
Appendix P

Traffic and access impacts assessment





Billabong Creek Regulators

Traffic Impact Assessment

NSW Department of Climate Change, Energy, the
Environment and Water

September 2024



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GHD Pty Ltd | ABN 39 008 488 373

133 Castlereagh Street, Level 15

Sydney, New South Wales 2000, Australia

T +61 2 9239 7100 | **F** +61 2 9239 7199 | **E** sydmal@ghd.com | **ghd.com**

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Glossary

Term	Description
Anabranch	A section of a river or stream that diverts from the main channel of the watercourse and rejoins downstream.
Clearing area	This is the area required to construct the proposed infrastructure. Within this area it is assumed that all vegetation would be removed, including trees and ground cover vegetation. Borrow pits also include a clearing area. However this is a conservative assumption and contractors would be encouraged to avoid removal where they can (through proposed mitigation measures).
Commonwealth Environmental Water Holder	The Commonwealth Environmental Water Holder is a statutory position established under the <i>Water Act 2007</i> (Cwth) responsible for managing the Commonwealth's environmental water holdings. These water holdings are used to protect or restore environmental assets of the Murray-Darling Basin.
Construction activity zone	The area surrounding and including the 'clearing area' that would be used for construction purposes e.g., laydown, site sheds, parking. It is assumed topsoil will need to be removed / cleared, with some re-grading to create level areas with grubbing and clearing of small shrubs/grasses. Trimming of trees may be required. Tree removal would not occur in portions of the CAZ outside of a clearing area.
Cumulative impacts	The combined impacts of the project on a matter with other relevant future projects
Disturbance area	The disturbance area includes all locations where the proposal directly impacts the land surface or water body. This includes clearing areas, construction activity zones, access tracks and power supply routes.
Efficiency measure	Provide more water for the environment by making water delivery systems for irrigation more efficient. This can include replacing or upgrading on-farm irrigation, or lining channels to reduce water losses within an irrigation network.
Entitlement	The volume of water authorised to be taken (subject to allocation) and used by an irrigator or water authority; includes bulk entitlements, environmental entitlements, water rights, sales water and surface-water and groundwater licenses.
Environmental flow	Any river flow pattern provided with the intention of maintaining or improving river health.
Fish passage	The ability of fish or other aquatic species to move through an aquatic system.
Fishway	Structures placed on or around constructed barriers (such as dams or weirs) to give fish the opportunity to move past the barrier.
The proposal	The construction and operation of the two regulators and supporting infrastructure.
The proposal site	The footprint that would be directly affected by construction and the location of operational infrastructure.
Regulator	A gated structure used to actively manage or control the amount of water that flows from one location to another.
Regulated	A water system in which water is stored or flow levels are controlled through the use of structures such as dams and weirs.
Sustainable diversion limit adjustment mechanism	A mechanism under the Murray-Darling Basin Plan that allows the sustainable diversion limit to be adjusted under certain circumstances.
Study area	The area investigated for this assessment which includes the proposal site and surrounding area, with the potential to be directly or indirectly affected by the proposal.
Weir	A low barrier or dam that is built across a watercourse and is designed to store water, control or alter the flow of water in a creek.

Abbreviations

Abbreviations	Definitions
AHD	Australian height datum
CEWO	Commonwealth Environment Water Office
DPE	NSW Department of Planning and Environment, now renamed as the Department of Planning, Housing and Infrastructure
DPIE	NSW Department of Planning, Industry and Environment (formerly known as NSW Department of Planning and Environment)
EIS	Environmental impact statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
GL	Gigalitre
km ²	Square kilometres
LEP	Local environmental plan
LGA	Local government area
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water, formerly Water Infrastructure NSW.
pce	passenger car equivalent
pcu	Passenger car units
SDLAM	Sustainable diversion limit adjustment mechanism
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State environmental planning policy
TfNSW	Transport for NSW
the Regulation	Environmental Planning and Assessment Regulation 2021 (NSW)
TIA	Traffic Impact Assessment
vcr	Volume to capacity ratio
AADT	Annual average daily traffic

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1. Introduction

1.1 Overview

NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) is proposing to replace two existing weirs along Billabong Creek with new regulators (the proposal). The two existing weirs to be demolished are Hartwood Weir and Wanganella Weir. These structures are situated on Billabong Creek within the Yanco Creek system in south-west NSW (refer to Figure 1.1).

These weirs were built in the early 20th century and have been used to regulate flows through Billabong Creek, create weirs pools for irrigation and, in the case of Wanganella Weir, provide town water supply. The weirs are currently in states of declining condition and functionality, and are barriers to the movement of fish through the creek. Their condition limits their ability to regulate flows through the Yanco Creek system and leads to inefficiencies in how water is delivered to the environment and irrigators.

The new regulators would be fully automated and remotely operated, meaning that operators could control the delivery of water more efficiently. The proposal is needed to improve the operator's ability to deliver the right amount of water to the right place at the right time. The new regulators would also feature fishways to support fish movement past the new structures. WaterNSW would own and operate the new regulators once constructed.

The proposal is subject to environmental and planning approvals in accordance with the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The proposal is State significant infrastructure (SSI), and the Minister for Planning is the approval authority. An environmental impact statement (EIS) is required to accompany the application for approval of the proposal.

1.2 Purpose and scope of this report

This report has been prepared by GHD Pty Ltd (GHD) as part of the EIS for the proposal. The EIS has been prepared to accompany the application for approval of the proposal and addresses the Secretary's Environmental Assessment Requirements (the SEARs), issued on 17 October 2024 (see section 1.5). Construction and operation of the proposal, and where required, identify feasible and reasonable mitigation and management measures. This report:

- describes the existing traffic and transport environment in the study area
- describes the existing road and transport conditions, traffic volumes and crash data
- assesses the impacts of construction and operation of the proposal within the vicinity of the proposal footprint and the surrounding road network
- recommends measures to mitigate and manage the impacts identified.

1.3 Structure of this report

The report is structured as follows:

Table 1.1 Report structure

Section No.	Chapter title	Content
1	Introduction	Provides background to, and an overview of, the proposed construction and operation works. This section also establishes the purpose of the document, the assumptions and limitations used in the assessment, and the structure in which information is presented.
2	Assessment approach and methodology	Describes the legislative and policy context for the assessment and relevant guidelines.
3	Existing environment	Provides a description of the existing road network, traffic, and transport conditions within the study area.
4	Impact Assessment	Provides a summary of the proposed construction works and details the additional traffic associated with the construction and operation of the regulators. Examines the potential traffic and transport impacts associated with the construction and operation of the new regulators.
5	Mitigation and Management Measures	Provides recommendations of proposed mitigation options for the construction and operational impacts of the proposal.
6	Conclusion	Presents a summary of the traffic assessment findings and sets out the principal conclusions for the study.

1.4 Summary of the proposal

1.4.1 Location

The proposal is located on Billabong Creek, which is part of the Yanco Creek system in south-west New South Wales (NSW), as shown on Figure 1.1. The Yanco Creek system forms a part of the Murray-Darling Basin. The proposal is located within the local government area (LGA) of Edward River.



- Regulator
- Town
- Major Watercourse
- Main Road
- Water Bodies

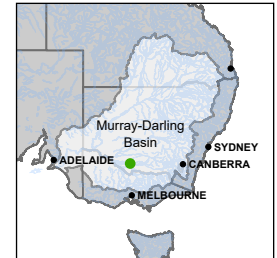
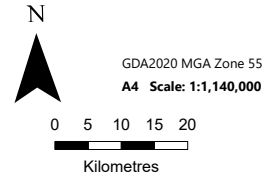


Figure 1.1 - Location of the proposal



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1.4.2 Key features of the proposal

The proposal involves replacing two existing weirs along Billabong Creek with new regulators including fishways.

The core structure of the two regulators is similar and would include:

- concrete piers with maintenance bulkhead slots
- automated layflat gates across the crest of the structure to assist with flow management and downstream fish passage
- a low turbulence ‘keyhole’ type vertical slot fishway with allowances for variable headwater to provide upstream fish passage
- automated sidewinder gates within the vertical slot fishway to allow for variable headwater conditions
- fixed concrete crests on the opposite side of the gates to the vertical slot fishway
- concrete apron downstream of the structure
- concrete wingwalls upstream and downstream of the structure
- access from a trafficable deck for maintenance (Hartwood Regulator only)
- pedestrian walkway access part way across Wanganella Regulator structure to facilitate housing of gate actuators and for maintenance
- walkway grating over gates to facilitate operations and maintenance
- crushed rock maintenance pads, access and turnaround areas adjacent to the structure
- rip rap and rock beaching upstream and downstream of structure for erosion protection
- control house
- sheet pile cut-off walls beneath the structure
- fencing of the structures to prevent public access
- SCADA control system.

An indicative layout of a regulator is shown in Figure 1.2. This example is of a five gate regulator with a fish passage and trafficable deck for maintenance vehicles.



Figure 1.2 *Indicative layout of a regulator*

The proposal would also involve the following elements:

- Power supply to the regulators would be provided by a mix of underground and overhead electricity cables connecting the structures to the grid.
- Access to the regulators would require permanent tracks for maintenance and some additional tracks to support construction only. Track upgrades include a new drainage culvert at Hartwood.

- The existing Forest Creek block bank, associated with the Hartwood Regulator, would be replaced with a similar earthen structure to the existing. This would include two concrete sills to define the upstream and downstream top of bank and armoured with rock beaching and crushed rock for erosion protection.
- A flood relief drainage channel would be constructed to reduce potential upstream flooding impacts from the Wanganella Regulator. The channel would enable flood waters to drain between the billabongs in the Wanganella Reserve during flood events. It would be 85 metres long, around 40 metres wide and 1.7 metres deep and located north of the Wanganella landfill. Once completed, the channel sides and base would be natural and vegetated with appropriate local native species.
- An existing borrow pit on private land at lot 56 / DP756322 near Hartwood Weir would be extended to provide material for the construction of Hartwood Regulator and Forest Creek block bank.

The location of the existing weirs, proposed infrastructure, and the indicative proposal footprints are shown on Figure 1.3 and Figure 1.4.

1.4.3 Timing

Construction of the proposal is anticipated to start in 2025 and be completed by 2026. The construction period is anticipated to be around 18 months. Construction would pause during periods of high flow.

Standard construction hours would be adopted in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009), as shown in Table 1.2. Most construction activities would be undertaken during this time.

