



Gara Battery Energy Storage System Traffic Impact Assessment

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ACEnergy Pty Ltd

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The Transport Planning Partnership

Gara Battery Energy Storage System

Traffic Impact Assessment

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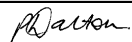
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References

ACEN (2024), Viewed 21 October 2024,

<https://acenrenewables.com.au/project/new-england-solar/>

AECOM (2010), *Armidale Regional Landfill Environmental Assessment*.

ARES (2025), *Gara BESS OSOM Route Study*.

Austrroads (2020a), *Guide to Traffic Management Part 3: Transport Study and Analysis Methods*.

Austrroads (2020b), *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management*.

Austrroads (2023), *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*.

Constructive Solutions (2019), *Stringybark Solar Farm Traffic and Transport Assessment*.

Constructive Solutions (2020), *Olive Grove Solar Farm Traffic and Transport Assessment*.

EMM (2024), *Oven Mountain Pumped Hydro Energy Storage Project Addendum Traffic Impact Assessment*.

Impact Traffic Engineering Pty Limited (2023), *Armidale Battery Energy Storage System (BESS): Armidale, NSW*.

Infinergy Pacific (2024), Viewed 4 September 2024,

<https://www.olivegrovesolarfarm.com.au/the-project/>

National Heavy Vehicle Regulator (2024), Viewed 4 September 2024,

<https://maps.nhvr.gov.au/>

New England Surveying & Engineering (2021), *Traffic Impact Assessment Oxley Solar Farm, 914 Gara Road, Metz*.

NSW Government (2017), *Waterfall Way Draft Corridor Strategy*.

NSW Government (2022), *Cumulative Impact Assessment Guidelines for State Significant Projects*.

Local Land Services (2024), Viewed 12 March 2024,

<https://trade.maps.arcgis.com/apps/webappviewer/index.html?id=dd585551cd5c4320bfcd2d671d8f2364>

New England Surveying and Engineering (2019), *Traffic Impact Assessment proposed Solar Farm Petersons Armidale Winery & Guesthouse 347 Dangarsleigh Road, Armidale.*

NGH Pty Ltd (2023), *Scoping Report Armidale East BESS.*

Oxley Solar Development Pty Ltd (2024), Viewed 4 September 2024,
<https://www.oxleysolarfarm.com.au/>

Standards Australia (2004), *Australian/New Zealand Standard 2890 Parking Facilities Part 1: Off-street car parking.*

Standards Australia (2018), *Australian/New Zealand Standard 2890 Parking Facilities Part 2: Off-street commercial vehicle facilities.*

Transport for New South Wales (2022), *Traffic Control at Work Sites Technical Manual.*

Transport for New South Wales (2023), *Supplement to Austroads Guide to Road Design.*

Transport for New South Wales (2024), Viewed 12 March 2024,
<https://maps.transport.nsw.gov.au/egeomaps/traffic-volumes/#/?z=6>

Transport for New South Wales (2024b), *OSOM vehicle facilitation upgrades Sandgate to Wallsend (A37 and A15) Minor works review of environmental factors.*

TTM Consulting (2017), *Traffic Assessment Metz Solar Farm, Bayley Park.*

1 Introduction

This report has been prepared on behalf of ACEnergy Pty Ltd (ACEnergy) to present the results of an assessment of the road transport implications of the Gara Battery Energy Storage System (Gara BESS, the Project), which would be located at 86 Woodlands Road, Armidale, New South Wales.

The Project would comprise installation of containerised lithium-ion batteries with a capacity of up to 400 Megawatts (MW) and 1,760 MW hour (MWh), an overhead transmission line to connect the BESS to the existing 330 kiloVolt (kV) network, and associated infrastructure. The site is located in the Armidale Local Government Area (LGA) and within the New England Renewable Energy Zone (REZ).

Table 1.1 summarises the road transport-related assessment requirements contained in the Secretary's Environmental Assessment Requirements (SEARs) and relevant input advice from Transport for New South Wales (TfNSW) and Armidale Regional Council (Council), as well as sections where these requirements are addressed in this report. This report has been updated to address additional information requested by TfNSW, which is presented in Appendix H.

Table 1.1: Relevant SEARs and Agency Advice and Sections Addressed

Matter to be Addressed	Section Addressed
Secretary's Environmental Assessment Requirements	
Transport and Access:	
1. an assessment of the peak and average traffic generation, including light vehicles, shuttle buses, heavy vehicles and high risk heavy vehicles requiring escort and construction worker transportation;	4.1
2. an assessment of the likely transport impacts to the site access route(s) including the above-listed vehicles, site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance;	4
3. a cumulative impact assessment of traffic from nearby developments; and	3.9 and 4
4. provide details of measures to mitigate and / or manage potential impacts - a schedule of all required road upgrades (including resulting from heavy vehicle and over mass / over dimensional traffic haulage routes), - clear figures of proposed road upgrades (including the site access point), and - road maintenance contributions, and any other traffic control measures.	4.13
TfNSW Advice	
The TIA is to be tailored to the scope of the proposed development and include, but not be limited to, the following: - Identify the hours of construction of works, days for construction, staging and scheduling of construction (inclusive of pre-construction minor works), peak of construction and timeframe for construction (i.e commencement year and completion year). - Detailed plans identifying the proposed location of any infrastructure within or outside of the project boundaries. - Identify the key accesses and routes for all traffic types required for each stage of the project.	2
	Refer to the EIS
	2.7

Matter to be Addressed	Section Addressed
The EIS and TIA must identify the source for all input materials and quantify the traffic generation associated with the haulage of source materials.	2.7
Traffic generation assessments and traffic surveys requirements:	
Existing background traffic must be informed by traffic surveys undertaken at the intersection or access point with the state classified road network at all access points with the classified road network associated with the light and heavy vehicle routes. The traffic surveys are required to be undertaken in accordance with Austroads Guide to Traffic Management (AGTM) Part 3 with raw data from the surveys provided with the TIA.	3.5
Project-related traffic primarily for worst-case scenario for the project (generally peak of construction).	4.1
Assessment of the turn warrants (figure 3.25 of Austroads Guide to Traffic Management Part 6) The worst-case scenario traffic generation for the project AM/PM peaks is required to be applied to the background traffic volumes. To be representative of the traffic volumes of the network the following must be included to inform the background traffic volumes for the turn warrants assessment, the existing background traffic volumes at the network AM/PM peak, annual growth rate applied linearly to the year of peak of the traffic vehicle movements and accumulative traffic associated with Major Projects (EIS and approved) with coinciding construction timeframes using through and turning movements using the same routes and intersections as the project.	4.6.1
Assess the Safe Intersection Sight Distance (SISD) in accordance with Part 4A of Austroads Guide to Road Design (AGRD) and TfNSW supplements.	4.6.2
Identify the necessary road network infrastructure upgrades that are required to cater for and mitigate the impact of project related traffic at the key state classified road intersections that form part of the project construction routes.	4.6 and 4.9
Traffic characteristics:	
Number and ratio of heavy vehicles to light vehicles.	3.5, 4.1 and 4.3
Identify the number of OSOM that do not require an NHVR permit and if they will occur during the AM/PM project peaks.	2.6
Identify the single vehicle trips required for each type of vehicle required to access the site during the AM/PM project peak, vehicles per an hour and vehicles per a day.	4.1
Include traffic volumes associated with input and outputs required during the construction of the development.	4.1
Identify the vehicle types required to access each intersection and access point along the route and site access points connecting to the state classified road network:	2.6
The origins, distribution, and directional splits for the worst-case scenario for all vehicle types at each state classified road intersections and access points required to facilitate the vehicle movements for the proposed project. Including low risk OSOMs moving in accordance with the NSW Class 1 Operators Guide.	2.7
Capacity analysis using AGRD at intersections with classified (State) road/s, and where relevant, analysis of any other intersections along the proposed transport route/s.	4.4
Impact on rail corridors and level crossings along transport route/s detailing any proposed interface treatments, where applicable.	Not applicable
A review of crash data along the identified transport route/s for the most recent 5-year reporting period and an assessment of road safety along the proposed transport route/s.	3.6
Emergency access to a state classified road (if applicable):	
Must identify how the access will be managed (i.e gates) to prevent the use of the access for other vehicles associated with the development during peak of construction and operation.	4.8
Identify the emergency design vehicle and provide a swept path analysis identifying.	4.8
Provision of sufficient storage at the throat of the access to allow for the emergency vehicle to store within the access and not within the through lane or shoulder.	4.8
Identify compliance with SISD for the design speed (posted speed +10km/hr).	4.6.2

Matter to be Addressed	Section Addressed
Relevant Council Advice	
- Other nearby developments not mentioned in the report and assumed not taken into consideration as part of the cumulative impacts are – Stringybark Solar Farm and Olive Grove Solar Farm both RSD projects and approximately 30MW. - Access to two other SSD projects are also east of Armidale being Oven Mountain pumped hydro and Doughboy wind farm. - In this regard the report states that cumulative impacts are anticipated to be minor, but with all such projects which have generally assumed that the construction of their project would be in isolation, consideration needs to be given to the high likelihood that a number of these projects will be under construction during similar timeframes, given the urgency to have these renewables brought online prior to the retirement of the coal fired power stations.	3.9 3.9.9 and 3.9.12 3.9.13, 3.11 and 4
Council would require a detailed TIA which is to include an assessment of the existing and proposed access to accommodate construction and operational traffic loads, including proposed access routes through and around Armidale, with any required upgrades to the be undertaken to the satisfaction of the appropriate road authorities Council / TfNSW. Any upgrades to public infrastructure will be the responsibility of the developer until the construction period is concluded at which time Council will inspect the condition of such infrastructure as part of their roads asset;	This report
Access roads may be inadequate for the size of vehicle required to transport equipment/materials and some widening/upgrades may be required as well as an assessment of the structural capacity of bridge infrastructure and creek crossings to accommodate over mass loads. In this regard, early discussion with Council and TfNSW is required.	4.9 and ARES (2025)
If the delivery route proposes to cross the railway overpass bridge at Kentucky/Dangar Streets, it is advised that the bridge is owned by railways and is currently restricted to one heavy vehicle at a time due to deterioration of the bridge. Pre and post certification of the structural integrity of the bridge is to be endorsed by the railways, certifying the ability to accommodate the loads and that no further strength reduction has occurred.	Restriction noted, refer to ARES (2025). Structural assessment not part of TIA scope.
The TIA is to identify whether the route for over dimension vehicles requires the removal and replacement of roundabout median islands and/or traversing centre islands, road signage and/or street furniture. Strong controls are to be implemented to ensure that this infrastructure is reinstated to the current layout and to Council's satisfaction.	4.9 and ARES (2025)

2 The Project

2.1 Description of the Project

The Project would include the following key infrastructure:

- enclosed lithium-ion batteries;
- power conversion systems including associated transformers;
- overhead power and fibre optic cabling interconnecting the equipment;
- grid connection equipment including switchgear, protection and control equipment, metering, reactive power equipment, filtering equipment, auxiliary transformers and enclosures/buildings for housing equipment;
- an overhead 330 kV sub-transmission line approximately 1 kilometre (km) long to connect the BESS to the existing Transgrid transmission line;
- earthing and lightning protection systems;
- site office, control rooms/switch rooms, storage area/enclosure, internal access tracks, on-site parking, security fencing, CCTV, and temporary construction laydown area;
- vegetation screening; and
- upgraded site access from Waterfall Way.

2.2 Project Stages

With regard to the potential impacts of the Project on the road transport environment, the Project is considered to have four distinct stages, which are briefly described below:

- Pre-Construction stage – pre-construction minor works would be undertaken over a period of approximately 18 weeks. The first six weeks would involve activities such as line marking, geotechnical drilling, installation of environmental impact mitigation measures and installation of fencing. The following 12 weeks would involve the upgrading of the access on Waterfall Way.
- Construction stage – over a period of 60 weeks occurring between Q1 of 2027 and Q2 of 2028, with peak construction activity occurring over a period of approximately four months. Construction activity would principally occur during standard construction hours, and is expected to attract an average of 58 workers and a peak of 80 workers to the site per day;
- Operational stage – commencing Q3 of 2028, and continuing over a period of 23 years, with the possibility of future upgrades extending the operational life. Once operational, the Project would be operated by up to five on-site workers, and would also be remotely monitored 24/7 for operations, safety and security. The Project would operate 24 hours per day, seven days per week; and

- Decommissioning stage – at the cessation of operational activities, infrastructure would be removed from the site and rehabilitation of the site would occur.

2.3 Assessment Scenarios

As the operational activities at the Project would generate low traffic volumes on a day-to-day basis, and decommissioning and rehabilitation activity of large projects is typically less intense than construction activity, the Project's construction period will have the greatest impact on the road network. This assessment therefore focusses on the impacts of the Project during its construction stage. Pre-construction and peak construction activity would occur in 2027.

2.4 Construction Schedule

2.4.1 Pre-Construction Enabling Works

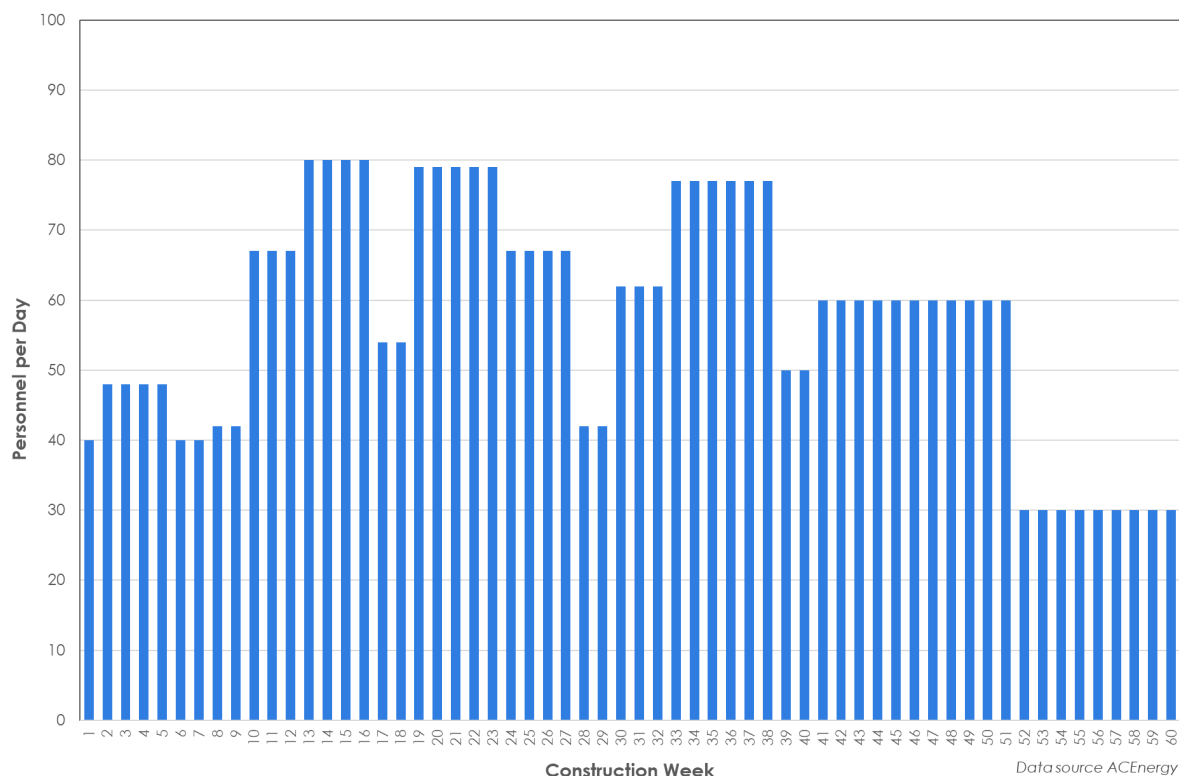
Pre-construction minor works would be undertaken over a period of approximately 18 weeks. Activities during the first six weeks (Stage 1) would involve conduct of a road dilapidation survey, installation of fencing, geotechnical drilling for the upgrade to the site access intersection, geotechnical investigations within the site, tree removal, and upgrading of the site access track (within the site) to facilitate access.

The following 12 weeks (Stage 2) would involve the upgrading of the access intersection on Waterfall Way.

2.4.2 Construction Workforce Schedule

ACEnergy has developed a schedule of the number of personnel anticipated to be required per week over the proposed 60-week construction period, based on the activities scheduled for each week. The number of personnel expected to be required at the Project site per day throughout the construction period is presented in Figure 2.1.

Figure 2.1: Construction Workforce Personnel per Day for Construction Activities

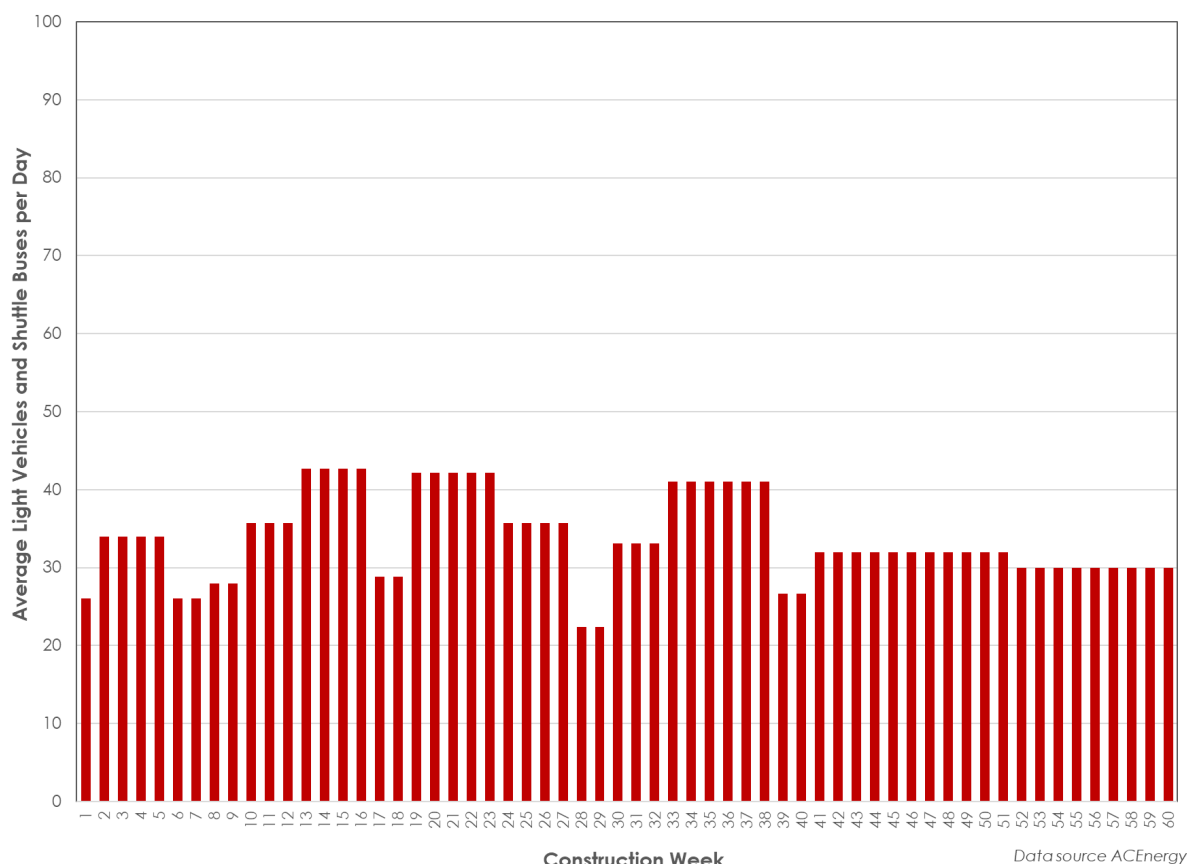


The construction schedule anticipates that throughout the construction period, an average of 58 people would attend the site each day, with a peak of 80 people per day attending the site during Weeks 13 to 16 inclusive. These estimates are inclusive of construction crews and management staff.

2.4.3 Light Vehicle and Shuttle Bus Schedule

ACEnergy has also developed a schedule of the number of light vehicles and shuttle buses anticipated to be required per week over the proposed 60-week construction period, based on the activities scheduled for each week, the personnel requirements and number of shuttle buses proposed to be provided to meet demands. The resulting number of light vehicles and shuttle buses expected to be required at the Project site per day throughout the construction period is presented in Figure 2.2.

Figure 2.2: Average Light Vehicles per Day for Construction Activities

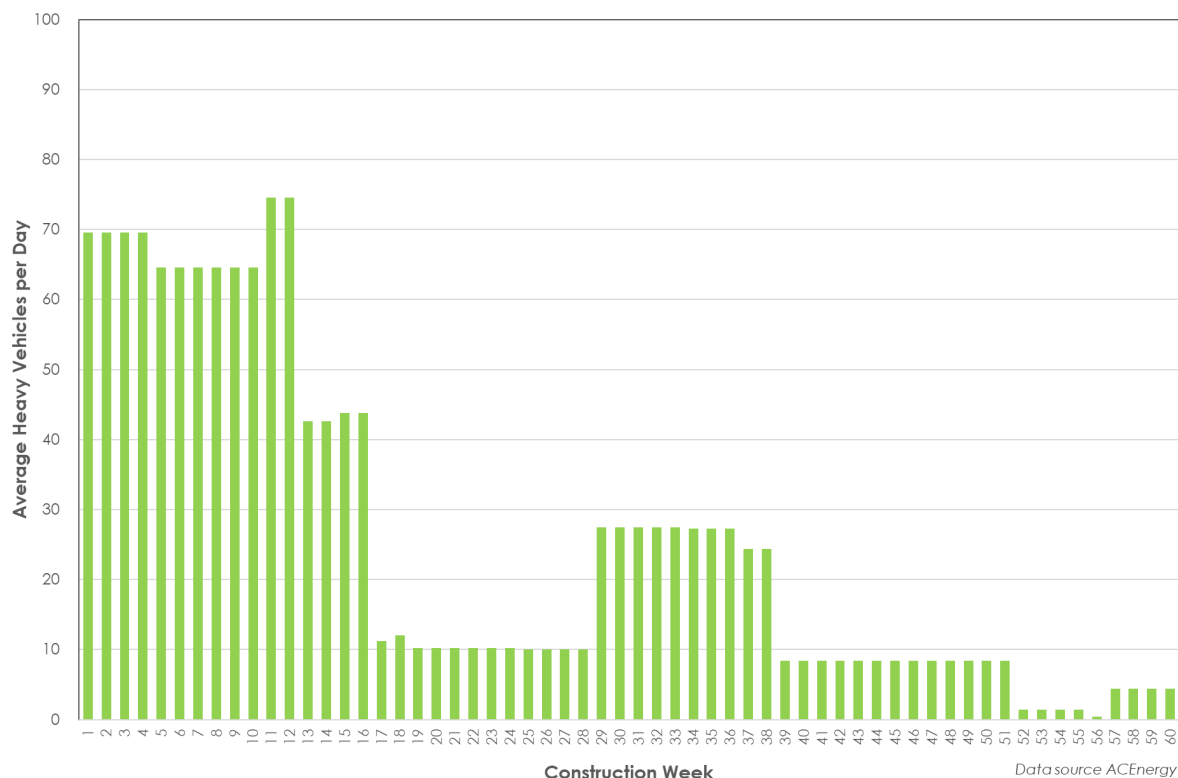


It should be noted that this assessment has adopted a first principles assessment of traffic generation for theoretical peak conditions (refer to Section 4.2). The number of light vehicles and shuttle buses attending the site each day as assessed herein for the theoretical cumulative peak is slightly higher than the peak assumed in the ACenergy schedule presented in Figure 2.2.

2.4.4 Heavy Vehicle Delivery Schedule

ACenergy has developed a schedule of the number of heavy vehicles anticipated to be required per week over the proposed 60-week construction period, based on the activities scheduled for each week. The number of heavy vehicles expected to access the Project site per day throughout the construction period is presented in Figure 2.3.

Figure 2.3: Average Heavy Vehicles per Day for Construction Activities



The construction schedule anticipates that throughout the construction period, an average of 25 heavy vehicles would attend the site each day, with a peak of 75 heavy vehicles per day required during Weeks 11 and 12.

2.5 Pre-Construction Hours

The pre-construction work would principally be undertaken during standard construction hours:

- 7:00 am to 6:00 pm Monday to Friday;
- 8:00 am to 1:00 pm on Saturdays; and
- at no time on Sundays or public holidays.

During Stage 2 of the pre-construction activities, it is anticipated that some activities would be undertaken outside of the standard construction hours, subject to those activities not resulting in amenity impacts and implementation of a noise protocol.

2.6 Construction Hours

Construction work would be undertaken during standard construction hours:

- 7:00 am to 6:00 pm Monday to Friday;
- 8:00 am to 1:00 pm on Saturdays; and
- at no time on Sundays or public holidays.

Where required, some construction activities may be undertaken outside of the standard construction hours, subject to those activities not resulting in amenity impacts and implementation of a noise protocol.

2.7 Pre-Construction Vehicle Types

Pre-construction personnel would drive a vehicle to and from the site. This would typically include light vehicles such as vans, utilities and four-wheel drives.

During the pre-construction activities, the heavy vehicles anticipated to travel to and from the Project site for deliveries would principally include rigid trucks for delivery of materials for fencing and road upgrade and drilling activities. The largest vehicle expected during the pre-construction stage would be a 15 tonne (t) tilt tray rigid truck that is 12.5 metres (m) long and 2.5 m wide.

2.8 Construction Vehicle Types

2.8.1 Workforce Vehicles

Construction personnel who reside in the local area would drive a vehicle to and from the site. This would typically include light vehicles such as vans, utilities and four-wheel drives. A shuttle bus service would be provided to transport the specialist construction workers who would be accommodated within Armidale, using 22-seater buses (Toyota Coaster or similar).

2.8.2 Delivery Vehicles

The heavy vehicles anticipated to travel to and from the Project site for deliveries throughout the construction period include 25 m B-doubles (adopted as the design vehicle for the Project access), semitrailers, truck and dog combinations, concrete agitators, and rigid trucks up to 12.5 m long. Heavy vehicles would be used to deliver equipment required for construction, including (but not limited to) fencing, concrete, cables and other electrical equipment.

2.8.3 Oversize Overmass Vehicles

Oversize overmass (OSOM) vehicles would be required to transport high voltage (HV) transformers and control rooms, and for the transport of cranes required during construction activities, described below.

