New England REZ Road Upgrade Advisor

OSOM Assessment Report

Energy Corporation of NSW

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Document control record

Document prepared by:
Aurecon Australasia Pty Ltd
ABN 54 005 139 873
Level 11, 73 Miller Street
North Sydney 2060 Australia
PO Box 1319
North Sydney NSW 2059
Australia

T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

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Glossary and abbreviations

Abbreviations or term	Description
AEMO	Australian Energy Market Operator
access points	Connection of access tracks or driveways to construction compounds/accommodation facilities with main roads though which vehicles enter or exit.
access routes	The roads within and surrounding the Project footprint identified from GIS analysis that are anticipated to be used to provide access to the Project footprint.
Access track	Temporary and permanent access tracks to network infrastructure and temporary construction areas. That does not include public roads.
ARTC	Australian Rail Track Corporation
State road	A national highway connecting NSW with other states owned and managed by TfNSW
Regional road	A provide for major regional and inter-regional traffic movement in a safe and operationally efficient manner., could be managed by state or local government
Local road	A road that provides vehicular access to abutting property, to other properties within a local area, to other local streets, such as cul-de-sacs (2) and provide access for emergency and service vehicle, managed by local government
Construction	The construction of the Project, including but not limited to the construction of transmission lines, energy hubs, ancillary infrastructure, but excluding pre-construction enabling works.
Construction compounds	An area used as the base for construction activities, usually for the storage of plant, equipment and materials, and/or construction site offices and worker facilities. It can also comprise concrete batching plant, crushing, grinding and screening plant, testing laboratory and wastewater treatment plant.
CRN	Country Regional Network
CWO	Central-West Orana
Data and Assumptions Book	Project data set of reference projects to be used by the New England Renewable Energy Zone Network Infrastructure Project (NE REZNIP) and assist EnergyCo in coordinating development and delivery of the NE REZ.
DA	Development Application
Easement	An easement is a legal right established over a portion of a landowner's property, allowing an entity to access and use that land for specific purposes, like building and maintaining transmission lines.
Easement Acquisition	Easement acquisition refers to the process by which an entity secures the necessary rights over a portion of a landowner's property to establish an easement. This allows for activities like constructing and maintaining infrastructure, while the landowner retains ownership of the land.
EII Act	Electricity Infrastructure investment Act
Energy hub	A substation or switching station where energy exported from renewable energy generation projects is aggregated, transformed to 500 kV (where required) and exported to the transmission network, and may include battery storage.
EnergyCo	Energy Corporation of New South Wales constituted by section 7 of the *Energy and Utilities Administration Act 1987* as the NSW Government statutory authority responsible for the delivery of NSW's Renewable Energy Zones. ▪ EnergyCo, an NSW Government statutory authority established under the EII Act, is responsible for leading the delivery of the REZs as part of the NSW Government's Electricity Infrastructure Roadmap (the Roadmap). As the Infrastructure Planner, EnergyCo is responsible for delivering the REZ's, EnergyCo's role is to lead the development, coordination and delivery of the REZs in a way that benefits consumers, investors, and regional communities.
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
GAV	General Access Vehicles

Abbreviations or term	Description
GIS	Geographic Information System A system that manages site cadastral data and associated information.
GW	Gigawatt
Hardstand area	A designated surface area meant to support heavy vehicle traffic.
HV	Heavy vehicle
ISP	Integrated System Plan
km	kilometres
kV	kilovolt
landowners	People who own properties/land
LGA	Local Government Area
LoS	Road's Level of Service
LV	Light vehicle
m	metres
MW	megawatt
MWh	megawatt-hour
NE	New England
NE REZ	New England Renewable Energy Zone REZ declared in the New England region which is intended to group new renewable energy generation projects and network infrastructure to deliver 6 GW of network capacity by 2033. A geographic area of approximately 15,500 km2 centred by Armidale and Guyra, extending west to Bendemeer, east between Walcha and Yarrowitch, to Nowendoc in the south and Deepwater in the north.
NHVR	National Heavy Vehicle Regulator
NSW	New South Wales
OSOM	Over-size-over-mass (vehicle movements) Required to transport large project components including wind turbine blades and synchronised condensers from the Port of Newcastle to the REZs.
Property Acquisition	Property acquisition involves the process of acquiring land or any interest in land, such as easements, for public purposes.
RAV	Restricted access vehicles include any vehicle which exceeds the overall dimensions of vehicles as defined in the Heavy Vehicle National Law (NSW).
refinement	Refinements to the Project are defined as aspects of the Project that generally fit within the limits set by the Project description in the EIS. Refinements do not change what is being sought for approval or require an amendment to the infrastructure application for the Project.
REZ	Renewable Energy Zone A geographic area with high-quality variable renewable energy resources (such as wind and solar), suitable topography and land use designations for development, and demonstrated interest from project developers. Renewable Energy Zones are identified and declared by the NSW Government.
RNI	REZ Network Infrastructure New transmission lines, energy hubs and associated infrastructure within the REZ developed by EnergyCo to facilitate the distribution of energy from generation projects to the NSW electricity grid.
TfNSW	Transport for NSW
The Project	The New England REZ Network Infrastructure Project consisting of new 500 kV and 330 kV transmission lines and related infrastructure, that would allow renewable energy generators and storage projects in the New England REZ to connect to the existing transmission network in the Upper Hunter region of NSW.
TMP	Traffic Management Plan

Abbreviations or term	Description
transmission line corridor	An area generally 200 metres wide that the transmission line route and easement would be located within.
transmission line easement	A legal right attached to a parcel of land that enables the non-exclusive use of the land by a third party other than the owner. For transmission lines, an easement defines the corridor area where the lines are located and that allows access, construction and maintenance work to take place. The easements for the 500 kV transmission lines would typically be 70 metres wide. However, a few select locations would require wider easements up to 130 metres wide for specific engineering or property reasons. The easement grants a right of access and for construction, maintenance and operation of the transmission line and other operational assets.
Transmission line alignment	The location of the transmission line structures within the transmission line easement.
transmission line routes	The location of the transmission line structures along the middle of the transmission line easement.
transmission line structures	Proposed free standing structures to support the transmission lines
TTCIS	Traffic and Transport Cumulative Impact Assessment
TTIA	Traffic and Transport Impact Assessment
WAD	Work Authorisation Deed
work site	A general word to describe a defined construction location

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1 Introduction

1.1 Project background

1.1.1 Strategic context

Four of the State's five existing coal fired power stations are expected to close within 15 years, starting with the Liddell power station in April 2023. These power stations currently provide around three quarters of NSW's electricity supply, and two thirds of the firming capacity required to meet peak demand in the State.

The NSW Government is taking action to coordinate and unlock investment in replacement generation before the State's existing coal fired power stations close. With some of the best renewable energy resources in the world, NSW is in a unique position to benefit from emerging low-cost technologies like wind, solar, batteries and pumped hydro. Attracting investment in clean, reliable, and affordable renewable generation and network infrastructure is a key focus for the State.

1.1.2 Renewable Energy Zones

The NSW Government's Electricity Strategy and Electricity Infrastructure Roadmap (the roadmap) set out a plan to deliver the State's first five Renewable Energy Zones (REZs) in the Central-West Orana (CWO), New England (NE), South West, Hunter-Central Coast and Illawarra regions. This builds on the NSW Transmission Infrastructure Strategy and supports the implementation of the Australian Energy Market Operator's (AEMO) Integrated System Plan (ISP).

Under the Roadmap, the Government is working to establish five new REZs around the State and deliver critical network infrastructure needed to bring new sources of renewable generation into the grid. This includes the design and deliver of the New England REZ (NE REZ) with a legislated generation capacity of 8 gigawatt (GW) and the new network capacity to unlock and integrate this new source of power into the existing grid.

The Energy Corporation of NSW (EnergyCo) is the NSW-Government-controlled statutory authority that, in its capacity as appointed infrastructure planner under the Electricity Infrastructure investment Act 2020 (NSW) (EII Act), will lead the delivery of the first five NSW REZs.

1.1.3 NE REZ network infrastructure (RNI)

The NE REZ was formally declared on 17 December 2021. Declaration was the first step in formalising the REZ under the EII Act. It sets out the intended network capacity (size), geographical area (location) and network infrastructure that will make up the REZ.

The declaration also established EnergyCo as the Infrastructure Planner for the NE REZ. EnergyCo will assess and make decisions on recommending the RNI. EnergyCo is working with network planners and participants, including the AEMO, Transgrid, Essential Energy and Ausgrid to specify the network infrastructure that will comprise the scope for the New England REZ. This includes planned, new and existing network infrastructure in the specified geographical area of the REZ.

Work is underway to further detail the specific network infrastructure needed to enable at least 8 GW of capacity. This may include high voltage transmission lines within the specified geographic area as well as network infrastructure joining the NE REZ to the existing network such as the Sydney Ring1, allowing additional renewable energy to travel to load centres.

The preliminary study corridor for NE REZ is shown in Figure 1-1.

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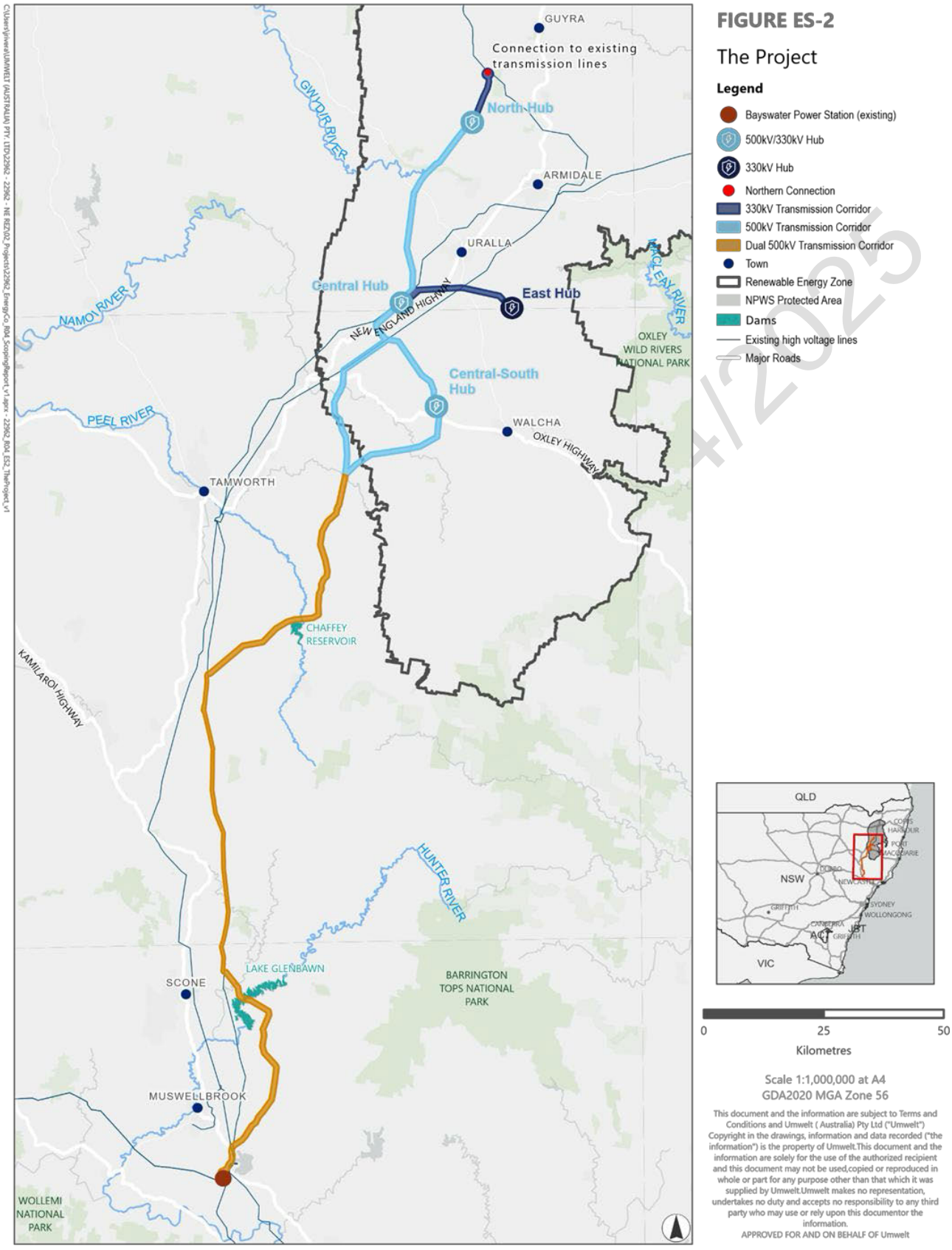