Table 1.2 Standard construction hours

Day	Start time	Finish time
Monday to Friday	7:00	18:00
Saturday	8:00	13:00
Sundays and public holidays	No regular work	

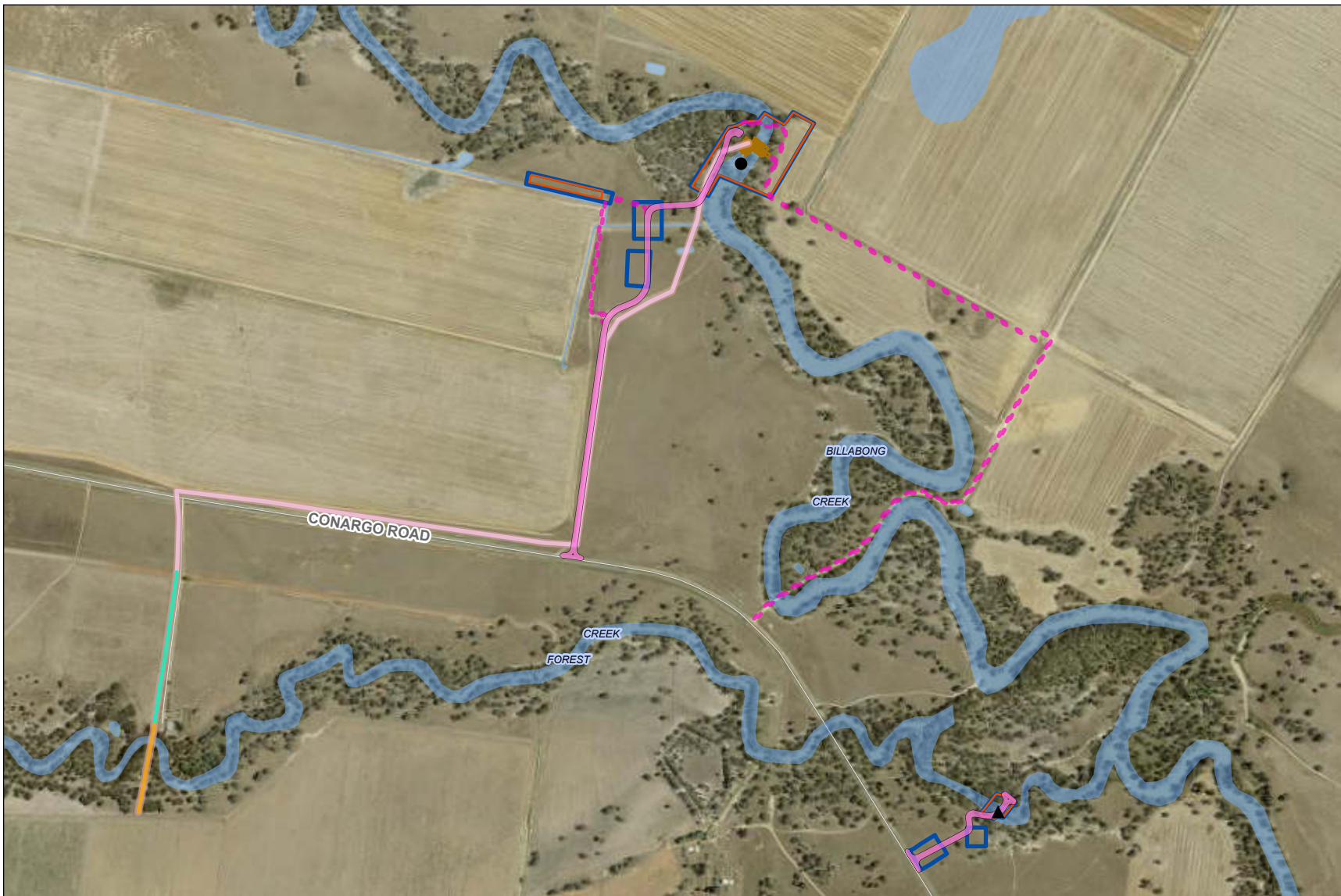
Notwithstanding this, the *Interim Construction Noise Guideline* (DECC, 2009) acknowledges that the following activities may need to be undertaken outside the recommended construction hours:

- emergency work
- delivery of oversized plant or structures
- works for which it can be demonstrated that there is a need to operate outside the recommended standard hours.

1.4.4 Operation

The proposal would be operated in accordance with the operating requirements established with the new asset owner and developed in consultation with key stakeholders. These operating requirements are known as the Yanco Creek System Operations Plan. The plan would take into account the regulation requirements at each regulator, as well as constraints such as limits to rates of rise and fall to accommodate fish breeding requirements.

The proposed regulators would provide greater control of water levels, which would be operated to meet environmental and water supply objectives. WaterNSW would own and operate the new regulators.



- Proposal**
- Proposed Hartwood Regulator
 - Construction Activity Zone
 - Clearing Area
- Power Supply**
- Power Supply
 - Power Supply (Existing aboveground)
 - Power Supply (to run underground)
 - Power Supply Buffer
- Access tracks**
- Construction Only
 - Construction plus O&M
- Existing features**
- Existing Weir
 - ▲ Existing Block Bank
 - Main Road
 - Water Bodies

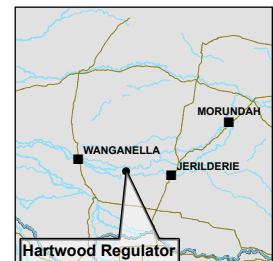
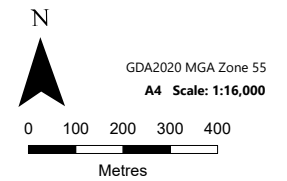
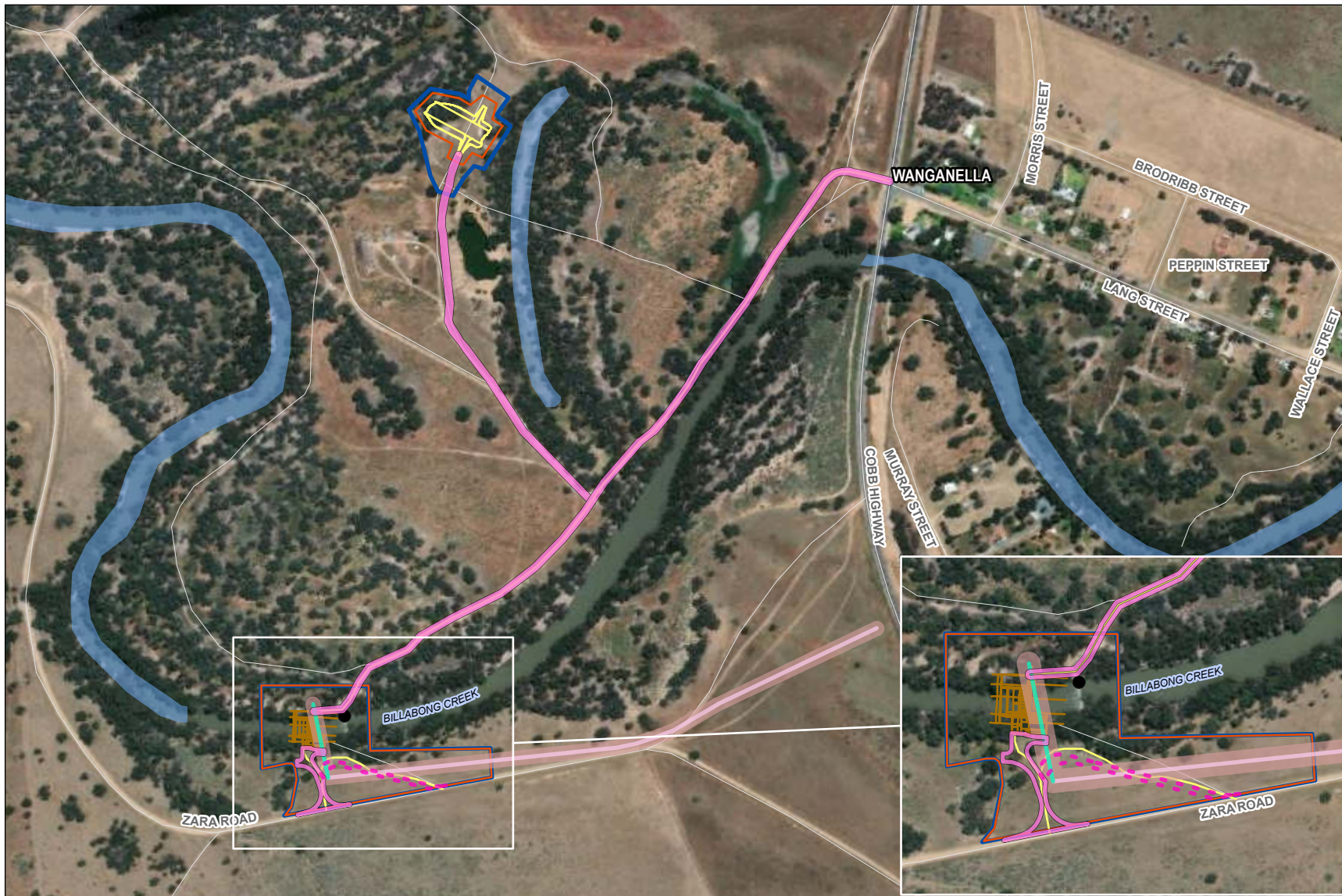


Figure 1.3 Location of Hartwood Regulator and Proposed Works



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- Proposal**
- Proposed Wanganella Regulator
 - Wanganella Bypass Channel
 - Construction Activity Zone
 - Clearing Area
- Power Supply**
- Power Supply
 - Power Supply (Existing aboveground)
 - Power Supply (to run underground)
 - Power Supply Buffer
- Access tracks**
- Construction Only
 - Construction plus O&M
- Existing features**
- Existing Weir
 - Roads
 - Water Bodies

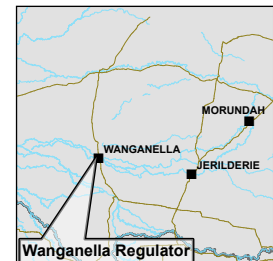
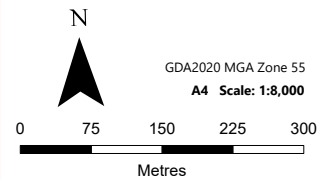


Figure 1.4 Location of Wanganella Regulator and Proposed Works



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1.5 Secretary’s environmental assessment requirements

This Traffic Impact Assessment (TIA) has been prepared to address the Secretary’s Environmental Assessment Requirements (SEARs). Table 1.3 outlines the requirements relevant to this assessment. The assessment also considers advice provided by Transport for NSW.