The vehicle proposed for delivery of two transformers, being the largest single component, is a prime mover and custom 18-axle low platform trailer, with estimated dimensions 56 m long, 4.2 m wide and 5.3 m high for each transformer, and would be accompanied by two Police escort vehicles and four pilot vehicles and any other requirements of the permit that would be applied for through the National Heavy Vehicle Regulator (NHVR). The movements of the two transformers would occur on two separate days during Week 16 of the construction stage.

Three cranes would also be transported to the Project site for lifting BESS, medium voltage power station (MVPS) units and transformers. The three crane vehicles would each have estimated dimensions 16 m long, 3.0 m wide and 4.0 m high, and would remain on-site during the construction activity before being transported from the site. The movement of the crane vehicles would each be accompanied by two pilot vehicles.

In addition, 11 OSOM vehicle movements would be generated by the transport of the switch rooms (two loads), control rooms (two loads), auxiliary services building (one load), operations and maintenance building (one load), sets of electrical busbars (two loads), concrete poles (one load) and steel poles (two loads). These movements would each be accompanied by two pilot vehicles.

Overall, 16 heavy vehicles requiring escort would access the Project site during the construction stage to deliver equipment for the Project. With the exception of the three cranes, these vehicles would typically each arrive and depart the Project site on the same day, and be scheduled to avoid concurrent OSOM vehicle movements. It is anticipated that with the exception of the transformers (described above), the vehicles would be eligible to operate under the NSW Class 1 Load Carrying Vehicle Exemption Notice or Multi-State Class 1 Load Carrying Vehicle Dimension Exemption Notice. This would be confirmed on a case-by-case basis once details of the loads, vehicles and operating conditions are refined. Access permits would be sought through NHVR for any movement that does not comply with the mass, dimension or operating requirements set out in the relevant gazette notice.

2.9 Vehicular Access and Routes

Vehicular access for the Project would be via the existing site access road to/from Waterfall Way. The site access road and its intersection with Waterfall Way would be upgraded to accommodate the vehicles expected to access the Project.

Construction personnel would be sourced from the local region including Armidale, Uralla and Tamworth, with some residing in smaller towns to the east of the site. Workers required from outside the local region, such as specialist electricians, would be accommodated within Armidale and would be transported to and from the Project site each day by shuttle bus via Waterfall Way. This specialist workforce is anticipated to make up approximately half of the total workforce. The majority of the workforce would therefore be expected to approach and depart the Project site from and to the west along Waterfall Way, with a small proportion of personnel who reside in the local region approaching and departing from and to the east of Waterfall Way.

Heavy vehicle deliveries are expected to be sourced primarily from suppliers in Armidale, Uralla and Tamworth. B-doubles would use approved routes between those towns and the site, e.g. New England Highway and through Armidale via Uralla Road and Kentucky Street, then via either Dangar Street, Taylor Street or Long Swamp Road and Canambe Street to Barney Street. Heavy vehicle drivers would be required to adhere to all travel restrictions along the route, including school zone speed limits, and the existing limit of one heavy vehicle at any time on the Dangar Street bridge over the Main North Railway (refer to Section 3.2). It is noted that other approved routes for B-doubles are also available and may be used by Project delivery vehicles.

Some materials such as aggregates and prefabricated components may be sourced from Coffs Harbour and Grafton, and would use Waterfall Way and/or Armidale Road to the east and north of the Project site. It is anticipated that delivery vehicles from the east would include rigid trucks and semitrailers.

The OSOM components for the Project are anticipated to be transported to the Project site from Mayfield Berth 4 at the Port of Newcastle. The nominated route to and from the Project site is discussed in the OSOM Route Study (ARES, 2025).

3 Existing Road Transport Environment

3.1 Site Location

The proposed Gara BESS development is to be located at 86 Woodlands Road, Armidale NSW 2350 (the Host Lot). 86 Woodlands Road is formed of several larger land parcels including Lot 1 DP246878, Lot 1 DP573787 and Lot 145 DP755826, which the development will impact on. The remainder of the larger landholding is formed by other non-associated lots with a total area of approximately 423 ha.

The Gara BESS will also impact on neighbouring properties being Lots 144 and 153 DP755826, and Travelling Stock Reserves (TSRs) Lot 7003 DP1060212 and Lot 7009 DP1060213.

The development footprint will occupy an area of approximately 22.43 ha across part of Lot 1 DP246878 and Lot 1 DP573787 and extend into the Waterfall Way (also referred to as Grafton Road) road reserve and Crown Land managed as Travelling Stock Reserves defined as Lot 7003 DP1060212 and Lot 7009 DP1060213 for site access. The transmission easement would impact Lot 1 DP246878 and Lots 144, 145 and 153 DP755826, together with an unconstructed Crown road reserve located unilaterally between Lots 144 and 145.

The site is located approximately 10 km east of the town of Armidale, and has frontage to Waterfall Way with an existing vehicular access for Lot 1 DP246878 being provided to/from Waterfall Way.

3.2 Road Network

Waterfall Way (MR 76) is a State road that extends approximately 170 km from New England Highway at Armidale in the west to Pacific Highway at Raleigh in the east, via Wollomombi, Ebor, Dorrigo and Bellingen. East of Armidale, Waterfall Way is also known as Grafton Road, and through Armidale, MR 76 is known as Barney Street, Dangar Street, Kentucky Street and Uralla Road. Waterfall Way is an approved route for use by HML 25/26 m B-doubles between Dorrigo and Armidale. In the vicinity of the Project site, Waterfall Way is a two-lane, two-way rural road, with a posted speed limit of 100 kilometres per hour (km/h).

The existing Project site access is a single lane unsealed road as shown in Figure 3.1.

Figure 3.1: Existing Project Site Access Road



Inbound to Project site from Waterfall Way

The existing Project site access road intersects with Waterfall Way between two horizontal large-radius curves on Waterfall Way, as shown in Figure 3.2. The intersection is a basic rural property access, with no widening of the sealed surface of Waterfall Way to accommodate vehicles turning in and out of the access.

Figure 3.2: Project Site Access Location on Waterfall Way



In the vicinity of the Project site access, the pavement of Waterfall Way is marked with edge lines, and has a sealed shoulder. Double two-way barrier centre lines are provided over a distance of approximately 1.3 km from the Project site access and to the south-west through the left-hand horizontal curve for travel from Armidale. Double one-way barrier lines are provided over a distance of approximately 220 m from the Project site access intersection towards the north-east. The continuous line is on the left for southbound travel and broken line is on the left for northbound travel. A broken dividing line is provided north of that point over a

distance of approximately 800 m, through the right-hand horizontal curve for travel from Armidale and past the Argyle-Mining Road intersection.

In Armidale, MR 76 crosses the Main Northern Railway at a road-over-rail bridge crossing. At the bridge, Dangar Street has a single travel lane in each direction and footpaths are provided on each side of the bridge. The bridge is signposted 'ONLY ONE HEAVY VEHICLE PERMITTED ON BRIDGE AT ANY ONE TIME' but does not allocate priority to one direction of travel or the other. Heavy vehicle drivers approaching from opposing directions have adequate sight distance to observe each other and slow as required to prevent two heavy vehicles being on the bridge concurrently. As noted by Council (refer to Table 1.1) this is due to deterioration of the bridge, which appears to relate to its structural integrity. TTPP notes that there is no signposting of a load limit applicable on the bridge, and that a structural assessment of the bridge has been undertaken with respect to its use by the largest OSOM vehicle anticipated to be generated by the Project (refer to Section 2.6).

At its intersections through Armidale, MR 76 is the major road at all sign-controlled intersections, with roundabouts controlling the intersections of Grafton Road, Canambe Street and Barney Street; Barney Street and Dangar Street; Dangar Street, Kentucky Street, O'Connor Road and Memorial Avenue; and Uralla Road and New England Highway. The intersection of Barney Street with Marsh Street is signal controlled. School speed zones apply on Dangar Street between Brown Street and Mossman Street, on Kentucky Street between Markham Street and west of Butler Street, and on Canambe Street between north of Mann Street and north of Brown Street. Zebra crossings are provided across Dangar Street north of Mann Street (Children's Crossing at school times) and south of Brown Street.

3.3 Waterfall Way Draft Corridor Strategy

The Waterfall Way Draft Corridor Strategy sets out a proposed strategic vision to manage and guide development of Waterfall Way to improve safety, traffic efficiency and sustainability. The draft strategy proposes a package of works for Waterfall Way, however there is no commitment to, or funding for, proposed actions contained in the draft strategy. Short term investments include:

- improving overtaking opportunities between the Pacific Highway and Bellingen;
- reviewing centreline markings to improve safety at informal overtaking locations;
- investigating pull over bays for slow moving vehicles between Thora and Dorrigo;
- progressively improving the formation width, by widening sealed shoulders and lane widths on a priority basis;
- implementing identified clear zone and safety barrier works to remove or provide protection from hazards including culverts within the clear zone; and
- planning for minor realignment between the Pacific Highway and Bellingen including accommodating for active transport users to promote safe connections.

In assessing future traffic demands on the corridor, the draft strategy adopted a growth rate of 1.6 per cent per annum on Waterfall Way between Armidale and east of Ebor.

3.4 Historic Traffic Volumes

Transport for New South Wales (TfNSW) collects and publishes traffic volume data at selected locations on its roads. Available data on roads in the vicinity of the Project site were reviewed and collated, noting that only limited data is available in this region. The closest TfNSW count station is located on Waterfall Way, 2.06 km east of Argyle-Mining Vale Road at Metz (Station ID: 92394). Data has not been collected at this station since 2012. Notwithstanding, the available Annual Average Daily Traffic (AADT) data at that station are presented in Table 3.1.

Table 3.1: TfNSW Historic Traffic Volume Data

Station	Year	Average Vehicles per Day	
		All Days	Weekdays
Waterfall Way, 2.06 km east of Argyle-Mining Vale Road (Station 92394)	2006	1,391	1,405
	2007	1,450	1,412
	2011	1,295	1,296
	2012	1,326	1,301

Reference: TfNSW, 2024a

TTPP has collated traffic data on Waterfall Way from publicly accessible documents relating to developments in the region. These results are for average daily traffic over the short survey periods that were surveyed, and results are summarised in Table 3.2.

Table 3.2: Traffic Volumes on Waterfall Way

Location	Survey Date	AM Peak Hour (vehicles per hour)	PM Peak Hour (vehicles per hour)	Daily (vehicles per day)
Waterfall Way 100m east of Armidale Regional Landfill entrance	1-11 June 2020 ^A	141 11:15 am to 12:15 pm	159 3:15 pm to 4:15 pm	1,597 10.6% heavy
Waterfall Way 830m west of Kempsey Road Wollomombi	June 2015 ^B	-	-	941 13.5% heavy
Waterfall Way West of Douglas Street Armidale (urban)	June 2015 ^B	-	-	5,411 7.0% heavy
Waterfall Way West of Kempsey Road	28 June 2022 ^C	81 8:00 am to 9:00 am	87 3:15 pm to 4:15 pm	-

^A Source: New England Surveying & Engineering, 2021

^B Source: NSW Government, 2017

^C Source EMM (2024)

With regard to the survey conducted by Armidale Regional Council, New England Surveying & Engineering (2021) notes that the survey period started on 28 May 2020, however the results are reported only for the period between 1 and 11 June 2020, as Covid-19 travel restrictions

were removed on 1 June 2020. While travel restrictions were not in place, it is anticipated that travel behaviour at that time was not typical, and the surveyed conditions should therefore be considered in that context.

3.5 Waterfall Way Traffic Survey

To quantify existing traffic conditions in proximity to the Project, TTPP commissioned an automatic tube count survey on Waterfall Way approximately 270 m west of the existing Project site access. The survey was conducted from Friday 2 August to Monday 12 August 2024 (inclusive). Key results from the survey are presented in Appendix A.

The ATC surveys included classification of the vehicles based on the Austroads-94 Vehicle Classification System. Under that system, light vehicles (Classes 1 and 2) include motorcycles, cars, vans, 4-wheel drives (4WDs), and utilities (including those towing a trailer or caravan) with a wheelbase not more than 3.2 m. Heavy vehicles (Classes 3 to 12) include single unit rigid trucks and buses with two, three or four axles and up to 14.5 m long, as well as articulated vehicles (which include semi-trailers and rigid trucks with trailers, B-doubles and road trains where permitted). The daily two-way traffic recorded during the survey are summarised in Table 3.3.

Table 3.3: Surveyed Two-Way Traffic on Waterfall Way (vehicles per day)

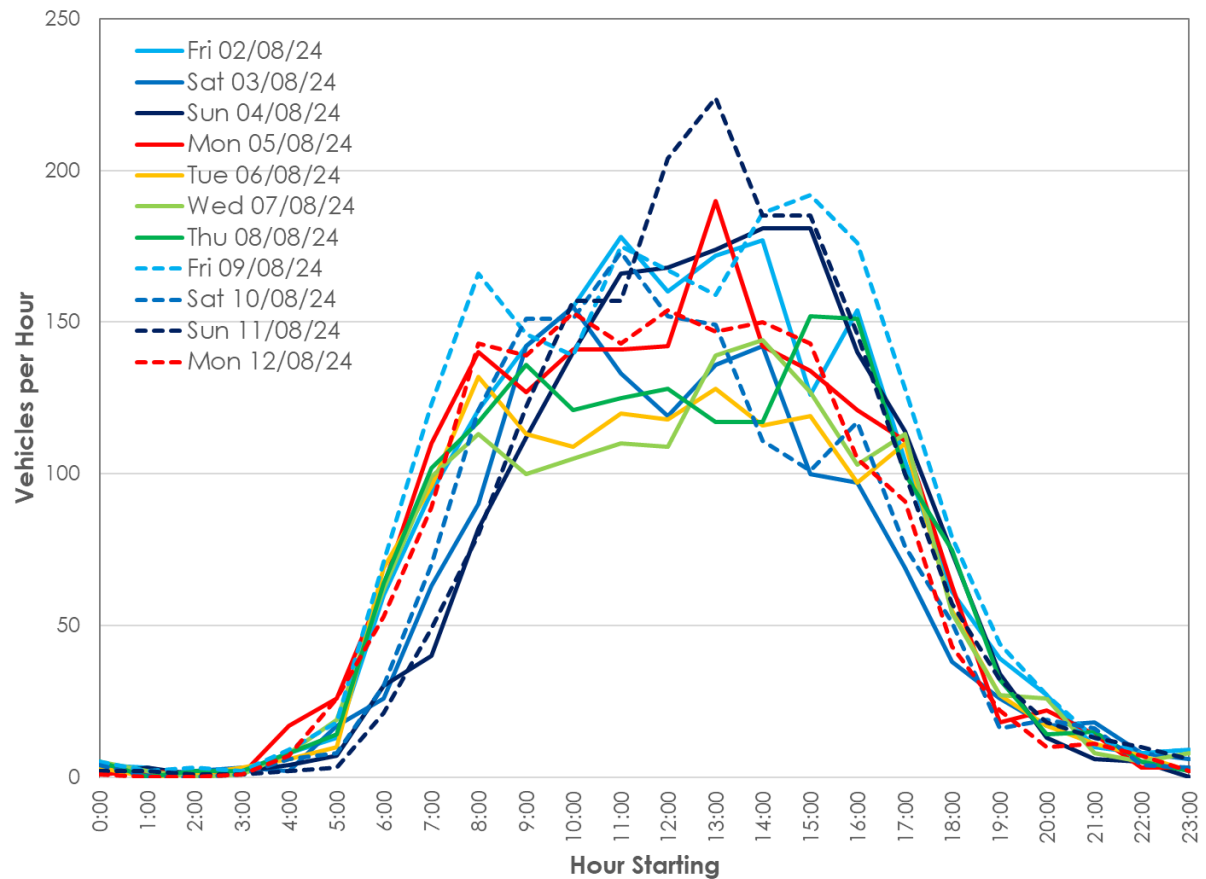
Day and Date	Light Vehicles	Heavy Vehicles		Total Vehicles	Percent Heavy Vehicles (%)
		Rigid	Articulated		
Friday 2 August 2024	1,642	149	36	1,827	10.1
Saturday 3 August 2024	1,286	97	30	1,413	9.0
Sunday 4 August 2024	1,520	142	16	1,678	9.4
Monday 5 August 2024	1,482	189	62	1,733	14.5
Tuesday 6 August 2024	1,266	151	52	1,469	13.8
Wednesday 7 August 2024	1,252	175	60	1,487	15.8
Thursday 8 August 2024	1,401	171	32	1,604	12.7
Friday 9 August 2024	1,798	201	48	2,047	12.2
Saturday 10 August 2024	1,395	114	21	1,530	8.8
Sunday 11 August 2024	1,639	112	26	1,777	7.8
Monday 12 August 2024	1,418	165	57	1,640	13.5

The results in Table 3.3 suggest that the highest two-way volumes were recorded on Fridays. On weekends heavy vehicles make up a lower proportion of the total traffic than on weekdays.

Figure 3.3 presents the distribution of traffic throughout each of the days during the survey period. This suggests that on most days, the highest two-way demands occur during the afternoon, however there is no distinct or consistent peak hour. The peak two-way hourly

demand recorded varied between 136 vehicles per hour (Tuesday) and 224 vehicles per hour (Sunday).

Figure 3.3: Hourly Two-Way Traffic on Waterfall Way August 2024



The survey also recorded the speed of vehicles on Waterfall Way, which are summarised in Table 3.4, noting the survey was located on the bend to the south-west of the Project site access. Eastbound traffic is therefore vehicles approaching the Project site access from Armidale.

Table 3.4: Vehicle Speeds on Waterfall Way (km/h)

	Eastbound	Westbound
Average Speed	91.4	94.4
85 th Percentile Speed	98.5	101.6

The operating speed (85th percentile speed) on Waterfall Way is therefore reasonably consistent with the posted speed limit of 100 km/h.

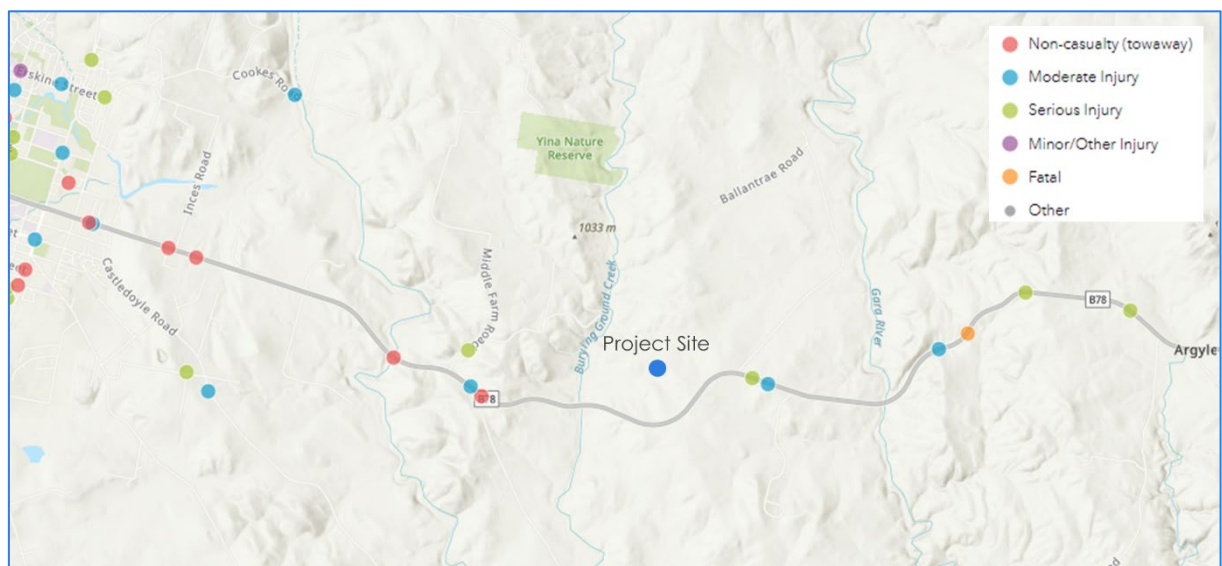
3.6 Road Crash History

Road crash information was obtained from the Centre for Road Safety (NSW) across the most recently available five-year period between 1 January 2018 and 31 December 2022 for those roads in proximity to the Project and identified as potentially being used by Project-generated traffic. The data include crashes which conform to the national guidelines for reporting and classifying road vehicle crashes based on the following criteria:

- The crash was reported to the police.
- The crash occurred on a road open to the public.
- The crash involved at least one moving vehicle.
- The crash involved at least one person being killed or injured or at least one motor vehicle being towed away.

The locations of crashes in the vicinity of the Project are presented in Figure 3.4.

Figure 3.4: Road Crash Locations 2018-2022



Key findings of the review of the crash history are summarised below. Over the period investigated, no crashes occurred on Waterfall Way at or near the location of the Project site access. Between the Project access and the urban area of Armidale (taken to be the area to which the 50 km/h speed limit applies), five crashes were reported. Key features of those crashes are presented in Table 3.5.

Table 3.5: Road Crash History Summary 2018-2022

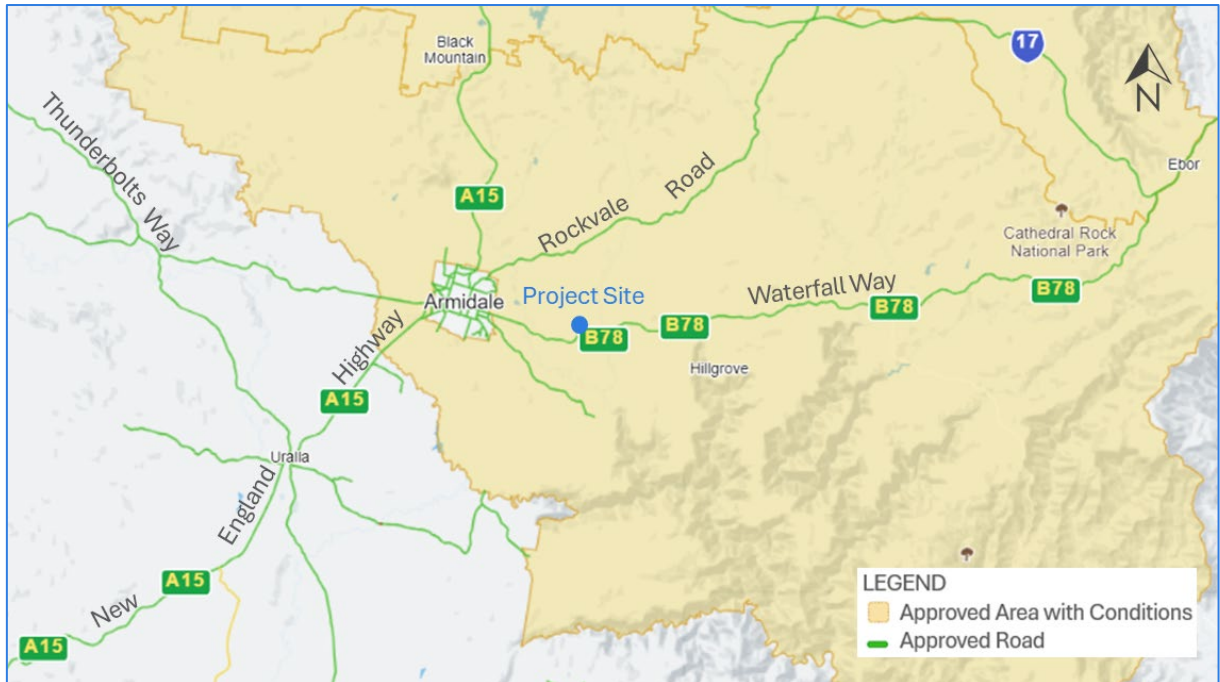
Crash ID	Location	Crash Details
1161944	Waterfall Way at Anchor Road	February 2018, Monday between 2pm and 4pm. An eastbound car in Waterfall Way struck the rear end of a stationary passenger van, which was behind a car (not in first impact) that was turning left in to a driveway. The crash occurred on a straight length of road, in daylight, on a dry road surface and in fine weather. No person was injured.
1281641	Waterfall Way at Gara Road	October 2021, Sunday between 8am and 10am. An eastbound motorcycle overtook and struck an eastbound light truck that was turning right. The crash occurred on a straight length of road, in daylight, on a dry road surface and in fine weather. One person was moderately injured.
1288608	Waterfall Way 300m east of Inces Road	April 2022, Tuesday between 4am and 6am. A westbound station wagon struck straying stock on the road. The crash occurred on a straight length of road, at dawn, on a dry road surface and in fog or mist. No person was injured.
1289206	Waterfall Way 200m east of Gara Road	May 2022, Monday between 12pm and 2pm. An eastbound car left the carriageway the left on a left hand bend and rolled over. The crash occurred on a curved length of road, in daylight, on a dry road surface and in fine weather. No person was injured. Speeding nominated as a contributing factor
1299938	Waterfall Way 1m east of Commissioners Waters Bridge	August 2022, Wednesday between 6pm and 8pm. An eastbound 4-wheel drive struck straying stock on the road. The crash occurred on a curved length of road, in darkness, on a dry road surface and in fine weather.

Two crashes involved vehicles striking straying stock in poor lighting conditions. Two crashes involved drivers not responding correctly to the movement of other vehicles, and one crash involved speeding leading to loss of control on a bend. The road crash history of the roads does not highlight any particular location with a notably poor crash history which may suggest an inherent concern with the road layout at that location.

