h) data required for the road traffic noise assessment, it was found that the measured background noise levels (LA90) were more than 10dB below the measured LAeq for most of the assessment period, indicating that the insect noise did not significantly affect the LAeq noise levels. Any periods where the difference between the LAeq and LA90 was less than 10dB(A) were omitted from the results in Table 6-40.

6.7.4 Potential impacts

Construction noise

Following the initial screening test construction noise was modelled for five construction scenarios with the predicted construction noise levels for the sensitive receivers for all time periods provided in Table 6-41. The predicted construction noise levels are provided in Table 6-34. It is noted that noise levels for the residences at Receiver 1 and Receiver 2 were modelled, however have not been included in Table 6-41 as no impacts were predicted, likely due to their distance from the proposal.

Noise contour maps for each for the construction scenarios are provided in the Appendix E of Noise and Vibration Assessment attached as Appendix I to this REF.

Table 6-41: Predicted construction noise levels

Can Receiver	Predicted Construction Noise Level, dB(A)		Exceedance of NML				
			Standard Hours	Out of Hours Works Period 1		Out of Hours Works Period 2	
	$L_{Aeq, 15\ min}$	L_{Amax}		Day	Evening	Evening	Night
Noticeable: Standard Hours, NML OOHW, <5dBA above NML							
Clearly audible: Standard Hours, <10dBA above NML OOHW, 5 to 15 dBA above NML							
Moderately intrusive: Standard Hours, 10 to 20 dBA above NML OOHW, 16 to 25 dBA above NML							
Highly Intrusive: Standard Hours >20 dB(A) above NML OOHW, >25 dB(A) above NML							
Scenario 1 - Site preparation							
Receiver 3	38	48	-	-	3	3	3
Receiver 4	52	62	7	12	17	17	17
Receiver 5	44	54	-	4	9	9	9
Receiver 6	49	59	4	9	14	14	14
Receiver 7	35	45	-	-	-	-	-
Scenario 2 - Earthworks, drainage and structures							
Receiver 3	40	50	-	-	5	5	5
Receiver 4	54	64	9	14	19	19	19
Receiver 5	46	56	1	6	11	11	11
Receiver 6	51	61	6	11	16	16	16
Receiver 7	37	47	-	-	2	2	2
Scenario 3 - Road formation							
Receiver 3	46	56	1	6	11	11	11
Receiver 4	61	71	16	21	26	26	26
Receiver 5	53	63	8	13	18	18	18
Receiver 6	58	68	13	18	23	23	23
Receiver 7	44	54	-	4	9	9	9
Scenario 4 - Line marking							
Receiver 3	27	37	-	-	-	-	-
Receiver 4	41	51	1	6	6	6	1
Receiver 5	34	44	-	-	-	-	-
Receiver 6	39	49	-	4	4	4	-
Receiver 7	24	34	-	-	-	-	-
Scenario 5 - Site clean-up, finishing work							
Receiver 3	32	42	-	-	-	-	-
Receiver 4	46	56	1	6	11	11	11
Receiver 5	38	48	-	-	3	3	3
Receiver 6	43	53	-	3	8	8	8
Receiver 7	29	39	-	-	-	-	-

The predicted LAeq results detailed in Table 6-41 are likely to exceed the NMLs for all construction scenarios at the nearest residential receivers for all time periods. Therefore, project specific management controls are required to mitigate the predicted noise impacts. These management controls are detailed further in section 6.7.5.

Moderately (Scenario 1, 2 and 3) and highly (Scenario 3) intrusive noise levels were predicted for the nearest affected residential receivers indicating the potential for sleep disturbance associated with construction activities at night. In the absence of measurement data, typical construction source L_{A01} noise levels were assumed to be 10 dB(A) above the predicted L_{Aeq} noise levels, based on measurements from previous projects.

From the modelling results (Table 6-40) it was determined that out of hours construction activities associated with Scenarios 4 and 5 would be unlikely to result in sleep disturbance. However, proposed night works for intersection and tie-in activities could potentially exceed the sleep disturbance criteria.

The CNVG stipulates that additional noise management measures may be required where noise levels are predicted to exceed the noise management levels. The required additional mitigation measures that may be implemented where exceedances of the NML are predicted and a detailed description of each mitigation is provided in section 4.9 of the Noise and Vibration Report attached as Appendix I.

Based on the predicted construction noise levels, no further mitigation measures are required for Standard Hours.

Construction vibration

Based on the separation distances between residents and the construction boundary exceeding 200 metres, construction vibrations are unlikely to create significant impacts.

No heritage structures are located within 10 kilometres therefore vibration associated with the works would not result in impacts to existing heritage buildings and structures. Project specific mitigation measures for vibration are therefore required. The standard mitigation measures outlined in Appendix B of the CNVG should be included in a Construction Noise and Vibration Management Plan and be implemented where relevant.

Operational noise

Operational road traffic noise impacts, without mitigation, have been predicted for the year of opening (2030) and the design year (2040) for the day (7am-10pm) and night-time periods (10pm-7am). Tabulated results of the predicted operational road traffic noise impacts are provided in Appendix I.

The worst case predicted traffic noise impact was 51 dBA Leq 15 hour and 47 dBA Leq 9hour at 4707 Newell Highway. This is 9 and 8 dBA below the RNCG criteria for the day and night periods respectively.

Based on the predicted road traffic noise levels, the proposal does not trigger requirements for mitigation in accordance with the *Road Noise Mitigation Guideline* (Transport, 2026). As mitigation is not required, a maximum noise level assessment is also not required.

6.7.5 Mitigation measures

Table 6-42 lists the noise and vibration mitigation measures that would be implemented by the proposal.

Table 6-42: Noise and vibration mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Construction noise	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the ICNG (DECC, 2009) and identify:	Contractor	Pre-construction, Construction	Section 4.6 of *QA G36 Environmental Protection*

Risk	Mitigation measures	Responsibility	Timing	Reference
	• all potential significant noise and vibration generating activities associated with the activity. • feasible and reasonable mitigation measures to be implemented in accordance with Appendix B of the CNVG (Transport, 2026) and the Noise and Vibration Assessment (Stantec 2026) • A monitoring program to assess performance against relevant noise criteria • Arrangements for consultation with sensitive receivers, including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance with noise criteria.			
Noise and vibration	All sensitive residential receivers likely to be affected will be notified at least seven days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: • the project • the construction period and construction hours • contact information for project management staff • complaint and incident reporting • how to obtain further information.	Contractor	Construction	Additional safeguard
Construction Noise	Where feasible, works will be carried out within standard construction hours: • 7am-6pm Monday to Friday • 8am-1pm Saturdays • no work on Sundays or public holidays. Works are not to be carried out during evening or night-time hours unless absolutely necessary for road safety reasons.	Contractor	Construction	Additional safeguard
Night work and high impact activities	Where night work is essential, the use of high impact machinery such as vibratory rollers, rock breakers and jackhammers will be avoided in the vicinity of sensitive receivers, where possible.	Contractor	Construction	Additional safeguard
Plant compliance and quieter methods	All plant and equipment will comply with relevant noise emission standards. Where feasible, quieter construction methods would be used.	Contractor	Construction	Additional safeguard

Risk	Mitigation measures	Responsibility	Timing	Reference
Respite periods and scheduling	Where work is predicted to exceed noise management levels, appropriate mitigation measures and respite periods will be implemented in accordance with CNVG	Contractor	Construction	Additional safeguard

6.8 Air quality

An Air Quality Assessment has been prepared by Zephyr Environmental to assess the potential for concentrations of pollutants specifically oxides of nitrogen (NO_x) and particulate matter (PM_{10} and $PM_{2.5}$) due to construction and operation of the proposal. A summary of the assessment is presented in the following sections with the Air Quality Assessment provided in Appendix J.

6.8.1 Methodology

Construction

The construction assessment involved the application of a semi-quantitative risk-based approach following the guidance developed by the UK Institute of Air Quality Management (IQAM) (IAQM, 2024) and adapted to conditions representative of the local area. The assessment involved the following main steps:

- Identification of the construction activities that would be likely to occur in relation to the project.
- Division of activities according to their different potential impacts: demolition, earthworks, construction and vehicle track-out. Risks were assessed in relation to the size of the project, the volume of traffic on unsealed roads, and the locations of sensitive receivers.
- Identification of project-specific management/mitigation measures to minimise the risk of any potential impacts.

Professional judgement is required in some steps of the IAQM assessment procedure for assessing risk, and where justification cannot be given a precautionary approach should be adopted.

Operation

The United States Environmental Protection Agency (US EPA) approved CAL3QHCR dispersion model was used to assess the impacts of vehicle emissions on ambient concentrations of NO_X, and two metrics of PM_{10} and $PM_{2.5}$. CAL3QHCR is an enhanced version of the CALINE Gaussian dispersion model and is designed specifically for the assessment of road traffic emissions. CALINE has been widely used in road traffic pollution studies across Australia and has been validated for Australian conditions.

CAL3QHCR determines pollutant concentrations at receptors downwind of roads located in relatively uncomplicated terrain. For this proposal the CAL3QHCR dispersion model was set up and run using the CALRoads View software.

The following information was required as input to the model:

- link type
- meteorological conditions
- receptor locations
- traffic volume by road link
- vehicle emission rate (grams per vehicle-kilometre per hour) of each pollutant for each road link.

The proposal was split into two links, representing northbound and southbound traffic. The traffic data was from counts in late 2023 and an annual increase of 0.44% was applied to obtain volumes for 2030 and 2040. Detailed hourly traffic flows were used in the emissions model. The default EPA vehicle types which were used to determine vehicle splits are summarised in Table 6-43.

Table 6-43: Vehicle types in the NSW EPA emissions model

Code	Vehicle Type	Vehicles include
CP	Petrol car[a]	Petrol car, 4WD[e], SUV[f] and people-mover, LPG[g] car/4WD
CD	Diesel car[a]	Diesel car, 4WD, SUV and people-mover
LCV-P	Petrol LCV[b]	Petrol light commercial vehicle < 3.5 tonnes GVM[h]
LCV-D	Diesel LCV	Diesel light commercial vehicle < 3.5 tonnes GVM
HDV-P	Petrol HDV[c]	Petrol heavy commercial vehicle < 3.5 tonnes GVM
RT	Diesel rigid HGV[d]	Diesel commercial vehicle 3.5 t < GVM < 25 t
AT	Diesel articulated HGV	Diesel commercial vehicle > 25 tonnes GVM
BusD	Diesel bus	Diesel bus > 3.5 tonnes GVM
MC	Motorcycle	Powered two-wheel vehicle

Notes:

(a) Referred to as 'passenger vehicle' in the inventory
(b) LCV = light commercial vehicle
(c) HDV = heavy-duty vehicle
(d) HGV = heavy goods vehicle
(e) 4WD = four-wheel drive
(f) SUV = sports-utility vehicle
(g) LPG = liquefied petroleum gas
(h) GVM = gross vehicle mass

The emissions and dispersion models were run for two operational scenarios. Listed below are the two scenarios and the included total daily traffic volumes associated with the northbound and southbound directions:

- opening year (2030) – 942 vehicles northbound and 823 southbound
- opening year +10 years (2040) – 984 vehicles northbound and 860 southbound.

6.8.2 Criteria

In NSW the statutory methods that are used to assess the air pollution impacts of projects are detailed in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW EPA, 2022) (Approved Methods). Air quality must be assessed in relation to impact assessment criteria (standards) and averaging periods for specific pollutants. However, the Approved Methods do not contain specific information on the assessment of transport projects.

The pollutants, metrics and standards set out for criteria pollutants in the Approved Methods for NOx, PM_{10} and $PM_{2.5}$ are listed in Table 6-44.

Table 6-44: Air quality standards for assessed pollutants in NSW

Pollutant	Concentration	Averaging period
$PM_{2.5}$	25 µg/m^3	24 hours
	8 µg/m^3	1 year
PM_{10}	50 µg/m^3	24 hours
	25 µg/m^3	1 year
Nitrogen dioxide (NO_2)	164 µg/m^3	1 hour
	31 µg/m^3	1 year

6.8.3 Policy setting

Air quality management guideline

The *Air quality management guideline* (Transport, 2022) provides guidance on managing air quality and emissions on Transport project sites, predominantly associated with dust from construction and exhaust emissions from vehicles, plant and equipment.

CASANZ Good Practice Guide

The Good Practice Guide for the Assessment and Management of Air Pollution from Road Transport Projects (Good Practice Guide) was published by the Clean Air Society of Australia and New Zealand (CASANZ) in 2023. It supports the assessment of air quality impacts from the construction and operation of road projects and provides a comprehensive procedure for determining the impacts on air quality due to a road project and how these may be minimised. The guide includes methodologies for different levels of assessment for both construction and operational impacts. The guide has been considered in this assessment.

6.8.4 Existing environment

Meteorology

The closest meteorological station with good data capture is the BoM Automatic Weather Station (AWS) at West Wyalong Airport, which is approximately 40 kilometres southwest of the proposal. Given the relatively flat terrain in the area this is likely to be representative of conditions for the proposal. The measurements of wind speed and direction from this station were used to compile wind roses for the six years of available data (2018 – 2023).

The mean wind speeds from 2018 to 2023 are consistent over the years, varying between 3.2 m/s and 3.8 m/s. Analysis of these six years of data show that 2023 is a representative year and it has been used for this assessment. Seasonal windroses for 2023 are shown in Figure 6-19.

On an annual basis, the most common winds are from the southwest quadrant, with smaller varying degrees of winds from the northern to eastern quadrants. Winds from the southwest are common in all seasons. A higher number of easterlies generally occur in summer and northerlies in winter. There is a significant percentage of calm conditions (17.7%) in the winter months.

Air quality

Air quality monitoring has not been undertaken for the proposal. The NSW DCCEEW air quality monitors at Wagga North, Bathurst and Orange approximately 100-150 kilometres to the south and east of the proposal, are representative of conditions in rural NSW. The PM_{10} and $PM_{2.5}$ data from these stations has been used in this assessment however it is noted that there is no NO_X or NO_2 data for these sites and so background concentrations are only determined for particulates.

The annual average and maximum 24-hour PM concentrations were very high during the drought and the Black Summer bushfires from 2018 to 2020. After two years of above average rainfall in 2021 and 2022 the concentrations have returned to what is likely to be representative in 2023. The average of all three sites equates to approximately 14 µg/m^3 annual average for PM_{10} and 6.4 µg/m^3 for $PM_{2.5}$. These values have been used as existing background concentrations.

24-hour average PM_{10} and $PM_{2.5}$ concentrations fluctuate considerably from day to day. For the purposes of this assessment, it is reasonable (and still conservative) to take a background 24-hour mean concentration for PM_{10} and $PM_{2.5}$ as the 99th percentile of the data (i.e. the concentration that would only be exceeded on one per cent of days). This approach removes the influence of extreme values, usually due to regional events such as bushfires, but retains a conservative upper bound to be used as background value on which to base the cumulative assessment. This value was 32.8 µg/m^3, for PM_{10} and 17.3 µg/m^3 for $PM_{2.5}$. These values have been used as existing background concentrations.