Table 1.3 Relevant SEARs

Requirements	Where addressed in this report
Traffic and transport (item 27, 28, 29, 30)	
27 Provide a Traffic Impact Assessment (TIA) prepared by a suitably qualified person in accordance with the Austroads Guide to Traffic Management (2020), the RTA Guide to Traffic Generating Developments (2013) and TfNSW Supplements to Austroads.	Full Report
The TIA should contain information such as:	Section 4 Impact assessment
A Expected traffic generation	
B Vehicle numbers and types of vehicles	Section 3 Existing Conditions and Section 4 Impact assessment
C Travel routes for vehicles accessing the development site	Section 4.1.1 Traffic generation
28 Provide a Traffic Management Plan to manage traffic generation during the construction period with input from the appointed contractors. This plan shall outline measures to manage traffic related issues generated by construction of the development.	The TMP is not contained in this document see Table 5.1.
A Potential impacts/delays associated with the development	Section 5 Mitigation Measures
B Works required to the existing road infrastructure	Section 5 Mitigation Measures
C Measures to be implemented to maintain the standard and safety of the network	Section 5 Mitigation Measures
D Procedures to monitor and ensure compliance	Section 5 Mitigation Measures
29 Identify controls for transport and use of any dangerous goods	Section 4 Impact Assessment
30 Consult with Transport for New South Wales in relation to identifying any impacts to navigable waterways. Where impacts are identified, provide a Waterway Management Plan.	Not covered in this assessment. Refer to Appendix E, Community Engagement.

1.6 Assumptions

Assumptions used in this Traffic Impact Assessment (TIA) are as follows:

- This TIA was developed as a desktop assessment of the proposal.
- Traffic data were provided by Edward River Council for The Cobb Highway (2011) and Conargo Road (2020). No additional traffic counts were undertaken for this study.
- Traffic data were not available for some of the local roads within the study area. Where no traffic count data were available for local roads, assumptions were based on the nearest road traffic count data.
- The conditions of the surrounding network are based on a desktop review utilising the following data sources:
 - aerial photography by Google Maps / NSW SIX Maps
 - street view images by Google Maps
 - public transport routes and schedules from TfNSW Trip Planner
 - road crash data published by TfNSW Centre for Road Safety.
- Traffic distribution estimates have been based on high-level assumptions on heavy vehicle routes and the construction methodology.
- Estimates of the expected construction and operational traffic volumes of the proposal have been provided by the client.

- In the absence of hourly data, peak hour traffic was estimated to be 10 per cent of daily traffic.
- A traffic growth rate of 1.0 per cent per annum from 2022 was utilised. No uplift was applied to provided data previous to 2022.

2. Assessment approach and methodology

2.1 Legislative and policy context to the assessment

This section summarises the legislation, guidelines and/or policies driving the approach to the assessment. The assessment was undertaken with reference to the following:

- Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development (Austroads, 2020)
- Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads, 2021)
- Guide to Traffic Generating Developments Updated Traffic Surveys (Roads and Maritime, 2013)
- Transport for NSW Traffic Modelling Guidelines (2013)
- Traffic Control and Work Sites Technical Manual (Transport for NSW, 2020).

The SEARs requirements relevant to traffic & transport and where these have been addressed in this report are discussed in section 1.5.

2.2 Study area

For the purposes of the assessment the construction footprint, operation footprint, and study area have been defined as follows:

- Proposal footprint – the area that would be directly disturbed by construction and the location of operational infrastructure. The disturbance area would include clearing areas, construction activity zones, access tracks and power supply corridors.
- Study area – the area investigated which includes the footprint of the proposal and surrounding area, with the potential to be directly or indirectly affected by the proposal.

The study area adopted for this TIA includes the roads that provide access to the proposal footprint, including access tracks. This includes:

- main roads within the vicinity of the proposal footprint
- travel routes along access tracks in the surrounding network.

The study area for this TIA has been defined as the road network within two kilometres from the access points of the proposal footprints.

2.3 Methodology

This TIA has been undertaken with reference to the Guide to Traffic Generating Development (TfNSW 2002). While not mandatory, the guide provides a process and methodology to undertake the TIA. The traffic operation assessment process outlined in the guide identifies the operating characteristics, which need to be compared with the agreed performance criteria.

The guide states that existing daily traffic volumes on roads adjacent to a proposed development should be compared with estimated daily traffic volumes. This enables the functions of roads in the overall hierarchy of roads to be reviewed in the context of the proposed development.

The assessment criteria adopted for this report is outlined in the following sections.

2.3.1 Mid-block assessment criteria

A mid-block assessment is an approach for assessing the road network operations between intersections based on hourly traffic volumes along a road and lane capacity limits.

The capacity of the road network to accommodate additional traffic generated by the construction and operation of the proposal was determined based on the mid-block volume to capacity ratio (vcr) of the impacted roads *before* (i.e., existing / baseline conditions) and after the construction and operation.

2.3.2 Volume to capacity ratio (vcr)

Volume to capacity ratio (vcr) is the ratio of the volume of vehicles (demand) and the capacity of the road. The ratio gives an indication of the road's degree of saturation and its ability to accommodate additional traffic. A lower vcr signifies low traffic volumes and typically translates to a better quality of service for road users. A ratio greater than one (1) suggests that the road is oversaturated and cannot handle the influx of volume, leading to delays and queue build-up.

The *Austrroads Guide to Traffic Management Part 3: Traffic Studies and Analysis Methods (AGTM Part 3)* indicates a practical degree of saturation of 0.90. For a conservative assessment of the traffic impacts associated with the proposal, a desirable outcome for the volume to capacity ratio of 0.85 or lower as been adopted.

2.3.3 Demand

Demand has been estimated to be equivalent to the traffic volumes traversing the assessed corridors. To account for the different impacts of light and heavy vehicles, traffic volumes are converted from 'vehicle units' to 'passenger car units' (pcu) using multipliers called passenger car equivalent (pce) factors. This allows for the assessment of traffic volume using one homogenised unit for all vehicles. A pce factor of 2.0 has been adopted for heavy vehicles to obtain a highly conservative assessment of the impacts of the proposal.

2.3.4 Lane capacity

The following hourly two-way traffic flow capacities in Table 2.1 have been used as a basis for undertaking the volume to capacity assessment for roads within the study area:

Table 2.1 Lane capacity for rural roads

Road type	Sealed/paved width (m) per carriageway *	Two-way carriageway capacity (vehicles per hour)
Unsealed formed road	-	400
Two-lane sealed road	5.81 - 6.4	2,350
	6.41 - 7.0	2,450
	8.81 - 9.4	2,500
	10.01-11.6	4,500

Source: Austrroads (2005, AP-R264/05 page 22)

It is noted that the source indicates carriageway capacity using vehicles per hour. For the purpose of this assessment, the capacity has been assumed to be equivalent to pcu.

3. Existing environment

3.1 Existing road network characteristics

3.1.1 Road hierarchy

Roads within New South Wales are categorised in the following two ways:

- by classification (ownership)
- by the function that they perform.

Road classification

Roads, as defined by the *Roads Act 1993*, are classified based on their importance to the movement of people and goods within NSW (as a primary means of communication).

The classification of a road allows Transport for New South Wales (TfNSW) to exercise authority of all or part of the road. Classified roads include Main Roads, State Highways, Tourist Roads, Secondary Roads, Tollways, Freeways, and Transitways. For management purposes, TfNSW has three administrative classes of roads:

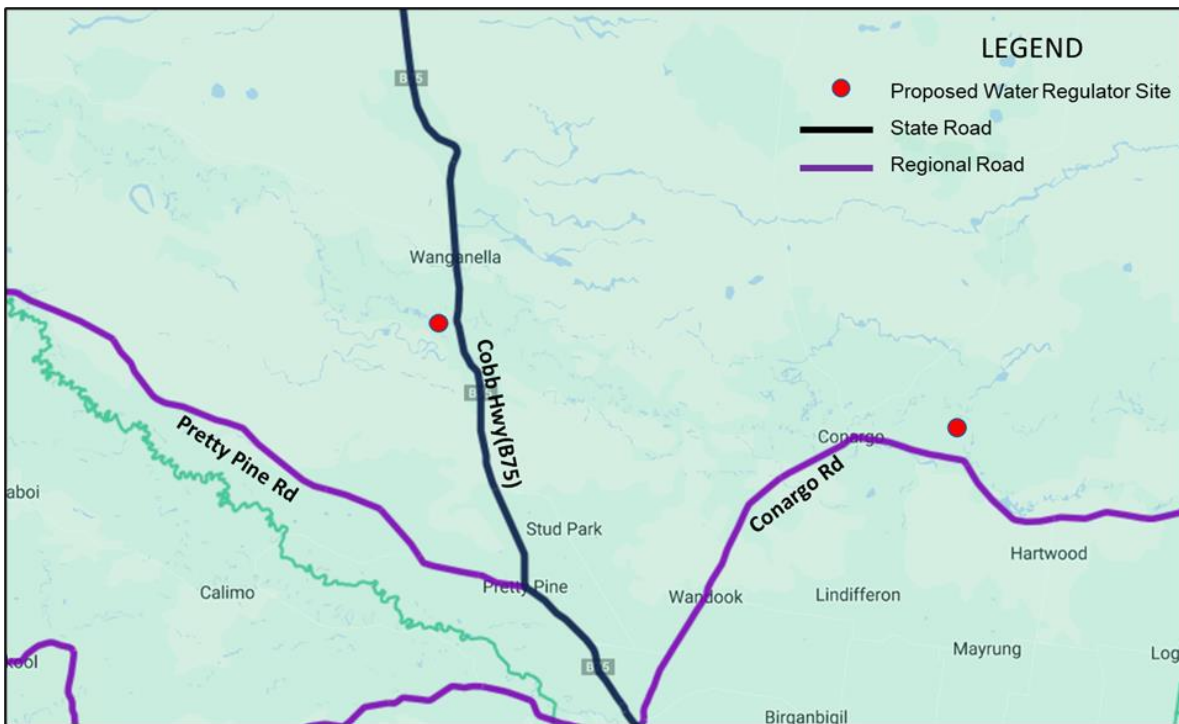
- **State Roads** – Major arterial links through NSW and within major urban areas. They are the principal traffic-carrying roads and are fully controlled and maintained by TfNSW. State Roads include all Tollways, Freeways and Transitways; and all or part of a Main Road, Tourist Road or State Highway.
- **Regional Roads** – Roads of secondary importance between State Roads and Local Roads which, along with State Roads, provide the main connections to and between smaller towns and perform a sub arterial function in major urban areas. Regional roads are the responsibility of councils for maintenance funding, though TfNSW funds some maintenance based on traffic and infrastructure. Traffic management on Regional Roads is controlled under the delegations to local government from TfNSW. Regional Roads may own all or part of a Main Road, Secondary Road, Tourist Road or State Highway; or other roads as determined by TfNSW.
- **Local Roads** – The remainder of the council-controlled roads, Local Roads are the responsibility of councils for maintenance funding. TfNSW may fund some maintenance and improvements based on specific programs (e.g., urban bus routes, road safety programs). Traffic management on Local Roads is controlled under the delegations to local government from TfNSW.