3.7 Heavy Vehicle Access

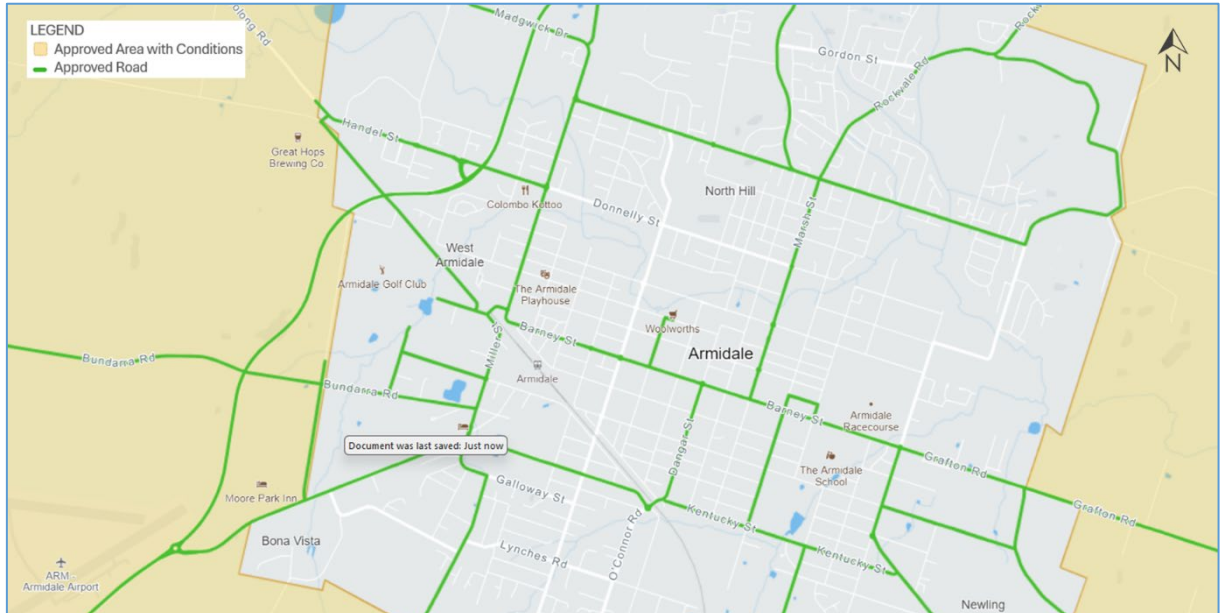
The Armidale Regional Council area is approved area for use by General Mass Limit (GML) and Concessional Mass Limit (CML) 25/26 m B-doubles, subject to conditions. Waterfall Way is an approved route for GML, CML and Higher Mass Limit (HML) 25/26m B-doubles. Figure 3.5 and Figure 3.6 present the approved area and routes for GML/CML B-doubles in the region and in Armidale respectively.

Figure 3.5: Approved Routes for GML 25/26 m B-doubles in the Region



Source: National Heavy Vehicle Regulator (2024)

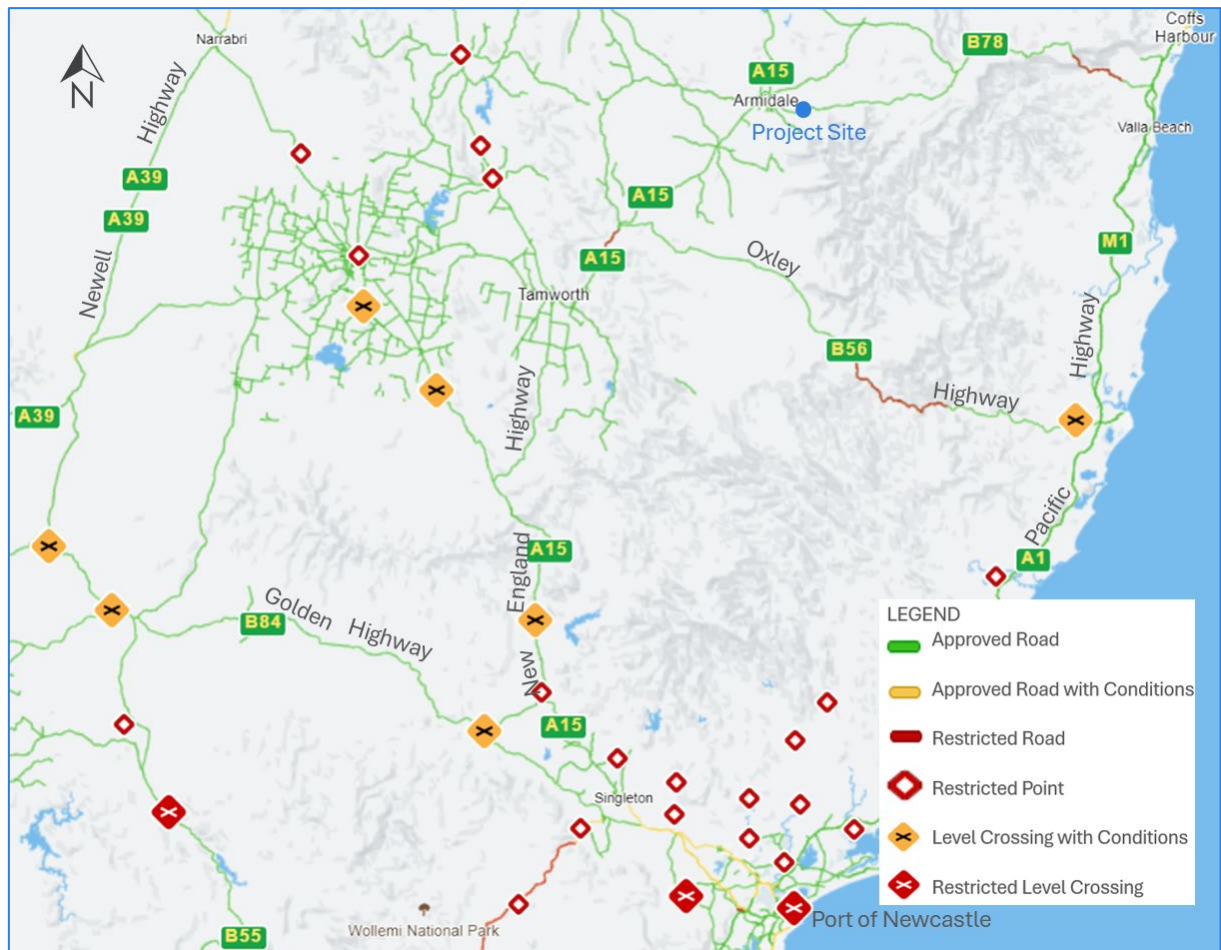
Figure 3.6: Approved Routes for GML 25/26 m B-doubles in Armidale



The NSW Oversize Overmass Load Carrying Vehicles Network map provides details of the approved routes as well as restricted structures for eligible load carrying vehicles operating under the Multi-State Class 1 Load Carrying Vehicles Mass Exemption Notice and the Multi-State Class 1 Load Carrying Vehicles Dimension Exemption Notice. Figure 3.7 illustrates the approved OSOM vehicle routes.

Review of the conditional and restrictions shown in Figure 3.7 and relevant to access to the Project site from Port of Newcastle, indicates that north of Tamworth, a restriction applies on New England Highway southbound only, that Police escort is required when the width exceeds 3.5 m. Travel time restrictions apply to vehicles exceeding various widths on New England Highway from north of Singleton to Pacific Highway near Hexham.

Figure 3.7: Oversize Overmass Load Carrying Vehicles Network



Source: National Heavy Vehicle Regulator (2024)

3.8 Travelling Stock Reserves

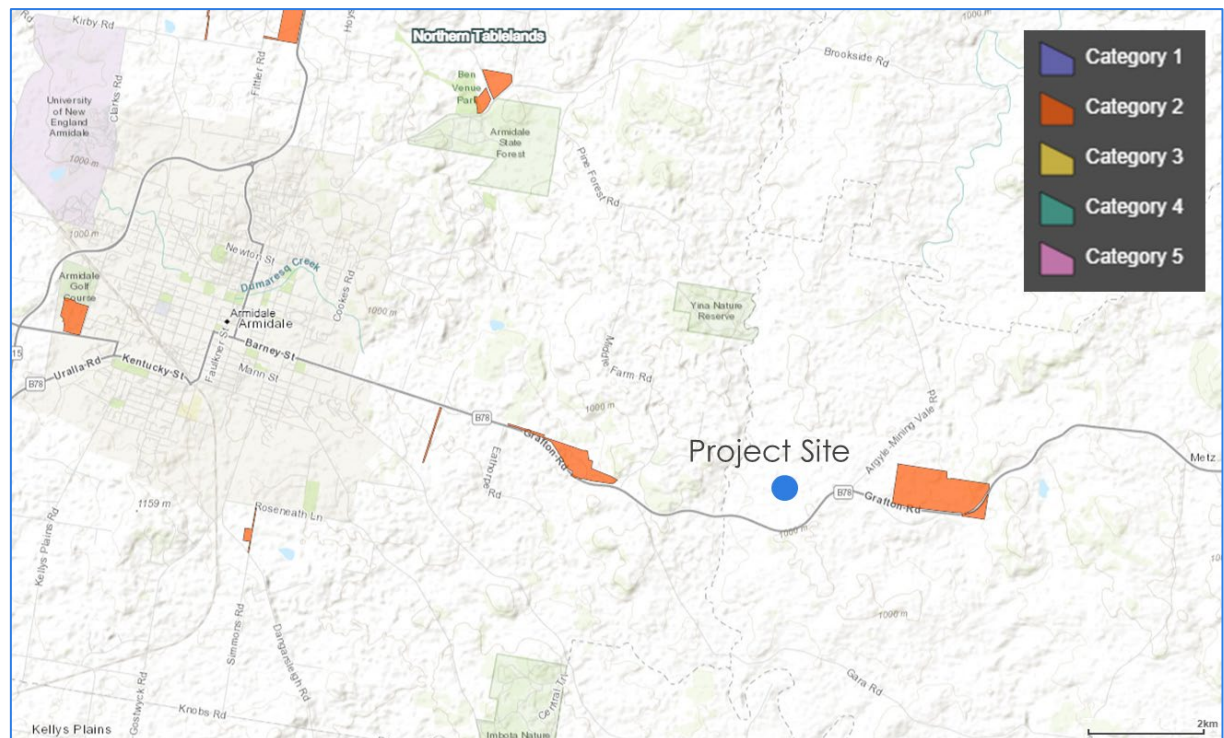
Travelling Stock Reserves (TSRs) are parcels of Crown land reserved under legislation for use by travelling stock. TSRs provide pasture reserves for travelling or grazing stock, and are also used for public recreation, apiary sites and for conservation and are categorised depending on their level and type of use.

TSRs in the eastern and central divisions of NSW (i.e., in the Armidale region) can be used by graziers during times of drought, bushfire and flood as supplementary grazing areas or for apiary sites. Use of TSRs for these activities requires a permit from Local Land Services, and stock are only to be walked over TSRs during daylight hours, and yarded at night. When stock

are on or near a road, approved warning signs must be displayed for motorists. Members of the public can use TSRs in the eastern and central divisions for recreation between sunrise and sunset, and for other uses such as conservation.

Figure 3.8 presents the locations and classifications of TSRs in the vicinity of the Project.

Figure 3.8: Classification of Travelling Stock Reserves



Source: Local Land Services (2024)

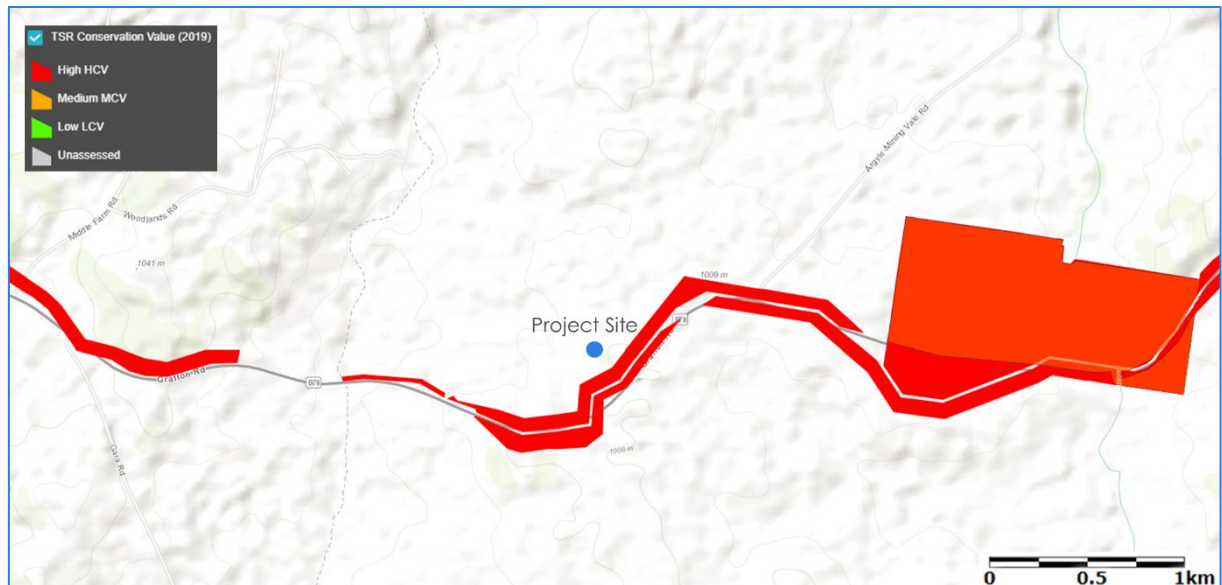
The TSRs in closest proximity to the site are:

- Commissioners Reserve (R682) – Category 2, located on the northern side of Waterfall way approximately 3 km west of the site, and
- Gara Reserve (R41000) – Category 2, located principally on the northern side of Waterfall Way with a small area to the south side, approximately 1.5 km east of the site.

Category 2 TSRs are used for travelling stock, emergency management or biosecurity purposes, but also other reasons, e.g., biodiversity conservation, Aboriginal cultural heritage or recreational purposes. Easements for property access, powerlines and pipelines are acceptable on Category 2 TSRs.

TPPP notes that in addition to the Category 2 TSRs in Figure 3.8, the online map (Local Land Services, 2024) also shows areas of medium and high “TSR Conservation Value (2019) along most of the length of Waterfall Way, which are not included in the classification map. These are illustrated in Figure 3.9, noting that the TSRs in proximity to the Project site are each side of the gazetted alignment of Waterfall Way which varies from the constructed alignment of Waterfall Way.

Figure 3.9: Travelling Stock Reserves Conservation Value



Source: Local Land Services (2024)

3.9 Cumulative Impacts of Other Developments

Other projects in the region may impact on future traffic conditions on those roads serving the Project, notably on Waterfall Way. Key proposed or approved projects that may potentially interact with, or have potential cumulative impacts with, the traffic generated by the Project have been identified with reference to the NSW Planning Portal, and are listed in Table 3.6. The projects are identified as being relevant in accordance with the *Cumulative Impact Assessment Guidelines for State Significant Projects* (NSW Government, 2022). Each of the projects in Table 3.6 have been reviewed and are discussed in this section.

Table 3.6: Relevant Projects for Cumulative Impact Assessment

Project	Overview	Status Summary	Report Section
Changes to Existing Projects (intensity of operations may change)			
Metz Solar Farm	SSD-7931 development of a 100 MW solar farm and associated infrastructure, access via Bayley Park Road	Operational	3.9.1
Armidale Regional Landfill	06_0220 development of a landfill facility, access via Waterfall Way	Operational	3.9.2
New England Solar Farm	SSD-9255 development of a 720 MW solar farm BESS and associated infrastructure	Stage 1 operational, Stage 2 construction	3.9.3
Approved Projects (approved but not yet started)			
Olive Grove Solar Farm	DA-17-2020 development of a 29.2 MW photovoltaic solar farm, access via Waterfall Way	Approved 2020	3.9.4
Stringybark Solar Farm	DA-112-2019 development of a 29.9 MW solar farm, access via Gara Road	Approved 2020	3.9.5
Petersens Solar Farm	DA-164-2019 development of a 5 MW solar farm, access via Dangarsfield Road	Approved 2020	3.9.6
Oxley Solar Farm	SSD-10346 development of a 215 MW solar farm with up to 50 MW of battery energy storage and associated infrastructure, primary access via Waterfall Way	Approved 2023	3.9.7
Projects Under Assessment (exhibited and currently under assessment)			
Armidale BESS	SSD-23515853 development of a 150 MW / 300 MWh BESS facility, access via Eathorpe Road	EIS submitted and exhibited, proponent preparing a Submissions Report	3.9.8
Oven Mountain Pumped Hydro Energy Storage	SSD-12422997 development of a 900 MW pumped hydro energy storage and generation project at Carrai	EIS submitted and exhibited, under assessment	3.9.9
Emerging Development Proposals (potentially relevant)			
Armidale East BESS	SSD-65058714 development of a 500 MW / 1,000 MWh BESS, access via Bayley Park Road	SEARs issued December 2023	3.9.11
Doughboy Wind Farm	SSD-64152463 development of a 55-turbine wind farm and BESS	SEARs issued 2023, application withdrawn July 2024	3.9.12

3.9.1 Metz Solar Farm

Metz Solar Farm (SSD-7931) is a solar farm located on Bayley Park Road at Metz, approximately 10 km east of the Project site. It was approved in 2017, and is now operational. TTM Consulting (2017) indicates that when operational, the Metz Solar Farm is forecast to generate up to eight vehicle movements per day, with most of the traffic being to and from Armidale.

As the development is now operational, no further changes to its traffic generation or distribution are expected to occur over its operational life compared with that captured by the traffic survey in 2024, and it is not considered further in this assessment.

3.9.2 Armidale Regional Landfill

The Armidale Regional Landfill is operated by Armidale Regional Council under the conditions of development approval 06_0220, which was issued in 2012. It is located on the southern side of Waterfall Way approximately 1.5 km east of the Project site. Construction works were completed in 2019, and was opened for operations in 2020, with an operational life of 50 years anticipated.

AECOM (2010) indicates that when operational, the Armidale Regional Landfill is expected to generate approximately 12 vehicle trips¹ per day, including:

- 6 trips by waste heavy vehicles (three inbound and three outbound);
- 2 heavy vehicle trips for transport of cover materials (one inbound and one outbound); and
- 4 light vehicle trips by staff (two inbound and two outbound).

All traffic to the Armidale Regional Landfill has an origin to the west along Waterfall Way, and a CHR treatment has been constructed in Waterfall Way at the site access.

As the development is now operational, no further changes to its traffic generation or distribution are expected to occur over its operational life compared with that captured by the traffic survey in 2024, and it is not considered further in this assessment.

3.9.3 New England Solar Farm

The New England Solar Farm (SSD-9255) is an approved solar farm with energy storage and associated infrastructure, located approximately 6 km east of Uralla, south of Armidale. Stage 1 (420 MW) commenced operations in 2023, and Stage 2 (320 MW) and a 200 MW / 2 hour battery has started construction (ACEN, 2024a). In its September 2024 project update, ACEN (2024b) indicates that work has begun on the electrical switchyard that will connect the New England BESS to the electricity transmission network. Switchyard construction is expected to take approximately six months.

EMM (2018) assessed the traffic impacts of construction and operation of the New England Solar Farm, and indicates that a number of access routes will be used, including Barleyfields Road and Big Ridge Road (and Munsies Road), Gostwyck Road and Hillview Road, Thunderbolt Bay and Salisbury Plains Road (and The Gap Road). EMM (2018) assumes that the workforce travels to/from Armidale and Tamworth, or resides at a construction accommodation village within the site. Construction of the New England Solar Farm is therefore not expected to generate any notable level of traffic on Waterfall Way.

¹ For clarity, consistent with Austroads definition, throughout this report a trip is a one-way movement. A vehicle arriving at and departing a site generates two vehicle trips.

Once operational, the traffic generated by the New England Solar Farm will be significantly reduced from that during its construction. As construction of the New England Solar Farm is likely to be complete before construction of the Project commences, the potential impacts of the New England Solar Farm on traffic conditions have not been considered further in this assessment.

3.9.4 Olive Grove Solar Farm

Olive Grove Solar Farm (DA-17-2020) is an approved solar farm with an on-site operations compound and on-site substation, located at 1060 Grafton Road at Metz, which is on the southern side of Waterfall Way. Constructive Solutions (2020) assessed the traffic and transport impacts of the Olive Grove Solar Farm, which will have its vehicular access via a new access point from Waterfall Way, located to the north-east of the existing Project site access. The new access will be constructed as a rural property access suitable for articulated vehicles, with a basic right-turn (BAR) treatment in Waterfall Way. Constructive Solutions (2020) presents a preliminary concept plan for the new access, which is reproduced in Figure 3.10. That access is to be located approximately 270 m from the Project site access intersection.

Figure 3.10: Preliminary Concept Plan for Olive Grove Solar Farm Access on Waterfall Way



Source: Constructive Solutions, 2023

All vehicles travelling between Armidale and the Olive Grove Solar Farm would travel along Waterfall Way past the Project site access. Based on the Constructive Solutions (2020)

assessment, this would generate the following trips on Waterfall Way between Armidale and the Olive Grove Solar Farm:

- Construction – over a nine month period:
 - 26 light and 12 heavy vehicle trips per day
 - 13 inbound trips during the AM peak hour
 - 13 outbound trips during the PM peak hour.
- Operations – over a 28-year period:
 - 14 light vehicle trips per day
 - 7 inbound trips during the AM peak hour
 - 7 outbound trips during the PM peak hour.

The expected timing of construction of the Olive Grove Solar Farm is not known (Infinergy Pacific, 2024). As it is understood that construction is not yet commenced, there is the potential for construction of the Olive Grove Solar Farm to overlap with that of the Project, and the impacts of that possible coincidence of traffic has been considered in this assessment.

3.9.5 Stringybark Solar Farm

Stringybark Solar Farm (DA-112-2019) is an approved solar farm located at 597 Gara Road at Armidale. Constructive Solutions (2019) assessed the traffic and transport impacts of the Stringybark Solar Farm, which will have its vehicular access via Waterfall Way and Gara Road. Gara Road intersects with Waterfall Way approximately 3.3 km west of the Project site access. A BAR treatment will be provided in Waterfall Way at its intersection with Gara Road. During construction, an existing access from Waterfall Way will be used by traffic associated with construction of the off-site substation, which is located at 1060 Waterfall Way. The vehicular access for 1060 Waterfall Way is located approximately 300 m south-west of the Project site access.

Constructive Solutions (2019) assumes that all project-generated vehicles will have an origin in Armidale. Vehicles travelling between Armidale and the Stringybark Solar Farm will travel along Waterfall Way between Armidale and Gara Road, and along Gara Road between Waterfall Way and the site access. All vehicles travelling between Armidale and the access for construction of the off-site substation will travel along Waterfall Way between Armidale and that site access. Traffic generated by construction of the Stringybark Solar Farm will therefore travel on Waterfall Way, but will not travel past the Project site access.

Based on the Constructive Solutions (2019) assessment, construction and operation of the Stringybark Solar Farm will generate the following average daily trips on Waterfall Way:

- Solar Farm Construction – over a nine month period, between Armidale and Gara Road:
 - 22 light and 10 heavy vehicle trips per day

- 12 inbound trips during the AM peak hour
- 12 outbound trips during the PM peak hour.
- Off-site Substation Construction – over a seven month period concurrent with the Solar Farm construction, between Armidale and 1060 Waterfall Way:
 - 10 light and 2 heavy vehicle trips per day
 - 5 inbound trips during the AM peak hour
 - 5 outbound trips during the PM peak hour.
- Operations, between Armidale and Gara Road:
 - 14 light vehicle trips per day
 - 7 inbound trips during the AM peak hour
 - 7 outbound trips during the PM peak hour.

The expected timing of construction of the Stringybark Solar Farm is not known (Infinergy Pacific, 2024). As it is understood that construction is not yet commenced, there is the potential for construction of the Stringybark Solar Farm to overlap with that of the Project, and the impacts of that possible coincidence of traffic has been considered in this assessment.

3.9.6 Petersens Solar Farm

Petersens Solar Farm (DA-164-2019) is an approved solar farm located at 347 Dangarsleigh Road at Armidale. New England Surveying & Engineering (2019) assessed the traffic and transport impacts of the Petersens Solar Farm, which will have its vehicular access via Dangarsleigh Road. Dangarsleigh Road extends in a north-south direction to the south of the Armidale town centre.

New England Surveying & Engineering (2019) estimates that during peak construction, the Petersens Solar Farm will generate 40 vehicles per hour during the peak hours. The majority of trips generated will have an origin in Armidale, with deliveries of solar farm components being from ports in either Sydney or Brisbane. Vehicles travelling between Armidale, Sydney or Brisbane and the Petersens Solar Farm will not travel past the Project site access on Waterfall Way.

The expected timing of construction of the Petersens Solar Farm is not known. As it is understood that construction is not yet commenced, there is the potential for construction of the Petersens Solar Farm to overlap with that of the Project. As the construction traffic generated by construction of the Petersens Solar Farm would not use Waterfall Way east of Armidale, the possible coincidence of construction traffic generated by the Petersens Solar Farm has not been considered in this assessment.

3.9.7 Oxley Solar Farm

Oxley Solar Farm (SSD-10346) is a solar farm and battery that was approved in 2023. It is located at 914 Gara Road, Metz. New England Surveying & Engineering (2021) assessed the traffic impacts of the Oxley Solar Farm, which will have its primary vehicular access via a new access off Waterfall Way approximately 270 m west of the Gara River. The primary access will be used for all vehicular access to the site, including heavy and OSOM vehicles. To provide access to some of the solar array panels, four new accesses will also be provided off Gara Road, which will be upgraded over a length of approximately 2 km. Vehicles will use these accesses only after having gained access to the site via the new access from Waterfall Way, and will return to Waterfall Way through the site and via the new access.

New England Surveying & Engineering (2021) assessed the trip generation of the construction and operation of the Oxley Solar Farm as follows:

- Peak Construction – over a period of six to nine months within a total construction period of 12 to 18 months:
 - 60 light and 122 heavy vehicle trips per day
 - 24 inbound trips during the project's AM peak hour
 - 7 inbound and 7 outbound trip during the on-street AM peak hour
 - 15 outbound trips during the project's PM peak hour
 - 6 inbound and 12 outbound trips during the on-street PM peak hour.
- Operations:
 - 10 light and 4 heavy vehicle trips per day
 - 1 inbound and 1 outbound trip during the AM and PM peak hours.

New England Surveying & Engineering (2021) assumes all vehicles generated by activity at the Oxley Solar Farm would have an origin in Armidale, and so would use Waterfall Way between Armidale and the Oxley Solar Farm access.

The expected timing of construction of the Oxley Solar Farm is not known (Oxley Solar Development, 2024). As it is understood that construction is not yet commenced, there is the potential for construction of the Oxley Solar Farm to overlap with that of the Project, and the impacts of that possible coincidence of traffic has been considered in this assessment.

3.9.8 Armidale BESS

The Armidale BESS (SSD-23515853) is a proposed development of a 150 MW / 300 MWh BESS facility with associated infrastructure located on the south-eastern corner of Waterfall Way and Eathorpe Road at Armidale. At the time of writing, the EIS for the Armidale BESS has been submitted and additional information has been sought from the applicant.