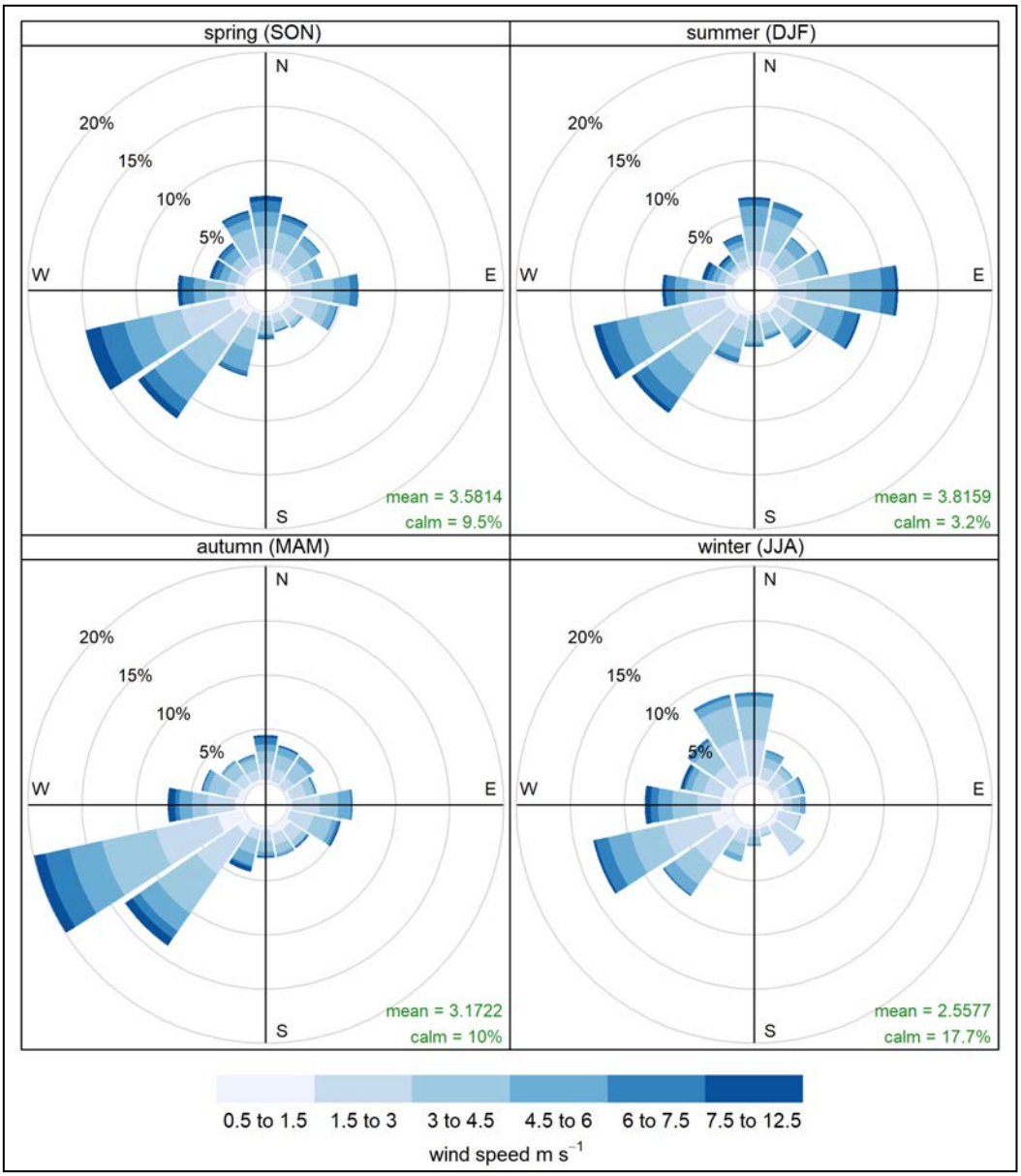


Figure 6-19: Seasonal windroses for 2023 at West Wyalong

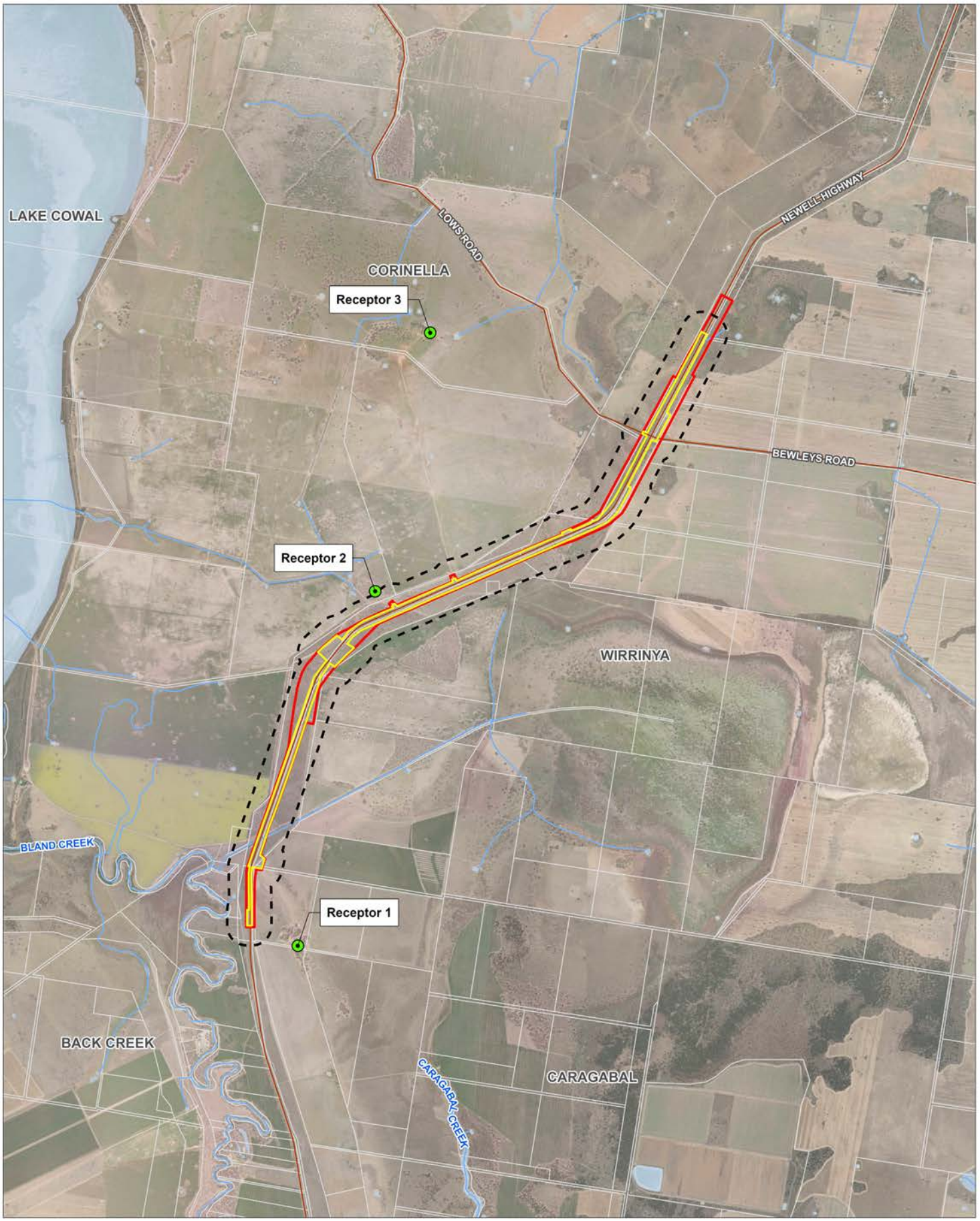
6.8.5 Potential impacts

Construction

A construction dust assessment would normally be required, where:

- there are human receptors within 250 metres of the boundary of the site and/or within 50 metres of the route(s) used by construction vehicles on the public highway, up to 250 metres from the site entrance(s)
- there are ecological receptors within 50 metres of the boundary of the site and/or within 50 metres of the route(s) used by construction vehicles on the public highway, up to 250 metres from the site entrance(s).

As part of the screening stage of the assessment, it was determined that no human sensitive receptors are within 250 metres of the construction boundary (Figure 6-20). The closest residence is 300 metres from the construction boundary. Ecologically sensitive vegetation is located adjacent to the Newell Highway. The BAR assessed that increased dust levels can reduce photosynthesis in flora and respiratory capability in fauna, however for this proposal it would not result in significant impacts to flora or fauna (section 6.1.3).



Air quality study area and sensitive receptors

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-20

Project Code: 304100217_ACO_001
Drawn By: MM, Checked By: TH
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Sensitive Receptor
- Existing Road
- Watercourse
- Cadastre
- Waterbody
- 250m Buffer Zone
- Construction Boundary

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Existing Road, Waterbody & Watercourse (NSW SS, 2025)

0 500 1,000 1,500 2,000 Metres
Scale at A3: 1:45,000



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\\au2012-ntap01_cifs02\shared_projects\304100217\FY21\091_NEWELL HWY WST WYALONG TO FORBES\Drawings\GIS | 304100217_ACO_001_AirQualitySensitiveReceivers 02 | Last updated 2026-10-20 By: mmostyn

In accordance with the IAQM method, undertaking further assessment past the screening stage is not required given the risk of impact is low. Any effects would be temporary and relatively short-lived and would only likely arise during prolonged dry weather with the wind blowing towards a specific receptor.

Despite the low risk of impact, there are mitigation measures that would be adopted to ensure they are minimised during construction. This would include measures incorporated into a dust management plan for the proposal (section 6.8.6).

Operation

The predicted pollutant concentration associated with the operation of the proposal 10 years after opening were modelled. Table 6-45 includes the maximum predicted concentrations solely from the proposal along with cumulative concentrations including the proposal and background values.

Table 6-45: Predicted proposal and cumulative concentrations at the maximum impacted receptor across the domain

Pollutant	Averaging period	Proposal only contribution (µg/m^3)	Background (µg/m^3)	Cumulative (µg/m^3)	Criterion (µg/m^3)
$PM_{2.5}$	24 hours	0.33	17.3	17.6	25
	1 year	0.10	6.4	6.50	8
PM_{10}	24 hours	0.48	32.8	33.3	50
	1 year	0.15	14.0	14.2	25
NO_2	1 hour	42.2	-	42.2	164
	1 year	3.0	-	3.0	31

Note: For NO_2 predictions, 100% NO_X predictions have been converted directly to NO_2.

The modelling indicates there are no predicted exceedances of the air quality criteria due to the operation of the proposal. Operation of the proposal is therefore not expected to result in any significant impacts to air quality.

6.8.6 Mitigation measures

Table 6-46 lists the air quality mitigation measures that would be implemented by the proposal.

Table 6-46: Air quality mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Air quality impacts	An Air Quality Management Plan (AQMP) will be prepared to detail the air quality control measures and procedures to be undertaken during construction, including: • air quality and dust management objectives that are consistent with regulator's guidelines • potential sources and impacts of dust, identifying all dust-sensitive receptors • mitigation measures to minimise dust impacts on sensitive receptors and the environment • a dust monitoring program to assess compliance with the identified objectives • contingency plans to be implemented in the event of non-compliances and/or complaints about dust.	Contractor	Pre-construction, Construction	Section 4.4 of *QA G36 Environmental Protection*
Air quality impacts	Areas of exposed surface are to be minimised throughout the construction site planning and programming, to reduce the area of potential construction dust emission sources.	Contractor	Construction	Additional safeguard
Air quality impacts	Control measures, such as compaction stabilisation or covering will be implemented to minimise dust from stockpile sites.	Contractor	Construction	Additional safeguard
Air quality impacts	Dust suppression measures, such as the use of water carts or soil binders, will be used in any unsealed surfaces and other exposed areas.	Contractor	Construction	Additional safeguard
Air quality impacts	All trucks will be covered when transporting materials to and from the site.	Contractor	Construction	Additional safeguard
Air quality impacts	Construction activities that generate dust will be avoided or modified during high wind periods.	Contractor	Construction	Additional safeguard
Air quality impacts	Work activities will be reviewed if the dust suppression measures are not adequately restricting dust generation.	Contractor	Construction	Additional safeguard
Air quality impacts	Rehabilitation of completed sections will be progressively undertaken.	Contractor	Construction	Additional safeguard

6.9 Property and land use

This section assesses the potential property and land use impacts of the proposal and identifies safeguards to avoid or minimise these impacts.

6.9.1 Methodology

The assessment of proposal impacts on land use and property incorporated:

- desktop assessment of existing property ownership, including dwellings and land use within the study area
- identifying impacted properties within the study area
- identifying properties directly impacted by construction and operational activities
- assessment of potential leased properties and dwellings during construction and operation of the proposal (including partial property lease)
- assessment of potential acquired properties and dwellings during construction and operation of the proposal (including partial property acquisition)
- identifying impacted local road access and property access during construction and operation
- design justification for acquisitions and leases
- assessment of potential land use changes due to acquisition.

Preparation of land use impacts on property has been completed to align with:

- *Land Acquisition (Just Terms Compensation) Act 1991*
- *Land Acquisition Information Guide* (Roads and Maritime Services, 2014).

6.9.2 Policy setting

The *Central West and Orana Regional Plan 2041* (DPE, 2022) identifies improving the resilience of major infrastructure to natural hazards, including flooding, as a priority for the region. The proposal would be consistent with the objective as it reduces the amount of time the Newell Highway is closed between West Wyalong and Forbes during and after flood events.

The *Central West and Orana Strategic Regional Integrated Transport Plan* (Transport, 2025) for its 20-year vision defines key transport priorities for the region. Initiatives defined by the plan have been incorporated into the proposal including the need for informal rest areas to improve the safe and efficient movement of heavy vehicles, and the need to identify and develop options for reducing vulnerabilities in key transport networks.

6.9.3 Existing environment

The Newell Highway is the main road connector between southwest Queensland and Victoria with 6.2 kilometres of the Newell Highway included within this proposal. This section of highway is within the LGA of Weddin and is adjacent to Forbes LGA and Bland LGA (Figure 6-21). This transport corridor is essential for local traffic, freight, tourists and public transport users being a major road pathway between Forbes and West Wyalong.

Land zoning

Land use zones within the proposal boundary are defined by the WLEP 2011. Surrounding areas within the adjacent LGAs are also defined by the *Forbes Local Environment Plan 2013* and *Bland Local Environment Plan 2011* Shown in Figure 6-22 is the land zoning of the surrounding area, and zoning specific to the proposal listed below:

- SP2 Infrastructure (Classified Road) along the existing Newell Highway
- RU1 Primary Production adjacent to the Newell Highway within the road corridor and surrounding properties.

Land use

The main land uses within the areas surrounding the proposal are reflected by the land zonings of the Weddin, Forbes and Bland LGAs. The land use at the proposal and broader area are summarised as the following:

- undeveloped parcels of undulating land and agricultural lots that are generally located outside the town centres (Grenfell, Forbes and West Wyalong) that surrounds the proposal area
- town centres nearby the proposal which generally consist of developed residential, commercial and industrial land
- east and west of the highway are patches of vegetation consisting of generally juvenile to mature trees, shrubs, and grasses
- Several residential receivers scattered sparsely within the broader agricultural land that surrounds the proposal
- non-residential receivers, including industry and businesses
- Lake Cowal is located to west of the proposal
- several State Forests and National Parks within the broader locality of the proposal
- TSR within the study area.

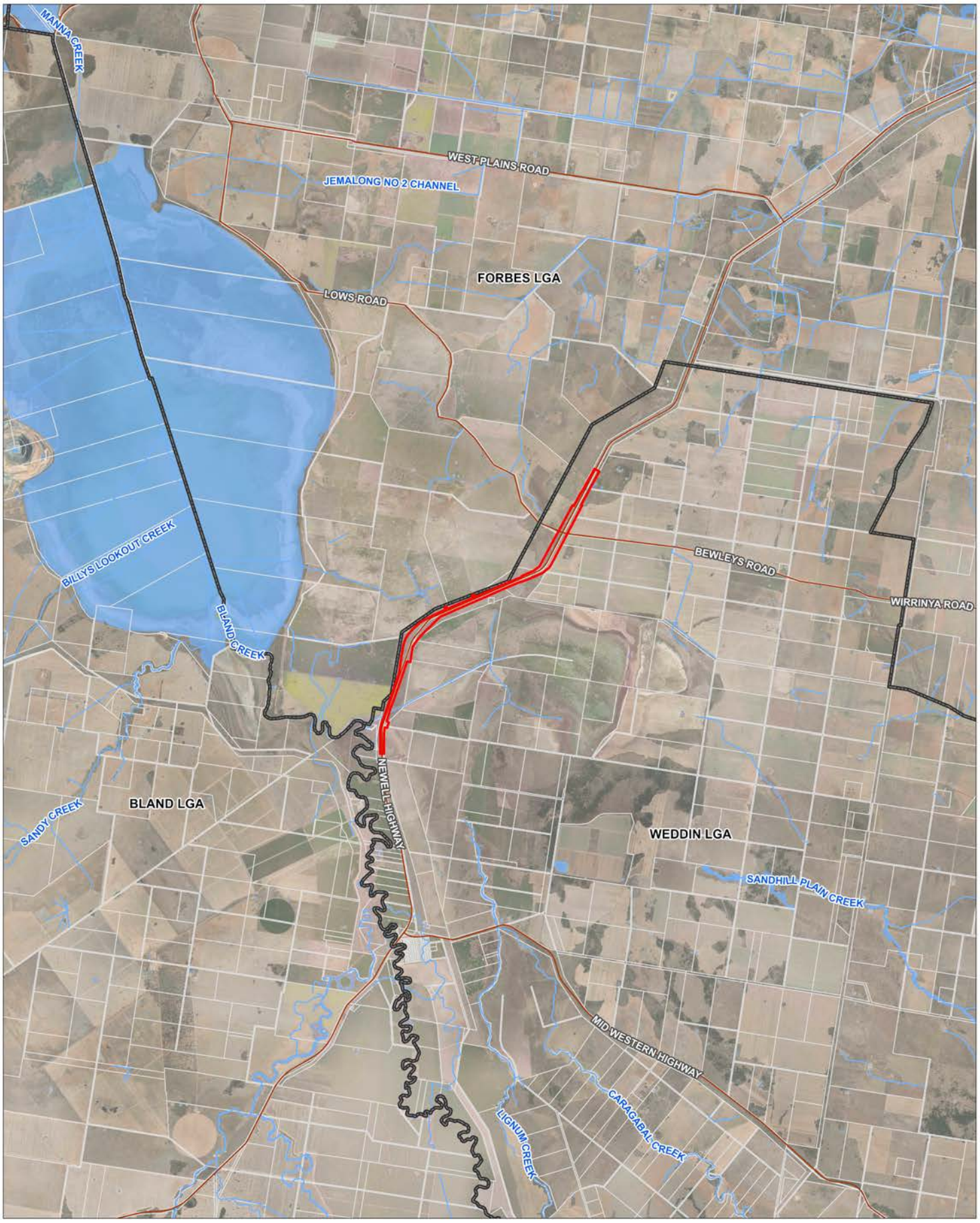
The history of land use and settlement of the region is included in section 6.3.

Property

Most of proposal is within the road corridor of the Newell Highway, however the study area extends onto publicly or privately owned land. The construction boundary extends into four properties outside of the road corridor, three Crown land lots, and one private property.

Details of property partial acquisition and temporary leases are provided in section 3.6.

TSR exist within the proposal boundaries, these are parcels of Crown Land reserved under the LLS Act for use by travelling stock as pasture reserves. The TSR within the proposal boundary are managed by Central West LLS.