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Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2024), NSWSS (2024)

Figure 1-1: Preliminary Study Corridor NE REZ

1.2 Project Overview

1.2.1 Project Features

The Project would comprise the development of the following key features:

- New overhead transmission lines including:
  - Dual 500 kilovolts (kV) lines between Bayswater Power Station substation and the New England REZ;
  - 500 kV and 330 kV lines within the REZ to connect to proposed energy hubs and existing transmission lines;
- Four new energy hubs within the REZ and a switching station at a northern connection point
  - Central-South Hub (Walcha) – 500 kV
  - Central Hub (Kentucky) – 500 kV
  - East Hub (Gostwyck) – 330kV
  - North Hub (Guyra) – 500 kV
- Ancillary infrastructure such as:
  - Access tracks and roads
  - Upgrades / augmentation of existing electricity infrastructure,
  - Communications infrastructure and facility
  - Laydown and staging areas
  - Earthwork material sites with crushing and screening plants
  - Concrete batching plants
  - Helicopter landing pads
  - Site offices and workforce accommodation camps

1.3 Previous works

Previous works were undertaken in the *Wind Farm Supply Chain Logistics – Transport Route Assessment* report prepared by GHD in 2022 to gauge the benefits and costs of providing road network upgrades, high-level turn path assessments and cost estimates.

1.3.1 Stage 1A works

The previous Stage 1A works included conducting a logistics transport study for a series of sites with limiting intersections and transport movements. These sites were identified by stakeholders as part of their Traffic Management Plans, were assessed for transporting their proposed infrastructure from Port of Newcastle to the three developing REZs (New England, Central West Orana and South-West). The primary constraint considered was the transportation of a 110 m wind turbine blade. The Stage 1A *Wind Farm Supply Chain Logistics – Transport Route Assessment* (2022) report indicated that a preliminary cost estimate would be developed in Stage 1B by GHD to facilitate the movements of such large blades.

The Stage 1A study outlined the constraints and required upgrades at each site, which served as the basis for the preliminary cost estimate in Stage 1B. Specific constraints included the construction of hardstand area for vehicular access over tight corners and kerbs, relocation or modification of signs, power poles, street lighting, and traffic signals, relocation or modification of fencing, and removal of vegetation. Additionally, this report also discussed the following:

- Wind farm industry trends

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- Approvals from local road authorities and landowners for upgrades and access
- Identification of the primary routes from NSW's two main ports to the three main proposed NSW REZs
- Funding model to fund and recover costs for the proposed road upgrades.

1.3.2 Stage 1B works

The previous Stage 1B works included responding to the discussion points raised by TfNSW in their formal response to the Stage 1A *Wind Farm Supply Chain Logistics – Transport Route Assessment* report prepared by GHD in 2022. Additionally, a preliminary cost estimate in Stage 1B was developed to address 20 constrained sites for the transportation of wind turbine blades from Port of Newcastle to the NE REZ. Port Kembla upgrades were not included in this stage.

The Stage 1B *Wind Farm Logistics Study – Stage 2 – New England Renewable Energy Zone* 2023 report includes the constraints identified from the turn paths of vehicles transporting various wind turbine blade sizes beyond the 110 m length considered in Stage 1A. These additional blade sizes ranged from 79 m up to 110 m. Turn paths were developed for the transportation of the wind turbine blades and the results were displayed on aerial imagery for two key factors:

- Hardstand area (required where the trailer wheels sweep over corners and kerbs)
- Property acquisition required (including blade over-sweep outside the road reserve)

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1.4 Scope and purpose of this report

This *OSOM Assessment Report* has been prepared in accordance with the requirements of Section 3.2.1 of the EnergyCo Project SR4276213479 Statement of Requirements (services Brief).

The purpose of the *OSOM Assessment Report* is to identify a suitable OSOM route, identifying and mitigating constraints, with the aim of consolidating OSOM movements for the RNI and generator sites within the REZ. This coordinated approach seeks to minimise impact on road users and reduce road upgrades requirements.

This report details the requirements for transporting OSOM components from the start of the Muswellbrook OSOM detour to the RNI and generator locations identified for the NE REZ.

Considerations in the assessment include:

- Type of transportation vehicles required for the RNI equipment design load(s)
- Materials required and how they are transported
- Transportation of equipment for the RNI construction of transmission towers and switching stations
- Type of transportation vehicles required by NE REZ solar and wind farm generators, including battery and storage utilising the RNI OSOM routes for construction
- Engagement with Generators identified by EnergyCo to understand their proposed OSOM routes and identify the requirements and scope for road upgrades
- Identify priority road upgrades to meet NE REZ and Generator construction timeframes
- Identify any impacted roads and provide assessment of any anticipated upgrades
- Identify any property acquisition requirements in relation to OSOM.
- Propose preferred OSOM network route for NE REZ project

1.5 Assumptions and limitations

1.5.1 Assumptions

The following assumptions were applied in developing this assessment:

- The design vehicles used for the concept & detailed design are:
  - 100m Blade Pinned Trailer Prototype
  - 250T Transformer Vehicle (150T payload plus the trailer/vehicle)
- The vehicle templates, for use in turn path analysis software, of these two design vehicles were provided by EnergyCo. This included an 85m long blade transport vehicle which had been used on other projects.
- Due to limited information available for the 100 m prime mover and trailer combination, as this vehicle is a prototype, the trailer used for the 85 m blade has been extended by about 15 m, along with the blade as a realistic projection for a reasonable assumption for the swept path. As this is a prototype vehicle, the comparisons to real world application is not yet able to be directly confirmed to determine the level of conservatism in the swept path clearances. The exact size, shape and design of the blades are also not known and may vary slightly depending on manufacturer. The provided transformer template is assumed to represent a 250T transformer, as the specific configuration was not detailed. The process to verify and confirm the vehicle configuration for the 250T transformer is currently underway with EnergyCo.
- Vertical clearances have been assessed using a K value of the centre line for Stage 1B.

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- Volumes presented in this report are based on EnergyCo's Data and Assumption Book v2.1 and include all relevant high and medium likelihood projects and the number of turbines, hubs and other key infrastructure components which OSOM vehicle movements are derived from.
- The OSOM movements to the relevant wind farm projects assume that wind turbines with 85 m blades will have 12 OSOM components per wind turbine, and wind turbines with blades greater than 85 m will have 14 OSOM components per wind turbine.
- Number of OSOM movement to the hubs is in accordance with *New England REZ Infrastructure Project Constructability Assessment Report* [Version 4]. Nevertheless, Section 5.8, Table 144 of this report indicated that there would be no transformer movements at the East Hub. It is Aurecon's understanding that transformer movements to the East Hub will, in fact, be necessary. Consequently, in line with the assumptions made for the Central Hub, Central South Hub, and North Hub, an additional three OSOM movements have been included for the East Hub. The ultimate OSOM movements per Hub per stage are provided in Table 3-1.

1.5.2 Limitations

- The transportation of the components adopted for the New England REZ were obtained from an examination of various sources, including:
  - Desktop study of similar renewable energy initiatives
  - A review of the Port to REZ and Central West Orana equipment
  - Discussions through EnergyCo on generators to confirm sizes of components
  - Feedback from EnergyCo and the Aurecon Energy TA in relation to specific needs for the NE REZ
- Details of vehicle types and loads are outlined Section 2. These details are digitised into AutoTURN 11.04. AutoTURN provides for customisation of vehicles and loads enabling 2D simulation of vehicle paths. These turn paths are used for assessment of lateral clearances. AutoTURN Pro provides for vehicle and load tracking points and 3D simulation of vehicle paths. These turn paths are used for vertical clearance checks.

  AutoTURN currently has limitations in the creation of highly customised and unusual vehicles used for this project and the exact vehicle details could not be replicated in the software. Similar behaving vehicles have been selected and modified to map a turn path that closely resembles the vehicles' dimensions and behaviours. The limitations and impacts/ mitigation measures are:
  - Front axles of the trailer cannot steer independently → more conservative swept paths
  - Number of articulation points → more conservative swept paths
  - Display of vehicle (prime mover outline) → display issue only
  - Limitation of axles → tracking points created for each missing wheel to ensure the swept paths show all tire tracking paths.
- Utility and biodiversity survey information was provided in the 20210406_Thunderbolt Energy Hub_All Intersections.dwg and was limited to the intersections in the Muswellbrook OSOM detour and Tamworth OSOM detour. Information for utility and biodiversity, such as vegetation, along the remaining routes were sourced from publicly available sources.
- Cadastral survey information was provided in the Stage 1B (Muswellbrook detour) Cadastral from generators.dwg and was limited to the intersections in the Muswellbrook OSOM detour and Tamworth OSOM detour. Cadastral information along the remaining routes were provided by the Aurecon GIS team using publicly available sources such as Department of Customer Service Spatial Services. The publicly available sources contained boundaries that were out of alignment at various locations. Where the cadastral boundary appears to be incorrect, visible fence alignments in the aerial imagery have been used. It is recommended that a lot / DP survey is undertaken to confirm the cadastral boundary before proceeding to detailed design.

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- Aerial images sourced from Nearmap are outdated or not covered on New England Highway, for the sections outlined below. Publicly available sources were used as alternatives.
- Between Common Road, Scone and Colly Creek Road, Willow Tree were limited to aerials dated 2015
- Between Colly Creek Road, Willow Tree and Duri Dungowan Road, Timbumburi, Nearmap coverage was not provided. The aerial within the AutoCAD Geolocation function at the time of the assessment was utilised.
- Between Schofield Road, Moonbi and Waterworks Road, Uralla, Nearmap coverage was not provided. The aerial within the AutoCAD Geolocation function at the time of the assessment was utilised.
- The consultation with the generator project owners and road authorities were completed by EnergyCo coordination team and the feedback from these stakeholders was communicated to our team and incorporated in the assessment
- The scope of this assessment is limited to Stage 1B and Stage 2 of the NE REZ project as detailed in Section 3.2 for the locations and in Section 3.3 for the OSOM movements across the two stages. Our understanding is that the Port to REZ up to Stage 1B was covered under CWO for both transformer and 100m blade as outlined throughout report and assumptions. For Stage 1B to Hubs the various 100m blade AND transformer have been assessed.
- The scope of this assessment is as per agreement with EnergyCo to cover from Stage 1B works through to the transmission lines, hubs, and generator sites within the NE REZ as outlined in the November 2024 mapping. As such, this analysis excludes Stage 1A OSOM movements. The section of the network between Port and Stage 1B will need to cater for the cumulative impacts of the NE REZ and CWO sites. OSOM movements from the Port of Newcastle, will require further assessment to ensure capacity and sustainability.
- Vehicle return trips for transformer vehicles movements from hub to port have not been assessed as they can close to be 25 m long and 3 m wide. This can be accommodated along existing heavy vehicle routes. Swept paths have not been carried out at this stage.
- This report is focused on the OSOM movements assessment for the following sites and location as detailed outline in Table 1-1 and throughout the report.

