

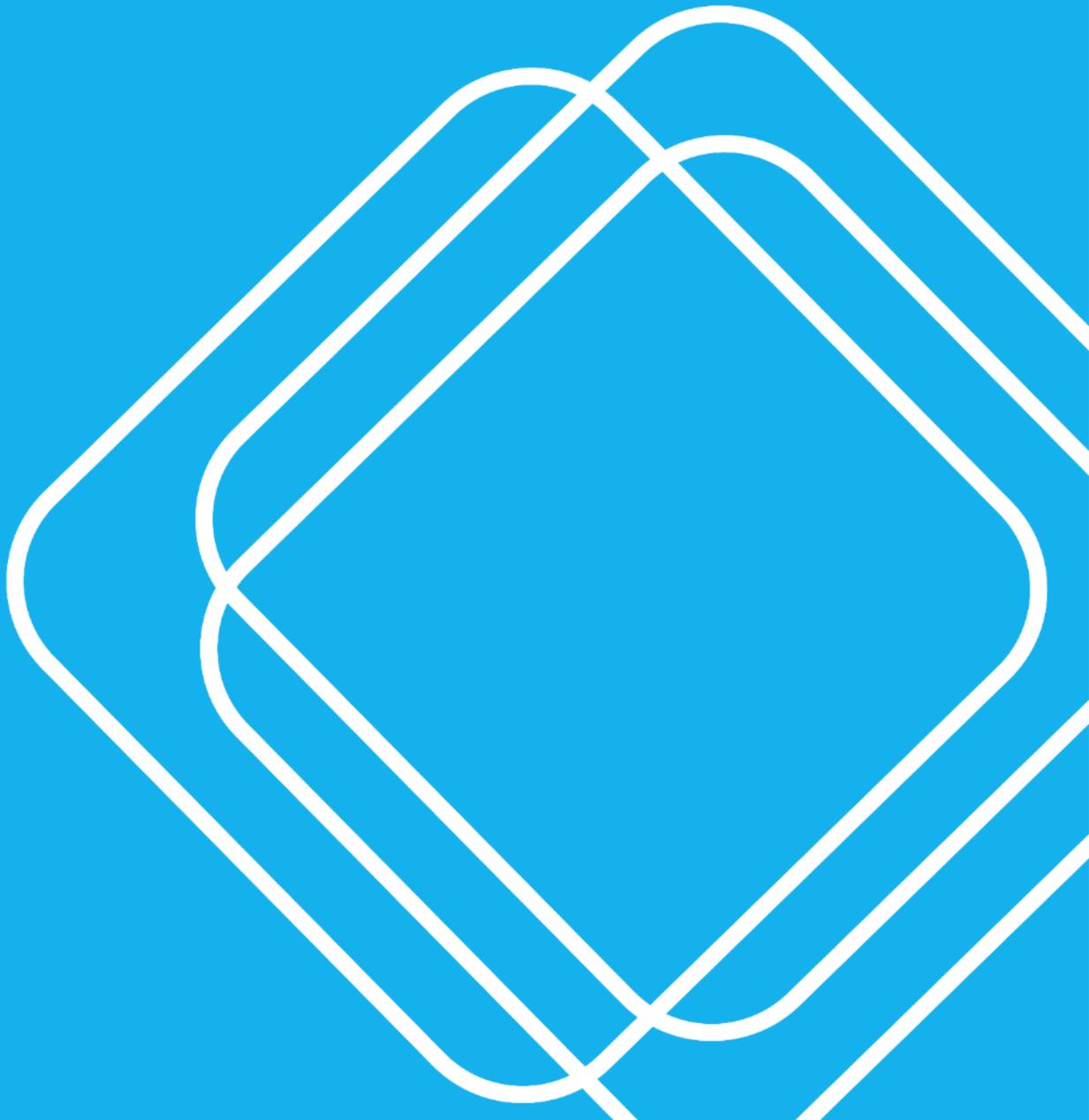
**APPENDIX H**  
**TRAFFIC ASSESSMENT – TRAFFIC AND TRANSPORT REPORT**

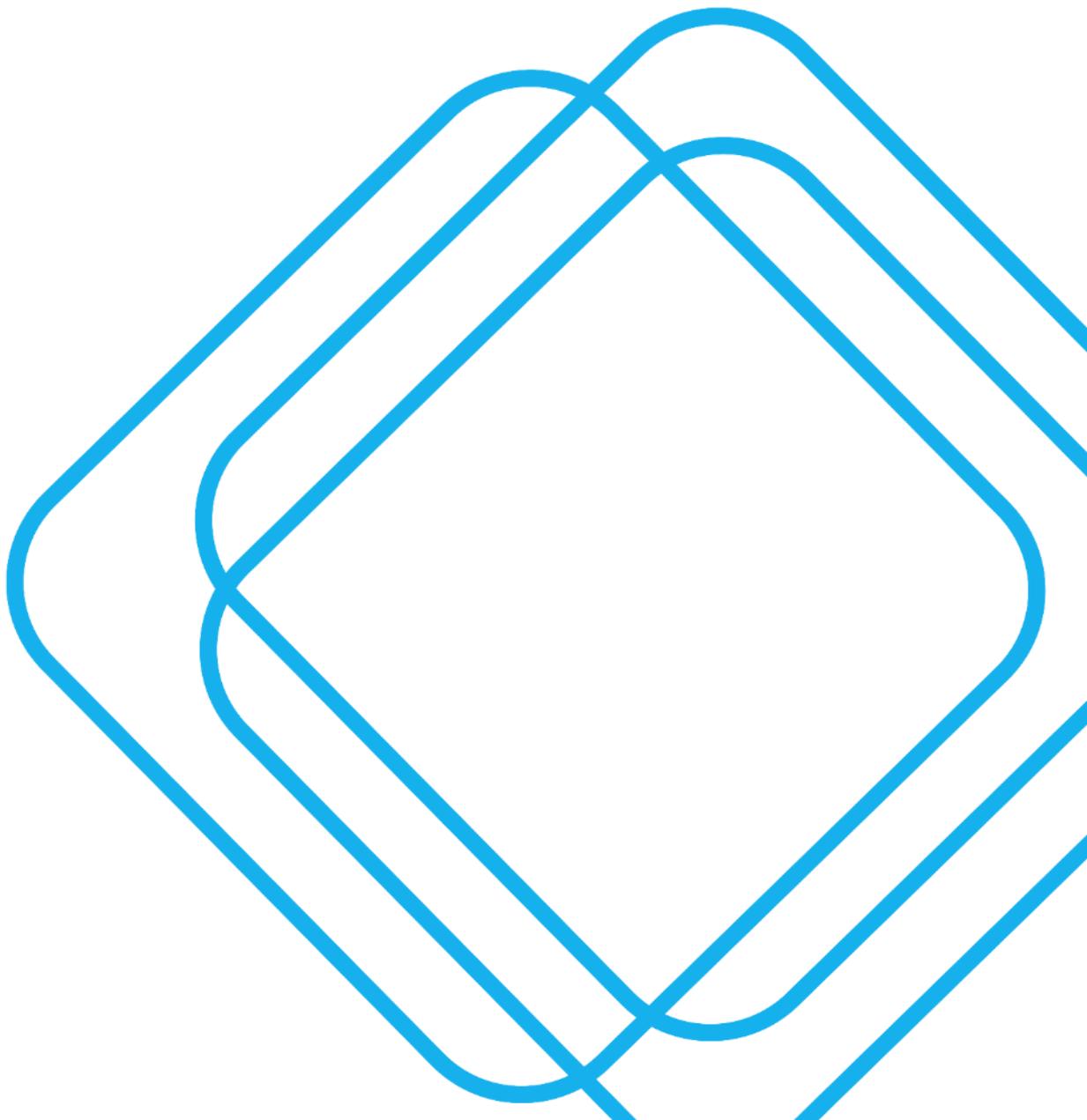


# VALLEY OF THE WINDS TRAFFIC ASSESSMENT

Traffic and Transport Report

25 FEBRUARY 2022





## Quality Assurance

<b>Project:</b>	Valley of the Winds Traffic Assessment		
<b>Project Number:</b>	SCT_00239		
<b>Client:</b>	UPC Renewables Australia Pty Ltd	<b>ABN:</b>	27 616 856 672
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<b>Document name:</b>	Valley of the Winds Traffic Assessment
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Revision	Revision Date	Details
1.0	10 August 2021	Initial draft report for review
2.0	27 September 2021	Draft for review
3.0	29 September 2021	Updated draft for review
4.0	21 December 2021	Final report
5.0	24 February 2022	Updated final report
6.0	25 February 2022	Updated final report

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## Reference terms

Term / Abbreviation	Definition
Ancillary infrastructure	Supporting infrastructure for: <ul style="list-style-type: none"> <li>• construction (temporary) e.g. compounds, batching plants, etc.</li> <li>• operational (permanent) e.g. operations and maintenance facilities, access tracks, etc.</li> </ul>
Associated dwellings / associated properties	Dwellings or properties on which the wind turbines, or the transmission line, are located.
Central-West Orana Transmission line	TransGrid's proposed East-West transmission line for the overall renewable energy zone located to the south of the Girragulang Road and Leadville clusters (the project's proposed dispatch to the NEM)
Construction access tracks	Vehicle access tracks for construction and delivery of plant and equipment on private property.
Electrical reticulation	Underground and overhead electrical services that connect the turbines and connect to the substations in each cluster
Girragulang Road Cluster	Wind turbine cluster east of Black Stump Way and Girragulang Road, south of Coolah
Impact footprint	The area containing all the permanent and temporary project components associated with construction and operation – effectively the disturbance area for the project.  Includes the transmission line connecting the wind farm to the Central-West Orana Transmission line and the access tracks to the wind farm clusters.
Leadville Cluster	Wind turbine cluster north of Golden Highway and east of Leadville township
Mount Hope Cluster	Wind turbine cluster west of Black Stump Way, south west of Coolah
Non-associated dwellings / non-associated properties	Dwellings or properties that are potentially impacted by the proposed wind farm, but on which wind turbines or transmission line are not located i.e. indirectly affected by the proposed development.
Operational access tracks	Vehicle access tracks for operations and maintenance on associated properties.
Overhead transmission line	The proposed overhead transmission lines (up to 330Kv) dispatching electricity from each cluster and connecting clusters (Mount Hope to Girragulang Road).  Also potentially connecting the Leadville cluster to the Girragulang Road high voltage transmission line.
Project	Refers holistically to the proposed Valley of the Winds Wind Farm, including the wind farm and the transmission line(s)
Proponent	UPC\AC Renewables Australia Pty Ltd (abbreviated to 'UPC\AC')

Term / Abbreviation	Definition
Survey boundary	<p>A survey boundary has been developed within the wind farm site boundary for the specialist environmental assessments in this EIS that consider the impacts of vegetation and ground disturbance.</p> <p>The survey boundary provides a 200-metre corridor around access tracks and turbines. This corridor ensures the EIS adequately identifies potential disturbance impacts, but also provides flexibility for the proposed layout to be refined within the surveyed area during detailed design.</p>
Transport routes	Public roads that are to be used for delivery of plant and equipment (e.g. rotor blades)
TxL or transmission line	The proposed high voltage (up to 500Kv) overhead transmission line(s) that will connect the wind farm to the Central-West Orana Transmission line
Wind farm site	The wind farm site boundary corresponds with the outer boundary of properties upon which the proposed Valley of the Winds wind farm is located. Includes the three clusters but excludes the transmission line connecting to the Central-West Orana REZ Transmission line.

## Executive Summary

UPC Renewables Australia Pty Ltd, operating as UPC\AC Renewables Australia (UPC\AC), proposes to construct and operate the Valley of the Winds wind farm (the project). This traffic assessment report has been prepared to inform the environmental impact statement (EIS) and development application (DA) for the project, which is a State Significant Development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011* and Part 4 of the *Environmental Planning and Assessment Act 1979*.

The project would consist of approximately 148 wind turbines and supporting infrastructure, including a high voltage transmission line, which would run about 13 kilometres from the Girragulang Road cluster to a connection point with the Central-West Orana Renewable Energy Zone Transmission line proposed by TransGrid and the NSW Government. The project would supply approximately 800 megawatts of electricity into the National Electricity Market.

The wind farm would be located close to the townships of Coolah and Leadville, with the transmission line running generally south to its connection with the Central-West Orana REZ Transmission line. The project would be entirely within the Warrumbungle Local Government Area (LGA).

The project would involve the construction, operation and decommissioning of three wind turbine clusters: the Mount Hope cluster (about 76 turbines), the Girragulang Road cluster (about 51 turbines) and the Leadville cluster (about 21 turbines). The construction of the project is expected to commence by early 2023 and last between 24 and 42 months and is expected to require up to 400 full time equivalent employees during the peak construction phase and about 50 full time equivalent employees during the operation and maintenance of the wind farm.

To assess the traffic and transport impacts of the project, a review of existing conditions was undertaken, including traffic survey data to establish a robust baseline for the traffic impact assessment. Future year traffic generation was estimated for the construction, operation, and decommissioning phases and an analysis of the future year conditions with and without the project was undertaken.

The traffic and transport impact assessment deals primarily with the construction phase of the project as traffic generation is forecast to be greatest during the construction phase, when compared to the operation and decommissioning phases which would require lower or equivalent labour force and materials.

During construction, it is forecast that construction material would be transported to the project along the Golden Highway, irrespective of if its origin (e.g. Newcastle or Sydney), and then access the cluster worksites from roads off the Golden Highway and Black Stump Way.

The potential traffic impacts associated with the construction workforce on the surrounding road network have been assessed under two scenarios:

- Regional distribution of workforce accommodation: this scenario assumes that construction worker accommodation would be distributed across six localities, including the townships of Coolah, Dunedoo, Cassilis, Coonabarabran, Gulgong and Mudgee; and workers would travel from established accommodation facilities in these towns. These workforce location assumptions are subject to confirmation of the final social impact assessment outcomes and ongoing consultation with Warrumbungle Shire Council. This scenario is considered the worst-case for traffic impacts and assumes travel to site using a mix of private vehicles and project shuttle services.
- Centralised workforce accommodation: this scenario assumes the bulk of the construction workforce is accommodated at a temporary workers accommodation camp located on site. It is expected that this scenario would result in reduced traffic impacts on the surrounding road network as the bulk of the construction workforce would be centrally located and therefore not travelling to and from site daily, using the wider road network. Traffic movements would occur between the workers accommodation and work zones within each of the clusters under this scenario.

Under both assessment scenarios for the construction workforce, construction activities at the three clusters were assumed to be undertaken sequentially, with construction vehicle movements associated with one cluster at a given time. Although there may be some overlap in construction activities, this assumption provides a representative worst-case assessment for each cluster.

The key findings of the traffic and transport assessment for the project are:

- The project would generate the greatest traffic and transport impact during the construction peak period for the Mount Hope cluster, as it has the most turbines. Depending on the construction workforce accommodation arrangement, the following traffic is forecast to be generated:
  - Under a regional distribution of construction workforce accommodation scenario, eight heavy vehicle trips and 253 light vehicle trips are forecast to be generated during the peak hours, i.e. four heavy vehicles entering and four heavy vehicles leaving the study area in each peak hour, and 253 light vehicles accessing the worksite in the AM peak hour and 253 light vehicles leaving in the PM peak hour. This is considered a worst-case scenario in terms of traffic generation during the construction period.
  - Under a centralised construction workforce accommodation scenario, eight heavy vehicle trips and 64 light vehicle trips are forecast to be generated during the peak hours, i.e. four heavy vehicles entering and four heavy vehicles leaving the study area in each peak hour, and 64 light vehicles accessing the worksite in the AM peak hour and 64 light vehicles leaving in the PM peak hour. The reduction in light vehicles under this construction scenario is due to a much higher use of shuttle buses from the worker camp to the construction sites.
- Given the low volume of background traffic in the vicinity of the study area, these additional construction trips are forecast to have minimal impact on the surrounding road network operational performance.
- The assessment of forecast peak construction traffic volumes indicate upgrades would be needed along the access roads to the three clusters and to some intersections to allow OSOM deliveries, as described in **Table ES-1**, prior to construction commencing. No other intersection upgrades are expected
- Parking for staff would be provided onsite for all phases of the project.
- The project is anticipated to have minimal impacts to public transport, rail crossings and pedestrians and cyclists. Construction workforce trips would typically occur before and after school bus services.
- The cumulative traffic impact from other planned and proposed developments in the area was considered as part of the forecast traffic growth and indicated the network would have capacity to accommodate the forecast traffic volumes.
- Once in operation, the project is forecast to generate about 50 vehicles to / from the project in each peak period, which is expected to have minimal impact on the road network. No operational management measures are expected to be required.

Prior to the commencement of construction of the project:

- A construction traffic management plan (CTMP) would be prepared in consultation with TfNSW and Warrumbungle Shire Council, which would seek to minimise any delays, disruptions, and safety risks and would include details such as temporary traffic management plans, driver's code of conduct, dilapidation survey and controls for transport and use of dangerous goods, etc.
- An engineered detailed design based on full 3D swept path analysis for the OSOM access intersections and proposed road upgrades will be developed in consultation with the relevant road authority. The design will be developed to the standard and satisfaction of Warrumbungle Shire Council and referred to TfNSW under Section 138 of the *Roads Act 1993* as appropriate.

Table ES-1 Schedule of proposed road upgrades

Item No.	Intersection / Road	Proposed upgrade	Approx. length (km)	Timing
<b>Road authority: Warrumbungle Shire Council</b>				
1	Mount Hope Road	From Neilrex Road intersection to Mount Hope cluster boundary, upgrade to the standard and satisfaction of Council for general construction traffic. <i>This upgrade would not be required under the centralised worker accommodation scenario.</i>	1.0	Prior to commencing construction of the Mount Hope cluster
2	Mount Hope Road	Within the Mount Hope cluster boundary, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles.	12.0	Prior to commencing construction of the Mount Hope cluster
3	Black Stump Way / Mount Hope Access Road intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.1.4 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Mount Hope cluster
4	Short Street	From the Golden Highway to Church Street, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles. UPCAC is committed to paving this section of road in response to feedback from the local community.	0.3	Prior to commencing construction of the Girragulung Road cluster
5	Turee Street	From Short Street to Main Street, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles. UPCAC is committed to paving this section of road in response to feedback from the local community.	0.3	Prior to commencing construction of the Girragulung Road cluster
6	Main Street	From Turee Street to Wyaldra Street, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles.	0.1	Prior to commencing construction of the Girragulung Road cluster
7	Wyaldra Street	From Main Street to Moorefield Road, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles.	0.3	Prior to commencing construction of the Girragulung Road cluster
8	Moorefield Road (east)	From Wyaldra Street to Girragulung Road cluster boundary, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles.	2.2	Prior to commencing construction of the Girragulung Road cluster
9	Turee Street / Main Street intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.3.2 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Girragulung Road cluster
10	Wyaldra Street / Moorefield Road intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.3.3 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Girragulung Road cluster

Item No.	Intersection / Road	Proposed upgrade	Approx. length (km)	Timing
11	Moorefield Road (west)	From Black Stump Way to GIRRAGULANG Road cluster boundary, upgrade to the standard and satisfaction of Council for general construction traffic.	4.6	Prior to commencing construction of the GIRRAGULANG Road cluster
12	The Leadville Stock Route	From Black Stump Way to Wardens Road, upgrade to the standard and satisfaction of Council for general construction traffic.	0.9	Prior to commencing construction of the Leadville cluster
13	Wardens Road	From The Leadville Stock Route to access track to Leadville cluster, upgrade to the standard and satisfaction of Council for general construction traffic.	0.9	Prior to commencing construction of the Leadville cluster
14	Wardens Road	From end of item 13 to access tracks to Leadville cluster, upgrade to the standard and satisfaction of Council for general construction traffic.	5.4	Prior to commencing construction of the Leadville cluster
<b>Road authority: Transport for NSW</b>				
15	Golden Highway / Black Stump Way intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.0.1 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Mount Hope cluster
16	Golden Highway / Leadville Access Road intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.2.3 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Leadville cluster
17	Golden Highway / Short Street intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.3.1 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the GIRRAGULANG Road cluster

Table note: Should the Golden Highway / Leadville Access Road intersection (road upgrade no. 16) not be able to proceed, an alternative access for OSOM vehicles to the Leadville cluster would be provided via Sir Ivan Dougherty Drive, Wardens Road and a new private access road. In this case, road upgrade no. 14 to Wardens Road would not be required, as general construction vehicles would use the new private access track rather than the section of Wardens Road past road upgrade no. 13, and road upgrades along Sir Ivan Dougherty Drive and intersection upgrades at the Golden Highway / Sir Ivan Dougherty Drive and Sir Ivan Dougherty Drive / Wardens Road intersections would be required. The extent of these required intersection works to allow access for OSOM vehicles are indicated on Drawings 4.2.1 and 4.2.2 in Appendix A.

## 1.0 Introduction

### 1.1 Project background

UPC Renewables Australia Pty Ltd, operating as UPC\AC Renewables Australia (UPC\AC) (the Proponent), proposes to construct and operate the Valley of the Winds wind farm (the project).

The project would consist of approximately 148 wind turbines and supporting infrastructure, including a high voltage transmission line, which would run approximately 13 kilometres from the Girragulang Road cluster to a connection point with the Central-West Orana Renewable Energy Zone (REZ) Transmission line proposed by TransGrid and the NSW Government. The project would supply approximately 800 megawatts (MW) of electricity into the National Electricity Market (NEM).

The wind farm would be located close to the townships of Coolah and Leadville, with the transmission line running generally south to its connection with the Central-West Orana REZ Transmission line. The project would be entirely within the Warrumbungle Local Government Area (LGA).

### 1.2 Site context

The project location is shown in **Figure 1–1**. Land surrounding the wind farm site is characterised by rolling pastoral hills, open flat valleys and ridgelines with scattered vegetation. The hill slopes are generally gentle in gradient and predominantly cleared of vegetation, except for patches of denser remnant vegetation on steeper terrain, near rocky outcrops and between saddles.

The townships of Coolah and Leadville are the closest population centres to the proposed site. These townships are located on gently sloping to level land within valleys near creeks. Most built structures are of low to moderate scale. The main street of Coolah is the focus for local retail and community services in the local area.

Land uses within the locality include:

- **Farming** – predominantly grazing cattle and sheep, with small patches of cropping (cereal and fodder)
- **Rural living** – scattered rural dwellings and sheds present throughout the landscape, with a higher density of dwellings in the townships.

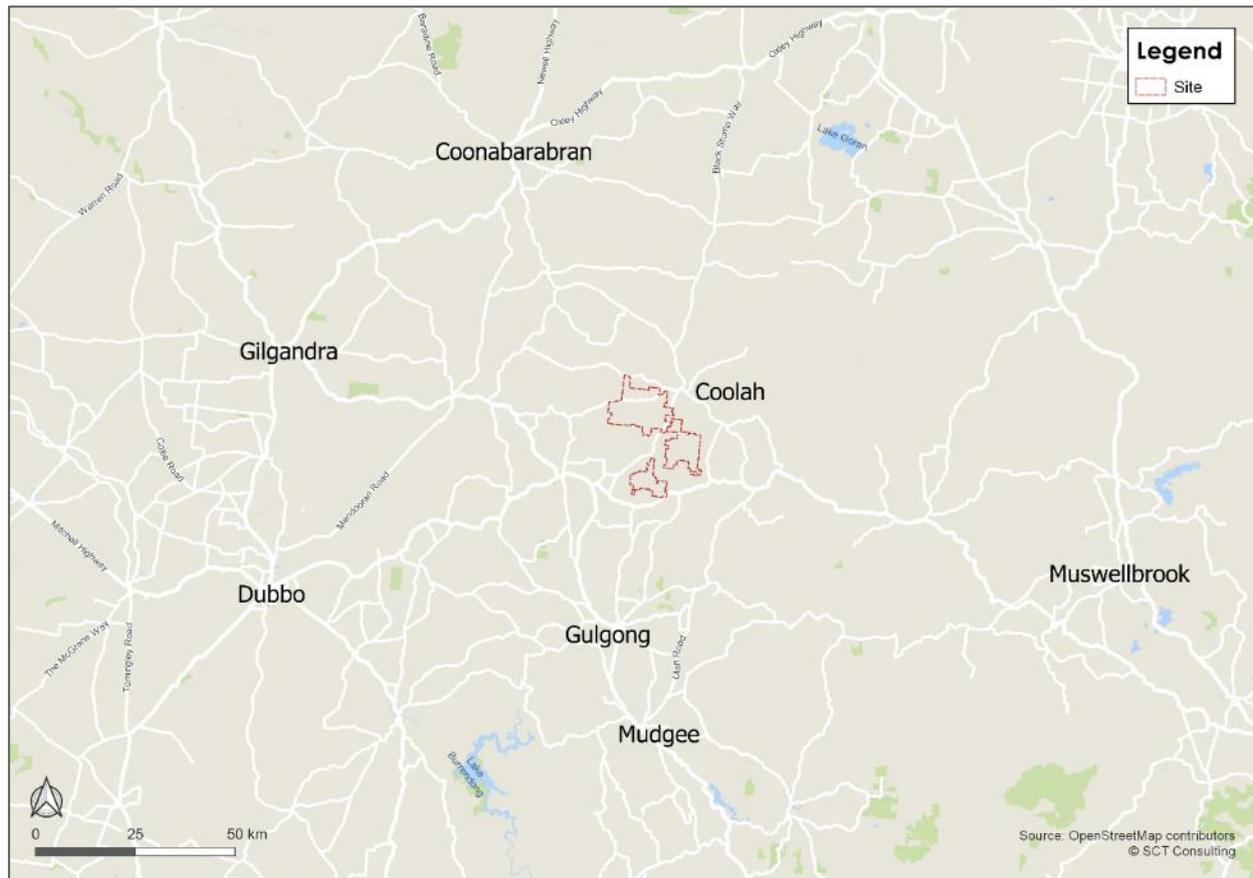
### 1.3 Purpose of this report

The capital value of the project would be more than \$30 million. Accordingly, the project is a State Significant Development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SR&D) and Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Under Section 4.12(8) of the EP&A Act, a development application (DA) for SSD must be accompanied by an environmental impact statement (EIS) that is lodged with the NSW Department of Planning, Industry and Environment for Development Consent.

The project was also referred to the Commonwealth Department of Agriculture, Water and the Environment for potential impacts to matters of national environmental significance protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). On 13 July 2020, a delegate of the Federal Minister for the Department of Agriculture, Water and the Environment determined that the project was a controlled action under section 75 of the EPBC Act and therefore requires assessment and approval under the EPBC Act. This assessment is to be undertaken under the *Amended Bilateral Agreement* between the Department of Agriculture, Water and the Environment and the Department of Planning, Industry and Environment.

This traffic assessment report has been prepared to inform the environmental impact statement (EIS) and development application (DA) for the project.

Figure 1–1 Site location



## 1.4 Assessment methodology and guidelines

This traffic assessment seeks to investigate the potential impacts associated with the project. The assessment includes the following key elements:

- Identify and assess the existing traffic conditions within the study region
- Assess the capacity and conditions of the existing road network to accommodate the type and volume of traffic generated by the project (including over size vehicles, over mass vehicles and escorted deliveries) during construction and operation
- Provide projections of traffic volumes (light and heavy vehicles) during the construction, operation and decommissioning phase
- Identify and assess the transport routes during construction and operation
- Assess the potential traffic impacts of the project on the road network, including intersection performance and site access arrangements and road safety
- Provide details of measures to manage potential impacts including required road upgrades and other traffic control measures.

The following guidelines were referenced for the assessments:

- *Guide to Traffic Generating Developments version 2.2* (RTA 2002)
- *Austrroads Guide to Road Design Part 3: Geometric Design* (Austrroads 2016)
- *Austrroads Guide to Road Design Part 4: Intersections and Crossings: General* (Austrroads 2017)
- *Austrroads Guide to Traffic Management Part 12: Traffic Impacts of Development* (Austrroads 2016).

In addition, a Transport Route Assessment of the local road conditions and proposed delivery route suitability of heavy vehicles, including over-size over-mass (OSOM) vehicles has been undertaken. The assessment is provided in **Appendix A** and includes:

- Site inspection of the relevant road intersections
- Concept level route analysis based on high-level 3D swept path analysis of key intersections for suitability of OSOM movements
- Highlight of each at-risk road structure that the haulage route crosses including bridges, major culverts, and minor culverts that may not meet the desirable cover to cater for proposed axle loads
- Strategic intersection design for access intersections to cater for the likely traffic in accordance with current standards (including the Austroads Guide to Road Design).

## 1.5 SEARs and agency submissions

In preparing this traffic and transport assessment, the Secretary's Environmental Assessment Requirements (SEARs), issued for the project (SSD 10461) on 9 June 2020, were addressed. The key matters raised by the SEARs for consideration in the traffic and transport assessment and the sections in this report addressing these matters are outlined in **Table 1-1**.

**Table 1-1 Issued SEARS and where addressed in this report**

Requirement	Section Addressed
Assess the construction, operational and decommissioning traffic impacts of the development on the local and State Road network	Section 0
Provide details of traffic volumes (both light and heavy vehicles) and transport and haulage routes during construction, operation and decommissioning, including traffic associated with sourcing raw materials (water, sand and gravel)	Section 4.0
Assess the potential traffic impacts of the project on road network function including intersection performance, site access arrangements, site access and haulage routes, and road safety, including school bus routes and school zones	Section 0
Assess the capacity of the existing road network to accommodate the type and volume of traffic generated by the project (including over-mass / over-dimensional traffic haulage routes from port) during construction, operation and decommissioning;	Section 4.0 and 0
An assessment of the likely transport impacts to the site access and haulage routes, site access point, any rail safety issues, any Crown Land, particularly in relation to the capacity and conditions of the roads;	Section 0
Provide details of measures to mitigate and / or manage potential impacts including a schedule of all required road upgrades (including resulting from over mass / over dimensional traffic haulage routes), road maintenance contributions, and any other traffic control measures, developed in consultation with the relevant road authority.	Section 6.0

In addition, transport related matters accompanying the SEARs, issued by Transport for NSW are addressed in **Appendix B**.

## 1.6 Report structure

This report has been structured into the following sections:

- **Section 3** describes the existing transport conditions for all modes of transport
- **Section 4** forecasts the likely trip generation, access routes, and parking demand due to the project
- **Section 5** describes the likely traffic and transport impacts due to the project
- **Section 6** presents mitigation measures, including road and intersection treatments associated with the project
- **Section 7** summarises the assessment and presents conclusions.

## 2.0 Project description

### 2.1 Overview

The project would involve the construction, operation and decommissioning of three clusters of wind turbines, that would be connected electrically. These are:

- Mount Hope cluster – approximately 76 turbines
- Girragulang Road cluster – approximately 51 turbines
- Leadville cluster – approximately 21 turbines.

Construction activities at these three clusters would be undertaken sequentially, as such, construction vehicle movements would generally only be associated with one work cluster at a given time.

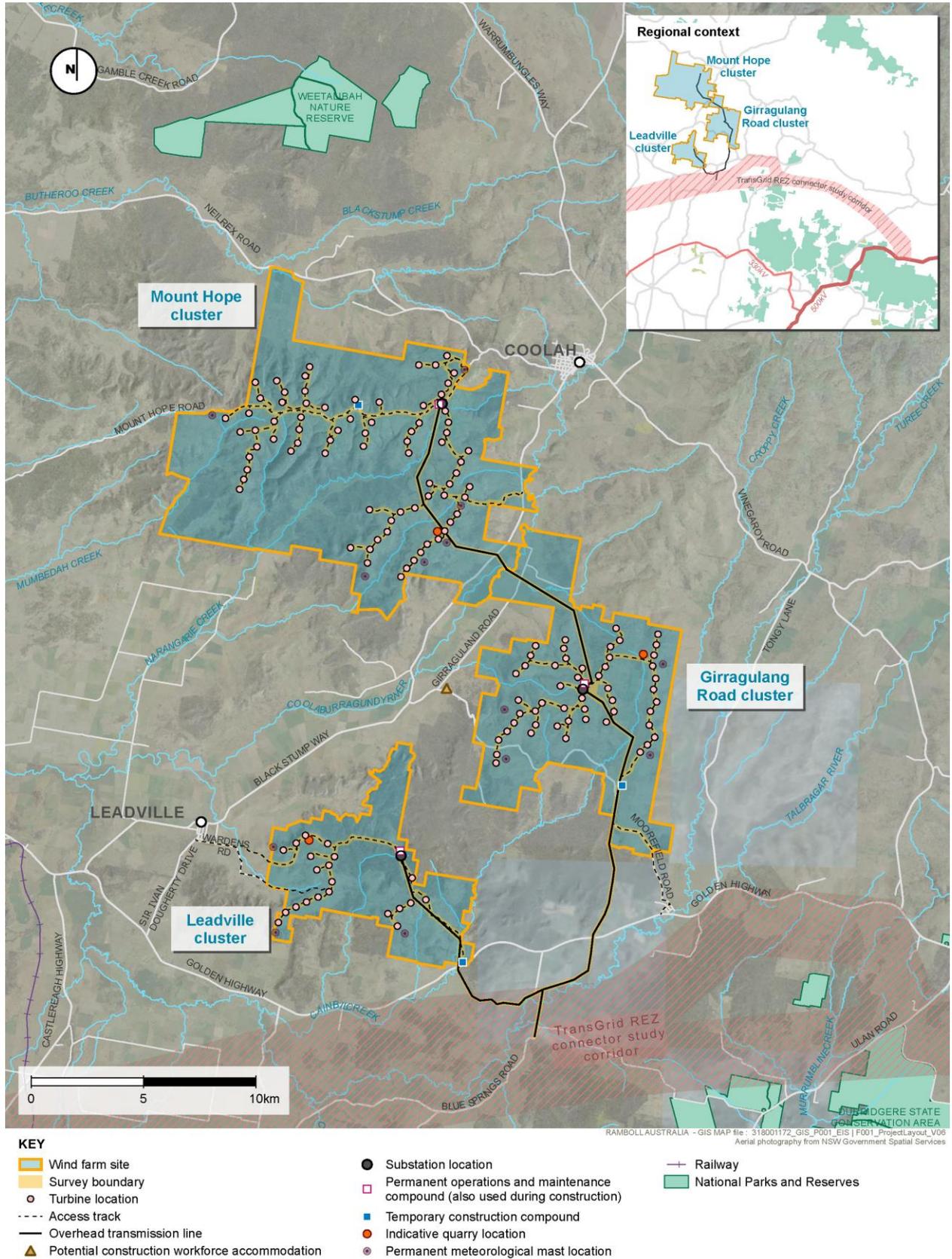
The project includes the following key components:

- Approximately 148 wind turbines with a maximum tip height of 250 metres and a hardstand area at the base of each turbine
- Electrical infrastructure, including:
  - substations in each cluster and a step-up facility at the connection to the Central-West Orana REZ Transmission line
  - underground 33 kilovolt electrical reticulation connecting the turbines to the substations in each cluster
  - overhead transmission lines (up to 330 kilovolt) dispatching electricity from each cluster
  - other electrical infrastructure as required including a potential battery energy storage system (BESS)
  - a high voltage transmission line (up to 500 kilovolt) connecting the wind farm to the Central-West Orana Transmission line
- Other permanent on-site ancillary infrastructure:
  - permanent operation and maintenance facilities
  - meteorological masts (up to thirteen)
- Access track network:
  - access and egress points to each cluster from public roads
  - operational access tracks and associated infrastructure within each cluster on private property
- Temporary construction ancillary facilities:
  - potential construction workforce accommodation on site
  - construction compounds
  - laydown areas
  - concrete batching plants
  - quarry sites for construction material (rock for access tracks and hardstands).