Local Government Area (LGA) boundaries

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-21

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 01 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Watercourse
- Existing Road
- Cadastre
- Waterbody
- LGA Boundary

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, LGA Boundary, Waterbody & Watercourse (NSW SS, 2025)

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Scale at A3: 1:100,000



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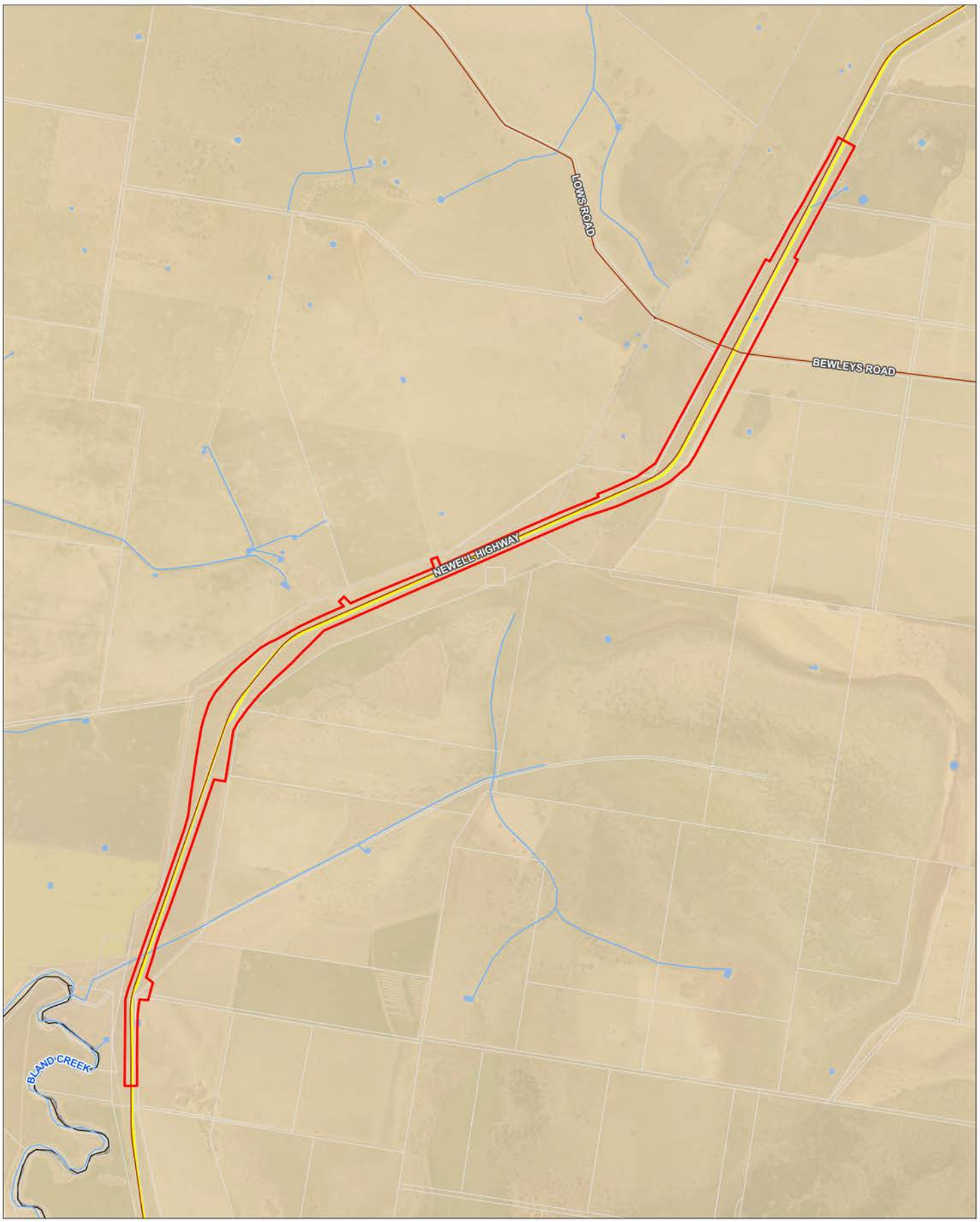

Land zoning

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-22

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 01 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Existing Road
- Watercourse
- Cadastre
- Waterbody

Land Zoning

- RU1 - Primary Production
- SP2 - Infrastructure

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Waterbody & Watercourse (NSW SS, 2025)
3. Land Zoning (DPHI, Nov 2025)

0 250 500 750 1,000 Metres
Scale at A3: 1:30,000



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Current and future development

There are no known current or proposed developments or expected changes to land use in the vicinity of the proposal. The surrounding land would continue to be utilised for agricultural purposed.

6.9.4 Potential impacts

Construction

The proposal would require the partial acquisition of 328,660 m² of land from two NSW Government properties (section 3.6). These lots are zoned at Primary Production (RU1).

All acquisitions of land would be carried out in consultation with landowners and in accordance with the requirements of the *Land Acquisition Act 1991* and the supporting NSW Government Land Acquisition Reform 2016.

Temporary loss of or changes to access may be experienced by landholders during construction. The proposal would require the temporary lease of approximately 470,997 m² of land from three Crown land lots and one private property.

The details of property acquisition and temporary lease are provided in Table 6-47.

Table 6-47: Summary temporary leases and land acquisition

Impact type	Impact area (m²)
Crown leased land	464,743
Private leased land	6254
Total temporary leased land	**470,997**
Crown acquired land	328,660
Total acquired land	**328,660**

During construction two property accesses would be directly affected by the proposal. Access to these properties would be maintained wherever possible, although temporary restrictions or short duration closures may be required . This impact and the appropriate mitigation measures are considered in section 6.6.

There may be temporary land use changes such as clearing and earthworks during construction to accommodate the site compounds and other ancillary facilities (section 3.4). On completion of construction, the temporary site compounds, work areas and stockpiles would be removed, and the site would be reinstated to their pre-construction condition or as otherwise agreed with the landowner as soon as possible following completion of construction activities.

Construction would also impact the use of the TSR and may result in loss of access to parts of the TSR during construction activities. Where possible, these impacts would be minimised and required engagement with LLS and DPHI Crown Lands and associated approvals would be obtained prior to commencement of construction.

Operation

Land required for the construction and operation of the proposal would be acquired from two Crown land lots (section 3.6). As the required land is located immediately adjacent to the existing road corridor, fragmentation of properties would be minimal. Any agricultural infrastructure impacted by the proposal, excluding vehicle tracks, would be relocated or reinstated by Transport.

All temporarily leased land would be returned to the relevant owners in a condition of equal or greater than prior to the lease.

The operation of the proposal would result in minimal permanent change to the land as the proposal is located within the existing road corridor and on the current road alignment. The operation of the Newell highway would result in overall positive

changes to nearby properties as they would experience shorter periods of inaccessibility due to road closures during flooding events.

6.9.5 Mitigation measures

Table 6-48 lists the property and land use mitigation measures that would be implemented by the proposal.

Table 6-48: Property and land use mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Property acquisitions	All property acquisition will be carried out in accordance with the *Guide to Property Acquisition in NSW* (Transport, 2022) and the *Land Acquisition (Just Terms Compensation) Act 1991.*	Transport	Pre-construction	Additional safeguard
Utilities	Prior to the commencement of works: • the location of existing utilities and relocation details will be confirmed following consultation with affected utility owners • further assessment will be undertaken if the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint.	Contractor	Detailed design, Pre-construction	Additional safeguard
Property adjustments	Consult with affected property owners where property adjustments (e.g. access, fencing) will be required.	Transport	Pre-Construction, Construction	Additional safeguard
Property reinstatement	All land temporarily leased for the proposal will be returned to landowners in their pre-construction condition or as otherwise agreed with the landowner as soon as possible following completion of construction activities.	Contractor	Construction	Additional safeguard
TSR impacts	Transport will consult with LLS and DPHI Crown Lands and obtain any required approvals prior to commencement of construction.	Transport	Detailed design, Pre-construction	Additional safeguard

6.10 Landscape character and visual impact

The landscape character and visual impact assessment (LCVIA) has been carried out to assess the potential landscape character and visual impacts during construction and operation of the proposal.

6.10.1 Methodology

The LCVIA has been prepared in accordance with the *Guideline for landscape character and visual impact assessment: EIA-N04* (Transport, 2023). Google Maps Street View was used to support the assessment of landscape character and visual impacts.

Landscape character assessment

The LCVIA study area was divided into a series of Landscape Character Zones (LCZs), each representing areas of consistent spatial, visual, and contextual characteristics. The assessment considered the impact of the proposal on the sense of place (built, natural, and cultural elements) of each LCZ.

Each LCZ was assessed on two criteria:

- sensitivity: the inherent capacity of the landscape to absorb change, informed by factors such as scenic quality, cultural and historical significance and the overall composition of the landscape
- magnitude: the scale, form, and composition of the proposed works and their location within the landscape. This includes consideration of whether the proposal would result in a positive or negative change to the character of the zone.

Visual impact assessment

The visual impact assessment assesses the potential changes to views experienced by key visual receptors, including residents, and motorists. The assessment considered:

- the composition and quality of existing views
- the capacity of the view to absorb change
- the duration and frequency of exposure to the proposal
- the magnitude of change introduced by the proposal.

For the proposal, representative viewpoints were selected across the LCVIA study area. The visual impact of the proposal was assessed by considering the sensitivity of the view and the magnitude of change to the view from the proposal. Definitions are as follows:

- Sensitivity refers to the quality of the view and how sensitive it is to the proposed change. It is measured by assessing a combination of factors including the composition of the view, its capacity to absorb change, and potentially also by duration (length of exposure) and frequency from key viewpoints.
- Magnitude refers to the nature and scale of the proposal in relation to the viewer. It is measured as the degree of change the view undergoes from the proposal. It includes physical character, size and scale considerations, proximity, the frequency and duration of views, and both day-time and night-time conditions.

Table 6-49 summarises the LCVIA assessment matrix which presents the overall impact rating based on the sensitivity and magnitude of change due to the proposal.

Table 6-49: Landscape character and visual impact rating matrix

Sensitivity	Magnitude				
	High	Moderate	Low	Negligible
High	High	High – Moderate	Moderate	Negligible
Moderate	High – Moderate	Moderate	Moderate - Low	Negligible
Low	Moderate	Moderate - Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

6.10.2 Existing environment

Local context

The proposal is located within the rural agricultural landscape of central NSW of Weddin Shire LGA and the adjacent Forbes and Bland LGAs.

The Newell Highway in this location traverses a landscape characterised by the flat to undulating terrain and the alluvial plains associated with Lake Cowal and Bland Creek. There are scattered trees and patches of vegetation within a largely cleared landscape dominated by grazing activities. The key features of this rural landscape include:

- Newell Highway and road infrastructure: a major transport route connecting Queensland and Victoria. It is high proportion of heavy vehicles as discussed in section 6.6.
- cleared grazing land
- isolated rural residences and agricultural buildings with associated vegetation
- natural features: the landscape includes scattered trees and vegetation patches, and an ephemeral wetland. The proposal is located to the north-east of Bland Creek which has fringing riparian vegetation.

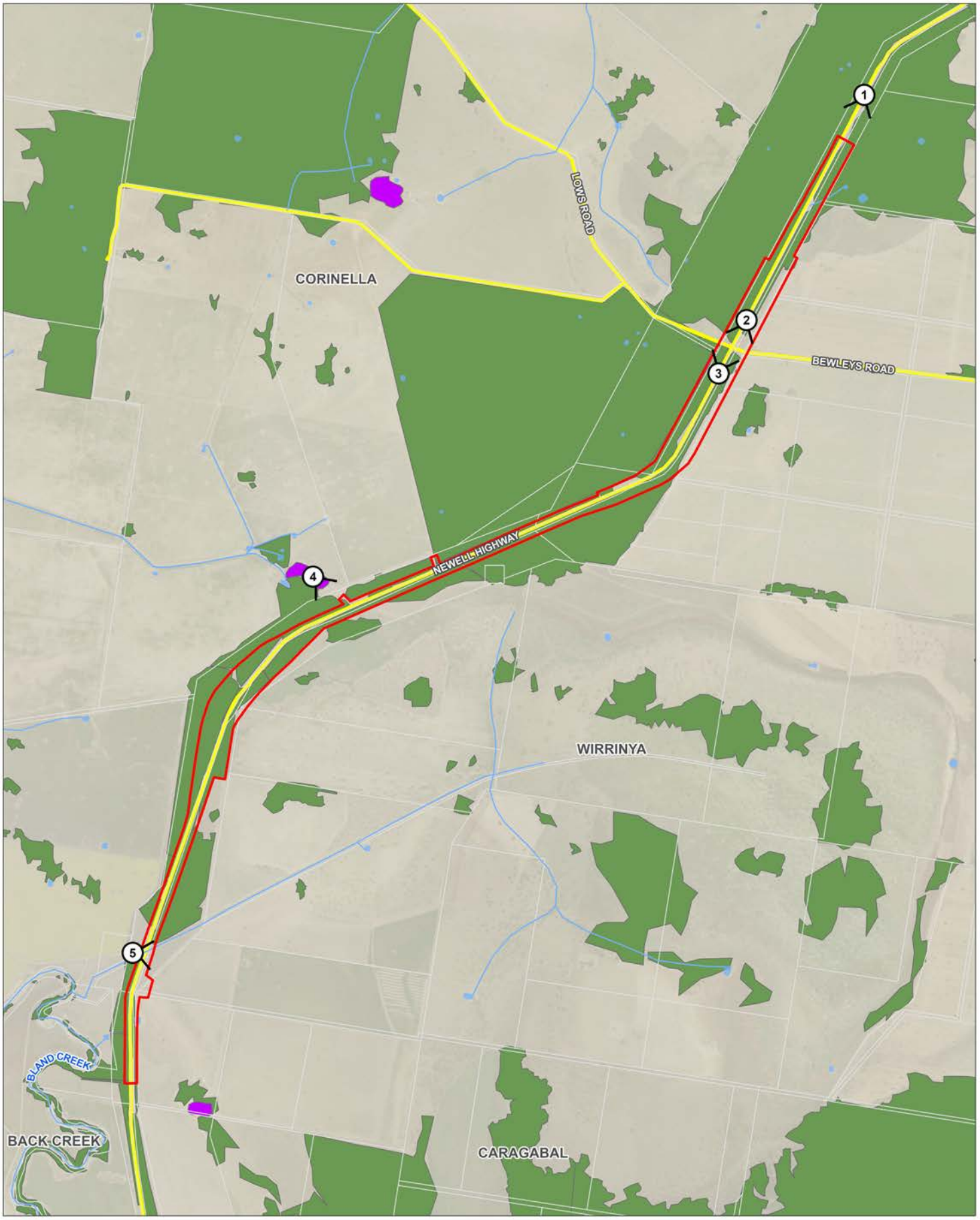
Aboriginal cultural heritage and non-Aboriginal heritage

Aboriginal cultural heritage and non-Aboriginal heritage characteristics of the study area and the wider region are discussed in sections 6.2 and 6.3 respectively.

Landscape characteristics

The landscape has been divided into four LCZs each representing a unique combination of landform, vegetation and land use. These zones were identified through site analysis, desktop review, and information collected during field investigations.

The four LCZs are shown in Figure 6-23 and described in Table 6-54.



Landscape character zones & viewpoints

Newell Highway Flood Mitigation
West Wyalong to Forbes, NSW

Figure 6-23

Project Code: 304100217_ECO_003
Drawn By: MM, Checked By: TH
Revision: 02 | Date: 2026-10-20

Stantec

Legend

- REF Study Area
- Viewpoint Direction
- Watercourse
- Cadastre
- Waterbody

Landscape Character Zone

- LCZ1 - Transport Corridor
- LCZ2 - Rural Residences and Buildings
- LCZ3 - Trees & Shrubs
- LCZ4 - Rural

Notes:
1. Map displayed in GDA2020 MGA Zone 55

References:
1. Aerial Imagery (Esri and other third party suppliers)
2. Cadastre, Waterbody & Watercourse (NSW SS, 2025)

0 250 500 750 1,000 Metres
Scale at A3: 1:30,000



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Table 6-50: Landscape character zones

LCZ	Description
LCZ1 – Transport corridor	Comprises the Newell Highway and the Bewleys Road / Lows Road intersection. It is characterised by existing road infrastructure and includes the paved road and associated infrastructure and signage. It is the most dominant infrastructure in a largely rural landscape.  View of LCZ1
LCZ2 – Rural residences and buildings	Comprises scattered houses and associated outbuildings and sheds located in the vicinity of the proposal. These are typically isolated from neighbouring houses and located on large rural properties. They are often distinguished by trees and other planting around the houses.  View towards LCZ2 from the Newell Highway
LCZ3 – Trees and shrubs	Comprises stands of vegetation located along and within the vicinity of the proposal. This LCZ includes patches of shrubs and trees within the road corridor and remnant patches within the surrounding rural landscape.  View of LCZ3 adjacent to the Newell Highway

LCZ	Description
LCZ4 – Rural	Encompasses most the landscape surrounding the proposal. It is characterised by rural activities within a largely cleared gently rolling landform.  View of LCZ4 from the Newell Highway

Source of images: Google 2026

Viewpoints

The potential visual impacts for the proposal are assessed in relation to five key viewpoints selected throughout the LCVIA study area. The locations and directions of chosen viewpoints are representative of the viewpoints within the visual catchment. The location of the viewpoints is shown in Figure 6-23 and described in Table 6-51.

Table 6-51: Viewpoints

Viewpoint	Location and description	Receptors
Viewpoint 1	**Location**: Newell Highway north of proposal looking south **Description:** Road viewpoint with views of the surrounding rural landscape with scattered trees and patches of vegetation 	Motorists and other road users

Viewpoint	Location and description	Receptors
Viewpoint 2	**Location:** North of the Newell Highway / Bewleys Road / Lows Road intersection looking south **Description:** Road viewpoint with views of the intersection and the surrounding rural landscape with scattered trees and patches of vegetation 	Motorists and other road users
Viewpoint 3	**Location:** Newell Highway / Bewleys Road / Lows Road intersection looking north **Description:** Road viewpoint with views of the intersection and the surrounding rural landscape with scattered trees and patches of vegetation 	Motorists and other road users
Viewpoint 4	**Location:** Rural residence to the west of the Newell Highway **Description:** Residential building surrounded by trees and landscaping plantings. Located approximately 300 metres to the west of the Newell Highway. View is of a rural landscape with scattered vegetation.	Residents, workers and visitors to property
Viewpoint 5	**Location:** Billabong Station access road west of the Newell Highway **Description:** Unsealed property access road to the west of the Newell Highway near the southern extent of the proposal. Access road has direct access and views of the Newell Highway and surrounding rural landscape.	Residents, workers and visitors to property

Source of images: Google 2026

6.10.3 Potential impacts

Construction

During the construction phase, the proposal would generate temporary localised visual impacts including:

- operation of temporary ancillary facilities
- use of traffic control measures, vehicles and personnel
- presence of construction vehicles, machinery and plant, site equipment and construction screening
- stockpiled materials
- earthworks
- light spill during night works
- vegetation removal.

The construction phase of the proposal would involve staged works within the construction boundary. These works would result in a range of temporary impacts on the existing landscape and visual environment.

The movement of construction vehicles and equipment within the construction boundary and on the Newell Highway would contribute to a dynamic and constantly changing visual environment. This activity would be particularly noticeable near ancillary sites and where construction interfaces with the Newell Highway/Bewleys Road/Lows Road intersection.

In summary, the construction phase would result in a substantial, though temporary, change to the visual landscape along the section of the Newell Highway where works are proposed. The extent and intensity of these impacts would vary depending on the works location and proximity to sensitive viewpoints but would be experienced across the full length of the proposal area.

Operation

Overall, the proposal would result in minimal permanent changes to the visual environment and landscape character along this section of the Newell Highway corridor. The changes would be experienced by motorists travelling along the Newell Highway and using the intersection with Bewleys Road and Lows Road, and residents, workers and visitors of the adjacent rural properties.

The proposal, located on the exiting alignment would result in little change to the existing road character. The most notable change would be from vegetation clearing associated with the proposal which would result in a widened cleared corridor adjacent to the road. Landscaping would be limited to stabilisation of disturbed areas and tree planting required for offsetting as detailed in Table 6-9. Regrowth of roadside vegetation would be expected to occur over time within the road corridor outside the operational safety zone associated with the road.

Landscape character assessment

Table 6-52 outlines the results of the landscape character assessment in terms of the sensitivity and magnitude of the works, and the overall impact assessment. Across the four LCZs the impact of the proposal varies from low to high-moderate.