Functional hierarchy

Functional road classification involves the relative balance of the mobility and access functions. TfNSW defines four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility to high accessibility and low mobility. These road classes are:

- **Arterial Roads** – generally controlled by TfNSW, they typically have no limit in flow and are designed to carry vehicles long distance between regional centres.
- **Sub-Arterial Roads** – can be managed by either TfNSW or local council. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through traffic between specific areas in a sub region or provide connectivity from arterial road routes (regional links).
- **Collector Roads** – provide connectivity between local roads and the arterial road network and typically carry between 2,000 and 10,000 vehicles per day.
- **Local Roads** – provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

A map of the road classifications within the study area is presented in Figure 3.1. The key roads are discussed further in the following sections.



Source: NSW Road Network Classifications, TfNSW, modified by GHD

Figure 3.1 Road classification of key roads in proximity to site

3.1.2 Road characteristics

The assessment area for works of proposed regulators is in remote or isolated areas and accessible by private tracks and, Zara Road. The proposal would also result in increased traffic movements along key access roads including Conargo Road, presented in Figure 3.2, and Cobb Highway presented in Figure 3.3. Increased traffic would be a temporary, short-term impact limited to the construction of the proposal.

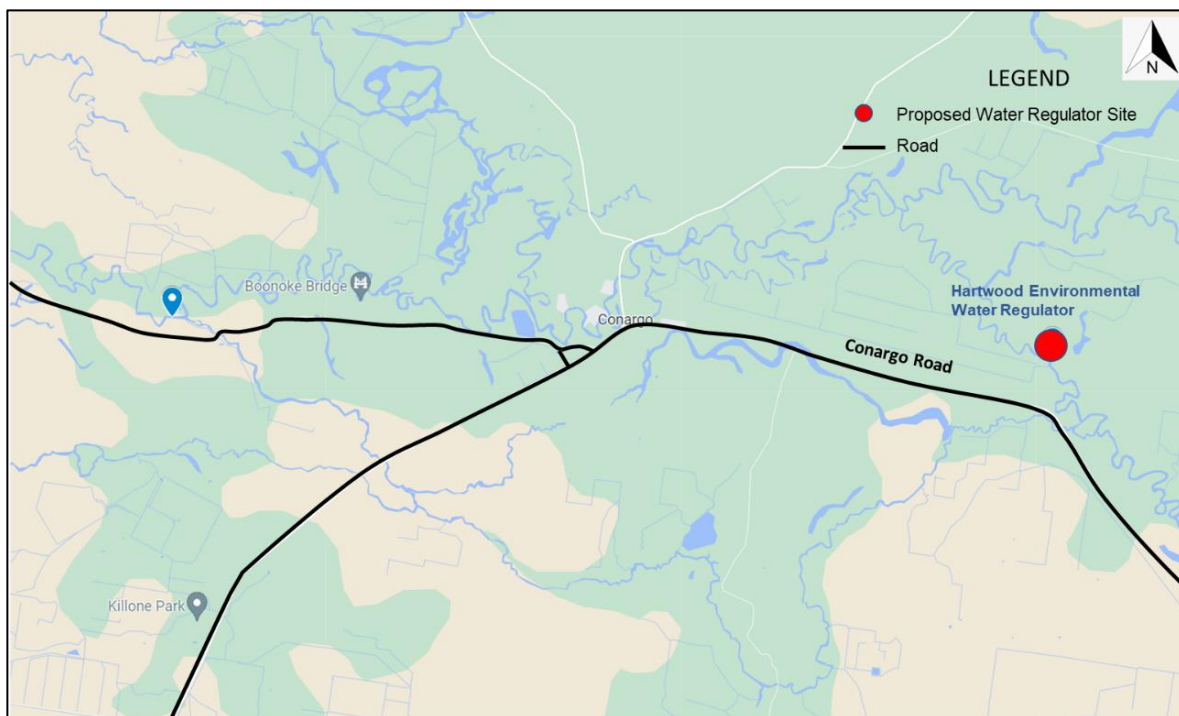


Image Source: Google Maps, modified by GHD

Figure 3.2 Key access roads near Hartwood Regulator

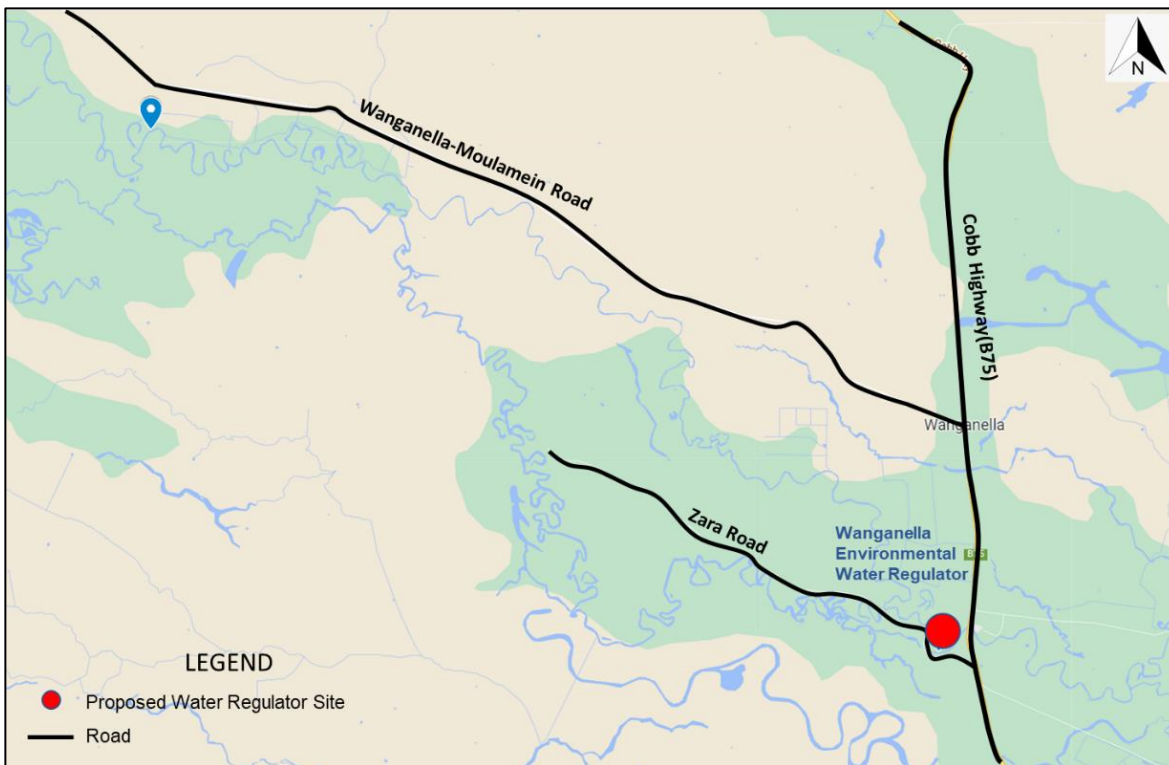


Image Source: Google Maps, modified by GHD

Figure 3.3 Key access roads near Wanganella Regulator

The following subsections describe the key roads that may be impacted by the construction activities associated with the proposal, including roads which are not located in proximity to the site (i.e., Cobb Highway). The maps within the description tables show the location of the key roads relative to the proposal (the new regulators).

3.1.2.1 Cobb Highway

Cobb Highway (pictured in Figure 3.4) is a state road and is a key route connecting NSW far west communities between Victoria and the Queensland Border. Cobb Highway also connects the Barrier, Mid-Western, Sturt, and Riverina Highways. The majority of Cobb Highway is a sealed single carriageway approximately 6.5 metres wide.

The key features of Cobb Highway are summarised in Table 3.1.

Table 3.1 Cobb Highway key features

Feature	Description
Carriageway	Sealed divided carriageway with each lane in each direction. Carriageway widths of approximately 6.5 metres (3.75 metres per lane). Lane markings and shoulders provided on both sides of the carriageway.
Parking	No designated parking facilities are provided.
Speed limit	100 km/h
Pedestrian Facilities	No pedestrian facilities are provided.
Bicycle Facilities	No cycling facilities.
Public Transport	No dedicated facilities



Image Source: Google Street View

Figure 3.4 Cobb Highway View facing north, approaching intersection with Zara Road

3.1.2.2 Conargo Road

Conargo Road (pictured in Figure 3.5) is a regional road which connects Deniliquin and Jerilderie via Wandook, Conargo, Hartwood and Coree. It is a sealed single carriageway approximately 6.5 metres wide.

The key features of Conargo Road are summarised in Table 3.2.

Table 3.2 Conargo Road key features

Feature	Description
Carriageway	Sealed divided carriageway with each lane in each direction. Carriageway widths of approximately 6.5 metres (3.75 metres per lane). Lane markings and shoulders provided on both sides of the carriageway.
Parking	No designated parking facilities are provided.
Speed limit	70 km/h
Pedestrian Facilities	No pedestrian facilities are provided.
Bicycle Facilities	No cycling facilities.
Public Transport	No dedicated facilities.



Image Source: Google Street View

Figure 3.5 Conargo Road, view facing west

3.1.2.3 Zara Road

Zara Road (pictured in Figure 3.6) is an unsealed track local road that runs an east-west alignment, with its eastern terminus at Wanganella and its western terminus at the Forest Anabranch.

The key features of Zara Road are summarised in Table 3.3.

Table 3.3 Zara Road key features

Feature	Description
Carriageway	Unsealed track. Carriageway widths of approximately six metres.
Parking	N/A
Speed limit	50km/h
Pedestrian Facilities	No pedestrian facilities.
Bicycle Facilities	No cycling facilities.
Public Transport	No access to public transport.