An illustration of the proposed layout is presented in **Figure 2–1**.

At the end of its practical life, the wind farm would be decommissioned, and the site returned to its pre-existing land use in consultation with the affected landholders.

Figure 2-1 Proposed Valley of the Winds layout



## 2.2 Employees and workforce

### 2.2.1 Employees

UPC\AC are undertaking ongoing consultation with Warrumbungle Shire Council regarding the most appropriate distribution of workers during construction.

For the purpose of this assessment, two construction workforce distribution scenarios have been considered:

- Regional distribution of workforce accommodation: this scenario assumes that construction workers would be distributed across six localities, including the townships of Coolah, Dunedoo, Cassilis, Coonabarabran, Gulgong and Mudgee; and would travel from established accommodation facilities in these towns.

These workforce location assumptions are subject to confirmation of the final social impact assessment outcomes and ongoing consultation with Warrumbungle Shire Council. This scenario is considered the worst-case for traffic impacts and assumes travel to site using a mix of private vehicles and project shuttle services.

- Centralised workforce accommodation: this scenario assumes the bulk of the construction workforce is accommodated at a temporary workers accommodation camp located on site. It is expected that this scenario would result in reduced traffic impacts on the surrounding road network as the bulk of the construction workforce would be centrally located and therefore not travelling to and from site daily, using the wider road network. Traffic movements would occur between the workers accommodation and work zones within each of the clusters under this scenario.

More detail on the indicative distribution of workers and associated trip generation is provided in **Section 4.0**

### 2.2.2 Construction phase

The timing of construction would be dependent on project approval however, it is expected to commence in the first quarter of 2023 and would run for a period of approximately 24 to 42 months. It is assumed that the peak construction period could occur in 2023, which is used as the future year for the construction traffic impact assessment. The project is expected to require up to 400 full time equivalent employees during the peak construction phase.

Standard daytime construction hours consistent with the *Interim Construction Noise Guideline* (Department of Environment and Climate Change 2009) (ICNG) are as follows:

- 7am to 6pm Monday to Friday
- 8am to 1pm on Saturdays
- No works on Sunday or public holidays.

UPC\AC is seeking approval for standard construction hours, plus additional time at the start and end of each day (Monday to Saturday) and Saturday afternoon, referred to as 'extended construction hours'. The extended working hours would maximise construction efficiency, maintain flexibility for large concrete pours and curing cycles and reduce the overall construction program. The proposed working hours would be:

- 6am to 6pm Monday to Friday
- 6am to 6pm on Saturdays
- No works on Sunday or public holidays.

The proposed extended hours would represent one hour at the start of each day (Monday to Friday), two hours at the start of the day on Saturdays, and five hours on Saturday afternoons in addition to the standard daytime working hours. Where possible, activities conducted within the extended hours period will be inaudible at noise sensitive receivers. High noise level activities, such as those involving noisy machinery, would be deferred to standard working hours where possible.

Out of hours work would also be required on limited occasions, such as when transporting large components including turbine blades, nacelles, and transformers to site, using over-size over-mass vehicles under police escort; or to facilitate large concrete pours and curing cycles that can't be undertaken during the extended working hours. Some staff arrival/departure movements and emergency response may also be required from time to time.

The Secretary, Warrumbungle Shire Council and surrounding landholders would be notified of any planned out of hours works.

### 2.2.3 Operational phase

The project is expected to require about 50 full time equivalent employees during the operation and ongoing maintenance of the wind farm.

### 2.2.4 Decommissioning phase

The decommissioning phase would require a similar labour force and therefore result in similar traffic generation compared to the construction phase.

## 2.3 Access

The proposed access routes to the clusters shown in **Figure 2-1** are:

- **Mount Hope cluster:**
  - Heavy vehicles
    - Access from the Golden Highway and Black Stump Way via a new access on Black Stump Way
  - Light vehicles
    - Regional distribution of workforce accommodation:
      - From the south and west, access from the Golden Highway and Black Stump Way via a new access on Black Stump Way
      - From the east, access from the Golden Highway via Vinegaroy Road, Binnia Street, Queensborough Street, Neilrex Road and Mount Hope Road
      - From the north, access from Black Stump Way via Queensborough Street, Neilrex Road and Mount Hope Road
    - Centralised workforce accommodation:
      - From Moorefield Road and Black Stump Way via a new access on Black Stump Way
- **Girragulang Road cluster:**
  - Heavy vehicles
    - Access from the Golden Highway via Short Street / Turee Street and Moorefield Road
  - Light vehicles
    - Regional distribution of workforce accommodation:
      - From the south, east and west, access from the Golden Highway via Short Street / Turee Street, which links with Moorefield Road
      - From the north, access from Black Stump Way via Moorefield Road
    - Centralised workforce accommodation:
      - From Moorefield Road
- **Leadville cluster:**
  - Heavy vehicles
    - Access from the Golden Highway via a new access on the Golden Highway
  - Light vehicles
    - Regional distribution of workforce accommodation:
      - From the south, east and west, access from the Golden Highway via a new access on the Golden Highway
      - From the north, access from Black Stump Way via Leadville Stock Route and Wardens Road

- Centralised workforce accommodation:
  - From Moorefield Road and Black Stump Way via Leadville Stock Route and Wardens Road.

With construction activities undertaken sequentially, all construction materials transported along the Golden Highway would only be associated with one of the sites at a given time. Similarly, construction staff movements between the worksites and accommodation would only be associated with one of the work clusters at a given time.

Should the new heavy vehicle access on the Golden Highway not be able to proceed, an alternative access for OSOM vehicles to the Leadville cluster would be provided via Sir Ivan Dougherty Drive, Wardens Road and a new private access road.

More detail on the proposed access routes is provided in **Section 4.0** and **Section 6.0**.

## 3.0 Existing conditions

Transportation of wind turbine components, as well as the majority of construction materials and equipment, is assumed to be generated at the Port of Newcastle or Sydney and transported by heavy vehicles. Given the size of some of the wind turbine components, many of the heavy vehicles may be classed as OSOM vehicles and subject to oversized and escorted transport regulations.

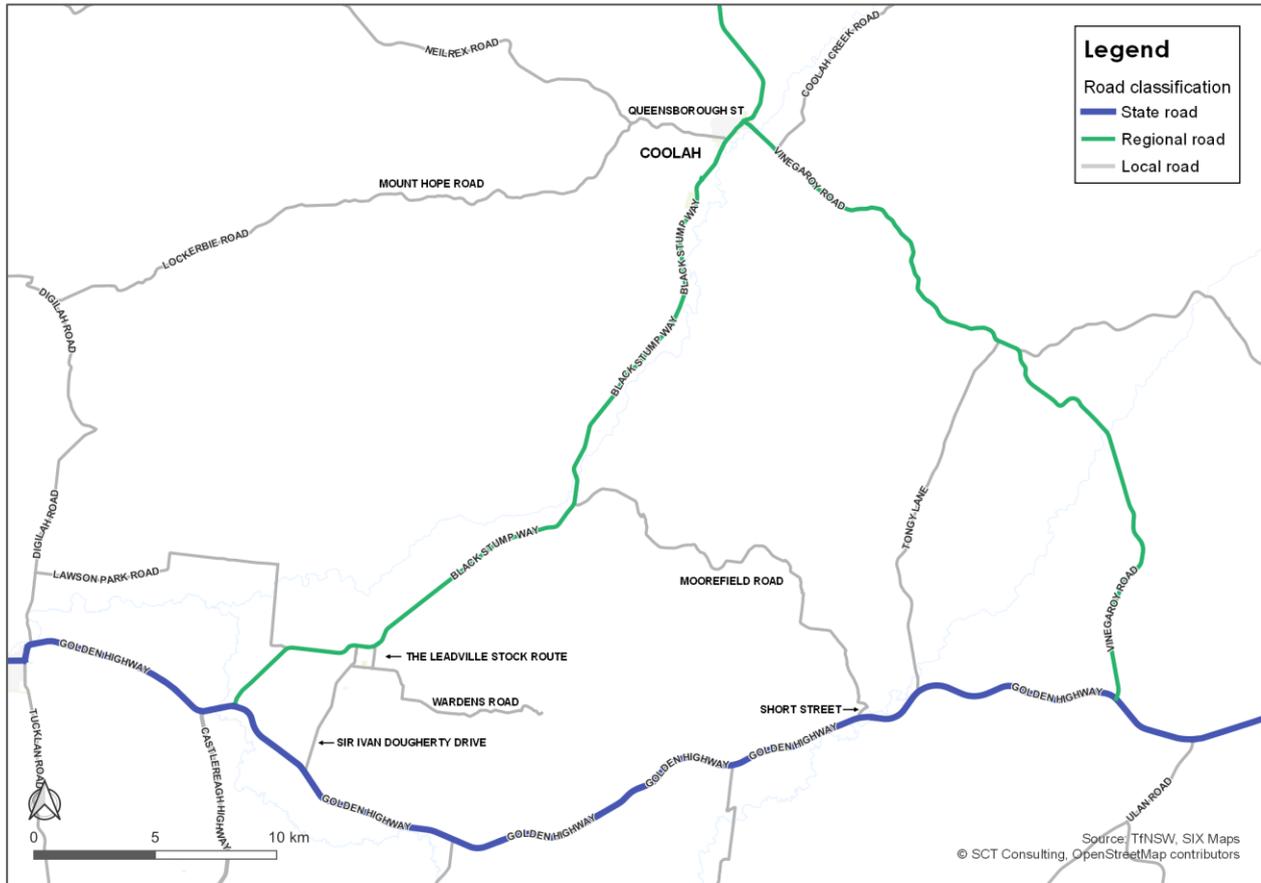
### 3.1 Surrounding road network

The route from Newcastle Port or the M1 Pacific Motorway to the Golden Highway is a 25/26m B-Double approved route. Sections of the surrounding road network that would or could be used to access the project during construction, operation and decommissioning would include the following roads:

- **Golden Highway** is a B-Double approved state road (B84), with a signposted speed limit of 100km/h, connecting the New England Highway at Belford in the Hunter Valley to the Newell Highway at Dubbo. It is a two-lane highway and intersects with Black Stump Way, Sir Ivan Dougherty Drive and Short Street between Dunedoo to the west and Merriwa to the east in the vicinity of the site.
- **Black Stump Way** is a north-south regional road providing a connection between Oxley Highway to the north and Golden Highway to the south. It serves as the main high street for the Coolah township, where it is named Binnia Street. It is a two-lane highway with a signposted speed limit of 100km/h for the majority of the corridor, with reduced speed limit of 50km/h within Coolah and Leadville. In addition, a 40 km/h school zone is effective within Coolah between Cunningham Street and Goddard Street.
- **Queensborough Street / Neilrex Road** is an east-west road providing a connection between Black Stump Way at Coolah and Neilrex, located about 40km west of Coolah. The road within the Coolah township is named Queensborough Street and once the road leaves the township, it is named Neilrex Road. The majority of the road is signposted with a speed limit of 100 km/h, with a reduced speed limit of 50 km/h in the Coolah township. At present, there are no centre line or road edge pavement markings. However, localised pavement improvements were recently undertaken near the intersection with Mount Hope Road.
- **Mount Hope Road** is an east-west road, which extends from Neilrex Road to Digilah Road to the west. The road is sealed for about 900m from the intersection of Neilrex Road, beyond which the road is unsealed.
- **Sir Ivan Dougherty Drive** is a sealed road providing access to properties within the Leadville locality. It is aligned north-south and spans between Wardens Road and the Golden Highway. It is a two-lane road with no centre line or road edge pavement marking except at the intersection with the Golden Highway. A speed limit of 100 km/h is signposted for the majority of the length, except for a segment adjacent to Wardens Road where the speed limit is reduced to 50 km/h.
- **The Leadville Stock Route** is an unpaved road connecting Black Stump Way and Wardens Road, and providing access to a few rural properties.
- **Wardens Road** is an unpaved road providing a local connection between Sir Ivan Dougherty Drive / Garland Street and the rural properties east of the Leadville township.
- **Short Street** is an unsealed local road, providing access to the village of Uarbry from the Golden Highway.
- **Moorefield Road** is a local road, which extends from Black Stump Way to Short Street (via Wyaldra Street, Main Street and Turee Street in Uarbry). The road is sealed for about 4.5km from the intersection of Black Stump Way, beyond which the road is unsealed.

The road network in the vicinity of the project is shown in **Figure 3–1**.

Figure 3–1 Road network around the site

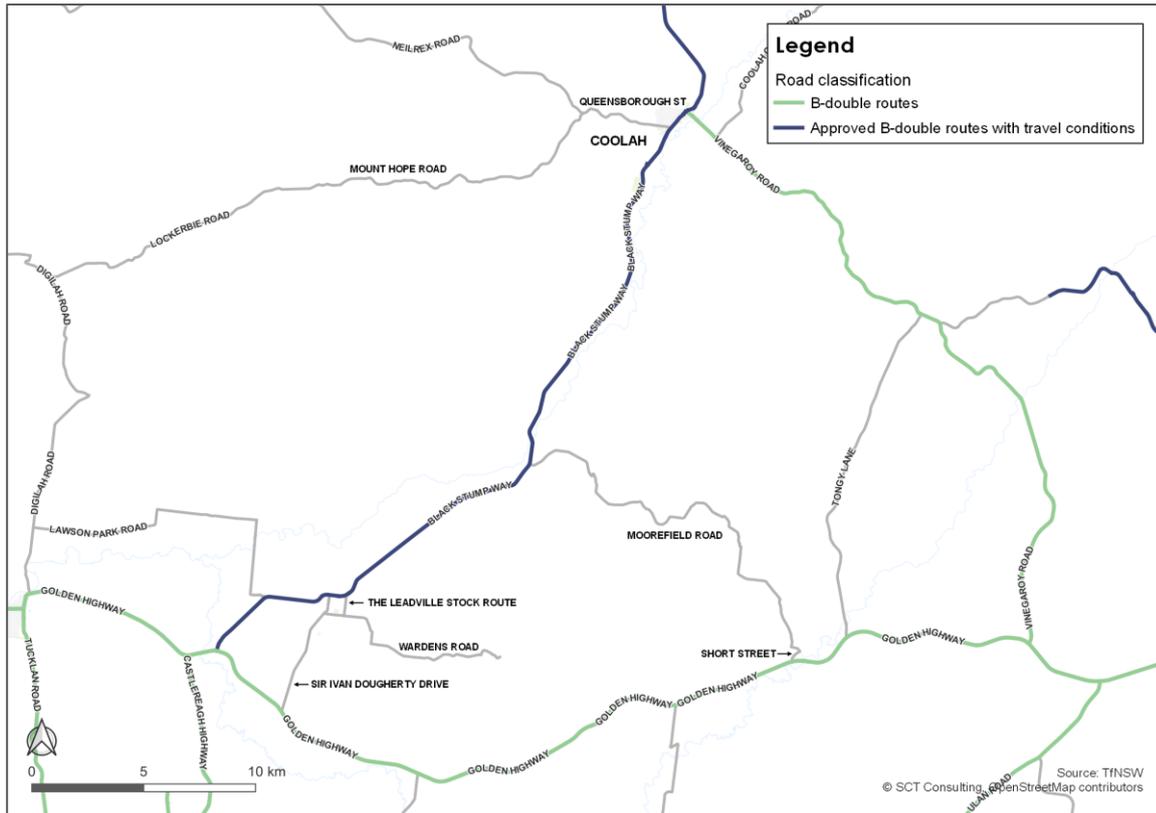


Source: TfNSW, 2021

**Figure 3–2** illustrates the approved B-double routes for the road network in the vicinity of the project according to the TfNSW Restricted Vehicle Access map<sup>1</sup>. The map indicates that the proposed heavy vehicle route of the Golden Highway and Black Stump Way permits B-double sized heavy vehicles. Black Stump Way has B-double travel conditions, which require all B-double travel through the Coolah township to go via the internal Heavy Vehicle bypass, that is Cunningham and Booyamurra Streets.

As the Golden Highway and Black Stump Way are approved for B-double sized heavy vehicle movement, the turning circles of heavy vehicles are accommodated at the intersection of Golden Highway and Black Stump Way.

**Figure 3–2 Restricted access vehicle map**



Source: TfNSW, 2021

<sup>1</sup> <https://www.rms.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/index.html>

### 3.1.1 Existing traffic flows

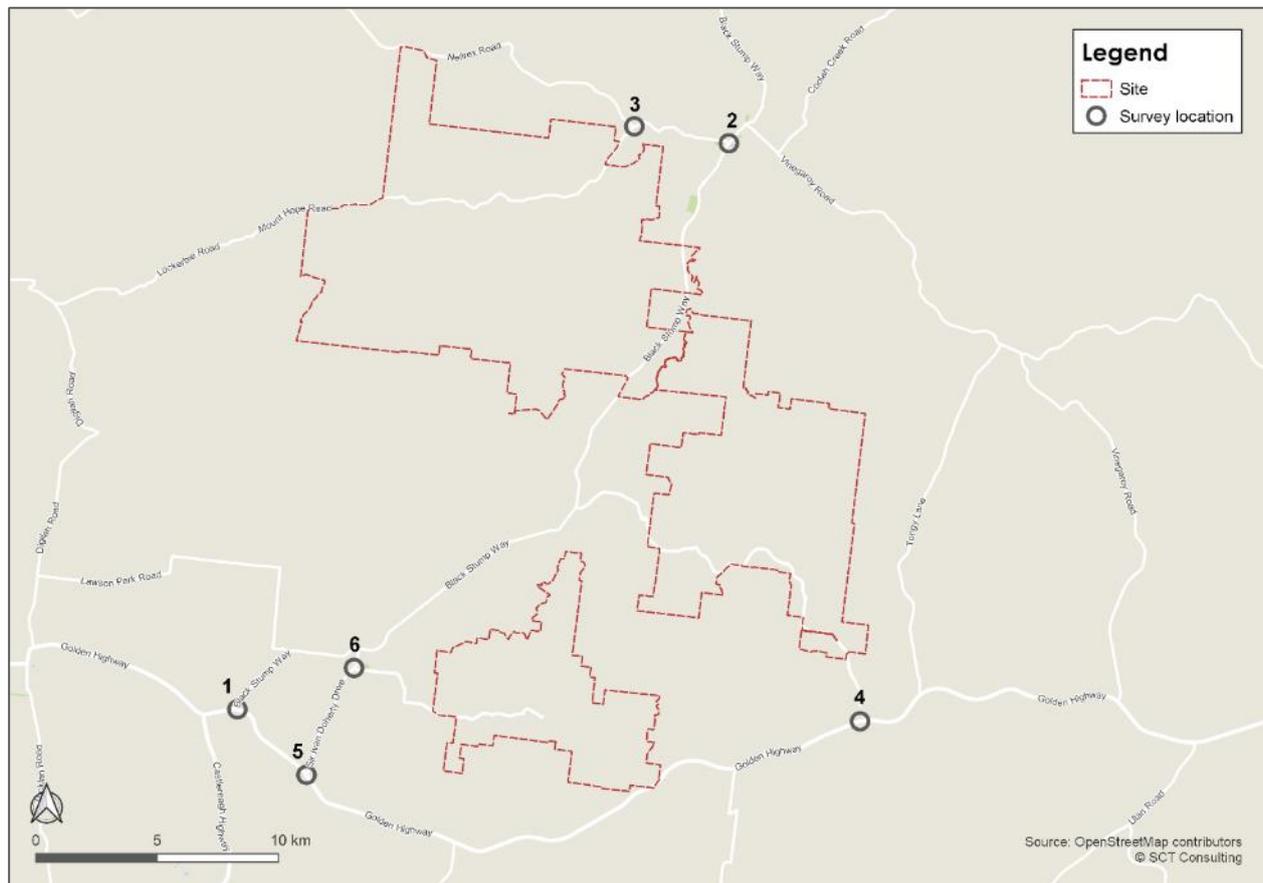
To identify the existing traffic conditions, traffic surveys were undertaken in the vicinity of the project site. The traffic surveys included classified intersection turn counts (light and heavy vehicles) as well as an automatic tube counter.

The Intersection traffic surveys were undertaken on Tuesday 9 June 2021 between 6-9am and 4-7pm at the following intersections<sup>2</sup> (see **Figure 3-3**):

1. Golden Highway / Black Stump Way
2. Queensborough Street / Binnia Street
3. Neilrex Road / Mount Hope Road
4. Golden Highway / Short Street
5. Golden Highway / Sir Ivan Dougherty Drive
6. Sir Ivan Dougherty Drive / Wardens Road.

The automatic tube counter was installed on Black Stump Way, approximately 1 km north of the Golden Highway intersection from 3 to 9 June 2021 to capture a 7-day, 24-hour mid-block traffic profile.

**Figure 3-3 Traffic survey locations**



<sup>2</sup> Short Street/Golden Highway intersection adopts traffic volumes collected at Sir Ivan Dougherty/Golden Highway intersection for eastbound and westbound movements given an equipment error for counts collected. It is expected the volumes on the Golden Highway at both intersections would be consistent given limited access points in between. A total of five vehicles in and out were assumed for traffic using the side road. This is considered reasonable based on the on-site observations.

### 3.1.1.1 Intersection volumes

The peak hour traffic volumes for key intersections from the traffic surveys are summarised in **Table 3-1**.

The summary shows that traffic volumes during the AM and PM peak hours are generally low, with the highest flow of 111 vehicles recorded at the Binnia Street / Queensborough Street intersection during the PM peak hour. All remaining intersections recording less than 100 vehicles during the hours surveyed. Given these low volumes of traffic, it is likely that there is spare capacity to accommodate future traffic growth.

**Table 3-1 Existing intersection peak hour traffic volumes**

Intersection	Peak hour	Total Vehicle Volume	Major Road			Minor Road		
			Vehicles	Heavy vehicle	% of heavy vehicle	Vehicles	Heavy vehicle	% of heavy vehicle
Golden Highway (Major) / Black Stump Way (Minor)	AM	99	65	19	29%	34	9	26%
	PM	89	58	15	26%	31	8	26%
Binnia Street (Major) / Queensborough Street (Minor)	AM	85	68	10	15%	17	1	6%
	PM	111	104	18	17%	7	1	14%
Neilrex Road (Major) / Mount Hope Road (Minor)	AM	25	20	2	10%	5	0	0%
	PM	16	15	1	7%	1	0	0%
Golden Highway (Major) / Sir Ivan Dougherty Drive (Minor)	AM	54	54	11	20%	0	0	0%
	PM	61	61	17	28%	0	0	0%
Sir Ivan Dougherty Drive (Major) / Garland Street / Wardens Road (Minor)	AM	7	7	2	29%	0	0	0%
	PM	1	1	0	0%	0	0	0%

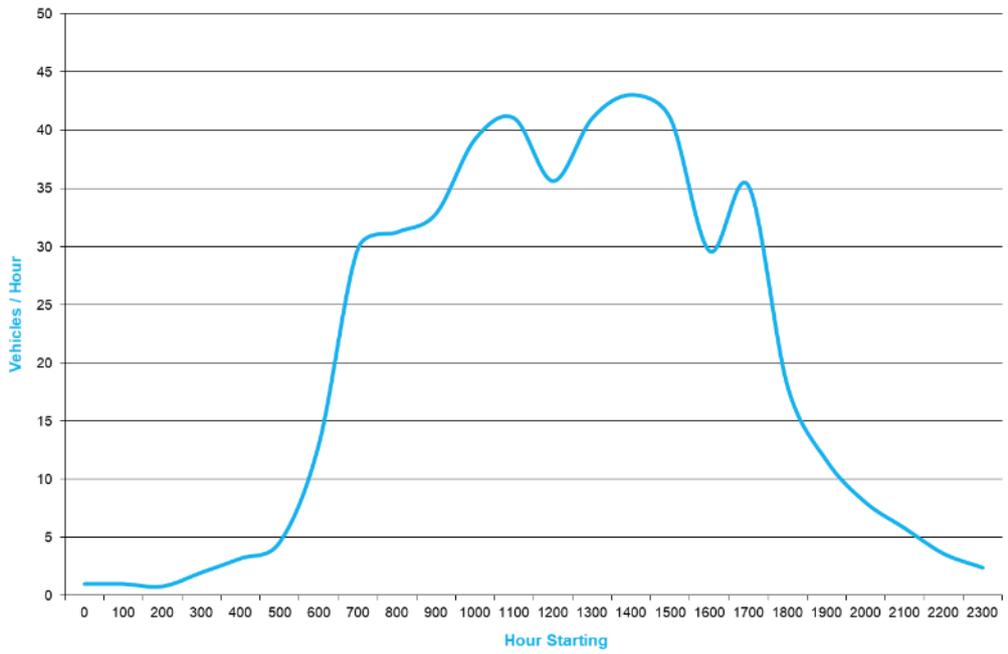
Source: SCT Consulting, based on Matrix traffic survey data, 2021

### 3.1.1.2 Mid-block volumes

The weekday mid-block hourly traffic profile along Black Stump Way from the automatic tube counter is presented in **Figure 3-4** and **Figure 3-5**. It shows there are no distinct AM or PM peak hours, but rather fairly consistent traffic throughout the day (about 7am to 5pm) in both directions of travel.

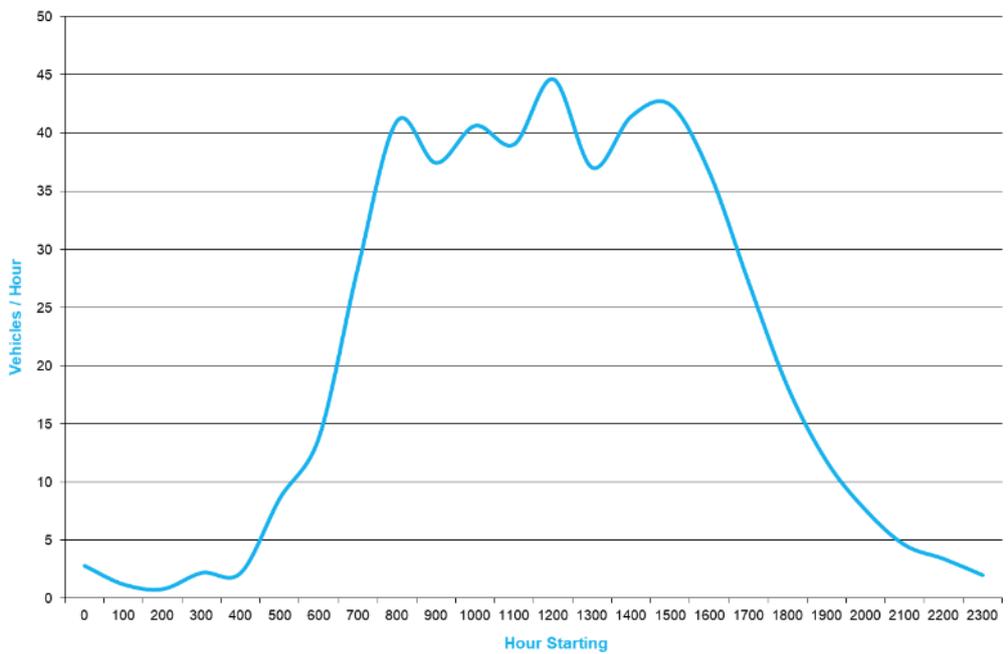
As per the intersection counts, hourly traffic flows are low, with the highest flow recorded at fewer than 45 vehicles observed for each direction of travel, which equates to fewer than 90 vehicles two-way per hour.

Figure 3–4 Black Stump Way weekday northbound traffic profile



Source: SCT Consulting, based on Matrix traffic survey data, 2021

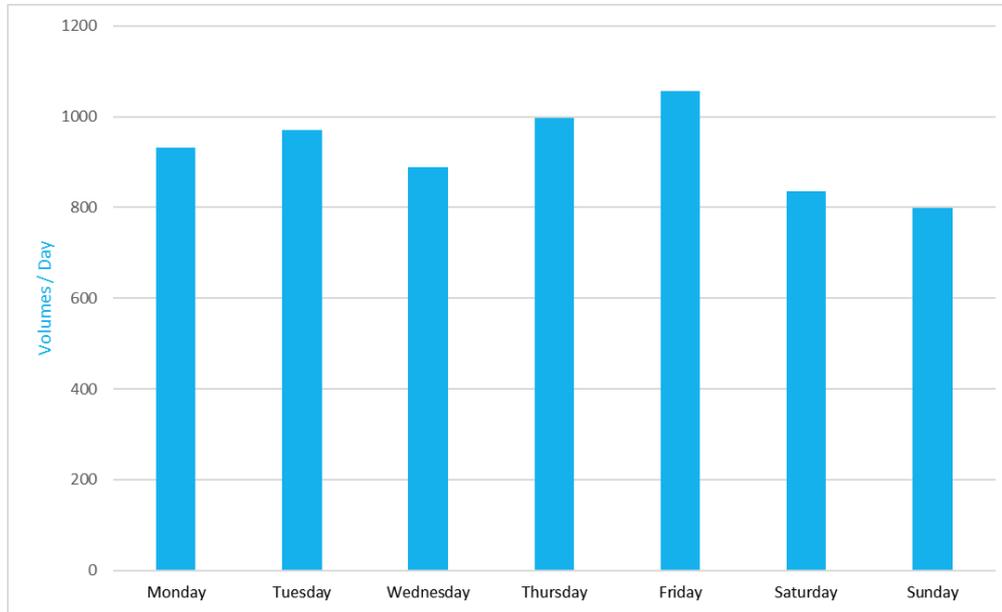
Figure 3–5 Black Stump Way weekday southbound traffic profile



Source: SCT Consulting, based on Matrix traffic survey data, 2021

The two-way daily total flows for Black Stump Way are shown in **Figure 3–6**. The data shows that traffic fluctuates throughout the weekdays with the lowest two-way daily traffic observed on Wednesday (889 vehicles) and the highest two-way daily traffic occurring on Friday (1,057 vehicles). The average of the weekday two-way daily flows was calculated as 970 vehicles per day, which matches the recordings of Tuesday (971 vehicles).

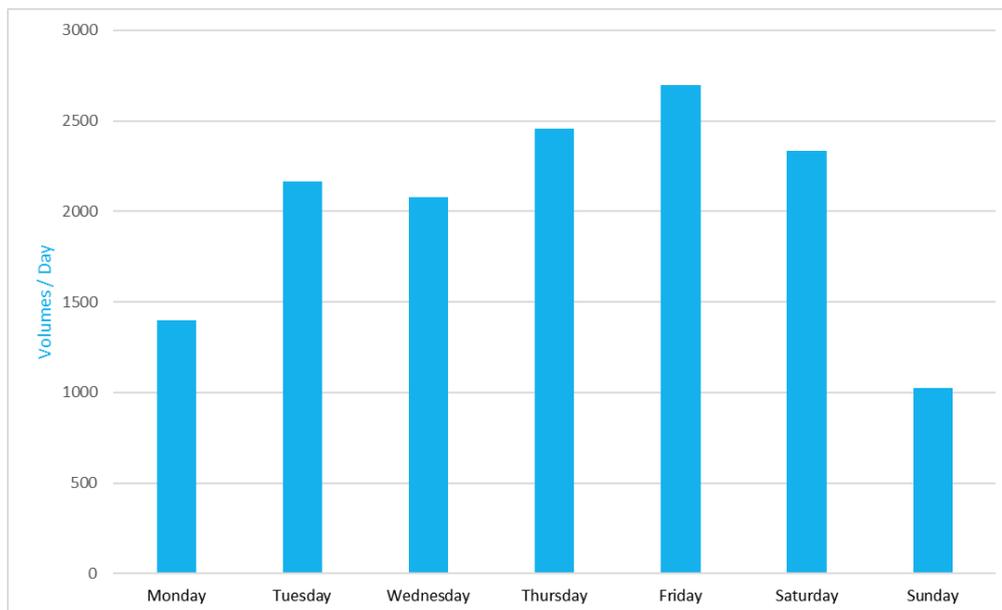
**Figure 3–6 Black Stump Way: 7-day two-way daily traffic profile**



Source: SCT Consulting, based on Matrix traffic survey data, 2021

The nearest Transport for NSW maintained permanent count station along the Golden Highway is located about 100km east of Black Stump Way (station ID 6163), east of the regional township of Merriwa. Although the count station is located beyond the study region and may correspond to higher flows given the higher density of Merriwa compared to the study region, the two-way daily traffic profile provided by the station offers an opportunity to appreciate the daily fluctuations along the Golden Highway. The daily profile along Golden Highway for June 2021 is shown in **Figure 3–7**. The data shows traffic fluctuates throughout the week with the lowest average two-way daily traffic recorded on a Monday (1,397 vehicles) and the highest on a Friday (2,696 vehicles). The average of the average weekday two-way daily flow is calculated as 2,158 vehicles, which matches closest to the Tuesday counts.

**Figure 3–7 Golden Highway: average two-way daily traffic profile (June 2021)**

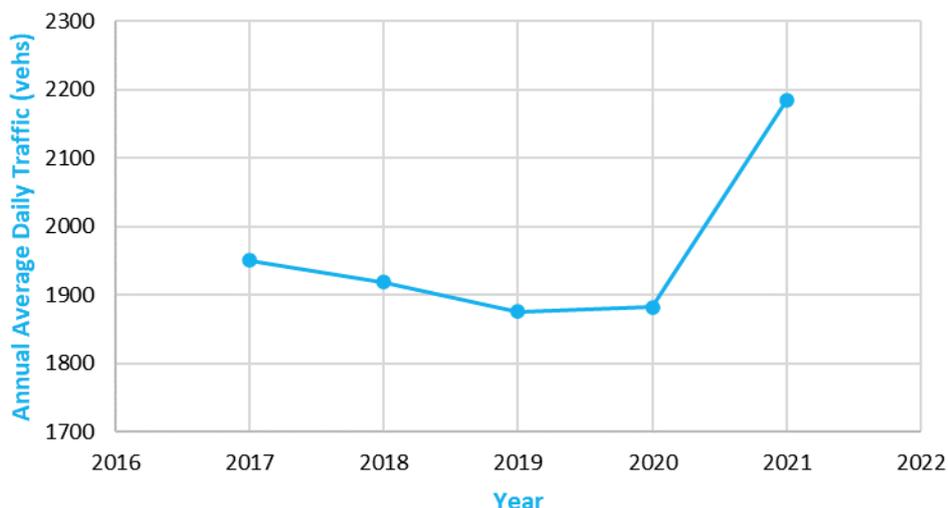


Source: SCT Consulting, based on TfNSW Traffic Volume Viewer (station ID 6163), 2021

### 3.1.2 Future year background traffic growth

Traffic volumes along the Golden Highway, recorded by the permanent count station (ID 6163), show that there had been a steady decline in traffic volume prior to 2000. However, post 2000, there has been a sharp increase, as shown in **Figure 3–8**. This increase is likely due to the construction activities at similar wind and solar farm projects, as well as mining activities, in the region, that use the Golden Highway to access their worksites.

Figure 3–8 Golden Highway AADT Station ID 6163



Source: SCT Consulting, based on TfNSW data, 2021

Based on the growth profile shown in **Figure 3–8**, this traffic and transport impact assessment assumed a conservative annual growth rate of 3.0 per cent per annum for Golden Highway to cater for both planned and proposed projects within the central western region of NSW. The 3.0 per cent per annum growth was applied to the surveyed 2021 traffic volumes along Black Stump Way and the Golden Highway to generate base traffic volumes for a 2023 peak construction year. It was assumed that no background traffic growth would take place on other roads due to their local nature.