Impact Traffic Engineering (2023) assessed the impacts of the Armidale BESS on the road transport environment, and indicates that vehicular access would be via Eathorpe Road, with a secondary / emergency access to Waterfall Way. The construction stage is anticipated to occur over a 9-month period, undertaken in three stages, generating the following daily vehicle trips on the external road network (which assume workers travel in individual light vehicles, with total trips reduced should buses be used to transport the workers):

- Stage 1 – 2 months, site establishment
 - 120 light, 24 heavy and 4 over-dimensional vehicle trips per day
- Stage 2 – 3 months, delivery of BESS infrastructure
 - 160 light, 20 heavy and 4 over-dimensional vehicle trips per day
- Stage 3 – 4 months, installation of BESS infrastructure
 - 160 light and 20 heavy vehicle trips per day

Impact Traffic Engineering (2023) indicates that construction activity would generate up to 46 inbound trips during the AM peak hour and 46 outbound trips during the PM peak hour. Once operational, the workforce is anticipated to generate not more than 4 light vehicle trips per day, with occasional maintenance, visitors and deliveries generating additional trips.

As the Armidale BESS has not yet been approved, it is unknown whether approval will be granted and the timing of its possible construction is not known. Should it be approved, there is the potential for construction of the Armidale BESS to overlap with that of the Project, and the impacts of that possible coincidence of traffic has been considered in this assessment.

3.9.9 Oven Mountain Pumped Hydro Energy Storage

The Oven Mountain Pumped Hydro Energy Storage project (SSD-12422997) is the proposed development of a 900 MW pumped hydro energy storage and generation project, with associated grid connection and ancillary infrastructure. It is located at Carrai, approximately halfway between Armidale and Kempsey. It is currently under assessment.

EMM Consulting Pty Ltd (EMM, 2024) prepared a traffic impact assessment for the amended project, which will have its main vehicular access from Kempsey Road at Smiths Bluff. Construction traffic would approach and depart to and from both Armidale and Kempsey. EMM (2024) estimates that the Oven Mountain Pumped Hydro Energy Storage project would generate its peak trips to and from Armidale during the first year of construction in 2027, as follows:

- 28 light vehicle and 14 heavy vehicle trips per day;
- 4 light and 2 heavy vehicle trips during the AM peak hour (6:00 am to 7:00 am);
- 3 light and 2 heavy vehicle trips during the PM peak hour (5:00 pm to 6:00 pm).

EMM (2024) indicates that the operational traffic would be significantly lower than construction traffic.

As the Oven Mountain Pumped Hydro Energy Storage project has not yet been approved, it is unknown whether approval will be granted and the timing of its possible construction is not known. Should it be approved, there is the potential for construction of the Oven Mountain Pumped Hydro Energy Storage project to overlap with that of the Project, and the impacts of that possible coincidence of traffic has been considered in this assessment.

3.9.10 Armidale East BESS

The Armidale East BESS project (SSD- 65058714) is the proposed development of a 500 MW / 1,000 MWh battery energy storage system, with associated infrastructure, located immediately adjacent to the Metz Solar Farm. A Scoping Report (NGH Pty Ltd, 2023) has been prepared which anticipates that (based on EIS submission in Q3 2024) construction would commence in Q1 2026 and take place over 18 months. The operational life of the project would start in Q3 2027 and continue for approximately 40 years. At the time of writing, the EIS has not yet been submitted.

NGH (2024) indicates that subject to assessment, vehicular access to the site would be via Bayley Park Road and Waterfall Way to/from Armidale, and does not present details regarding the potential traffic generation of the construction or operational activities.

As the Armidale East BESS has not yet been approved, it is unknown whether approval will be granted and the timing of its possible construction is not known. Should it be approved, there is the potential for construction of the Armidale East BESS to overlap with that of the Project, however as no information has yet been provided by the applicant regarding its potential traffic generation, the possible coincidence of construction traffic has not been considered in this assessment.

3.9.11 Doughboy Wind Farm

Doughboy Wind Farm (SSD-64152463) was a proposed wind farm comprising up to 55 wind turbine generators and a BESS, located approximately 40 km east of Armidale. The proponent for the Doughboy Wind Farm withdrew the application on 18 July 2024, and it has not been considered further in this assessment.

3.9.12 Cumulative Construction Traffic Generation on Waterfall Way

Based on the construction traffic forecasts described in Sections 3.9.1 to 3.9.12, the traffic generated by each of the developments that may potentially occur concurrently with construction of the Project has been quantified. While it is considered very unlikely that the construction activity for each of the projects described above would coincide, Table 3.7

summarises the daily two-way traffic generated by those activities on Waterfall Way including the total should they all occur at the same time.

Table 3.7: Daily Traffic Generated by Other Developments (vehicles per day)

Location on Waterfall Way	Olive Grove Solar Farm		Stringybark Solar Farm		Oxley Solar Farm		Armidale BESS		Oven Mountain		Total	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
West of Eathorpe Road	26	12	32	12	60	122	160	20	28	14	306	180
West of Gara Road	26	12	32	12	60	122	0	0	28	14	146	160
West of Stringybark Solar Off-Site Access Road	26	12	10	2	60	122	0	0	28	14	124	150
West of Project site	26	12	0	0	60	122	0	0	28	14	114	148
West of Olive Grove Solar Farm Access	26	12	0	0	60	122	0	0	28	14	114	148
West of Oxley Solar Farm Access	0	0	0	0	60	122	0	0	28	14	88	136

Table 3.8 summarises the peak hourly two-way traffic generated by those activities on Waterfall Way. Similar to Table 3.7, this includes the total traffic generated should all construction activity occur at the same time, and should peak hour traffic generation of each project also occur during the same hour of the day. This is considered to be a very unlikely scenario that will tend to overestimate the cumulative impacts of the construction activity on the road network.

Table 3.8: Peak Hour Traffic Generated by Other Developments (vehicles per hour)

Location on Waterfall Way	Olive Grove Solar Farm		Stringybark Solar Farm		Oxley Solar Farm		Armidale BESS		Oven Mountain		Total	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
West of Eathorpe Road	13	13	17	17	24	15	46	46	6	5	106	96
West of Gara Road	13	13	17	17	24	15	0	0	6	5	60	50
West of Stringybark Solar Off-Site Access Road	13	13	5	5	24	15	0	0	6	5	48	38
West of Project site	13	13	0	0	24	15	0	0	6	5	43	33
West of Olive Grove Solar Farm Access	13	13	0	0	24	15	0	0	6	5	43	33
West of Oxley Solar Farm Access	0	0	0	0	24	15	0	0	6	5	30	20

3.10 Growth in Traffic

Outside of the effects of changes to traffic due to the effects of the developments described in Section 3.9, growth in traffic can also be expected to occur due to general changes in travel behaviour and population. Noting that the draft strategy for Waterfall Way adopted a growth rate of 1.6 per cent per annum on Waterfall Way, this assessment has also assumed that surveyed traffic may increase at a rate of 1.6 percent per annum above that surveyed in 2024.

3.11 Baseline Future Traffic Volumes

Future daily and peak hourly traffic volumes on Waterfall Way without the Project have been forecast for 2027, being the year during which the Project would be expected to have its greatest impact on traffic volumes. For the purpose of this assessment, the average weekday has been considered, and the surveyed volumes on Waterfall Way near the Project site have been assumed to be indicative of volumes along Waterfall Way between Eathorpe Road and the Gara River.

The forecasts of average weekday daily traffic at key locations along Waterfall Way are summarised in Table 3.9, which robustly assumes that construction of all the potentially cumulative developments described in Section 3.9 occur concurrently.

Table 3.9: Average Weekday Daily Traffic on Waterfall Way 2027 (vehicles per day)

Location on Waterfall Way	Surveyed 2024		Growth to 2027		Other Developments		Total	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
West of Eathorpe Road	1,466	221	71	11	306	180	1,843	412
West of Gara Road					146	160	1,683	392
West of Stringybark Solar Off-Site Access Road					124	150	1,661	382
West of Project Access					114	148	1,651	380
West of Olive Grove Solar Farm Access					114	148	1,651	380
West of Oxley Solar Farm Access					88	136	1,625	368

The forecasts of average weekday and Saturday AM and PM peak hour traffic at key locations along Waterfall Way are summarised in Table 3.10, which robustly assumes that construction of all the potentially cumulative developments described in Section 3.9 occur concurrently. The surveyed AM and PM volumes in Table 3.10 have been selected with regard to the Project's construction hours, (refer to Section 2.5), with the Project's traffic generation expected to be greatest at the start and end of the construction hours each day. On weekdays, the peak of traffic to and from the Project would be expected to occur as workers arrive before 7:00 am and depart after 6:00 pm, however for the purpose of this assessment, the higher surveyed demands between 7:00 am and 8:00 am, and between 5:00 pm and 6:00 pm have been applied to ensure a robust assessment. Similarly on Saturdays, the peak of traffic to and from the Project would be expected to occur as workers arrive before 8:00 am, however for the purpose of this assessment, the higher surveyed demands between 8:00 am and 9:00 am have been applied to ensure a robust assessment. The surveyed PM peak hourly demand on Saturday coincides with the expected movement of workers leaving the site after 1:00 pm.

Table 3.10: Peak Hour Traffic on Waterfall Way 2027 (vehicles per hour)

Location on Waterfall Way	Surveyed 2024		Growth to 2027		Other Developments		Total	
	AM	PM	AM	PM	AM	PM	AM	PM
Weekday								
West of Eathorpe Road	102	108	6	6	106	96	214	210
West of Gara Road					60	50	168	164
West of Stringybark Solar Off-Site Access Road					48	38	156	152
West of Project Access					43	33	151	147
West of Olive Grove Solar Farm Access					43	33	151	147
West of Oxley Solar Farm Access					30	20	138	134
Saturday								
West of Eathorpe Road	106	140	5	6	106	96	217	242
West of Gara Road					60	50	171	196
West of Stringybark Solar Off-Site Access Road					48	38	159	184
West of Project Access					43	33	154	179
West of Olive Grove Solar Farm Access					43	33	154	179
West of Oxley Solar Farm Access					30	20	141	166

Weekday Surveyed AM = 7:00 am to 8:00 am, Surveyed PM = 5:00 pm to 6:00 pm.
 Saturday Surveyed AM = 8:00 am to 9:00 am, Surveyed PM = 1:00 pm to 2:00 pm.

4 Impacts of the Project

4.1 Pre-Construction Trip Generation

ACEnergy has developed a schedule for the number of vehicles expected to be required during the pre-construction stage of the Project, which is presented in Table 4.1.

Table 4.1: Pre-Construction Vehicle Schedule

Phase	Duration	Light Vehicles	Heavy Vehicles	Total Vehicles
Stage 1	6 weeks	-	-	-
- Road dilapidation survey		1	0	1
- Fencing installation		2	2	4
- Geotechnical drilling (road upgrade)		1	2	3
- Geotechnical drilling (site)		1	2	3
- Tree removal		2	3	5
- Access track upgrade		6	10	16
Stage 2 – Intersection Upgrade	12 weeks	6	14	20

It is expected that the Stage 1 activities would not all occur concurrently, nor would each activity take place continuously throughout the six-week period. Some overlapping of the activities would be expected, and some vehicles may remain on-site for an extended period, rather than being driven to and from the site each day, e.g. drilling rig. Nevertheless, for the purpose of this review, it has been assumed that on a peak day, all of the vehicles expected during Stage 1 pre-construction activities would travel to and from the site. On a typical day, the number of vehicles attending the site would be below the peak assumed.

Similarly, the vehicles required during the Stage 2 activities would not all attend the site on each and every day throughout the 12-week period. Some vehicles may remain on-site for an extended period rather than being driven to and from the site each day. Nevertheless, for the purpose of this review, it has been assumed that on a peak day, all of the vehicles expected during Stage 2 pre-construction activities would travel to and from the site.

4.1.1 Pre-Construction Workforce Trips

The pre-construction workforce would drive light vehicles to the site, with some limited car-pooling likely to occur. A maximum of 13 and six light vehicles would travel to the site during Stages 1 and 2 respectively. Those light vehicles would travel to the Project site in the morning prior to the start of pre-construction hours, and depart from the Project site in the evening at the end of the pre-construction hours.

The pre-construction workforce is expected to be made up of existing residents of the local region, so would not generate any requirement for temporary or additional accommodation facilities.

As the workforce present during the pre-construction activities would be low, and light vehicles used by the workforce would include light commercial vehicles for transporting tools, it is not practical to provide shuttle bus services during this period. To the extent possible, workers travelling similar routes would be encouraged to car-pool, noting that vehicle numbers would be monitored and capped.

4.1.2 Pre-Construction Delivery Trips

A maximum of 19 and 14 heavy vehicles would travel to and from the site on a peak day during the Stage 1 and Stage 2 pre-construction stages respectively. This would generate 38 and 28 heavy vehicle trips per day during the Stage 1 and Stage 2 pre-construction stages respectively.

Delivery trips would typically be spread throughout the day, and most would be scheduled to occur during the day while the workforce is already present, i.e. outside the periods during which the workforce travels. As a robust assessment, it has however been assumed that approximately 15 % of the daily heavy vehicle trips may occur during the same hours that the workforce arrives in the morning, and depart in the evening.

4.1.3 Total Pre-Construction Trip Generation

The total number of vehicle trips forecast to be generated during the pre-construction period (noting the conservatively high nature of the forecasts described above) are summarised in Table 4.1. TTPP notes that ACenergy proposes that the number of vehicle trips generated would be actively monitored and managed throughout the pre-construction activity (refer to Section 4.14).

Table 4.2: Forecast Peak Day Pre-Construction Stage Trip Generation

	AM Peak (vehicles per hour)		PM Peak (vehicles per hour)		Daily (vehicles per day)	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Stage 1 – Other Works						
Light vehicles	13	0	0	13	13	13
Heavy vehicles	3	3	3	3	19	19
Total Stage 1	15	3	3	15	32	32
Stage 2 – Upgrade Access						
Light vehicles	6	0	0	6	6	6
Heavy vehicles	2	2	2	2	14	14
Total Stage 2	8	2	2	8	20	20

AM and PM peak hours occur when the workforce travel to/from the Project site.

Based on the pre-construction hours, the AM and PM peaks in traffic generated by the movement of the pre-construction workforce are expected to occur prior to 7:00 am and after 6:00 pm on weekdays, and prior to 8:00 am and after 1:00 pm on Saturdays. Throughout the rest of the day (7:00 am to 6:00 pm on weekdays and 8:00 am to 1:00 pm on Saturdays), the pre-construction workforce would not travel to and from the site. Throughout the day, the number of heavy vehicle movements generated during any one hour would be very low, and would be expected to be less than the 15 % of daily movements presented in Table 4.1, i.e. less than three vehicles entering and exiting the site in any one hour. The volumes presented in Table 4.1 therefore represent maximum hourly and daily traffic on a peak day during the pre-construction stage, noting that these conditions would not occur each and every day, nor each and every hour throughout the pre-construction period.

TfNSW has requested that the trips generated during the AM and PM peak hours in the pre-construction stage be comparable with that of the existing land use. Noting that the Stage 2 pre-construction activities would be subject to a Works Authorisation Deed (WAD) obtained from TfNSW, which would include a Construction Traffic Management Plan (CTMP) with traffic control requirements, the TfNSW requirement for comparable traffic generation is reasonably considered to apply only to the Stage 1 pre-construction activities.

TTPP notes that there is no “standard” for the number of vehicle trips generated by a rural property to allow a simple comparison as may be possible for other land uses. The trip generation of a rural property may be expected to vary significantly depending on the size and location of the property, and the exact nature of activities that take place, and may vary significantly on a seasonal basis. With regard to the Stage 1 pre-construction trip generation and the existing land use, it is noted that:

- the types of light and heavy vehicles expected to be used during the Stage 1 pre-construction activities are consistent with those that would be expected to be used on rural properties;

- the Stage 1 pre-construction activities would occur for a short-term period only, which is consistent with seasonal variations in traffic generated by rural properties;
- the peak hourly traffic demands generated by Stage 1 pre-construction activities would not align with the background peak demands generated by existing land uses in the region as surveyed on Waterfall Way, so would take up available capacity outside of peak periods with no worsening of the peak demands experienced in the region.

4.2 Peak Construction Trip Generation

4.2.1 Peak Construction Workforce Trips

The construction workforce schedule (Figure 2.1) indicates that an average of 58 people would attend the site each day throughout the construction period, with a peak of 80 people per day attending the site during Weeks 13 to 16 inclusive.

Approximately half of the construction workforce would be specialist workers, who would be accommodated in Armidale and transported to and from the Project site each day in shuttle buses. When the peak total workforce of 80 personnel is present, the specialist workforce would comprise approximately 40 personnel. Up to four shuttle buses would be used to transport the specialist workforce between Armidale and the Project site. Assuming each shuttle bus returns to Armidale after unloading passengers in the morning, then returns to the site ready to collect passengers in the evening, each shuttle bus would generate four vehicle trips per day (two in the morning and two in the evening). Four shuttle buses would generate 16 vehicle trips per day (eight in the morning and eight in the evening).

Construction workers who reside in the local region would drive light vehicles to and from the site, with some car-pooling of those workers likely to occur. When the peak workforce of 80 personnel is present, local resident workers would comprise approximately 40 personnel. Excluding any allowance for car-pooling, those workers would require up to 40 light vehicles. To allow for variations in the local and specialised workforce that may occur, this assessment has however assumed that up to 60 per cent of the total workforce may be local residents who drive to and from the Project site. Excluding any allowance for car-pooling, this would require up to 48 light vehicles to transport the peak construction workforce in addition to the shuttle buses. Those light vehicles would travel to the Project site in the morning, and depart from the Project site in the evening.

This is considered to be a conservatively high estimate of the potential trip generation, as it assumes that four shuttle buses are used that have a total capacity to transport 88 personnel to/from Armidale, as well as 48 light vehicles that have capacity to transport a minimum of 48 personnel (and more when car-pooling is taken into consideration). The trip generation adopted for this assessment therefore has capacity to transport a significantly higher number of personnel than are anticipated to be required at the site during the peak weeks of construction activity.

4.2.2 Peak Construction Delivery Trips

The heavy vehicle delivery schedule (Figure 2.2) indicates that an average of 25 heavy vehicles would attend the site each day throughout the construction period, with a peak of 75 heavy vehicles per day required during Weeks 11 and 12. Each heavy vehicle would typically arrive and depart from the Project site on the same day, with 75 deliveries on a peak day generating 150 vehicle trips.

Delivery trips would typically be spread throughout the day, and would typically be scheduled to occur during the day while the workforce is already present, i.e. outside the periods during which the workforce travels. As a robust assessment however, it has been assumed that during the peak delivery stage of the Project, up to 15 % of the daily delivery trips may occur during the same hours that the workforce arrives in the morning, and depart in the evening. During the peak weeks when 75 deliveries per day are expected, this is equivalent to 11 heavy vehicle trips per hour during those peak hours.

4.2.3 Total Peak Construction Trip Generation

To ensure a robust assessment of the potential impacts of the Project on the road network, this assessment assumes that the peak of 75 heavy vehicles per day (Weeks 11 and 12) would occur at the same time that the peak workforce of 80 personnel is present (Weeks 13 to 16). This assumption will tend to overestimate the total combined trip generation that would occur at any one time.

The total number of vehicle trips forecast to be generated during the peak construction period (noting the conservatively high nature of the forecasts described above) are summarised in Table 4.1. TPP notes that ACEnergy proposes that the number of vehicle trips generated would be actively monitored and managed throughout the construction activity (refer to Section 4.14).

Table 4.3: Forecast Peak Construction Stage Trip Generation

	AM Peak (vehicles per hour)		PM Peak (vehicles per hour)		Daily (vehicles per day)	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Workforce – shuttle bus	4	4	4	4	8	8
Workforce – light vehicles	48	0	0	48	48	48
Deliveries – heavy vehicles	11	0	0	11	75	75
Total	63	4	4	63	131	131

AM and PM peak hours occur when the workforce travel to/from the Project site.

4.3 Trip Distribution

4.3.1 Pre-Construction Stage

It is estimated that the pre-construction workforce would principally reside in Armidale, Uralla and Tamworth, with accommodation to be provided at the University of New England for non-local workers. The majority of workers (estimated to be 90 %) would therefore be expected to approach the Project site from the west along Waterfall Way and depart to the west to return to Armidale. It is estimated that 10 % of the pre-construction workforce would reside in towns to the east of the Project site and so would be expected to approach the Project site from the east along Waterfall Way and depart to the east.

Light vehicles transporting the workforce would arrive at the site prior to 7:00 am on weekdays or 8:00 am on Saturdays, and depart the site after 6:00 pm on weekdays or 1:00 pm on Saturdays.

The majority of heavy vehicle deliveries are expected to be sourced from Armidale, Uralla and Tamworth, so would approach the Project site through Armidale and from the west, and depart along the same route in the reverse direction. Deliveries from Coffs Harbour and Grafton would make up approximately 25 % of all heavy vehicle deliveries and would approach and depart via Waterfall Way to/from the east. Heavy vehicles would deliver to the Project site throughout the day during the construction hours.

4.3.2 Peak Construction Stage

Construction personnel would be sourced from the local region including Armidale, Uralla and Tamworth, and non-local specialist workers would be accommodated in Armidale.

The shuttle buses would operate between Armidale and the Project site, and would approach the Project site from the west along Waterfall Way and depart to the west to return to Armidale. It is estimated that 90 % of the local personnel would reside in Armidale, Uralla and Tamworth, and so would be expected to approach the Project site from the west along Waterfall Way and depart to the west to return to Armidale. It is estimated that 10 % of the local personnel would reside in towns to the east of the Project site and so would be expected to approach the Project site from the east along Waterfall Way and depart to the east.

Shuttle buses and light vehicles transporting the workforce would arrive at the site prior to 7:00 am on weekdays or 8:00 am on Saturdays, and depart the site after 6:00 pm on weekdays or 1:00 pm on Saturdays.

The majority of heavy vehicle deliveries are expected to be sourced from Armidale, Uralla and Tamworth, so would approach the Project site through Armidale and from the west, and depart along the same route in the reverse direction. Deliveries from Coffs Harbour and

Grafton would make up approximately 25 % of all heavy vehicle deliveries and would approach and depart via Waterfall Way to/from the east. Heavy vehicles would deliver to the Project site throughout the day during the construction hours.

Table 4.2 summarises the distribution of the Project-generated traffic adopted for this assessment during the peak construction stage of the Project. TPP notes that AC Energy proposes that the number of vehicle trips generated by direction would be actively monitored and managed throughout the construction activity (refer to Section 4.14).

Table 4.4: Forecast Peak Construction Stage Trip Distribution

	AM Peak (vehicles per hour)		PM Peak (vehicles per hour)		Daily (vehicles per day)	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Trips to/from West of Project Site						
Shuttle bus	4	4	4	4	8	8
Light vehicles	43	0	0	43	43	43
Deliveries	8	0	0	8	56	56
Total to/from West	55	4	4	55	107	107
Trips to/from East of Project Site						
Shuttle bus	0	0	0	0	0	0
Light vehicles	5	0	0	5	5	5
Deliveries	3	0	0	3	19	19
Total to/from East	8	0	0	8	24	24

AM and PM peak hours occur when the workforce travel to/from the Project site.

The OSOM components for the Project are anticipated to be transported to the Project site from Mayfield Berth 4 at the Port of Newcastle as described in the OSOM Route Study. The timing of OSOM vehicle deliveries would be managed on a case-by-case basis.

4.4 Impact on Traffic Volumes

4.4.1 Pre-Construction Stage

Noting that the maximum traffic generated during Stage 1 of the pre-construction stage would be greater than the maximum generated during Stage 2 of the pre-construction stage, this assessment has focussed on the impacts of the Project's pre-construction activity during Stage 1.

The impact of the maximum Project-generated pre-construction traffic on traffic volumes on Waterfall Way has been assessed, cumulative with the potential coincidence of traffic associated with other developments in the region and background growth in traffic. Table 4.2 presents the forecast daily traffic during the average weekday with the maximum pre-

construction traffic expected to be generated during Stage 1 of the Project pre-construction stage.

Table 4.5: Daily Traffic on Waterfall Way Project Pre-Construction Stage 1 (vehicles per day)

Location on Waterfall Way	Baseline 2027 ^A		Project Maximum Pre-Construction		Total	
	Light	Heavy	Light	Heavy	Light	Heavy
West of Eathorpe Road	1,843	412	24	28	1,867	440
West of Gara Road	1,683	392	24	28	1,707	420
West of Stringybark Solar Off-Site Access Road	1,661	382	24	28	1,685	410
West of Project Access	1,651	380	24	28	1,675	408
West of Olive Grove Solar Farm Access	1,651	380	2	10	1,653	390
West of Oxley Solar Farm Access	1,625	368	2	10	1,627	378

^A With other development construction activity and background growth, refer to Table 3.9.

Table 4.3 presents the forecast hourly traffic during the average weekday during the pre-construction stage in 2027. As previously noted, this assumes the peak traffic generated by other developments occurs during the same hours as the Project-generated peak traffic, and occurs during the hours 7:00 am to 8:00 am, and 5:00 pm to 6:00 pm. As peak pre-construction workforce travel would likely occur prior to 7:00 pm and after 6:00 pm, Table 4.3 tends to overestimate the total traffic occurring during any one hour.

Table 4.6: Peak Hourly Traffic Waterfall Way Pre-Construction Stage 1 (vehicles per hour)

Location on Waterfall Way	Baseline 2027 ^A		Project Maximum Pre-Construction		Total	
	AM	PM	AM	PM	AM	PM
Weekdays						
West of Eathorpe Road	214	210	16	16	230	226
West of Gara Road	168	164	16	16	184	180
West of Stringybark Solar Off-Site Access Road	156	152	16	16	172	168
West of Project Access	151	147	16	16	167	163
West of Olive Grove Solar Farm Access	151	147	3	3	154	150
West of Oxley Solar Farm Access	138	134	3	3	141	137
Saturday						
West of Eathorpe Road	217	242	16	16	233	258
West of Gara Road	171	196	16	16	187	212
West of Stringybark Solar Off-Site Access Road	159	184	16	16	175	200
West of Project Access	154	179	16	16	170	195
West of Olive Grove Solar Farm Access	154	179	3	3	157	182
West of Oxley Solar Farm Access	141	166	3	3	144	169

^A With other development construction activity and background growth, refer to Table 3.10.