Table 1-1: Report Scope

Consideration	Hubs	Northern Connection	Transmission Lines	Generator Sites (Solar farms, Windfarms (incl. blades), BESS, etc)
Traffic – OSOM movements	✓	✓	✓	✓ [redacted]

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2 Oversize and overmass components

The transportation of renewable energy zone components relies on specialised oversize and/or overmass (OSOM) vehicles traversing the road network. A thorough understanding of this transportation involves examining the physical characteristics of the components and the specifics of the transport equipment used. These parameters fundamentally determine transportation constraints and inform the scope of assessment for identifying priority upgrades to the critical road network routes

2.1 Wind turbines

Each wind turbine will include the following component which will require an OSOM movement to transfer the component to the nominated site:

2.1.1 Wind turbine blades

It's a requirement to undertake all assessments based on 100m long blades for NE REZ.

Figure 2-1: Wind turbine blade component

The Central West Orana REZ limit the length of the wind turbine blades to 85 m, however the intersections between Port of Newcastle and the Denman Road / Bengalla Road intersection have been assessed with 100 m blades. Figure 2-2 shows the vehicle specifications of the 100 m blade transportation vehicle.

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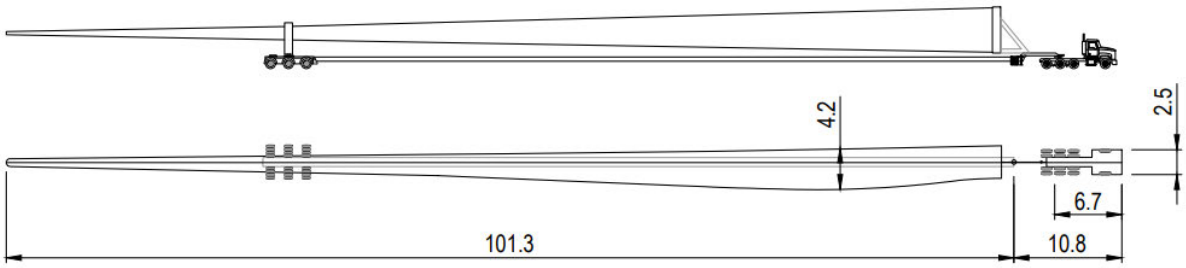

Figure 2-2: Vehicle specifications of the 100 m blade transportation vehicle template

2.1.2 Towers

The components and transportation of the components for the wind turbine towers were adopted from the Central West Orana Stage 1A design report. From this report Rex J Andrews (RJA) confirmed that Vestas T3 Mid2 tower 87T trailer is the worst-case vehicle using the Stage 1A detour. Figure 2-3 shows RJA's vehicle specifications of the Vesta T3 Mid2 Tower 87T trailer. Refer to Figure 2-4 for dimensions of the AutoTURN template created and Figure 2-5 for a turning movement.

Tower component lengths fully depend on the design and construction of the tower and can be modified in size to take route constraints into consideration, but longer segments are preferred to reduce the number of segments. Based on a review of collated wind farm projects and their blade transportation vehicle AutoTurn templates and dimensions, the key constraints were identified.

The NE REZ considers wind turbine blades up to 100 m in length, and it is likely wind tower segments will be longer for 100 m blades. It is also noted with increased tower heights; the base diameter may be impacted and will either need to increase in size or width of material to provide the required strength. Physical height limitations leaving the port of Newcastle will likely dictate the size of these components. These constraints were then used to assess the OSOM routes for NE REZ across the available vehicle combinations. Further to the assessments undertaken, a review of RJA provided information recommended to check the above vehicle with an additional 4 m length to provide greater flexibility.

For the components going to the NE REZ sites, the increased length of the turbine blades to 100m result in the blade being the worst-case vehicle. Even with the additional 4m in tower length, the blade length and transformer size were still greater for the 5.9 m max tower body assessed and were identified as the key constraints for this assessment. As such, broader tower sections have not been assessed along the route as part of this assessment.

Noting that 6.5 m is a fixed constraint on the Hunter Expressway (which is the previously identified maximum achieved vertical clearance along the Port to REZ route), the design of the tower base for a 100 m blade should be developed such that the maximum vertical clearance of 6.5 m can be achieved.

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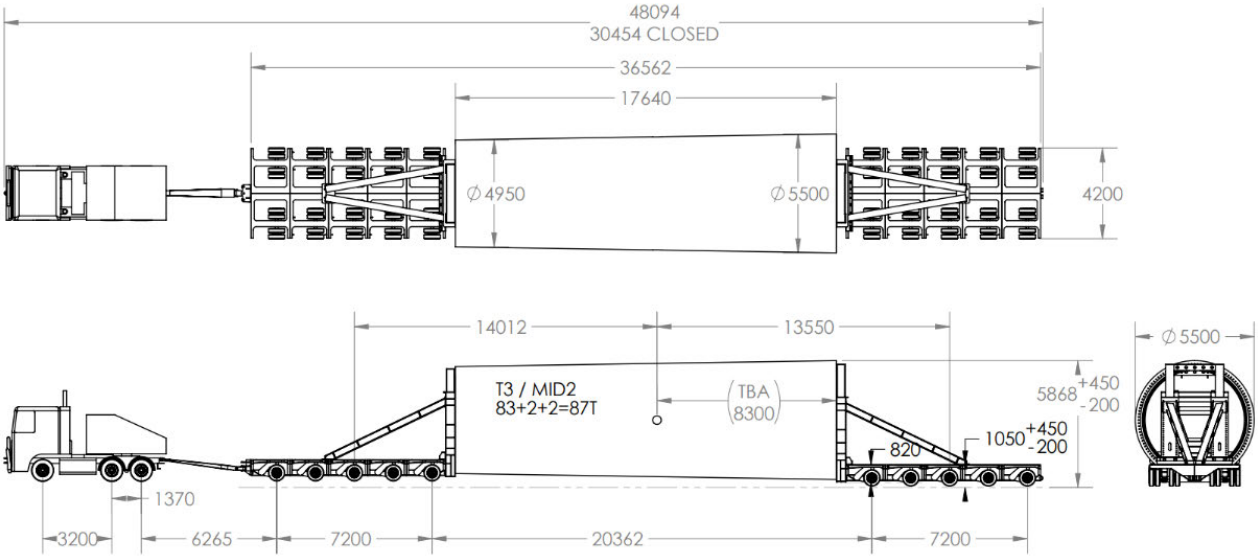

Figure 2-3: Vehicle specifications of the Vesta T3 Mid2 Tower 87T trailer (Source: RJA as provided in P2R Vehicle specifications and template v2)

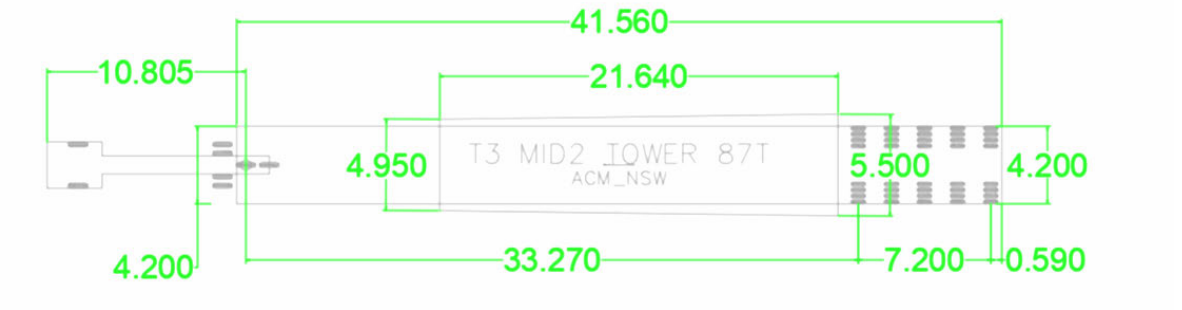

Figure 2-4: Vesta T3 Mid2 Tower 87T trailer AutoTURN template (Source: P2R Vehicle specifications and template v2)

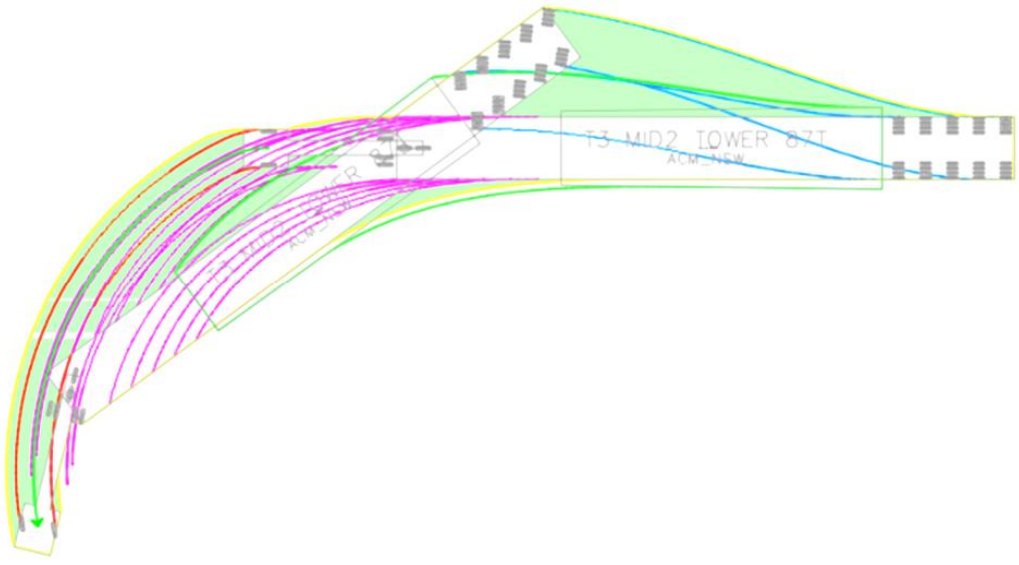

Figure 2-5: Vesta T3 Mid2 Tower 87T trailer turning movement (Source: P2R Vehicle specifications and template v2)

2.1.3 Transformers

EnergyCo and Aurecon's Energy TA provided details of transformers. The transformers considered are outlined in Table 2-1 and the dimensions of the 250T transformer vehicle are shown in Figure 2-6.

The exciter transformers pose a challenge due to their height exceeding the clearance of existing bridges. Notably, the Hunter Expressway has a fixed clearance constraint of 6.5 m. Therefore, the transformers should be designed to fit within the available envelope.