Table 6-52: Landscape character assessment

Zone	Sensitivity	Magnitude	Landscape Character Impact
LCZ1 Transport corridor	Low The Newell Highway is a modified landscape dominated by the road infrastructure. It can absorb change with little impact to this character.	Low The vegetation clearing required to facilitate the proposal would impact this LCZ. This and the raising of some sections, to accommodate the new culverts, on the existing alignment would have a low magnitude of change on the landscape character of this zone.	Low
LCZ2 Rural residences and buildings	High This LCZ, being buildings and their surrounds where people work and live makes this LCZ sensitive to change.	Negligible Residences are located away from the Newell Highway corridor and the changes from the proposal, including vegetation clearing, would have low magnitude of change to this LCZ	Negligible
LCZ3 Trees and shrubs	High The prevalence of established, mature native vegetation, including an area of Aboriginal significance and a culturally significant tree (Figure 6-8) make this LCZ sensitive to change.	Moderate The vegetation clearing associated with the proposal would impact the existing landscape character through the widening of the cleared area adjacent to the highway. This would have a moderate magnitude of change to this LCZ.	High/moderate
LCZ4 Rural	Low The farmland located on both sides of the Newell Highway in the LCVIA study area has largely been cleared of vegetation this gives the LCZ some capacity to absorb change.	Low The proposal would slightly increase the visual prominence of the road corridor; it is assessed that this would have a low magnitude of change in this LCZ.	Low

Visual impact assessment

Table 6-53 outlines the results of the visual impact assessment of the following development. Overall, the visual impacts of the proposal are low due to most of the visual receptors being road users travelling on the Newell Highway. There are few residential buildings in the vicinity of the proposal, the closest being at Viewpoint 4, approximately 300 metres from the proposal. The moderate visual impact at this viewpoint is largely mitigated by distance, the nature of the proposal works and the flat landscape.

Table 6-53: Visual impact assessment

Viewpoint	Receptors	Sensitivity	Magnitude	Visual impact
Viewpoint 1	Motorists and other road users	Low	Low	Low Road users travelling along the Newell Highway have a low sensitivity to changes in the road corridor due to the speed of travel and no stopping opportunities (e.g. rest areas or lookouts).

Viewpoint	Receptors	Sensitivity	Magnitude	Visual impact
				Changes to the visual environment from the proposal include the raising of the road at the culvert locations and from the clearing of vegetation for the construction. These changes are assessed as having a low magnitude of impact. The visual impact from the proposal at this viewpoint is Low.
Viewpoint 2	Motorists and other road users	Low	Low	Low Road users entering the intersection of the Newell Highway, Bewleys Road, and Lows Road have a low sensitivity to changes in the road corridor due to the speed of travel. No permanent works are proposed at this intersection however clearing for the construction activities and the raised pavement from the installation of the new culverts would be visible to the north and south from these viewpoints. The road infrastructure remains the dominant feature at these viewpoints and there would be a low visual impact from the proposal.
Viewpoint 3	Motorists and other road users	Low	Low	
Viewpoint 4	Residents, workers and visitors to property	High	Negligible	Negligible The closest residence to the Newell Highway is located approximately300 metres to the west of the proposal. Due to the distance and vegetation between the visual receptors and the highway the residence is visually separated from the road corridor and there would be negligible visual impact from the proposal. The proposal would have a negligible visual impact.
Viewpoint 5	Residents, workers and visitors to property	Moderate	Low	Low Residents at Billabong Station, 4359 Newell Highway access the Newell Highway at this viewpoint. No permanent works are proposed at this intersection however vegetation clearing would be undertaken. The road infrastructure remains the dominant feature at this viewpoint and there would be a low visual impact from the proposal.

6.10.4 Mitigation measures

Table 6-54 lists the landscaper character and visual amenity mitigation measures that would be implemented by the proposal. Other mitigation measures that would contribute to the management of visual impacts are identified in the section 6.1.4 (Biodiversity).

Table 6-54: Landscape character and visual impact mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Visual impact of construction work	Work sites, including construction areas and supporting ancillary facilities will be managed to minimise visual impacts, including appropriate fencing or screening (e.g. use of shade cloth) of areas used for storage of equipment, parking, stockpile screening and arrangements for the storage and removal of rubbish and waste materials.	Contractor	Construction	Additional safeguard
Light spill	The design of temporary lighting will be undertaken in accordance with the requirements in *Australian Standard AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting* and will avoid unnecessary light spill on adjacent receivers.	Contractor	Construction	Additional safeguard
Vegetation removal	Native vegetation removal will be minimised through detailed design and during construction.	Transport / Contractor	Detailed design, Construction	Additional safeguard
Stabilisation of disturbed areas	Progressively implement revegetation work to limit erosion and to establish vegetation. This will include the use of cleared material as part of revegetation work where feasible. Any plants and seeds mixes selected for revegetation should reflect the existing vegetation communities and landscape character.	Transport / Contractor	Construction	Additional safeguard

6.11 Socio-economic

A socio-economic assessment has been carried out to assess the potential impacts during construction and operation of the proposal.

6.11.1 Methodology

Study area

The study area for the socio-economic assessment considers:

- 2021 Australian Bureau of Statistics Census data from Weddin, Forbes and Bland LGAs
- social and recreational infrastructure, and places of community significance within the Weddin, Forbes and Bland LGAs
- community values held by the people that live and work in Forbes, West Wyalong, Grenfell, Wirrinya, and Corinella
- previous assessments and communications between Transport and residents about the proposal.

Methodology

A desktop search of the following relevant databases was conducted on 11 August 2026:

- 2021 Census data: Weddin (LGA18100) (ABS, 2021)
- 2021 Census data: Forbes (LGA12900) (ABS, 2021)
- 2021 Census data: Bland (LGA10800) (ABS, 2021)
- Newell Highway – West Wyalong to Forbes Flood Immunity Preliminary Environmental Investigation. Prepared by Jacobs on behalf of Transport (Jacobs, 2021)
- Major Projects website (NSW Government, 2026)
- Weddin, Forbes and Bland LEP land use zoning and community profiles.

In assessing the level of impact, consideration was given to the sensitivity of the existing socio-economic environment (determined by qualities that influence its resilience to change and capacity to adapt), and the magnitude of change, including the scale, duration, intensity, and scope of the proposal.

The overall degree of impact resulting from the proposal was based on the combination of the environmental sensitivity and magnitude of the impact.

6.11.2 Existing environment

The study area is in the Weddin Shire LGA in the Central West region. Although the proposal is entirely situated within Weddin Shire LGA, socio-economic data was included from Forbes and Bland LGA given its proximity to these LGAs. This is shown in Figure 6-21.

The Newell Highway is a major connection between southeast Queensland and Victoria providing freight, stock, emergency services and tourism connections through and within NSW. TSRs, managed by LLS, are located along the Newell Highway for the extent of the proposal.

Key local and regional characteristics

Key statistics for the Weddin, Forbes and Bland LGAs are outlined in Table 6-55.

Table 6-55: Weddin, Forbes, and Bland LGA 2021 census key statistics

Description	Weddin LGA	Forbes LGA	Bland LGA
Estimated Population	3608	9319	5547
Median weekly household income ($)	1046	1259	1326
Number of people in the labour force (15y+)	1560	4312	2623
Travelled to work by car (%)	59.2	72.0	61.3
Travelled to work by public transport (%)	0.0	0.7	4.5
Average number of motor vehicles per dwelling	2.1	1.9	2.1

Source: (ABS 2021)

Property and land use

Four properties are located within the construction boundary with the nearest resident being 4707 Newell Highway, Corinella around 300 metres to the west of the Newell Highway. One property is privately owned and three are owned by the NSW Government (Crown Land lots). Land use is predominately agriculture comprised of cropping and cattle grazing.

Informal access tracks exist along the Newell Highway providing for agricultural machinery movements for landowners between properties. These tracks are not gazetted or formalized roads.

Regional employment

According to a Labour Force Survey conducted by the Jobs and Skills Australia in May 2026 (Jobs and Skills Australia, 2026), the largest employment sector in the Central West region was health care and social assistance with 15,800 people employed representing 13.5% of the workforce. Retail trade and education and training represented next largest employment sectors with 11,900 people employed for both industries.

The combination of the Central West region and the Orana region to the north had a regional product contributor of $2.5 billion from mining in 2011, and $1.3 billion from agriculture, forest and fishing (Jacobs, 2021). The Lake Cowal Gold Mine is situated approximately 11.5 kilometres to the northwest of the proposal on the western side of Lake Cowal.

Since the end of the gold rush, Weddin Shire's economy has been based on mixed farming and agriculture and in 2024 the shire contributed $244 million to the economy (Regional Development Australia Central West, 2025). The Weddin Shire produces wheat, canola, barley, lambs and wool. Services such as machinery dealerships, wool brokers, grain handling companies, agriculture suppliers and metal fabrication businesses also operate within the Weddin Shire.

The Weddin Shire Council 2024-2025 Annual Report (Weddin Shire Council, 2025) details the employment portfolio for employed people over the age of 15 comprising 22.7% working in agriculture, 3.9% working in local government, and 3.6% working in hospitals.

For the Forbes LGA for employed people over the age of 15 was 8.5% worked in schools, 3.4% worked in agriculture or farming, and 3.3% worked in supermarkets or grocery stores (ABS, 2021). Within Bland LGA, for those over the age 15, 17.5% worked in agriculture or farming, 10.6% worked gold ore mining, and 4.0% worked in local government administration.

The region has in recent years seen development of renewable energy projects including the Wyalong Solar Farm, West Wyalong Solar Farm, Jemalong Solar Farm, Jemalong Solar Thermal Plant and Daroobalgie Solar Farm (NSW Government, 2026). The potential cumulative impact of projects proposed or under construction is addressed in section 6.14.

Places of community significance and values

Weddin Shire derives its name from Weddin Mountain (approximately 51.4 kilometres southeast of the study area). The mountain is a place where indigenous youths underwent a period of ceremonial isolation during their initiation (Weddin Shire Council, 2025). The mountain range rises about 400 meters above the surrounding landscape and is of great significance both to the Wiradjuri people and residents of Weddin Shire.

The Forbes Community Strategic Plan (Forbes Shire Council, 2025) details places of community significance and value throughout the Forbes LGA, including but not limited to Lake Forbes, the Lachlan River and the Central West Livestock Exchange.

Lake Cowal which is NSW's largest natural inland lake at approximately 21 kilometres long and 9.5 kilometres wide is within the Bland LGA. Of significance within West Wyalong is a replica of the True Blue Poppet Head and a miner's hut, commemorating the Neeld family's 1894 gold mine.

Education and healthcare

A range of educational facilities are located across the three LGAs. Within the Forbes LGA, there are four primary schools, two high schools and a TAFE campus (Forbes Shire Council, n.d). A range of childcare, preschool, family day care, playgroup and vacation care services are delivered through both community-based and private providers within the Forbes LGA (Forbes Shire Council, n.d). Within Weddin LGA, there are 5 primary schools, two high schools, a TAFE campus (Weddin Mountains Region, 2026). Two childcare centres (Australian Children's Education & Care Quality Authority n.d.) and one mobile early learning childhood service (NSW Department of Education, 2025) are provided within the Weddin LGA. Within the Bland LGA, there are eight primary schools, two high schools and a TAFE campus (SchoolScan AU, 2026). Childcare and early education services within the Bland LGA include the Bland Shire Children Services Unit and several privately operated early learning and childcare facilities (Bland Shire Council, 2026).

Healthcare services within the region are mostly provided through facilities located in Forbes, Grenfell and West Wyalong. Forbes has the largest healthcare facility in the area, Forbes Hospital which is part of the Lachlan Health Service (Forbes Shire Council, n.d). Forbes Hospital provides a 24-hour emergency department, inpatient services, maternity services, surgical

services, renal dialysis, pharmacy, pathology, medical imaging and a range of community health services (NSW Government, 2026). Within Weddin LGA, healthcare services are centred on Grenfell Multipurpose Service (MPS), which provides inpatient, outpatient and community health services to residents of Grenfell and surrounding communities within the Weddin Shire (NSW Government, 2026). The facility operates as part of the Western NSW Local Health District network and functions as the primary provider of healthcare services within the LGA (NSW Government, 2026). Within Bland LGA, healthcare services are primarily located in West Wyalong. The township provides access to general medical, community health and allied health services (NSW Government, 2026).

Mining

The Lake Cowal Gold Mine is situated approximately 11.5 kilometres to the northwest of the proposal on the western side of Lake Cowal. The Cowal operation is an open pit gold mine operated by Evolution Mining since July 2015. The mines workforce is approximately of 480 employees and 800 contractors (Evolution Mining, 2026).

Tourism

Weddin is a region that has a variety of natural attractions which drive the tourism industry. These include Weddin Mountains National Park, Ben Halls Cave and Warroo Game Reserve. Other attractions include the Grenfell Historic Museum, the Big Tennis Raquet and the Goolagong Log Cabin Museum. The Weddin Shire hosts a variety of annual events that attract tourists to the region including the Grenfell Henry Lawson Festival of the Arts, Wyalong Machinery and Antique Fair, Weddin Mountain Muster, the Canola Cup, the Grenfell Show and the Tullibigeal Picnic Races.

Within the Forbes LGA natural attractions that contribute to the local tourism sector include Lake Forbes, Gum Swamp Wildlife Refuge and the Lachlan River. The Forbes LGA also hosts a variety of annual events attracting visitors including Bedgerabong Picnic Races, Forbes Rodeo, Kalari-Lachlan River Arts Festival and the Forbes Motor Show.

Bland Shire offers a broad range attractions to do with people, the landscapes, heritage and attractions of the shire. At West Wyalong two digital kiosks have recently been installed to help visitors find places to eat, things to do and events happening across the district. These offerings include the West Wyalong Heritage Walk, public art, murals, museums and village attractions. The Bland Shire is also designated as a declared fossicking district.

Social and recreational infrastructure

Regional venues for social and recreational use include the Aquatic Center, the Art Gallery, the Grenfell Endemic Gardens, Wallangreen Sculpture Garden, all of which are in Grenfell, approximately 60 kilometres to the east. The wider area also has the Aussie Biscuit Factory, Forbes and District Historical Society Museum, and Sculpture Down, the West Wyalong Stadium along with a range of other social and recreational facilities.

6.11.3 Potential impacts

Construction

Local businesses and residents are unlikely to be significantly impacted by the proposal, however delays and longer travel time for those using this section of the Newell Highway are likely to be experienced. During construction the Newell Highway would remain open and traffic control measures would be in place to management vehicle movement through the construction area (section 6.6). Nearby residents and freight movement along the Highway may experience impacts associated with increased travel time and the required use of detours. Lows Road would be closed for one week during stage one and three for the removal of the temporary intersection which would impact local traffic using this road to access properties. It is not anticipated that the tourism sector of the locality would be negatively impacted by the proposal however vehicles travelling through the construction area may experience delays.

Temporary leases and partial acquisition of several properties would be required for the completion of the proposal comprising 470,997 m^2 for temporarily leases and 328,660 m^2 acquired. Most the land to be leased and acquired is Crown land, a temporary lease would be required over one private property. Leased land would be used for site access or site compound areas for the duration of the proposal and the acquired land would be used for the permanent widening of the road pavement and buffer area. Engagement with impacted landowners would be undertaken.

The informal access tracks that run parallel to the Newell Highway that are used for agricultural vehicle movements between paddocks and properties would be impacted. The tracks within the construction boundary would be removed and are not proposed to be reinstated.

Construction would also impact the use of the TSR and may result in loss of access to parts of the TSR during construction activities. Where possible, these impacts would be minimised and required engagement with LLS and DPHI Crown Lands and associated approvals would be obtained prior to commencement of construction.

There is a potential for minor amenity impacts to occur during the construction stage of the proposal. These impacts would occur due to the presence of construction equipment and activities visible to passing vehicles and residents.

Operation

Operation of the proposal would provide benefit with the highway remaining open for longer during flood events reducing disruption to freight and other vehicle movement through the area as well as connectivity for residents along the highway. benefits.

The flooding assessment completed for the proposal assessed the flood afflux of the proposal during an event like the November 2022 historical flood event, the 20%, 10%, 5% and 1% AEP design flood events, and 2030 and 2100 climate change sensitivity scenarios using the calibrated models to identify potential impacts to properties within the catchment. For the assessment the adopted flood afflux criteria was 25 mm for general residential buildings and 10-20 mm for sensitive receivers. The flood modelling identified potential exceedances of the adopted criteria at one property during a modelled 2022 historical flood event and five properties during the modelled 1% AEP event. These affected properties are already subject to flooding under existing conditions, with existing flood depths generally ranging between approximately 200 mm and 500 mm. Although the proposal results in an increase in flood level at those residential buildings, the increase was considered relatively small compared to the existing flood depths and may not result in a material increase in flood damages (refer to section 6.4).

The proposal includes provision for a new school bus bay should it be required for a future school bus route. This would enable a service to commence without additional road upgrades minimising future impacts to vehicle movement along the highway in this location.

6.11.4 Mitigation measures

Table 6-56 lists the socio-economic mitigation measures that would be implemented by the proposal. Other mitigation measures that would address socio-economic impacts are provided in section 6.9.5.

Table 6-56: Socio-economic mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Communication and stakeholder engagement	A Communications and Stakeholder Engagement Plan will be prepared in accordance with the *Stakeholder and community engagement guidelines* (Transport, 2023) and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The Communications and Stakeholder Engagement Plan will include (as a minimum): • mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • a complaints procedure.	Contractor	Detailed design, Pre-construction, Construction	Additional safeguard

6.12 Waste and resource management

Transport is committed to ensuring the responsible management, avoidance, recovery and reuse of waste within the construction boundary in accordance with the WARR Act. The WARR Act aims to encourage the most efficient use of resources and reduce environmental harm in accordance with the principles of ecologically sustainable development (ESD) and to adhere to the following resource management hierarchy:

- avoidance of unnecessary resource consumption
- resource recovery (including reuse, reprocessing, recycling and energy recovery)
- disposal.

By adopting the above principles, Transport would aim to efficiently reduce resource use, reduce costs and reduce environmental harm in accordance with the principles of ESD.

6.12.1 Policy setting

Legislative framework

The key waste related legislation that is relevant to the proposal include:

- POEO Act: Specifies requirements for licences and the regulation of various activities that have the potential to pollute or harm the environment
- Protection of the Environment Operations (Waste) Regulation 2014: Sets out provisions related to the storage and transportation of waste, special requirements for the management of certain special wastes including asbestos and the exemption of certain occupiers or types of waste from paying waste contributions
- WARR Act: Promotes waste avoidance and resource recovery and establishes a waste management hierarchy which includes reduction, recovery and disposal.