4.4.2 Peak Construction Stage

The impact of the peak Project-generated construction traffic on traffic volumes on Waterfall Way has been assessed, cumulative with the potential coincidence of traffic associated with other developments in the region and background growth in traffic. Table 4.2 presents the forecast daily traffic during the average weekday during the peak Project construction stage in 2027. As the shuttle buses would have gross vehicle mass (GVM) greater than 5 t, they are classified as heavy vehicles.

Table 4.7: Daily Traffic on Waterfall Way with Project Peak Construction (vehicles per day)

Location on Waterfall Way	Baseline 2027 ^A		Project Peak Construction		Total	
	Light	Heavy	Light	Heavy	Light	Heavy
West of Eathorpe Road	1,843	412	86	128	1,929	540
West of Gara Road	1,683	392	86	128	1,769	520
West of Stringybark Solar Off-Site Access Road	1,661	382	86	128	1,747	510
West of Project Access	1,651	380	86	128	1,737	508
West of Olive Grove Solar Farm Access	1,651	380	10	38	1,661	418
West of Oxley Solar Farm Access	1,625	368	10	38	1,635	406

^A With other development construction activity and background growth, refer to Table 3.9.

Table 4.3 presents the forecast hourly traffic during the average weekday during the peak Project construction stage in 2027. As previously noted, this assumes the peak traffic generated by other developments occurs during the same hours as the Project-generated peak traffic, and occurs during the hours 7:00 am to 8:00 am, and 5:00 pm to 6:00 pm. As peak Project workforce travel would likely occur prior to 7:00 pm and after 6:00 pm, Table 4.3 tends to overestimate the total traffic occurring during any one hour.

Table 4.8: Peak Hourly Traffic Waterfall Way Project Peak Construction (vehicles per hour)

Location on Waterfall Way	Baseline 2027 ^A		Project Peak Construction		Total	
	AM	PM	AM	PM	AM	PM
Weekdays						
West of Eathorpe Road	214	210	59	59	273	269
West of Gara Road	168	164	59	59	227	223
West of Stringybark Solar Off-Site Access Road	156	152	59	59	215	211
West of Project Access	151	147	59	59	210	206
West of Olive Grove Solar Farm Access	151	147	8	8	159	155
West of Oxley Solar Farm Access	138	134	8	8	146	142
Saturday						
West of Eathorpe Road	217	242	59	59	276	301
West of Gara Road	171	196	59	59	230	255
West of Stringybark Solar Off-Site Access Road	159	184	59	59	218	243
West of Project Access	154	179	59	59	213	238
West of Olive Grove Solar Farm Access	154	179	8	8	162	187
West of Oxley Solar Farm Access	141	166	8	8	149	174

^A With other development construction activity and background growth, refer to Table 3.10.

4.5 Midblock Capacity

The capacity of a road is defined as the maximum hourly rate at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under the prevailing roadway, traffic and control conditions. The capacity of a single traffic lane is affected by factors such as the pavement width and restricted lateral clearances, the presence of heavy vehicles and grades.

Austrroads (2020a) provides guidelines for the capacity and performance of two-lane, two-way rural roads, which, in turn, refers to the *Highway Capacity Manual* (HCM) (Transportation Research Board, 2016). The HCM defines three classes of road which relate to drivers' expectations. Class I roads are those on which motorists expect to travel at relatively high speeds. They most often serve long-distance trips or provide connecting links between facilities that serve long-distance trips. Class II roads are those on which motorists do not necessarily expect to travel at high speeds, and may function as access routes to Class I

facilities, serve as scenic or recreational routes, or pass through rugged terrain. Class III roads serve moderately developed areas, and may be portions of a Class I or Class II highway that pass through small towns or developed recreational areas, where local traffic mixes with through traffic, and the density of unsignalised roadside access points increases.

Level of Service (LOS) represents road users' perceptions of the quality of service provided by a road link, and describes operational conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. Levels of Service are designated A through F, with LOS A providing the best traffic conditions, with no restriction on desired travel speed or overtaking. LOS B to D describes progressively worse traffic conditions. LOS E occurs when traffic conditions are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre in the traffic stream. The service flow rate for LOS E is taken as the capacity of a lane or roadway. In rural situations, LOS C is generally considered to be acceptable. At LOS C, most vehicles are travelling in platoons, and travel speeds are curtailed. At LOS D, platooning increases significantly, and the demand for passing is high, but the capacity to do so is low. The LOS experienced by drivers on two-way rural roads is dependent on the drivers' expectations regarding the road. The LOS criteria for two-lane roads are as shown in Table 4.4.

Table 4.9: LOS Criteria for Two-Lane Two-Way Roads

Level of Service	Class I		Class II	Class III
	Average Travel Speed (km/h)	Percent Time-Spent-Following (%)	Percent Time-Spent-Following (%)	Percent Free-Flow Speed (%)
A (best)	> 90	≤ 35	≤ 40	> 91.7
B	> 80 – 90	> 35 – 50	> 40 – 55	> 83.3 – 91.7
C	> 70 – 80	> 50 – 65	> 55 – 70	> 75.0 – 83.3
D	> 60 – 70	> 65 – 80	> 70 – 85	> 66.7 – 75.0
E (at/near capacity)	≤ 60	≥ 80	≥ 85	≤ 66.7

Source: Austroads (2020a).

Waterfall Way in the region of the Project would generally be considered as a Class I route, hence the applicable criteria are average travel speed (ATS) and percent time-spent-following (PTSF). Table 4.5 summarises the results of the assessment of midblock LOS, during the key hours of the average weekday and Saturday relevant to the Project as described herein. This assessment is indicative of the conditions along Waterfall Way between Armidale and the Project, rather than being applicable to a specific location only. The assessment includes the cumulative effects of background growth, the potential construction activity related to other developments, and the Project construction activity assuming the workforce all travel from Armidale. As the forecast traffic volumes during the pre-construction stage are lower than during the peak construction stage, the midblock LOS during the construction stage would be the more critical, and hence LOS has been calculated only for conditions forecast during the peak construction stage.

Table 4.10: Midblock LOS on Waterfall Way

Scenario	Eastbound			Westbound		
	ATS	PTSF	LOS	ATS	PTSF	LOS
Weekday AM Peak Hour						
Surveyed 2024	102	29.6	A	102	31.1	A
Baseline 2027	102	40.4	B	101	24.5	A
Peak Construction 2027	101	49.4	B	100	20.8	A
Weekday PM Peak Hour						
Surveyed 2024	102	33.8	A	102	27.4	A
Baseline 2027	102	29.0	A	102	37.0	B
Peak Construction 2027	100	24.2	A	101	47.5	B
Saturday AM Peak Hour						
Surveyed 2024	102	37.0	B	102	23.7	A
Baseline 2027	102	44.8	B	101	18.6	A
Peak Construction 2027	101	53.0	C	99	16.3	A
Saturday PM Peak Hour						
Surveyed 2024	102	39.1	B	102	26.4	A
Baseline 2027	101	35.5	B	101	35.6	B
Peak Construction 2027	99	31.2	A	100	47.2	B

Assumes all Project-generated traffic approaches eastbound and departs westbound.

The results in Table 4.5 indicate that with the cumulative impacts of the construction of potential other developments, background growth and Project-generated construction traffic, drivers would experience good operating conditions on Waterfall Way, being level of service A to C during the key hours. LOS C represents acceptable conditions in which drivers experience some degree of platooning, and is forecast for eastbound traffic during the Saturday morning peak. Noting the conservatively high nature of the forecasts as described herein, and that the forecast PTSF lies at the lower threshold for level of service C, no concerns are raised regarding the capacity or operation of Waterfall Way with the Project.

4.6 Operation of the Intersection

At unsignalised intersections with minor roads, where there are relatively low volumes of through and turning vehicles, capacity considerations are usually not significant, and detailed analysis of capacity is not warranted. As a guide, at volumes below the following combinations of maximum hourly volumes at a cross intersection with a two lane two-way road, capacity analysis is not warranted:

- major road 400 vehicles per hour, minor road 250 vehicles per hour;
- major road 500 vehicles per hour, minor road 200 vehicles per hour; and
- major road 650 vehicles per hour, minor road 100 vehicles per hour.

As demonstrated in Table 4.3, the peak hourly two-way traffic volumes on Waterfall Way near the Project access with the Project traffic cumulative with background growth and construction of other developments would be approximately 175 vehicles per hour (major road). The Project site access road (minor road) is expected to carry up to 30 vehicles per hour during the peak hours of the peak construction stage. The combined flows would be well below the threshold volumes for analysis at the impacted intersections, and as such, there is no capacity concerns regarding the operation of the intersection of Waterfall Way with the Project access.

Nevertheless, noting TfNSW's interest in intersection capacity (refer to Table 1.1) TTPP has assessed the operating conditions of the intersection of Waterfall Way with the Project site access. The critical periods for the operation of that intersection would be during the peak hours when the workforce and delivery vehicles would be arriving at or departing from the Project site. As the demands at the intersection would be greater during the peak construction stage than the pre-construction stage, the analyses have focused on the intersection's forecast operating conditions during the more critical construction stage.

The analyses have been conducted using SIDRA INTERSECTION 10, which determines characteristics of intersection operating conditions including the degree of saturation, average delays, and levels of service. The degree of saturation, or x-value, is the ratio of the arrival rate of vehicles to the capacity. The average delay, expressed in seconds per vehicle, is measured over all movements at signalised intersections, and over the movement with the highest average delay at roundabout and priority intersections. Average vehicle delay is the commonly used measure of intersection performance defined by TfNSW. Table 4.6 shows the criteria adopted by TfNSW for assessing the level of service, noting that at unsignalised intersections, the average delay reported is that for the movement with the highest average delay per vehicle.

Table 4.11: Intersection Level of Service Criteria

Level of Service (LoS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Note: Average delay per vehicle is measured as seconds per vehicle (sec/veh).

The outputs from the SIDRA analyses are summarised in Table 4.7, and results presented in Appendix B. The analysis assumes the workforce all depart within a 30 minute period during the peak hour.

Table 4.12: Peak Hour Intersection Operating Conditions Waterfall Way and Project Access

	Degree of Saturation	Average Delay per Vehicle (sec/veh)	Level of Service
Weekday AM Peak Hour	0.111	9.0	A
Weekday PM Peak Hour	0.120	10.5	A
Saturday AM Peak Hour	0.119	9.0	A
Saturday PM Peak Hour	0.125	10.5	A

The results demonstrate that the intersection would have adequate capacity to accommodate the forecast traffic with the peak Project construction activity cumulative with background growth and other developments. Drivers would experience only short delays on the worst movement, being the right turn exiting the Project access.

4.7 Site Access Intersection Design

It is proposed that the intersection of Waterfall Way with the Project site access be upgraded to provide a BAL and BAR treatment in Waterfall Way, with trimming and/or removal of some roadside vegetation (subject to ecology assessment) to provide adequate sight distance for eastbound drivers approaching the intersection in accordance with the requirements of the *Austroads Guide to Road Design*. A strategic design for the intersection upgrade has been prepared by AT&L, as shown in Appendix C of this report. The plans have been prepared with consideration of the Austroads design requirements as appropriate to the vehicles expected to access the Project during construction, and have been updated in response to feedback from TfNSW and Council. The updates include revision of the alignment of the access road to intersect with Waterfall Way at 90 degrees, with adjustments to the hold line location, to maximise sight distance for a driver in the access road, and additional plans presenting details of signage, linemarking and drainage information as requested by TfNSW. Appendix D presents a sight distance assessment that was previously unintentionally omitted. Key features of the inputs to the intersection design are discussed below.

4.7.1 Intersection Turn Treatments

The intersection of Waterfall Way with the Project site access has been reviewed with regard to the current guidelines for the level of treatment in the major road at a high-speed intersection as given in Austroads (2020b). The warranted treatment is based on an assessment of the combination of through and turning movements at the intersection, with higher turning volumes generally requiring higher levels of treatment above the minimum. The warrants are applicable to greenfields intersections, however may also be appropriate to consider when determining upgrade requirements for existing intersections. Although not intended for use at accesses and driveways, they may be used as a reference for such.

The warrants have been applied to the requirement for left-turn and right-turn treatments in Waterfall Way, for which the peak hour would occur during the AM peak when the workforce

arrive at the site. The relevant major road traffic volume (Q_M) for the left-turn treatment warrant is the eastbound traffic on Waterfall Way. The relevant major road traffic volume (Q_M) for the right-turn treatment warrant is the total of the eastbound and westbound through traffic on Waterfall Way, and the left-turn traffic into the Project site.

The weekday surveyed traffic on Waterfall Way (refer to Section 3.5) between 6:00 am and 7:00 am is lower than between 7:00 am and 8:00 am. Although the pre-construction and construction workforce is likely to arrive prior to 7:00 am on weekdays, the higher demand between 7:00 am and 8:00 am has been adopted for this review of the warrants. Similarly, the surveyed traffic on Saturdays between 7:00 am and 8:00 am is lower than that between 8:00 am and 9:00 am. Although the pre-construction and construction workforce is likely to arrive prior to 8:00 am on Saturdays, the higher demand between 8:00 am and 9:00 am has been adopted.

4.7.1.1 Pre-Construction Stage

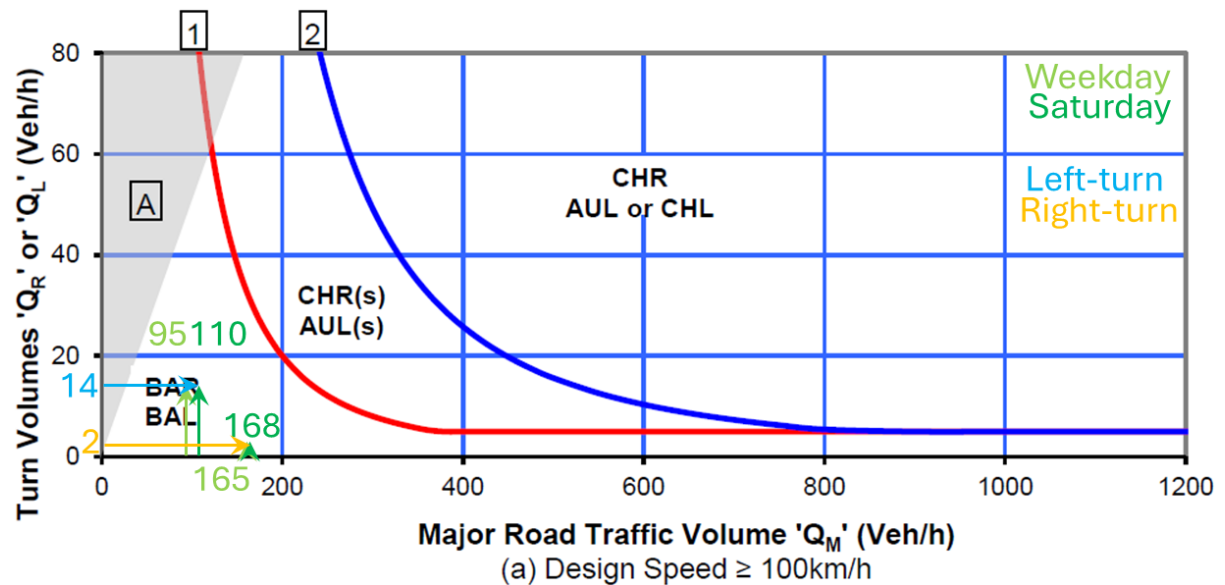
Robustly assuming that the cumulative peak hour traffic generated by other developments all coincides with the peak Project pre-construction traffic (which is also noted to be conservatively high as described in Section 4.1), Table 4.13 summarises the components of the traffic demands during the Stage 1 pre-construction activities (being higher than the Stage 2 demands), and the resulting left-turn and right-turn treatments based on Austroads (2020b).

Table 4.13: Application of Major Road Treatment Warrants – Stage 1 Pre-Construction

	Left-Turn or Right-Turn Traffic Q_L or Q_R (vehicles per hour)	Major Road Traffic Q_M (vehicles per hour)	Treatment
Weekday AM Peak Left-Turn Treatment			
2024 Surveyed 7:00 am to 8:00 am	-	50	-
Growth 2024 to 2027 at 1.6 % p.a.	-	3	-
Other Developments	-	42	-
Project Traffic (Pre-Construction)	14	-	-
Total	14	95	Basic Left-Turn (BAL)
Weekday AM Peak Right-Turn Treatment			
2024 Surveyed 7:00 am to 8:00 am	-	102	-
Growth 2024 to 2027 at 1.6 % p.a.	-	6	-
Other Developments	-	43	-
Project Traffic (Pre-Construction)	2	14	-
Total	2	165	Basic Right-Turn (BAR)
Saturday AM Peak Left-Turn Treatment			
2024 Surveyed 8:00 am to 9:00 am	-	65	-
Growth 2024 to 2027 at 1.6 % p.a.	-	3	-
Other Developments	-	42	-
Project Traffic (Pre-Construction)	14	-	-
Total	14	110	Basic Left-Turn (BAL)
Saturday AM Peak Right-Turn Treatment			
2024 Surveyed 1:00 pm to 2:00 pm	-	106	-
Growth 2024 to 2027 at 1.6 % p.a.	-	5	-
Other Developments	-	43	-
Project Traffic (Pre-Construction)	2	14	-
Total	2	168	Basic Right-Turn (BAR)

Application of the warrants are also illustrated in Figure 4.1.

Figure 4.1: Application of Austroads Treatment Warrant – Stage 1 Pre-Construction



The comparison indicates that the forecast pre-construction demands would warrant the minimum BAL and BAR treatments at the intersection of Waterfall Way with the Project site access. TTPP notes that the Austroads warrants were developed to level out at a minimum of three vehicles per hour, thus with regard to the right-turn treatments, while Table 4.13 indicates that BAR treatments would be warranted, the right-turn demand during the pre-construction stage would be below the threshold for such treatments.

The peak hourly traffic volumes during the Stage 1 pre-construction activities would be low, and the activities during that stage would be required to facilitate the upgrading of the intersection that would be undertaken during pre-construction Stage 2. Formal upgrading of the intersection to provide BAL treatment to accommodate the Stage 1 pre-construction traffic is therefore not considered to be warranted.

4.7.1.2 Peak Construction Stage

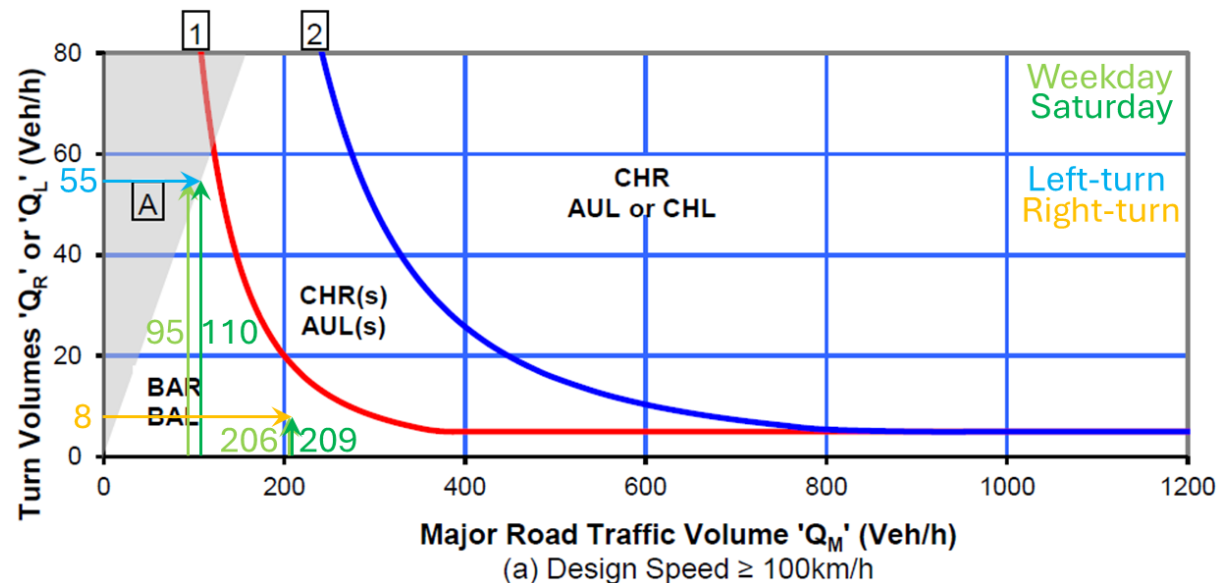
Robustly assuming that the cumulative peak hour traffic generated by other developments all coincides with the peak Project construction traffic (which is also noted to be conservatively high as described in Section 4.1), Table 4.8 summarises the components of the traffic demands and the resulting left-turn and right-turn treatments based on Austroads (2020b).

Table 4.14: Application of Major Road Intersection Treatment Warrants – Peak Construction

	Left-Turn or Right-Turn Traffic Q_L or Q_R (vehicles per hour)	Major Road Traffic Q_M (vehicles per hour)	Treatment
Weekday AM Peak Left-Turn Treatment			
2024 Surveyed 7:00 am to 8:00 am	-	50	-
Growth 2024 to 2027 at 1.6 % p.a.	-	3	-
Other Developments	-	42	-
Project Traffic (Peak Construction)	55	-	-
Total	55	95	Basic Left-Turn (BAL)
Weekday AM Peak Right-Turn Treatment			
2024 Surveyed 7:00 am to 8:00 am	-	102	-
Growth 2024 to 2027 at 1.6 % p.a.	-	6	-
Other Developments	-	43	-
Project Traffic (Peak Construction)	8	55	-
Total	8	206	Basic Right-Turn (BAR)
Saturday AM Peak Left-Turn Treatment			
2024 Surveyed 8:00 am to 9:00 am	-	65	-
Growth 2024 to 2027 at 1.6 % p.a.	-	3	-
Other Developments	-	42	-
Project Traffic (Peak Construction)	55	-	-
Total	55	110	Basic Left-Turn (BAL)
Saturday AM Peak Right-Turn Treatment			
2024 Surveyed 1:00 pm to 2:00 pm	-	106	-
Growth 2024 to 2027 at 1.6 % p.a.	-	5	-
Other Developments	-	43	-
Project Traffic (Peak Construction)	8	55	-
Total	8	209	Basic Right-Turn (BAR)

Application of the warrants are also illustrated in Figure 4.1.

Figure 4.2: Application of Austroads Treatment Warrant – Peak Construction



The comparison indicates that the forecast demands would warrant a BAL treatment at the intersection of Waterfall Way with the Project site access should all of the peak construction workforce arrive from the west (Armidale) and a BAR treatment should all the peak construction workforce arrive from the east. The rural BAL and BAR treatments on the major road have a widened shoulder, which assists turning vehicles to move further off the through carriageway, making it easier for through vehicles to pass.

The concept design for the upgraded intersection (Appendix C) includes BAL and BAR treatments on Waterfall Way.

4.7.2 Sight Distance

Austroads (2023) indicates that at property accesses, sight distances should desirably comply with the sight distance requirements for intersections, i.e., that approach sight distance (ASD), safe intersection sight distance (SISD) and minimum gap sight distance (MGSD) are achieved, however notes that where this is not possible due to constraints, Australian Standard AS2890.1 provides guidance for non-domestic accesses. Each of these requirements as relevant to conditions at the proposed access on Waterfall Way are described below.

ASD is the minimum sight distance that must be available on the minor road approaches to all intersections, and is also desirable on the major road approaches. ASD is measured from a driver's eye height to the road surface. Austroads (2023) notes that the provision of ASD on the major road may have implications in which case stopping sight distance (SSD) should be achieved. SSD is the distance to enable a normally alert driver, travelling at the design speed on wet pavement to perceive, react and brake to a stop before reaching a hazard on the road ahead. SSD is measured from a driver's eye height to an object 0.2 m high.

SISD is the minimum sight distance which should be provided on the major road at any intersection (Austroads, 2023). It provides sufficient distance for a driver on the major road to observe a vehicle on a minor road moving into a collision situation and to decelerate to a stop before reaching the collision point. It is measured along the carriageway from an approaching vehicle (driver's eye height of 1.1 m) to an object height of 1.25 m, and assumes the driver of the vehicle on the minor road is located a distance of 7.0 m (minimum 5.0 m) from the conflict point.

Minimum Gap Sight Distance (MGSD) corresponds to the critical acceptance gap that drivers are prepared to accept when undertaking a crossing or turning manoeuvre at intersections. It is the distance for the driver of a vehicle entering or crossing the major road to see a vehicle in the conflicting streams in order to safely commence the desired manoeuvre. MGSD is measured from driver's eye height of 1.1 m to a point 0.65 m above the travelled way.

Table 4.9 presents the calculations of sight distances based on the operating (85th percentile) speed of the vehicles approaching on the major road (or minor road where relevant) and the grades on which the vehicles approach, consistent with Austroads (2023). TfNSW default practice (TfNSW, 2023) with respect to geometric design is to use a design speed that is equal to the posted speed limit plus 10 km/h, noting that Austroads applies this only under conditions in which the operating speed is not known. Table 4.9 includes both the Austroads (2023) and TfNSW practice calculations.

Table 4.15: Sight Distance Requirements for Drivers Approaching on Waterfall Way

	Austroads 2023		TfNSW Practice	
	Eastbound	Westbound	Eastbound	Westbound
Operating Speed (km/h)	98.5	101.6	110	110
Reaction time (sec)	2.0	2.0	2.5	2.5
Observation time (sec)	3.0	3.0	3.0	3.0
Coefficient of deceleration	0.36	0.36	0.36	0.36
Longitudinal Grade (%)	+1.5	-2.3	+1.5	-2.3
SISD (m)	238	262	295	309
ASD (m)	156	177	203	218
Car SSD (m) Coefficient of deceleration 0.46	135	149	177	185
Truck SSD (m) Coefficient of deceleration 0.29	180	209	233	255
MGSD – exiting by right-turn to Armidale	139	139	153	153
MGSD – exiting by left turn to east	139	n/a	153	n/a
MGSD – entering by right-turn from east	111	n/a	122	n/a

As noted above, Austroads (2023) refers to Australian Standard AS2890.1 for guidance for sight distance requirements for non-domestic accesses where compliance with intersection sight distance requirements is not possible due to constraints, and therefore is appropriately

considered with respect to the subject location. Sight distance requirements in AS2890.1 are based on the posted speed limit unless the 85th percentile speed is more than 5 km/h above the posted speed limit, and are based on the observing driver having an eye height of 1.15 m, which is consistent with that of a car driver. While not specially referred to in Austroads (2023), AS2890.2 presents requirements for sight distances for accesses for commercial (heavy) vehicles, and is therefore also considered relevant to the pre-construction and construction phases of the Project. The AS2890.2 requirements are based on the posted speed limit of the frontage road, unless the 85th percentile speed is significantly higher, and the observing driver having an eye height in the range of 1.15 m to 2.5 m, and observing an object with a height of 1.15 m.