Table 2-1: Dimensions of transformer

ConEd 575 +/-40°:	Series Transformer	Exciter Transformer
Shipping mass of transformer without oil [t]	239	254
Length [mm]	9,589	13,437
Width [mm]	3,802	4,170
Height [mm]	4,754	7,754

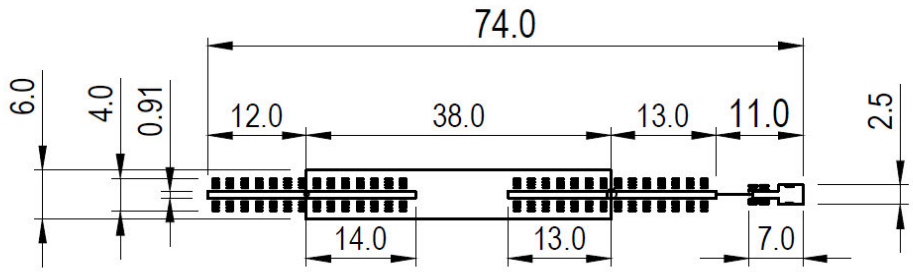

Figure 2-6: Dimensions of transformer vehicle template

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2.1.4 Nacelle

Based on the information provided by EnergyCo during the assessment period, six different nacelle transportation vehicles were evaluated. None of these vehicles present any constraining factors and are well within the global constraints established for this assessment. The identified global constraints include a blade length of 100 meters, a tower requiring a vertical clearance of 6.5 meters, and a transformer vehicle mass of 250 tonnes. Consequently, the transportation of the nacelle will be accommodated within the road upgrade works required for the blades and transformer, without any additional impact during transportation. The vehicle configuration will resemble a low trailer, similar to the arrangement shown below in Figure 2-7.

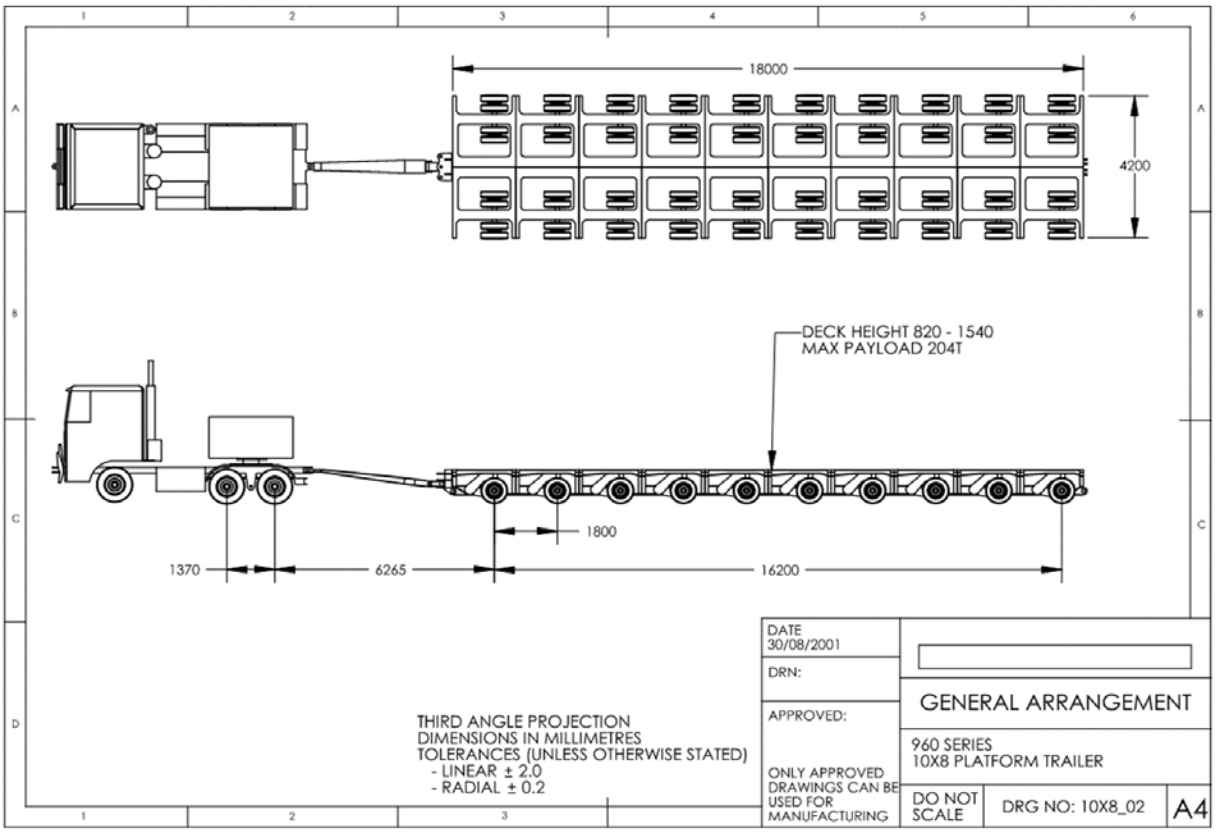

Figure 2-7: Example of nacelle transportation vehicle (Source: Wind Farm Supply Chain Logistics – Transport Route Assessment)

2.2 Summary of components

Table 2-2 outlines the principal characteristics and considerations pertinent to wind turbine components and ancillary infrastructure essential for wind farm development.

Table 2-2: Characteristics of wind farm components

Component	Method of transport	Main physical constraint	Range
Blade	Specialised OSOM vehicle – blade lengthways	Length	Limited to the route height clearance of 6.5 m Up to 100 m length Up to 4.2 m width
Tower	Specialised OSOM vehicle – tower section on its side	Height	Limited to the route height clearance of 6.5 m Up to 5.9 m width
Transformer	Specialised OSOM vehicle	Weight	Up to 250 tonnes Limited to the route height clearance of 6.5 m Up to 4.17 m width

Current a

Component	Method of transport	Main physical constraint	Range
Nacelle	Specialised OSOM vehicle	Length	Limited to the route height clearance of 6.5 m Up to 49 m length Up to 5 m width
Ancillary infrastructure components essential for wind farm developments			
Synchronous condensers	Specialised OSOM vehicle	Weight	Up to 200 tonnes

Due to the size and vehicle configurations required for the transportation of the blades and transformers, these two components have been considered as the key components that will determine the level of road upgrades required. The vehicle configurations required for the movement of the blades and transformers are the subject of this OSOM assessment. The transportation of the other components such as tower sections and the synchronous condensers will be contained within the road upgrade works required for the blades and transformer.

3 Origin and destination of OSOM movements

This section outlines the origin and destination of OSOM movements, starting from the Port of Newcastle to the wind farms, RNI and other generator projects within the boundaries of the NE REZ.

The OSOM route selection and assessment from Port of Newcastle to intersection of Bengalla Road and Wybong Road was documented as part of the CWO REZ Stage 1A. These works accounted for a 100m blade length with 6.5 m vertical clearance. Works for the NE REZ OSOM assessment are to the north of this intersection.

In addition, OSOM routes assessments for the Thunderbolt Energy Hub and Winterbourne Wind Farm, were also undertaken by others, are summarised below in Section 3.4.1 and 3.4.2, respectively.

Routes assessed for the NE REZ are summarised in section 6 and detailed throughout this report.

3.1 Ports of Discharge

This OSOM assessment aligns and acts as a continuation to the previous Stage 1A works, which have been summarised in Section 1.3. The previous works identified the primary port of discharge for the components of the wind farm infrastructure, and OSOM components as the Port of Newcastle.

The Port of Newcastle, located on the east coast of New South Wales (NSW), is a critical logistics hub for the importation and transportation of wind turbine blades. The port's infrastructure and capabilities are tailored to manage the unique requirements of handling oversized components, thereby playing a vital role in the renewable energy supply chain.

The Mayfield Precinct, specifically the Mayfield 4 Berth is currently a viable and preferred option for the delivery, storge and transportation of wind turbine infrastructure, including blades and towers. Mayfield 4 Berth is a common-use facility that offers services tailored to specific projects utilising its existing infrastructure. It is also strategically connected to both national rail and road networks. The berth is equipped with two Liebherr 550 tonne mobile harbour cranes, which feature lift assistance systems capable of handling a wide variety of project cargo. These cranes can also operate in tandem for handling heavy lifts.

The Berth details are as follows:

- Berth length: 265m
- Berth depth: 12.8m
- Channel depth: 15.2m

An aerial view of the Mayfield 4 Berth is provided in Figure 3-1 and the Port of Newcastle port map and precincts are shown in Figure 3-2.

Current as of 1/04/2025

Figure 3-1: Aerial view of Mayfield 4 Berth (Image source: Nearmap, 2024)

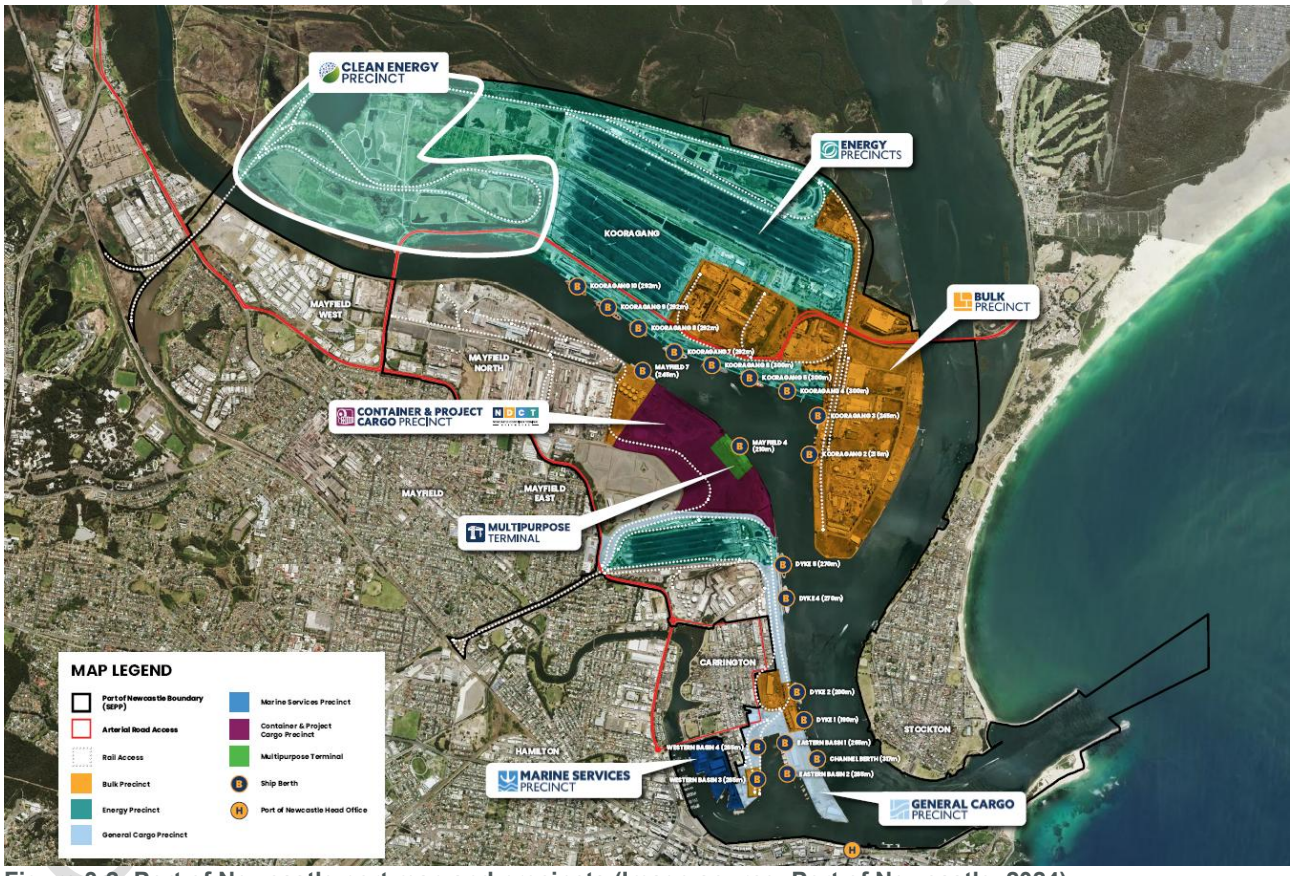

Figure 3-2: Port of Newcastle port map and precincts (Image source: Port of Newcastle, 2024)

[redacted]