Waste Classification Guidelines

The *NSW Waste Classification Guidelines* (EPA, 2014) provides guidance on the assessment, classification, management and disposal of all waste generated by the proposal. The EPA waste classification process involves the following four parts:

- Part 1 – Classifying the waste: Describes the six basic steps to classify waste.
- Part 2 – Immobilising waste: Waste classified as hazardous in accordance with the Waste Guidelines or harmful to human health and/or the environment because of the high levels of contaminants may not be suitable for disposal to landfill in NSW. This part describes immobilisation of contaminants in waste and associated approval and disposal requirements.
- Part 3 – Waste containing radioactive material: This part assists in identifying the classification and management requirements for solid and liquid wastes containing radionuclides.
- Part 4 – Acid sulfate soils: This part applies to ASS which are unable to be managed on-site. In these cases, off-site disposal to landfill is often the most appropriate management option.

Resource recovery exemptions

Resource recovery exemptions are granted by the EPA where the land application or use of a waste material is a bona-fide, fit for purpose, reuse opportunity that causes no harm to the environment or human health, rather than a means of waste disposal. An exemption facilitates the use of these waste materials outside of certain requirements of the waste regulatory framework.

The *Protection of the Environment Operations (Waste) Regulation 2014* provides exemptions or orders for some of the requirements under the POEO Act or certain wastes and resource recovery activities where it can be demonstrated that waste reuse would not cause harm to human or environmental health. Under these provisions, an application to the EPA is not required but, Transport must demonstrate that all conditions are followed prior to applying any exemption or order. The two provisions which may be applicable to the reuse of materials as part of the proposal are:

- Resource Recovery Exemptions made under Part 9, clause 91 and 92 which relate to the consumption of any material for reuse.
- Resource Recovery Order made under Part 9, clause 93 which covers the requirements for the generation, supply and / or processing of material for reuse.

The following general resource recovery exemptions have been issued by the EPA and are of most relevance to road construction activities:

- excavated natural material
- excavated public road material
- mulch
- reclaimed asphalt pavement
- recovered aggregate
- stormwater

Use of these exemptions would facilitate the re-use of the waste generated by the proposal, particularly excavated soils. Where no specific Resource Recovery Order or Exemption is available for the intended reuse of a waste material, an application to the EPA can be made for a resource recovery exemption.

6.12.2 Existing environment

Existing waste that within the proposal area includes roadside litter and other waste material associated with roadside maintenance including green waste (trees and other removed vegetation), excavated road material (concrete, asphalt, aggregate).

6.12.3 Potential impacts

Construction

Inappropriately managed waste has the potential to result in impacts to air quality, human health, water quality and visual impacts and may result from improper waste handling, storage and transport practices. The significance of these impacts from the proposal is anticipated to be low, as proposed safeguards and management measures would manage potential directs to the surrounding environment.

During construction, the proposal has the potential to generate waste from activities such as:

- vegetation (native, exotic and noxious) removal
- earthworks for temporary access road and associated batters
- earthworks for constructing culverts and batters
- construction of road pavements

Waste streams likely to be generated during construction of the proposal may include:

- excess spoil - indicative cut and fill volumes are outlined in section 3.3.7 and may include potentially contaminated material exposed during earthworks

- green waste from vegetation clearing
- demolition waste (pipes, fencing, guideposts, guard rails) from adjustment to the existing road
- road and building materials including concrete, asphalt and aggregate
- packing materials from items delivered to the site, including pallets, crates, cartons, plastics and wrapping material
- packaging and general waste from staff (lunch packaging, portable toilets etc)
- chemicals, oils, lubricants and other liquid wastes, and batteries from the maintenance of construction plant and equipment
- waste water from wash-down and bunded areas
- redundant erosion and sediment controls.

Material generated by the proposal and unsuitable for construction activities would be classified in accordance with the *NSW Waste Classification Guidelines* (EPA, 2014) and disposed of at an approved materials recycling or waste disposal facility. Final waste classification is required once the volumes of waste requiring offsite disposal during construction are confirmed.

Section 4.2.7 the POEO Act establishes the procedures for issuing licenses for environment protection in relation to various aspects including waste. Clause 35 of Schedule 1 of the POEO Act of details, for road construction activities, when an EPL would be required. The need for an EPL would be reviewed at detailed design and prior to construction once the methodology has been confirmed.

Operation

Waste generation during the operation of the proposal would be minimal and would be like the waste production from the existing road corridor, including:

- roadside litter
- waste material associated with road maintenance
- illegal dumping.

It is not expected that the proposal would result in a substantial increase in amount of waste generated and it would be reused and recycled where possible.

6.12.4 Mitigation measures

Table 6-57 lists the waste mitigation measures that would be implemented by the proposal.

Table 6-57: Waste mitigation measures

Risk	Mitigation measures	Responsibility	Timing	Reference
Waste	A review will be undertaken during detailed design to determine if an EPL under the POEO Act is required for the proposal.	Transport	Detailed design	Additional safeguard
Waste management	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: • measures to avoid and minimise waste associated with the project • classification of wastes and management options (re-use, recycle, stockpile, disposal)	Contractor	Pre-construction, Construction	Section 4.2 of *QA G36 Environmental Protection*

Risk	Mitigation measures	Responsibility	Timing	Reference
	• statutory approvals required for managing on- and off-site waste, or application of any relevant resource recovery exemptions • procedures for storage, transport and disposal • monitoring, record keeping and reporting. The WMP will align Transport's *Waste Management Guideline (EMF-WM-GD-0055)* and relevant Transport Waste fact sheets.			
Waste management	All wastes will be managed and disposed of in accordance with the POEO Act, POEO Waste Regulation and *NSW Waste Classification Guidelines* (NSW EPA, 2014).	Contractor	Construction	Additional safeguard
Waste management	Resource management hierarchy principles will be followed, including: • avoid unnecessary resource consumption as a priority • avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • disposal is undertaken as a last resort.	Contractor	Construction	Additional safeguard
Waste management	Excavated material will be reused on site where feasible and suitable for the intended reuse. Where excavated material cannot be used on site, opportunities for reuse on nearby projects would be investigated.	Contractor	Construction	Additional safeguard
Waste	Any additional fill material required will be sourced from appropriately licensed facilities and/or other construction projects wherever possible. Additional fill material will be sourced and verified as suitable for use in accordance with relevant NSW EPA and Transport guidelines.	Contractor	Construction	Additional safeguard
Waste	If vegetation is to be mulched and transported off site for beneficial reuse, it will be assessed for the presence of weeds, pest, and other disease and a Mulch Management Plan prepared in accordance with the NSW EPA Mulch Order and Exemption.	Contractor	Construction	Additional safeguard
Waste	Waste is not to be burnt on site.	Contractor	Construction	Additional safeguard
Waste	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction	Additional safeguard

6.13 Greenhouse gases and climate change

6.13.1 Existing environment and potential impacts

Table 6-58 provides an assessment of the existing environment and potential impacts from the proposal on greenhouse gases and climate change.

Table 6-58: Existing environment and potential impacts – greenhouse gases and climate change

Environmental factor	Existing environment	Potential impacts
Greenhouse gases	Greenhouse gases include carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons and perfluorocarbons. These gases have heat absorbing capacity or global warming potential. Greenhouse gases in the region would likely be associated with the use of agricultural machinery, other agricultural plant and equipment and heavy and light vehicle use. The operation of the Cowal Mine to the west of the proposal would also contribute to greenhouse gas emissions in the region.	Construction of the proposal is likely to generate greenhouse gases through combustion of fuels from plants and machinery. Manufacturing and transportation of materials would also produce greenhouse gases. During operation, greenhouse gas emissions would continue to be generated by vehicles using the Newell Highway. As the proposal is an upgrade to the highway it would not change the project growth of traffic volumes or the associated change to greenhouse gas emissions. There would be no change to land use from the proposal that would contribute to increase greenhouse gas emissions however vegetation will be cleared. Planting will be undertaken as part of the biodiversity offsetting required for the proposal and any plants and seeds mixes selected for revegetation would reflect the existing vegetation communities and landscape character.
Climate change	Globally average air temperature has warmed by over 1.2 ± 0.1 °C since records began in 1850 (based on 2020 data). Increasing global mean temperatures and changes to the average climate system, driven primarily by higher carbon dioxide levels due to human influence, lead to higher frequency and intensity of extreme weather events globally and in Australia. Significantly, the projected recurrence and intensity of extreme weather events can occur much faster and have a more significant impact than changes to the average climate system state. Climate change has impacted Australia and NSW by increasing the severity and frequency of heatwaves, bushfires, extreme rainfall, flooding and landslides, drought, and extreme winds and cyclones. The *Central West and Orana: Climate Change Snapshot* (DCCEEW 2025) provides the baseline climate (1990-2009 average) for the region with the average temperature being 17.1°C. The	The potential impacts on climate change from the proposal is expected to be minimal, however there will be greenhouse gas emission generated by construction of the proposal. Climate change has potential to result in impacts during operation of the proposal and could include: • extreme heat and heatwaves - accelerated deterioration of road surface infrastructure, resulting in decreased safety for motorists (e.g. potholes) - increased risk to workers during operation from heat stroke, heat stress or heat exhaustion resulting in reduced productivity • extreme rainfall and flooding - increased rainfall intensity along the highway resulting in increased road incidents and safety risks to motorists - erosion of infrastructure foundations resulting in the exposure of concrete (e.g. road base, drainage infrastructure)

Environmental factor	Existing environment	Potential impacts
	snapshot shows that the average temperature increase across the region between 2050 and 2090 is projected to be 0.2°C for a low emissions scenario, 1.2°C under a medium-emissions scenario and 2.0°C under a high-emissions scenario. Average annual rainfall is expected to decrease for the region, however, the severity of extreme rainfall events and storms is expected to increase.	- increased risk of additional scour and erosional impacts on surrounding waterways and the associated environmental impacts (e.g. water quality, ecological implications for species). - accelerated degradation of assets from increased rainfall intensities and prolonged flooding resulting in increased maintenance and operational costs and repairs • increased storms and extreme winds - increased risk to vehicle movements and impact, particularly to high sided vehicles during extreme winds • drought - soil cracking resulting in damage to infrastructure (e.g. culverts, road base, embankments)

Sustainability

Transport is committed to delivering services, projects, operations and programs in a manner that balances economic environmental and social issues to ensure a sustainable transport system for NSW. Sustainability is addressed further in Chapter 8.

6.13.2 Mitigation measures

Table 6-59 lists the greenhouse gases, climate change and sustainability mitigation measures that would be implemented by the proposal.

Table 6-59: Greenhouse gases, climate change and sustainability mitigation measures

Impact	Mitigation measures	Responsibility	Timing	Reference
GHG emissions	The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.	Contractor	Construction	Section 4.4 of *QA G36 Environmental Protection*
GHG emissions	Energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment.	Contractor	Construction	Section 4.4 of *QA G36 Environmental Protection*
GHG emissions	Maintain construction plant and equipment in good working condition, switch off engines when not in use, and avoid idling vehicles where practicable.	Contractor	Construction	Additional safeguard
Climate change	Prepare a climate risk assessment in accordance with the latest Transport Climate Risk Assessment	Transport	Detailed design	Additional safeguard

Impact	Mitigation measures	Responsibility	Timing	Reference
	Guidelines and *AS 5334-2013 Climate change adaptation for settlements and infrastructure - A risk based approach* (Australian standards, 2013). This would include a sensitivity analysis and consideration of climate change impacts on flooding, heat, and bushfire risk.			
Climate change	Incorporate design elements, where applicable at a project scale, to address risks identified in the climate risk assessment.	Transport	Detailed design	Additional safeguard
Hazard and risk	A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to: • details of hazards and risks associated with the activity • measures to be implemented during construction to minimise these risks • record keeping for materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • a monitoring program to assess performance in managing identified risks • contingency measures to be implemented in the event of unexpected hazards, risks arising and emergency situations. The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or Office of Environment and Heritage (OEH) publications.	Contractor	Pre-construction	Additional safeguard
Sustainability	Preparation of a Sustainability Management Plan for the proposal aligning with the Transport *Environment and Sustainability Policy* (2026), *Transport Sustainability Plan 2021* (2021), *Future Transport Strategy* (2022) and *Net Zero and Climate Change Policy* (2023).	Transport	Detailed design	Additional safeguard
Sustainability	Integrate the sustainability requirements, initiatives and opportunities identified in the Sustainability Management Plan into future design.	Transport	Detailed design	Additional safeguard
Sustainability	Review and update the Sustainability Management Plan, as required, to address design development, construction, operation/maintenance stages of the proposal.	Transport and Contractor	Detailed design	Additional safeguard

6.14 Cumulative impacts

6.14.1 Study area

The cumulative impact assessment has considered relevant projects within the three LGAs near the proposal: Weddin, Forbes and Bland.

6.14.2 Newell Highway program of work

As outlined in section 2.1, the proposal originated as part of a wider program of work to upgrade the Newell Highway as part of the *Newell Highway Corridor Strategy* (Transport 2015). Some of the projects that are a part of this program along the Newell Highway are:

- improvement of road alignment at Trewilga, near Peak Hill – completed 2018
- Newell Highway overtaking lanes - 38 overtaking lanes been constructed with the final completed in 2023
- upgrades to the Newell Highway/Mitchell Highway intersection – completed 2023
- Newell Highway Mungle Back Creek to Boggabilla heavy duty pavement – completed April 2021
- Newell Highway Narrabri to Moree heavy duty pavement – completed November 2025
- Parkes bypass – completed November 2025
- pavement upgrade to improve safety and reliability on the Newell Highway north of Moree – not commenced
- Oxley Highway Intersection upgrade – not commenced
- new Dubbo Bridge – not commenced
- widening between Coonabarabran and Narrabri through the Pilliga – not commenced
- realignment at Grong Grong – not commenced
- upgrades at Coonabarabran – not commenced
- upgrades at Boggabilla – not commenced.

Of the projects yet to be constructed none are within the study area and or within 100 kilometres of the study area.

6.14.3 Other projects and developments

A search of the DPHI's Major Projects website and Weddin, Forbes and Bland Shire Council's Development Application Registers was carried out on 27 of August 2026. Projects near the study area or with the potential to occur simultaneously with the proposal are outlined in Table 6-60.

Table 6-60: Present and future projects

Project	Description	Potential for cumulative impacts
Daroobalgie Solar Farm	The project belonging to Pacific Hydro Australia Pty Ltd would involve the development of a 40 MW solar farm, 160 MWh battery storage system and associated infrastructure including a switchyard and overhead transition line. The development would be located about 11 kilometres north-east of Forbes more than 60 kilometres north east of the study area.	Construction of the solar farm may coincide with the construction of this proposal. If construction periods coincide with the proposal there may be additional demand for construction materials and depending on technical requirements for the material may result in supply limitations.

Project	Description	Potential for cumulative impacts
	The project is a state significant development and was determined in June 2024. The expected date for commencement of construction is unknown.	The project is located more than 60 kilometres from the proposal and there are not anticipated to be any cumulative impacts from the operation stage of this project.
Peninsula Solar Farm	The project by Edify Energy Pty Ltd would involve the development of a 130 MW solar farm, 400 MWh battery storage system and associated infrastructure including switching stations and substations. The development would be located within the township of Paytens Bridge, New South Wales about 60 kilometres from the study area. The project is a state significant development and was determined in June 2024. The expected data for commencement of construction was the 2025/2026 financial year.	The end of the construction of the solar farm may coincide with commencement of construction of this proposal. If construction periods coincide with the proposal there may be additional demand for construction materials and depending on technical requirements for the material may result in supply limitations. The project is located more than 60 kilometres from the proposal and there are not anticipated to be any cumulative impacts from the operation stage of this project.
Cowal Gold Operations underground development	Evolution Mining Pty Ltd, the owners and operators or Cowal Gold Mine, lodged an application for the consent to expand mining operations to include a new underground mine, including extension of mine life from 2032 to 2039. The project is located 11.5 kilometres west of the study area, on the western edge of Lake Cowal. The application was approved in November 2022 and operation of the underground commenced in 2024.	No construction or operational cumulative impacts are anticipated.

6.14.4 Potential impacts

Cumulative impacts are those that result from the successive, incremental, and/or combined effects of a proposal when added to other existing, planned, and/or reasonable anticipated future proposals. Potential impacts may include:

- Traffic and transport - During construction, there may be additional heavy vehicle movements on the Newell Highway resulting in cumulative impacts from potential delays. It is anticipated that the cumulative impacts on traffic would be minor/negligible, with the implementation of safeguards and management measures.
- Aboriginal heritage - The proposal has the potential to contribute to cumulative impacts to Aboriginal cultural records of the area through direct impacts during construction. No additional impacts to Aboriginal sites are anticipated during the operation of the proposal and, therefore, no further cumulative impacts to Aboriginal heritage.
- Socio-economic - Cumulative socio-economic impacts during construction may arise from the combined effects of multiple projects occurring within the same region. The construction activities would provide employment in construction related jobs, and business opportunities through provision of goods and services. This has the potential to be a positive cumulative impact.

Separation distances between the proposal and the other projects in the region means potential for any other cumulative construction and operational impacts, such as on biodiversity, air quality, noise and visual amenity, is considered unlikely.

6.14.5 Mitigation measures

Table 6-61 lists the cumulative impact mitigation measures that would be implemented by the proposal.

Table 6-61: Cumulative mitigation measures

Impact	Mitigation measures	Responsibility	Timing	Reference
Cumulative construction impacts	The CEMP and associated sub-plans would consider potential cumulative impacts from surrounding development activities as they become known. This would include, but not limited to: • consultation with the proponent and/or lead contractor of adjacent construction projects • preparation of traffic management plans in consultation with adjacent construction projects.	Contractor	Pre-construction, Construction	Additional safeguard

7. Environmental management

This chapter describes how the proposal will be managed to reduce potential environmental impacts during detailed design, construction and operation. A framework for managing potential impacts is provided. A summary of site-specific measures is provided and the licence and/or approval requirements required prior to construction are listed.

7.1 Environmental management plans

Mitigation measures have been identified in the REF to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these mitigation measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A CEMP will be prepared to describe the mitigation measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by the Transport's Environment and Sustainability Officer prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the *QA Specification G36 - Environmental Protection (Management System)*, *QA Specification G38 - Soil and Water Management (Soil and Water Plan)*, *QA Specification G40 - Clearing and Grubbing,* and *QA Specification G10 - Traffic Management*.