### 3.1.3 Intersection layout and geometry

The key existing intersections that might provide access for the project are:

- Golden Highway / Short Street
- Golden Highway / Sir Ivan Dougherty Drive
- Sir Ivan Dougherty Drive / Wardens Road
- Golden Highway / Black Stump Way
- Black Stump Way / Leadville Stock Route
- Black Stump Way / Moorefield Road
- Black Stump Way / Queensborough Street
- Neilrex Road / Mount Hope Road.

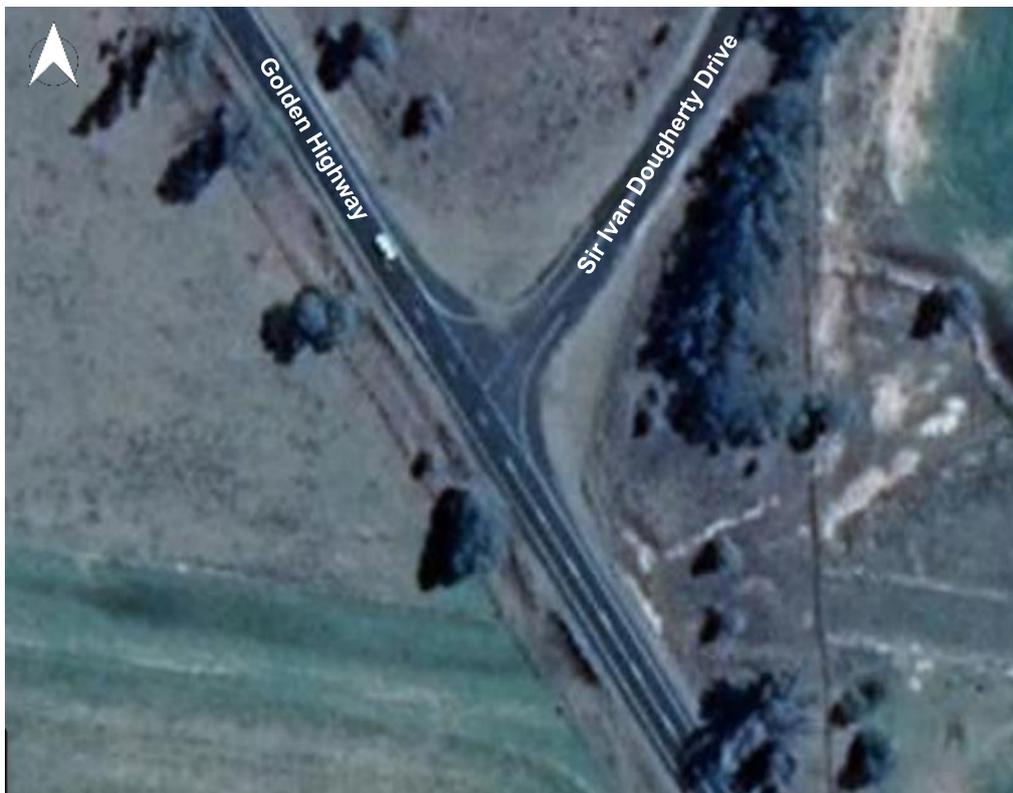
Given the rural nature of the region, all intersections are priority controlled with basic left / right turn treatments, except for the Golden Highway / Black Stump Way intersection, where channelised turning lanes are provided for the right turn and left turn movements on the Golden Highway, and the Black Stump Way / Moorefield Road intersection, which has a channelised left turn lane on Black Stump Way. Aerial views of the intersections are shown in **Figure 3–9** to **Figure 3–16**.

Figure 3–9 Golden Highway / Short Street



Source: Google Maps, 2021

Figure 3–10 Golden Highway / Sir Ivan Dougherty Drive



Source: Google Maps, 2021

Figure 3–11 Sir Ivan Dougherty Drive / Wardens Road



Source: Google Maps, 2021

Figure 3–12 Golden Highway / Black Stump Way



Source: Google Maps, 2020

Figure 3-13 Black Stump Way / Leadville Stock Route



Source: Google Maps, 2021

Figure 3-14 Black Stump Way / Moorefield Road



Source: Google Maps, 2021

Figure 3-15 Black Stump Way / Queensborough Street



Source: Google Maps, 2021

Figure 3-16 Neilrex Road / Mount Hope Road



Source: Google Maps, 2021

### 3.1.4 Safe intersection sight distance review

A review of the safe intersection sight distance (SISD) at the existing intersections was undertaken. SISD is defined by the *Austrroads Guide to Road Design Part 4A (AGRD04a)* as the “*minimum sight distance that should be provided on a major road at any intersection*”. AGRD04a provides the following equation to determine the SISD:

$$SISD = \frac{D_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)}$$

where

$D_T$  = decision time (sec) = observation time (3 sec) + reaction time (sec)

$V$  = operating (85<sup>th</sup> percentile) speed (km/h)

$d$  = coefficient of deceleration

$a$  = longitudinal grade in %

With a reaction time of 2.5 seconds and heavy vehicle coefficient of deceleration of 0.29, which are appropriate for trucks (OSOMs would be catered for differently as they are under escort), the following SISD were determined for the key intersections:

#### Golden Highway / Black Stump Way

Based on the above assumptions, and assuming the 85<sup>th</sup> percentile speeds are as per the posted speed limit of 100km/h, the intersection of Golden Highway / Black Stump Way requires SISD of 289m for vehicles exiting from Black Stump Way. At present, the intersection satisfies this requirement with sight distances of about 290m and 320m for eastbound and westbound traffic respectively, as shown in **Figure 3–17**.

**Figure 3–17 View of Golden Highway from Black Stump Way**



Golden Highway eastbound approach



Golden Highway westbound approach

### Golden Highway / Sir Ivan Dougherty Drive

Similar to the intersection at Black Stump Way, a SISD of 254m is required for vehicles exiting from Sir Ivan Dougherty Drive. The intersection satisfies this requirement with sight distances of about 290m and 380m for southbound and northbound traffic respectively, as shown in **Figure 3-18**.

**Figure 3-18 View of Golden Highway from Sir Ivan Dougherty Drive**



Golden Highway southbound approach



Golden Highway northbound approach

### Golden Highway / Short Street

A SISD of 254m is required for vehicles exiting from Short Street. The intersection satisfies this requirement with sight distances of about 290m and 300m for southbound and northbound traffic respectively, as shown in **Figure 3-19**.

**Figure 3-19 View of Golden Highway from Short Street**



Golden Highway southbound approach



Golden Highway northbound approach

### Black Stump Way / The Leadville Stock Route

This intersection may be used by workers travelling from Coolah and Coonabarabran or the centralised worker accommodation to the Leadville cluster. Assuming the 85<sup>th</sup> percentile speeds are as per the posted speed limit of 100km/h, the SISD required for vehicles exiting onto Black Stump Way from Leadville Stock Route is 289m. The intersection satisfies this requirement with sight distances of about 290m and 300m for eastbound and westbound traffic respectively, as shown in **Figure 3–20**.

**Figure 3–20 View of Black Stump Way from The Leadville Stock Route**



Black Stump Way westbound approach

Source: Google Street View, 2022



Black Stump Way eastbound approach

### Black Stump Way / Moorefield Road

This intersection may be used by workers travelling from Coolah and Coonabarabran to the Girragulang Road cluster or to and from the centralised worker accommodation and the Mount Hope and Leadville clusters. Assuming the 85th percentile speeds are as per the posted speed limit of 100km/h, the SISD required for vehicles exiting onto Black Stump Way from Moorefield Road is 289m. The intersection satisfies this requirement with sight distances over 300m for both southbound and northbound traffic respectively, as shown in **Figure 3–21**.

**Figure 3–21 View of Black Stump Way from Moorefield Road**



Black Stump Way southbound approach

Source: Google Street View, 2022



Black Stump Way northbound approach

### Sir Ivan Dougherty Drive / Garland Street / Wardens Road

The posted speed limit at the intersection of Sir Ivan Dougherty Drive / Garland Street / Wardens Road is 50km/h. This posted speed limit increases on Sir Ivan Dougherty Drive to 100km/h from about 20m south of the intersection. Assuming an 85<sup>th</sup> percentile speed of 60km/h at the intersection, the SISD required for vehicles exiting onto Sir Ivan Dougherty Drive and Garland Street is 141m. The intersection satisfies this requirement with sight distances of about 175m and 145m of northbound and southbound traffic respectively, as shown in **Figure 3–22**.

**Figure 3–22 View of Sir Ivan Dougherty Drive and Garland Street from Wardens Road**



Sir Ivan Dougherty Drive northbound approach



Garland Street southbound approach

### Black Stump Way / Queensborough Street

The posted speed limit at the intersection of Black Stump Way and Queensborough Street is 50km/h. Given the area is an urban setting, it is assumed that the 85<sup>th</sup> percentile travel speed would be equivalent to 10 per cent greater than the posted speed limit. Based on this assumption, the SISD required for vehicles exiting onto Black Stump Way from Queensborough Street is 125m. The intersection satisfies this requirement with sight distances of about 140m and 250m for northbound and southbound traffic respectively, as shown in **Figure 3–23**.

**Figure 3–23 View of Black Stump Way (Binnia Street) from Queensborough Street**



Black Stump Way (Binnia Street) northbound approach



Black Stump Way (Binnia Street) southbound approach

### Neilrex Road / Mount Hope Road

The posted speed limit along Neilrex Road is 100km/h, with the section adjacent to Mount Hope Road consisting of series of bends. Assuming an 85<sup>th</sup> percentile speed of 90km/h to account for the gradient and bends on the approach, a SISD of 247m is required for vehicles exiting from Mount Hope Road to Neilrex Road. As shown in **Figure 3–24**, the sightlines do not satisfy the SISD requirements with sight distances of about 110m and 135m for eastbound and westbound traffic respectively.

**Figure 3–24 View of Neilrex Road from Mount Hope Road**



Neilrex Road eastbound approach



Neilrex Road westbound approach

### Summary of safe intersection sight distance review

Based on the SISD review undertaken, all the existing access locations for the project meet the standards, except for the Neilrex Road / Mount Hope Road intersection, which is discussed further in Section 4.3.

### 3.1.5 Roadway design standards

Given the low surveyed traffic volumes, *Austrroads Guide to Road Design Part 3 Geometric Design*, which specifies road width design standards for low volume roads (generally rural) based on daily traffic volumes, would apply. The corresponding design standards, based on 2021 surveyed traffic volumes for the rural roads adjacent to the worksites, are summarised in **Table 3-2**.

It is observed that the existing daily traffic volume along Black Stump Way is lower than the daily traffic volume category suggested by Austrroads design standards, for the existing road width. This suggests that Black Stump Way could accommodate greater volumes of traffic than currently exists along the corridor.

The impact of the project on these daily volumes and any upgrade requirements are discussed in **Section 5.1**.

**Table 3-2 Daily traffic volumes and corresponding design standards**

Daily traffic volume category	Applicable roads	Existing daily traffic volume	Austrroads (2021) design standards*	Existing road width
1-150 vehicles	Short Street, Turee Street, Main Street, Wyaldra Street and Moorefield Road	< 100	8.7m wide total carriageway (if unsealed); or minimum 3.7m wide seal	4.4m unsealed
	Sir Ivan Dougherty Drive	< 100		4.1m sealed
	Wardens Road	< 50		3.7m unsealed
	The Leadville Stock Route	< 50		3.7m unsealed
	Mount Hope Road	< 50		5.3m sealed
150-500 vehicles	Neilrex Road	< 200	Minimum 7.2m wide seal	7.1m sealed
	Queensborough Street	< 250		8.6m sealed
500-1,000 vehicles	-	-	Minimum 7.2m – 8m wide seal	-
1,000-3,000 vehicles	Black Stump Way	~1,000	Minimum 9m wide seal	8.6m sealed
	Golden Highway	~2,200		9.0m sealed
>3,000 vehicles	-	-	Minimum 10m wide seal	-

Source: SCT Consulting, based on Matrix traffic survey data, 2021

\*Austrroads Guide to Road Design Part 3, Table 4.5

### 3.1.6 Intersection turning bay warrants review

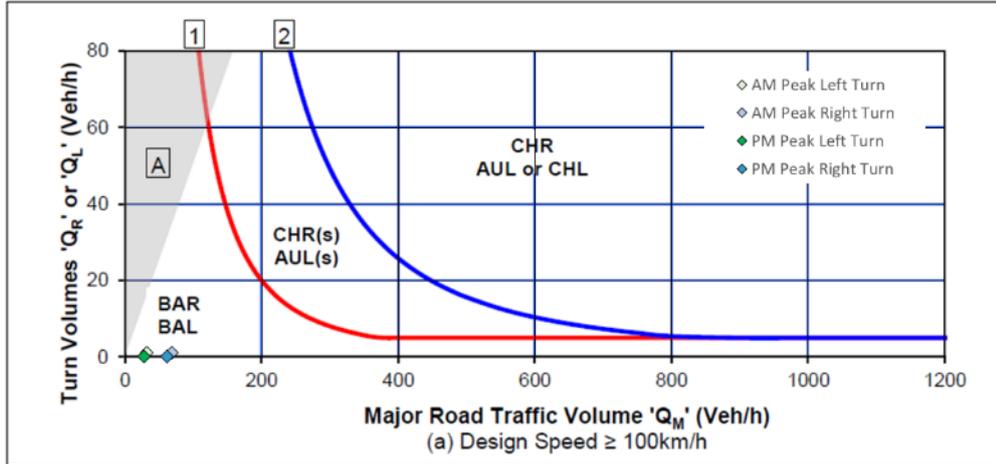
*Austrroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* specify warrants for intersection turning bays at an intersection, based on a combination of peak hour through and turning traffic movements.

The peak hour turning traffic movements at existing access intersections on the Golden Highway and Black Stump Way to which the standards would apply were assessed against the warrants. This included the following intersections:

- Golden Highway / Black Stump Way (already provided with auxiliary lanes)
- Golden Highway / Sir Ivan Dougherty Drive
- Golden Highway / Short Street
- Black Stump Way / The Leadville Stock Route
- Black Stump Way / Moorefield Road (already provided with auxiliary lanes)

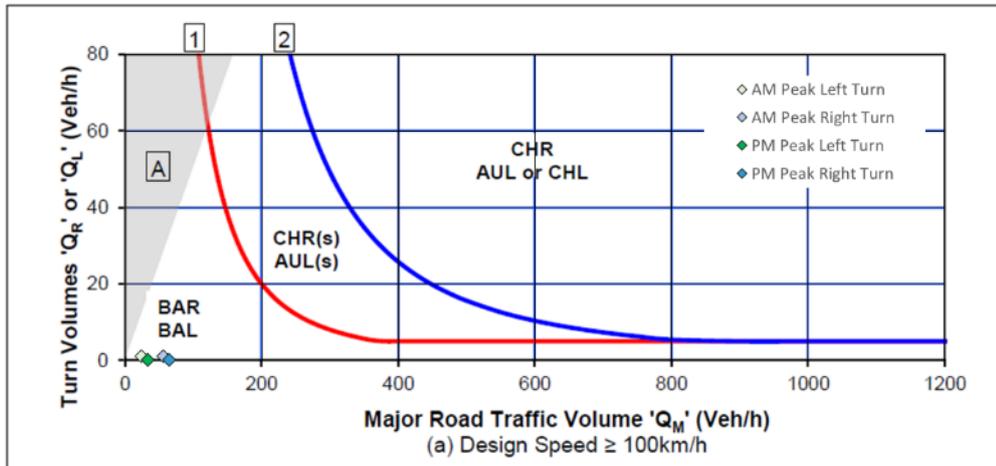
The assessment considered both the AM and PM peak hours. The assessment of the existing intersection layout and traffic volumes indicates that no upgrades are currently required at these intersections, as shown in **Figure 3–25** to **Figure 3–27**. Although turn bay provisions are provided at the intersections of Golden Highway / Black Stump Way and Black Stump Way / Moorefield Road, the traffic volumes recorded at these intersections suggest the intersections could operate with a basic intersection arrangement.

Figure 3–25 Warrants for Golden Highway / Black Stump Way



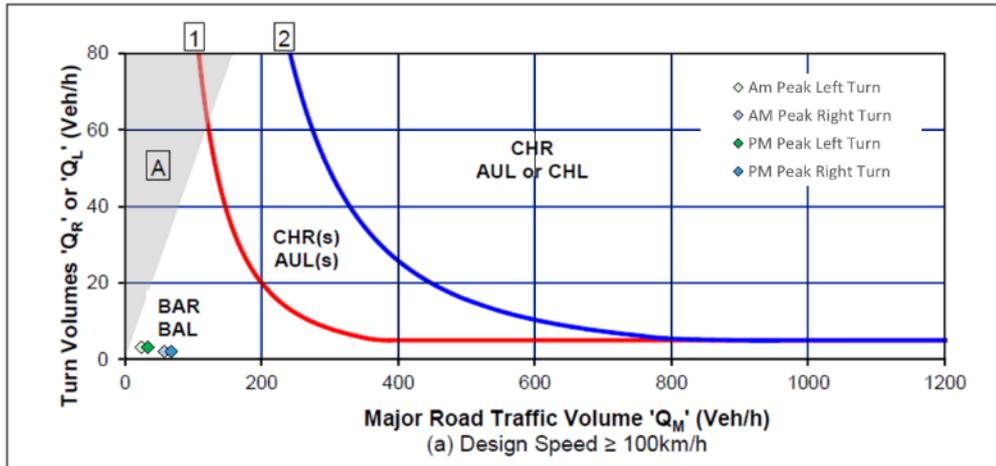
Source: Austroads Guide to Traffic Management Part 6, 2020

Figure 3–26 Warrants for Golden Highway / Sir Ivan Dougherty Drive



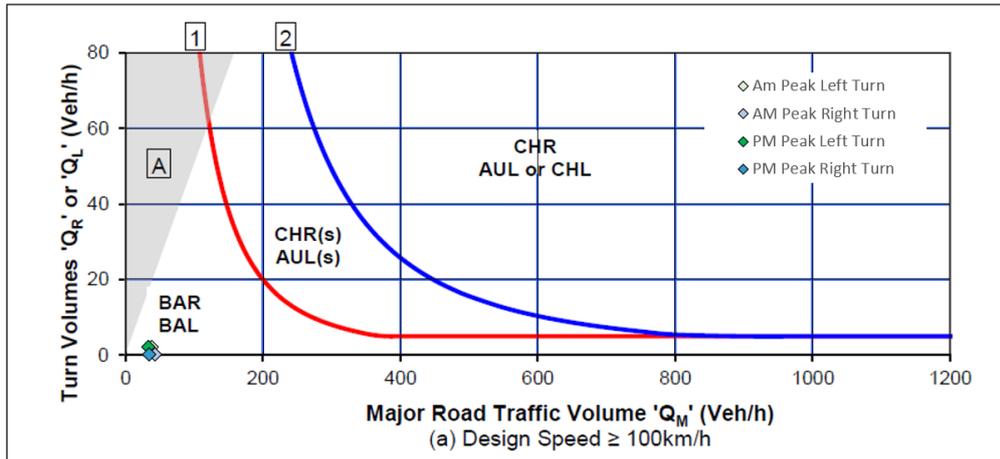
Source: Austroads Guide to Traffic Management Part 6, 2020

Figure 3–27 Warrants for Golden Highway / Short Street



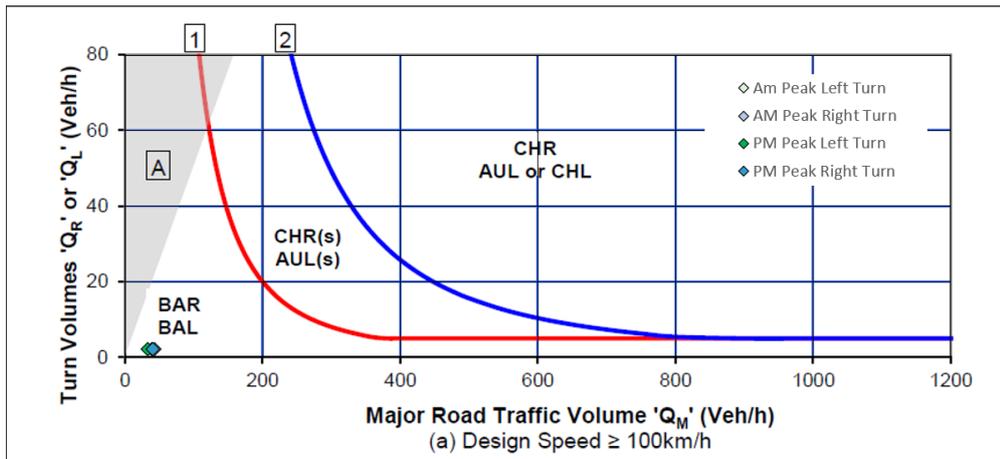
Source: Austroads Guide to Traffic Management Part 6, 2020

Figure 3–28 Warrants for Black Stump Way / The Leadville Stock Route



Source: Austroads Guide to Traffic Management Part 6, 2020

Figure 3–29 Warrants for Black Stump Way / Moorefield Road



Source: Austroads Guide to Traffic Management Part 6, 2020

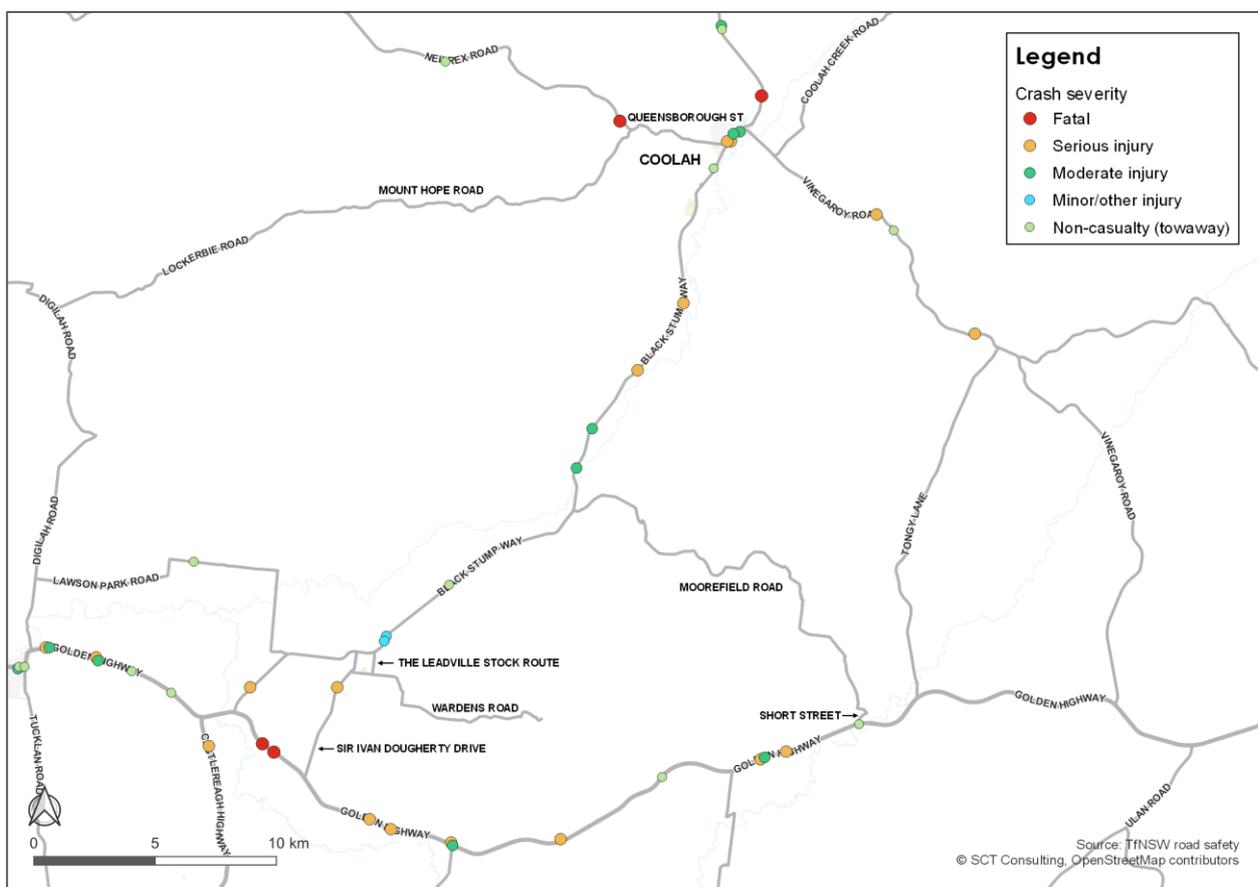
### 3.2 Crash data

Road crash data between 2015 to 2019 was sourced from the TfNSW Road Safety website<sup>3</sup>, which documents crashes into the following five categories:

- Fatal
- Serious injury
- Moderate injury
- Minor / other injury
- Non-casualty (towaway).

The locations of the crashes and the corresponding categories are shown in **Figure 3–30**.

**Figure 3–30** Crash data in the vicinity of the project (2015-2019)



Source: TfNSW Road Safety, 2021

Over the five-year crash analysis period, data shows that the Golden Highway recorded eight serious injuries, there were six serious injuries along Black Stump Way, two serious injuries along Vinegaroy Road and one serious injury along both Sir Ivan Dougherty Drive and Castlereagh Highway. A total of eight moderate injuries occurred along Black Stump Way and Golden Highway.

Four single-vehicle fatal crashes took place in the area over the five years (shown in **Table 3-3**) – two on the Golden Highway, where fatigue was deemed a factor in the incidents, one on Black Stump Way, where the vehicle struck an animal, and one on Neilrex Road, during the evening hours, which is a relatively high proportion of fatal accidents in comparison with the NSW average of 4.4 per 100,000 population (2019) and the national average of 4.1 per 100,000 population (June, 2021).

<sup>3</sup> <https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/nsw.html?tabnsw=3>

Table 3-3 Crash data analysis (Fatal Injury only)

Location	Year	Severity	RUM* code	Natural lighting	Description
Golden Highway (1.5km to the west of Sir Ivan Dougherty Drive)	2017	Fatal	71	Daylight	Left off carriageway into object / parked vehicle
Golden Highway (2km to the west of Sir Ivan Dougherty Drive)	2017	Fatal	71	Daylight	Left off carriageway into object / parked vehicle
Neilrex Road (4.3km to the west of Black Stump Way)	2017	Fatal	67	Dark	Struck animal
Black Stump Way (1.7km north of Vinegaroy Road)	2016	Fatal	62	Dusk	Accident / broken down

Source: SCT Consulting, based on TfNSW crash data, 2020

\*Road User Movement referenced from *Definitions and notes to support road crash data, TfNSW, 2019*

### 3.3 Rail crossings (disused in the vicinity)

There are remnants of disused Coolah Branch rail track on certain segments, which historically branched off the Gwabegar Line. However, at present, there are no train operations within the vicinity of the study area. As such, there are no rail crossings to assess.

### 3.4 Parking

There are no formal parking facilities in the vicinity of the study area given the rural nature of the area.

### 3.5 Active transport

Footpaths are limited adjacent to the high street of Coolah with pedestrian desire lines outside of the main road evidenced by worn grass verges. Outside of the town, there are no active transport facilities given the rural setting of the area with very limited pedestrian demands.

### 3.6 Public transport / school transport

There are no regular public bus services in the vicinity of the wind farm site. However, there is a coach service as part of Transport NSW TrainLink, which provides single weekly service connections between Lithgow rail station and Coolah.

A school bus service is operated by Grace Coaches to Sacred Heart Catholic Primary School (Coolah), Coolah Central School and Mendooran Central School to cater for the local student population. This service operates typical of school services with operational times aligned with school start and finish times.

## 4.0 Traffic generation, access routes and parking demand

### 4.1 Traffic generation

There are no specific generation rates for wind farms in the TfNSW trip generation guidelines. The traffic generation was therefore determined through the forecast employee, workforce and construction vehicles to cater for the construction phase, operation phase and decommissioning phase for the project.

#### 4.1.1 Construction phase

For the purpose of this assessment, it was assumed that construction activities at the three clusters would be undertaken sequentially, with construction vehicle movements associated with one cluster at a given time. Although there may be some overlap in construction activities, this assumption provides a representative worst-case assessment for each cluster. Based on conservative assumptions, the two-year construction phase of the wind farm is expected to generate the following peak construction traffic demand for the sites:

- Peak generation of 72 heavy vehicle trips per day (36 heavy vehicles to site and 36 vehicles from site per day) would occur at the Mount Hope cluster worksite, as it contains the most turbines. This equates to eight heavy vehicle trips during the peak hour (four heavy vehicles to site and four heavy vehicles from site).
- Up to 400 employees per day, who would likely travel in a combination of individual vehicles and minivans / shuttle buses. Two construction workforce accommodation scenarios have been considered:
  - Regional distribution of workforce accommodation: this scenario assumes that construction workers would be distributed across six localities, including the townships of Coolah, Dunedoo, Cassilis, Coonabarabran, Gulgong and Mudgee; and would travel from established accommodation facilities in these towns. These workforce location assumptions are subject to confirmation of the final social impact assessment outcomes and ongoing consultation with Warrumbungle Shire Council. This scenario is considered the worst-case traffic impacts and assumes travel to site with about 25% shuttled staff with the remainder using private vehicles. As such, it is forecast that 506 light vehicle trips per day would be generated to transport construction staff (253 light vehicles to site in the morning and 253 light vehicles from site in the evening).
  - Centralised workforce accommodation: this scenario assumes the bulk of the construction workforce is accommodated at a temporary workers accommodation camp located on site, accessed off Moorefield Road. This scenario assumes travel to site with up to 90% shuttled staff, due to the remote centralised location, with the remainder using private vehicles. As such, it is forecast that only 128 light vehicle trips per day would be generated to transport construction staff (64 light vehicles to site in the morning and 64 light vehicles from site in the evening) in this scenario.

The construction vehicle movements would peak during 2023, when the majority of materials are transported to the site and the peak workforce numbers are reached. These traffic generation numbers also include other construction materials, such as gravel, sand, concrete, water trucks, etc.

For the assessment, it is assumed that the typical heavy vehicles would consist of 26m B-double heavy vehicles. However, it is acknowledged that Performance Based Standards (PBS) vehicles could be used, which may achieve higher productivity via accommodating heavier loads within the same footprints and efficiencies, which may reduce the volume of heavy vehicles generated during the construction phase.

Transportation of some project infrastructure, such as wind turbines, would require over-size over-mass (OSOM) vehicles that exceed the regulatory limits of standard vehicle dimensions. These are discussed further in **Section 5.5**.

The daily trip generation and peak hour trip generation for each wind farm cluster under the two construction workforce accommodation scenarios are summarised in **Table 4-1** and **Table 4-2**.

**Table 4-1 Traffic generation for peak construction phase: Regional distribution of workforce accommodation**

Vehicle type	Daily trips	Estimated peak hour trips	Assumption
<b>Mount Hope cluster</b>			
Heavy vehicles	36 HVs x 2 = 72 HVs	8 HVs	<ul style="list-style-type: none"> <li>One vehicle generates two trips per day given vehicles do not stay on site over night</li> <li>10% of the daily estimated goods vehicle trips are made in the peak hour.</li> </ul>
Light vehicles (mini-buses / private cars used by staff)	253 LVs x 2 = 506 LVs	253 LVs	<ul style="list-style-type: none"> <li>Based on 25% shuttled staff on 12-seater mini-buses</li> <li>All staff arrive / leave during peak hour</li> </ul>
<b>Total</b>	<b>578 trips</b>	<b>261 trips</b>	
<b>Girragulang Road cluster</b>			
Heavy vehicles	24 HVs x 2 = 48 HVs	6 HVs	<ul style="list-style-type: none"> <li>One vehicle generates two trips per day given vehicles do not stay on site over night</li> <li>10% of the daily estimated goods vehicle trips are made in the peak hour.</li> </ul>
Light vehicles (mini-buses / private cars used by staff)	253 LVs x 2 = 506 LVs	253 LVs	<ul style="list-style-type: none"> <li>Based on 25% shuttled staff on 12-seater mini-buses</li> <li>All staff arrive / leave during peak hour</li> </ul>
<b>Total</b>	<b>554 trips</b>	<b>259 trips</b>	
<b>Leadville cluster</b>			
Heavy vehicles	10 HVs x 2 = 20 HVs	2 HVs	<ul style="list-style-type: none"> <li>One vehicle generates two trips per day given vehicles do not stay on site over night</li> <li>10% of the daily estimated goods vehicle trips are made in the peak hour.</li> </ul>
Light vehicles (mini-buses / private cars used by staff)	253 LVs x 2 = 506 LVs	253 LVs	<ul style="list-style-type: none"> <li>Based on 25% shuttled staff on 12-seater mini-buses</li> <li>All staff arrive / leave during peak hour</li> </ul>
<b>Total</b>	<b>526 trips</b>	<b>255 trips</b>	

**Table 4-2 Traffic generation for peak construction phase: Centralised workforce accommodation**

Vehicle type	Daily trips	Estimated peak hour trips	Assumption
<b>Mount Hope cluster</b>			
Heavy vehicles	36 HVs x 2 = 72 HVs	8 HVs	<ul style="list-style-type: none"> <li>One vehicle generates two trips per day given vehicles do not stay on site over night</li> <li>10% of the daily estimated goods vehicle trips are made in the peak hour.</li> </ul>
Light vehicles (mini-buses / private cars used by staff)	64 LVs x 2 = 128 LVs	64 LVs	<ul style="list-style-type: none"> <li>Based on 90% shuttled staff on 12-seater mini-buses</li> <li>All staff arrive / leave during peak hour</li> </ul>
<b>Total</b>	<b>200 trips</b>	<b>72 trips</b>	

Vehicle type	Daily trips	Estimated peak hour trips	Assumption
<b>Girragulang Road cluster</b>			
Heavy vehicles	24 HVs x 2 = 48 HVs	6 HVs	<ul style="list-style-type: none"> <li>One vehicle generates two trips per day given vehicles do not stay on site over night</li> <li>10% of the daily estimated goods vehicle trips are made in the peak hour.</li> </ul>
Light vehicles (mini-buses / private cars used by staff)	64 LVs x 2 = 128 LVs	64 LVs	<ul style="list-style-type: none"> <li>Based on 90% shuttled staff on 12-seater mini-buses</li> <li>All staff arrive / leave during peak hour</li> </ul>
<b>Total</b>	<b>176 trips</b>	<b>70 trips</b>	
<b>Leadville cluster</b>			
Heavy vehicles	10 HVs x 2 = 20 HVs	2 HVs	<ul style="list-style-type: none"> <li>One vehicle generates two trips per day given vehicles do not stay on site over night</li> <li>10% of the daily estimated goods vehicle trips are made in the peak hour.</li> </ul>
Light vehicles (mini-buses / private cars used by staff)	64 LVs x 2 = 128 LVs	64 LVs	<ul style="list-style-type: none"> <li>Based on 90% shuttled staff on 12-seater mini-buses</li> <li>All staff arrive / leave during peak hour</li> </ul>
<b>Total</b>	<b>148 trips</b>	<b>66 trips</b>	

#### 4.1.2 Operation phase

Traffic generation during the operational phase of the project is forecast to be much less than the construction phase, with 50 operational staff forecast to generate about 100 daily light vehicle trips, consisting of 50 cars entering the site during AM peak hour and 50 cars exiting the site during the PM peak hour, with no ride sharing amongst the staff.

Heavy vehicles would only be required for infrequent repairs and maintenance and are not expected to occur on an hourly basis, unlike during the construction phase. As such, minimal hourly heavy vehicle generation is expected during the operational phase.

#### 4.1.3 Decommissioning phase

The decommissioning phase is expected to have a similar labour force and therefore result in similar traffic generation compared to the construction phase.