3.2.3 Return to Port of Newcastle

Although some vehicles have trailers with extendable trays that can be folded and pinned. The closed assembly reduces the length of the vehicle to less than 26 metres and the width to 3.4 metres. A typical folded assembly is shown in Figure 3-5. Once the trailers are closed, vehicles can return to the port as normal heavy vehicles. They can utilise the standard highway network and do not need to take the OSOM detours that they travelled in delivering the equipment. Travel times back to the Port of Newcastle should be completed in 6 hours or less with consideration of travel time constraints as outlines in Section 5.3

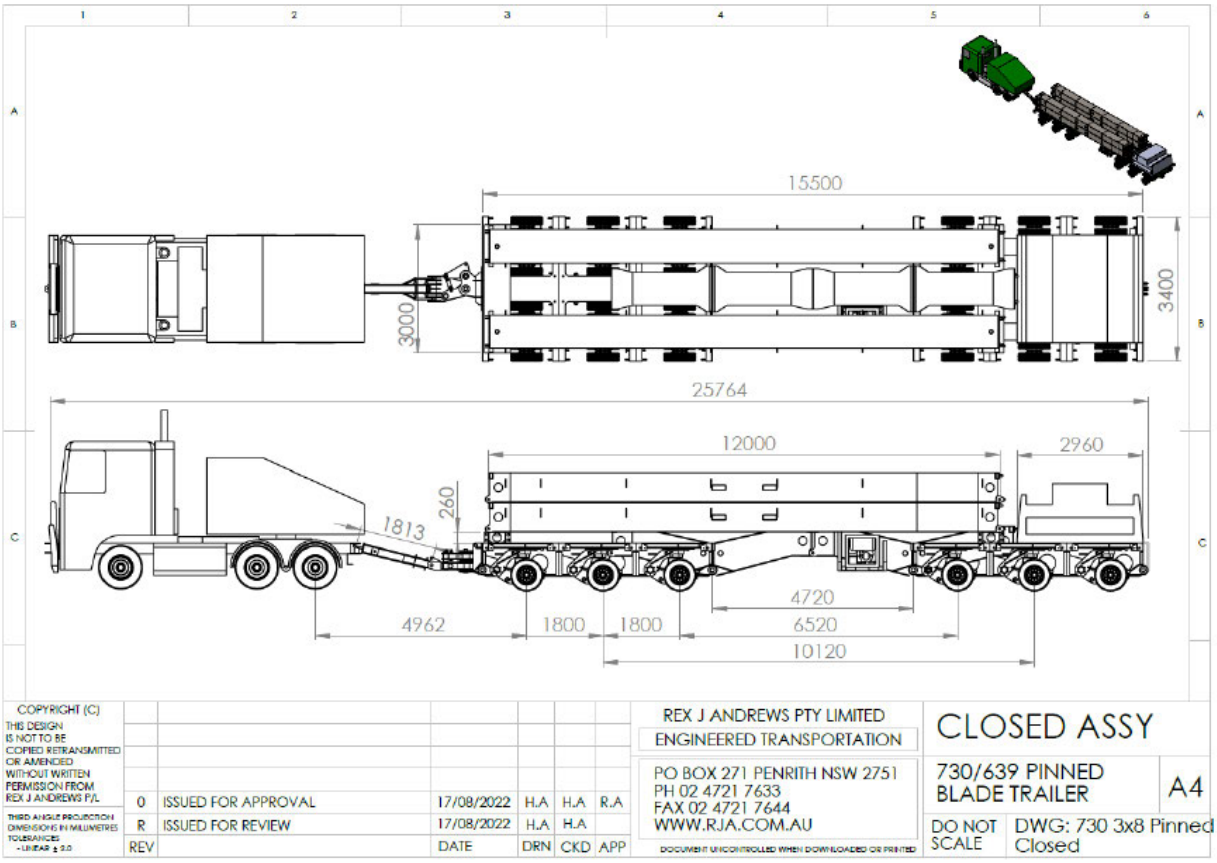

Figure 3-5: Closed / Reduced assembly OSOM Trailer (Source: Central West Orana Renewable Energy Zone – Port to REZ Road Upgrade Program)

Current as of 1

[redacted]

4 Assessment methodology

This section outlines the methodology followed for the OSOM assessment, and outlines the data sources utilised, the routes assessed, any limitations and uncertainties, and assumptions made.

4.1 OSOM assessment approach

The aim of this assessment is to identify a suitable OSOM route for the Hubs, switching station, transmission lines and the key generator projects and quantify the required level of road upgrades along the routes. The approach adopted for each component of this OSOM assessment is summarised in Table 4-1.

Table 4-1: OSOM assessment methodology

OSOM assessment component	Approach
Literature review	A review of previous studies including, logistics and generator OSOM assessments, was undertaken to identify any gaps. The reports generated by the previous assessments were reviewed and are outlined in Table 4-2.
Assessment of OSOM routes with turn paths using AutoTURN	The turn paths along the OSOM routes were assessed using AutoTURN software. The vehicle templates were provided to Aurecon and were used for previous CWO assessments were also adopted for this assessment. The objective of this turn path assessments is to understand the level of impact to: ■ Vegetation impacts ■ Property acquisition ■ Easement acquisition ■ Properties impacted ■ Hardstand area ■ Utility impacts ■ Other impacts (Culverts, drainage, and so on) Options were developed for a number of route or detour locations to assess the different road upgrade works that would be required

OSOM assessment component	Approach
Summary of critical points along the north / south NE REZ route	The vehicle movements and road upgrade works required at identified critical points along the route were documented. The summary of the vehicle movements at critical points includes: ■ The movement location or intersection ■ The aerial at the movement location or intersection with the movement shown ■ The coordinates (both Decimal Degree (DD) and Degrees, Minutes, Seconds (DMS) coordinate systems have been provided) ■ The movement procedure at each identified location ■ Any restrictions that may apply at each location or intersection, such as vertical clearances, bridges or culverts.
Documentation of impacts	Locations requiring road upgrade works along the route are discussed in detail and the modification works required are outlined. A summary of each section of the route is provided which provides a high-level insight into the following: ■ Vegetation impacts ■ Property acquisition ■ Easement acquisition ■ Number of Properties impacted ■ Additional hardstand area required for movements ■ Road conditions ■ Utility impacts ■ Other impacts (Culverts, drainage)
Route consolidation within NE REZ	Identifying a suitable route option to service RNI and generator projects with likelihood of high and medium, based on the following criteria: ■ Using state routes and roads with higher road hierarchy ■ Providing key connection to multiple projects ■ Deviating traffic from town centres and residential areas where practically possible ■ Vegetation impact and construction complexity ■ Feedback from Authorities such as TfNSW and Councils

Current as of 2025

<table>
<tr><th>OSOM assessment component</th><th>Approach</th></tr>
<tr><td>Layby locations</td><td>
Two types of road side facilities are presented as part of this project:
Laybys - Areas that equipped with rest facilities to enable drivers taking regular breaks in accordance with the journey management plans and to adhere to TfNSW OSOM permit conditions.
Pull off areas - is a safe area for loads to stop along the route to reduce queuing and travel delay.

The majority of OSOM movement are planned for the late night/ early morning. If movements are undertaken during higher volume daylight hours the overall OSOM travel time between laybys will mostly be impacted be the increased need to pull over to allow other vehicles to pass. Given the small percentage of OSOM vehicles traveling during daylight hours the number of laybys is not expected to be impacted. This may need refinement based on the final strategy selected but the headways for daylight movements are expected to be further apart so increased travel time will be offset by reduced number of OSOM convoys.

The queuing length formed as a result of the OSOM movement will be calculated based on the following:
■ Determine the hourly traffic volume in the direction of travel at the time of the works from survey and project cumulative assessment (where appropriate)
■ Divide the hourly traffic volume by 60 to determine the vehicles expected every minute.
■ Determine the length of time that vehicles will be required to stop (this includes stop time for work reasons and clearance times)
■ Multiply this number by the vehicles expected per minute (i.e. vehicles per minute X number of minutes):
■ Determine the types of vehicles that will be using the road and multiply its length by the number (include a 3 m space between each vehicle)
<table>
<tr><th>Vehicle type</th><th>Approximate length</th></tr>
<tr><td>Car</td><td>5.5 m</td></tr>
<tr><td>Truck/Bus</td><td>14 m</td></tr>
<tr><td>B Double</td><td>26 m</td></tr>
</table>

The impact of OSOM vehicle movements on other road users can be measured in terms of either delay or maximum queue length (number of vehicles). Indicative Level Of Service (LOS) is as follows:
■ Delay to other road users - maximum 5 minutes additional travel time (especially relevant on higher trafficked roads).
■ Maximum queue length - 50 vehicles considering the cumulative movements (during the expected OSOM operating hours) The practicality of achieving these indicative LOS targets depends on consideration of factors such as class/importance of the road, traffic volume (daily and peak hour), general traffic speed, OSOM vehicle speed, number and duration of OSOM movements and funding available for infrastructure. Road volumes during the operating hours of the OSOM are outlined in Section 8.
</td></tr>
</table>

5 Additional requirements

5.1 Roles and responsibilities

For every movement of an OSOM vehicle, arrangements for pilot and police support are necessary. The specific roles and responsibilities of the involved parties during these movements are outlined below:

Pilot vehicles: Operated by certified and trained drivers, pilot vehicles will lead the OSOM vehicle from both the front and rear, manage the queue of vehicles following the convoy, and support police in traffic management at critical points as needed.

Police vehicles: Officers will be responsible for controlling traffic at intersections or their approaches, facilitating the safe passage of OSOM vehicles through these areas as necessary. A 12 month look ahead will be provided to the police to help with resourcing and management.

In accordance with the *Additional Access Conditions – Oversize and overmass heavy vehicles and loads* (TfNSW, 2020) document, load carrying vehicles exceeding a width of 5.5 m and length of 35 m require three pilot vehicles during day time and night time. Additionally, loads six metres wide or wider and or 40 metres long or longer are required to contact police to arrange police escort vehicles as only NSW police have traffic directing powers in NSW.

Given the frequency of OSOM vehicles and consistency of loads (mostly blades and tower components) the project is seeking dispensation from needing a police escort for every load. Upgrades to infrastructure and agreed traffic management are proposed in most cases to enable self-management of the OSOM convoys. These will be refined by the network operator once the routes are agreed in the next stages as the delivery methodology is detailed.

5.2 Driver Fatigue Management

To effectively manage fatigue, drivers must adhere to strict rest requirements based on their working hours. Drivers must rest for at least 15 minutes for every five hours of work, 60 minutes for every 10 hours and working a maximum of 12 hours in a day. Under the standard fatigue management, heavy vehicle regulation truck drivers must follow breaks according to the Heavy Vehicle Fatigue Management. In a 24-hour period, you must have at least 12 hours of rest time. These 12 hours of rest must include:

- Drivers must take a 15-minute rest break after working 5.25 hours
- Drivers must take a 30-minute rest break after working 7.5 hours, with at least 15 minutes of that break being continuous
- At least 7 hours of non-work time in any 24-hour period spent driving or stationary

The National Heavy Vehicle Regulator (NHVR) has established stringent guidelines for the management of driver fatigue. For solo drivers who have successfully completed the Basic Fatigue Management (BFM) accreditation module under the National Heavy Vehicle Accreditation Scheme (NHVAS), the associated fatigue management requirements are outlined in Table 5-1. Based on the size of the vehicles and expected status of professional driver involved, it is envisaged that all drivers will have the completed fatigue management accreditation.