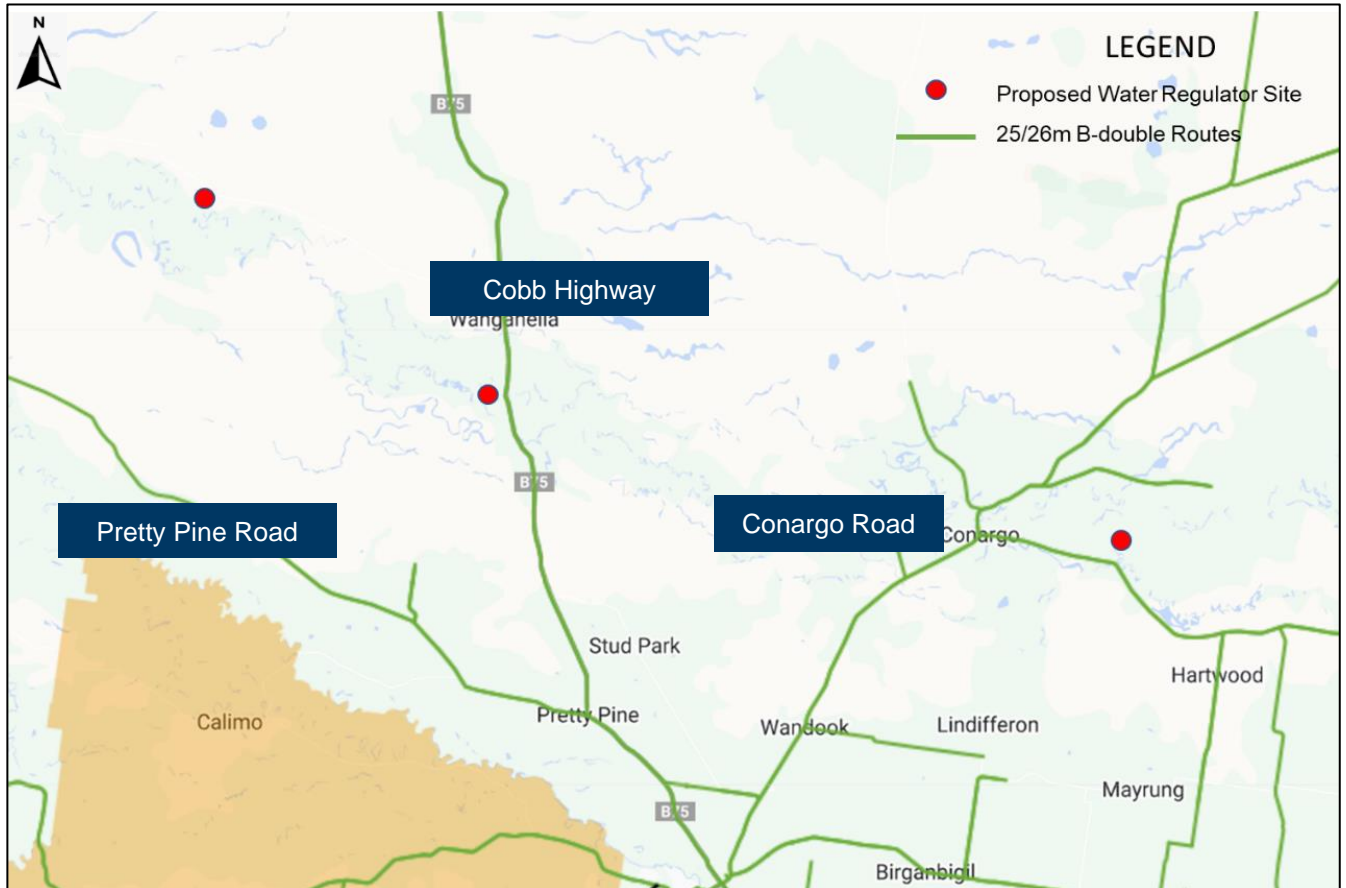


Figure 3.6 Zara Road, view facing south east from Wanganella Weir

3.1.3 Freight routes

Outputs from the Transport for NSW Restricted Access Vehicle map (refer to Figure 3.7) indicate that the nearest key freight routes to the proposal footprint, authorised to accommodate vehicles up to the size of 26 metre B-double trucks, include Cobb Highway, Conargo Road, Pretty Pine Road.

There are no approved B-double routes on Zara Road.



Data Source: Transport For NSW, modified by GHD

Figure 3.7 Restricted Access Vehicle Map

3.1.4 Public and active transport

A review of the existing public transport services and active transport facilities in the study area has been undertaken to determine any potential conflicts and mitigate or minimise negative impacts to these road users in terms of safety and amenity.

Details of public transport, walking and bicycle riding access are provided in the following sub-sections.

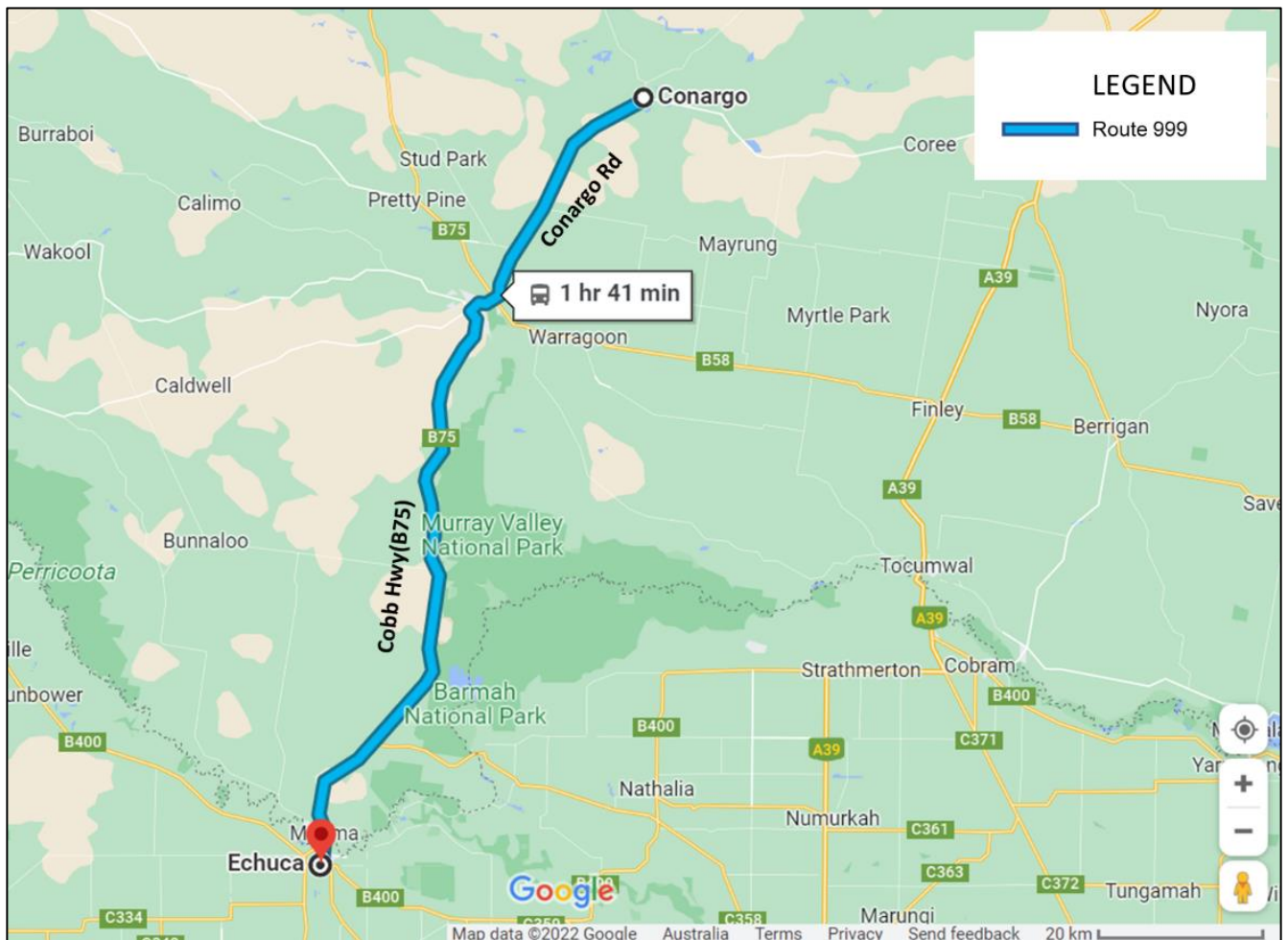
3.1.4.1 Bus services

There is one bus service that operates in the vicinity of the proposal area, which is from Conargo to Echuca-Moama and return every Wednesday. The bus service is operated by LC Dyson's Bus Services once a week. There are several bus stops along Cobb Highway and Conargo Road, as shown in Figure 3.8. The bus route number, bus stops and frequency are summarised in Table 3.4.

Table 3.4 Bus services

Bus route description	Stops	Bus Service Frequency
Route 999: Conargo to Echuca-Moama	Conargo Junction Store Deniliquin North Information Bay Whitlock St Bus Interchange V/Line stop Mathoura V/Line stop Central Motel Moama Moama coach stop Echuca Railway Station Echuca Regional Health	Wednesday (One service a week only)

Source: Bus Route Timetables 160 164 166, Transport for NSW



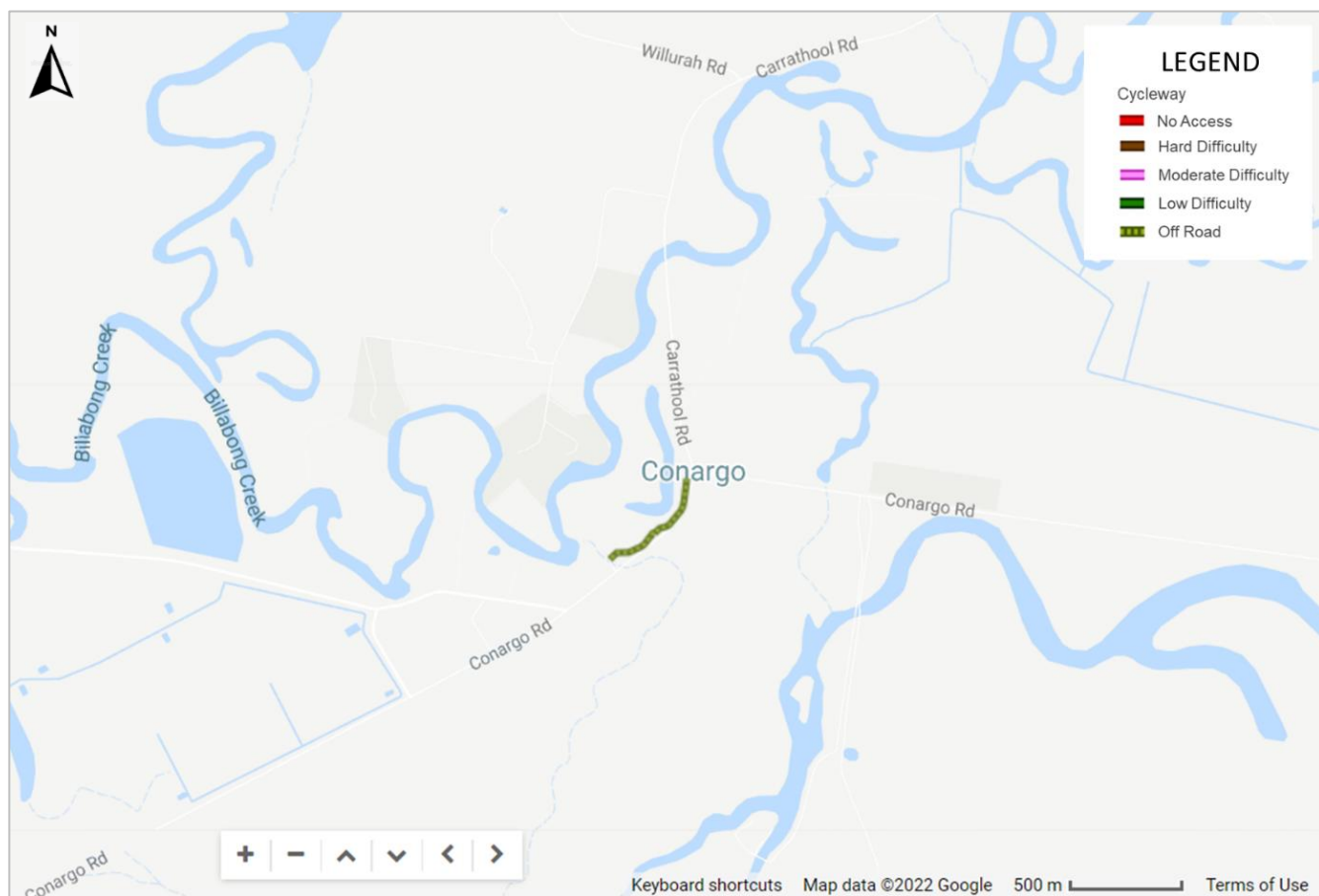
Source: Bus route information from Transport for NSW *Bus Routes and Timetables*