### 4.2 Parking demand

The parking demand during the construction, operation and decommissioning phases of the project would be accommodated on-site. Given the remote location of the worksites, there would be no demand for on-street parking.

### 4.3 Access routes

#### 4.3.1 Heavy vehicle routes

Large components, such as wind turbine blades, will be shipped to Australia from overseas and transported to the site from the Port of Newcastle and access the worksites by the following route:

- Industrial Drive
- Pacific Highway

- New England Highway
- Hunter Expressway
- New England Highway
- Golden Highway.

Heavy vehicles generated from the Sydney region, if needed, would traverse M1 Motorway / Hunter Expressway to join onto the New England Highway and the Golden Highway. These roads are all approved B-double routes and would be suitable for transporting OSOM materials under escort and under a Traffic Management Plan.

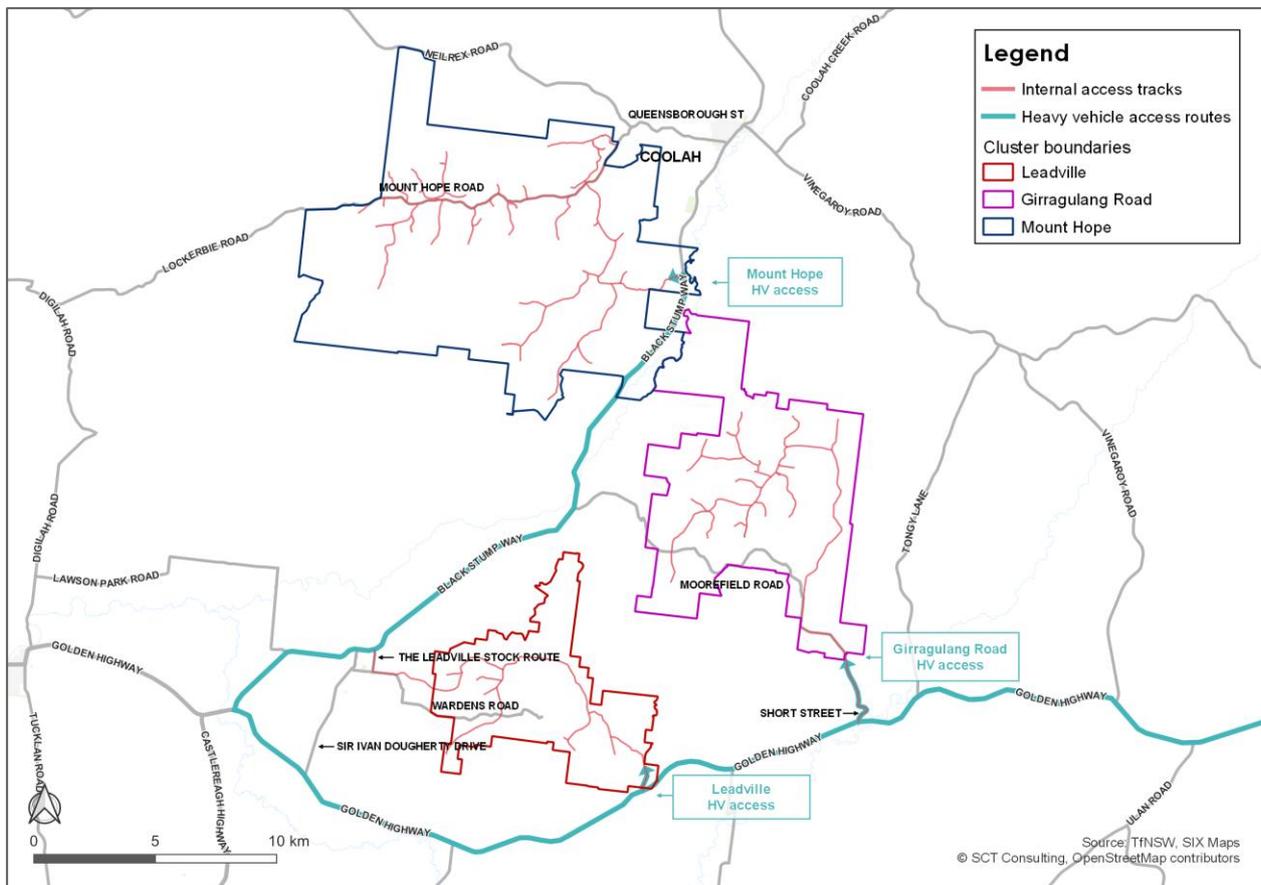
As described in **Section 2.2**, the wind farm will consist of three sites: the Mount Hope cluster, Girragulang Road cluster and Leadville cluster. Heavy machinery and large construction materials are proposed to be transported to each site via the Golden Highway and then regional and local roads.

Based on the assessments undertaken in the Transport Logistics Assessment (see **Appendix A**), which indicated significant impacts at the Sir Ivan Dougherty / Wardens Road intersection and also that the Neilrex Road route to the Mount Hope cluster would not be feasible for large components (such as wind turbine blades), the following heavy vehicle and OSOM access routes to the three clusters from the Golden Highway are proposed:

- **Mount Hope cluster:** via Black Stump Way and a new access on Black Stump Way, south of Coolah. The section of Mount Hope Road located within the Mount Hope cluster boundary would be used by heavy vehicles and OSOM vehicles to access the internal access tracks to the turbine locations.
- **Girragulang Road cluster:** via Short Street, Turee Street and Moorefield Road
- **Leadville cluster:** via a new access on the Golden Highway.

The access routes to the clusters are shown in **Figure 4-1**. The two new access locations on Black Stump Way and the Golden Highway have been located to provide safe intersection sight distances.

**Figure 4-1 Heavy vehicle access routes to worksite clusters**



### 4.3.2 Light vehicle route

About 400 construction staff are forecast during the peak construction period. UPC\AC are undertaking ongoing consultation with Warrumbungle Shire Council regarding the most appropriate accommodation distribution of workers during construction. For the purpose of this assessment, two construction workforce accommodation scenarios have been considered.

#### 4.3.2.1 Regional distribution of workforce accommodation

In this scenario, it is assumed that the workers would be distributed across six localities with established accommodation facilities. Based on the existing levels of short-term accommodation, the distribution of the workers is summarised in **Table 4-3**. These workforce location assumptions are subject to confirmation of the final social impact assessment outcomes and ongoing consultation with Warrumbungle Shire Council.

The light vehicle routes to the three clusters are shown in **Figure 4-2** to **Figure 4-4**. The routes are based on the quickest travel time, which are based on road condition (sealed or unsealed) and posted speed limits.

It is expected that work at the three clusters would be undertaken sequentially. As such, all staff would arrive at the common cluster site by either private vehicle or shuttle bus. For a worst-case assessment, shuttle services are only assumed for two furthest accommodation sites of Coonabarabran and Mudgee. In reality, the proportion of shuttle buses may be higher with a reduced traffic impact.

**Table 4-3 Location of construction workforce accommodation**

Location	Workers	Percentage
Coolah	60	15%
Dunedoo	60	15%
Cassilis	20	5%
Gulgong	60	15%
Coonabarabran	120	30%
Mudgee	80	20%
<b>Total</b>	<b>400</b>	<b>100%</b>

Figure 4-2 Staff access routes to Mount Hope cluster: Regional distribution of workforce accommodation

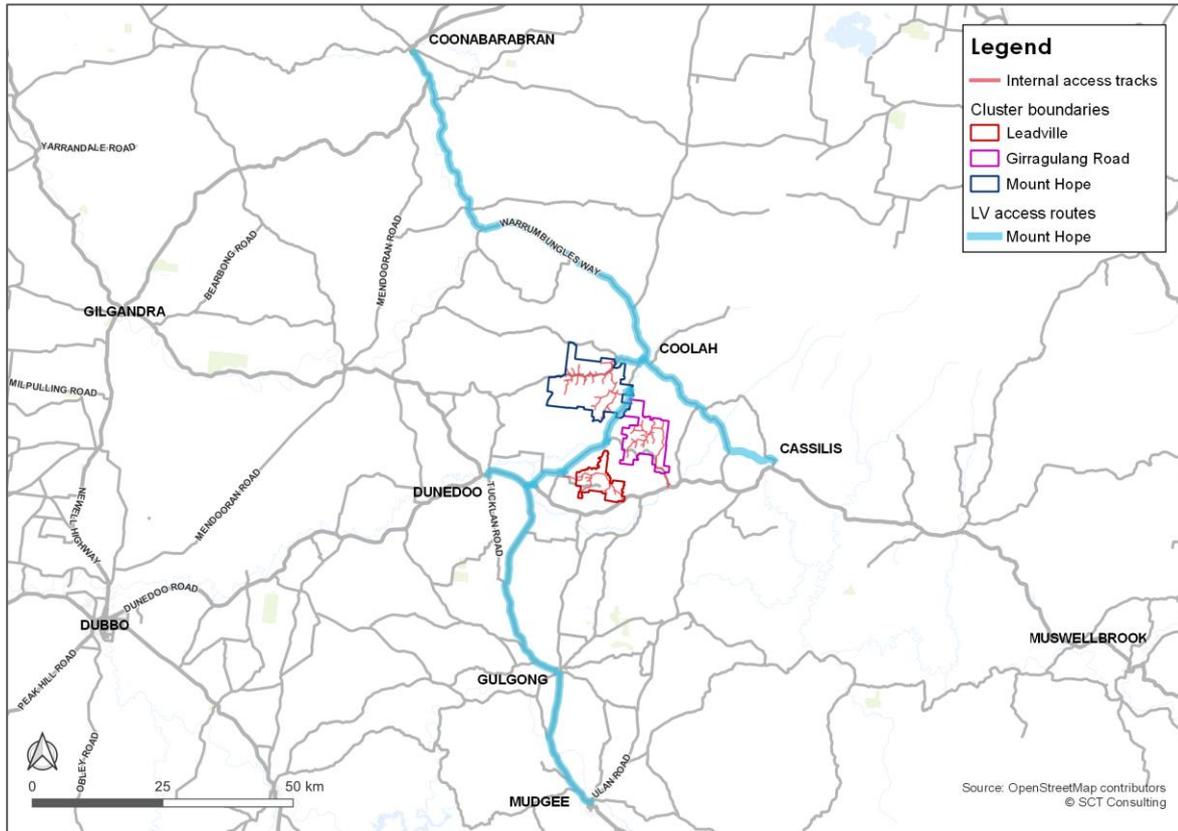


Figure 4-3 Staff access routes to Girragulang Road cluster: Regional distribution of workforce accommodation

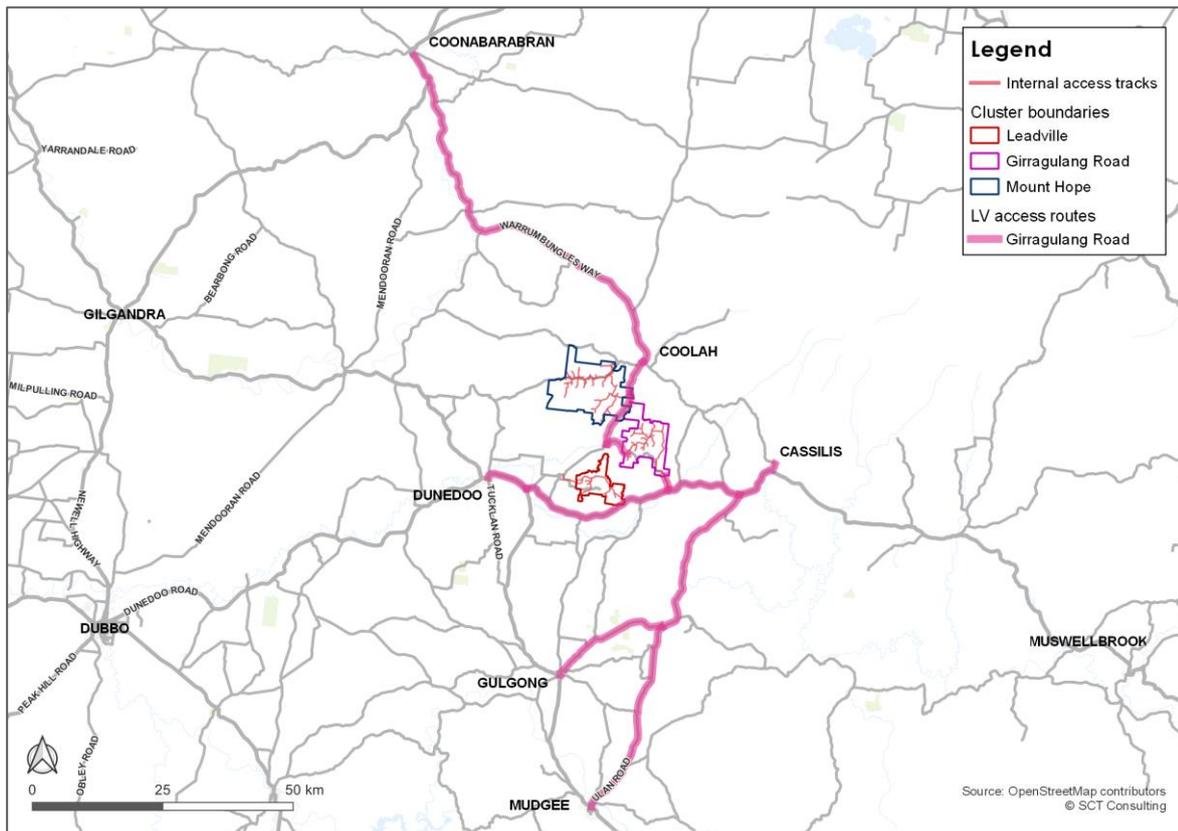
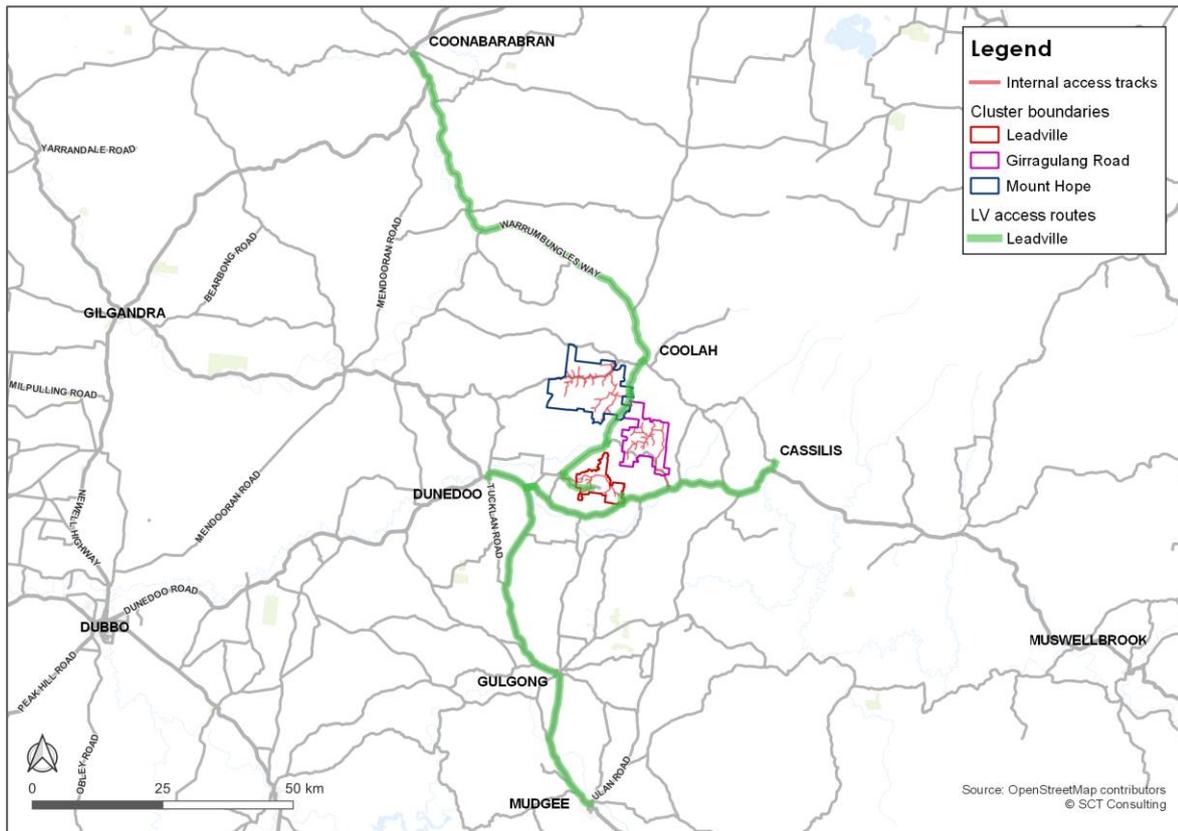


Figure 4–4 Staff access routes to Leadville cluster: Regional distribution of workforce accommodation

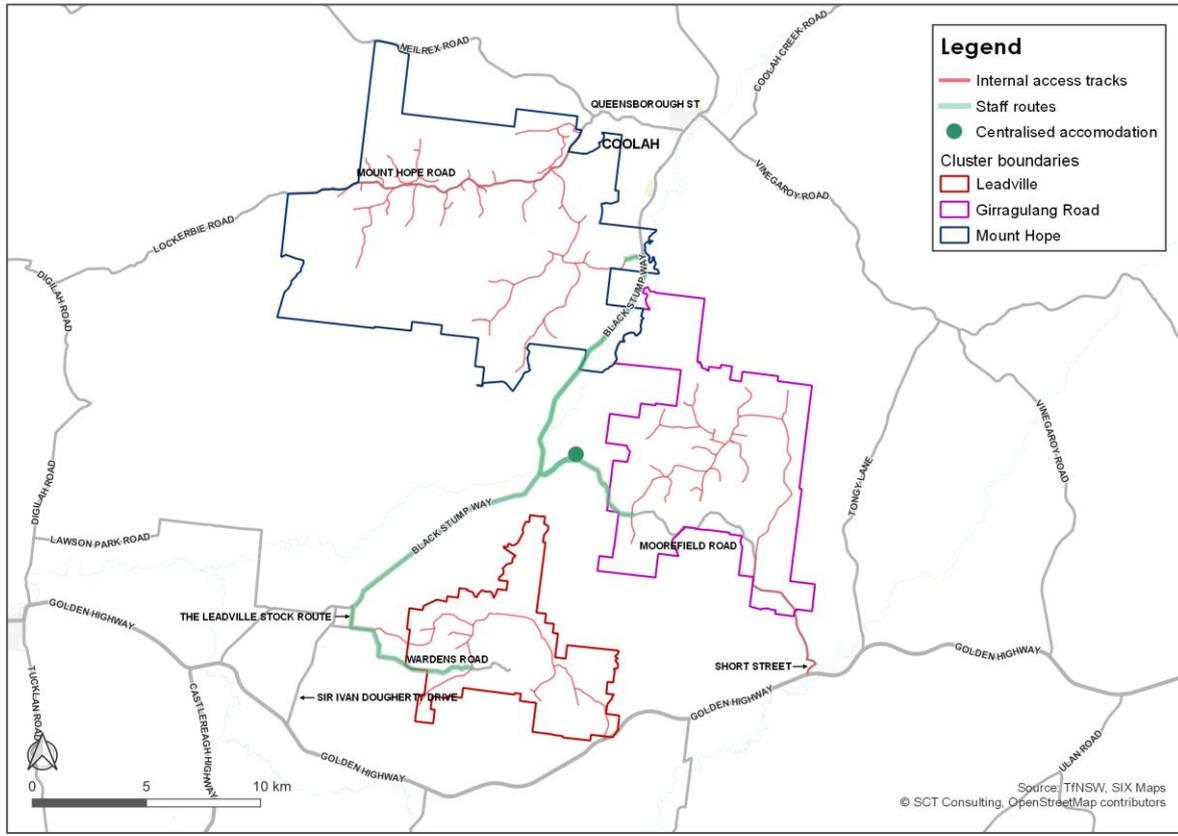


#### 4.3.2.2 Centralised workforce accommodation

In this scenario, it is assumed that the bulk of the construction workforce is accommodated at a temporary workers accommodation camp located on site, accessed off Moorefield Road.

The light vehicle routes from the workers camp to the three clusters are shown in **Figure 4–5**.

Figure 4–5 Staff access routes to the three wind turbine clusters: Centralised workforce accommodation



## 5.0 Impact assessment

The traffic and transport impact assessment deals primarily with the construction phase of the project as traffic generation is forecast to be greatest during the construction phase when compared to the operation and decommissioning phases. These latter two phases would require lower or equivalent labour force and materials.

Standard weekday construction hours would be between 7am to 6pm Monday to Friday (though out of hours work and extended construction hours may be required on limited occasions), with construction staff arriving before 7am and departing after 6pm. Although these periods do not coincide with the road network's weekday AM and PM peak hours, a worst-case scenario assessment is undertaken to assume the construction workforce traffic impacts occur during the weekday AM and PM peak hours for the surrounding road network.

### 5.1 Roadway impacts and upgrades

#### 5.1.1 Regional distribution of workforce accommodation

**Table 5-1** compares the forecast daily two-way traffic volumes during the peak construction phase for the 'future year (2023) base' and the 'future year (2023) with construction' scenarios. The forecast volumes include light and heavy vehicles and present the highest construction volume associated with each cluster, as described in **Section 4.1**.

**Table 5-1 Future daily traffic assessment for construction traffic with regional distribution of workforce accommodation**

Existing daily traffic volume category	Applicable roads	Future year base daily traffic volume (2023)	Additional construction daily traffic volume	Future year with construction daily traffic volume category	Upgrade needed (Y/N?)
1-150 vehicles	Short Street, Turee Street, Main Street, Wyaldra Street and Moorefield Road (east) – Girragulang Road Cluster	< 100	344	150-500	Y
	Moorefield Road (west) – Girragulang Road Cluster	< 50	210	150-500	Y
	The Leadville Stock Route – Leadville Cluster	< 50	210	150-500	Y
	Wardens Road – Leadville Cluster	< 50	210	150-500	Y
	Mount Hope Road – Mount Hope Cluster	< 50	244	150-500	Y
150-500 vehicles	Neilrex Road – Mount Hope Cluster	< 200	244	150-500	N
	Queensborough Street – Mount Hope Cluster	< 250	244	150-500	N
1,000-3,000 vehicles	Black Stump Way – Mount Hope Cluster	< 400	334	1,000-3,000	N

The forecast daily traffic increases indicate that upgrades would be required for Short Street, Turee Street, Main Street, Wyaldra Street, Moorefield Road, Wardens Road, The Leadville Stock Route and Mount Hope Road. They would require upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles, where relevant. This includes paving sections of Short Street and Turee Street in response to feedback from the local community. For all access roads except the Golden Highway, the road authority is the Warrumbungle Shire Council.

Within the Mount Hope cluster boundary, the construction traffic on Mount Hope Road, which would be used by heavy vehicles and OSOM vehicles to access the internal access tracks, would vary and it is recommended that this section of Mount Hope Road is upgraded to the road authority's proposed standard once vehicle loads are confirmed.

Details of the road upgrades are described in **Table 6-2**.

### 5.1.2 Centralised workforce accommodation

**Table 5-2** compares the forecast daily two-way traffic volumes with a centralised workforce accommodation site during the peak construction phase for the ‘future year (2023) base’ and the ‘future year (2023) with construction’ scenarios. The forecast volumes include light and heavy vehicles and present the highest construction volume associated with each cluster, as described in **Section 4.1**.

**Table 5-2 Future daily traffic assessment for construction traffic with centralised workforce accommodation**

Existing daily traffic volume category	Applicable roads	Future year base daily traffic volume (2023)	Additional construction daily traffic volume	Future year with construction daily traffic volume category	Upgrade needed (Y/N?)
1-150 vehicles	Short Street, Turee Street, Main Street, Wyaldra Street and Moorefield Road (east) – Girragulang Road Cluster	< 100	48	< 150	N
	Moorefield Road (west) – Girragulang Road Cluster	< 50	128	150-500	Y
	The Leadville Stock Route – Leadville Cluster	< 50	128	150-500	Y
	Wardens Road – Leadville Cluster	< 50	128	150-500	Y
1,000-3,000 vehicles	Black Stump Way – Mount Hope Cluster	< 400	200	1,000-3,000	N

The forecast daily traffic increases indicate that upgrades would be required for Moorefield Road, Wardens Road and The Leadville Stock Route. They would require upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles. For all access roads except the Golden Highway, the road authority is the Warrumbungle Shire Council. This includes paving sections of Short Street and Turee Street in response to feedback from the local community.

Details of the road upgrades are described in **Table 6-2**.

## 5.2 Intersection performance

An intersection assessment was undertaken using SIDRA 9.0 to check the queue lengths for turning movements.

**Table 5-3** to **Table 5-6** provides a comparison of the intersection performances during the AM and PM peak hours with the forecast traffic volume during the peak construction phase, including the ‘future year (2023) base without project’ and the ‘future year (2023) with project’ construction traffic volumes. The volumes include light and heavy vehicles and presents the highest construction volume associated with each cluster.

The summaries show that all the intersections would operate with spare capacity, as evidenced by the Level of Service A for all approaches to the intersection. Furthermore, the analysis shows that minimal resultant queues are expected at the intersections.

Table 5-3 Golden Highway / Black Stump Way (Mount Hope Cluster) intersection performance

Intersection	Peak hour	2023 without project			2023 with project (Regional distribution of workforce)			2023 with project (Centralised workforce)		
		Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue
Golden Highway North Approach	AM	32	A	0	163	A	0	32	A	0
	PM	28	A	0	28	A	0	28	A	0
Black Stump Way East Approach	AM	37	A	1.2	41	A	2.3	41	A	2.1
	PM	33	A	1.3	168	A	6.4	37	A	1.9
Golden Highway South Approach	AM	37	A	0	41	A	0.8	41	A	0.7
	PM	35	A	0	39	A	0.7	39	A	0.7

Table 5-4 Queensborough Street / Binnia Street (Mount Hope Cluster) intersection performance

Intersection	Peak hour	2023 without project			2023 with project (Regional distribution of workforce)			2023 with project (Centralised workforce)		
		Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue
Binnia Street North Approach	AM	34	A	0.3	156	A	2.9	34	A	0.3
	PM	62	A	0.5	62	A	0.5	62	A	0.5
Queensborough Street West Approach	AM	17	A	0.3	17	A	0.3	17	A	0.3
	PM	10	A	0.2	132	A	2.3	10	A	0.2
Binnia Street South Approach	AM	37	A	0	37	A	0	37	A	0
	PM	45	A	0	45	A	0	45	A	0

Table 5-5 Neilrex Road / Mount Hope Road (Mount Hope Cluster) intersection performance

Intersection	Peak hour	2023 without project			2023 with project (Regional distribution of workforce)			2023 with project (Centralised workforce)		
		Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue
Neilrex Road West Approach	AM	12	A	0	12	A	0	12	A	0
	PM	5	A	0	5	A	0	5	A	0
Mount Hope Road South Approach	AM	5	A	0.1	5	A	0.1	5	A	0.1
	PM	2	A	0	124	A	1.4	2	A	0
Neilrex Road East Approach	AM	9	A	0	131	A	0	9	A	0
	PM	11	A	0	11	A	0	11	A	0

Table 5-6 Black Stump Way / Access Road (Mount Hope Cluster) intersection performance

Intersection	Peak hour	2023 without project			2023 with project (Regional distribution of workforce)			2023 with project (Centralised workforce)		
		Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue
Black Stump Way North Approach	AM	-	-	-	33	A	0	33	A	0
	PM	-	-	-	52	A	0	52	A	0
Mount Hope Access Road West Approach	AM	-	-	-	6	A	0.4	6	A	0.4
	PM	-	-	-	136	A	1.8	69	A	1.0
Black Stump Way South Approach	AM	-	-	-	172	A	0	105	A	0
	PM	-	-	-	52	A	0	52	A	0

Table 5-7 Golden Highway / Short Street (Girragulang Road Cluster) intersection performance

Intersection	Peak hour	2023 without project			2023 with project (Regional distribution of workforce)			2023 with project (Centralised workforce)		
		Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue
Golden Highway West Approach	AM	26	A	0	76	A	0	26	A	0
	PM	36	A	0	36	A	0	36	A	0
Short Street North Approach	AM	5	A	0.1	8	A	0.4	8	A	0.4
	PM	5	A	0.1	156	A	2.7	8	A	0.4
Golden Highway East Approach	AM	33	A	0.1	134	A	2.8	36	A	0.6
	PM	33	A	0.1	36	A	0.6	36	A	0.6

Table 5-8 Golden Highway / Access Road (Leadville Cluster) intersection performance

Intersection	Peak hour	2023 without project			2023 with project (Regional distribution of workforce)			2023 with project (Centralised workforce)		
		Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue	Volume	Level of Service	95 <sup>th</sup> %ile Queue
Golden Highway West Approach	AM	-	-	-	155	A	0	24	A	0
	PM	-	-	-	34	A	0	34	A	0
Short Street North Approach	AM	-	-	-	4	A	0.3	4	A	0.3
	PM	-	-	-	152	A	2.0	4	A	0.3
Golden Highway East Approach	AM	-	-	-	51	A	1.0	34	A	0.4
	PM	-	-	-	34	A	0.4	34	A	0.4

### 5.3 Intersection warrants

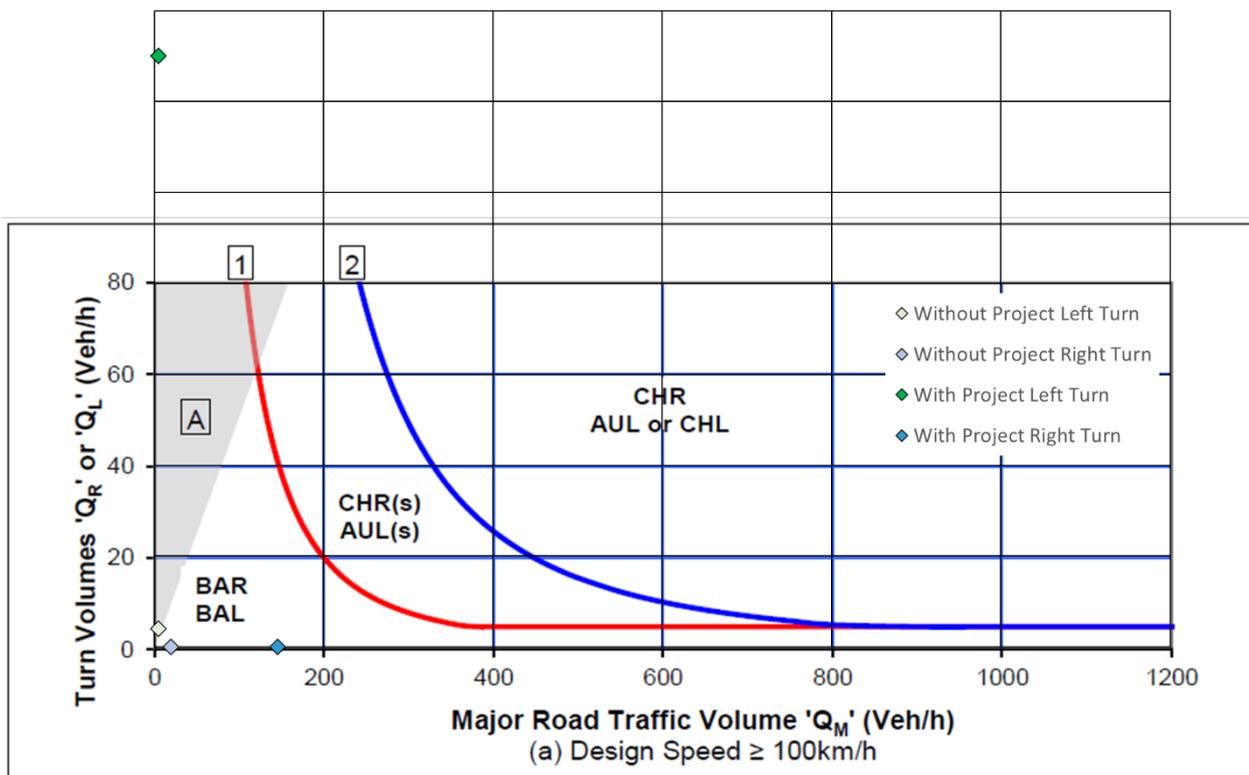
#### 5.3.1 Regional distribution of workforce accommodation

The following five key intersections currently operate as basic intersection arrangements with design speeds of 100km/h or more, and as such were assessed against the Austroads warrant design charts to assess the warrant for any additional intersection treatments:

- Neilrex Road / Mount Hope Road (during construction of Mount Hope cluster)
- Black Stump Way / Mount Hope Cluster Access Road (during construction of the Mount Hope cluster)
- Golden Highway / Short Street (during construction of the Girragulang Road cluster)
- Golden Highway / Leadville Cluster Access Road (during construction of the Leadville cluster)
- Black Stump Way / The Leadville Stock Route (during the construction of the Leadville cluster).

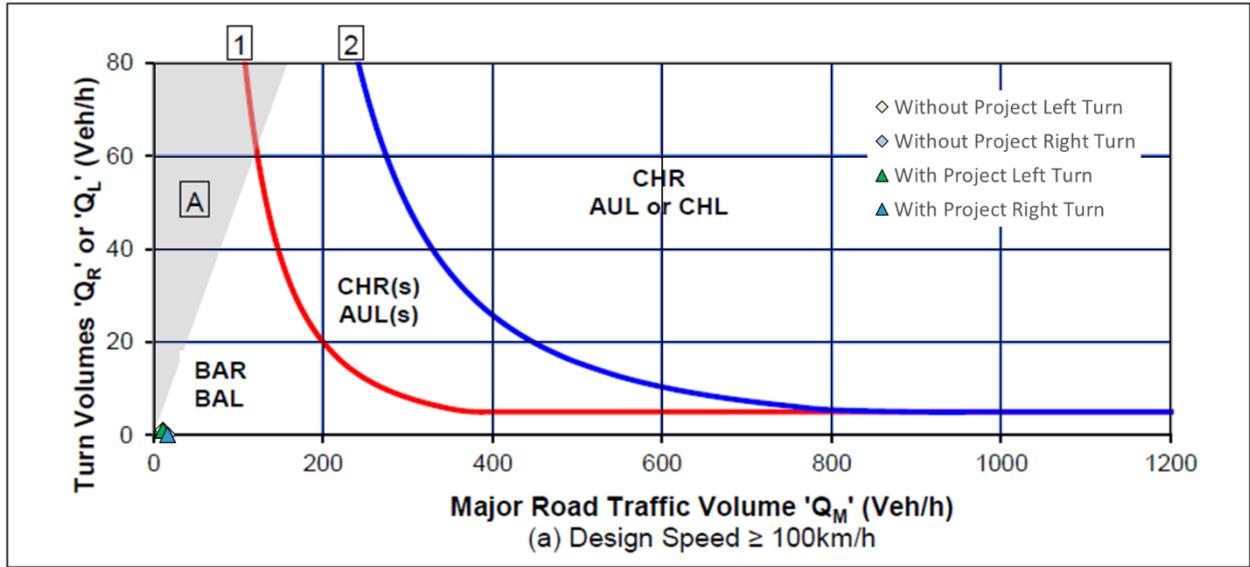
Figure 5–1 to Figure 5–10 shows a comparison of the ‘future year (2023) base without project and the ‘future year (2023) with project’ scenarios. The figures show that the forecast turn movements fall within the limits of the basic intersection arrangement. As such, the project does not warrant any additional left or right turn turning lanes in either of the AM or PM peak flow periods during the construction period.