Considering that the surveyed operating speeds are consistent with the posted speed limit, the AS2890 sight distance requirements are:

- AS2890.1 – Minimum SSD 160 m
- AS2890.1 and AS2890.2 – Desirable (5 second gap) 139 m
- AS2890.2 – for 8 second gap 222 m.

Observations on-site indicate that the sight distances available under existing conditions exceed the SSD, ASD, SISD and MGSD required for westbound drivers on Waterfall Way, with a clear line of sight available for over 300 m. The existing sight distance available for eastbound drivers is approximately 220 m, which exceeds the car SSD, ASD and MGSD required by either Austroads or TfNSW inputs, but is below the SISD requirement using either the Austroads or TfNSW inputs. The existing sight distance available between eastbound drivers and a driver at the access is however consistent with the AS2890.2 sight distance requirement for heavy vehicles at a non-domestic access.

Roadside vegetation to the south-west of the Project access is the main constraint on the sight line for eastbound drivers, and in response, the intersection design includes clearing/trimming of some vegetation on the western side of Waterfall Way (subject to ecology assessment) to improve the sight line for eastbound drivers. During development of the proposed intersection design, an assessment was undertaken of the sight lines available with the proposed tree trimming/removal (refer to Appendix D). This demonstrates that SISD of at least 248 m would be available for eastbound drivers to observe a vehicle on the Project site access road moving into a collision situation and to decelerate to a stop before reaching the collision point. The proposed intersection design includes advisory signs for the approaching intersection (W2-4) that would be provided on Waterfall Way to alert approaching drivers to the presence of the intersection and the potential presence of vehicles. As the horizontal curve to the south-west of the intersection constrains the speed of the approaching vehicles, the provision of at least 248 m SISD is satisfactory, and the application of a higher approach speed and reaction time based on vehicle speeds higher than the operating speed is not warranted.

With the proposed tree clearing:

- ASD required for intersection design is met or exceeded based on the Austroads and TfNSW default inputs;
- SSD required for intersection design is met or exceeded based on Austroads and TfNSW default inputs;
- SISD required for intersection design is met or exceeded for westbound traffic based on Austroads and TfNSW default inputs, and met or exceeded for eastbound traffic based on Austroads inputs;
- MGSD required for intersection design is met or exceeded based on Austroads and TfNSW input values;
- AS2890 sight distance requirements for commercial (heavy) vehicle property access are met or exceeded.

The sight distance is therefore compliant with Austroads (2023) for property accesses, with ASD, SSD and MGSD in both directions being compliant with or exceeding the requirements for intersections using TfNSW's default values. The SISD is compliant with Austroads guidelines which consider the operating speed of the road. Provision of SISD that is compliant with TfNSW's higher default values is not possible due to the alignment of Waterfall Way. Under conditions where constraints do not allow compliance with intersection sight distance requirements, Austroads (2023) refers to AS2890, and the available sight distance is compliant with the AS2890 sight distance requirements for heavy vehicle accesses. The available sight distance (subject to the nominated tree removal) is therefore satisfactory.

The tree clearing would occur during Stage 1 of the pre-construction activity. Until such time as that tree clearing occurs, the sight distance for eastbound drivers would be approximately 220 m. As noted above, this exceeds the car SSD, ASD and MGSD required by either Austroads or TfNSW inputs and is consistent with the AS2890.2 sight distance requirement for heavy vehicles at a non-domestic access. It is below the SISD requirement using either the Austroads or TfNSW inputs.

To mitigate the risk associated with the reduced SISD available during the Stage 1 pre-construction activities, and considering the short-term nature of those activities, temporary traffic management measures may be implemented to alert drivers on Waterfall Way to the possible presence of vehicles at or around the site access. The aim of these would be to reduce the reaction time of drivers and speed of vehicles approaching on Waterfall Way. Variable Message Sign (VMS) boards would be temporarily located on Waterfall Way throughout the Stage 1 pre-construction activities, with displayed messages expected to be "CHANGED TRAFFIC CONDITIONS" (T1-23n_VMS), "REDUCE SPEED" (G9-9_VMS) and/or symbolic trucks crossing or entering (T2-25n_VMS). To reduce complacency, the VMS would display messages only during the hours that pre-construction activities occur. The temporary VMS signs would be located on-site to ensure that they do not further obstruct sight distance for drivers. An indicative Traffic Guidance Scheme is presented in Appendix E.

4.7.3 Heavy Vehicle Access

During Stage 1 of pre-construction activities, i.e. prior to upgrading of the access intersection to provide the BAL and BAR treatments, the largest vehicle required to access the site would be a 12.5 m long rigid truck. The swept path of that vehicle is presented in Appendix E. This indicates that subject to temporary pavement widening works on the northern side of the site access road, the movement of that vehicle can be satisfactorily accommodated without the vehicle crossing the centreline of Waterfall Way.

As described in Section 4.7.2, supplementary to (or as an alternative to) temporary pavement widening, temporary traffic control (refer to indicative TGS in Appendix E) may also be implemented to actively manage the movement of heavy vehicles to and from the site during the Stage 1 pre-construction activity. During Stage 2 pre-construction activities, it is expected that traffic controls would be implemented as part of the CTMP that would be agreed with TfNSW. The use of temporary traffic control during Stage 1 pre-construction activity would also be subject to consultation with TfNSW, and if implemented, would aim to be consistent with controls implemented during Stage 2 pre-construction and peak construction activities.

Swept path assessments of the vehicles expected to access the Project site on a day-to-day basis during its peak construction stage following upgrading of the intersection have been conducted and are shown in Appendix C.

4.8 Site Access Intersection Upgrade Works

Roadworks required for the upgrading of the Project site access intersection with Waterfall Way would be subject to a Works Authorisation Deed (WAD) obtained from TfNSW. As part of this WAD, a Construction Traffic Management Plan (CTMP) would be prepared in consultation with TfNSW, and works would be undertaken in accordance with that agreement and relevant traffic control requirements, including the *Traffic Control at Work Sites Technical Manual* (TfNSW, 2022).

4.9 Site Access Security and Emergencies

A gate will be provided across the Project site access road to prevent unauthorised vehicular access outside of construction hours. The gate will be sufficiently set back from Waterfall Way to allow a B-double to store between the gate and the edge of Waterfall Way clear of traffic should a delivery vehicle arrive outside of the construction hours.

If required, emergency vehicles would enter and exit the site via the intersection on Waterfall Way. Emergency vehicles such as fire trucks are smaller than the largest vehicles for which the intersection is designed, and no detailed assessment of their swept paths is warranted.

4.10 OSOM Vehicle Access

A route study has been conducted by ARES for the movement of the largest component from Mayfield Berth 4 at the Port of Newcastle to the Project site. This identifies the nominal size of the vehicle required, its pilot and escort requirements, and minor modifications that would be required to allow the transport of the largest component.

TTPP notes that development of the New England REZ will generate other OSOM vehicle movements between the Port of Newcastle and the region, which would use vehicles of a similar size to or larger than that proposed for the Project, and use the same or a similar route as that proposed for Project-generated OSOM vehicles to access the region. TfNSW has prepared a Review of Environmental Factors (TfNSW, 2024b) for road upgrades to facilitate OSOM vehicle movements between Sandgate and Wallsend, some of which lie on the proposed Project route. The timing of those works and their implications for Project OSOM vehicle movements would be considered as details of Project timing and OSOM vehicles are refined.

The proposed movement of OSOM vehicles would be negotiated with TfNSW and relevant local councils on a case-by-case basis, and a suitable contractor would be engaged for the task. Oversize loads would be transported with the relevant permits (if required) from the NHVR and load declarations obtained in accordance with *Additional Access Conditions Oversize and overmass heavy vehicles and loads* (TfNSW, 2020) and any other licences and escorts as required by regulatory authorities. The consultation with TfNSW and Councils would include identification of any non-Project OSOM vehicle movements, to minimise the likelihood of multiple OSOM vehicles operating concurrently or in a manner that may result in unacceptable impacts on general traffic. Authorisation of Project-generated OSOM vehicle movements would appropriately be conditional upon replacement of any road signage or furniture impacted by OSOM vehicle movements with equivalent infrastructure in a timely manner and to the satisfaction of TfNSW and/or Councils as relevant.

As part of the permit, the contractor would develop a traffic management plan and confirm the most suitable route based on the specific requirements of the load and vehicle dimensions and mass. The traffic management plan for OSOM vehicle movements would identify risks and minimise the impact of the movement on the road network, addressing:

- the route to be used;
- escorts and pilot requirements;
- travel restrictions;
- timing of the movement (noting the movement of OSOM vehicles would be avoided during the peak periods and during school zone travel times);
- communication with local authorities, police and emergency services; and
- any minor temporary civil works that may be required to accommodate the vehicle.

The Preliminary Hazard Assessment undertaken for the Project identifies that some dangerous goods loads are anticipated, including lithium batteries, transformer oils and diesel fuel. Transport Emergency Response Plans (TERPs) will be prepared for any placard load of dangerous goods which will consider:

- the types and quantities of dangerous goods being transported;
- the locations the dangerous goods will be transported;
- the types of incidents that may occur during the transport of the dangerous goods;
- the personnel and resources required to manage incidents involving the dangerous goods; and
- procedures to follow to manage incidents involving the dangerous goods.

The contractor engaged for the transport of any dangerous goods will be responsible for the preparation and implementation of the TERPs, and for training of drivers.

4.11 Internal Access and Parking

The internal access road within the Project site will be used by all vehicles entering and exiting the site, and all vehicles will enter and exit the site in a forward direction. The access road will be widened on its approach to Waterfall Way to ensure vehicles are able to pass each other without impacting traffic on Waterfall Way. During construction, informal car parking will be available within a designated area for the workforce to park vehicles that are not directly engaged in construction activities.

4.12 Impacts on Road Safety

The road crash history of the Project's local access route did not identify any causation factors which may be exacerbated by increased traffic resulting from the Project.

As described in Section 4.6, the intersection of Waterfall Way with the Project site access will be upgraded in accordance with Austroads design guidelines, with turn treatments provided consistent with those suggested by Austroads on safety grounds. Sight distances will be in accordance with Austroads (2023) requirements. Drivers at the intersection will experience only short delays, which minimises the likelihood that they will take unacceptable risks.

4.13 Impacts on Travelling Stock Reserves

The additional traffic generated by the Project would use Waterfall Way, where TSRs are available. During the peak construction activity (as assessed herein), the Project would generate up to 214 vehicle trips per day (86 light vehicles and 128 heavy vehicles) west of the Project Site, and 48 vehicle trips per day (10 light vehicles and 38 heavy vehicles) east of the

Project Site. The majority of the generated trips would occur during two hours of the day. The additional traffic generated by the Project would not have a significant impact on the TSRs on or near Waterfall Way, as the use of the TSRs for travelling stock would be subject to the usual permit conditions, with warning signs to be provided to motorists where stock are on or near the road.

It is recommended that as part of site inductions, the Project's workforce and contractors be made aware of the possible presence of stock on or near Waterfall Way when the warning signs are displayed.

4.14 Mitigation Measures

It is proposed that the number and distribution of vehicle trips generated would be actively managed throughout the Project pre-construction and construction activities. This management is expected to include measures that would be included in contractual arrangements with the pre-construction and construction workforce and contractors. Such measures may include:

- requiring contractors to provide forecasts of their total vehicle numbers inclusive of workforce travel, heavy vehicle deliveries and OSOM vehicles on week by week basis;
- sharing of the vehicle forecasts with all site managers;
- nominating limits on total and directional vehicle numbers, with site management coordinating the total vehicle activity levels to remain within the nominated limits;
- monitoring and recording daily vehicle activity, including the direction of travel, by site management;
- identifying exceedances of the nominated limits, with consequences of non-compliances to be identified and enforced. These may include:
 - placing restrictions on non-essential vehicle movements until compliance is restored;
 - fining contractors (e.g. via specified donation amount to a charity of their choice) for repeated breaches; and/or
 - revising scheduling to balance traffic loads.

The following measures are proposed to mitigate the impacts of the Project on the safety and efficiency of the road network:

- the intersection of Waterfall Way with the Project site access road would be upgraded with BAL and BAR treatments on Waterfall Way (refer to Appendix C) in accordance with Austroads guidelines;
- specific trees would be trimmed/removed (subject to ecology assessment) on the western side of Waterfall Way to the south of the Project site access to maximum sight distance between approaching drivers and the access intersection;

- required permits would be obtained for OSOM vehicle movements, and modifications to accommodate the largest OSOM vehicle movement would be implemented, the details of which would be confirmed as the size and load requirements are refined (desktop review by ARES [2025] has identified possible changes to roadside signage, traffic signals at one location and vegetation clearing); and
- a WAD would be obtained for the upgrading works at the intersection of Waterfall Way with the Project site access, including preparation of a CTMP for those activities and work to be undertaken in accordance with relevant traffic control requirements.

It is recommended that a TMP and Driver Code of Conduct be developed and implemented to govern traffic movements during the Project construction stage. These would form part of the contractual arrangements with suppliers to the Project, and would be prepared in consultation with Council and/or TfNSW prior to commencement of construction of the Project, to address such matters as:

- compliance with access routes and travel restrictions that may be applicable;
- compliance with road rules, laws and regulations, including those relating to OSOM vehicles and dangerous goods transport;
- maintaining safe following distances between vehicles, and increasing separation in poor visibility (e.g. fog or rain);
- reporting of any unsafe driving practices or incidents;
- driver behavioural expectations within the site (e.g. radio communication, speed limits, and use of flashing lights on moving vehicles); and
- driver behaviour expectations at any specific locations or conditions, including at the Dangar Street bridge in Armidale, when warning signs advise that stock are present on or near the road, and in the vicinity of any school bus during bus operating hours.

To mitigate the risk associated with the reduced SISD available during the Stage 1 pre-construction activities prior to the upgrade of the site access intersection, VMS boards would be temporarily located on Waterfall Way throughout the Stage 1 pre-construction activities, with advisory messages displayed only during the hours that pre-construction activities occur. The aim of these would be to reduce the reaction time of drivers and speed of vehicles approaching on Waterfall Way.

It is recommended that the community be informed of the expected changes in traffic conditions expected with the Project activities. AC Energy has developed a community engagement program for the pre-construction stage, which is outlined below:

1. Identify impacted stakeholders

We will assess the impact of the works on neighbours, road users, and businesses, as well as identify any stakeholders who may not be directly impacted but should be informed of the upcoming works.

2. Develop clear and timely messaging

We will develop concise collateral, which will provide the following:

- Purpose of the works: why this is happening in the context of the broader project
- Timing and duration of the works, including any night or weekend works
- Impacts that may be experienced (road closures or detours, traffic delays, noise and/or dust, and other impacts, as applicable)
- Mitigation measures we will implement to minimise disruptions (e.g. traffic control, signage)
- Dedicated point of contact throughout the works period.

3. Notify via appropriate communication channels

Notifications will be tailored to the stakeholder group and the degree of impact they may experience. Notifications will be issued at least 1-2 weeks before works begin and may include:

- Direct notification (phone calls to immediate neighbours, letters, emails, or SMS to residents, businesses and key stakeholders in the area)
- Public signage near affected roads and work sites, as applicable
- Updates to the project webpage

5. Monitor

We will proactively monitor and respond to all enquiries, feedback and complaints. Any input will be carefully considered in the planning and delivery of the early works, and addressed where appropriate.

Any changes or delays will be communicated as soon as they arise.

Subject to the above measures, this study has not identified any additional road or intersection upgrades that are required to mitigate the impacts of the Project's construction activities on the capacity, safety and efficiency of the road network.

5 Conclusion

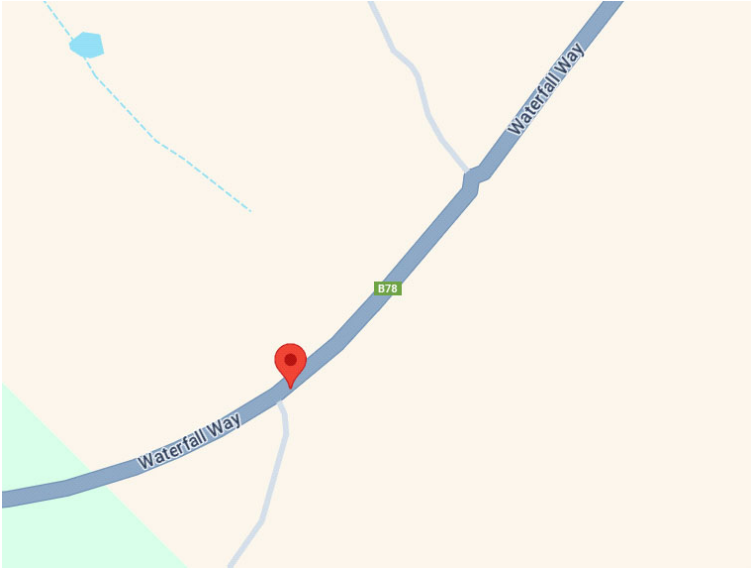
This study has examined the likely road transport implications of the construction and operation of the Gara BESS at 86 Woodlands Road, Armidale. It is concluded that with the Project, the capacity, safety and efficiency of the road network would be satisfactory, subject to the following recommended mitigation measures:

- Upgrade the intersection of Waterfall Way with the Project site access road with BAL and BAR treatments on Waterfall Way (refer to Appendix C) in accordance with Austroads guidelines;
- Trim or remove nominated trees (refer to Appendix D) on the western side of Waterfall Way to the south of the Project site access to improve sight distance between approaching drivers and the access intersection;
- Obtain required permits for OSOM vehicle movements, and implement the modifications needed to accommodate the largest OSOM vehicle movement, noting that the details of which would be confirmed as the size and load requirements are refined;
- Obtain a WAD for the upgrading works at the intersection of Waterfall Way with the Project site access, including preparation of a CTMP and undertake all work in accordance with relevant traffic control requirements;
- Actively manage the number and distribution of vehicle trips generated throughout the Project construction activities as part of contractual arrangements with the construction workforce and contractors.
- Develop and implement a TMP and Driver Code of Conduct in consultation with Council and/or TfNSW, to govern traffic movements during the Project construction stage.
- Implement a community engagement program to inform the community and stakeholders about changed traffic conditions expected during the Project's activities.

Appendix A

Traffic Survey Data

Client	TTPP	
Project No.	24053	
Suburb	Metz	
Coordinates	30°32'45.9"S 151°46'11.0"E	
Location	Waterfall Way 270 m W of Site Access	
Speed Limit	100 km/h	
Start Day/Date	Friday, 2 August 2024	
End Day/Date	Monday, 12 August 2024	



Eastbound	Fri 02/08/24	Sat 03/08/24	Sun 04/08/24	Mon 05/08/24	Tue 06/08/24	Wed 07/08/24	Thu 08/08/24	Fri 09/08/24	Sat 10/08/24	Sun 11/08/24	Mon 12/08/24
00:00:00	3	2	0	0	2	2	3	2	1	0	0
01:00:00	0	0	2	0	0	1	0	0	0	1	0
02:00:00	0	2	0	1	0	0	2	3	0	0	0
03:00:00	2	2	2	0	1	0	1	1	1	1	1
04:00:00	2	1	2	10	2	3	3	6	5	2	3
05:00:00	9	12	3	15	7	14	7	12	6	2	15
06:00:00	42	22	23	42	47	46	48	52	22	18	28
07:00:00	49	43	26	47	45	49	49	74	47	35	33
08:00:00	61	51	51	59	56	43	52	83	79	56	52
09:00:00	86	79	62	70	59	58	79	103	85	83	66
10:00:00	101	94	83	85	57	63	70	94	90	87	76
11:00:00	108	79	95	79	65	68	69	100	107	80	77
12:00:00	96	66	92	71	62	56	77	84	85	89	59
13:00:00	97	79	78	94	65	76	57	72	93	94	69
14:00:00	93	73	72	58	63	67	58	81	59	84	71
15:00:00	72	44	60	63	58	64	70	105	42	56	74
16:00:00	91	42	44	53	47	52	78	91	45	44	57
17:00:00	60	29	27	71	60	62	54	67	28	32	48
18:00:00	34	17	23	26	25	32	31	45	26	13	26
19:00:00	18	11	13	13	14	16	22	17	10	10	13
20:00:00	17	5	6	12	12	15	7	20	7	3	4
21:00:00	6	6	1	9	7	3	7	9	8	4	6
22:00:00	3	5	1	2	1	4	4	4	3	6	1
23:00:00	8	3	0	2	2	4	0	5	1	2	0
TOTAL	1058	767	766	882	757	798	848	1130	850	802	779

Westbound	Fri 02/08/24	Sat 03/08/24	Sun 04/08/24	Mon 05/08/24	Tue 06/08/24	Wed 07/08/24	Thu 08/08/24	Fri 09/08/24	Sat 10/08/24	Sun 11/08/24	Mon 12/08/24
00:00:00	1	1	1	1	1	3	2	3	3	2	1
01:00:00	3	1	1	2	0	1	0	2	0	1	0
02:00:00	0	0	1	0	1	0	0	0	0	1	0
03:00:00	0	1	0	1	2	1	1	1	0	0	0
04:00:00	6	1	2	7	4	5	5	3	1	0	4
05:00:00	4	5	4	11	3	5	7	6	2	1	11
06:00:00	18	4	7	21	22	16	16	19	8	3	25
07:00:00	45	20	14	63	51	50	53	49	23	14	56
08:00:00	60	39	31	81	76	70	65	83	42	24	91
09:00:00	56	63	50	57	54	42	57	43	66	39	73
10:00:00	54	61	57	56	52	42	51	45	61	70	77
11:00:00	70	54	71	62	55	42	56	75	66	77	66
12:00:00	64	53	76	71	56	53	51	83	67	115	95
13:00:00	75	57	96	96	63	63	60	87	56	130	78
14:00:00	84	69	109	84	53	77	59	105	52	101	79
15:00:00	54	56	121	71	61	63	82	87	59	129	69
16:00:00	63	55	96	68	50	51	73	85	72	102	48
17:00:00	44	40	87	40	50	51	46	61	48	68	43
18:00:00	27	21	51	37	30	22	44	34	25	44	17
19:00:00	21	15	21	5	13	11	10	27	6	22	9
20:00:00	10	12	7	10	5	11	7	7	12	15	6
21:00:00	4	12	5	5	4	5	8	4	8	9	5
22:00:00	5	3	4	1	6	1	1	4	1	4	6
23:00:00	1	3	0	1	0	4	2	4	2	4	2
TOTAL	769	646	912	851	712	689	756	917	680	975	861

Eastbound	Class	Fri 02/08/24	Sat 03/08/24	Sun 04/08/24	Mon 05/08/24	Tue 06/08/24	Wed 07/08/24	Thu 08/08/24	Fri 09/08/24	Sat 10/08/24	Sun 11/08/24	Mon 12/08/24
SV	1	906	641	660	728	637	662	710	973	714	714	653
SVT	2	59	73	58	43	35	41	42	57	68	44	46
TB2	3	39	29	24	45	34	35	44	40	26	20	31
TB3	4	13	1	2	19	11	19	24	23	13	6	20
T4	5	7	1	0	9	5	5	6	5	1	0	5
ART3	6	4	4	3	0	2	1	2	2	0	1	4
ART4	7	3	0	3	4	1	1	3	3	2	4	1
ART5	8	2	0	0	4	1	3	0	4	1	1	2
ART6	9	7	6	0	11	16	15	9	9	3	2	8
BD	10	3	1	0	10	5	15	2	4	1	0	7
DRT	11	1	1	0	0	1	0	0	0	0	0	0
TRT	12	0	0	0	0	0	0	0	0	0	0	0
M/C	1	14	10	16	9	9	1	6	10	21	10	2
CYCLE	1	0	0	0	0	0	0	0	0	0	0	0
???	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		1058	767	766	882	757	798	848	1130	850	802	779

Westbound	Class	Fri 02/08/24	Sat 03/08/24	Sun 04/08/24	Mon 05/08/24	Tue 06/08/24	Wed 07/08/24	Thu 08/08/24	Fri 09/08/24	Sat 10/08/24	Sun 11/08/24	Mon 12/08/24
SV	1	623	507	724	667	551	510	611	705	530	792	678
SVT	2	24	38	50	32	29	34	26	39	40	68	39
TB2	3	19	18	26	22	28	34	31	23	18	24	30
TB3	4	49	43	81	72	53	65	55	91	46	52	61
T4	5	22	5	9	22	20	17	11	19	10	10	18
ART3	6	0	0	1	0	0	2	1	1	2	1	4
ART4	7	4	5	5	9	5	0	4	12	3	8	5
ART5	8	5	7	2	9	7	6	3	8	3	5	11
ART6	9	6	5	2	8	10	9	5	4	6	4	10
BD	10	1	1	0	7	3	8	3	1	0	0	4
DRT	11	0	0	0	0	1	0	0	0	0	0	1
TRT	12	0	0	0	0	0	0	0	0	0	0	0
M/C	1	15	17	11	2	4	4	6	10	21	9	0
CYCLE	1	1	0	1	1	1	0	0	4	1	2	0
???	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		769	646	912	851	712	689	756	917	680	975	861

Appendix B

Sidra Output

MOVEMENT SUMMARY



Site: [101] Weekday AM (General)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

AM Peak Arrival of Workforce in 30 minutes

Site Category: (None)

Stop (Two-Way)

Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop of Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]				[Veh. veh	Dist] m				km/h
			veh/h	%	veh/h	%	v/c	sec							
NorthEast: Waterfall Way															
5	T1	All MCs	73	23.6	73	23.6	0.054	0.2	LOS A	0.1	0.8	0.11	0.15	0.11	95.5
6	R2	All MCs	13	23.1	13	23.1	0.054	8.9	LOS A	0.1	0.8	0.11	0.15	0.11	33.0
Approach			86	23.6	86	23.6	0.054	1.5	NA	0.1	0.8	0.11	0.15	0.11	74.3
NorthWest: Project Site															
7	L2	All MCs	2	0.0	2	0.0	0.009	4.4	LOS A	0.0	0.3	0.32	0.99	0.32	29.9
9	R2	All MCs	4	100.0	4	100.0	0.009	9.0	LOS A	0.0	0.3	0.32	0.99	0.32	24.5
Approach			6	66.7	6	66.7	0.009	7.5	LOS A	0.0	0.3	0.32	0.99	0.32	26.1
SouthWest: Waterfall Way															
10	L2	All MCs	98	12.2	98	12.2	0.111	8.2	LOS A	0.0	0.0	0.00	0.34	0.00	75.1
11	T1	All MCs	100	6.3	100	6.3	0.111	0.0	LOS A	0.0	0.0	0.00	0.34	0.00	90.6
Approach			198	9.3	198	9.3	0.111	4.1	NA	0.0	0.0	0.00	0.34	0.00	82.2
All Vehicles			290	14.7	290	14.7	0.111	3.4	NA	0.1	0.8	0.04	0.29	0.04	76.4