Figure 3.8 Bus routes and stops

3.1.4.2 Walking and cycling

Active transport facilities in proximity to the study area are currently limited and have poor connectivity.

As shown in Figure 3.9, only one section of off-road cycleway along Conargo Road is in the study area in the town of Conargo. There are no dedicated footpaths and cycling lanes that provide direct access to the proposal area.

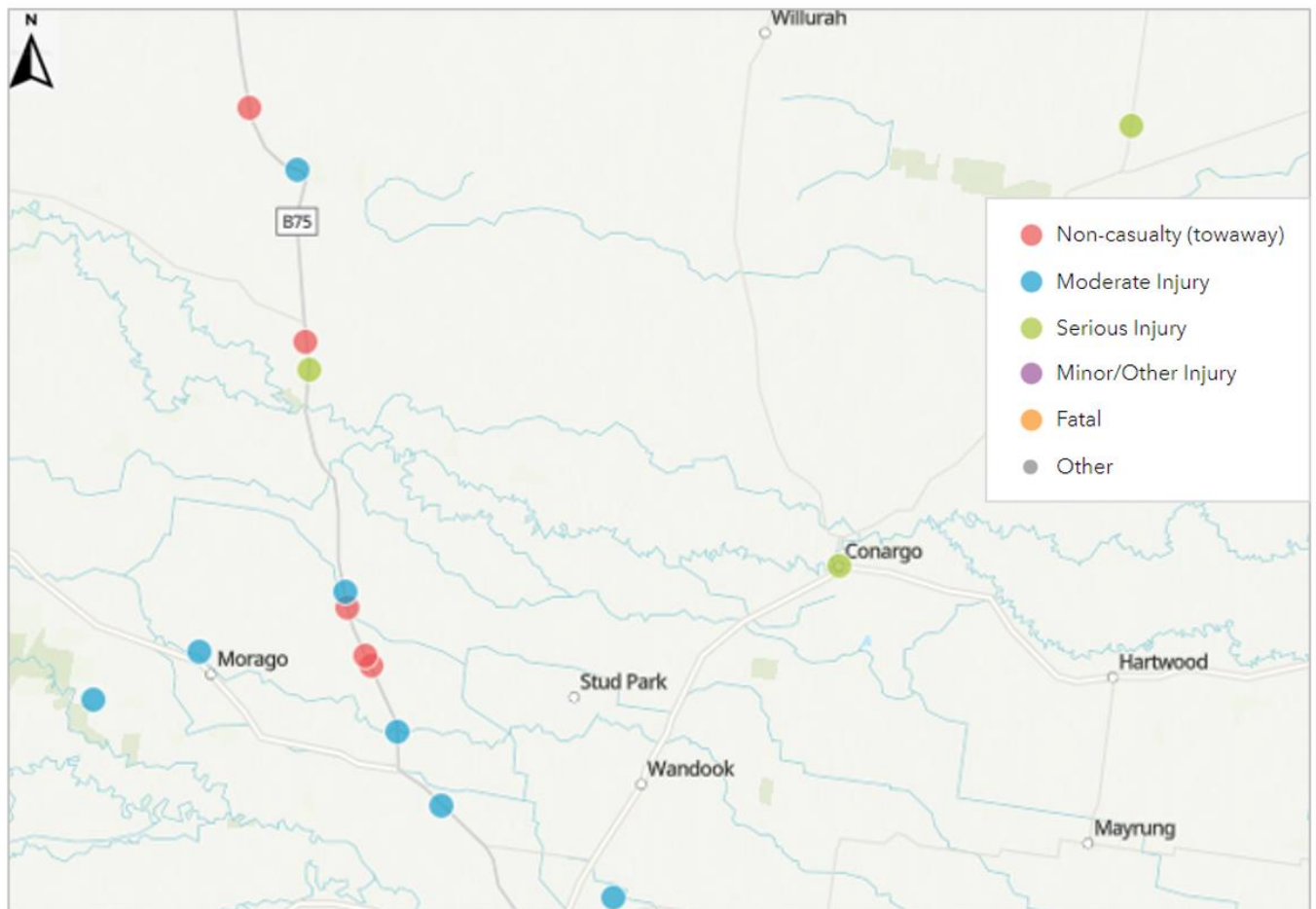


Source: Transport for New South Wales Cycleway Finder; modified by GHD

Figure 3.9 Cycling facilities

3.2 Crash review

Road crash information in the study area was collected from road crash statistics published by NSW Centre for Road Safety over a five-year period. From 2018 to 2022. A total of 19 road crash incidents were recorded within the study area of the proposal, as presented in Figure 3.10 and Table 3.5.



Source: NSW Road Crash Data 2018-2022, Centre for Road Safety

Figure 3.10 Road crashes within study area

Table 3.5 Road crash incidents within study area

Year	Degree of Crash					Total per year
	Non-casualty (towaway)	Minor/Other Injury	Moderate Injury	Serious Injury	Fatal	
2018		-	1	1	-	2
2019	3	-	6		-	9
2020		-	1	1	-	2
2021	1	-			-	1
2022	1	-	3	1	-	5
Total	5	-	11	3	-	19

The following information can be drawn from the crash data:

- Of the 19 crashes in the crash review study area, three resulted in serious injury, eleven resulted in moderate injury and five were non-casualty crashes.
- The most common type of crash was off-path (off right/off left bend) crashes, with a total of seven in the study area. The next most common type of crash were vehicles out of control on bend, of which there were five, and another three was those vehicles struck animal crashes.

3.3 Existing traffic volumes

Traffic data was obtained from Edward River Council for the main roads in the study area. For roads with no available data, traffic volumes have been assumed based on data from nearby roads. A summary of the available data and assumptions are outlined in Table 3.6.

Table 3.6 Traffic volume data (directional mid-block counts)

Road Name	Available counts	Count Year	Source
Cobb Highway	Daily average	2011	Edward River Council
Conargo Road	Daily average	2020	Edward River Council
Zara Road	No data	N/A	For a highly conservative assessment, assumed same as Wanganella-Conargo Road traffic volumes.
Pretty Pine Road	Daily average	2020	Edward River Council

As the proposal is not confined to a single area, the peak period of each road is expected to vary depending on location, land use, and direction of travel.

Since there is no singular “peak hour” for the network, the peak traffic volume for each road is used in the analysis, regardless of if the peak volumes did not actually occur at the same time in the road network. This allows for the conservative assessment of the worst-case scenario that could take place in the study area. According to traffic volume data provided by Edward River Council, there were no traffic volume increases for most of the roads from 2011 to 2020.

Traffic counts for 2022 were estimated from the traffic volume data using the following assumptions:

- zero growth rate per annum according to previous data
- peak hour traffic is equivalent to 10 per cent of average daily traffic
- 50 per cent northbound/southbound and 50 per cent eastbound/westbound of existing traffic counts.

A summary of the 2022 traffic data is presented in Table 3.7.

Table 3.7 Traffic volume count summary (2022)

Road Name	Direction	AADT (vph)	Existing traffic	
			AM Peak (vph)	PM Peak (vph)
Cobb Highway	Southbound	169	17	17
	Northbound	169	17	17
Conargo Road	Southbound	350	35	35
	Northbound	350	35	35
Zara Road	Eastbound	7	1	1
	Westbound	7	1	1
Pretty Pine Road	Eastbound	122	12	12
	Westbound	122	12	12

Note: AADT = Annual Average Daily Traffic vph = vehicles per hour

To account for the different impacts of light and heavy vehicles, traffic volumes are converted from 'vehicle per hour' (vph) to 'passenger car units' (pcu) using multipliers called passenger car equivalent (pce) factors. This allows for the assessment of traffic volume using one homogenised unit for all vehicles. A pce factor of 2.0 has been adopted for heavy vehicles to obtain a highly conservative assessment of the impacts of the proposal. The existing traffic volumes converted to pcu are shown in Table 3.8.

Table 3.8 Traffic volume count converted to pcu (2022)

Road Name	AADT (vph)	LV (%)	HV (%)	AADT (pcu)
Cobb Highway	338	79	21	410
Conargo Road	699	74	26	882
Zara Road	14	92	8	15

A summary of the mid-block vcr of the key roads is provided in Table 3.9.

Table 3.9 Existing mid-block vcr – key roads (2022)

Regulator	Road Name	Direction	AADT (pcu)	Existing traffic		Carriageway capacity * (pcu / direction)	vcr (2022)	
				AM Peak (pcu)	PM Peak (pcu)		AM Peak	PM Peak
Wanganella Regulator	Cobb Highway	Southbound	205	21	21	1225	0.017	0.017
		Northbound	205	21	21	1225	0.017	0.017
	Zara Road	Eastbound	8	1	1	200	0.004	0.004
		Westbound	8	1	1	200	0.004	0.004
Hartwood Regulator	Conargo Road	Southbound	441	44	44	1,225	0.036	0.036
		Northbound	441	44	44	1,225	0.036	0.036

Note: AADT = Annual Average Daily Traffic pcu = passenger car units (1 LV = 1 pcu, 1 HV = 2 pcu)

* It is noted that the original source indicates carriageway capacity using vph. For the purposes of this assessment, the capacity has been assumed to be equivalent to passenger car units (pcu).