Figure 5–1 Neilrex Road / Mount Hope Road (Mount Hope Cluster) - AM peak with regional workforce distribution



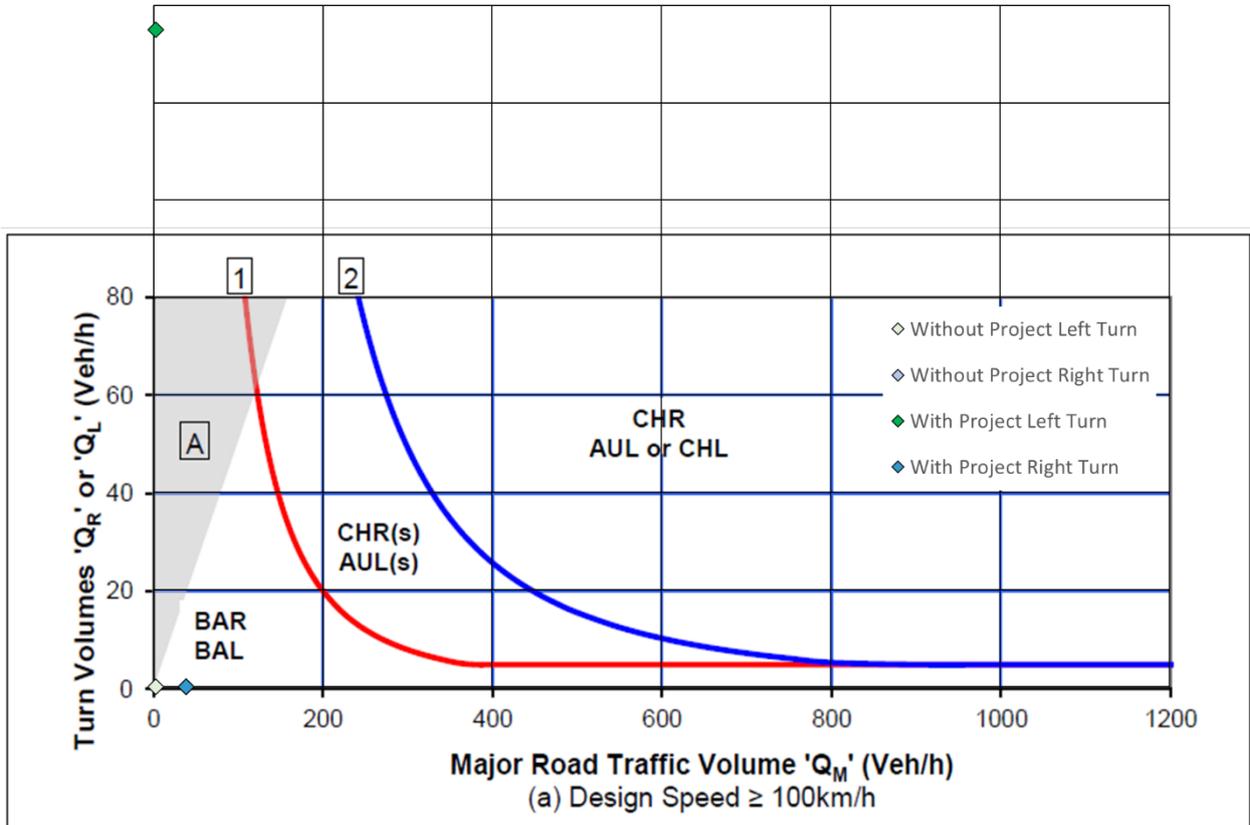
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-2 Neilrex Road / Mount Hope Road (Mount Hope Cluster) - PM peak with regional workforce distribution



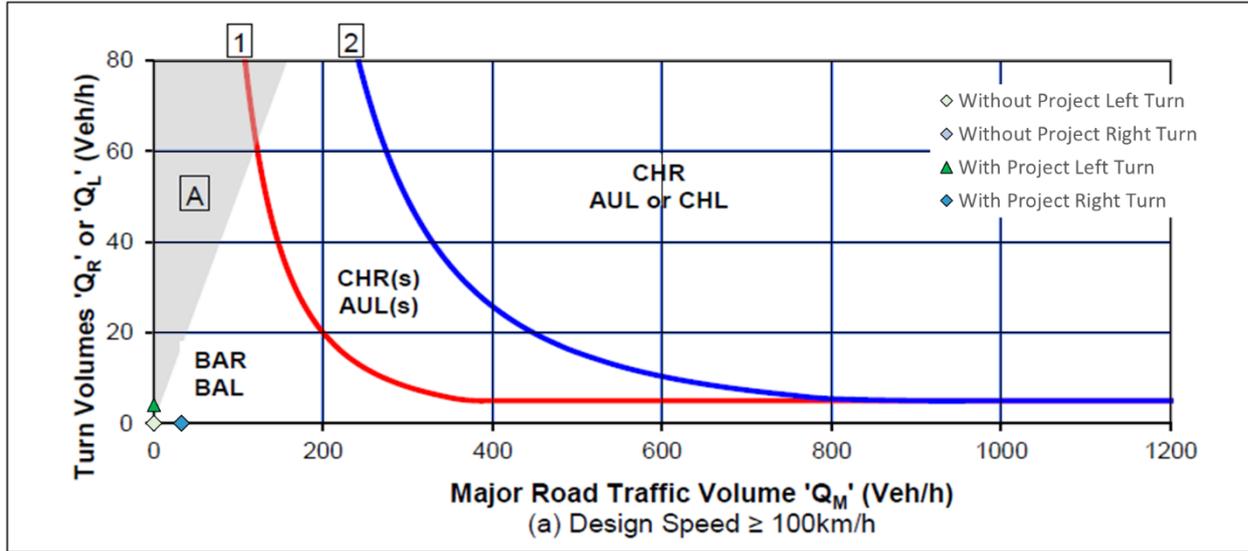
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-3 Black Stump Way / Mount Hope Cluster Access Road (Mount Hope Cluster) - AM peak with regional workforce distribution



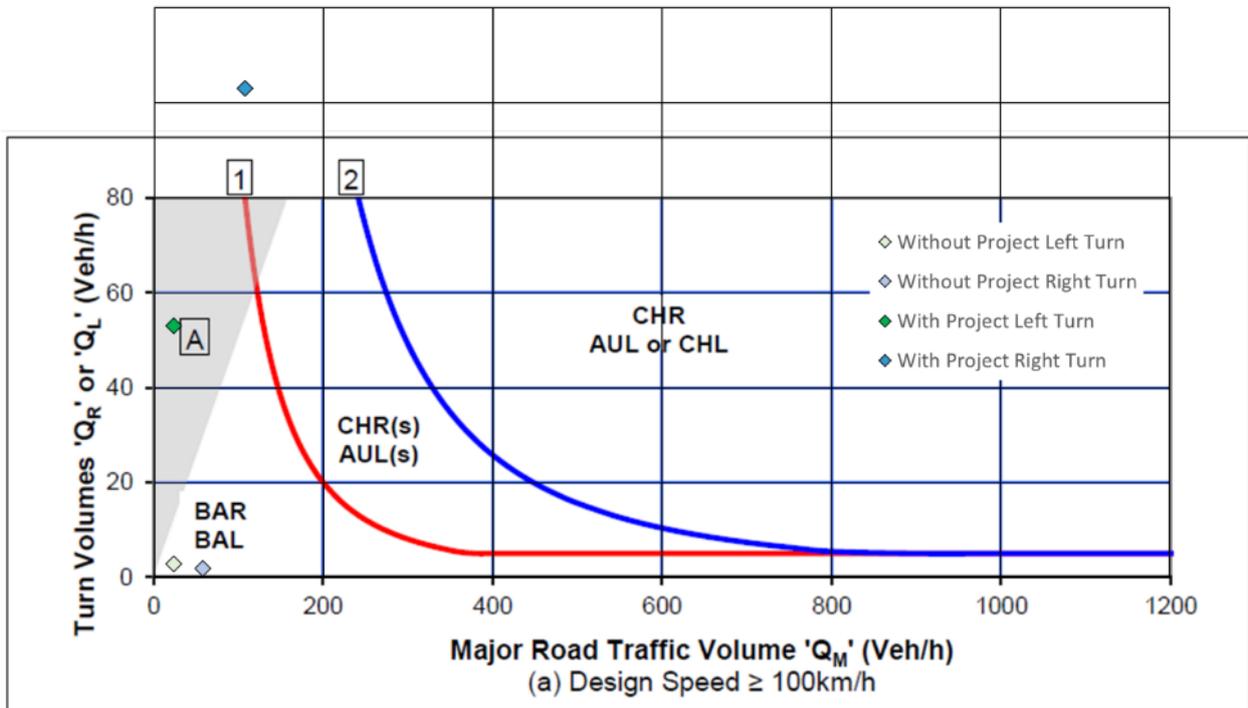
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-4 Black Stump Way / Mount Hope Cluster Access Road (Mount Hope Cluster) - PM peak with regional workforce distribution



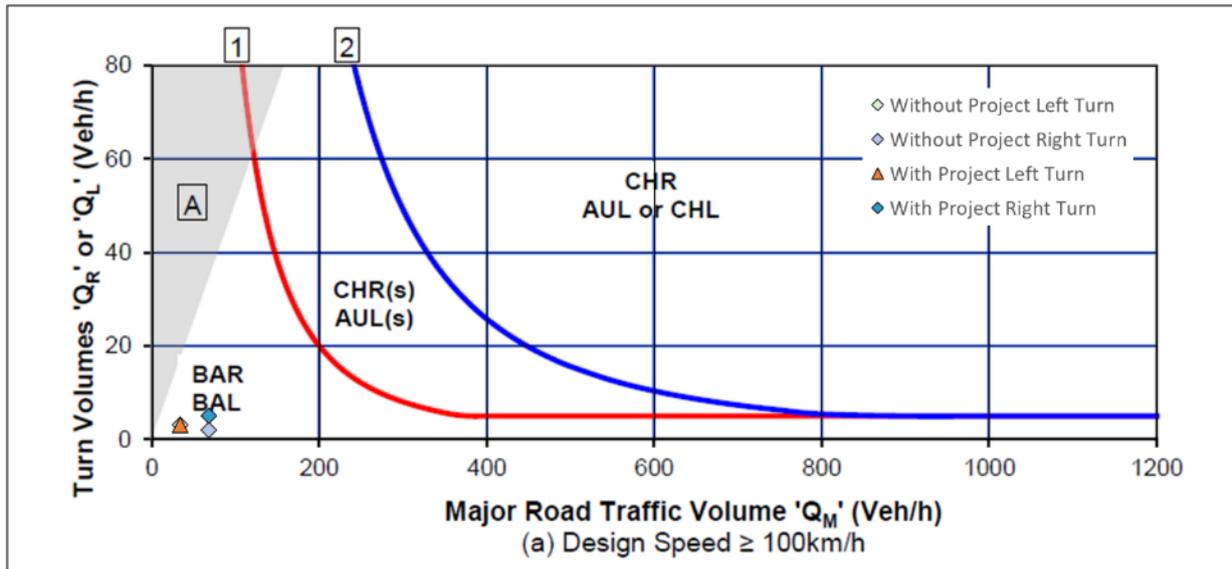
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-5 Golden Highway / Short Street (Girragulang Road Cluster) - AM peak with regional workforce distribution



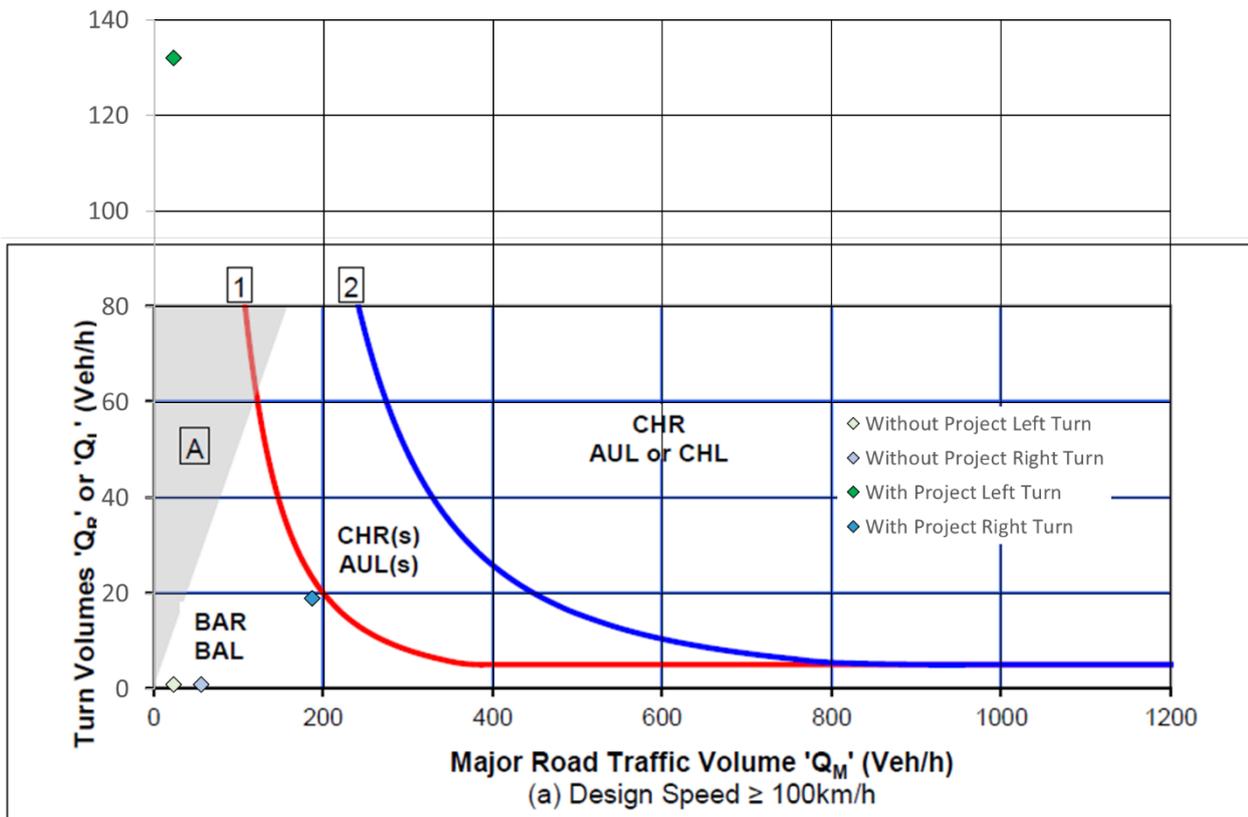
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-6 Golden Highway / Short Street (Girragulang Road Cluster) - PM peak with regional workforce distribution



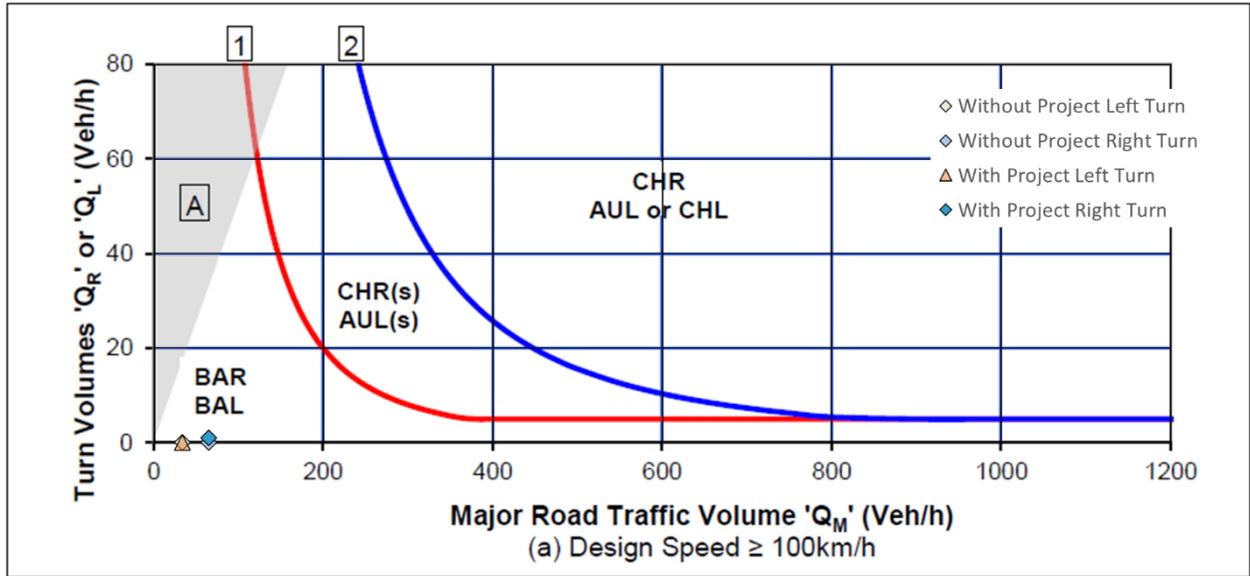
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-7 Golden Hwy / Leadville Cluster Access Road (Leadville Cluster) - AM peak with regional workforce distribution



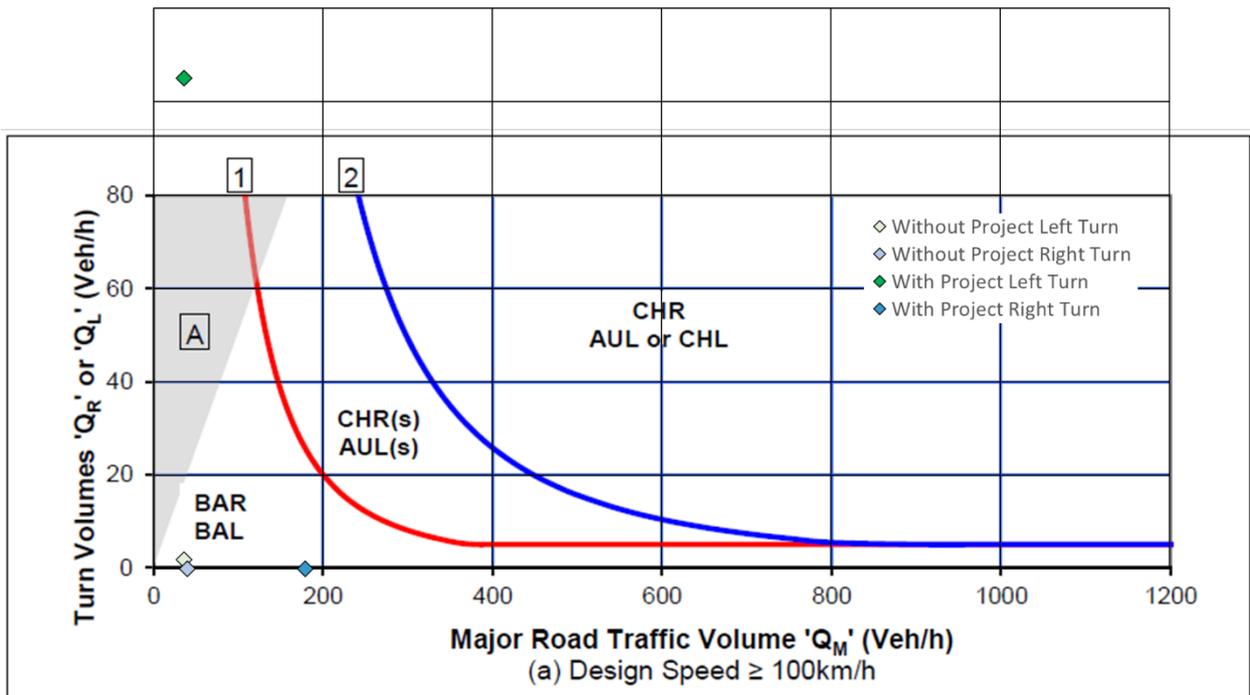
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5–8 Golden Hwy / Leadville Cluster Access Road (Leadville Cluster) - PM peak with regional workforce distribution



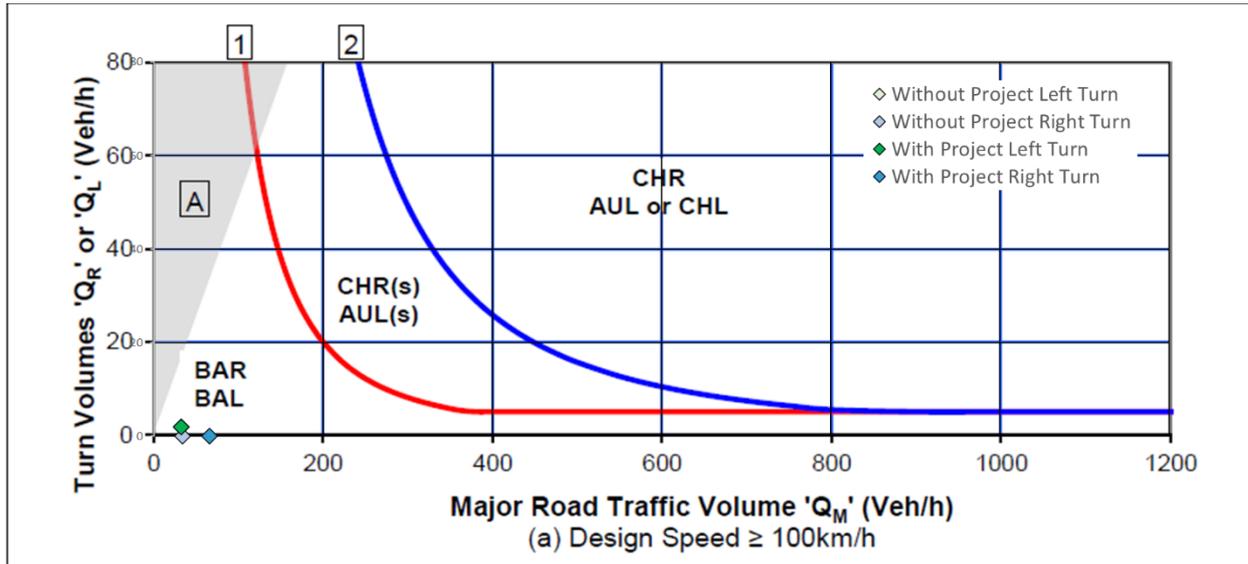
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5–9 Black Stump Way / The Leadville Stock Route - AM peak with regional workforce distribution



Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-10 Black Stump Way / The Leadville Stock Route - PM peak with regional workforce distribution



Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

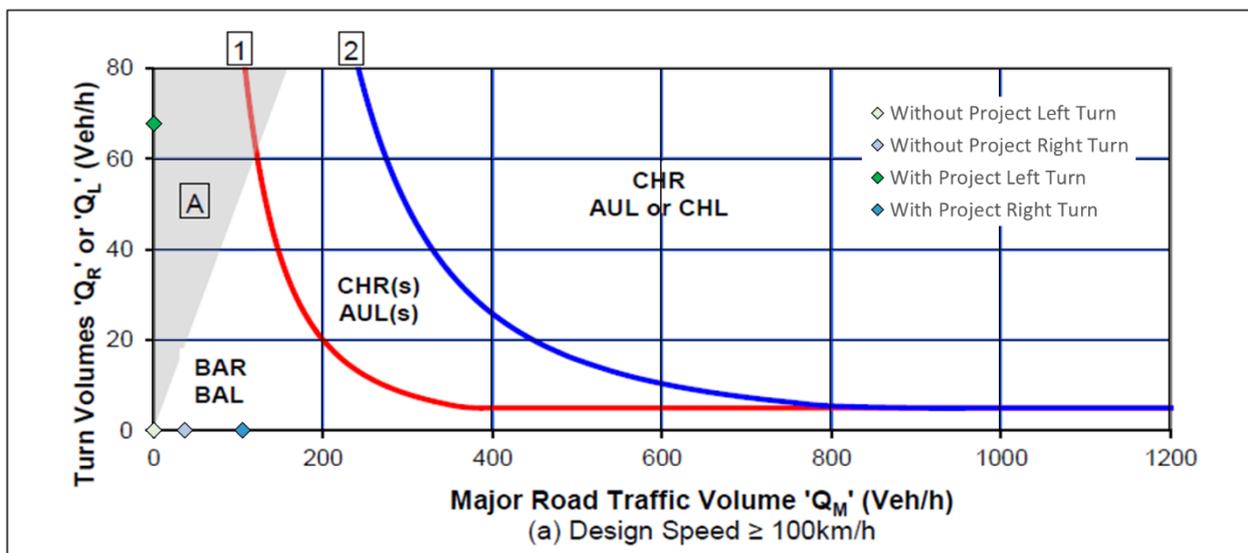
### 5.3.2 Centralised workforce accommodation

The following two key intersections currently operate as basic intersection arrangements with design speeds of 100km/h or more, and as such were assessed against the Austroads warrant design charts to assess the warrant for any additional intersection treatments:

- Black Stump Way / Mount Hope Cluster Access Road (during construction of the Mount Hope cluster)
- Black Stump Way / The Leadville Stock Route (during the construction of the Leadville cluster)

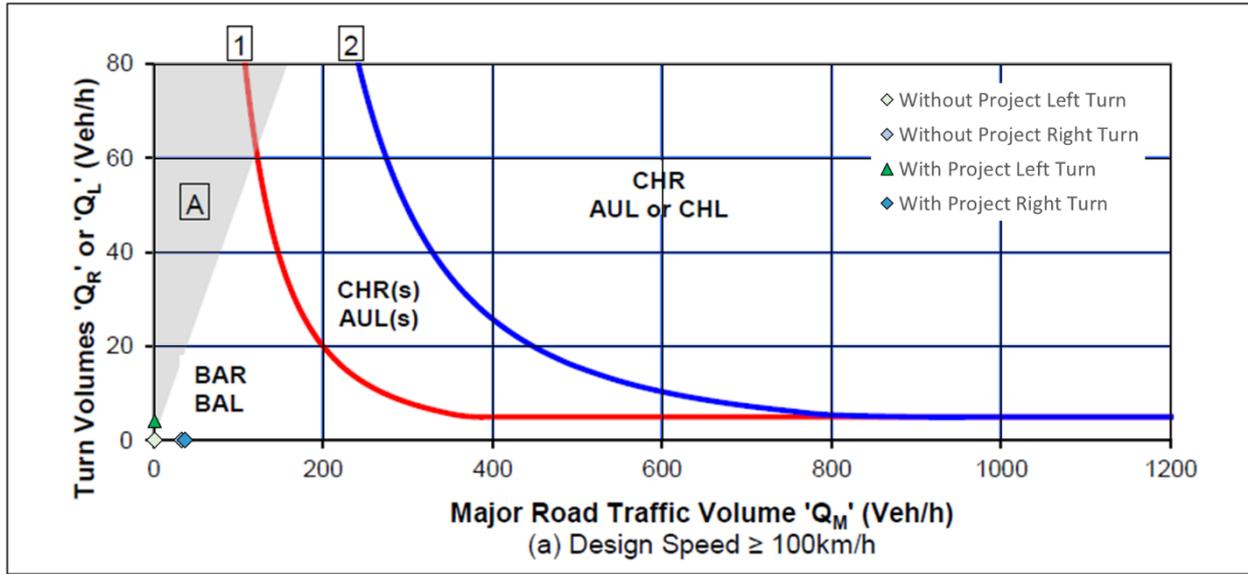
As Black Stump Way / Moorefield Road intersection already has a left-turn auxiliary lane, it has not been reassessed here. **Figure 5-11 to Figure 5-14** shows a comparison of the 'future year (2023) base without project and the 'future year (2023) with project' scenarios for the centralised workforce accommodation. The figures show that the forecast turn movements fall within the limits of the basic intersection arrangement. As such, the project does not warrant any additional left or right turn turning lanes in either of the AM or PM peak flow periods during the construction period.

Figure 5-11 Black Stump Way / Mount Hope Cluster Access Road - AM peak with centralised workforce



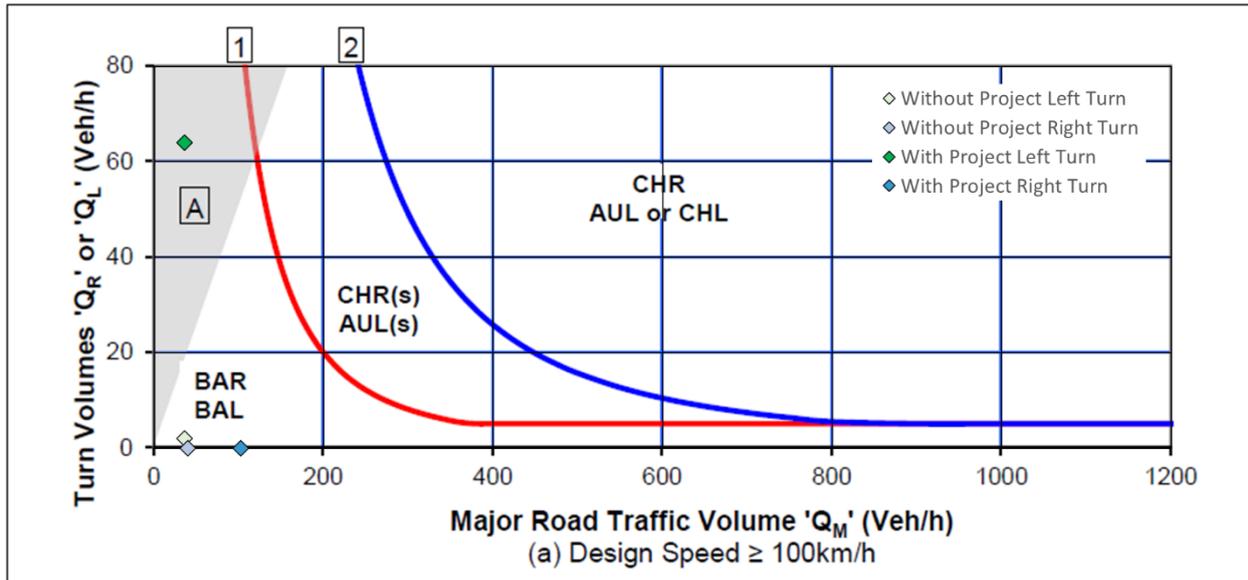
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-12 Black Stump Way / Mount Hope Cluster Access Road - PM peak with centralised workforce



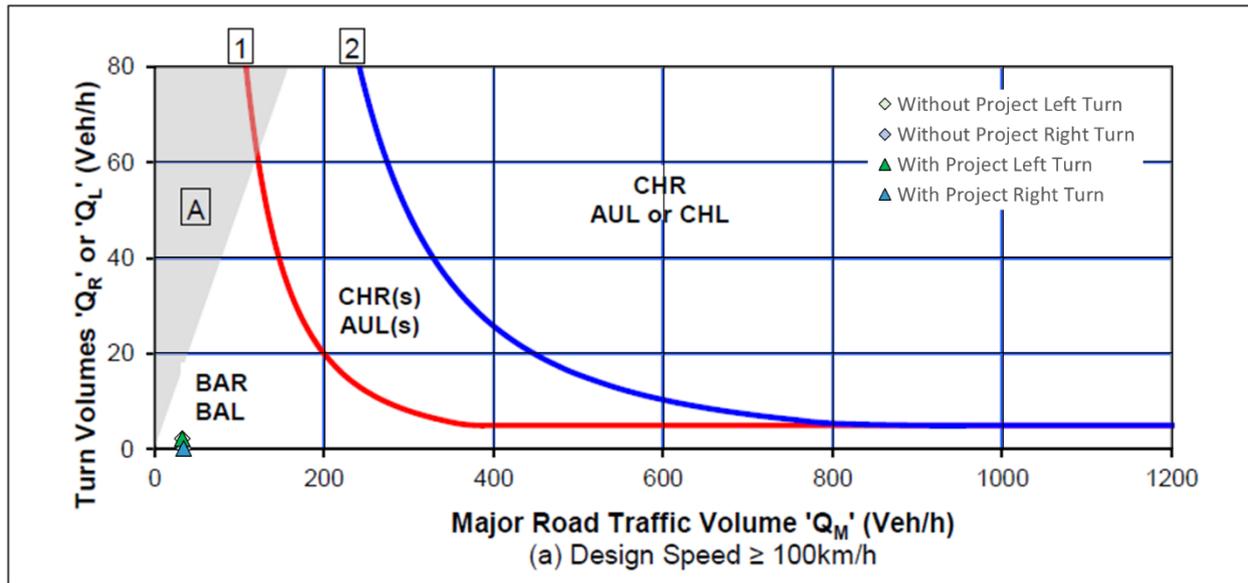
Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-13 Black Stump Way / The Leadville Stock Route - AM peak with centralised workforce



Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

Figure 5-14 Black Stump Way / The Leadville Stock Route - PM peak with centralised workforce



Source: SCT Consulting based on Austroads Guide to Traffic Management Part 6, 2021

## 5.4 Safe intersection sight distance

A review of the safe intersection sight distance (SISD) at the proposed new access roads on Black Stump Way and the Golden Highway was undertaken.

### 5.4.1.1 Black Stump Way / Mount Hope Cluster Access Road

Assuming the 85<sup>th</sup> percentile speeds are as per the posted speed limit of 100km/h on Black Stump Way, the intersection of Black Stump Way / Mount Hope Access Road would require SISD of 289m for vehicles exiting from the Mount Hope Cluster Access Road. The location of the new intersection would satisfy this requirement with sight distances of over 500m for both the southbound and westbound traffic.

### 5.4.1.2 Golden Highway / Leadville Cluster Access Road

Assuming the 85<sup>th</sup> percentile speeds are as per the posted speed limit of 100km/h on the Golden Highway, the intersection of Golden Highway / Leadville Access Road would also require SISD of 289m for vehicles exiting from the Leadville Access Road. The location of the new intersection would satisfy this requirement with sight distances of over 300m for both the eastbound and westbound traffic.

## 5.5 Over-Size Over-Mass impacts

Transportation of project infrastructure, such as wind turbines, would require over-size over-mass (OSOM) vehicles exceeding the regulatory limits of standard vehicle dimension of 19m length, 2.5m width, 4.3m height or in excess of 42.5 tonnes. Movement of such OSOM vehicles would require a permit to access the public roads with escort vehicles as part of a convoy. In obtaining the permit, a Transport Management Plan detailing the route, duration, road closures, traffic detours, notification as well as any Traffic Control Plans would need to be prepared.