7.2 Summary of mitigation measures

Mitigation measures outlined in this REF will be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These mitigation measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The mitigation measures are summarised in Table 7-1.

Table 7-1: Summary of mitigation measures

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
GEN1	General - minimise environmental impacts during construction	A CEMP will be prepared and submitted for review and endorsement of the Transport for NSW Senior Manager Environment and Sustainability prior to commencement of the activity. As a minimum, the CEMP will address the following: • any requirements associated with statutory approvals • details of how the project will implement the identified measures outlined in the REF • issue-specific environmental management plans • roles and responsibilities • communication requirements • induction and training requirements • procedures for monitoring and evaluating environmental performance, and for corrective action • reporting requirements and record-keeping • procedures for emergency and incident management • procedures for audit and review. the endorsed CEMP will be implemented during the undertaking of the activity.	Contractor / Transport	Pre-construction, detailed design, Construction	Additional safeguard
GEN2	General – notifications	All key stakeholders affected by the activity would be notified at least seven days prior to commencement of the activity.	Contractor / Transport	Pre-construction	Additional safeguard
GEN3	General – environmental awareness	All personnel working on site would receive training to ensure awareness of environment protection requirements to be implemented during the project. This would include up-front site induction and regular "toolbox" style briefings.	Contractor / Transport	Pre-construction, Construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
B1	General biodiversity	A Flora and Fauna Management Plan (FFMP) will be prepared in accordance with Transport's *Biodiversity Management Guidelines: Protecting and managing biodiversity on Transport for NSW projects* (Transport, 2024) and implemented as part of the CEMP. The Flora and Fauna Management Plan will include but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones and protected habitat features • pre-clearing survey requirements • procedures for unexpected threatened species finds and fauna handling • procedures addressing relevant matters specified in the DPI *Policy and guidelines for fish habitat conservation and management* (DPI, 2013) • protocols to manage weeds and pathogens • procedures for management of construction activities that may result in fire (for example hot work).	Contractor	Detailed design, Pre-construction, Construction	Section 4.8 of *QA G36 Environmental Protection*
B2	Vegetation, habitat removal and impact to threatened flora and fauna	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Transport	Detailed design	Additional safeguard
B3	Vegetation removal	Pre-clearing surveys will be undertaken in accordance with *Guide 1: Pre-clearing process* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Pre-construction	Additional safeguard
B4	Vegetation removal and removal of fauna habitat	Vegetation and habitat removal will be undertaken in accordance with *Guide 4: Clearing of vegetation and removal of bushrock* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard
B5	Vegetation removal	The unexpected species find procedure is to be followed under *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024) if TECs, threatened flora or fauna not assessed in the biodiversity assessment, are identified in the construction boundary.	Contractor	Construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
B6	Vegetation removal	Native vegetation will be re-established in accordance with *Guide 3: Re-establishment of native vegetation* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Post-construction	Additional safeguard
B7	Vegetation removal	A Tree and Hollow Replacement Plan will be developed in accordance with the *Tree and Hollow Replacement Guidelines* (Transport, 2024). Seed for propagation of replacement plantings will be harvested of otherwise sourced from the local area, where possible.	Transport	Pre-construction	Additional safeguard
B8	Groundwater dependent ecosystems	Interruptions to water flows associated with groundwater dependent ecosystems will be minimised through detailed design.	Transport	Detailed design	Additional safeguard
B9	Removal of fauna habitat	Habitat will be replaced or re-instated in accordance with *Guide 5: Re-use of woody debris and bushrock* and *Guide 8: Artificial hollows* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard
B10	Fauna handling and injury and mortality of fauna	Fauna will be managed in accordance with *Guide 9: Fauna* handling of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard
B11	Aquatic impacts	Impacts to aquatic habitat will be minimised through detailed design.	Transport	Detailed design	Additional safeguard
B12	Fragmentation of habitat corridors	Connectivity measures will be considered for impacts not considered a landscape scale connectivity impact in accordance with *the Draft Wildlife Connectivity Guidelines for Road Projects* (RTA, 2011) or equivalent updated NSW Transport Guidelines. Any connectivity measures implemented will be installed under the supervision of an experienced ecologist.	Transport	Detailed design	Additional safeguard
B13	Edge effects	Exclusion zones will be set up at the limit of clearing in accordance *with Guide 2: Exclusion zones* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard
B14	Aquatic habitat	Aquatic habitat will be protected in accordance with *Guide 10: Aquatic habitats and riparian zones* of the *Biodiversity Management Guideline: Protecting and managing*	Contractor	Construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
		biodiversity on Transport for NSW projects (EMF-BD-GD-0039) (Transport, 2024) and Section 3.3.2 *Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013* (DPI (Fisheries NSW), 2013).			
B15	Construction water	Where water is being pumped from a water body water pumps to be fitted with appropriate fish screen/mesh attachment prior to use. Water to be discharged into a bunded or screened site to allow any fish caught to be rescued and immediately released back into the aquatic environment	Contractor	Construction	Additional safeguard
B16	Invasion and spread of weeds	Weed species will be managed in accordance *with Guide 6: Weed management* of the *Biodiversity Management Guideline: Protecting and managing biodiversity on Transport for NSW projects* (EMF-BD-GD-0039) (Transport, 2024).	Contractor	Construction	Additional safeguard
B17	Construction lighting	Artificial light impacts will be minimised through detailed design. During nightwork, it is recommended that all artificial lighting be directed away from sensitive receivers (i.e. adjacent habitat etc.) to limit indirect impacts to biodiversity values.	Contractor	Construction	Additional safeguard
AH1	Impact on Aboriginal heritage	An Aboriginal Heritage Management Plan (AHMP) will be prepared in accordance with the *Procedure for Aboriginal cultural heritage consultation and investigation* (Transport, 2025) and *Unexpected Heritage Items Procedure* (Transport, 2022) and implemented as part of the CEMP. It will provide specific measures and controls to be implemented for managing impacts on Aboriginal heritage and the long term storage or reburial of recovered artefacts. The AHMP will be prepared in consultation with all relevant Aboriginal groups.	Contractor	Pre-construction, Construction	Section 4.9 of *QA G36 Environmental Protection*
AH2	Impact on Aboriginal heritage	Complete a stage 3 Aboriginal cultural heritage assessment and associated reporting for the proposal under the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (Transport, 2025), *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010).	Transport	Detailed Design, Pre-construction	Additional safeguard
AH3	Impact on Aboriginal heritage	An application for an AHIP will be made under section 90A of the NPW Act for the specified Aboriginal sites and Aboriginal objects contained within the following sites: • AHIMS ID: 43-5-0093	Transport	Pre-construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
		• AHIMS ID: 43-5-0095. If any additional sites (or components to existing sites) are identified during the Stage 3 PACHCI, they may be included in the AHIP application. Management of identified or salvaged artefacts will be carried out in accordance with the AHIP.			
AH4	Impact on Aboriginal heritage	An ACHAR report must be completed in support of an AHIP application to Heritage NSW.	Transport	Pre-construction	Additional safeguard
AH5	Impact on Aboriginal heritage	Establish and maintain exclusion zones and protective fencing around the relevant AHIMS sites to prevent indirect impacts from construction activities such as vehicle movement, stockpiling, and vibration.	Contractor	Pre-construction, Construction	Additional safeguard
AH6	Aboriginal heritage	Update the ACHAR and AHIMS search if more than 12 months has passed since the last assessment to ensure all heritage data is current and accurate.	Transport / Contractor	Pre-construction	Additional safeguard
AH7	Impact on Aboriginal heritage	Deliver a heritage induction to all site personnel, including information on Aboriginal cultural heritage values, obligations of all site contractors under the conditions of the AHIP, legislative obligations under the NPW Act, and site-specific sensitivities.	Contractor	Construction	Additional safeguard
AH8	Impact on Aboriginal heritage	The Unexpected Heritage Items Procedure (Transport, 2022) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction. This applies where Transport for NSW does not have approval to disturb the object/s or where a specific measure for managing the disturbance (apart from the Procedure) is not in place. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Section 4.9 of *QA G36 Environmental Protection*
NAH1	Impact on unexpected Non-Aboriginal heritage	The S*tandard Management Procedure - Unexpected Heritage Items* (Transport, 2022) will be followed in the event that any unexpected heritage items, archaeological remains or potential relics of non-Aboriginal origin are encountered. Work will only re-commence once the requirements of that Procedure have been satisfied.	Contractor	Construction	Section 4.9 of *QA G36 Environmental Protection*

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
H1	Soil and water management	A Soil and Water Management Plan (SWMP) will be prepared and implemented as part of the CEMP. The SWMP will identify all reasonably foreseeable risks relating to soil erosion and water pollution and describe how these risks will be addressed during construction.	Contractor	Detailed design, Pre-construction, Construction	Section 2.1 of *QA G38 Soil and Water Management*
H2	Erosion and sedimentation	A site specific erosion and sediment control plan (ESCP) and progressive ESCPs for each stage of work during will be prepared and implemented prior to site disturbance and each stage of work commencing. The ESCP will include (but not limited to): • runoff, diversion, and drainage points for separation of clean offsite water and dirty onsite water • sediment fences and basins • installation of measures at work entry and exit points to prevent the loss of soil • regular inspections of the site to identify potential problems and allow for rectification or repair • measure to stabilise concentrated flows • measures to manage sediment tracking on to public roads • engagement of suitably qualified erosion and sediment control specialist to advise on erosion and sediment control issues and undertake inspections.	Contractor	Pre-Construction, Construction	Section 2.2 of *QA G38 Soil and Water Management*
H3	Erosion and sedimentation	Erosion and sediment control measures applying to any works below the 2-year ARI flood level will be designed in accordance with *Managing Urban Stormwater: Soils and Construction. Volume 1* (Landcom, 2004).	Contractor	Construction	Additional safeguard
H4	Erosion and sedimentation	Stabilisation of disturbed lands will be carried out progressively as construction stages are completed, ensuring rehabilitation is effective to reduce the erosion hazard.	Contractor	Construction	Additional safeguard
H5	Accidental spills	A spill management plan will be developed as part of the CEMP and communicated to workers on site. Appropriate aquatic spill kits are to be maintained on site. These spills kits must be specific for working within a freshwater environment.	Contractor	Construction	Additional safeguard
H6	Bland Creek water quality	If Bland Creek waters are to be used for construction purposes, additional monitoring closer to the commencement of construction should be undertaken to assess the suitability for use.	Contractor	Pre-construction, Construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
H7	Flooding	A Flood Response Management Plan will be prepared as part of the CEMP to address the risks associated with the flooding during earthworks. The Flood Response Management Plan will include (but limited to): • Flood risk mapping and identification of flood prone areas. • Procedures for monitoring flood conditions and mitigating associated risks. • Triggers for action based on rainfall thresholds and flood warnings. • Pre-flood preparation such as securing of loose material, equipment, fuels and chemicals and identification of flood-free storage areas. • Measures to stabilise and secure work areas and compounds in the event of flooding.	Contractor	Construction	Additional safeguard
H8	Groundwater	Targeted shallow monitoring or standpipe piezometers should be undertaken in areas where construction works including excavation may extend below approximately 2.5 mbgl, particularly at low-lying flood-prone locations would inform detailed design and construction of the proposal.	Transport	Detailed design	Additional safeguard
H9	Groundwater	If any excavation works are proposed to a depth of 15 mbgl or greater, a monitoring bore should be installed near the proposed works into the deeper regional shallow alluvial aquifer, to confirm depth to groundwater and assess potential impacts.	Transport	Detailed design, Pre-construction	Additional safeguard
SC1	Unexpected Contamination	An Unexpected Finds Protocol will be prepared and included within the CEMP to manage unexpected occurrences of contaminated materials. If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Transport for NSW Senior Manager Environment and Sustainability and / or NSW EPA.	Contractor	Construction	Section 4.2 of *QA G36 Environmental Protection*
SC2	Accidental spill to land	A site-specific emergency spill plan will be developed and include spill-management measures in accordance with relevant EPA guidelines. The plan will address measures to be implemented in the event of a spill, including initial response and containment, notification of emergency services and relevant authorities (including Transport and NSW EPA officers).	Contractor	Pre-construction, Construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
SC3	Soil stabilisation and restoration	The rehabilitation of disturbed areas will be carried out progressively as construction stages are completed, and in accordance with: • Landcom's Managing Urban Stormwater: Soils and Construction series • Roads and Maritimes' *Guideline for Batter Stabilisation Using Vegetation* (2015).	Contractor	Construction	Additional safeguard
TT1	Traffic and transport	A Construction Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. TMP will be prepared in accordance with the *Transport Traffic Control at Work Sites Manual* (Transport, 2026) and *QA Specification G10 Control of Traffic* (Transport, 2026). The TMP will include: • confirmation of haulage routes • measures to maintain access to local roads and properties • site specific traffic control measures outlining measures (including signage) to manage and regulate traffic movement • access to construction sites including entry and exit locations and measures to prevent construction vehicles queuing on public roads • requirements and methods to consult and inform the local community of impacts on the local road network • a response plan for any construction traffic incident • monitoring, review, and amendment mechanisms.	Contractor	Pre-construction, Construction	Section 4.8 of *QA G36 Environmental Protection*
TT2	Construction site access	Construction site access will be designed and implemented in consideration of: • road design guidelines and turning paths for heavy vehicles • appropriate sight distances to allow traffic to safely enter and exit • visibility of compliant warning and way-finding signs • use of accredited traffic controllers, where appropriate, and/or other controls to separate, slow down, or temporarily stop traffic for safe entry/exit • minimising use of local roads, where practical.	Contractor	Pre-construction, Construction	Additional safeguard
TT3	Traffic management measures	Any temporary traffic diversions or road closures will be implemented in accordance with Transport Management Centre and Council requirements and notified to emergency services.	Contractor	Construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
TT4	Property access	Property access will be maintained where feasible and reasonable and property owners will be consulted well in advance of work starting that may temporarily restrict or control access.	Contractor	Construction	Additional safeguard
TT5	Local road closures	Council will be consulted with prior to any local road closures to identify suitable mitigation measures such as detour routes.	Contractor	Pre-construction, Construction	Additional safeguard
TT6	Road closures	A ROL will be obtained prior on road works commencing.	Contractor	Pre-construction	Additional safeguard
TT7	Damage to local roads	Any damage to the local road network identified to be caused by construction vehicles for the proposal will be remediated by the contractor.	Contractor	Construction	Additional safeguard
TT8	Pedestrian and cyclist	Appropriate traffic controls would be implemented to manage pedestrian or cyclist movement during construction. This may include a traffic controller or vehicle escorting them through the construction works.	Contractor	Construction	Additional safeguard
TT9	Heavy vehicle	Traffic controllers should coordinate the movement of heavy vehicles through the work site.	Construction contractor	Construction	Additional safeguard
TT10	Reduce speeds, traffic delays and disruptions during construction	Road users, local communities and the freight industry will be provided with timely, accurate, relevant and accessible information about changed traffic arrangements and delays owing to construction activities.	Transport and Construction Contractor	Construction	Additional safeguard
TT11	Traffic control devices	Traffic control devices should be installed in accordance with Australian Standards to protect the work areas.	Construction Contractor	Construction	Additional safeguard
NV1	Construction noise	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the ICNG (DECC, 2009) and identify: • all potential significant noise and vibration generating activities associated with the activity. • feasible and reasonable mitigation measures to be implemented in accordance with Appendix B of the CNVG (Transport, 2026) and the Noise and Vibration Assessment (Stantec 2026) • A monitoring program to assess performance against relevant noise criteria	Contractor	Pre-construction, Construction	Section 4.6 of *QA G36 Environmental Protection*