This analysis indicates that, presently, all key roads surrounding the study areas are operating below capacity with vcr ranging from 0.004 to 0.036. This is well under the target maximum acceptable vcr of 0.85, which means that the roads have significant capacity to accommodate additional traffic.

3.4 Construction arrangements

The construction methodology is typical for both sites, with the exception of the construction of a flood mitigation channel at the Wanganella site over a two-week period. The exact phase the channel will be built in is unknown. As a robust assumption, this construction is assumed to coincide with peak construction traffic volumes for the rest of the proposal footprint. Construction arrangements would be made up of three phases outlined below, with construction arrangements related to vehicular access explained in more detail in the following section.

- site establishment – site establishment would include vegetation removal, access track upgrades, establishment of construction activity zones and hardstand areas
- construction of structures – including sediment and erosion controls, cranes, cofferdams, working platforms, regulators, demolition of the existing weirs
- installation of utility services
- site rehabilitation and removal of all construction equipment.

3.4.1 Access tracks

Equipment and personnel would require daily access to the worksites during construction. The available data indicates that key roads and tracks into the site locations are in reasonable condition but are not all-weather tracks and access may be impacted during inclement weather. Accordingly, all weather access to the sites is important to support construction activity.

The lengths of track to be upgraded and constructed new are described below.

3.4.1.1 Hartwood

The existing structure is owned and operated by WaterNSW. The existing weir is approximately 50km north-east of Deniliquin and 10km east of Conargo. The surrounding land is Crown Land on the west bank and private land on the east bank. Existing access is from Conargo Road to the south through the Crown Land parcel.

Existing access is intersected by a travelling stock route, which is understood to be held by NSW Local Land Services (LLS). The main access to the west bank is via an existing track with modifications required for a further 400m to facilitate heavy vehicle movement. Access to the east bank via a private bridge, would need to be considered for heavy vehicle movements based on the width and load rating. If the bridge is unsuitable for heavy loads, then a larger crane would need to be utilised to allow all works to be undertaken from one side as mentioned in the constructability report. The 2.805 kilometre length of access track is to be upgraded and constructed new, are estimated to be the following lengths:

- construction only upgrade 897 metres
- construction only new track 425 metres
- construction plus operation and maintenance new 702 metres
- construction plus operation and maintenance upgrade 781 metres.

Figure 1.3 in section 1.4.4 shows the location of the proposed construction and maintenance tracks to access the Hartwood regulator.

3.4.1.2 Wanganella

The existing Wanganella Weir provides a weir-pool for town water supply and is located approximately 1km downstream of the township of Wanganella. The existing weir is owned and maintained by Edward River Council.

The existing weir is on Crown Waterway and adjacent to Crown Land, with the weir pool providing a popular camping and picnicking, boating, and fishing site. Access over a small stock bridge is required for the secondary access to the north bank. The width and load rating of the bridge should be investigated further for heavy vehicle movements. This is considered the secondary access, however if the stock bridge is not a viable access route, then the south bank has acceptable access via Zara Road with only minor upgrades to 250m of the existing track. The estimated lengths of track to be upgraded and constructed new are described below.

The 1.478 kilometre length of access track works are estimated to be the following lengths:

- construction only upgrade 1.158 kilometres
- construction plus operation and maintenance new 321 metres.

Figure 1.4 in section 1.4.4 shows the location for proposed construction and maintenance tracks for the Wanganella regulator.

3.4.2 Construction period and hours

The construction period and hours of work is discussed in section 1.4.3.

3.4.3 Construction vehicle types

During construction, the types of vehicles accessing or egressing the proposal footprint as below: -

- light vehicles
- small truck (5t) – tilt tray and small delivery trucks
- larger delivery truck – semi trailer
- concrete trucks (up to 31t) and concrete boom truck
- truck and trailer (45t) – quarry trucks
- crane (franna 20t)
- mobile crane (60-100t)
- mobile crane (60-100t).

3.4.4 Additional vehicles for construction of Wanganella flood mitigation channel

During the construction of the flood mitigation channel at the Wangenlla site only, the types of vehicles accessing or egressing the proposal footprint as below:

- Moxy articulated dump truck
- 25-30 tonne Excavator x2
- Scraper
- grader
- roller 13 tonne plus
- water cart (Tandem 12,000 litres)
- front end loader.

3.4.5 Construction workforce

The construction workforce for the proposal is estimated to peak at around 26 personnel over eighty days during the fishway/regulator construction phase at the Hartwood site. At the Wanganella site, it is assumed the (up to) eight additional workforce needed to construct the flood mitigation channel are on site concurrently with the 26 personnel over eighty days during the fishway/regulator construction phase. Resulting in a peak workforce of 34 at the Wanganella site.

Estimated construction workforce numbers for each of the construction phases are shown in Table 3.10.

Table 3.10 Estimated construction workforce for Hartwood Regulator

Construction Phase	Hartwood Regulator – No. personnel on site-daily average	Wanganella Regulator – No. personnel on site-daily average
Mobilisation	12	12
Site-set-up including access installation	12	12
Stage 1 Cofferd Dam	17	17
Foundation preparation	14	14
Permanent Sheet pile	15	15
Fishway/Regulator Construction	26	26
Earthworks	20	20
Flood Mitigation Channel	N/A	8
Access Bridge	20	20
Steel Walkways and steel works	17	17
Install Regulating Gates, Electrical and Commission	22	22
Removal and reinstall temporary coffer dam (Stage 2)	15	15
Foundation preparation	15	15
Permanent Sheet pile	15	15
Regulator Construction (Stage 2)	20	20
Access Bridge (Stage 2)	20	20
Steel Walkways and steel works	15	15
Remove Cofferd Dams	15	15
Regulator and fishway full commissioning	20	20
Decommission existing weir & demobilisation	15	15

Source: CK Project Services

3.5 Operation and maintenance

A limited range of activities would be required to operate the proposal. Traffic generation during operations is expected to be minimal. NSW DCCEEW has provided the below operational data:

- Average estimated truck movements to each of the weirs would be average about 10 per month (both ways), and 20 per month during the first two years due to the commissioning of the fishway.
- It is noted that these volumes would fluctuate slightly, depending on the time of the year.
- At times, the maintenance may span over a couple of days, or for major items approximately a week.
- Maintenance activities would include operations and monitoring (monthly), Scada, hydrometric monitoring and the occasional site visit (tour).

In summary, on average the operation and maintenance of the proposal would generate around up to one inbound and outbound vehicle movement per day.

4. Impact assessment

4.1 Construction

This section provides details of the estimated traffic that would be generated by the proposed works and an analysis of its likely impacts to the adjoining road network.

As the operation and maintenance stages of the proposal are expected to generate minimal traffic compared to the construction stage, the analysis of the construction impacts would highlight the most significant impact that the proposal would have on the road network.

For the purposes of this assessment, the traffic generation during the peak construction period would be analysed to account for the worst-case scenario.

4.1.1 Traffic generation

This section provides details of the estimated traffic that would be generated by the proposed works. The term “vehicle movement” signifies a one-way movement of a vehicle from one point to another (i.e., one round trip is equivalent to two vehicle movements).

The following assumptions were utilised in the estimation of peak hour vehicle movements:

- Light vehicles – it is assumed that there would be opportunities for workers to carpool and therefore the total number of personnel has a factor of 0.75 included in terms of vehicle movement.
- Daily movements – include access into the worksite to start shift and egress from the site at completion of shift.
- 50 per cent of peak construction traffic would access and egress the sites from the north, and 50 per cent of traffic access and egress the site from the south.
- Realistically, peak light vehicle (LV) and heavy vehicle (HV) movements would not occur during the same period during the day. However, to obtain a conservative assessment, peak movements of both vehicle types have been assumed to occur during the peak hour.
- 25 per cent of HV movements for all activities have been assumed to occur during the single peak hour. With the exception of the construction of the flood mitigation channel at Wanganella where a peak of six additional movements per hour have been assumed based on three trucks and a turnaround time of 30-minutes. These six heavy movements have been added onto the existing 25 per cent of HV movements as it is not clear at what stage the construction of the channel will take place. Resulting in a peak hour of 14 HV movements.
- To obtain a conservative assessment, 26 LV movements for fishway/regulator construction activity have been assumed to occur during the single peak hour.
- In the case of the Wanganella Regulator the 26 LV movements is uplifted to 32 to account for additional workforce associated with the construction of the flood mitigation channel.

The estimated traffic that would be generated by the proposed construction works is summarised in Table 4.1.

Table 4.1 Traffic generation during construction

Traffic generation per regulator	Total Duration (days)	Total vehicle movements		Peak daily Movement	
		LV	HV	LV	HV
Hartwood Regulator	277	8,183	1,643	39	51
Wanganella Regulator	265	7,817	1,687	51	80

Source: CK Project Services

The approximate volumes of peak construction traffic and total construction traffic generation which would be generated by the proposed activities per hour are summarised Table 4.2.

The table presents the total number of movements for both directions of traffic (assuming 50 per cent northbound and 50 per cent southbound) and describes the highest estimated traffic generation during construction for the affected portions of the road.

Table 4.2 *Estimated traffic generation during peak construction period*

Regulator	Affected roads	Direction	Peak construction traffic generation				Total construction traffic generation (vph)	
			AM Peak (vph)		PM Peak (vph)		AM Peak	PM Peak
			LV	HV	LV	HV		
Hartwood Regulator	Conargo Road	Southbound	26	13	26	13	39	39
		Northbound	26	13	26	13	39	39
Wanganella Regulator	Cobb Highway	Eastbound	32	14	32	14	34	34
		Westbound	32	14	32	14	34	34
	Zara Road	Eastbound	32	14	32	14	48	48
		Westbound	32	14	32	14	48	48

Note: LV = light vehicle HV = heavy vehicle vph = vehicles per hour (vph are one-way movements)

4.1.2 Mid-block analysis

The impacts of the proposal on the road network were quantified by adding the traffic generated by the construction and operation works to the expected future traffic volumes on the road network. The future baseline traffic for 2025 was estimated by applying a growth rate of one per cent per annum to the 2022 traffic volumes described in section 3.3. In the case of the Wanganella regulator, peak volumes for the construction of the drainage channel are assumed to be concurrent with the peak traffic volumes for the construction of the regulator. The resulting vcr are provided in Table 4.3.