As noted in **section 3.1**, the route from the Port of Newcastle to the site access points from the Golden Highway is an approved B-double route. However, temporary road closures and traffic diversions may be required to facilitate the turning movements of the OSOM vehicles, depending on the length and width. Two key locations where traffic management measures may be needed for the OSOM vehicles are indicated in **Figure 5-15** and are:

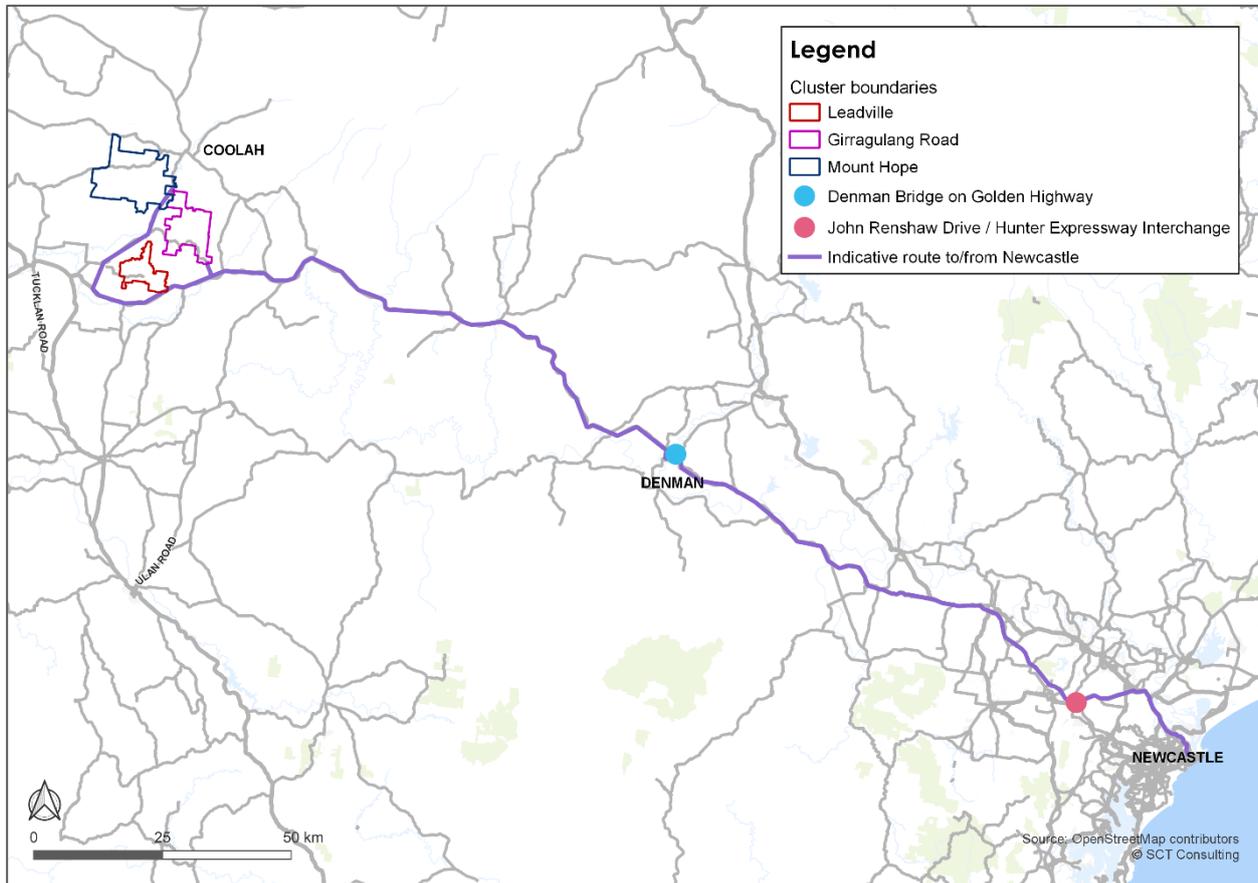
- **New England Highway and Hunter Expressway interchange**

Outbound OSOM movements from the Port of Newcastle to the site may not be able to negotiate the reverse bends at the roundabout interchange at the New England Highway and Hunter Expressway due to the curvature of the bends. As such, short-term temporary road closure of the Hunter Expressway may be necessary to allow OSOM movements to enter the Hunter Expressway via the eastbound off-ramp and cross-over to the westbound lanes of the expressway via the median crossing.

– **Denman Bridge, Golden Highway, Denman**

Vertical and horizontal limitations of the Denman Bridge truss structure, located at Denman Hunter River, could be too short and narrow to facilitate the OSOM movements. As such, alternate routes for the OSOM movements may need to be investigated to use the New England Highway via Scone.

Figure 5-15 Two key locations where traffic management measures may be needed



Detailed OSOM routes and management would be prepared as part of the CTMP. As requested by Transport for NSW, a high-level Transport Route Assessment has been undertaken for access to the cluster sites from the Golden Highway and is presented in **Appendix A**.

The drawings in **Appendix A** indicate the extent of work required at intersections along the access routes, such as widening the road footprint, vegetation clearing, signage relocation, etc. to allow OSOM vehicles to access the work sites. The location and extent of these intersection and road upgrades are summarised in **Section 6.0**.

A summary of other key findings from the high-level Transport Route Assessment were:

– **Mount Hope cluster**

- Narrow and low vegetation was identified along the Black Stump Way between Golden Highway and Coolah. Some vegetation clearing would be required along Black Stump Way to provide a clear path of travel.
- Culvert and bridge crossings were identified along the Black Stump Way, such as Hannahs Bridge and Hobbins Gully Crossing. Once the Heavy Load Platform (HLP) configuration required to suit the OSOM deliveries to site is known, a further structural assessment of all bridge and culvert crossing points would be undertaken in collaboration with Warrumbungle Shire Council asset maintenance team.
- Wind turbine blade delivery is not considered feasible via Queensborough Street and Neilrex Road due to constraints at the Binnia Street / Queensborough Street intersection and Neilrex Road ascent, with an alternative access off Black Stump Way recommended.

#### – **Leadville cluster**

- Wind turbine blade delivery is not preferred via Sir Ivan Dougherty Drive and Wardens Road due to constraints at the Sir Ivan Dougherty Drive / Wardens Road intersection, with an alternative access off the Golden Highway recommended.

#### – **Girragulang Road cluster**

- Upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles, along with associated works, along Short Street, Turee Street, Main Street, Wyaldra Street and Moorefield Road would be required. This would include paving the sections of Short Street and Turee Street in response to feedback from the local community.

In general, it is recommended that further structural investigation and design be undertaken in collaboration with Warrumbungle Shire Council once the final route has been selected and the vehicle loads are confirmed.

It is also noted that, in agreement with Transport for NSW, the OSOM route analysis undertaken for this EIS is based on high-level 3D swept path analysis to generally indicate locations where civil works are likely to be required. An engineered detailed design of the OSOM access, based on full 3D swept path analysis, is to be referred to Transport for NSW for concurrence under Section 138 of the *Roads Act 1993* prior to commencement of construction.

## **5.6 Transmission line installation**

The wind farm would connect to the Central-West Orana REZ transmission line, with transmission lines proposed south of the Golden Highway. As such, short-term road occupation of the Golden Highway may be required for the connection. The road occupation may require short term road closures with temporary traffic controls or traffic detours.

Upon further understanding of the occurrence and timings of such requirements, the traffic management measures, as well as the consultation process with relevant stakeholders, especially emergency services operators, would be detailed as part of the CTMP and discussed with TfNSW prior to construction.

## **5.7 Parking impacts**

All project-associated parking is proposed to be accommodated within the project worksites. As there are no formal parking provisions in the vicinity of the wind farm site, due to the rural nature of the area, it is unlikely that there would be any increased demands for on-street parking adjacent to the worksites.

Increased parking demands at or adjacent to the staff accommodation sites under the regional distribution of worker accommodation scenario, would need to be assessed within the CTMP when the accommodation locations are confirmed. However, it is anticipated that the accommodation locations would include off-street parking and as such would generally not impact on the on-street parking supply of the associated localities.

## **5.8 Public transport / school transport impacts**

The low volume of project-generated traffic is not forecast to impact the existing coach and school bus services or routes, especially given that the peak construction vehicle movements would occur before 7am and after 6pm, and thus not coincide with school bus service times.

## **5.9 Rail crossing impacts**

No impact on rail corridor and level crossings is anticipated.

## **5.10 Pedestrian and cycle impacts**

There are no pedestrian or cycle demands or provisions adjacent to the wind farm, and so it is unlikely the project activities would result in pedestrian and cycle impacts. While increased traffic movements are forecast within the accommodation locations under the regional distribution of worker accommodation scenario, where there are likely to be pedestrian and cycle demands, the construction workforce trips are scheduled to occur before 7am and after 6pm. These periods are typically outside the normal peak period for walking and cycling activities and so minimal pedestrian or cycle impact is forecast.

## 5.11 Road safety

The volume of traffic generated by construction is expected to be low compared to existing traffic on the Golden Highway. The effect of the short-term increase is not expected to substantially impact road safety in and around the study area, although there is still a risk with construction traffic interacting with general traffic, with elevated risk when construction-related vehicles are entering and leaving construction sites.

Impacts on road safety for all users during construction would be mitigated through the provision of a CTMP, which would be developed in consultation with TfNSW and Council and would include the development of construction staging and temporary works plan that minimises conflicts with the existing road network with clear advance identifiers of construction activities and vehicles to warn motorists on approach to the worksite access points. Further management measures would be incorporated in the CTMP.

## 5.12 Cumulative traffic impacts

A cumulative impact review was conducted with adjacent approved developments using common traffic routes, including the Liverpool Range Wind Farm, Ungula Wind Farm, Wollar Solar Farm, Stubbo Solar Farm and Dunedoo Solar Farm. The status of each project, and the common traffic routes with construction vehicle movements, are indicated in **Table 5-9**.

The greatest combined volume of these projects occurs along the Golden Highway with 623 vehicles per day, east of Cassilis. West of Cassilis, the combined traffic volume is 279 vehicles per day. The traffic volumes associated with the Valley of the Winds project, east of Cassilis, would mainly be heavy vehicle movements, with about 70 vehicle trips forecast, which equates to a cumulative traffic increase of 693 vehicles per day along the Golden Highway.

The existing daily traffic volume along the Golden Highway is 2,185 vehicles per day (**Table 3-2**), and so the resultant cumulative traffic volume along the Golden Highway would be about 2,900 daily vehicles, which still satisfies the Austroads roadway design standards for a rural highway (see **section 3.1.5**).

As noted in Section 3.1.2, traffic volumes along the Golden Highway have seen a sharp increase in recent years, which is likely due to construction activities at similar wind and solar farm projects, as well as mining activities, in the region. This traffic and transport impact assessment has assumed a conservative annual growth rate of 3.0 per cent per annum for background traffic on the Golden Highway and Black Stump Way, which has therefore also taken planned and proposed projects within the region into account.

**Table 5-9 Projects considered in the cumulative assessment**

Project	Status	Common access route and construction vehicle movements
Liverpool Range Wind Farm <sup>4</sup>	Development approval was granted in March 2018	The Traffic and Transport Report for the project identifies the following common access route: <ul style="list-style-type: none"> <li>Newcastle Port to Cassilis via New England Highway and Golden Highway with peak daily traffic generation of 344 construction vehicle movements.</li> </ul>
Ungula Wind Farm <sup>5</sup>	Development approval was granted in May 2021	Although the transport assessment of the project does not address traffic volumes along Golden Highway, it is assumed that the traffic flows along Saxa Road stems from Golden Highway. As such, the following common access route is assumed: <ul style="list-style-type: none"> <li>Saxa Road via New England Highway and Golden Highway with peak daily traffic generation of 46 construction vehicle movements.</li> </ul>
Wollar Solar Farm <sup>6</sup>	Development approval was granted in February 2020	The Wollar Solar Farm Traffic Impact Assessment identified the following common access route: <ul style="list-style-type: none"> <li>Ulan Road via New England Highway and Golden Highway with peak daily traffic generation of 9 construction vehicle movements.</li> </ul>

<sup>4</sup> Epuron (2017) Traffic and Transport Report

<sup>5</sup> Samsa Consulting (2020), Ungula Wind Farm Project Transport Assessment

<sup>6</sup> Ontoit (2018), Wollar Solar Farm Traffic Impact Assessment

Project	Status	Common access route and construction vehicle movements
Stubbo Solar Farm <sup>7</sup>	Development approval was granted in June 2021	The Stubbo Solar Farm Traffic and Transport Report identified the following common access route: <ul style="list-style-type: none"> <li>• Ulan Road via New England Highway and Golden Highway and with peak heavy vehicle generation of 120 vehicle movements.</li> </ul>
Dunedoo Solar Farm <sup>8</sup>	Development approval was granted in September 2021	The proposed Dunedoo Solar Farm Traffic Assessment identifies the following common access route: <ul style="list-style-type: none"> <li>• Golden Highway with peak daily traffic generation of 104 construction vehicle movements.</li> </ul>

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<sup>7</sup> SCT Consulting (2020), Stubbo Solar Farm Traffic and Transport Report

<sup>8</sup> Stantec (2020), Dunedoo Solar Farm Traffic Assessment

## 6.0 Mitigation measures and proposed upgrades

Based on the assessment undertaken, mitigation measures considered to be required are summarised in **Table 6-1**. A schedule of proposed road upgrades and intersection treatments is provided in **Table 6-2** and illustrated in **Figure 6-1 to Figure 6-3**. The numbers on the maps reference the item numbers in **Table 6-2**.

The proposed upgrades and intersection treatments will be developed in agreement with the relevant road authority as indicated in **Table 6-2**.

**Table 6-1 Traffic and transport mitigation measures**

Management/mitigation measure	Timing
<p>A construction traffic management plan (CTMP) will be prepared in consultation with TfNSW and Warrumbungle Shire Council. The plan will include:</p> <ul style="list-style-type: none"> <li>• Details of the transport routes to be used for all project-related traffic, responding appropriately to either a regional distribution of construction worker accommodation scenario or a centralised worker accommodation scenario.</li> <li>• Details of any road upgrade works required by the Development Consent</li> <li>• Requirements for a Road Occupancy Licence (ROL) or other specific measures for the stringing of transmission lines across the Golden Highway. This would be discussed with TfNSW.</li> <li>• A protocol for undertaking independent dilapidation surveys to assess the existing condition of the proposed construction routes prior to and post-construction, and post-decommissioning</li> <li>• A protocol for the repair of the construction routes if dilapidation surveys identify these roads to be damaged during construction, operation or decommissioning works</li> <li>• Details of the measures that will be implemented to minimise traffic impacts during construction, operation and decommissioning works, including:                         <ul style="list-style-type: none"> <li>○ Traffic Control Plans, including detours and signage</li> <li>○ Notifying the local community about project-related traffic impacts</li> <li>○ Procedures for receiving and addressing complaints from the community about project-related traffic</li> <li>○ Minimising potential for conflict with coach and school bus services, other road users during peak hours as far as practicable (measures also required during operation of the project) including consultation with service providers</li> <li>○ Minimising dirt tracked onto the public road network from project-related traffic</li> <li>○ Scheduling of haulage vehicle movements to minimise convoy length or platoons</li> <li>○ Responding to local climate conditions that may affect road safety, such as fog, dust and wet weather</li> <li>○ Responding to any emergency repair or maintenance requirements</li> <li>○ A traffic management system for managing OSOM movements</li> </ul> </li> <li>• A program to ensure drivers associated with the project receive suitable training on the Driver Code of Conduct and any other relevant obligations under the CTMP</li> <li>• A flood response plan detailing procedures and options for safe access to and from the site in the event of flooding</li> <li>• Controls for transport and use of dangerous goods in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development, Australian Dangerous Goods Code and Australian Standard 4452 Storage and Handling of Toxic Substances.</li> </ul>	<p>Prior to construction commencing</p>
<p>An engineered detailed design based on full 3D swept path analysis for the OSOM access intersections and proposed road upgrades will be developed in consultation with the relevant road authority. The design will be developed to the standard and satisfaction of Warrumbungle Shire Council and referred to TfNSW under Section 138 of the <i>Roads Act 1993</i> as appropriate.</p>	<p>Prior to construction commencing</p>
<p>Parking requirements for the project construction and operation workforce will be provided onsite and parking will not be provided on public roads adjacent to the worksites.</p>	<p>Prior to construction commencing</p>

Table 6-2 Schedule of proposed road upgrades

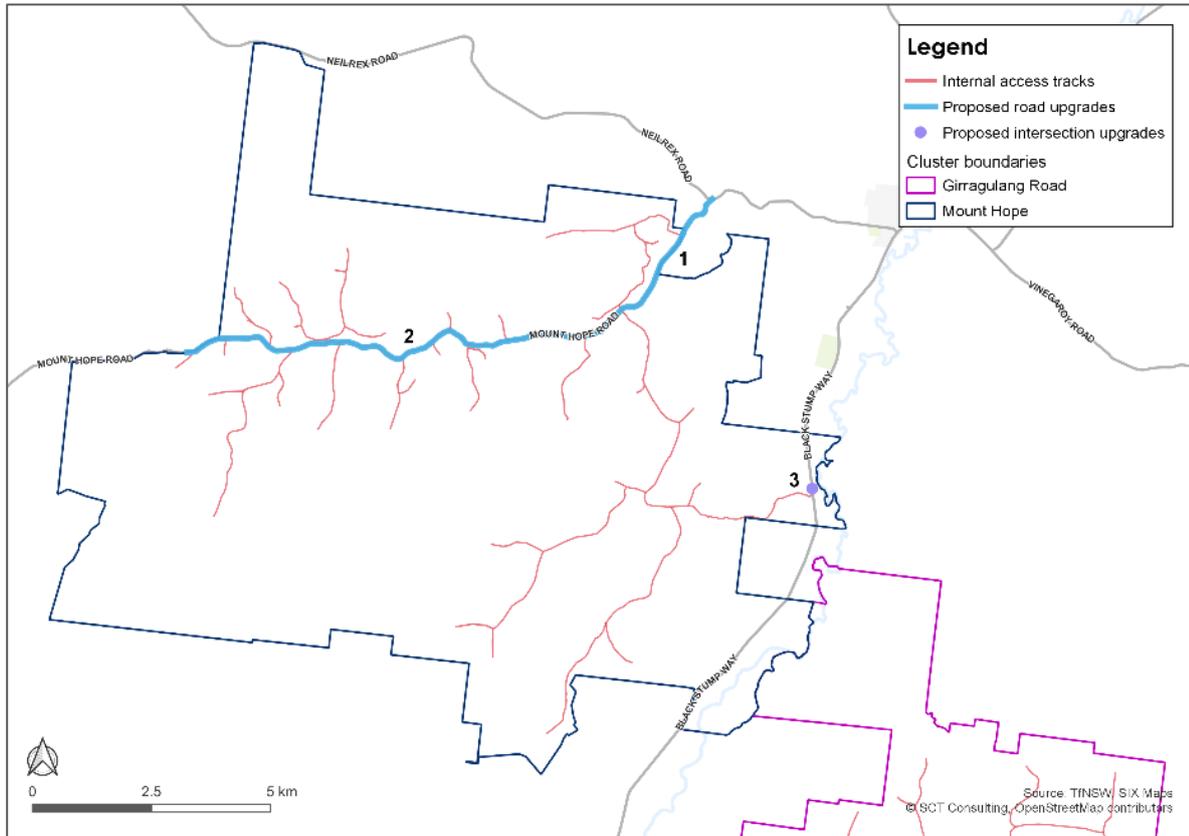
Item No.	Intersection / Road	Proposed upgrade	Approx. length (km)	Timing
<b>Road authority: Warrumbungle Shire Council</b>				
1	Mount Hope Road	From Neilrex Road intersection to Mount Hope cluster boundary, upgrade to the standard and satisfaction of Council for general construction traffic. <i>This upgrade would not be required under the centralised worker accommodation scenario.</i>	1.0	Prior to commencing construction of the Mount Hope cluster
2	Mount Hope Road	Within the Mount Hope cluster boundary, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles.	12.0	Prior to commencing construction of the Mount Hope cluster
3	Black Stump Way / Mount Hope Access Road intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.1.4 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Mount Hope cluster
4	Short Street	From the Golden Highway to Church Street, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles. UPC\AC is committed to paving this section of road in response to feedback from the local community.	0.3	Prior to commencing construction of the Girragulung Road cluster
5	Turee Street	From Short Street to Main Street, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles. UPC\AC is committed to paving this section of road in response to feedback from the local community.	0.3	Prior to commencing construction of the Girragulung Road cluster
6	Main Street	From Turee Street to Wyaldra Street, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles.	0.1	Prior to commencing construction of the Girragulung Road cluster
7	Wyaldra Street	From Main Street to Moorefield Road, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles.	0.3	Prior to commencing construction of the Girragulung Road cluster
8	Moorefield Road (east)	From Wyaldra Street to Girragulung Road cluster boundary, upgrade to the standard and satisfaction of Council for general construction traffic and OSOM vehicles.	2.2	Prior to commencing construction of the Girragulung Road cluster
9	Turee Street / Main Street intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.3.2 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Girragulung Road cluster
10	Wyaldra Street / Moorefield Road intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.3.3 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Girragulung Road cluster

Item No.	Intersection / Road	Proposed upgrade	Approx. length (km)	Timing
11	Moorefield Road (west)	From Black Stump Way to Girragulang Road cluster boundary, upgrade to the standard and satisfaction of Council for general construction traffic.	4.6	Prior to commencing construction of the Girragulang Road cluster
12	The Leadville Stock Route	From Black Stump Way to Wardens Road, upgrade to the standard and satisfaction of Council for general construction traffic.	0.9	Prior to commencing construction of the Leadville cluster
13	Wardens Road	From The Leadville Stock Route to access track to Leadville cluster, upgrade to the standard and satisfaction of Council for general construction traffic.	0.9	Prior to commencing construction of the Leadville cluster
14	Wardens Road	From end of item 13 to access tracks to Leadville cluster, upgrade to the standard and satisfaction of Council for general construction traffic.	5.4	Prior to commencing construction of the Leadville cluster
<b>Road authority: Transport for NSW</b>				
15	Golden Highway / Black Stump Way intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.0.1 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Mount Hope cluster
16	Golden Highway / Leadville Access Road intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.2.3 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Leadville cluster
17	Golden Highway / Short Street intersection	Extent of required works to allow access for OSOM vehicles indicated on Drawing 4.3.1 in <b>Appendix A</b> .	N/A	Prior to commencing construction of the Girragulang Road cluster

Should the Golden Highway / Leadville Access Road intersection (16) not be able to proceed, an alternative access for OSOM vehicles to the Leadville cluster would be provided via Sir Ivan Dougherty Drive, Wardens Road, and a new private access road (indicated on **Figure 6-3**).

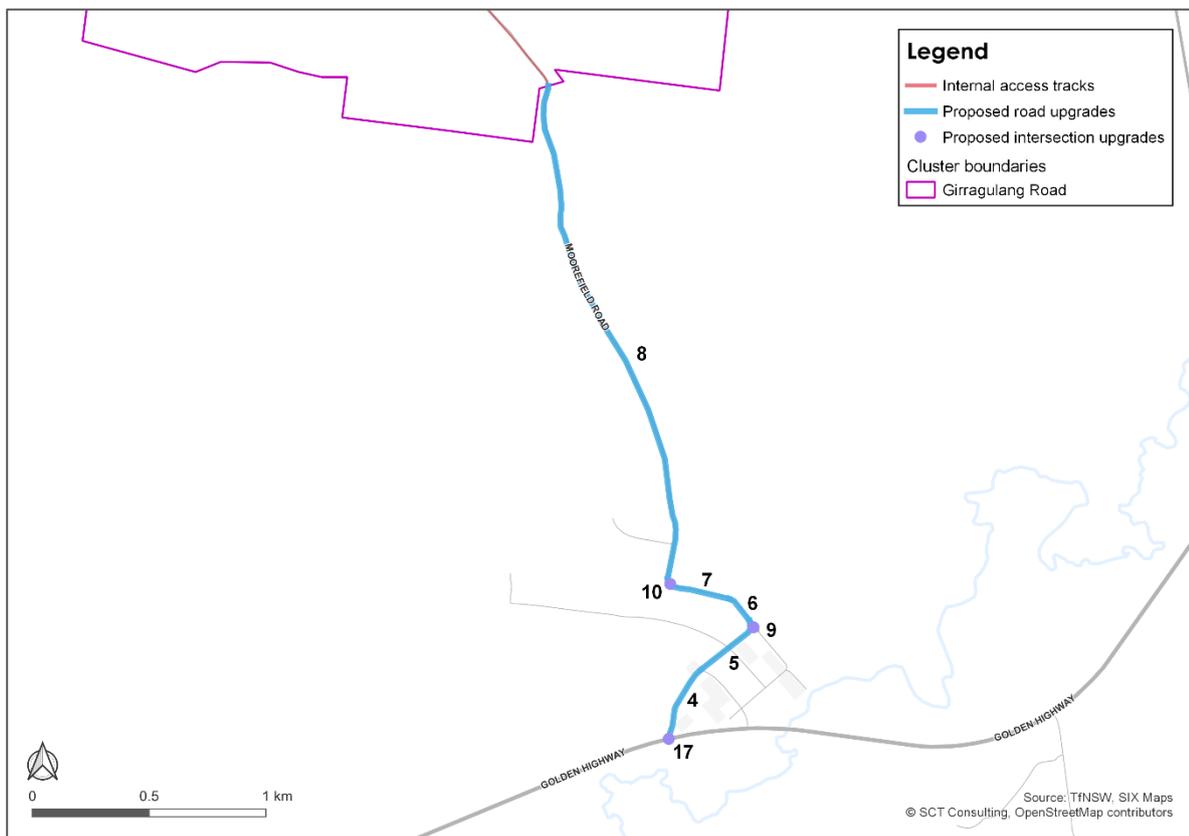
In this case, road upgrade no. 14 to Wardens Road would not be required, as general construction vehicles would use the new private access track rather than the section of Wardens Road past road upgrade no. 13, and road upgrades along Sir Ivan Dougherty Drive and intersection upgrades at the Golden Highway / Sir Ivan Dougherty Drive and Sir Ivan Dougherty Drive / Wardens Road intersections would be required. The extent of these required intersection works to allow access for OSOM vehicles are indicated on Drawings 4.2.1 and 4.2.2 in **Appendix A**.

Figure 6–1 Map 1 of proposed road upgrades



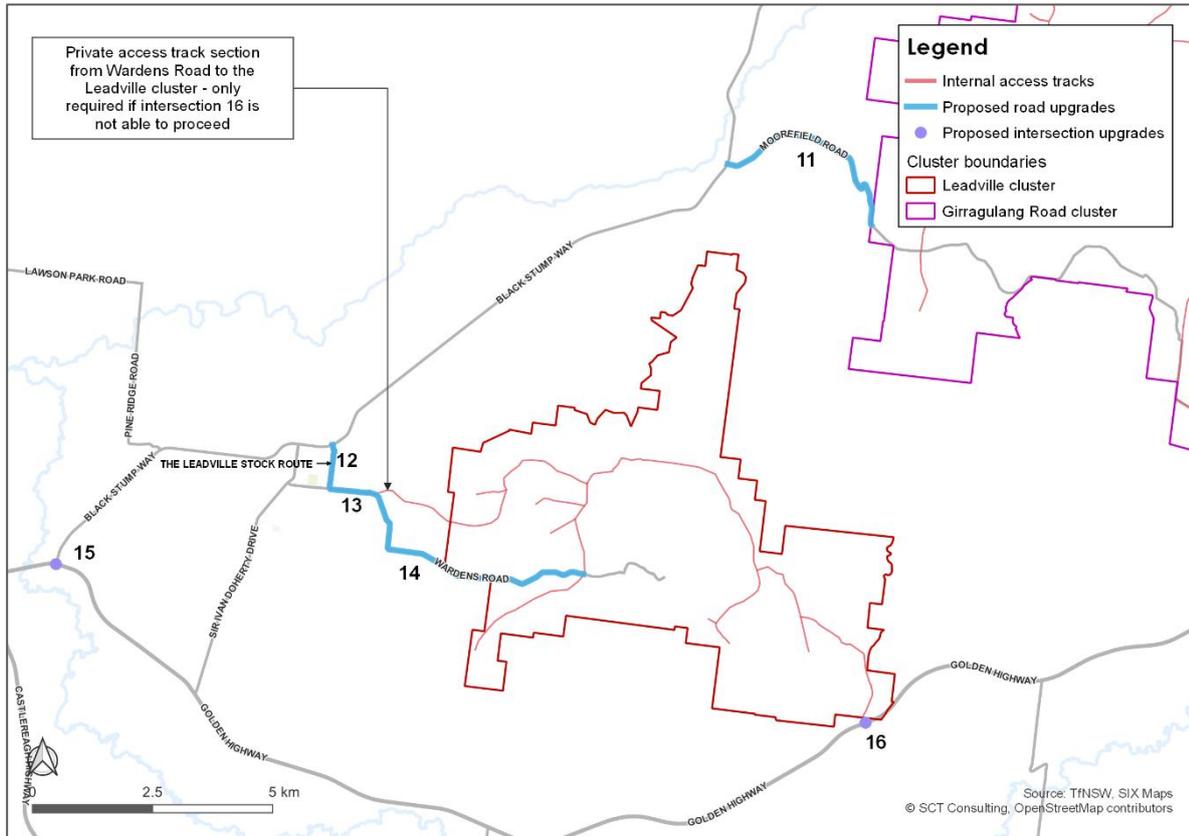
Note: Numbers reference the schedule of proposed road upgrades

Figure 6–2 Map 2 of proposed road upgrades



Note: Numbers reference the schedule of proposed road upgrades

Figure 6–3 Map 3 of proposed road upgrades



Note: Numbers reference the schedule of proposed road upgrades

## 7.0 Summary and conclusions

The key findings of the traffic and transport assessment for the project are:

- The project would generate the greatest traffic and transport impact during the construction peak period for the Mount Hope cluster, as it has the most turbines. Depending on the construction workforce accommodation arrangement, the following traffic is forecast to be generated:
  - Under a regional distribution of construction workforce accommodation scenario, eight heavy vehicle trips and 253 light vehicle trips are forecast to be generated during the peak hours, i.e. four heavy vehicles entering and four heavy vehicles leaving the study area in each peak hour, and 253 light vehicles accessing the worksite in the AM peak hour and 253 light vehicles leaving in the PM peak hour. This is considered a worst-case scenario in terms of traffic generation during the construction period.
  - Under a centralised construction workforce accommodation scenario, eight heavy vehicle trips and 64 light vehicle trips are forecast to be generated during the peak hours, i.e. four heavy vehicles entering and four heavy vehicles leaving the study area in each peak hour, and 64 light vehicles accessing the worksite in the AM peak hour and 64 light vehicles leaving in the PM peak hour. The reduction in light vehicles under this construction scenario is due to a much higher use of shuttle buses from the worker camp to the construction sites.
- Given the low volume of background traffic in the vicinity of the study area, these additional construction trips are forecast to have minimal impact on the surrounding road network operational performance.
- The assessment of forecast peak construction traffic volumes indicate upgrades would be needed along the access roads to the three clusters and to some intersections to allow OSOM deliveries, as described in **Table 6-2**, prior to construction commencing. No other intersection upgrades are expected.
- Parking for staff would be provided onsite for all phases of the project.
- The project is anticipated to have minimal public transport, rail crossing and pedestrian and cycle impacts. Construction workforce trips would typically occur outside of school travel times and are not expected to interfere with school bus services.
- The cumulative traffic impact from other planned and proposed developments in the area was considered as part of the forecast traffic growth considered in this assessment and has therefore also accounted for the planned and proposed projects within the region. Cumulative traffic and transport impacts associated with this project are not expected.
- Once in operation, the project is forecast to generate about 50 vehicles to / from the project in each peak period, which is also forecast to have minimal impact on the road network.

Prior to the commencement of construction of the project:

- A construction traffic management plan (CTMP) would be prepared in consultation with TfNSW and Warrumbungle Shire Council, which would seek to minimise any delays, disruptions, and safety risks and would include details such as temporary traffic management plans, driver's code of conduct, dilapidation survey and controls for transport and use of dangerous goods, etc.
- An engineered detailed design based on full 3D swept path analysis for the OSOM access intersections and proposed road upgrades will be developed in consultation with the relevant road authority. The design will be developed to the standard and satisfaction of Warrumbungle Shire Council and referred to TfNSW under Section 138 of the *Roads Act 1993* as appropriate.

APPENDIX A

# Transport Route Assessment



# Transport Route Assessment

*for*

## Valley of the Winds

*for* SCT Consulting



CIVIL

## Report Document Control

**Project:** Valley of the Winds  
**Project Ref:** NL210841-00  
**Document Ref:** E01  
**File Name:** NL210841\_E01.CP  
**Client:** SCT Consulting  
**Title:** Transport Route Assessment

### Revision History:

Revision	Report Status	Issue Date	Prepared	Reviewed	Admin
A	DRAFT	8/08/21	CP	JK	BBC
B	DRAFT	9/08/21	CP	JK	BBC
C	DRAFT	20/09/21	CP	JK	BBC
D	FINAL	27/09/21	JK	CP	BBC
E	FINAL	25/02/22	JK	CP	BBC
F	FINAL	22/04/22	JK	CP	BBC

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Dip Civil Construction Design

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# 1. Purpose and Scope

## 1.1. Background

UPC Renewables Australia Pty Ltd, operating as UPC\AC Renewables Australia (UPC\AC) (the Proponent), proposes to construct and operate the Valley of the Winds wind farm (the project). The project would supply approximately 800 megawatts (MW) of electricity into the National Electricity Market (NEM) and is spread across three cluster sites near the townships of Coolah, Leadville and Uarby in New South Wales. Northrop has been engaged to undertake a concept level route analysis of the local public road network from the Golden Highway to the cluster site entrances.

## 1.2. Purpose

The purpose of this report is to respond in part to the pre lodgement comments provided by Transport for NSW (TfNSW) in their letter dated 1 June 2020. This report is intended to supplement the overarching Traffic Impact Assessment (TIA) prepared by SCT.

In their comments, TfNSW requested a concept level route analysis be prepared for the project based on high level 3D swept path analysis to generally indicate locations where civil works are likely to be required. The letter notes that further full engineered detailed design based on 3D swept path analysis is to be undertaken prior to construction. Any construction activities with TfNSW or Council road reserves would require approval under a Works Authority Deed (WAD) or application under Section 138 of the Roads Act.

In addition, the letter requests that the assessment highlights any at-risk road structures that the haulage routes cross including bridges, major culverts and minor culverts.

It is noted that Northrop's scope of analysis is limited to the turnoff from Golden Highway for each site access. It is understood that the route from the Port of Newcastle to Dubbo along the Golden Highway has been analysed and consequently proven as accessible during construction of other similar projects in the area.

## 1.3. Scope

Northrop were engaged to complete the following scope:

- A concept-level route analysis based on high-level 3D swept path analysis to generally indicate locations where civil works are likely to be required.
- Highlight each at-risk road structure that the haulage route crosses including bridges, major culverts, and minor culverts that may not meet the desirable cover to cater for proposed axle loads
- Strategic intersection design for access intersections to cater for the likely traffic in accordance with current standards (including the Austroads Guide to Road Design).
- Complete the assessment from the turnoff from Golden Highway to each of the three sites only.

## 1.4. Limitations

It is noted that no survey data was provided for the assessment and instead existing intersection and road geometry was determined by aerial imagery obtained from Nearmap and Google Maps data. Cadastre boundaries were obtained from Elevation and Depth – Foundation Spatial Data (ELVIS) which is provided by The Intergovernmental Committee on Surveying and Mapping (ICSM). In most locations the aerial imagery did not align with the cadastre boundaries. Site measurements were undertaken to confirm critical obstacles however the assessment is ultimately indicative only. Further assessment, in line with TfNSW multi-stage approach based on verified survey data must be undertaken prior to any application for construction.

## 2. Site Visit

In June and July 2021, representatives of Northrop conducted site visits to the area. Selected routes were driven and assessed from locations accessible by car. No private property was accessed during the site visit.

### 3. Design Vehicles

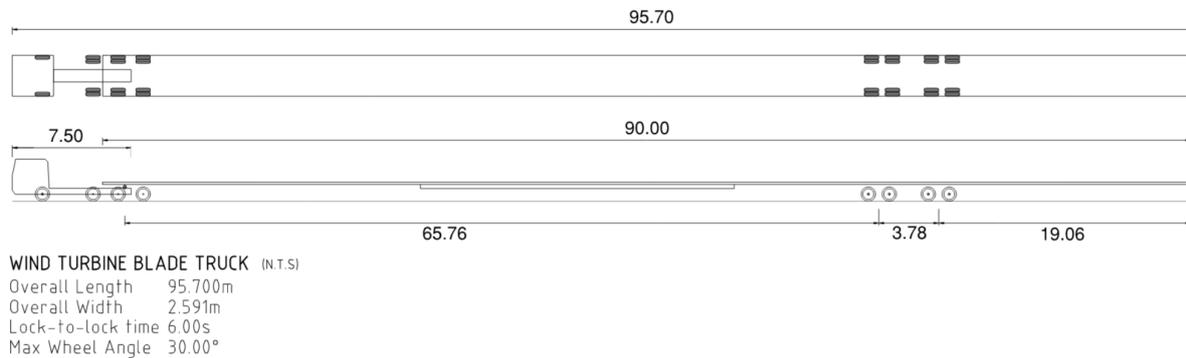
Delivery of the plant and equipment will require over-size over-mass (OSOM) loads such as the wind turbine blades, tower and transformer components. The final details of the wind turbines to be adopted for the Valley of the Winds is not known at this time. As with all other wind turbine developments, specialised transport equipment will be used for the delivery of the OSOM loads however the details of this won't be known until a delivery contractor is engaged.