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
		• Arrangements for consultation with sensitive receivers, including notification and complaint handling procedures • Contingency measures to be implemented in the event of non-compliance with noise criteria.			
NV2	Noise and vibration	All sensitive residential receivers likely to be affected will be notified at least seven days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of: • the project • the construction period and construction hours • contact information for project management staff • complaint and incident reporting • how to obtain further information.	Contractor	Construction	Additional safeguard
NV3	Construction Noise	Where feasible, works will be carried out within standard construction hours: • 7am-6pm Monday to Friday • 8am-1pm Saturdays • no work on Sundays or public holidays. Works are not to be carried out during evening or night-time hours unless absolutely necessary for road safety reasons.	Contractor	Construction	Additional safeguard
NV4	Night work and high impact activities	Where night work is essential, the use of high impact machinery such as vibratory rollers, rock breakers and jackhammers will be avoided in the vicinity of sensitive receivers, where possible.	Contractor	Construction	Additional safeguard
NV5	Plant compliance and quieter methods	All plant and equipment will comply with relevant noise emission standards. Where feasible, quieter construction methods would be used.	Contractor	Construction	Additional safeguard
NV6	Respite periods and scheduling	Where work is predicted to exceed noise management levels, appropriate mitigation measures and respite periods will be implemented in accordance with CNVG.	Contractor	Construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
AQ1	Air quality impacts	An Air Quality Management Plan (AQMP) will be prepared to detail the air quality control measures and procedures to be undertaken during construction, including: • air quality and dust management objectives that are consistent with regulator's guidelines • potential sources and impacts of dust, identifying all dust-sensitive receptors • mitigation measures to minimise dust impacts on sensitive receptors and the environment • a dust monitoring program to assess compliance with the identified objectives • contingency plans to be implemented in the event of non-compliances and/or complaints about dust.	Contractor	Pre-construction, Construction	Section 4.4 of *QA G36 Environmental Protection*
AQ2	Air quality impacts	Areas of exposed surface are to be minimised throughout the construction site planning and programming, to reduce the area of potential construction dust emission sources.	Contractor	Construction	Additional safeguard
AQ3	Air quality impacts	Control measures, such as compaction stabilisation or covering will be implemented to minimise dust from stockpile sites.	Contractor	Construction	Additional safeguard
AQ4	Air quality impacts	Dust suppression measures, such as the use of water carts or soil binders, will be used in any unsealed surfaces and other exposed areas.	Contractor	Construction	Additional safeguard
AQ5	Air quality impacts	All trucks will be covered when transporting materials to and from the site.	Contractor	Construction	Additional safeguard
AQ6	Air quality impacts	Construction activities that generate dust will be avoided or modified during high wind periods.	Contractor	Construction	Additional safeguard
AQ7	Air quality impacts	Work activities will be reviewed if the dust suppression measures are not adequately restricting dust generation.	Contractor	Construction	Additional safeguard
AQ8	Air quality impacts	Rehabilitation of completed sections will be progressively undertaken.	Contractor	Construction	Additional safeguard
PL1	Property acquisitions	All property acquisition will be carried out in accordance with the *Guide to Property Acquisition in NSW* (Transport, 2022) and the *Land Acquisition (Just Terms Compensation) Act 1991*.	Transport	Pre- construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
PL2	Utilities	Prior to the commencement of works: • the location of existing utilities and relocation details will be confirmed following consultation with affected utility owners • further assessment will be undertaken if the scope or location of proposed utility relocation works falls outside of the assessed proposal scope and footprint.	Contractor	Detailed design, Pre-construction	Additional safeguard
PL3	Property adjustments	Consult with affected property owners where property adjustments (e.g. access, fencing) will be required.	Transport	Pre- Construction, Construction	Additional safeguard
PL4	Property reinstatement	All land temporarily leased for the proposal will be returned to landowners in their pre-construction condition or as otherwise agreed with the landowner as soon as possible following completion of construction activities.	Contractor	Construction	Additional safeguard
PL5	TSR impacts	Transport will consult with LLS and DPHI Crown Lands and obtain any required approvals prior to commencement of construction.	Transport	Detailed design, pre-construction	Additional safeguard
LC1	Visual impact of construction work	Work sites, including construction areas and supporting ancillary facilities will be managed to minimise visual impacts, including appropriate fencing or screening (e.g. use of shade cloth) of areas used for storage of equipment, parking, stockpile screening and arrangements for the storage and removal of rubbish and waste materials.	Contractor	Construction	Additional safeguard
LC2	Light spill	The design of temporary lighting will be undertaken in accordance with the requirements in *Australian Standard AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting* and will avoid unnecessary light spill on adjacent receivers.	Contractor	Construction	Additional safeguard
LC3	Vegetation removal	Native vegetation removal will be minimised through detailed design and during construction.	Transport / Contractor	Detailed design, Construction	Additional safeguard
LC4	Stabilisation of disturbed areas	Progressively implement revegetation work to limit erosion and to establish vegetation. This will include the use of cleared material as part of revegetation work where feasible. Any plants and seeds mixes selected for revegetation should reflect the existing vegetation communities and landscape character.	Transport / Contractor	construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
SE1	Communication and stakeholder engagement	A Communications and Stakeholder Engagement Plan will be prepared in accordance with the *Stakeholder and community engagement guidelines* (Transport, 2023) and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The Communications and Stakeholder Engagement Plan will include (as a minimum): • mechanisms to provide details and timing of proposed activities to affected residents, including changed traffic and access conditions • a complaints procedure.	Contractor	Detailed design, Pre-construction, Construction	Additional safeguard
W1	Waste	A review will be undertaken during detailed design to determine if an EPL under the POEO Act is required for the proposal.	Transport	Detailed design	Additional safeguard
W2	Waste management	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will include but not be limited to: • measures to avoid and minimise waste associated with the project • classification of wastes and management options (re-use, recycle, stockpile, disposal) • statutory approvals required for managing on- and off-site waste, or application of any relevant resource recovery exemptions • procedures for storage, transport and disposal • monitoring, record keeping and reporting. The WMP will align Transport's *Waste Management Guideline (EMF-WM-GD-0055)* and relevant Transport Waste fact sheets.	Contractor	Pre-construction, Construction	Section 4.2 of *QA G36 Environmental Protection*
W3	Waste management	All wastes will be managed and disposed of in accordance with the POEO Act, POEO Waste Regulation and *NSW Waste Classification Guidelines* (NSW EPA, 2014).	Contractor	Construction	Additional safeguard
W4	Waste management	Resource management hierarchy principles will be followed, including: • avoid unnecessary resource consumption as a priority • avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • disposal is undertaken as a last resort.	Contractor	Construction	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
W5	Waste management	Excavated material will be reused on site where feasible and suitable for the intended reuse. Where excavated material cannot be used on site, opportunities for reuse on nearby projects would be investigated.	Contractor	Construction	Additional safeguard
W6	Waste	Any additional fill material required will be sourced from appropriately licensed facilities and/or other construction projects wherever possible. Additional fill material will be sourced and verified as suitable for use in accordance with relevant NSW EPA and Transport guidelines.	Contractor	Construction	Additional safeguard
W7	Waste	If vegetation is to be mulched and transported off site for beneficial reuse, it will be assessed for the presence of weeds, pest, and other disease and a Mulch Management Plan prepared in accordance with the NSW EPA Mulch Order and Exemption.	Contractor	Construction	Additional safeguard
W8	Waste	Waste is not to be burnt on site.	Contractor	Construction	Additional safeguard
W9	Waste	Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction	Additional safeguard
CC1	GHG emissions	The use of alternative fuels and power sources for construction plant and equipment will be investigated and implemented, where appropriate.	Contractor	Construction	Section 4.4 of *QA G36 Environmental Protection*
CC2	GHG emissions	Energy efficiency and related carbon emissions will be considered in the selection of vehicle and plant equipment.	Contractor	Construction	Section 4.4 of *QA G36 Environmental Protection*
CC3	GHG emissions	Maintain construction plant and equipment in good working condition, switch off engines when not in use, and avoid idling vehicles where practicable.	Contractor	Construction	Additional safeguard
CC4	Climate change	Prepare a climate risk assessment in accordance with the latest Transport Climate Risk Assessment Guidelines and *AS 5334-2013 Climate change adaptation for settlements and infrastructure - A risk based approach* (Australian standards, 2013). This would include a sensitivity analysis and consideration of climate change impacts on flooding, heat, and bushfire risk.	Transport	Detailed design	Additional safeguard

No.	Impact	Mitigation measures	Responsibility	Timing	Reference
CC5	Climate change	Incorporate design elements, where applicable at a project scale, to address risks identified in the climate risk assessment.	Transport	Detailed design	Additional safeguard
CC6	Hazard and risk	A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The HRMP will include, but not be limited to: • details of hazards and risks associated with the activity • measures to be implemented during construction to minimise these risks • record keeping for materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • a monitoring program to assess performance in managing identified risks • contingency measures to be implemented in the event of unexpected hazards, risks arising and emergency situations. The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or Office of Environment and Heritage (OEH) publications.	Contractor	Pre-construction, Construction	Additional safeguard
S1	Sustainability	Preparation of a Sustainability Management Plan for the proposal aligning with the Transport *Environment and Sustainability Policy* (2026), *Transport Sustainability Plan 2021* (2021), *Future Transport Strategy* (2022) and *Net Zero and Climate Change Policy* (2023).	Transport	Detailed design	Additional safeguard
S2	Sustainability	Integrate the sustainability requirements, initiatives and opportunities identified in the Sustainability Management Plan into future design.	Transport	Detailed design	Additional safeguard
S3	Sustainability	Review and update the Sustainability Management Plan, as required, to address design development, construction, operation/maintenance stages of the proposal.	Transport and Contractor	Detailed design	Additional safeguard
C1	Cumulative construction impacts	The CEMP and associated sub-plans would consider potential cumulative impacts from surrounding development activities as they become known. This would include, but not limited to: • consultation with the proponent and/or lead contractor of adjacent construction projects • preparation of traffic management plans in consultation with adjacent construction projects.	Contractor	Pre-construction, Construction	Additional safeguard

7.3 Licensing and approvals

The licences and approvals outlined in Table 7-2 have been identified as required for the proposal on the current proposal design. As the design progresses and consultation with agencies and stakeholders is undertaken, approval requirements may be refined. Any required licences and approvals would be obtained prior to the commencement of construction works.

Table 7-2: Summary of licensing and approvals required

Instrument	Requirement	Timing
Protection of the Environment Operations Act 1997 (s48)	The need for an EPL would be reviewed at detailed design and prior to construction once the methodology has been confirmed.	Prior to start of the activity
National Parks and Wildlife Act 1974 (s90)	Aboriginal heritage impact permit	Prior to start of the activity
Water Management Act 2000 (s90 / 91)	Transport would consult with the NSW DCCEEW to ensure that all applicable licences and / or approvals for any impacts to surface and ground water are obtained prior to construction.	Prior to start of the activity
Crown Land Management Act 2016 (Division 3.4, 5.5 and 5.6)	Lease or licence to occupy areas of Crown land.	Prior to start of the activity
Roads Act 1933 (s138)	A Road Occupancy Licence would need to be obtained from the relevant roads authority by the contractor	Prior to start of the activity

8. Sustainability

8.1 Policy context

Transport is committed to ensuring socially and environmentally beneficial transport outcomes by embedding sustainable initiatives into transport infrastructure.

Sustainability requirements and objectives have been embedded in the proposal development consistent with *Transport Sustainability Plan 2021* focus areas and goals (Table 8-1).

Table 8-1: Transport Sustainability Plan 2021 focus areas and goals

Sustainability focus areas	Sustainability goals
Respond to climate change	Net zero emissions by 2050 Consider climate change risks in all decisions
Protect and enhance biodiversity	No net loss of biodiversity
Improve environmental outcomes	Develop a circular economy for transport by designing waste and pollution out and keeping products and materials in use Reduce environmental impacts of projects and operations
Procure responsibility	All suppliers meet the standards in the Transport Supplier Sustainability Charter Social and environmental outcomes included in all procurement decisions Go beyond minimum compliance targets in Aboriginal Procurement Policy
Partner with communities	Always leave a positive legacy for communities as a result of projects Uphold, apply and report on community engagement
Respect heritage and culture	Aboriginal culture is integrated and preserved Acknowledging and incorporating culture through stories, examples, and best practice
Align spend and impact	All decisions consider value created from sustainability alongside financial analysis Reduce whole of life costs for the transport network
Empower customers to make sustainable choices	Use customer journeys to inform, engage and inspire more sustainable practices and demonstrate Transport's progress

A range of opportunities and initiatives have been identified and developed for the proposal in line with the eight focus areas and are discussed in section 8.2.

8.2 Sustainability issues, opportunities and initiatives

Table 8-2 lists some sustainability objectives and initiatives for the key stages of the proposal.

Table 8-2: Sustainability objectives and initiatives for the proposal

Sustainability focus areas	Sustainability initiative	Stages of the proposal			
		Concept design (REF)	Detailed design	Procurement	Construction
Respond to climate change	Undertake a project level Climate Risk Assessment and consider adaptation measures for all climate change risks with an original risk rating of moderate or above during detailed design and construction.		✓ Refer to section 6.13		✓
	Provide a resilient design that responds to impacts of climate change i.e. flood damage, fire damage		✓		
	Design for higher surface temperatures to ensure design life is achieved		✓		
	Explore opportunities to reduce an overall emissions through innovative practices		✓	✓	✓
	Ensure construction site compounds perform sustainably. Initiatives include: • net zero emissions • renewable energy use • sustainable site compound water reuse				✓
Protect and enhance biodiversity	Report on the findings of monitoring undertaken of biodiversity mitigation effectiveness including lessons learnt				✓
	Minimise the footprint of the project to reduce environmental disturbance		✓		✓
	Engage with local Aboriginal communities to understand fauna use of the local area	✓	✓		✓
	Avoid the loss of mature trees in the design	✓	✓		
	Where possible use the removed trees as hollows back on the proposal				✓
	Ensure water quality is not impacted through discharges				✓

Sustainability focus areas	Sustainability initiative	Stages of the proposal			
		Concept design (REF)	Detailed design	Procurement	Construction
Improve environmental outcomes	Develop waste strategy with a focus of diverting waste from landfill				✓
	Incorporate the use of recycled materials where possible		✓	✓	✓
	100% of useable spoil is reused, recycled or repurposed		✓		✓
Procure responsibly	All paper used in project offices is made of post-consumer recycled content or carbon neutral certified				✓
	Investigate the use of low carbon or reduced carbon construction materials			✓	✓
	Develop a sustainable procurement strategy for the project			✓	
	Use locally sourced materials where available, reasonable and feasible			✓	✓
	Employ a local labour force where available, reasonable and feasible			✓	✓
	Consider project staging to increase sustainability outcomes		✓		✓
	Engage Indigenous companies throughout the project lifecycle			✓	✓
Partner with communities	Keep the community informed and engaged with the proposal	✓	✓		✓
Respect and heritage culture	Demonstrate alignment with the Transport PACHCI	✓	✓	✓	
	Look for opportunities to integrate jobs for Aboriginal peoples related to the project			✓	✓
	Investigate incorporating traditional Aboriginal ceremonies in some stages of the project e.g. smoking ceremonies		✓		✓
Align spend and impact	Establish systems and processes to ensure sustainability (environmental, social and economic) criteria are			✓	

Sustainability focus areas	Sustainability initiative	Stages of the proposal			
		Concept design (REF)	Detailed design	Procurement	Construction
	assessed in procurement of goods and services				
	Provide regular reports on progress towards all sustainability objectives and targets				✓
Empower customers to make sustainable choices	Do not overdesign the road beyond the requirements of the proposal	✓	✓		

8.3 Sustainability assurance

Transport will ensure requirements are included in relevant contracts for the works and manage the ongoing inclusion and monitor outcomes of sustainability across the project lifecycle. To deliver effective sustainability initiatives, the delivery contractor will be responsible for ensuring requirements are embedded into the design, procurement, costing, construction, and maintenance and reported regularly to Transport.

9. Conclusion

This chapter provides the justification for the proposal. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ESD as defined in Section 193 of the Environmental Planning and Assessment Regulation 2021.

9.1 Justification

The Newell Highway is a vital transport corridor that stretches 1060 kilometres through NSW linking Queensland and Victoria. It is one of Australia's most important freight routes and a vital transport link to regional centres in western NSW.

The Newell Highway between West Wyalong and Forbes is prone to flooding has a history of road closures during periods of heavy rain. The highway is particularly susceptible to flooding in the Lake Cowal / Bland Creek catchment at Marsden when the downstream Lake Cowal's water levels become elevated. Twenty kilometres of the highway can be closed during large floods such as the events in 2016 and 2022 where the highway was closed for six and seven weeks respectively. Extended closures of the Newell Highway result in significant losses in freight productivity, lengthy detours for all road users, adverse impacts on local businesses and social challenges for the communities connected by the highway. The need to improve the flood resilience and reliability of this route has been identified as a key priority in strategies and plans at state, regional and local levels as detailed in section 2.1.

The benefits from the proposal include:

- reduction to the amount of time the highway is closed during and after flood events
- improvements to the safety of all road users
- reduction in lengthy detours due to flood events
- improvements to efficiency and reduction in disruptions to freight movements
- reduction in losses of productivity and economic impacts from flooding
- improvements to connectivity and resilience for reginal communities.

The proposal has been developed through an options development and assessment processes at the strategic and concept design stages. A range of options were considered to address the identified flooding impacts and reduce to the amount of time the highway is closed during and after flood events. These identified the section of the Newell Highway most impacted by flood events and focused on the development of options for the Marsden section. The selection of the preferred option was assessed against the development criteria and whether it aligned with the proposal objective.

Although the proposal would result in some environmental impacts, they have been avoided or minimised where possible through the design and site-specific safeguards and mitigation measures summarised in section 7. The positive benefits of the proposal are considered to outweigh any adverse impacts.

9.2 Objects of the EP&A Act

Table 9-1 describes how the proposal is consistent with the objects of the EP&A Act.

Table 9-1: Objects of the *Environmental Planning and Assessment Act 1979*

Instrument	Requirement
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,	The proposal would improve the number of days the section of the Newell Highway would remain open during and after flood events improving accessibility for not only vehicles traveling through the area but the local community travelling shorter distances. This would contribute to the social and economic welfare of the nearby community. The proposal design, impact, mitigation measures detailed in this REF allow for the proper management, development and conservation of natural and artificial resources.
1.3(b) To promote the supply, delivery and maintenance of housing, including affordable housing,	Not relevant to the proposal.
1.3(c) To promote productivity through the development and management of the State and its resources,	The proposal would improve productivity by increasing the reliability of a key transport and freight corridor. The upgraded road would minimise the duration of road closures and lengthy detours resulting from flooding between Forbes and West Wyalong.
1.3(d) To protect the environment, including the conservation of threatened species of native animals and plants and ecological communities and their habitats,	Construction of the proposal would require clearing of native vegetation and habitat. The impacts on threatened species, populations and ecological communities are discussed in section 6.1.3. The removal of 55.37 hectares of native vegetation and nine scattered trees would be required. This includes 1.74 hectares of vegetation commensurate with a TEC listed under the BC Act, 0.66 hectares of which are commensurate with a TEC listed under the EPBC Act. Assessments of significance have been conducted for the proposal and indicate that impacts to threatened biodiversity are unlikely to be significant under the BC Act, FM Act or EPBC Act. The construction boundary would be further optimised during detailed design with the aim of minimising ecological impacts of the proposal.
1.3(e) To promote resilience to climate change and natural disasters through adaptation, mitigation, preparedness and prevention,	The proposal would promote resilience to climate change and natural disasters by improving the Newell Highway's capacity to withstand and recover from flood events. The proposal would reduce the duration of inundation and improve the network's reliability during and after flood events, supporting regional connectivity and freight movement.
1.3(f) To promote the sustainable management of built and cultural heritage, including Aboriginal cultural heritage,	The study area has been assessed to have low potential to contain archaeological remains mainly due to the lack of any substantial development throughout the nineteenth and twentieth centuries. The proposal would have negligible archaeological impacts. However, to manage this potential risk, the *Unexpected Heritage Items Procedure* (Transport, 2022) would be implemented during construction. Construction of the proposal would directly impact two Aboriginal archaeological sites, comprising a low-density artefact scatter (AHIMS ID: 43-5-0093) and an

Instrument	Requirement
	isolated crystal quartz flake (AHIMS ID: 43-5-0095). Impacts to these sites would be minimised where possible during detailed design. Transport would apply for an AHIP for the two sites and any additional sites (or components to existing sites) identified during the Stage 3 PACHCI, under section 90 of the NPW Act prior to construction.
1.3(g) To promote good design, amenity and the proper construction and maintenance of built environments, including the protection of the health and safety of the occupants of buildings,	The proposal promotes good design and the proper construction and maintenance of the built environment through the upgrade of a section of the Newell Highway's flood prone area between Forbes and West Wyalong in accordance with relevant design standards. The design process included the assessment and refinement of options to achieve the best outcomes for this section of the Newell Highway within the available funding.
1.3(h) To provide opportunities for participation in environmental planning and assessment,	During development of the proposal, consultation with relevant government agencies, asset owners, Aboriginal groups and the community was carried out. Details of the consultation is provided in Chapter 5. Consultation will continue with directly affected landowners (Crown land), residents, stakeholders and the community during the REF exhibition period, throughout the development of the detailed design, and during construction should the project be approved.
1.3(i) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	The principles of ESD have been considered throughout the design and development of the proposal. Feedback from stakeholders was also considered during the design process. During the development of the concept design environmental, social and cultural constraints were considered and when the proposal moves to detailed design the construction boundary would be further optimised to minimise environmental impacts and ensure the best possible outcomes. Chapter 6 of the REF has considered relevant economic, environmental and social considerations, and the principles of ESD are considered in Section 8.2.
1.3(j) To promote a proportionate and risk-based approach to environmental planning and assessment,	Environmental constraints and risks from the proposal to environmental values were considered through the development of options, selection of the preferred option and the concept design. The intent was to minimise impacts while achieving the overall proposal objective. The detailed design stage would provide another opportunity to optimise the disturbance footprint further. Chapter 6 of the REF has also considered the relevant economic, environmental and social risks and opportunities associated with the proposal.
1.3(k) To promote the orderly and economic use and development of land.	Not relevant to the proposal.