Current as of 11/04/2025

Table 5-1: NHVR BFM Solo drivers fatigue management requirements

Time (In any period of)	Work (A driver must not work for more than a maximum of)	Rest (And must have the rest of that period off work with at least a minimum rest break of)
6 ¼ hours	6 hours work time	15 continuous minutes rest time
9 hours	8 1/2 hours work time	30 minutes rest time in blocks of 15 continuous minutes
12 hours	11 hours work time	60 minutes rest time in blocks of 15 continuous minutes
24 hours	14 hours work time	7 continuous hours stationary rest time
7 days	36 hours long/night work time	No limit has been set
14 days	144 hours work time	24 continuous hours stationary rest time taken after no more than 84 hours work time and 24 continuous hours stationary rest time and 2 x night rest breaks and 2 x night rest breaks taken on consecutive days

- Stationary rest time is the time a driver spends out of a regulated vehicle or in an approved sleeper berth of a stationary regulated heavy vehicle.
- Long / night work time is any work time (outside of the period of midnight to 6:00 AM) that is in excess of 12 hours of work in a 24-hour period or any work time between midnight and 6:00 AM (or the equivalent hours in the time zone of the base of a driver).
- Night rest breaks are seven continuous stationary rest time taken between the hours of 10:00 PM on a day and 8:00 AM on the next day (using the time zone of the base of the driver) or a 24 continuous stationary rest break.
- OSOM movements will be undertaken by specialised drivers who will be accredited. Drivers will have route awareness and familiarity due to the expected frequency of OSOM movements along NE REZ. Their experience allows them to anticipate conditions and mitigate fatigue risks effectively. These accredited professionals adhere to NHVR regulations and fatigue management protocols, safely managing fatigue within the BFM framework. Given their expertise, route consistency and expected frequency of OSOM movements (as mentioned in Section 8.4), an Advanced Fatigue Management (AFM) model will be implemented to optimise work-rest arrangements while maintaining safety and aligning with NHVR's performance-based approach.

The AFM model allows the NHVR to give non-prescriptive, tailored work and rest arrangements to operators who adopt a performance-based risk management approach to managing driver fatigue. Operators can propose their own work and rest hours based on their operational needs rather than using the prescribed hours stated in the Heavy Vehicle National Law (HVNL). When assessing an AFM application, the NHVR assess whether the operator's fatigue management system adheres to the following principles:

- **Principles 1 & 2:** Focus on work-related rest breaks from driving within the defined 'work opportunity'.
  - Principle 1: Reduce the time spent continuously working in the work opportunity.
  - Principle 2: The more frequent breaks from driving, the better.
- **Principles 3, 4, 5 & 6:** Focus on sleep opportunities between work opportunities.
  - Principle 3: Ensure an adequate sleep opportunity in order to obtain sufficient sleep.
  - Principle 4: Maximise adequate night sleep.
  - Principle 5: Minimise shifts ending between 00:00-06:00.
  - Principle 6: Minimise extended shifts.
- **Principle 7:** Relates to breaks in sequences of work opportunities to reduce the likelihood of an accumulation of unsafe levels of fatigue over an extended sequence of shifts.
  - Principle 7: Prevent accumulation of fatigue with reset breaks of at least 30hrs (and include two-night periods, 6:00 am) between work sequences.

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5.3 Travel time constraints

Certain travel restrictions apply to roads at specific times of the day, which are mandated by the NHVR *NSW Class 1 Load Carrying Vehicle Operator's Guide*. A summary of the relevant constraints is listed below.

The constraints for OSOM vehicles include:

- **Night time travel**: Vehicles exceeding 2.5 m wide or 22 m long may only travel between 9:30 PM and 5:30 AM on the following roads:
  - John Renshaw Drive: between the M1 Pacific Motorway and the New England Highway at Beresfield
  - New England Highway: between Weakleys Drive at Beresfield and Thomas Mitchell Drive (for northbound travel) or Muscle Creek Road (for southbound travel) south of Muswellbrook
  - Hunter Expressway: between the M1 Pacific Motorway (near Seahampton and the New England Highway near Branxton)
  - Golden Highway: Intersection of the new England Highway and parking bay on Jerry Plain Road near Warkworth
- Weekday and peak hour travel – Urban zone
  - Vehicles exceeding 2.5 m width or 22 m in length must not travel on any classified State Road between Monday and Friday (except on a state wide public holiday) between the hours of 5:30 AM and 9:00 AM and between 4:00 PM and 6:00PM.
  - However, despite the above restriction, vehicles not exceeding 3.2 m wide may operate in the Newcastle Outer Zone during peak times between the hours of 5:30 AM and 9:00 AM and between the hours of 4:00 PM and 6:00.
  - For the purposes of this clause, the Newcastle Outer Zone is defined as the area bounded by and including:
    - A line drawn from the Pacific Ocean at Glenrock Lagoon to the intersection of Pacific Highway and Northcott Drive,
    - Northcott Drive, Bridges Road, Turton Road, Hanbury Street
    - along the northern railway line to Watt Street and the Hunter River
    - the Pacific Ocean and the North Channel of the Hunter River, then north from Stockton bridge along
    - Nelson Bay Road to Williamtown, then west along
    - Cabbage Tree Road to Masonite Road near Tomago, then along
    - Masonite Road to the Pacific Highway at Heatherbrae, then south along the
    - Pacific Highway to Hexham, then west along the
    - New England Highway to Weakleys Drive Thornton,
    - Weakleys Drive to the F3 Sydney Newcastle Freeway at Beresfield, then south along
    - F3 Sydney Newcastle Freeway, through the intersection of the F3 Sydney Newcastle Freeway and Palmers Road, to the crossing of MR217 at Dora Creek
    - then Dora Creek and Lake Macquarie to the Pacific Ocean crossing the Pacific Highway at Swansea Bridge.
- **Weekday and peak hour travel restrictions** – Regional zone: Vehicles that are oversize must not travel in the daytime in accordance with the following
  - Vehicles exceeding 3.2 m in width are not permitted to travel during Monday to Friday 5:30 AM to 9:30 AM; and Monday to Friday 3:00 PM to 6:00PM (except on state-wide public holidays), on New England Highway from Weakleys Drive to the Singleton side of the traffic lights at Magpie Street (Bunning's corner) (north of Singleton)

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  - Vehicles exceeding 3.2 m in width are not permitted to travel during Monday to Friday 5:00AM to 9:00 AM; and Monday to Friday 4:00 PM to 6:00 PM (except on state-wide public holidays), on the Hunter Expressway between the M1 Pacific Motorway near Seahampton and the New England Highway near Branxton
- **Weekends and state-wide public holidays** – Regional zone: Vehicles exceeding 2.5 m in width or 22 m in length are not permitted to travel in the daytime on weekends or state-wide public holidays on the following:
  - Putty road from Windsor to Golden Highway near Mount Thorley, travel is not permitted after 8:30 AM
- **Public holiday periods (including 23 December to 3 January)**: Vehicles exceeding 2.5 m in width or 22 m in length are not permitted to travel in the daytime during public holiday periods on the following
  - New England Highway, from Hexham Bridge to Weakleys Drive
  - Golden Highway, from New England Highway to Dubbo
  - Oxley Highway, from Port Macquarie to Coonabarabran
  - Hunter Expressway, between the M1 Pacific Motorway near Seahampton and the New England Highway near Branxton

While the preference had been for night time operation, given the locations of these constraints which occur primarily outside of the preferred OSOM route, there may be an opportunity for some OSOM movements during the day with considerations of any additional constraints raised by councils such as not during school bus times or peak traffic periods, that is, not between 6AM – 10AM or 3PM – 6PM. Section 8.4 provides details of weekday traffic profiles, outlining the low traffic volume periods as identified in Figure 8-3.

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6 New England REZ OSOM route options assessed

This report presents the outcomes of an extensive assessment conducted for the movement of oversize overmass (OSOM) vehicles associated with the development of the NE REZ and multiple renewable sites. As mentioned in Section 3.4, the link from Port Newcastle to Muswellbrook was previously assessed for a 100 m blade and thus mark the starting point for this assessment. A comprehensive route analysis was undertaken to evaluate the feasibility of potential routes linking from Muswellbrook to north of Armidale. This assessment considered a multitude of factors critical to the successful transportation of oversized equipment, including the vertical clearance or a maximum loaded height of 6.5 m. This clearance is based on the vertical clearance identified in the Port to REZ route assessment previously undertaken.

Key considerations included the specific vehicle requirements necessary for each route, ensuring compliance with safety and operational standards. Timing implications were also examined to determine optimal travel windows, allowing for efficient logistics while adhering to any access restrictions or curfews that may affect movement.

Furthermore, the analysis addressed various physical constraints along the proposed routes, such as road widths, heights, and structural integrity of bridges and overpasses. Compliance with the National Heavy Vehicle Regulator (NHVR) legislation was a primary focus, ensuring all movements met regulatory standards governing OSOM transport, refer to Section 10.

Stakeholder preferences were also instrumental in shaping our evaluation as engagement with the state road authority, local authorities, and relevant organisations was conducted by EnergyCo to align project objectives with the interests and concerns of those affected by the transportation activities.

This thorough assessment ultimately aims to identify the most viable and efficient routes for OSOM convoys, maximising operational effectiveness while managing disruption to the local environment and community. Section 11.7 provides a summary of the comparative assessment undertaken in identifying the preferred OSOM routes, with further details of the comparative assessment provided in **Appendix R**.

The capacity assessments of the existing bridges along the OSOM routes are currently on-going, refer to **Appendix Q** for the list of structures that will require an assessment. A technical memorandum will be prepared to identify all required upgrade works to existing bridges along the OSOM route (including geometrical or structural modification).

The existing bridges along Muswellbrook OSOM detour route is being carried out and documented in the OSOM Bridge Assessment – Stage 1B design report (*NEREZRUA-A00-REP-BG-0001-STAGE1B_OSOM_BRIDGE_ASSESSMENT_MSC01*). Refer to this report for the assumptions, assessment methodology, and outcomes of the bridge assessments along the Muswellbrook OSOM detour route.

A summary of the route options assessed in this report are summarised in Table 6-1 and are shown in Figure 6-1. The preferred OSOM routes resulting from the assessments are shown in Figure 6-2. Local routes branching off from this core north / south route are further discussed in Section 7. **Appendix A** provides an A3 version of the assessed route options. The Significance of impacts are relative to each other for the purposed of options selection and preferred route refinement.

For utilities:

- Minor impacts relate to localised low voltage impacts such as street light and isolated overhead wires.
- Moderate impacts relate to power pole impacts or multiple street lights, and
- Major would relate to trunk main or high voltage relocations.

For environmental impacts:

- Minor impacts relate to localised pruning and shrubs removal
- Moderate impacts relate to removal of serval trees and / or larger gras land areas.
- Major would relate to removal of significant number of trees.

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The OSOM route options in the LGAs of Muswellbrook Shire, Tamworth Regional, Uralla Shire, Walcha and Armidale are discussed in the following subsections.

Table 6-1: NE REZ OSOM route options

LGA	OSOM route options
Muswellbrook Shire	■ New England Highway ■ [redacted]
Upper Hunter Shire	■ New England Highway
Liverpool Plains Shire	■ New England Highway
Tamworth Regional	■ New England Highway ■ Tamworth Detour Options – OSOM route via Tamworth town – OSOM detour via Burgmanns Lane ■ Sub-option OSOM detour via Back Kootingal Road – OSOM detour via Whitehouse Lane ■ Sub-option OSOM detour via Back Kootingal Road
Uralla Shire	■ New England Highway ■ [redacted]
Walcha	■ New England Highway ■ [redacted]

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LGA	OSOM route options
Armidale	■ New England Highway ■ [redacted]

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6.3 Tamworth OSOM route options

Three main options were assessed for the OSOM detour at Tamworth, with an additional detour sub-option assessed for manoeuvring as well as connecting back to New England Highway. Figure 6-6 and Table 6-6 below summarise the options considered for OSOM vehicles around Tamworth. For Burgmanns Lane and Whitehouse Lane options, the sub-options considered for reconnecting to New England Highway are through Nundle Road (New England Highway Sub-Option) or through Back Kootingal Road (Back Kootingal Road Sub-Option).