It is understood that similar projects in the area have installed wind turbines with blades in the order of 60 – 80m long. Examples include Liverpool Range Wind Farm which assessed 65m blades, Ungula Wind Farm which assessed 83.5m blades. The blades will be the largest component by size and blades of this size typically have a mass of more than 20 tonnes including transport frame, depending on the model selected.

With the intent providing flexibility in the development, the design vehicle used in this assessment assumes a maximum blade length of 90m giving an overall length of delivery vehicle of 95.70m.

The heaviest component loads for the project would be either the nacelle, which could be more than 120 tonnes, or the substation main transformer, which would likely be of a similar mass.

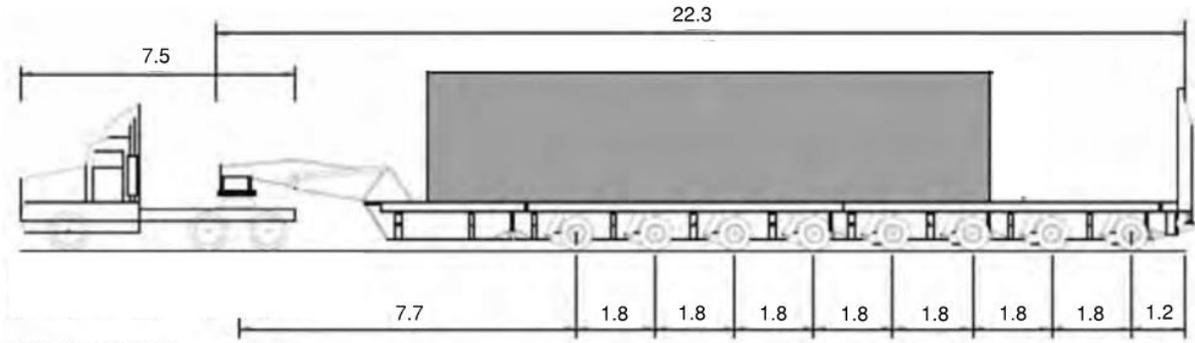
Typically, the intersection geometry will be controlled by the blade delivery vehicles. As depicted in Figure 3.1, a traditional delivery method will comprise a Prime Mover, Dolly and Steerable Jinker. This design vehicle configuration has been used to evaluate the intersection requirements as shown in Appendix A.



**Figure 3.1 – Typical blade transport vehicle**

As noted in the TfNSW letter, there are alternate special-purpose Hydraulic Lifting Trucks that could reduce the impacted area however for the purpose of this assessment, a traditional vehicle as depicted in Figure 3.1 has been adopted.

The structural load applied to bridges and culverts will be dictated by the heaviest component loads and the final configuration of the Heavy Load Platform (HLP). The HLP will likely comprise 4 dual tyres per axle and an axle spacing of 1.8m. The final axle configuration will depend upon the equipment used and the approved maximum load per axle. A typical heavy load vehicle is indicated below in Figure 3.2 and comprises a Prime Mover and Steerable 8 Axle Float.



<b>NACELLE TRUCK</b>	
Overall Length	28.0
Overall Width	4.00
Lock-to-lock time	6.00s
Max wheel angle	25.00°

Figure 3.2 – Typical nacelle trailer arrangement

## 4. Route Analysis

Manoeuvring assessment for the typical blade transport vehicle indicated in Figure 3.1 has been completed at intersections and tight bends along the transport route advised by UPC/AC and presented in the following sections 4.1 to 4.3. Also included are photographic records of each intersection. Plan drawings for each assessed location have been provided in Appendix A of this report and have been completed using the following methodology:

- Obtain aerial photography of intersection location.
- Obtain cadastre information for the intersection and surrounding properties.
- Confirm intersection scale using site measurement of pavement width.
- Complete swept path analysis using Autoturn, Vehicle Tracking software.

It is apparent that at several locations the swept path of the blade body and/ or blade tip (including the Jinker wheel path) will require alterations to the existing TfNSW and Council roads and other infrastructure to enable the required manoeuvre to be made. Alterations may include:

- Local widening of road footprint.
- Temporary removal/ relocation of street furniture.
- Relocation of electrical poles and stays.
- Removal/trimming of vegetation.
- Removal of fences.
- Relocation or protection of underground services.

Provision of a temporary easement or licence area will be required to complete this manoeuvre. It is noted that the cadastre data does not align with the aerial photography used in our analysis and therefore, physical fence lines were adopted as property lines. It is recommended that all intersections and property boundaries in the vicinity of tight manoeuvres be surveyed to confirm the accurate position of key all features (including levels, drainage elements etc) as part of future investigation such that appropriate agreements can be made if impact on adjacent landowners is identified.

### 4.1. Mount Hope Cluster

The Mount Hope Cluster is situated near the township of Coolah. Predominantly, access will be from Golden Highway via Black Stump Way/ Neilrex Road and Mt Hope Road. Due to limitations in access within the township of Coolah and ascending Neilrex Road, an alternate access was also investigated directly off Black Stump Road as described in Section 4.1.4 below.

#### 4.1.1 Golden Highway/ Black Stump Way

**Description:** The current intersection configuration includes a channelised right turn and auxiliary left turn lane. The intersection is relatively flat and mostly clear of vegetation.

**Issues:**

1. Road widening will be required to provide sufficient area for the vehicle swept path. Swale drains run adjacent the intersection so minor earthworks will be required to divert the drains clear of the proposed vehicle path and provide a level pavement.
2. An existing culvert is located to the east of the intersection; however it is expected that vehicle access could be achieved without lengthening of the culvert.
3. A number of existing signposts will need to be temporarily relocated out of the swept path.

4. Narrow and low vegetation was identified along the Black Stump Way between Golden Highway and Coolah as indicated on drawing 4.0.1.
5. A number of culvert and bridge crossings were identified along the Black Stump Way. Of particular interest were Hannahs Bridge crossing of Coolaburragundy River and Hobbins Gully. Council advised that Hannahs Bridge was constructed in 1961 and was therefore likely designed for a MS18 vehicle, effectively a 33t truck. It is expected that the proposed vehicle loading will exceed the bridge capacity, if all load is applied at once, however this will be dependent on the load mass, axle configuration, crossing location (i.e. centrally across the bridge) and speed of the proposed vehicles. It is recommended that a load rating of the existing bridge be determined in accordance with AS5100.7 to determine the existing capacity. Preliminary investigation identified minor surface cracking which is not of particular concern however a detailed condition assessment will be required to determine any further capacity reduction due to damage.

#### Image 4.1.1a) - Hannahs Bridge

The age of Hobbins Gully crossing is not known however it is evident that it was constructed more recently than Hannahs Bridge. It consists of 8 cast insitu cells and appears to be in a good state of repair. It is recommended that a load rating be undertaken in accordance with AS5100.7 to determine sufficient capacity for the load, once known.

#### Image 4.1.1b) - Hobbins Gully Crossing

### Recommendations:

1. Vegetation clearing as required along Black Stump Way to provide a clear path of travel.
2. Relocation of existing signage to provide a clear path of travel.
3. Minor earthworks to provide level roadside environment while maintaining existing swale drains.
4. Installation of guard rails over the existing culvert to protect the delivery vehicle from the steep drop.
5. Road widening to support the path of travel.
6. Undertake further structural assessment of all bridge and culvert crossing points once the HLP configuration is known and in collaboration with Warrumbungle Shire Council asset maintenance team

### 4.1.2 Binnia Street/ Queensborough Street

**Description:** The intersection is within the Coolah township and is constrained between existing private properties, kerbs, fences and overhead power. There is evidence of underground stormwater, water and electrical services however the depth and type are not known. The intersection and surrounds are relatively flat.

#### Issues:

1. At least two power poles conflict with the proposed swept path and would require relocation.
2. The swept path encroaches onto adjacent properties on both sides of the road with significant and potential impact on the existing dwelling on the inside of the corner.
3. Underground stormwater, water and telecommunication will likely be affected by the overweight loads. Relocation or protection will be required.

4. Several existing street trees are impacted by the swept path.
5. The required pavement widening extends into private properties.
6. Road longitudinal grades on Neilrex Road ascending to Mount Hope Road were found to be in the order of 14% based on desktop assessment.
7. The proximity of road batters and road bends on Neilrex Road are expected to conflict with the swept path of the blades. Detail survey and 3D swept path assessment would be required to determine the viability of this route in more detail.

**Recommendation:**

1. Access via this intersection would require significant service relocation, tree removal, road widening, landowner agreement and potential land acquisition to prevent property damage (inside corner dwelling). Additionally, the bends and longitudinal grades along Neilrex Road are likely to prevent access to wind turbine blades without significant tree removal and road widening. It is therefore suggested that special purpose equipment is utilised to reduce the swept path to within the road reserve or alternate access is provided for wind turbine blade delivery. This is discussed further in Section 4.1.4. Private vehicles and other large vehicles may be able to utilise this route however further detailed assessment based on survey information would be required.

**4.1.3 Neilrex Road/ Mt Hope Road**

**Description:** The intersection consists of a sealed rural road with no kerb or gutter, formal lane designation or line marking. Swale drains and batters line the eastern side of the intersection. Large vegetation is within close proximity to the carriageway.

**Issues:**

1. The intersection is relatively flat but roadside batters and thick vegetation appear to interfere with the swept path of the wind turbine blades.
2. There is evidence of in ground services (communications) at the intersection that is likely to be impacted on by both the required swept path of the delivery vehicle and the overweight loads.
3. The intersection is surrounded by dense vegetation with the first few hundred meters of Mt Hope Road being steep with large embankments that will require trimming to facilitate the proposed blades mid span path.
4. The remainder of Mt Hope Road is unsealed with vegetation overhanging closely to the roadway. The unsealed road surface will also require consideration regarding condition and drainage upgrades to ensure all weather access is achievable.

**Recommendation:**

1. It is expected that wind turbine blade delivery will not be feasible via this access route due to constraints at the Binnia Street / Queensborough intersection and Neilrex Road ascent, but that delivery of other components may be viable. In this instance it is expected that road widening, and vegetation clearing will be required to facilitate the increase in large vehicles.
2. Mt Hope Road will require an appropriate surface treatment and associated works such as culverts, swales and vegetation clearing.
3. Relocation of signage as required to avoid the swept path.

**4.1.4 Alternate Access – Directly off Black Stump Way**

**Description:** The intersection is located in a straight flat section of Black Stump Road providing good sight distance and requiring minimal civil upgrade works. Access would be via an existing farm access point with augmentation as required to facilitate the swept path.

**Issues:**

1. The swept path (rear overhang) extends into the neighbouring property to the east of Black Stump Road.
2. Swale drains exist on either side of the road that would need to be diverted around any widening or be piped below.

**Recommendation:**

1. Minor earthworks to provide level roadside environment while maintaining existing swale drains.
2. Widening to support the path of travel.
3. Removal of existing fence clear of the path of travel.
4. Approval from affected landowners (no significant structures appear to be in the blade path).

#### **4.2. Leadville Cluster**

The Leadville Cluster is located to the east of the Leadville township. Access will be from Golden Highway via Sir Ivan Dougherty Drive and Wardens Road. Alternatively, access may be provided direct from Golden Highway.

##### **4.2.1 Golden Highway/ Sir Ivan Dougherty Drive**

**Description:** The current intersection configuration excludes any overtaking or deceleration lanes. The intersection is relatively flat and mostly clear of vegetation. Swale drains and underground services exist on the eastern side of the intersection. Sir Ivan Dougherty carriageway is sealed but narrow with large overhanging trees. The majority of Sir Ivan Dougherty Drive is straight with 3 open radius bends.

**Issues:**

1. The swept path extends into neighbouring properties to the west of the Golden Highway.
2. Widening will be required to provide sufficient area for the vehicle swept path. Swale drains run adjacent the intersection so minor earthworks will be required to divert the drains and provide a level pavement.
3. Vehicle paths are likely to impact on an existing culvert structure on the Golden Highway.
4. Underground services (communications) will require adjustments to facilitate the proposed vehicle path. A number of existing signposts will need to be relocated out of the swept path.
5. Narrow and low vegetation was identified along the Sir Ivan Dougherty Drive between Golden Highway and Wardens Road as identified on drawing 4.1.0.
6. A number of shallow pipe culvert crossings were identified along the length of Sir Ivan Dougherty Drive. The strength class of the pipes was not evident on inspection however an assessment of the required strength using PipeClass software package indicated that a class 6 would be required. On review of their current condition, it is unlikely that the pipes will achieve Class 6 requirements and it is therefore anticipated that the pipes will be insufficient to support the expected vehicle loads and replacement, protection or repair will likely be required.

**Recommendation:**

1. Vegetation clearing as required along Sir Ivan Dougherty Drive to provide a clear path of travel.
2. Relocation of existing signage to provide a clear path of travel.
3. Minor earthworks to provide level roadside environment while maintaining existing swale drains.
4. Widening to support the path of travel.
5. Confirm with Council as to the pipe class of existing culverts to determine if they will have sufficient capacity to support the expected vehicle loads as part of the detailed assessment.

**4.2.2 Sir Ivan Dougherty Drive/ Wardens Road**

**Description:** The intersection consists of a sharp right hand turn from Sir Ivan Dougherty Drive onto Wardens Road, surrounded by large trees and vegetation as well as existing drainage channels and culverts. Wardens Road is currently unsealed.

**Issues:**

1. Preliminary swept path analysis determined significant impact on vegetation, drainage infrastructure and adjacent properties if the current intersection geometry was to be followed. Instead, an alternate route was assessed creating a more direct manoeuvre through the intersection. This was found to have less of an impact on existing vegetation, drainage infrastructure and properties and is reflected in drawing 4.2.2.
2. Wardens Road is currently unsealed with vegetation overhanging the road carriageway.
3. An existing concrete weir crossing is unlikely to support the proposed traffic loads or provide all weather access and will require replacement with a suitable culvert.

**Recommendation:**

1. Wardens Road will require an appropriate surface treatment and associated works such as culverts, swales and vegetation clearing.
2. Relocation of existing signage to provide a clear path of travel.
3. Minor earthworks to provide level roadside environment while maintaining existing swale drains.

**4.2.3 Alternate Access 1 – Directly off Golden Highway**

**Description:** The intersection is located in a straight section of Golden Highway and utilises an existing farmer's access. Investigation on site identified significant batters on either side of the road as well as existing stormwater culverts that may conflict with vehicle swept paths.

**Issues:**

1. The blades mid span and rear overhang path extends over the edge of a steep drop on both sides of the road.
2. There are some large trees on the western side of the access road that will require removal to allow vehicle access.
3. Swale drains and culverts exist on either side of the road that would need to be either augmented or protected with barriers to facilitate widening.

**Recommendation:**

1. Earthworks and infrastructure upgrades would be required to accommodate the design vehicle swept paths. An alternate access further to the east was assessed.

**4.2.4 Alternate Access 2 – Directly off Golden Highway**

**Description:** The proposed intersection is also located in a straight section of Golden Highway and will involve construction of an entirely new intersection to facilitate the intended access. Site investigation identified a relatively large embankment located on the southern side of the Golden Highway that will require some earthworks to flatten the embankment and provide suitable clearance for the rear overhang of the 90m blade.

**Issues:**

1. Rear overhang extends over an existing embankment on the Southern Side of Golden Highway, earthworks required (including tree removal).
2. Safe Intersection Sight Distance (SISD) may be tight and unachievable due to trees and minor cutting embankments.
3. Requires full construction of a new intersection and internal access road.

**Recommendation:**

1. While vegetation clearing and trimming of road embankments will improve intersection sight distances, an assessment of SISD at this location indicated that it is unlikely to meet the SISD requirements.

**4.3. Girragulang Cluster**

The Girragulang Cluster is located to the north of the Uarbry township. Access will be from Golden Highway via Short Street, Turee Street, Main Street, Wyaldra Street and Morefield Road. This route from the Golden Highway is unsealed and densely lined with trees and vegetation up to the existing formation edge.

**4.3.1 Golden Highway/ Short Street (Leading to Turee Street)**

**Description:** The current intersection configuration excludes any overtaking or deceleration lanes. The intersection is relatively flat and mostly clear of vegetation. Swale drains, culverts and underground services existing on the eastern side of the intersection. Short Street and Turee Street are unsealed and delineation of the actual carriageway is unclear. Dense vegetation lines the road reserve.

**Issues:**

1. There is a road embankment on the northern side of Golden Highway and that will require regrading to provide a level platform for swept path.
2. Due to the length of the assessment vehicle (95.70m) and the acute angle off the Golden Highway onto Short Street, significant widening will be required to provide sufficient area for the vehicle swept path.
3. A number of existing signposts and trees conflict with swept path.
4. Underground telecommunication services will likely be affected by the overweight loads.
5. An existing drainage culvert sits under Short Street and is unlikely to support the proposed vehicle loads.

6. Short Street and Turee Street are unsealed.

**Recommendation:**

1. Regrading of Short Street verge will be required to provide a level transition from Golden Highway onto Short Street.
2. Consideration of a slip lane towards the south off Golden Highway utilising existing unformed road reserves so that the approach angle of the delivery vehicle is perpendicular to the Golden Highway, crossing the highway directly into Short Street.
3. Widening will be required to provide sufficient area for the vehicle swept path.
4. Short Street and Turee Street will require a pavement surface and associated works such as culverts, swales and vegetation clearing.
5. Existing signposts will need to be relocated out of the swept path.
6. Underground telecommunication services will require relocation or protection.
7. Augmentation or replacement of an existing drainage culvert will be required to suit the new pavement extents.

#### **4.3.2 Turee Street/ Main Street**

**Description:** The intersection is an unformed, unsealed gravel pavement. A number of large trees existing in what should be the centre of the intersection. Existing private properties surround the intersection.

**Issues:**

1. A number of existing trees conflict with swept path.
2. Existing power poles and stay poles are in close proximity to the swept path.
3. Turee and Main Street are unsealed.

**Recommendation:**

1. Turee Street and Main Street will require an appropriate surface treatment and associated works such as culverts, swales and vegetation clearing.
2. Consider relocating the existing power poles and stay poles to provide a clear swept path manoeuvre.

#### **4.3.3 Wyaldra Street/ Moorefield Road**

**Description:** The intersection is an unformed, unsealed gravel pavement. A number of large trees overhand the carriageway. Existing private properties surround the intersection.

**Issues:**

1. A number of existing trees and vegetation conflict with swept path.
2. Wyaldra and Moorefield Road are unsealed.

**Recommendation:**

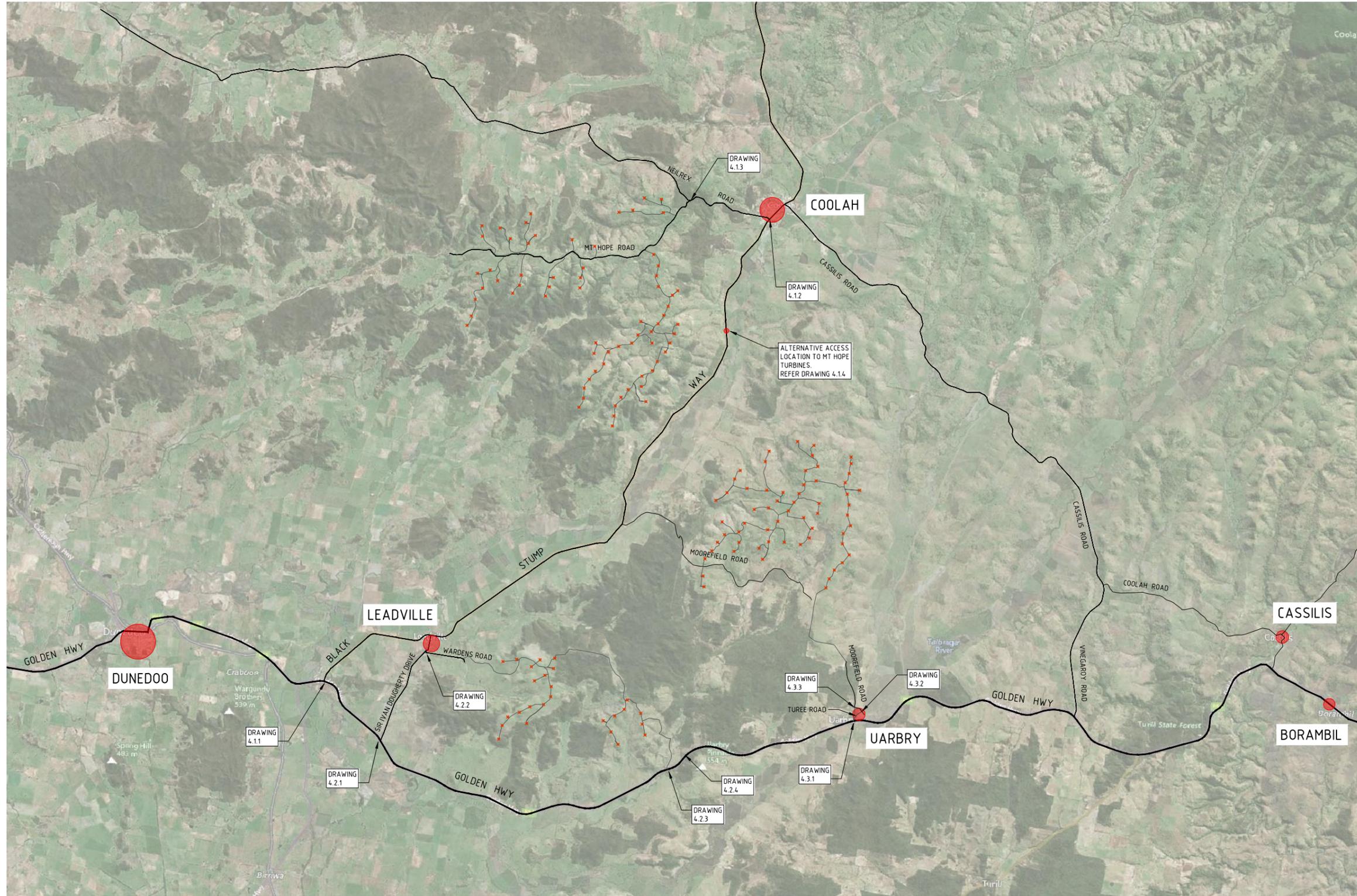
1. Wyaldra Street and Moorefield Road will require an appropriate surface treatment and associated works such as culverts, swales and vegetation clearing.

## 5 Culvert and Waterway Crossing Assessment

A preliminary culvert and waterway crossing investigation was undertaken and is documented where relevant in Sections 4.1 to 4.3.

It is recommended that further structural investigation and design be undertaken in collaboration with Warrumbungle Shire Council once the final route has been selected and the vehicle loads are confirmed. Of particular interest will be Hannahs Bridge and Hobbins Gully Crossing on Black Stump Way.

# Appendix A – Intersection Assessment



DRAWN: B. DUGGAN  
 DESIGNED: J. KIDD  
 JOB MANAGER: C. PIPER  
 VERIFIER:

LEGEND	
	EXISTING ROAD NETWORK
	PROPOSED ACCESS TRACK
	APPROX WIND TURBINE LOCATION

**NOT FOR CONSTRUCTION**

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR COORDINATION	JK	CP		21.07.21
2	ISSUED FOR INFORMATION	JK	CP		30.07.21
A	FINAL ISSUE FOR APPROVAL	JK	CP		09.08.21
B	AMENDED FINAL ISSUE FOR APPROVAL	JK	CP		20.09.21
C	FINAL ISSUE FOR APPROVAL	JK	CP		22.04.22

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 Ph (02) 4943 1777 Email newcastle@northrop.com.au  
 ABN 81 094 433 100

PROJECT

**VALLEY OF THE WINDS**

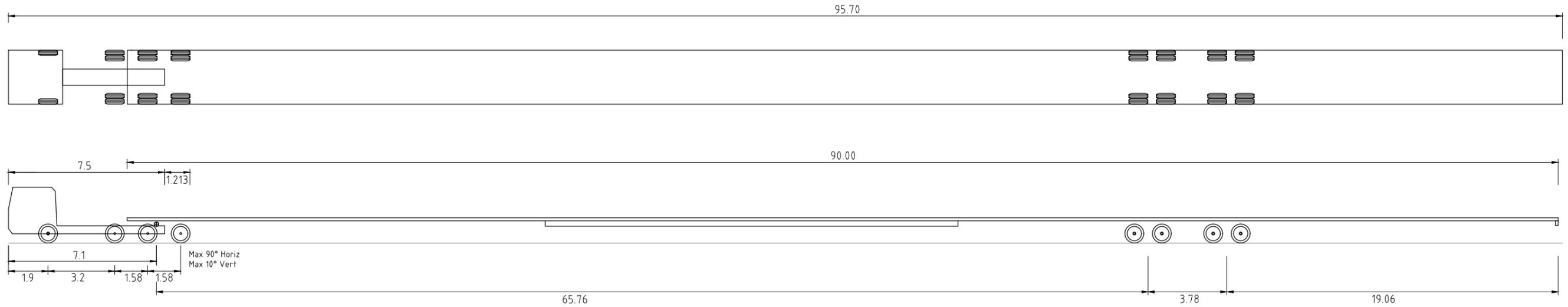
**WIND TURBINE BLADE TRAILER INTERSECTION ASSESSMENT**

DRAWING TITLE

**CIVIL ENGINEERING PACKAGE**

**GENERAL ARRANGEMENT PLAN**

JOB NUMBER		<b>NL210841</b>
DRAWING NUMBER	REVISION	
<b>4.0.1</b>	<b>C</b>	
DRAWING SHEET SIZE = A3		



**WIND TURBINE BLADE TRUCK (N.T.S)**  
 Overall Length 95.700m  
 Overall Width 2.591m  
 Lock-to-lock time 6.00s  
 Max Wheel Angle 30.00°

DRAWN: B. DUGGAN  
 DESIGNED: J. KIDD  
 JOB MANAGER: C. PIPER  
 VERIFIER:

**NOT FOR CONSTRUCTION**

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE	CLIENT	ARCHITECT	PROJECT	DRAWING TITLE	JOB NUMBER	DRAWING NUMBER	REVISION
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2	ISSUED FOR INFORMATION	JK		CP	30.07.21							
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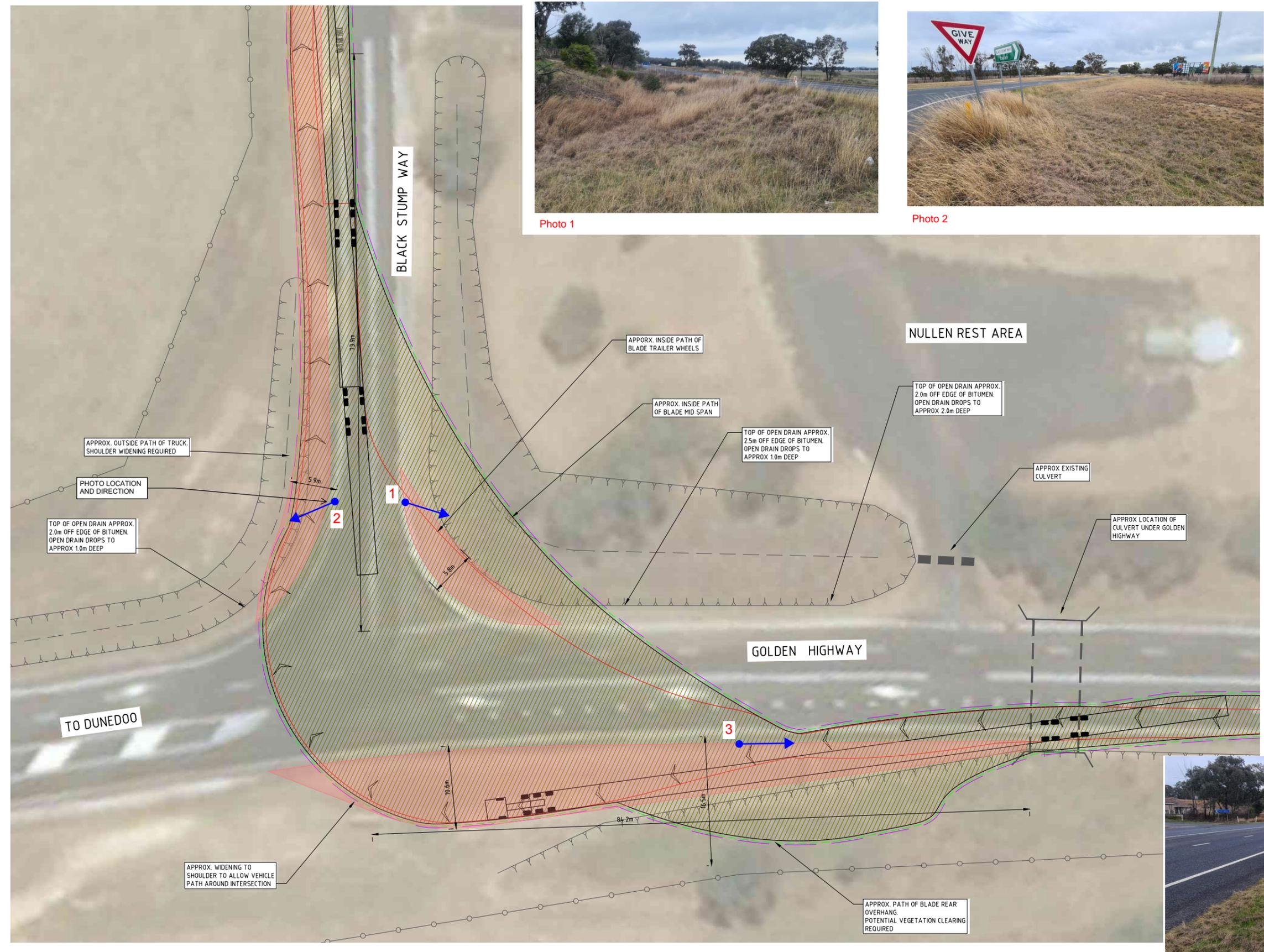


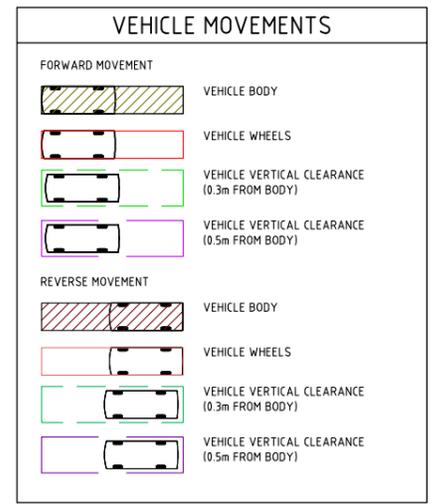
Photo 1



Photo 2



Photo 3



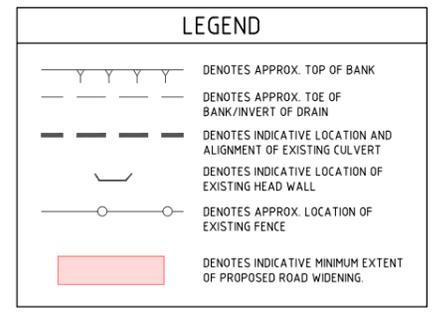
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IT IS NORTHROP'S INTENTION TO UTILISE STANDARD VEHICLES NOMINATED IN AS2890.1 AND AS2890.2 FOR ALL DESIGN/CHECKING VEHICLE SIMULATIONS AT AN IDEAL MOVEMENT SPEED OF 10KM/H WITH A NOMINAL VEHICLE BODY OFFSET OF 500MM. WHERE MANOEUVRABILITY IS LIMITED AND SITE CONDITIONS ARE FAVOURABLE, AN ABSOLUTE MINIMUM SPEED OF 5KM/H WITH AN ABSOLUTE MINIMUM VEHICLE BODY CLEARANCE OF 300MM MAY BE ADOPTED.