9.2.1 Ecologically sustainable development

ESD is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the project.

ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD as per the EP&A Act are discussed below. Further information on consideration of sustainability issues, opportunities and initiatives is provided in Chapter 8.

The precautionary principle

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

This principle was considered during route options development (refer to Chapter 2). The precautionary principle has guided the assessment of environmental impacts for this REF and the development of mitigation measures in the following ways:

- The construction boundary and location of ancillary sites were revised to minimise impacts on TECs.
- The proposed design has been refined to minimise impacts on culturally sensitive areas that were identified during Aboriginal heritage investigations undertaken in March 2026. Avoidance of culturally sensitive areas has been included where possible with the proposal avoiding two culturally significant trees.
- The best-available technical information, environmental standards and measures have been used to minimise environmental risks. These safeguards would be implemented during construction and operation of the proposal.
- Conservative 'worst-case' scenarios were considered while assessing environmental impact. For example, the construction noise assessment has been carried out for reasonable 'worst-case' scenarios, with reference to the CNVG.
- Specialist studies were incorporated to gain a detailed understanding of the existing environment and potential impacts.
- Management measures have been developed using the best available technical information, environmental standards and guidelines. These measures would be applied throughout detailed design and construction of the proposal.
- A CEMP would be prepared before construction starts. This requirement would ensure the proposal maintains a high-level of environmental performance.

Intergenerational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The Newell Highway is a key freight corridor and an essential road connection for many communities in central-western NSW. The proposal would assist in providing a road network that would support employment growth in the central west reducing the number of days the road is closed during and after flood events and providing resilient transport infrastructure for the current and future generations.

The following intergenerational equity measures have been adopted:

- the design minimises vegetation clearance within sensitive ecological areas, to ensure that such areas are conserved for future generations
- the provision of offsets for removal of individual trees
- an Aboriginal cultural heritage assessment, including consultation with the local Aboriginal community, was commenced during the concept design and is being continued through the preparation of an ACHAR to avoid or minimise the potential for irreparable damage to occur to Aboriginal cultural heritage during construction

- the economic benefits in the form of freight efficiency and development potential for surrounding areas for the current and future generation were identified
- issues that have potential long-term implications were minimised or avoided, for example consumption of non-renewable resources, waste disposal, greenhouse emissions, removal of vegetation and impacts on water quality, through concept selection and application of management measures
- requirements to minimise the impact of climate change from greenhouse emissions were identified, for example minimising vegetation clearance, optimising fuel economy of all construction machinery, use of renewable energy for on-site electrical energy requirements, use of recycled materials where feasible.

Conservation of biological diversity and ecological integrity

This principle states: "the diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival".

The proposal is in an area that has previously been modified from the construction of the Newell Highway and nearby agricultural activities. However, remnant areas of native vegetation and associated habitats remain including those along the existing highway. The design for the proposal sought to minimise removal of native vegetation, where possible.

A biodiversity assessment was undertaken to identify and manage the potential impacts of the proposal on biodiversity. It is acknowledged that the proposal would result in impacts on biodiversity, including the removal of 55.37 hectares of native vegetation and nine scattered trees. This includes 1.74 hectares of vegetation commensurate with TECs listed under the BC Act, 0.66 hectares of which is also commensurate with a TEC listed under the EPBC Act. The BAR determined that the proposal is unlikely to lead to a significant impact on threatened species, populations, ecological communities or their habitats.

Opportunities to further minimise the extent of vegetation removal would be explored during the detailed design and preconstruction phases of the proposal. The adherence to the mitigation measures outlined in this REF would help to ensure that biological diversity and ecological integrity of receiving environments would be retained. In addition:

- a Tree and Hollow Replacement Plan would be developed as per the *Transport Tree and Hollow Replacement Guidelines* (Transport, 2024)
- site selection for construction-phase facilities considered environmental values to minimise native vegetation clearance.
- the cultural significance of remaining areas of native vegetation and native fauna to the local Aboriginal community was considered
- offsets would be provided for unavoidable impacts requiring the removal of individual trees.

Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources that may be affected by the carrying out of a project, including air, water, land and living things.

Environmental, economic and social issues were considered in the rationale for the proposal and design options. The REF has examined the environmental, economic and social consequences of the proposal and identified mitigation measures to manage the potential for adverse impacts.

Mitigation measures detailed in section 7.2, including avoiding, reusing, recycling, managing waste during construction and operation, would be implemented.

9.3 Conclusion

The proposed upgrade of a section of the Newell Highway at Marsden between West Wyalong and Forbes is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration (where relevant) of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, AOBV, impacts on threatened species and ecological communities and their habitats, and other protected fauna and native plants. It has also considered potential impacts to MNES listed under the EPBC Act.

A number of potential environmental impacts from the proposal have been avoided or reduced during the options identification and assessment and concept design development. The proposal, as described in the REF, best meets the project objectives but would still result in some impacts on biodiversity, Aboriginal heritage, traffic, noise, and property and land use. Mitigation measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also improve route reliability on this section of the Newell Highway by reducing road closures during and after flood events, keeping freight moving and communities connected, and enhance safety for all road users. On balance, the proposal is considered justified and the following conclusions are made.

9.3.1 Significance of impact under NSW legislation

The proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared nor approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act. A BDAR or Species Impact Statement is not required. The proposal is subject to assessment under Division 5.1 of the EP&A Act. Consent from Council is not required.

9.3.2 Significance of impact under Australian legislation

The proposal is not likely to have a significant impact on MNES nor the environment of Commonwealth land within the meaning of the *EPBC Act.* A referral to the Australian DCCEEW is not required.

10. Certification

I certify that I have reviewed and endorsed the contents of this REF and, to the best of my knowledge, it is in accordance with the EP&A Act, the Environmental Planning and Assessment Regulation 2021 and the Guidelines approved under Section 170 of the Environmental Planning and Assessment Regulation 2021, and the information is neither false nor misleading.



11. EP&A Regulation publication requirement

Table 11-1: Environmental Planning and Assessment Regulation 2021 publication requirement

Requirement	Yes / No
Does this REF need to be published under section 171(4) of the Environmental Planning and Assessment Regulation 2021	☒ Yes ☐ No

12. References

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13. Terms and acronyms

Table 13-1: Terms and acronyms used in this REF

Term / acronym	Description
4WD	Four-wheel drive
A-B Triple.	A heavy combination consisting of a prime mover towing three trailers
ABS	Australian Bureau of Statistics
ACHAR	Aboriginal Cultural Heritage Assessment Report
AFG	Aboriginal Focus Group
AHIP	Aboriginal Heritage Impact Permit
AHIMS	Aboriginal Heritage Information Management System
AHMP	Aboriginal Heritage Management Plan
AGRD	Austroads *Guide to Road Design*
AOBV	Area of Outstanding Biodiversity Value
AQMP	Air Quality Management Plan
ARI	Average reoccurrence interval
AS	Australian Standard
ASS	Acid Sulphate Soils
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
Bridge-sized box culvert	Box culverts with a combined opening width greater than 6.0m
BTEX	Benzene, toluene, ethylbenzene and xylene
CEMP	Construction Environmental Management Plan
CH	Chainage (in metres)
CLM Act	*Contaminated Land Management Act 1997*
CML	Concessional Mass Limit
CNVG	Construction Noise Management Guideline
CoPC	Contaminants of potential concern
DCCEEW	Department of Climate Change, Energy, the Environment and Water

Term / acronym	Description
DITRDCSA	Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts
DO	Dissolved oxygen
DPE	Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure
DPIRD	Department of Primary Industries and Regional Development
DPI - Fisheries	Department of Primary Industries - Fisheries
DPI – Lands	Department of Industry: Lands
DUAP	Department of Urban Affairs and Planning
EC	Electrical conductivity
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	Environment Protection Agency
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1990*
EPL	Environmental Protection License
ESD	Ecologically sustainable development
FFMP	Fauna and Flora Management Plan
FM Act	*Fisheries Management Act 1994*
GDE	Groundwater dependent ecosystem
GML	General Mass Limit
GVM	Gross vehicle mass
HDV	Heavy duty vehicle
HGV	Heavy goods vehicle
HML	Higher Mass Limit
HSiD	Health and safety in design
ICNG	Interim Construction Noise Guideline
ILUA	Indigenous Land Use Agreement
IAQM	Institute of Air Quality Management
KFH	Key fish habitat
LALC	Local Aboriginal Land Council

Term / acronym	Description
LCV	Light commercial vehicle
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	Local Land Services
MPa	Megapascal
MNES	Matter of National Environmental Significance
NATA	National association of Testing Authority
NHL	National Heritage List
NO_x	*Oxides of Nitrogen*
NPW Act	*National Parks and Wildlife Act 1974*
NRAR	Natural Resource Access Regulator
NT Act	*Native Title Act 1993*
OEH	Office of Environment and Heritage
ORP	Redox potential
OSOM	Over size and/or over mass
PACHCI	Procedure for Aboriginal Cultural Heritage Consultation and Investigation
PAH	Polycyclic aromatic hydrocarbons
PCBC	Reinforced concrete box culvert
PCT	Plant community type
POEO Act	*Protection of the Environment Operations Act 1997*
$PM_{2.5}$ / PM_{10}	Particulate matter with a diameter of 2.5 / 10 micrometres or less
PSI	Preliminary Site Investigation
RAP	Registered Aboriginal Parties
RCBC	Reinforced Concrete Box Culvert
REF	Review of environmental factors
RMS	Roads and Maritime Services
Roads Act	*Roads Act 1993*
ROL	Road Occupancy License
SEPP	State Environmental Planning Policy

Term / acronym	Description
SEPP (Transport and Infrastructure)	*State Environmental Planning Policy (Transport and Infrastructure) 2021*
SES	State Emergency Services
SoHI	Statement of Heritage Impact
SUV	Sport-utility vehicle
SWMP	Soil and Water Management Plan
TEC	Threatened ecological community
TMP	Traffic Management Plan
TRH	Total recoverable hydrocarbons
Transport	Transport for New South Wales
TSR	Traveling Stock Reserves
VMS	Variable Message Signs
WARR Act	*Waste Avoidance and Resource Recovery Act 2001*
WLEP 2011	*Weddin Local Environmental Plan 2011*
WM Act	*Water Management Act 2000*

Appendix A: Consideration of section 171(2) factors and MNES and Commonwealth land

Section 171(2) factors

The following factors have been considered to assess the likely impacts of the proposal on the natural and built environment in accordance with the requirements of the *Guideline for Division 5.1 assessments* (DPHI, 2026) and the *Roads and Related Facilities EIS Guideline* (DUAP, 1996). These factors are also listed in clause 171(2) of the Environmental Planning and Assessment Regulation 2021.

Factor	Where addressed
a) Environmental impact on the community.	Chapter 6
b) The transformation of the locality.	Sections 6.9 and 6.11
c) Any environmental impact on the ecosystems of the locality.	Section 6.1.3
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality.	Chapter 6
e) Any effect on any locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.	Sections 6.2, 6.3, 6.10 and 6.11
f) Any impact on the habitat of protected fauna (within the meaning of the BC Act).	Section 6.1.3
g) Any endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air.	Section 6.1.3
h) Any long-term effects on the environment.	Chapter 6
i) Any degradation of the quality of the environment.	Chapter 6
j) Any risk to the safety of the environment.	Chapter 6
k) Any reduction in the range of beneficial uses of the environment.	Chapter 6
l) Any pollution of the environment.	Sections 6.4, 6.5, 6.7, 6.8, 6.12 and 6.13
m) Any environmental problems associated with the disposal of waste.	Section 6.12.3
n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply.	Section 3.3.8
o) The cumulative environmental effect with other existing or likely future activities.	Section 6.14
p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions.	Not applicable
q) Applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1	Section 2.1.1
r) Other relevant environmental factors	Chapter 6

Matters of National Environmental Significance and Commonwealth land

Under the environmental assessment provisions of the EPBC Act, the following MNES and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian DCCEEW.

A referral is not required for proposed actions that may affect nationally-listed threatened species, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Factor	Impact
a. Any impact on a World Heritage property? There are no World Heritage properties within or close to the study area	Nil
b. Any impact on a National Heritage place? There are no National Heritage places within or close to the study area	Nil
c. Any impact on a wetland of international importance? There are no wetlands of international importance within or close to the study area	Nil
d. Any impact on a listed threatened species or communities? The biodiversity assessment (refer to section 6.1 and Appendix C) identifies that the proposal would impact on one TEC, however, this impact is not expected to be significant. The proposal would result in the removal 0.66 hectares of vegetation commensurate with a TEC listed under the EPBC Act.	Minor
e. Any impacts on listed migratory species? No listed migratory species were detected within the study area during field surveys. A review of the PSMT completed for the proposal identified 10 migratory species were predicted to occur within 10 kilometres of the proposal. A habitat assessment was carried out to determine the potential for these species to occur within the study area which determined that no migratory species were considered to have a moderate or higher likelihood of occurrence. Further information is provided in section 6.1.3	Minor
f. Any impact on a Commonwealth marine area? The proposal is not located in or would impact a Commonwealth marine area	Nil
g. Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action	Nil
h. Additionally, any impact (direct or indirect) on the environment of Commonwealth land? The proposal is not located in or would impact the environment of Commonwealth land	Nil

Appendix B: Statutory consultation checklists

SEPP (Transport and Infrastructure)

Certain development types

Issue	Potential impact	Yes/no	If 'yes' consult with	SEPP (Transport and Infrastructure)
Car park	Does the project include a car park intended for the use by commuters using regular bus services?	No		Section 2.111(1)(a)
Bus depots	Does the project propose a bus depot?	No		Section 2.111(1)(b)
Permanent road maintenance depot and associated infrastructure	Does the project propose a permanent road maintenance depot or associated infrastructure such as garages, sheds, tool houses, storage yards, training facilities and workers' amenities?	No		Section 2.111(1)(c)

Development within the Coastal Zone

Issue	Potential impact	Yes/no	If 'yes' consult with	SEPP (Transport and Infrastructure)
Development with impacts on certain land within the coastal zone	Is the proposal within a coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No		Section 2.14

Note: See interactive map at Planning Portal NSW spatial viewer - find a property.

Note: a certified coastal zone management plan is taken to be a certified coastal management program.

Council related infrastructure or services

Issue	Potential impact	Yes/no	If 'yes' consult with	SEPP (Transport and Infrastructure)
Stormwater	Are the works likely to have a *substantial* impact on the stormwater management services which are provided by council?	Yes	Weddin Shire Council Forbes Shire Council Bland Shire Council	Section 2.10(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will *strain* the capacity of the existing road system in a local government area?	Yes	Weddin Shire Council	Section 2.10(1)(b)
Sewerage system	Will the works involve connection to a council owned sewerage	No		Section 2.10(1)(c)

Issue	Potential impact	Yes/no	If 'yes' consult with	SEPP (Transport and Infrastructure)
	system? If so, will this connection have a substantial impact on the capacity of any part of the system?			
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?	No		Section 2.10(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?	No		Section 2.10(1)(e)
Road & footpath excavation	Will the works involve more than minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	Yes	Weddin Shire Council	Section 2.10(1)(f)

Local heritage items

Issue	Potential impact	Yes/no	If 'yes' consult with	SEPP (Transport and Infrastructure)
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than minor or inconsequential?	No		Section 2.11

Flood liable land

Issue	Potential impact	Yes/no	If 'yes' consult with	SEPP (Transport and Infrastructure)
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a minor extent?	Yes	Weddin Shire Council Forbes Shire Council Bland Shire Council	Section 2.12
Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance?	Yes	State Emergency Services	Section 2.13

Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled Floodplain Development Manual: the management of flood liable land published by the New South Wales Government.

Public authorities other than councils

Issue	Potential impact	Yes/no	If 'yes' consult with	SEPP (Transport and Infrastructure)
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the NPW Act, or on land acquired under that Act?	No		Section 2.15(2)(a)
National parks and reserves	Are the works on land in Zone C1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No		Section 2.15(2)(b)
Navigable waters	Do the works include a fixed or floating structure in or over navigable waters?	No		Section 2.15(2)(c)
Artificial light	Would the works 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? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	No		Section 2.15(2)(d)
Defence communications buffer land	Are the works on buffer land around the defence communications facility near	No		Section 2.15(2)(e)

Issue	Potential impact	Yes/no	If 'yes' consult with	SEPP (Transport and Infrastructure)
	Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in section 5.15 of Lockhart LEP 2012, Narrandera LEP 2013 and Urana LEP 2011.			
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the Mine Subsidence Compensation Act 1961?	No		Section 2.15(2)(f)
Willandra Lakes region world heritage property	Is the development on, or reasonably likely to have an impact on, a part of the Willandra Lakes Region World Heritage Property?	No		Section 2.15(2)(g)
Western Parkland City land	Is the development within a Western City operational area specified in Schedule 2 of the *Western Parkland City Authority Act 2018*, with a capital investment value of $30 million or more?	No		Section 2.15(2)(h)

Appendix C: Biodiversity Assessment Report

Appendix D: PACHCI Stage 2 Report

Appendix E: Statement of Heritage Impact

Appendix F: Hydrology and Hydraulic Assessment Report

Appendix G: Stage 1 PSI and Soils, Surface and Groundwater Assessment

Appendix H: Traffic and Transport Assessment

Appendix I: Noise and Vibration Assessment

Appendix J: Air Quality Assessment

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