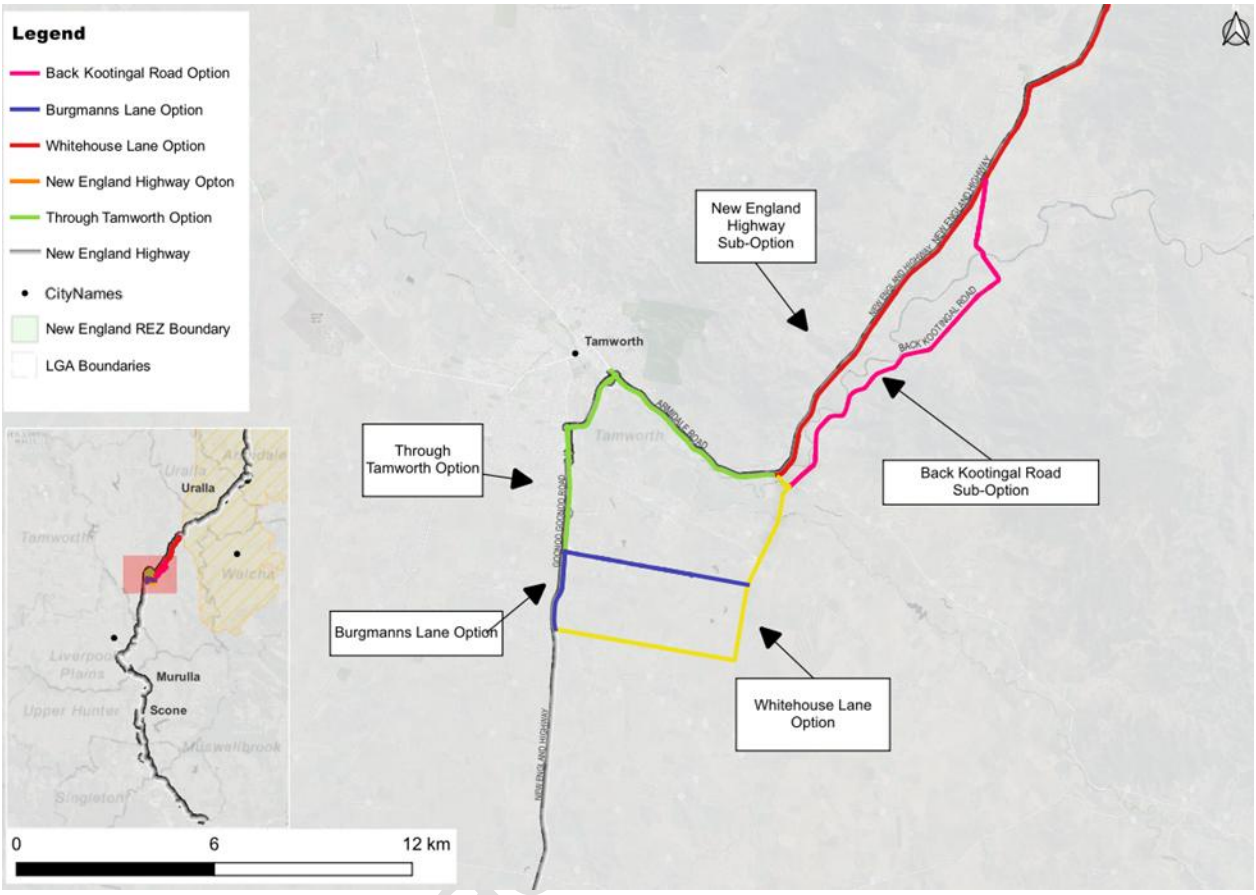

Figure 6-6: Tamworth OSOM route options (Image source: Esri Grey/Open Street Map)

Current as

Table 6-6: Tamworth OSOM route options key constraints

	OSOM route via Tamworth town New England Highway / Scott Road / Murray Street / Marius Street / New England Highway	**OSOM detour via Whitehouse Lane** **(Preferred route)** New England Highway / Whitehouse Lane / Marsden Park Road / O'Briens Lane / Nundle Road / New England Highway	**OSOM detour via Burgmanns Lane** New England Highway / Burgmanns Lane / New Road / Marsden Park Road / O'Briens Lane / Nundle Road / New England Highway
Key constraints	▪ Minimum 2 complete property acquisitions including minimum of 2 major buildings (including commercial and government property). ▪ Minimum 3 partial acquisitions with very close physical impacts to existing buildings. ▪ 4 x roundabouts require modifications. ▪ 1 x existing bridge requiring load assessment. ▪ Major community impacts.	▪ 9 x existing bridges likely to require minor upgrades ▪ Property acquisition limited to at-intersections only ▪ More residential properties along the street compared to Burgmanns Lane but most houses are setback considerably from the road. ▪ 1 x building impact and full property acquisition at Nundle Road / NE Hwy (common to both options)	▪ 2 x new bridges to be constructed and notable vegetation and property ▪ Road has poor drainage / flooding performance compared to Whitehouse Lane ▪ Portion of new road required to be constructed and new road reserve to be acquired. ▪ 1 x building impact and full property acquisition at Nundle Road / NE Hwy (common to both options)

In addition to the above OSOM route options, an additional OSOM detour via Back Kootingal Road was assessed as part of Whitehouse Lane and Burgmanns Lane detour to connect O'Briens Lane to New England Highway. However, this route option was discounted due to the large technical and vegetation impacts associated with it.

The proposed OSOM detour via Whitehouse Lane, along the New England Highway, Whitehouse Lane, Marsden Park Road, O'Briens Lane, Nundle Road back to New England Highway minimises the impacts on the township of Tamworth and minimises the area of hardstand or paving required, thereby reducing the vegetation impact.

Similar to the OSOM detour route via [redacted], this route necessitates practical upgrades at key locations. The major consideration along this route is the existing bridge on Nundle Road, over Cockburn River due to its proximity to the Nundle Road intersection with New England Highway which OSOM vehicles will be required to turn at. However, OSOM vehicle movements can be accommodated at this location with upgrades. Therefore, the OSOM detour via Whitehouse Lane is the preferred option due to its directness and minimised impacts compared to the other options. A description and summary of the preferred route is provided in section 6.3.3. The major impacts along the OSOM route via Tamworth town and OSOM detour via Burgmanns Lane are discussed in the following subsections.

A detailed comparison of the assessed route details and options has been undertaken, as provided in below Table 6-7. The table provides a comparative assessment with high-level overview and approximation of impacts identified in the route selection. Section 11.7 provides a summary of the route options considered for the OSOM study, with Appendix R providing the detail version.

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Table 6-7: Tamworth OSOM detour route option assessment

Assessment Details and Criteria	Option 1 - Through Tamworth Town	Option 2 - Detour via Whitehouse Lane (Preferred route)	Option 3 - Detour via Brugmanns Lane
Option Description	Scott Street, Marius Street, New England Highway	New England Highway, Whitehouse Lane, Marsden Park Road, O'Brien's Lane, Nundle Road, New England Highway	England Highway, Burgmanns Lane, O'Briens Lane, Nundle Road
Route Length (km)	11.3	11.8	11.9
Purpose of route within REZ Network	Access to RNI locations and all generator projects (12 projects)	Access to RNI locations and all generator projects (12 projects)	Access to RNI locations and all generator projects (12 projects)
Key constraint(s)	Travels through town centre and has residential property impacts	Two turn path options were evaluated at the Goonoo intersection, both requiring full acquisition and demolition of a residential property	Poor drainage/flooding
Technical			
No. of locations requiring road upgrades	6 Locations	6 Locations	6 Locations 1 New Access Road
Pavement / Hardstand area (min m^2)	1,789 to 3,076*	9,468 to 11,082*	15,862 to 15,970*
Road Structure and Utilities Impacts	Likely to have impact to multiple overhead utilities Impacts existing roundabouts and vegetated dividing medians	No overhead structures impacted. Multiple overhead utilities identified along route, clearance to be verified as modification works may be required. * 4 to 6 power pole to be relocated* 13 to 19 signs and poles to be relocation or removed*	Likely to warrant paving of Burgmanns Lane due to potential flooding new road connection from Burgmanns Lane to Marsden Park Road is required
Bridge and culvert crossings	1 Existing bridge requiring load assessment*	9 Bridges/culverts - Minimal impact, only one (Bridge on Nundle Road over Cockburn River) may require additional widening works. * All bridges and culverts assessed for OSOM vehicles One culvert potentially requiring lengthening along Nundle Rd adjacent to O'Briens Lane. One culvert over Goonoo Goonoo Creek requiring further inspection and load assessment	New bridge/culvert required on new road connecting Burgmanns Lane to Marsden Park Road. This will also share the same linkage back to New England Highway as the Whitehouse Lane option. Bridge on Nundle Road over Cockburn River may require additional widening works.

Assessment Details and Criteria	Option 1 - Through Tamworth Town	Option 2 - Detour via Whitehouse Lane (Preferred route)	Option 3 - Detour via Brugmanns Lane
Likely physical impact on vegetation	Yes	Yes	Yes
Property			
No. of residential properties along the route	266	63	30
Property acquisition area (min m^2)	918	9,044	22,639
Easement acquisition area (min m^2)	No impact	At intersection of Goonoo/NEH (RS_TRC_38) *	No impact
Environmental			
Vegetation Impacts Significance	Minor to moderate, generally impacting vegetated dividing medians	Removal of 16 trees to 26 trees (includes small trees)	Moderate to major vegetation removal required due to new access road
Social and Community Impacts			
Property Impact	Minimum 2 complete property acquisitions including minimum of 2 major buildings (including commercial and government property) Minimum 3 partial acquisition with impacts to existing buildings.	1 x building impact and full property acquisition at Nundle Road / NE Hwy	1 x building impact and full property acquisition at Nundle Road / NE Hwy
Other criteria			
Flooding and Drainage Conditions	Subject to further investigation	Existing bridge over Goonoo Goonoo Creek on WH lane already provides some flood immunity to the road OSOM detour via Back Kootingal Road was also assessed for this option/ However, this route option was discounted due to the large technical, social and environmental impacts that were associated with this option.	Road has poor drainage / flooding performance compared to Whitehouse Lane. OSOM detour via Back Kootingal Road was also assessed for this option/ However, this route option was discounted due to the large technical, social and environmental impacts that were associated with this option.

*Note: Based on route turning options

6.3.1 OSOM route via Tamworth town

There are 2 locations where buildings are impacted (i.e. would be required to be demolished).

- Intersection of Goonoo/NEH (RS_TRC_38)
  - Two turn path options have been evaluated, both of which necessitate the complete acquisition and demolition of a residential property, resulting in significant adverse impacts on at least four additional

nearby residences. These impacts are unlikely to meet acceptable thresholds, despite both options remaining within the cadastral boundary.

  - Option 1 involves the full acquisition of a residential property along with the Hungry Jacks site, and it also closely approaches three residential buildings, bordering their fence lines. This option requires an easement or partial acquisition of another residential property, which is situated very close to the building.
  - Option 2 entails the full acquisition of a residential property while avoiding the Hungry Jacks site. This option similarly passes closely by three residential buildings and necessitates easements or partial acquisitions for two additional residences, again placing them in close proximity to the proposed path.