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY



Site: [102] Weekday PM (General)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

PM Peak Departure of Workforce in 30 minutes

Site Category: (None)

Stop (Two-Way)

Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop of Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]				[Veh. veh	Dist] m				km/h
NorthEast: Waterfall Way															
5	T1	All MCs	93	13.4	93	13.4	0.053	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	99.4
6	R2	All MCs	2	0.0	2	0.0	0.053	7.4	LOS A	0.0	0.1	0.01	0.01	0.01	33.5
Approach			95	13.1	95	13.1	0.053	0.2	NA	0.0	0.1	0.01	0.01	0.01	95.4
NorthWest: Project Site															
7	L2	All MCs	13	23.1	13	23.1	0.120	5.0	LOS A	0.4	3.3	0.28	0.93	0.28	29.0
9	R2	All MCs	98	12.2	98	12.2	0.120	5.4	LOS A	0.4	3.3	0.28	0.93	0.28	29.6
Approach			111	13.5	111	13.5	0.120	5.4	LOS A	0.4	3.3	0.28	0.93	0.28	29.5
SouthWest: Waterfall Way															
10	L2	All MCs	4	100.0	4	100.0	0.046	10.5	LOS A	0.0	0.0	0.00	0.03	0.00	46.7
11	T1	All MCs	76	10.9	76	10.9	0.046	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	98.4
Approach			80	15.4	80	15.4	0.046	0.5	NA	0.0	0.0	0.00	0.03	0.00	93.2
All Vehicles			286	13.9	286	13.9	0.120	2.3	NA	0.4	3.3	0.11	0.37	0.11	51.0

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY



Site: [103] Saturday AM (General)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

AM Peak Arrival of Workforce in 30 minutes

Site Category: (None)

Stop (Two-Way)

Site Scenario: 1 | Local Volumes

Vehicle Movement Performance													
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop of Rate
			[Total HV]	[Total HV]	[Total HV]	[Total HV]				[Veh.]	[Dist]		Number of Cycles to Depart
			veh/h	%	veh/h	%	v/c	sec		veh	m		
NorthEast: Waterfall Way													
5	T1	All MCs	59 15.9	59 15.9	0.044	0.3	LOS A	0.1	0.8	0.14	0.18	0.14	94.9
6	R2	All MCs	13 23.1	13 23.1	0.044	8.9	LOS A	0.1	0.8	0.14	0.18	0.14	32.9
Approach			72 17.2	72 17.2	0.044	1.8	NA	0.1	0.8	0.14	0.18	0.14	70.7
NorthWest: Project Site													
7	L2	All MCs	2 0.0	2 0.0	0.009	4.5	LOS A	0.0	0.3	0.33	0.99	0.33	29.9
9	R2	All MCs	4 100.0	4 100.0	0.009	9.0	LOS A	0.0	0.3	0.33	0.99	0.33	24.5
Approach			6 66.7	6 66.7	0.009	7.5	LOS A	0.0	0.3	0.33	0.99	0.33	26.1
SouthWest: Waterfall Way													
10	L2	All MCs	98 12.2	98 12.2	0.119	8.2	LOS A	0.0	0.0	0.00	0.31	0.00	75.6
11	T1	All MCs	116 4.5	116 4.5	0.119	0.0	LOS A	0.0	0.0	0.00	0.31	0.00	91.3
Approach			214 8.1	214 8.1	0.119	3.8	NA	0.0	0.0	0.00	0.31	0.00	83.4
All Vehicles			291 11.5	291 11.5	0.119	3.4	NA	0.1	0.8	0.04	0.29	0.04	76.6

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\Users\Penny.Dalton\OneDrive - TTPP\24009 Armidale BESS\07 Modelling Files\Model\24009-251104-Gara BESS.sipx

MOVEMENT SUMMARY



Site: [104] Saturday PM (General)

Output produced by SIDRA INTERSECTION Version: 10.0.6.236

PM Peak Departure of Workforce in 30 minutes

Site Category: (None)

Stop (Two-Way)

Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand		Arrival		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop of Rate	Number of Cycles to Depart	Aver. Speed
			Flows		Flows					[Veh. veh	Dist] m				
			[Total HV] veh/h	%	[Total HV] veh/h	%									v/c
NorthEast: Waterfall Way															
5	T1	All MCs	103	9.9	103	9.9	0.058	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	99.4
6	R2	All MCs	2	0.0	2	0.0	0.058	7.4	LOS A	0.0	0.1	0.01	0.01	0.01	33.5
Approach			105	9.7	105	9.7	0.058	0.1	NA	0.0	0.1	0.01	0.01	0.01	95.8
NorthWest: Project Site															
7	L2	All MCs	13	23.1	13	23.1	0.125	5.2	LOS A	0.4	3.4	0.31	0.93	0.31	28.9
9	R2	All MCs	98	12.2	98	12.2	0.125	5.7	LOS A	0.4	3.4	0.31	0.93	0.31	29.5
Approach			111	13.5	111	13.5	0.125	5.6	LOS A	0.4	3.4	0.31	0.93	0.31	29.5
SouthWest: Waterfall Way															
10	L2	All MCs	4	100.0	4	100.0	0.062	10.5	LOS A	0.0	0.0	0.00	0.02	0.00	46.8
11	T1	All MCs	108	6.6	108	6.6	0.062	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	98.9
Approach			112	9.9	112	9.9	0.062	0.4	NA	0.0	0.0	0.00	0.02	0.00	95.1
All Vehicles			329	11.1	329	11.1	0.125	2.1	NA	0.4	3.4	0.11	0.33	0.11	54.3

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\Users\Penny.Dalton\OneDrive - TTPP\24009 Armidale BESS\07 Modelling Files\Model\24009-251104-Gara BESS.sipx

Appendix C

Intersection Design

GARA BESS (ARMIDALE)

STRATEGIC INTERSECTION DESIGN

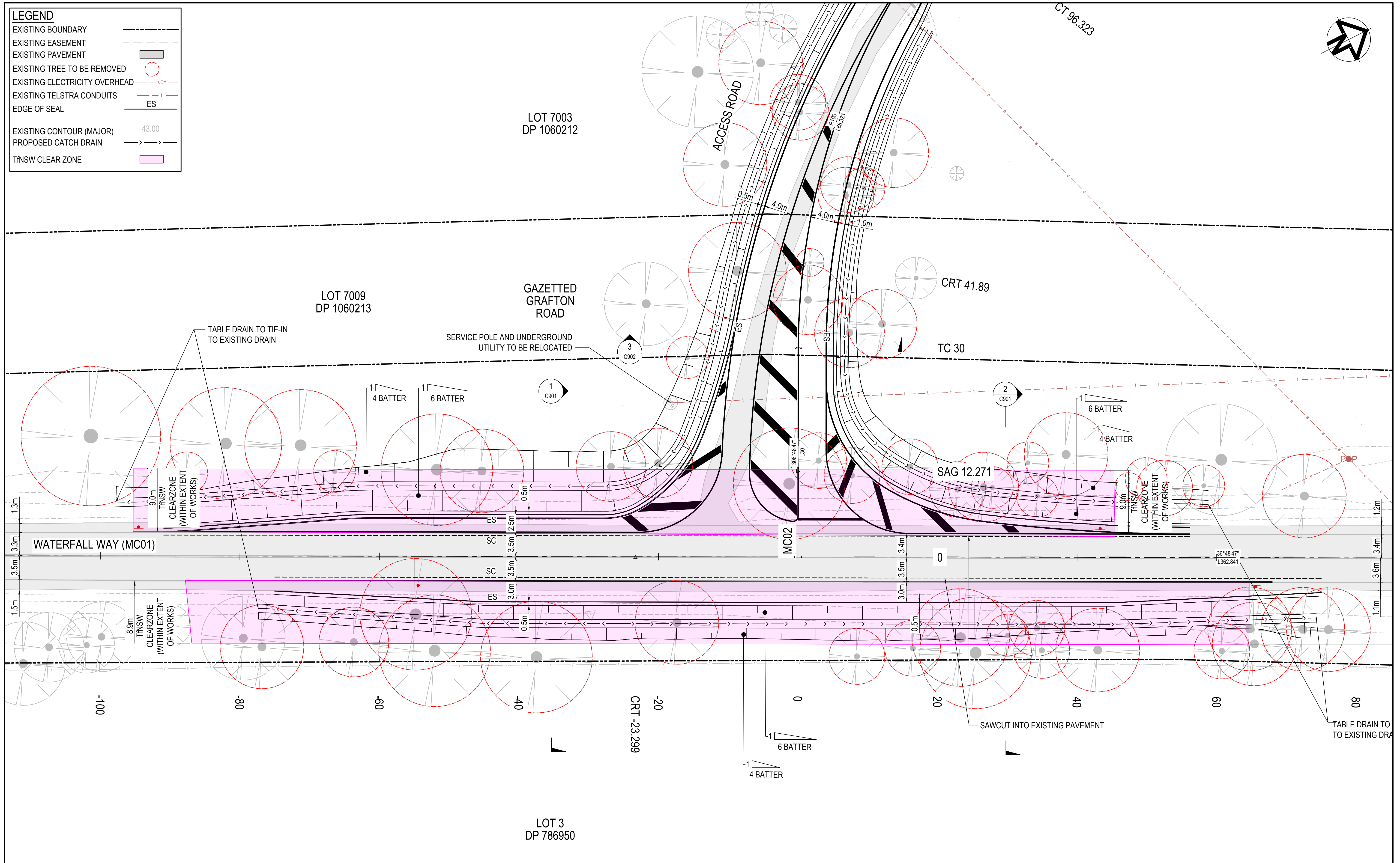
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GENERAL	
24-1239-C100	COVER SHEET, DRAWING LIST AND LOCALITY PLAN
24-1239-C101	GENERAL ARRANGEMENT PLAN
24-1239-C102	SIGNAGE AND LINEMARKING PLAN
24-1239-C103	INTERSECTION GRADING PLAN
24-1239-C111	EXISTING CENTERLINE LONGSECTION
24-1239-C112	PROPOSED ACCESS ROAD LONGSECTION
PAVEMENT PLAN	
24-1239-C201	PAVEMENT PLAN
VEHICLE TURN PATHS	
24-1239-C301	DESIGN VEHICLE TRACKING PLAN
24-1239-C302	CHECKING VEHICLE TRACKING PLAN
24-1239-C303	OVERSIZE OVERMASS (OSOM) VEHICLE TRACKING PLAN
STORMWATER PLANS	
24-1239-C401	STORMWATER PLAN
24-1239-C411	STORMWATER LONGSECTIONS
SECTIONS	
24-1239-C901	TYPICAL SECTIONS SHEET 1
24-1239-C902	TYPICAL SECTIONS SHEET 2



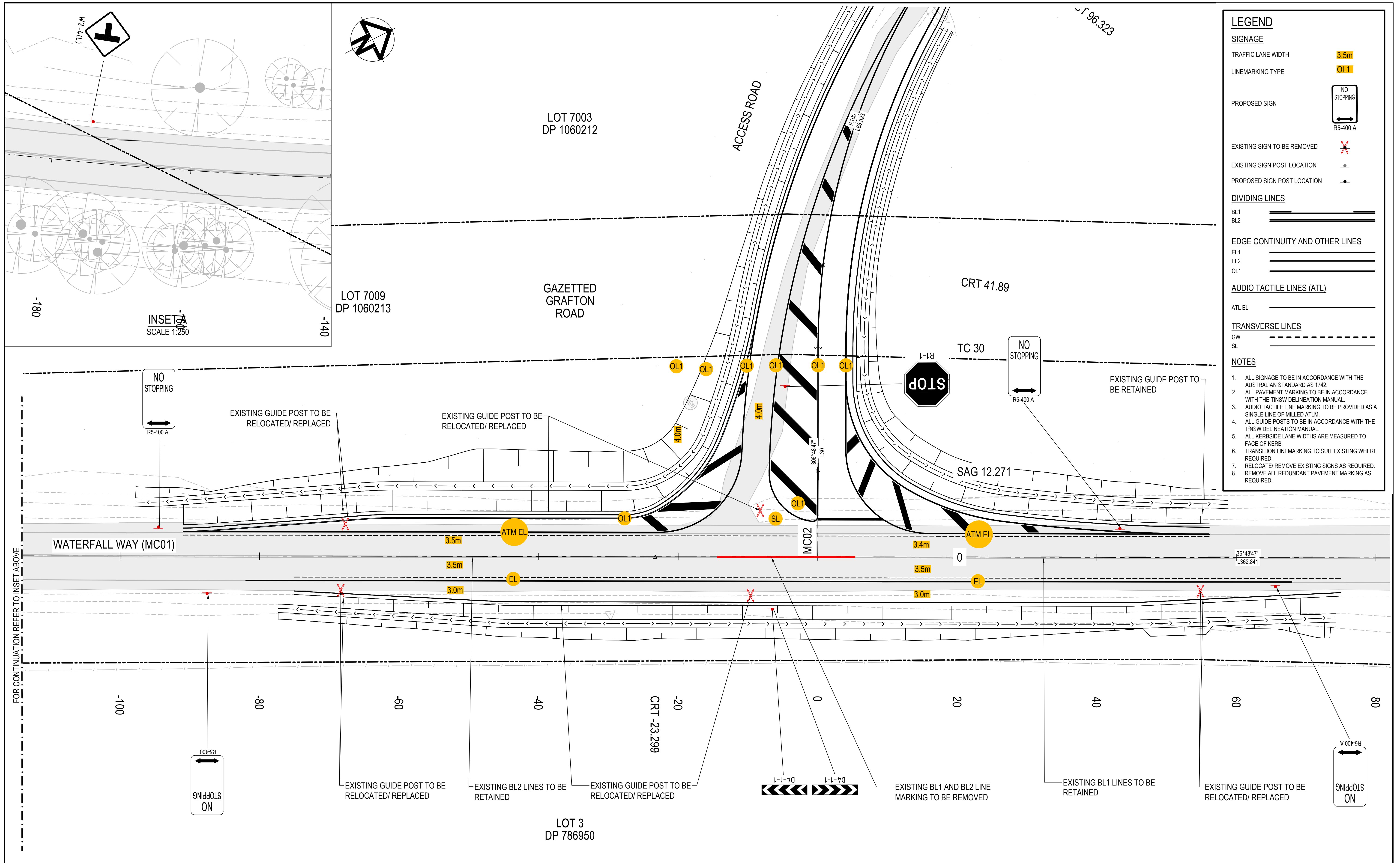
LOCALITY PLAN
NOT TO SCALE

		Bar Scales	THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L	Client 	Scale	Drawn Designed	JS EH	Project GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN	Civil Engineers and Project Managers  Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405	
B	ISSUED FOR APPROVAL	04/11/2025								
A	ISSUED FOR APPROVAL	15-10-25								
Issue	Description	Date								

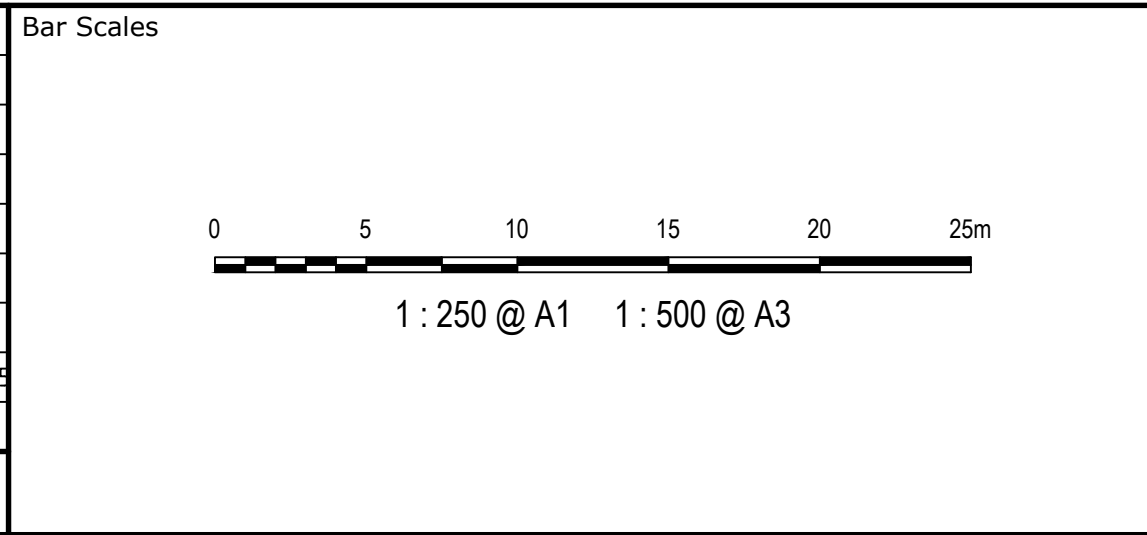
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Project - Drawing No.		Issue
24-1239-C100		B



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					Grid GDA2020	Designed EH			Title GENERAL ARRANGEMENT PLAN	
					Height Datum AHD	Checked GB				
						Approved				
B	ISSUED FOR APPROVAL				04/11/2025				Status FOR APPROVAL NOT TO BE USED FOR CONSTRUCTION Project - Drawing No. 24-1239-C101	A1
A	ISSUED FOR APPROVAL				15-10-25					
Issue	Description				Date					



B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date



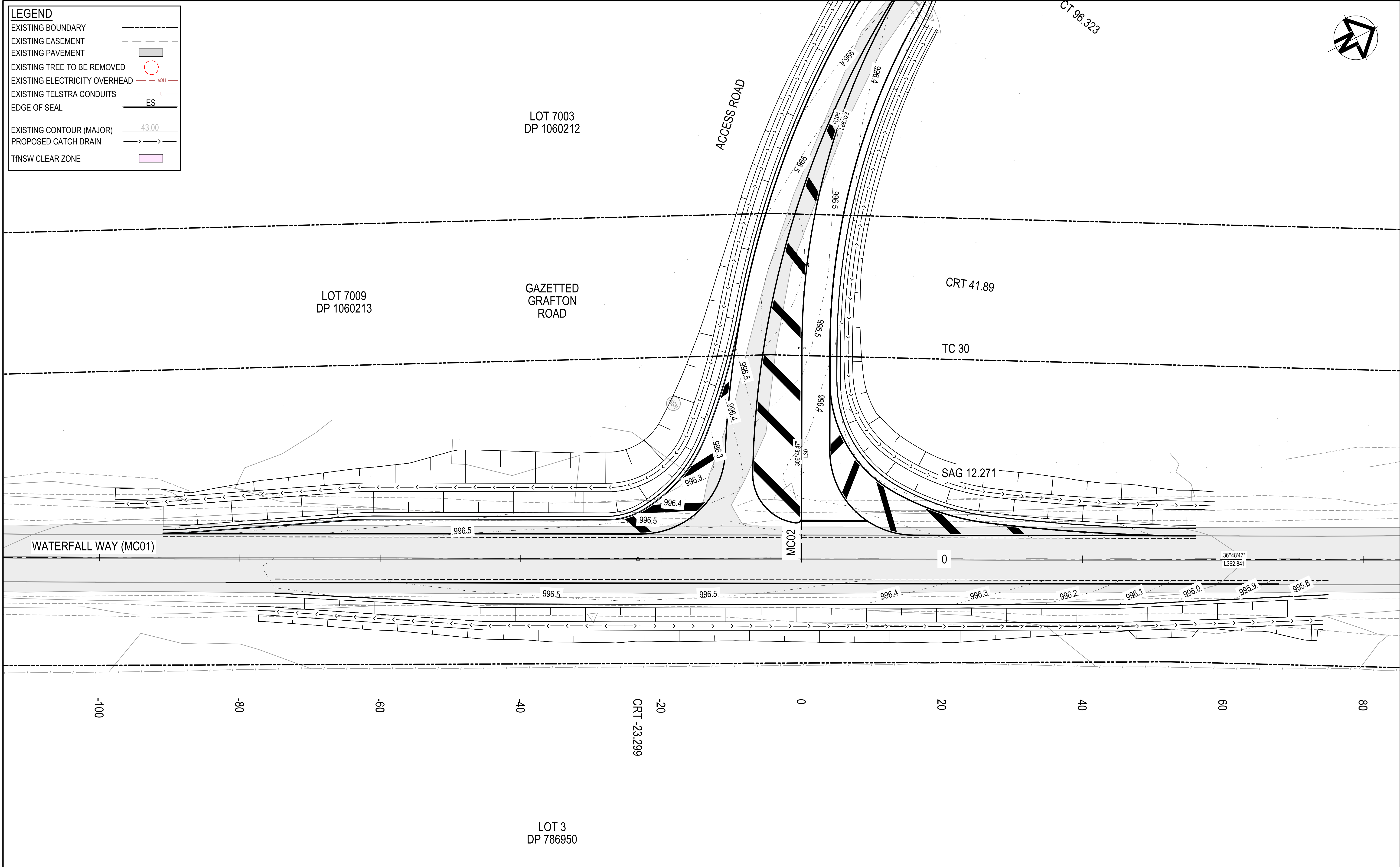
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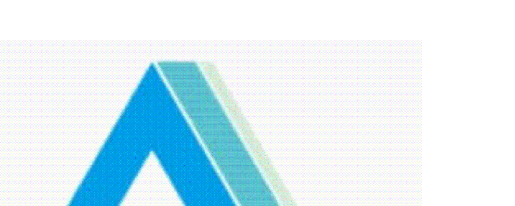
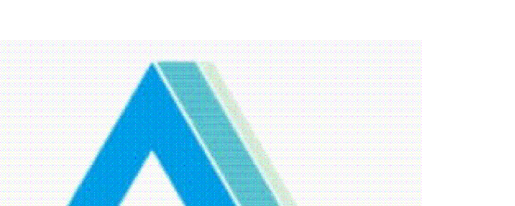


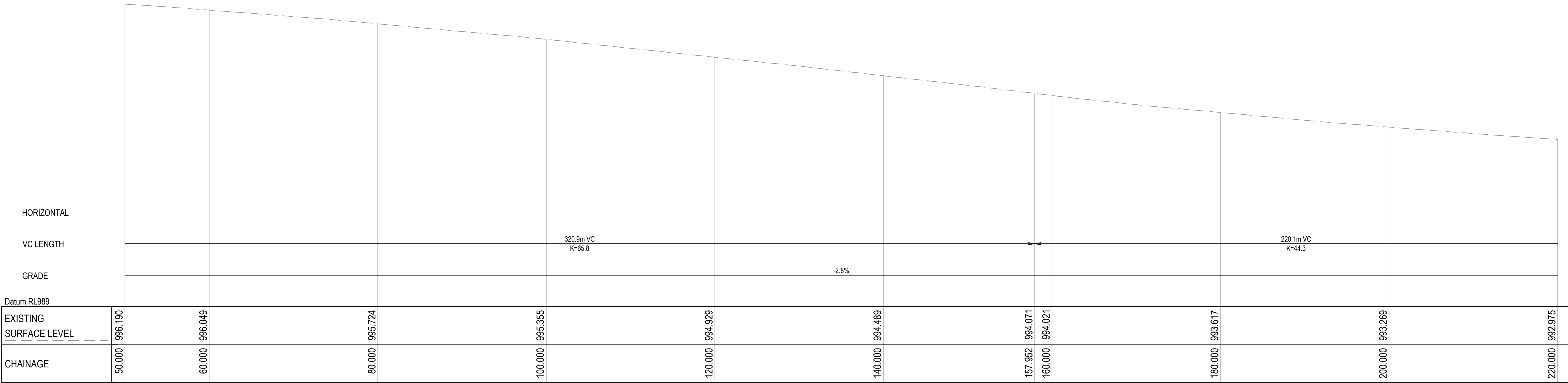
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Grid	GDA2020	Checked	GB
Height Datum	AHD	Approved	

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	SIGNAGE AND LINEMARKING PLAN

Civil Engineers and Project Managers		Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405
Status	FOR APPROVAL	A1
	NOT TO BE USED FOR CONSTRUCTION	
	Project - Drawing No.	Issue
24-1239-C102		B

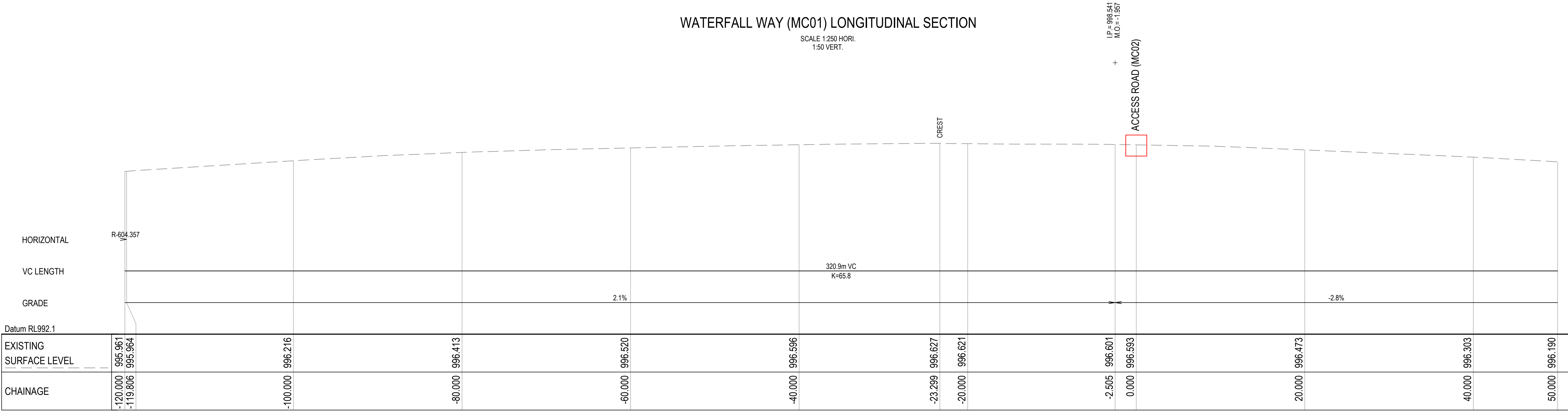


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										Designed	EH									
										Grid	GDA2020				Checked	GB				
										Height Datum	AHD				Approved					
B	ISSUED FOR APPROVAL	04/11/2025										Title	INTERSECTION GRADING PLAN	Status	FOR APPROVAL NOT TO BE USED FOR CONSTRUCTION	A1				
A	ISSUED FOR APPROVAL	15-10-25																		
Issue	Description	Date																		



WATERFALL WAY (MC01) LONGITUDINAL SECTION

SCALE 1:250 HORI.
1:50 VERT.