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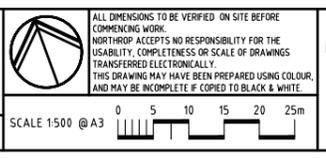


VERIFIER: C. PIPER  
 JOB MANAGER: C. PIPER  
 DESIGNED: J. KIDD  
 DRAWN: B. DUGGAN

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE	CLIENT
1	ISSUED FOR COORDINATION	JK		CP	21.07.21	
2	ISSUED FOR INFORMATION	JK		CP	30.07.21	
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B	AMENDED FINAL ISSUE FOR APPROVAL	JK		CP	20.09.21	
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PROJECT  
**VALLEY OF THE WINDS**  
**WIND TURBINE BLADE TRAILER INTERSECTION ASSESSMENT**

DRAWING TITLE  
**CIVIL ENGINEERING PACKAGE**  
**MT HOPE SITE GOLDERN HWY - BLACK STUMP WAY LEADVILLE**

JOB NUMBER <b>NL210841</b>	
DRAWING NUMBER <b>4.1.1</b>	REVISION <b>C</b>
DRAWING SHEET SIZE = A3	

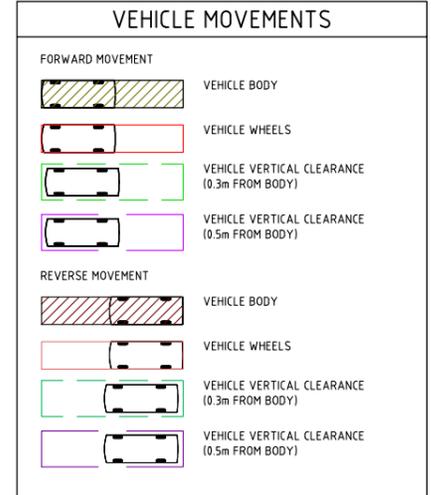
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Photo 1



Photo 2



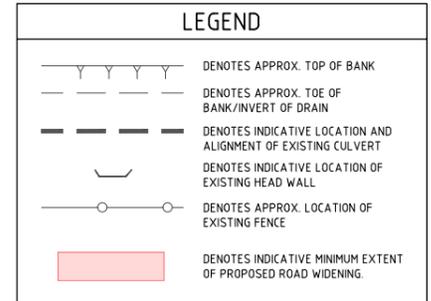
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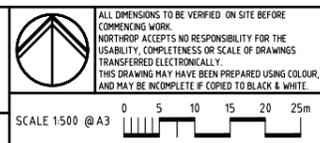
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**NOT FOR CONSTRUCTION**

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PROJECT  
**VALLEY OF THE WINDS**  
**WIND TURBINE BLADE TRAILER**  
**INTERSECTION ASSESSMENT**

DRAWING TITLE  
**CIVIL ENGINEERING PACKAGE**  
**MT HOPE SITE**  
**BINNIA ST - QUEENSBOROUGH ST**  
**COOLAH**

JOB NUMBER		REVISION
<b>NL210841</b>		<b>C</b>
DRAWING NUMBER	DRAWING SHEET SIZE = A3	
<b>4.1.2A</b>		

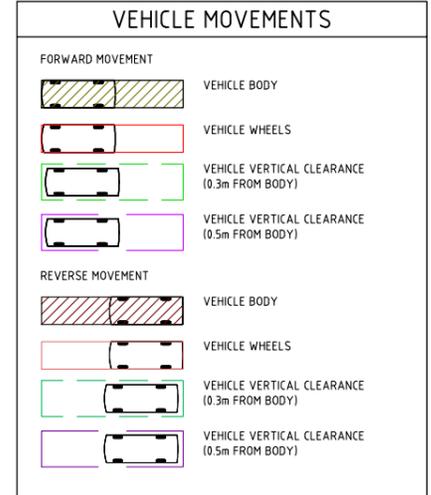
DRAWN: B. DUGGAN  
 DESIGNED: J. KIDD  
 JOB MANAGER: C. PIPER  
 VERIFIER:



Photo 1



Photo 2



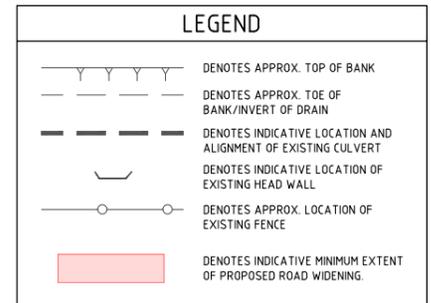
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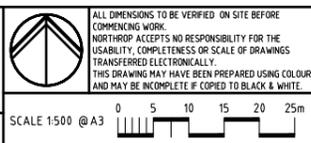
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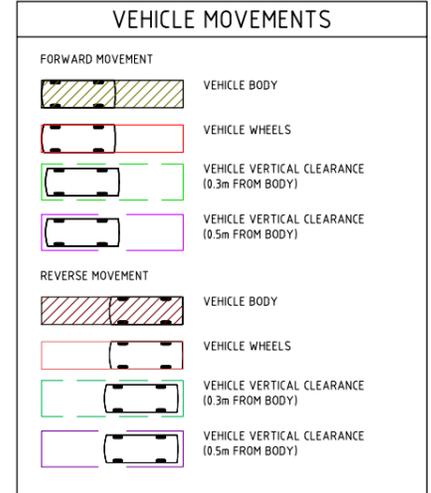
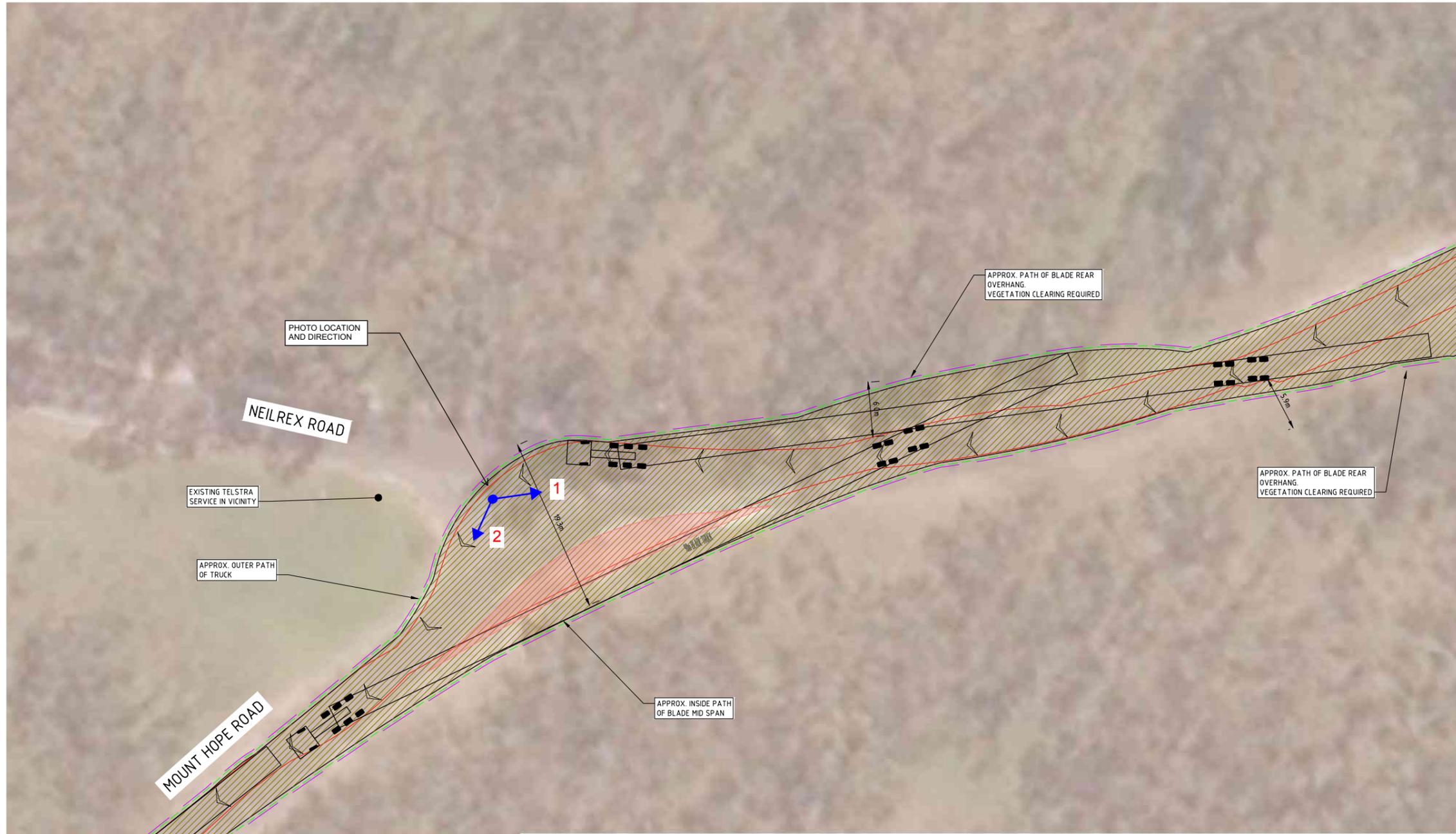


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PROJECT  
**VALLEY OF THE WINDS**  
**WIND TURBINE BLADE TRAILER INTERSECTION ASSESSMENT**

DRAWING TITLE  
**MT HOPE SITE QUEENSBOROUGH STREET COOLAH**

JOB NUMBER	
<b>NL210841</b>	
DRAWING NUMBER	REVISION
<b>4.1.2B</b>	<b>C</b>
DRAWING SHEET SIZE = A3	



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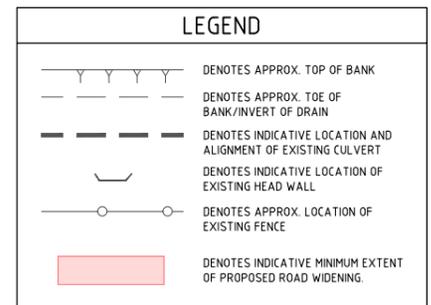


Photo 1



Photo 2

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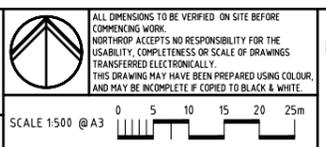
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PROJECT  
**VALLEY OF THE WINDS**  
**WIND TURBINE BLADE TRAILER**  
**INTERSECTION ASSESSMENT**

DRAWING TITLE  
**CIVIL ENGINEERING PACKAGE**  
**MT HOPE SITE**  
**NEILREX ROAD - MT HOPE ROAD**  
**COOLAH**

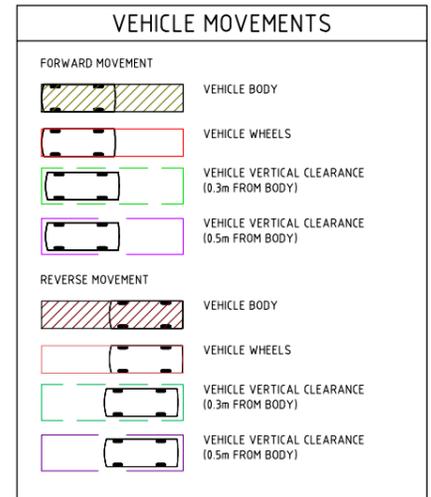
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<b>NL210841</b>	
DRAWING NUMBER	REVISION
<b>4.1.3</b>	<b>C</b>
DRAWING SHEET SIZE = A3	



Photo 1



Photo 2



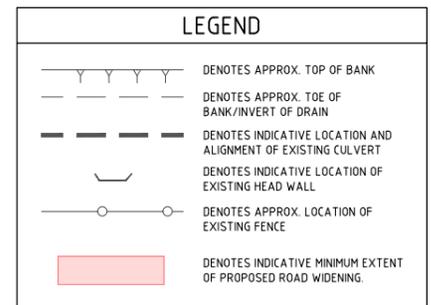
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SCALE 1500 @ A3

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PROJECT  
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**WIND TURBINE BLADE TRAILER**  
**INTERSECTION ASSESSMENT**

DRAWING TITLE  
**CIVIL ENGINEERING PACKAGE**  
**MT HOPE SITE**  
**ALTERNATE ACCESS**  
**BLACK STUMP WAY, COOLAH**

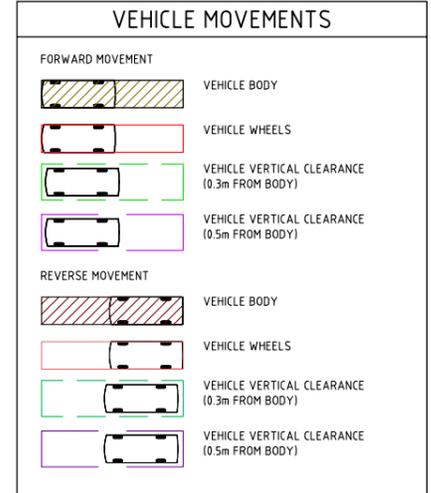
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<b>NL210841</b>	
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<b>4.1.4</b>	<b>C</b>
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Photo 1



Photo 2



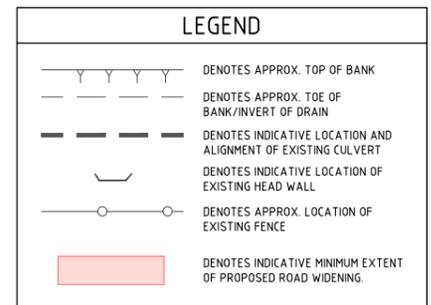
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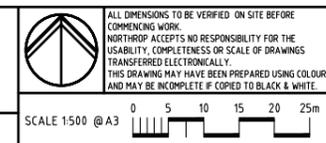
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PROJECT  
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**INTERSECTION ASSESSMENT**

DRAWING TITLE  
**LEADVILLE SITE**  
**GOLDERN HWY - SIR IVAN DOUGHERTY DR**  
**LEADVILLE**

JOB NUMBER		REVISION
<b>NL210841</b>		<b>C</b>
DRAWING NUMBER	DRAWING SHEET SIZE = A3	
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Photo 3

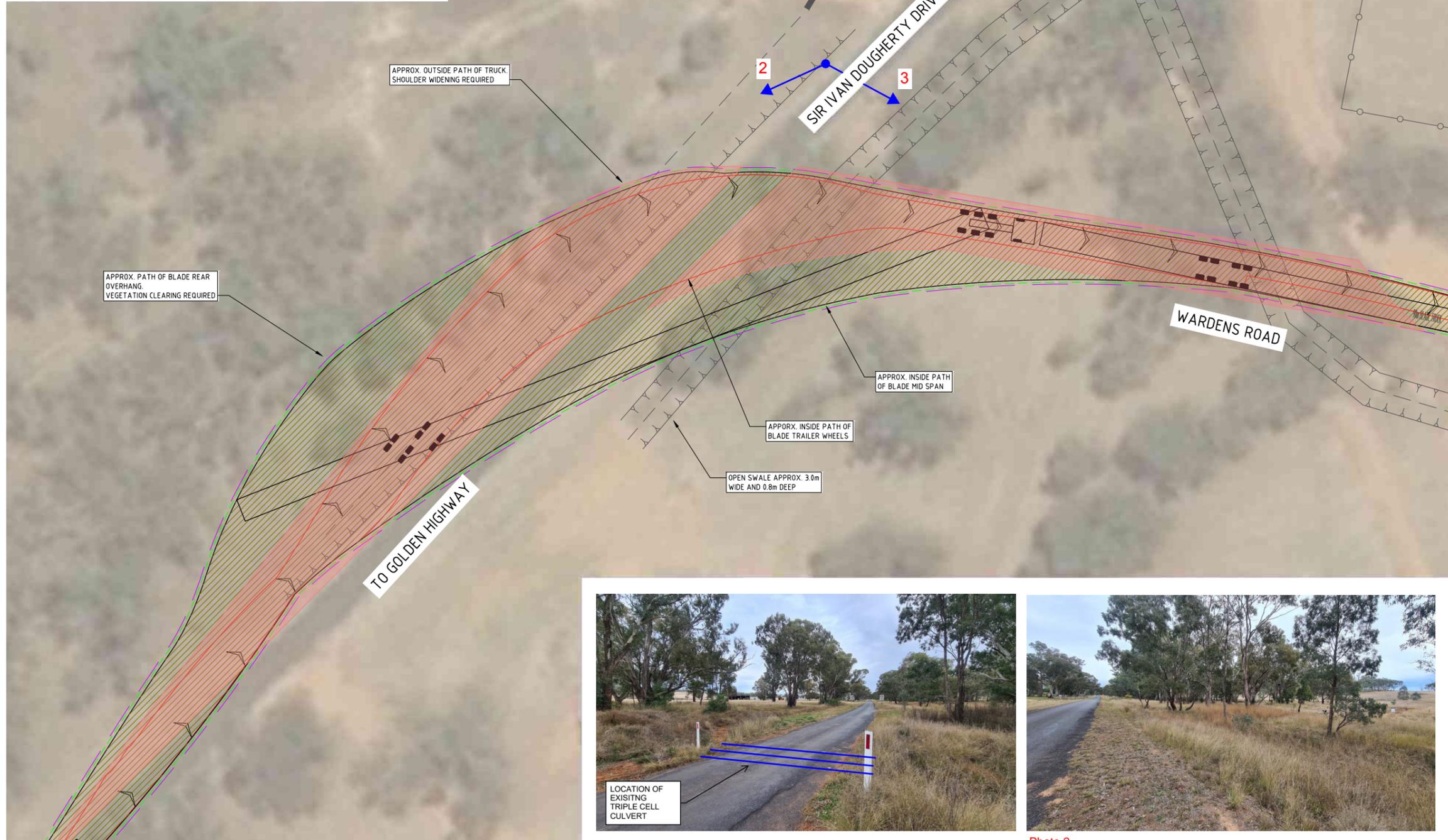
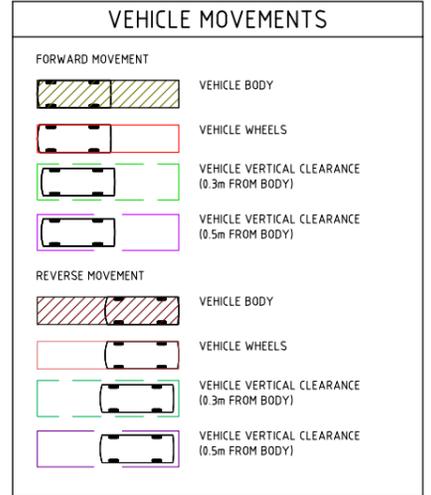


Photo 1



Photo 2



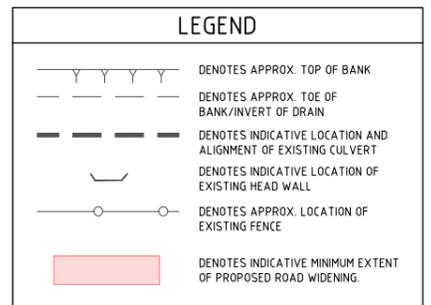
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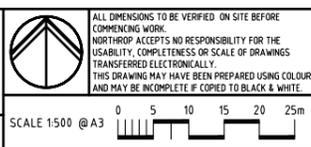
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PROJECT  
**VALLEY OF THE WINDS**  
**WIND TURBINE BLADE TRAILER**  
**INTERSECTION ASSESSMENT**

DRAWING TITLE  
**LEADVILLE SITE**  
**SIR IVAN DOUGHERTY DR -**  
**WARDENS ROAD**  
**LEADVILLE**

JOB NUMBER <b>NL210841</b>	
DRAWING NUMBER <b>4.2.2</b>	REVISION <b>C</b>
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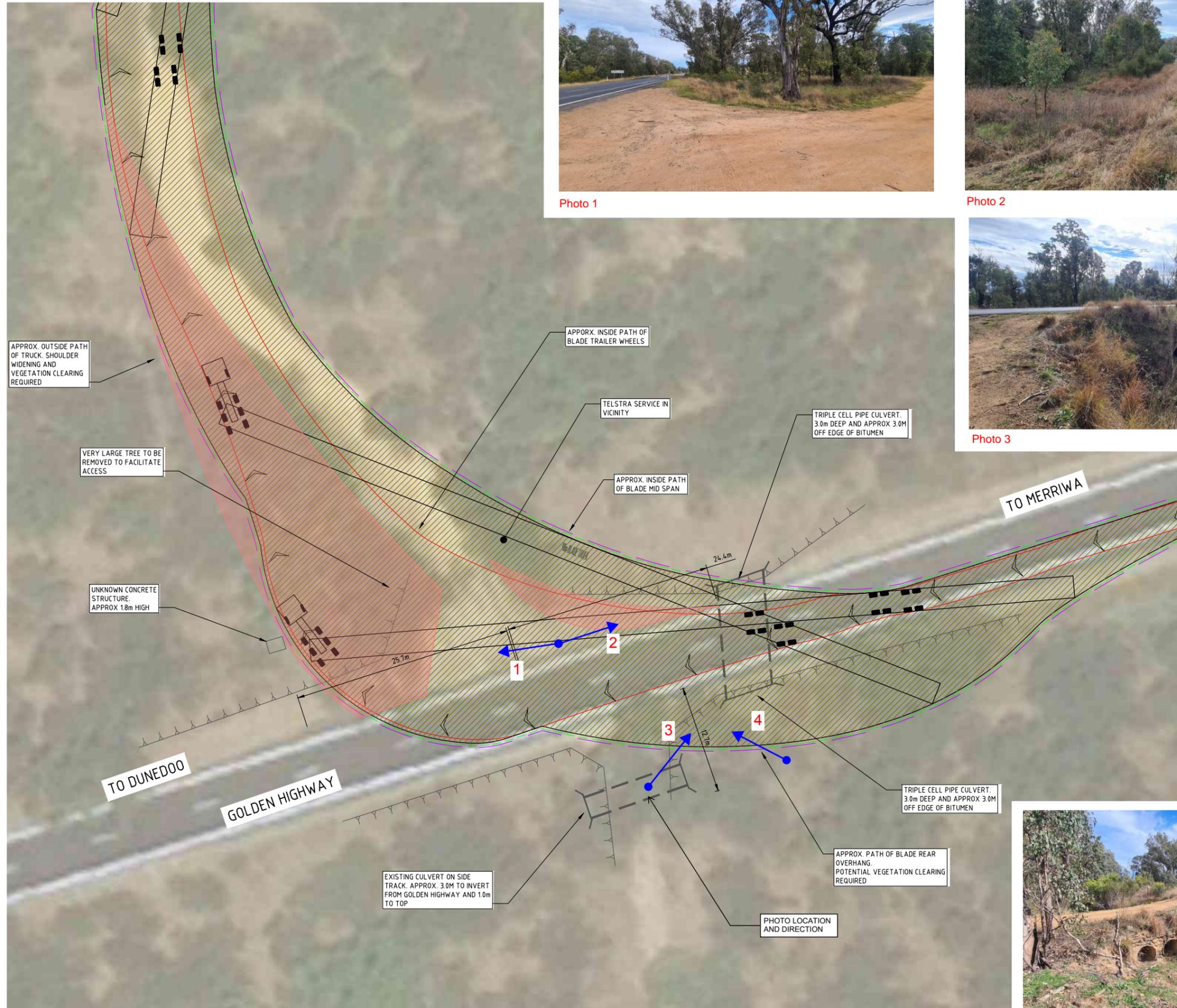


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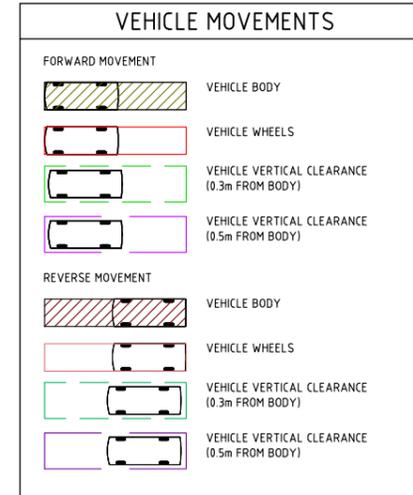
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Photo 3



Photo 4



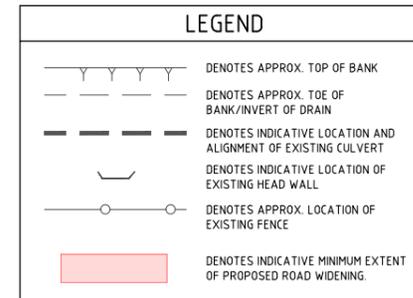
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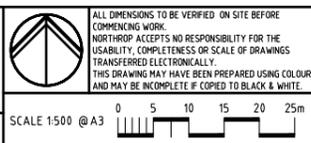
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 JOB MANAGER: C. PIPER  
 DESIGNED: J. KIDD  
 DRAWN: B. DUGGAN

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PROJECT  
**VALLEY OF THE WINDS**  
**WIND TURBINE BLADE TRAILER INTERSECTION ASSESSMENT**

DRAWING TITLE  
**CIVIL ENGINEERING PACKAGE**  
**LEADVILLE SITE ALTERNATE ACCESS GOLDERN HWY, UARBRY**

JOB NUMBER	
<b>NL210841</b>	
DRAWING NUMBER	REVISION
<b>4.2.3</b>	<b>C</b>
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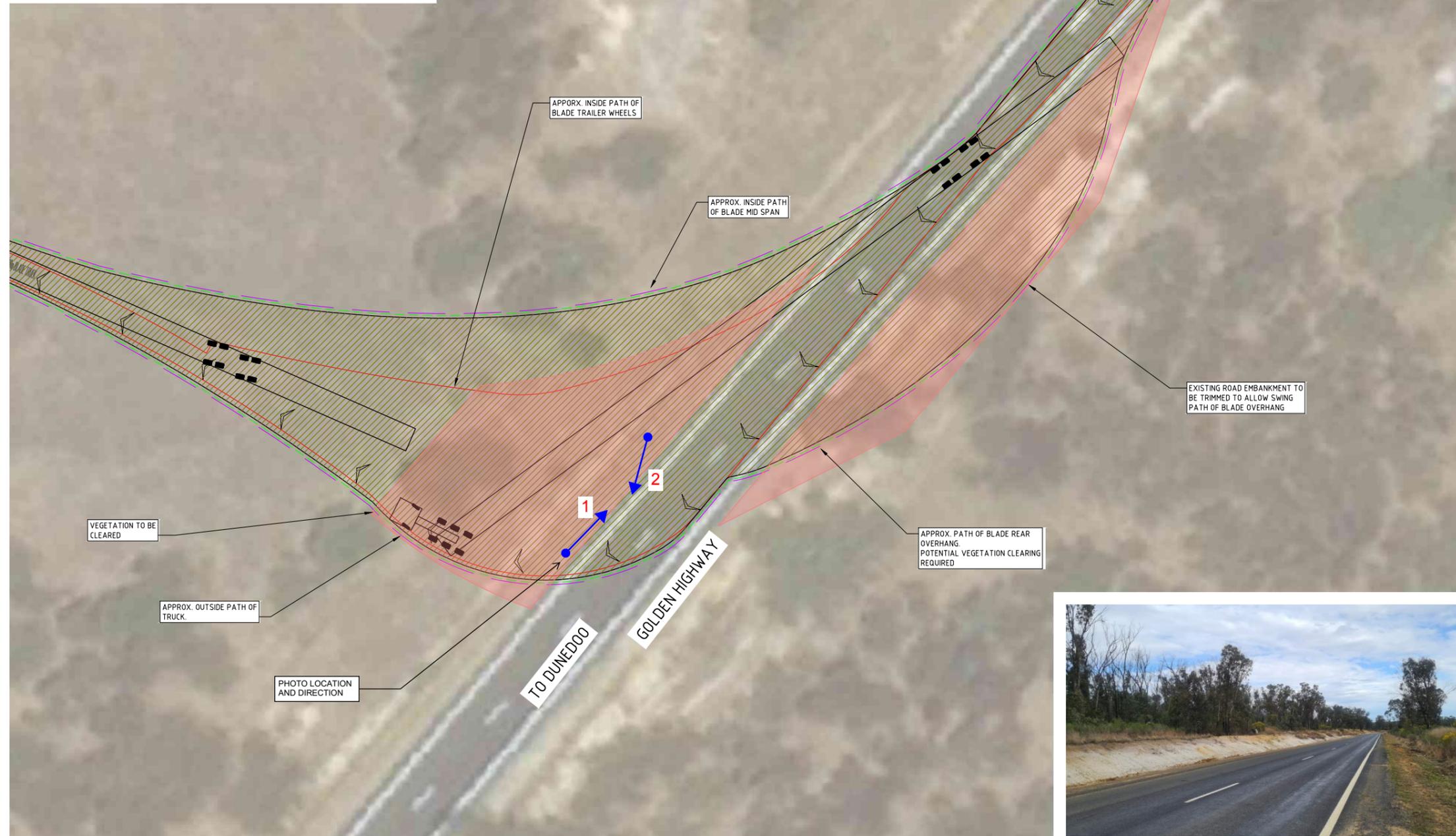
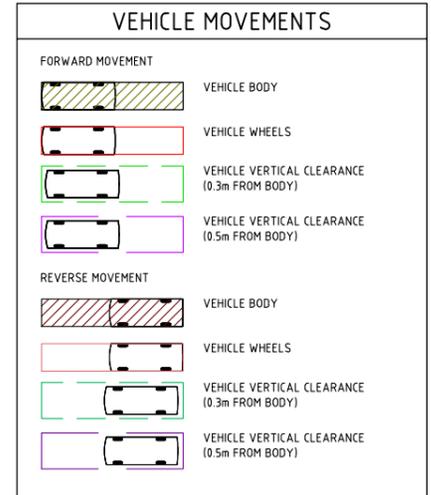


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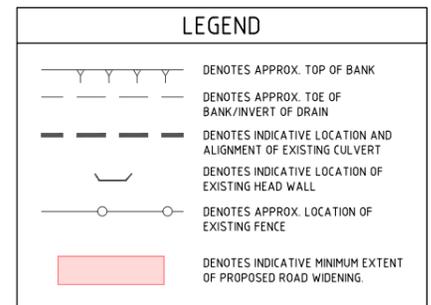
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**Not considered further**

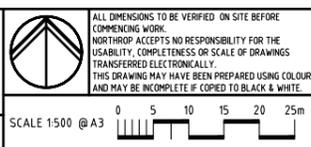
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PROJECT

**VALLEY OF THE WINDS**

**WIND TURBINE BLADE TRAILER INTERSECTION ASSESSMENT**

DRAWING TITLE

**CIVIL ENGINEERING PACKAGE**

**LEADVILLE SITE ALTERNATE ACCESS 2 GOLDERN HWY, UARBRY**

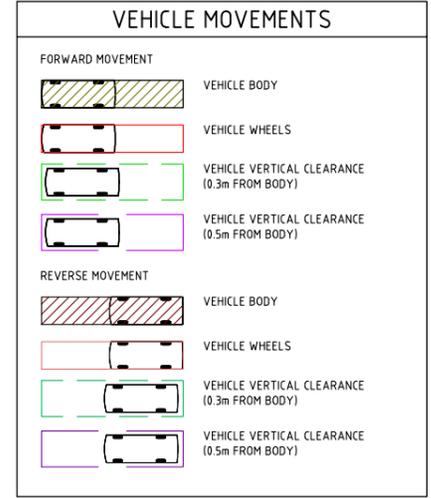
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<b>NL210841</b>	
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Photo 1



Photo 2



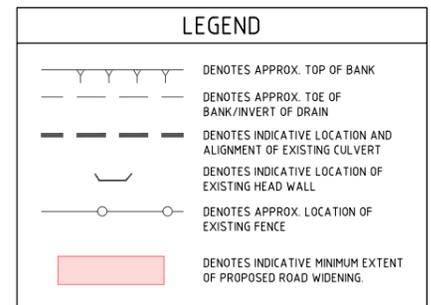
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PROJECT  
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**WIND TURBINE BLADE TRAILER INTERSECTION ASSESSMENT**

DRAWING TITLE  
**CIVIL ENGINEERING PACKAGE**  
**GIRRAGULANG SITE GOLDERN HWY - SHORT STREET UARBRY**

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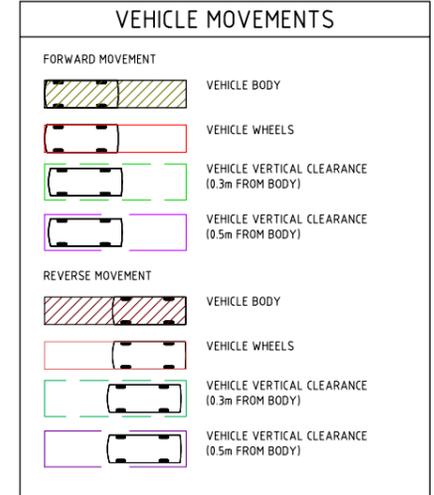
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Photo 2



Photo 3



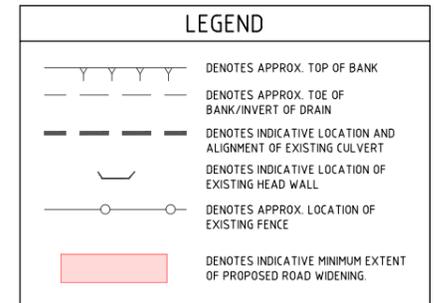
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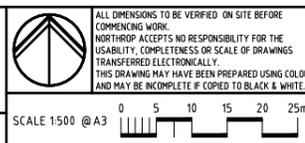
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PROJECT  
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**WIND TURBINE BLADE TRAILER**  
**INTERSECTION ASSESSMENT**

DRAWING TITLE  
**GIRRAGULANG SITE**  
**TUREE STREET - MAIN STREET**  
**UARBRY**

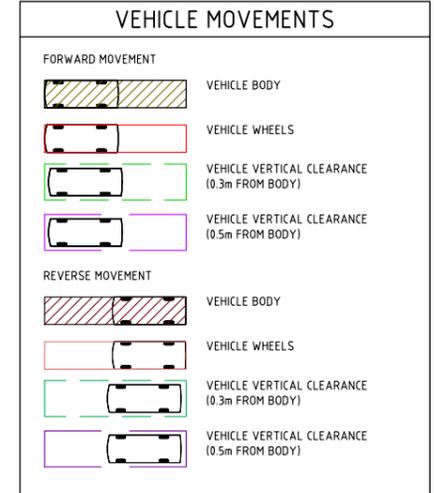
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Photo 1



Photo 2



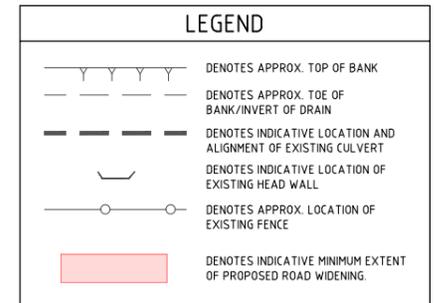
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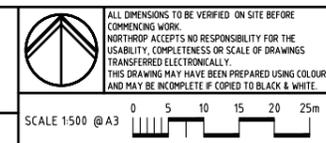
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PROJECT  
**VALLEY OF THE WINDS**  
**WIND TURBINE BLADE TRAILER**  
**INTERSECTION ASSESSMENT**

DRAWING TITLE  
**CIVIL ENGINEERING PACKAGE**  
**GIRRAGULANG SITE**  
**MAIN STREET - MOORFIELD ROAD**  
**UARBRY**

JOB NUMBER	
<b>NL210841</b>	
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APPENDIX B

# Response to Agency comments

**Table B-1** provides an indication of where the specific agency comments have been discussed. While some of the detail requested may not be available at this stage of the project development, the intent of the requested item has been discussed to the extent possible.

**Table B-1 Agency comments and how they have been addressed**

Agency letters	Section addressed
Transport for NSW	
The assessment is to address the following:	
Project schedule: <ul style="list-style-type: none"> <li>Hours and days of work, number of shifts and start and end times.</li> <li>Project phases and stages, including construction, operation and decommissioning.</li> </ul>	Section 2.0
Traffic volumes: <ul style="list-style-type: none"> <li>Existing background traffic</li> <li>Project related traffic for each phase or stage of the project</li> <li>Projected cumulative traffic at commencement of operation and a 10-year horizon.</li> </ul>	Sections 2.2, 3.1.1, 4.0
Traffic characteristics: <ul style="list-style-type: none"> <li>Number and ratio of heavy vehicles to light vehicles</li> <li>Peak times for existing traffic</li> <li>Peak times for project-related traffic including commuter periods</li> <li>Proposed hours for transportation and haulage</li> <li>Interactions between existing and project-related traffic.</li> </ul>	Sections 4.1, 0
Description of all over size and over mass vehicles and the materials to be transported.	Section 5.5 Appendix A
The origins, destinations and routes for: <ul style="list-style-type: none"> <li>Commuter (employee and contractor) light vehicles, pool vehicles and buses</li> <li>Heavy (haulage) vehicles</li> <li>Over size and over mass vehicles.</li> </ul>	Section 4.0
Road safety assessment of key haulage route/s	Section 3.1
Impact of traffic generation on public roads and measures employed to ensure traffic efficiency and road safety during construction, operation and decommissioning	Sections 5.1, 6.0
The need for improvements to the road network, including road widening and intersection treatments, to cater for and mitigate the impact of project related traffic. Road facilities, accesses and intersection treatments are to be in accordance with Austroads Guide to Road Design including provision of Safe Intersection Sight Distance (SISD)	Sections 3.1.4, 5.3
Local climate conditions that may affect road safety during the life of the project (e.g. fog, wet and dry weather, icy road conditions)	Section 6.0
The layout of the internal road network, parking facilities and infrastructure	N/A
Impact on rail corridors and level crossings detailing any proposed interface treatments.	Section 5.9
Impact on public transport (public and school bus routes).	Section 5.8
Identification and assessment of impacts of the project, such as blasting, lighting, visual, noise, dust and drainage on the function and integrity of affected public roads.	Refer to other specialist reports
Controls for transport and use of dangerous goods in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development, Australian Dangerous Goods Code and Australian Standard 4452 Storage and Handling of Toxic Substances.	Section 6.0

Agency letters	Section addressed
Transport for NSW	
A Traffic Management Plan (TMP) developed in consultation with relevant Councils and TfNSW. The TMP is to identify strategies to manage the impacts of project related traffic, including any community consultation measures for peak haulage periods.	Section 6.0
A Driver Code of Conduct for haulage operations including, but not be limited to: <ul style="list-style-type: none"><li>• Safety initiatives for haulage through residential areas and/or school zones</li><li>• An induction process for vehicle operators and regular toolbox meetings</li><li>• A public complaint resolution and disciplinary procedure.</li></ul>	Section 6.0