- Intersection of NEH & NEH (RS_TRC_40)
  - Three turn path options have been evaluated, each requiring the full acquisition and demolition of specific structures, which include a residential house, a hotel/restaurant, or a large commercial property and a Defence building. Beyond these primary acquisitions, all options are projected to exert close impacts on an additional three to five surrounding residential and commercial buildings, which are unlikely to be deemed acceptable, even with the turn path maintained within the cadastral boundaries.
  - Furthermore, the assessment indicates that significant modifications are required for four roundabouts, and an evaluation of the Peel River Bridge's load rating suitability is necessary to ensure structural integrity and safety.

6.3.2 OSOM detour via Burgmanns Lane

There are three locations where properties will be impacted (i.e. property acquisition would be required).

- Intersection of Burgmanns Lane/NEH (RS_TRC_41)
  - Two turn path options have been proposed, each involving property acquisitions and the establishment of new hardstand areas.
  - Option 1 entails a right-hand turn through the property located on the south-eastern corner of the intersection, subsequently directing vehicles onto the road reserve on the northern side of Burgmanns Lane to minimise impacts on the affected property. This option requires a property acquisition area of 701 m² and affects vegetation on both sides of the New England Highway.
  - Option 2 involves a right-hand turn through the same property but confines vehicles to the road carriageway, resulting in a more considerable impact on the affected property with a larger acquisition area of 1,217 m². While the vegetation impacts are comparable to those in Option 1, this option additionally necessitates the relocation of a power pole situated on the southern side of Burgmanns Lane.
- Burgmanns Lane extension to Marsden Park Road
  - There is no existing road connecting Burgmanns Lane directly to Marsden Park Road. A new road would need to be installed requiring a total paved area of approximately 15,188 m^2. Significant land acquisition is required as well as property acquisition, totalling to approximately 16,994 m^2. The new road crosses Calala Creek, thereby requiring the installation of a new bridge.
- The total hardstand area for this OSOM detour could be up to 15,970 m², with a property acquisition requirement of up to 22,639 m², depending on the various manoeuvring options considered.

6.3.3 Preferred Tamworth OSOM detour via Whitehouse Lane (South of Tamworth to east of Tamworth)

A detour around Tamworth is proposed in recognition of existing buildings and other infrastructure constraints through the town of Tamworth. The proposed detour begins south of Tamworth, utilising Whitehouse Lane, Marsden Park Road, O'Briens Lane, and Nundle Road, before reconnecting with the New

Current as of 11/04/2025

England Highway. The proposed detour is shown in blue in Figure 6-7. The figure further identifies pinch points, where potential impact areas requiring work are identified to enable OSOM movements.

The proposed detour route was compared against other options, and it was concluded that this route avoids passing through the town of Tamworth and requires less property acquisition and fewer new pavement works compared to the alternatives.

The works required along the Tamworth OSOM detour via Whitehouse Lane are provided in **Appendix F** and the detailed turn paths are provided in **Appendix G**.

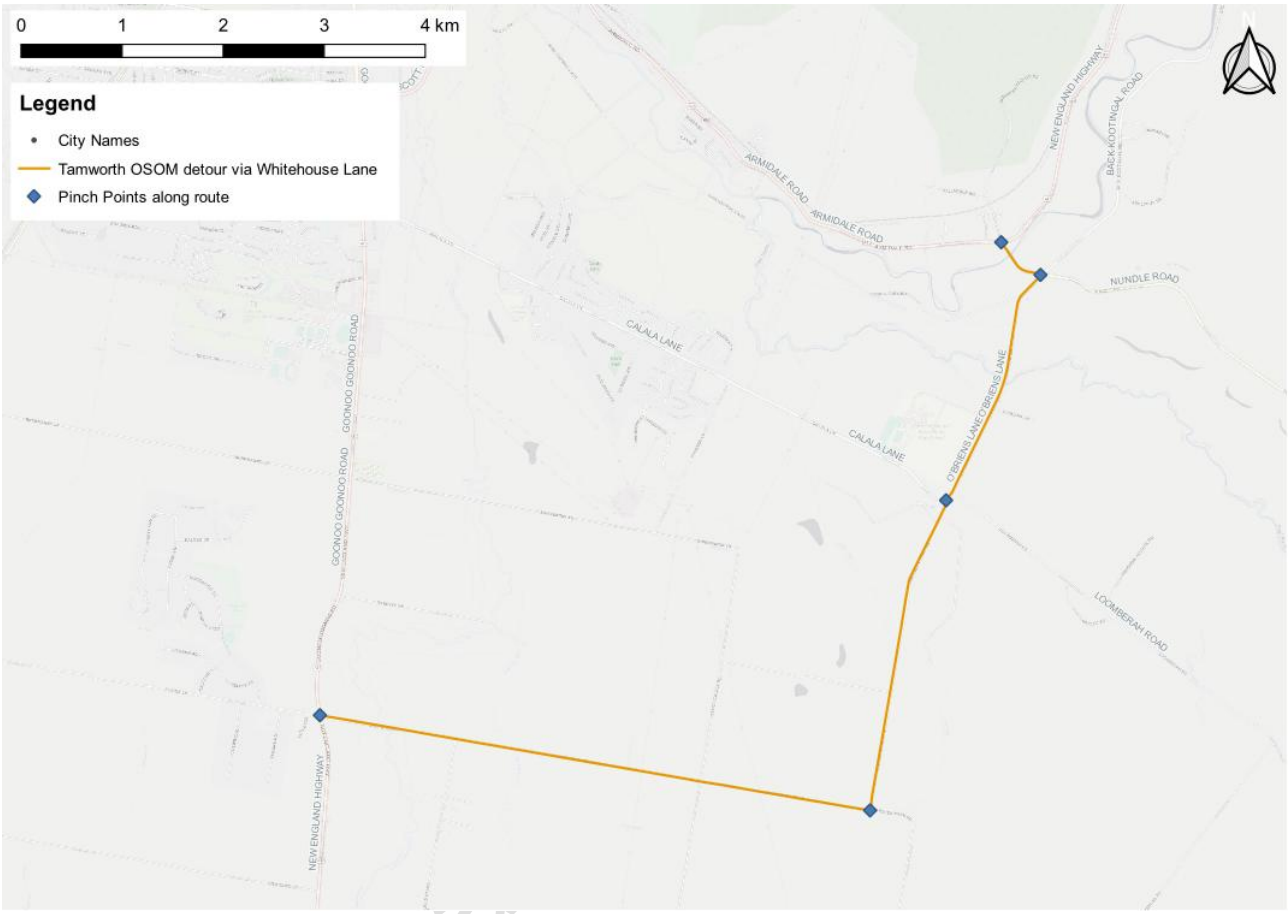

Figure 6-7: Tamworth OSOM detour via Whitehouse Lane (Image source: Esri Grey/Open Street Map)

A detailed summary of the preferred Tamworth OSOM detour via Whitehouse Lane is provided in Table 6-8.

Table 6-8: Tamworth OSOM detour via Whitehouse Lane summary

Item	Description
Distance	11.75 kilometres
Start point	New England Highway and Whitehouse Lane intersection
End point	Nundle Road and New England Highway intersection
Roads within route	1. Whitehouse Lane (5.5 km) 2. Marsden Park Lane (3.2 km) 3. O'Briens Lane (2.5 km) 4. Nundle Road (0.55 km)

Current

Route approval	■ Whitehouse Lane and Marsden Park Lane are not approved on the NSW OSOM load carrying vehicles network ■ O'Briens Lane and Nundle Road are approved on the NSW OSOM load carrying vehicles network ■ Whitehouse Lane and Marsden Park Lane are not approved on the NSW 4.6 m high vehicle network ■ O'Briens Lane is approved with condition on the NSW 4.6 m high vehicle network. Permit is required from Tamworth Regional Council to travel on O'Briens Lane due to 25 tonne load limit on road ■ Nundle Road is approved on the NSW 4.6 m high vehicle network

[redacted]

11 Summary

11.1 New England Highway

- The New England Highway serves as the primary route for Over-Sized and Over-Mass (OSOM) movements, facilitating access to various hubs and renewable energy projects within the New England Renewable Energy Zone (REZ). Starting from the Bengalla Road/Wybong Road intersection, components will predominantly traverse the New England Highway, extending from the junction with Stair Street north of Muswellbrook to the intersection with Martin Street in Armidale. The OSOM route south of this intersection has been evaluated as part of the CWO REZ OSOM Assessment.
- Significant upgrades will be necessary along this route, which will include the installation of hardstand areas, the relocation of power poles, the removal and relocation of vegetation, modification of road signage, and securing approvals from Muswellbrook Shire Council, Tamworth Regional Council, and private landowners.
- The anticipated impacts are largely confined to urban areas, particularly in Aberdeen and Moonbi. A high-level assessment of potential impacts on bridges has been conducted, as detailed in the Bridges Inspection Notes and Initial Assessment (see Appendix Q). Notably, no railway crossings have been identified along the affected section of the highway.
- The terrain along the route is generally flat, suggesting that modifications to road gradients are unlikely. However, this conclusion is contingent upon a comprehensive survey of the entire route.
- Additionally, the route features several gantries, which must be a minimum of 6.5 metres in clearance to accommodate bridge heights. It is recommended to verify the height clearances on-site or via survey, similar to the checks required for power lines.

[redacted]

11.3 Tamworth OSOM detour

A detour around Tamworth is recommended to reduce impacts to the town such as disruptions and impacts to properties, vegetation and utilities. Multiple options were considered, with a recommended option along Whitehouse Lane. There are still locations along this route that are constrained and will require new hardstand areas to provide suitable turning areas.

Confirmation of EnergyCo's preferred OSOM route is required for the three options immediately north of Tamworth at the New England Highway / Nundle Road intersection (north of Tamworth). This complex intersection can be avoided by adoption of the Back Kootingal Road alternative which bypasses approximately 10 km of the New England Highway. The Back Kootingal Road alternative does require partial property acquisition at eight properties as well as reconstruction / modification to one bridge. There are several constraints along this route which identify it as a less suitable option. Comments on the bridge inspections are included in Appendix Q.

Current as of 11/04/2025

Note: The comparative assessment is colour-coded to provide an indication of the assessed impacts across the route options where green is positive, yellow is moderate and red is poor. Grey denoted limited available information or no notable differentiator

Table 11-1: OSOM detours options comparative assessment.

Detour Option	Option Description	Route Length (km)	Road Upgrades	Pavement / Hardstand	Road Structure and Utilities Impacts	Bridge and Culvert Crossings	Vegetation Impacts Likelihood	Residential Properties along route	Required Property acquisition	Required Easement Acquisition
[redacted]										
Tamworth	*Refer to Figure 6-6*									
Option 1 - Through Town	Scott St, Marius St, New England Hwy	11.3								
Option 2 - Detour via Whitehouse Lane *(Preferred)*	New England Hwy, Whitehouse Ln, Marsden Park Rd, O'Brien's Ln, Nundle Rd, New England Hwy	11.8								
Option 3 - Detour via Burgmanns Lane	New England Hwy, Burgmanns Ln, O'Briens Ln, Nundle Rd	11.9								

[redacted]

Appendices

Appendix F – Tamworth OSOM detour via Whitehouse Lane detailed route assessment

Current as of 11/04/2025

Appendix G – Tamworth OSOM detour via Whitehouse Lane turn paths

Current as of 11/04/2025

Document prepared by

Aurecon Australasia Pty Ltd
ABN 54 005 139 873

Level 11, 73 Miller Street
North Sydney 2060 Australia

PO Box 1319
North Sydney NSW 2059
Australia

T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

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