The values indicate that with background traffic growth and additional vehicle traffic generated by the construction works, all roads within the study area would continue to operate at satisfactory level below capacity:

- During the construction period, vcr of the assessed roads would range from 0.056 to 0.244. The roads would have at least 75 per cent spare capacity to accommodate additional traffic volumes.

The assessment indicates that the proposal is expected to have minimal impacts to the peak hour traffic volumes.

Table 4.3 Forecast increase in peak hour two-way traffic volumes – 2025 with construction

Regulator	Road Name	Direction	Capacity (pcu / direction) *	Existing traffic (2022)					2025 during Construction				
				Traffic Volume			vcr		Traffic Volume		vcr		
				AADT (pcu)	AM Peak (pcu)	PM Peak (pcu)	AM Peak	PM Peak	AM Peak (pcu)	PM Peak (pcu)	AM Peak	PM Peak	
Wanganella Regulator	Cobb Highway	Southbound	1225	205	21	21	0.017	0.017	69	69	0.056	0.056	
		Northbound	1225	205	21	21	0.017	0.017	69	69	0.056	0.056	
	Zara Road	Eastbound	200	8	1	1	0.004	0.004	49	49	0.244	0.244	
		Westbound	200	8	1	1	0.004	0.004	49	49	0.244	0.244	
Hartwood Regulator	Conargo Road	Southbound	1225	441	44	44	0.036	0.036	83	83	0.068	0.068	
		Northbound	1225	441	44	44	0.036	0.036	83	83	0.068	0.068	

LEGEND  Free flow Congested

Note: AADT = Annual Average Daily Traffic pcu = passenger car units (1 LV = 1 pcu, 1 HV = 2 pcu)

* It is noted that the original source indicates carriageway capacity using vph. For the purposes of this assessment, the capacity has been assumed to be equivalent to passenger car units (pcu).

4.1.3 Worksite access: sight distance

Available sight distance at the access points to the construction work sites was assessed to determine whether there is adequate longitudinal sight distance at the proposed access to allow drivers approaching and exiting the temporary worksite to safely navigate into and out of the site.

This assessment was undertaken based on a desktop assessment only, using Google Maps and Google Street view. However, it is worth noting that the actual sight distances observed on site may differ from the Google images, which may be outdated because of changes to vegetation, changes to the road environment and the level of google camera above the road surface of a vehicle varies from driver eye height etc.

Approach Sight Distance (ASD) is the minimum requirement to provide the driver of a vehicle adequate sight distance to observe the road layout with sufficient time to react and stop, if necessary, before entering the conflict area. Approach sight distance is measured from the driver eye height (1.1 metres to 0.0 metres or the road surface for cars, and 2.4 metres to 0.0 metres for trucks).

Safe Intersection Sight Distance (SISD) provides sufficient sight distance for a driver of a vehicle on the major road to observe approaching vehicles from the minor road and to stop before a potential collision. Safe intersection sight distance is measured from the driver eye height of (1.25 metres for cars, and 2.4 metres for trucks).

The required sight distances were derived from the *Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections* (Austroads, 2017). Table 4.4 provides a summary of the sight distance requirements for intersections providing access to the proposed construction workspace.

Table 4.4 Sight distance requirement for cars and trucks

Regulator	Location	Design Speed (km/h)	ASD (minimum requirement)			SISD (minimum requirement)		
			Required (m)		Measured (direction from access)	Required (m)		Measured (direction from access)
			Cars	Trucks		Cars	Trucks	
Hartwood Regulator	Conargo Road	70	92	105	295+ m (east)	151	187	295+ m (east)
					500+ m (west)			500+ m (west)
Wanganella Regulator	Zara Road	50	55	62	285+ m (east)	97	117	285+ m (east)
					285+ m (west)			285+ m (west)
	Cobb Highway	100	165	191	140+ m (south)	248	317	140+ m (south)
					350+ m (north)			350+ m (north)

Requirements derived from Austroads Guide to Road Design Part 3: Geometric Design and Part 4a: Unsignalised and Signalised Intersections (Austroads, 2021)

* For unsealed roads with no posted limits, the following speed limits have been assumed, in accordance with **NSW rules on speed limits**: 50 km/h in built up areas; 100 km/h for all other roads.

As summarised in Table 4.4, the measured sight distances meet the minimum sight distance requirement at all locations, except Wanganella Regulator access via Cobb Highway (access coming from the west). While the number of vehicles traversing this road is expected to be very low (less than 50 vehicles per day), traffic management measures such as appropriate road signs are recommended to be installed to warn other road users (i.e. passing traffic) of the nature of activities in proximity to Wanganella.

4.1.4 Car parking

Parking for all construction vehicles and worker vehicles would be contained on site within the proposal area. As such, car parking would have no impact on the existing road network.

4.1.5 Public transport

Public transport facilities would not be impacted by the proposal as the proposed sites and their respective access points are not located near any public transport facilities.

No active transport facilities in the vicinity of the proposal footprints have also been recorded. Proposed measures are identified in section 5 to mitigate or minimise any impacts to other road users.

4.1.6 Impact of hazardous or dangerous goods

The transport of hazardous or dangerous goods is not expected to be required for the construction of the proposal. If transport of hazardous or dangerous goods is required, transportation would be undertaken in accordance with the following standards and codes:

- State Environmental Planning Policy (Resilience and Hazards) 2021
- Australian Code for the Transport of Dangerous Goods by Road & Rail (National Transport Commission 2020)
- AS/NZS 4452:1997 The storage and handling of toxic substances (Joint Standards Australia/Standards New Zealand 1997).

4.2 Operation

As described in section 3.5, traffic generation during operations is expected to be minimal. On average, the operation and maintenance of the proposal would only generate around one inbound and outbound vehicle movement per day. Therefore, the impact on traffic created by the proposal during the operational phase is considered to be negligible

4.3 Cumulative impacts

The other projects planned in the study area were reviewed to determine if the proposal has the potential to result in significant cumulative impacts. No potential cumulative impacts relevant to traffic were identified during construction or operational phases of the proposal. As such, no further cumulative assessment was conducted.

5. Mitigation and management of impacts

Table 5.1 lists the mitigation and management measures that would be implemented to manage potential impacts to traffic and transport identified in section 4.

Table 5.1 Traffic & Transport mitigation and management measures

ID	Impact	Environmental safeguard	Responsibility	Timing
T1	Impacts to traffic and transport networks	<p>Develop a construction traffic management sub-plan, prior to construction. The plan shall detail:</p> <ul style="list-style-type: none"> – the potential impacts/delays associated with the development – the works required to the existing road infrastructure – the measures to be implemented to maintain the standard and safety of the network – the procedures to monitor and ensure compliance. <p>The plan will include, at a minimum, the following management measures:</p> <ul style="list-style-type: none"> – preparation of a Traffic Guidance Scheme, detailing adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption to surrounding land uses is minimised – maintain accessibility for pedestrians and cyclists – indicate routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses – implement measures to manage traffic flows around the area affected by the construction of the proposal, including, as required, regulatory and direction signposting, line marking, and variable message signs and all other traffic control devices necessary for the implementation of the construction traffic management sub-plan – undertake consultation with the relevant road authorities during preparation of the sub-plan. Ensure the performance of proposal traffic arrangements is monitored during construction. 	Contractor	Pre-construction
T2	Safety implications arising from the general increase in traffic volumes	<p>Protection shall be provided through advanced warning of roadworks, speed changes, safety barriers with adequate offsets and deflection allowance, where necessary.</p> <p>The CTMP shall cover strategies to manage vehicular flow to facilitate the safe movement of road users (i.e., workers and staff, and the general public – pedestrians, cyclists, and other non-proposal vehicles) within, around, and to/from the proposal footprint.</p>	Contractor	Construction and operation

ID	Impact	Environmental safeguard	Responsibility	Timing
T3	Increase in heavy vehicles	All deliveries shall be scheduled and coordinated to facilitate the organised arrival of trucks. Ample space and time shall be allotted for the safe loading and unloading of materials. All parking and queueing (if any) shall be contained within the proposal footprint.	Contractor	Construction and operation
T4	Damage on roads along haulage and access routes resulting from the movement of proposal vehicles	The conditions of the access roads to the proposal's footprint, and of the roads linking the proposal sites to the existing freight network (see section 3.1.3) used for freight transport shall be assessed by a Road Dilapidation Report prior to construction commencing and following completion of construction. Any defects attributable to construction activities shall be rectified or compensated in consultation with the relevant road authorities.	NSW DCCEEW / Contractor	Construction
T5	Environmental impacts associated with the movement of vehicles	Monitor the roads leading to and from the proposal footprint and take necessary steps to rectify any road deposits caused by site vehicles as soon as reasonably practicable, to maintain the safety of road users. Where possible, offset the construction vehicle activity from peak periods of road network activity.	Contractor	Construction
T6	Environmental impacts associated with the movement of vehicles	Induct employees and contractors to raise awareness and understanding of traffic and transport mitigation measures to be implemented during construction via the CEMP.	Contractor	Construction
T7	Impacts to road infrastructure	Undertake the necessary upgrades and construction of vehicular access tracks to provide safe and efficient movement of light and heavy vehicles to the proposal sites as described in section 3.4.1.	Contractor	Pre-construction

6. Conclusion

6.1 Overview

A Traffic Impact Assessment was undertaken to determine the potential impact on traffic and transportation associated with the construction and operation of the proposal. Based on a review of traffic and transport facilities in proximity to the proposal footprint (including road hierarchy, road network operation, freight routes, active transport and public transport, crash data and traffic volumes) and an analysis of proposal trip generation and distribution and it is expected that the proposal would have a negligible impact on the adjoining road and transport network.

Mitigation measures would be implemented prior to construction and during construction to minimise impacts to traffic and transport networks and minimise environmental impacts associated with the movement of vehicles during construction, including the development of a Construction Traffic Management Plan (CTMP).

6.2 Key Findings

Construction

During the construction period, vcr of the assessed roads would range from 0.056 to 0.244. Both roads would have at least 75 per cent spare capacity to accommodate additional traffic volumes.

The assessment indicates that the proposal is expected to have minimal impacts to the peak hour traffic volumes.

Sight distance

The measured sight distances meet the minimum sight distance requirement at all locations, except Wanganella Regulator access via Cobb Highway (access coming from the west). While the number of vehicles traversing this road is expected to be very low (less than 50 vehicles per day), traffic management measures during construction works, such as appropriate road signs are recommended to be installed to warn other road users (i.e., passing traffic) of the nature of activities in proximity to Wanganella.

Operation

Traffic generation during operations is expected to be minimal. On average, the operation and maintenance of the proposal would only generate around one inbound and outbound vehicle movement per day. Therefore, the impact on traffic created by the proposal during the operational phase is considered to be negligible.

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