WATERFALL WAY (MC01) LONGITUDINAL SECTION

SCALE 1:250 HORI.
1:50 VERT.

B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date

Bar Scales

012345m

1 : 50 @ A1 1 : 100 @ A3

0510152025m

1 : 250 @ A1 1 : 500 @ A3

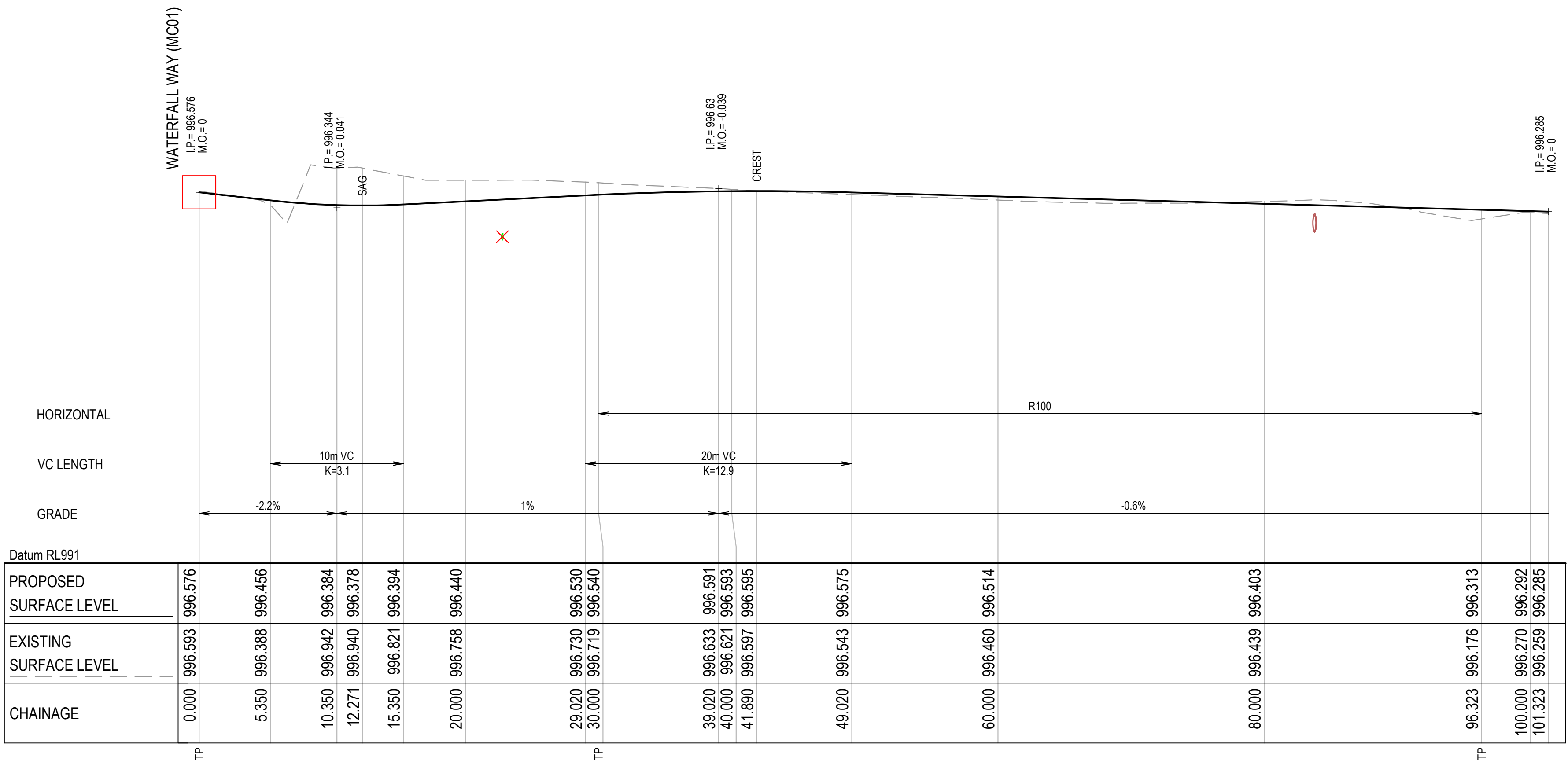
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Client

Scales	1:50 (V) 1:250 (H)	Drawn	EH	
	Grid	GDA2020	Designed	EH
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Height Datum	AHD	Approved		

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN

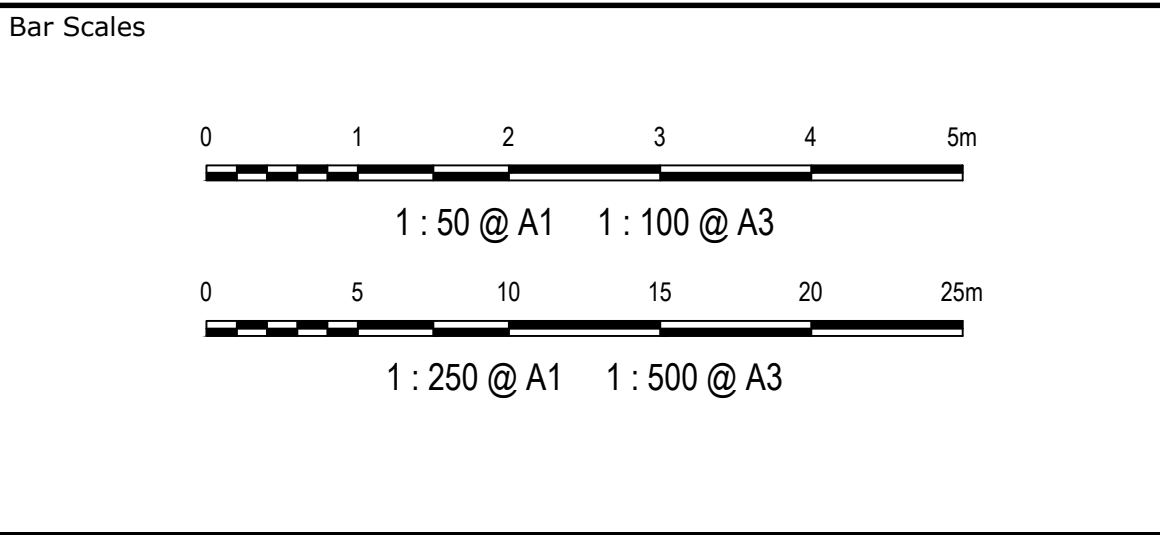
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		NOT TO BE USED FOR CONSTRUCTION		
		Project - Drawing No.	Issue	
24-1239-C111		B		



ACCESS ROAD (MC02) LONGITUDINAL SECTION

SCALE 1:250 HORI.
1:50 VERT.

B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date



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Scales	1:50 (V) 1:250 (H)	Drawn	EH
Grid	GDA2020	Designed	EH
Height Datum	AHD	Checked	GB
		Approved	

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	PROPOSED ACCESS ROAD LONGSECTION

Civil Engineers and Project Managers		Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405
		
Status	FOR APPROVAL NOT TO BE USED FOR CONSTRUCTION	A1
Project - Drawing No.	24-1239-C112	Issue B

This engineering plan view illustrates a proposed road layout and easement area. The plan includes the following details:

- Legend:**
 - EXISTING BOUNDARY: Dashed line
 - EXISTING EASEMENT: Dotted line
 - EXISTING PAVEMENT: Light grey fill
 - PROPOSED PAVEMENT: Pink fill
- Property Lots:**
 - LOT 7003 DP 1060212 (Top center)
 - LOT 7009 DP 1060213 (Middle left)
 - GAZETTED GRAFTON ROAD (Middle center)
 - LOT 3 DP 786950 (Bottom center)
- Road Features:**
 - ACCESS ROAD:** A road running vertically from the top center, curving to the right.
 - WATERFALL WAY (MC01):** A horizontal road at the bottom, with a proposed pink pavement area extending from the left.
 - MC02:** A vertical line segment at the intersection of the Access Road and Waterfall Way.
- Technical Data:**
 - CRT -23.299:** A horizontal line segment on the left side.
 - CRT 41.89:** A horizontal line segment on the right side.
 - TC 30:** A horizontal line segment on the right side.
 - SAG 12.271:** A horizontal line segment on the right side.
 - 0:** A horizontal line segment at the bottom right.
 - 36°48'47" L362.841:** A horizontal line segment at the bottom right.
 - 36°48'47" L362.841:** A horizontal line segment at the bottom right.
 - 36°48'47" L362.841:** A horizontal line segment at the bottom right.
- Other Labels:**
 - ACCESS ROAD:** A label for the vertical road.
 - GAZETTED GRAFTON ROAD:** A label for the horizontal road.
 - WATERFALL WAY (MC01):** A label for the horizontal road at the bottom.

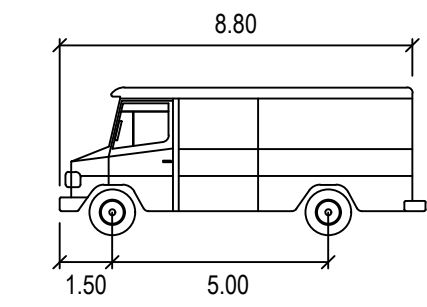
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LEGEND

VEHICLE BODY ENVELOPE

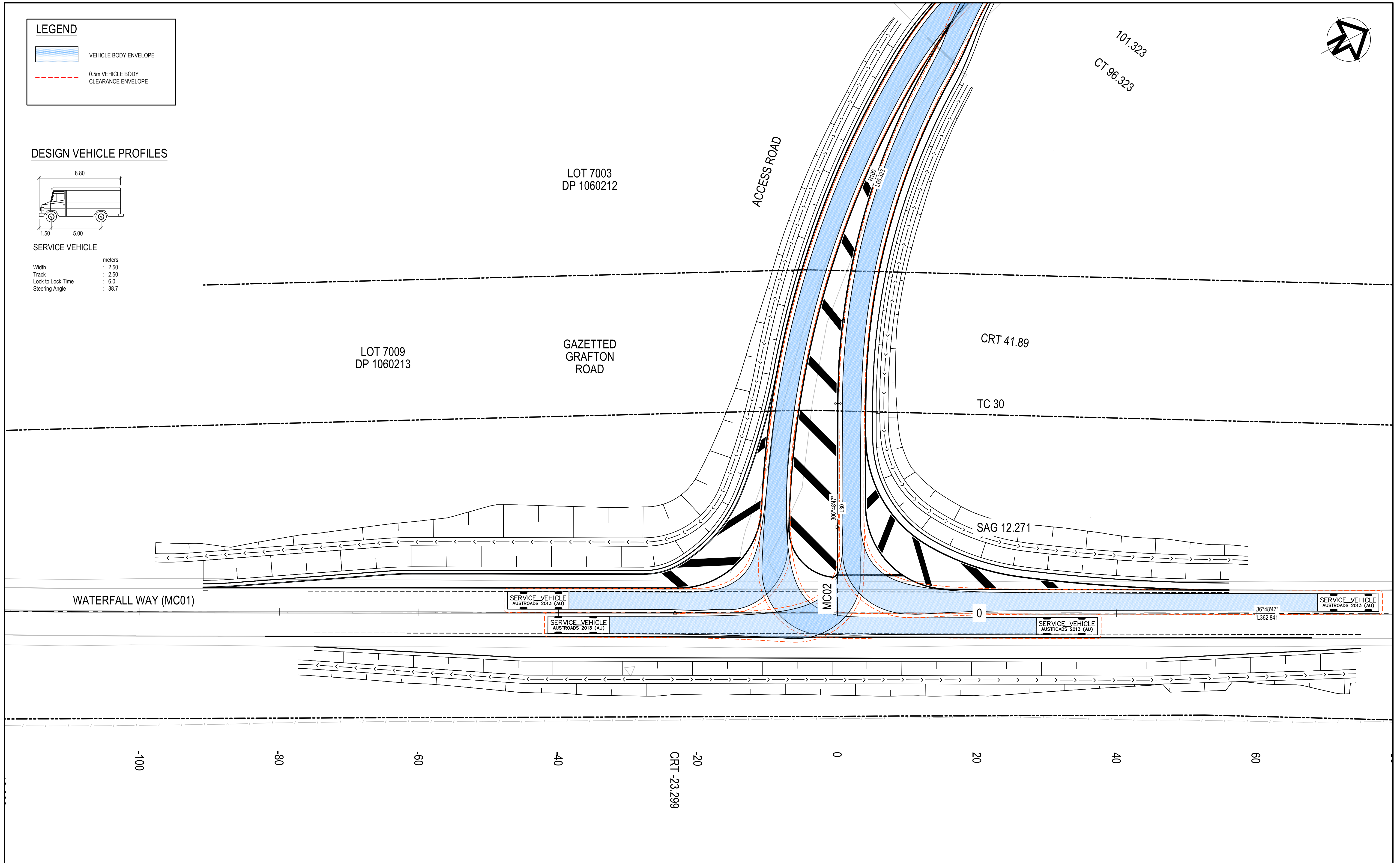
0.5m VEHICLE BODY CLEARANCE ENVELOPE

DESIGN VEHICLE PROFILES



SERVICE VEHICLE

Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 38.7



B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date

Bar Scales

0 5 10 15 20 25m

1 : 250 @ A1 1 : 500 @ A3

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Client

ACENERGY

Scales	1:250	Drawn	EH
Grid	GDA2020	Designed	EH
Height Datum	AHD	Checked	GB
		Approved	

Project

GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN

Title

DESIGN VEHICLE TRACKING PLAN

Civil Engineers and Project Managers

Level 10, 124 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
E info@atl.net.au
www.atl.net.au
ABN 96 130 882 405

at&l

Status

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project - Drawing No.

24-1239-C301

Issue

B

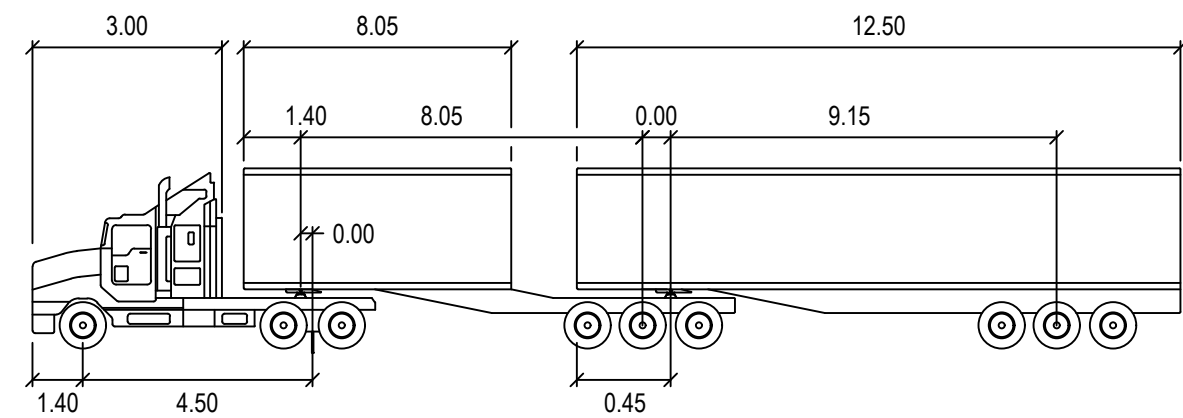
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LEGEND

VEHICLE BODY ENVELOPE

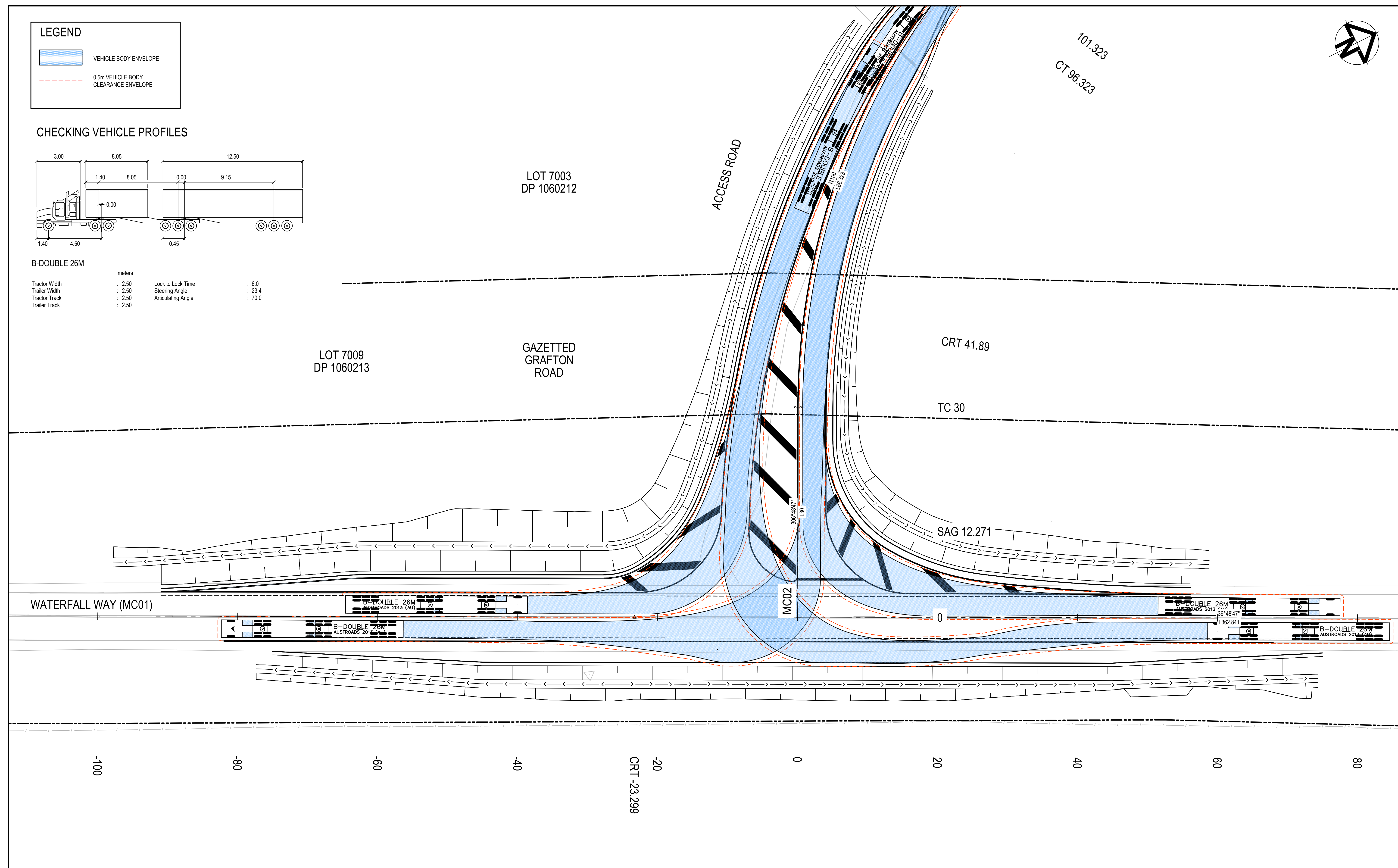
0.5m VEHICLE BODY CLEARANCE ENVELOPE

CHECKING VEHICLE PROFILES



B-DOUBLE 26M

	Tractor Width	: 2.50	Lock to Lock Time	: 6.0
	Trailer Width	: 2.50	Steering Angle	: 23.4
	Tractor Track	: 2.50	Articulating Angle	: 70.0
	Trailer Track	: 2.50		



B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date

Bar Scales

0 5 10 15 20 25m

1 : 250 @ A1 1 : 500 @ A3

THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Client

Scales	1:250	Drawn	EH
		Designed	EH
Grid	GDA2020	Checked	GB
Height Datum	AHD	Approved	

Project

GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN

Title

CHECKING VEHICLE TRACKING PLAN

Civil Engineers and Project Managers

Level 10, 124 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
E info@atl.net.au
www.atl.net.au
ABN 96 130 882 405

at&l

Status

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

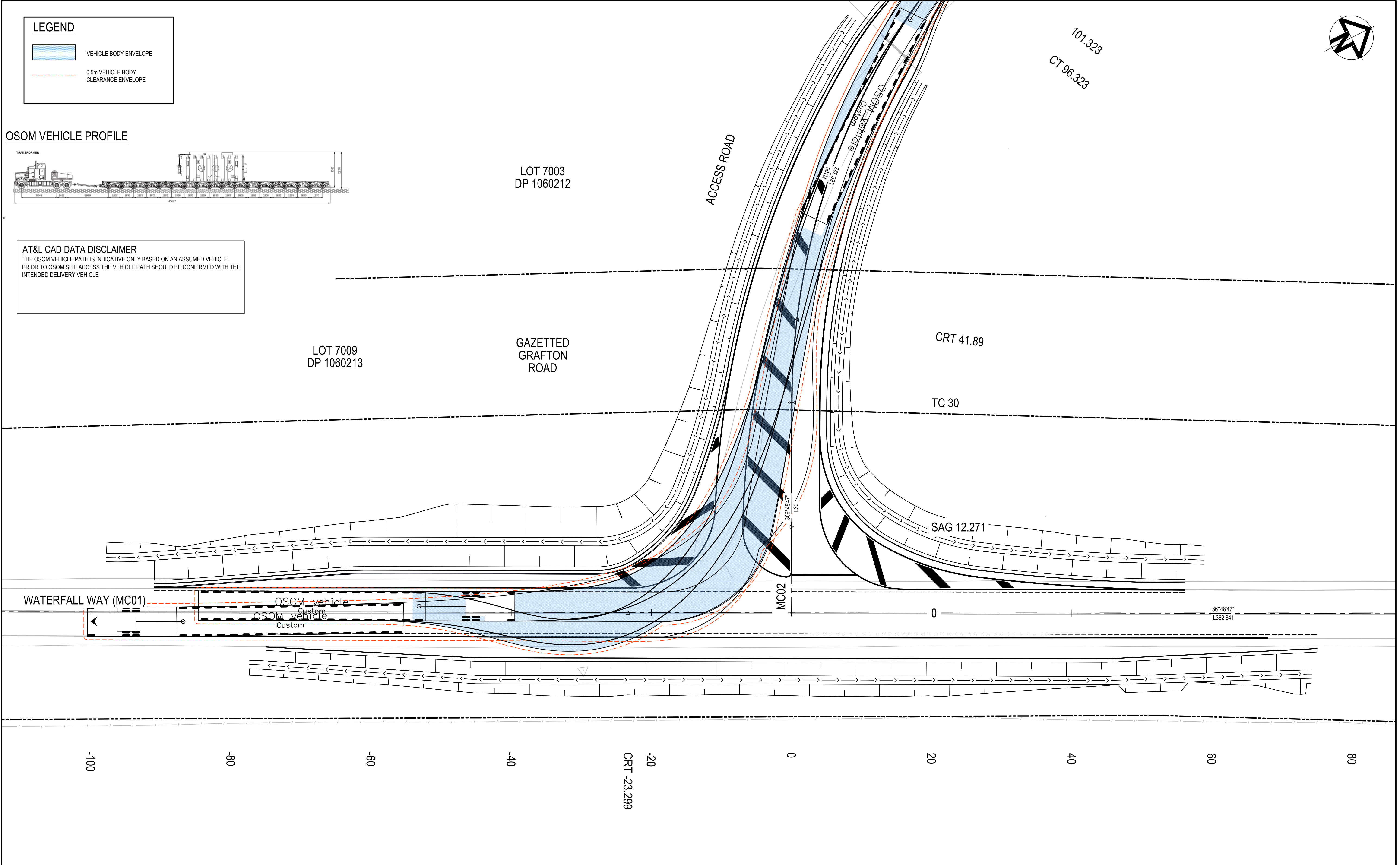
Project - Drawing No.

24-1239-C302

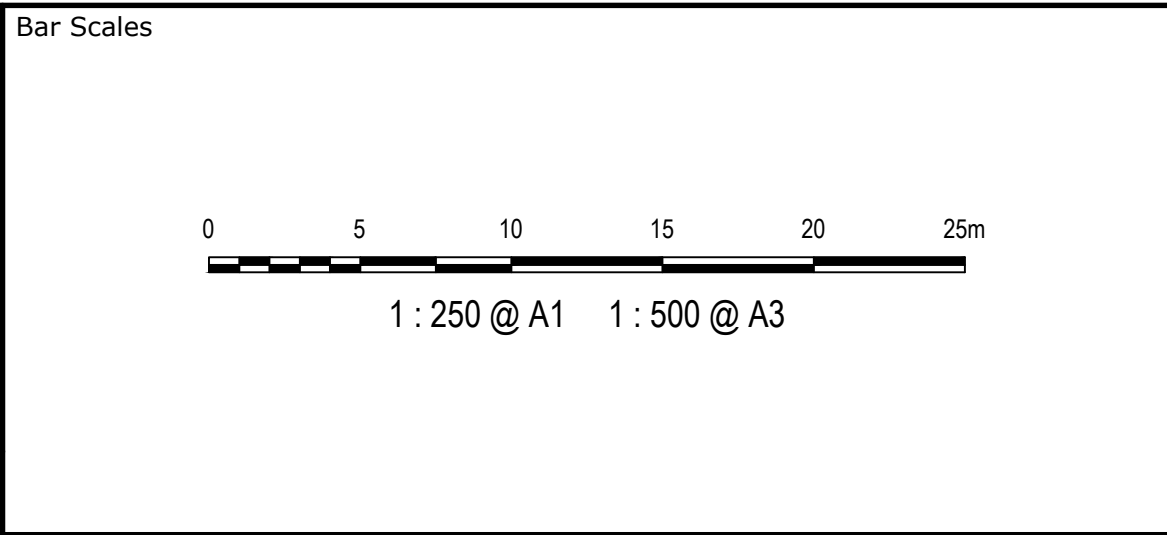
Issue

B

A1



B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date



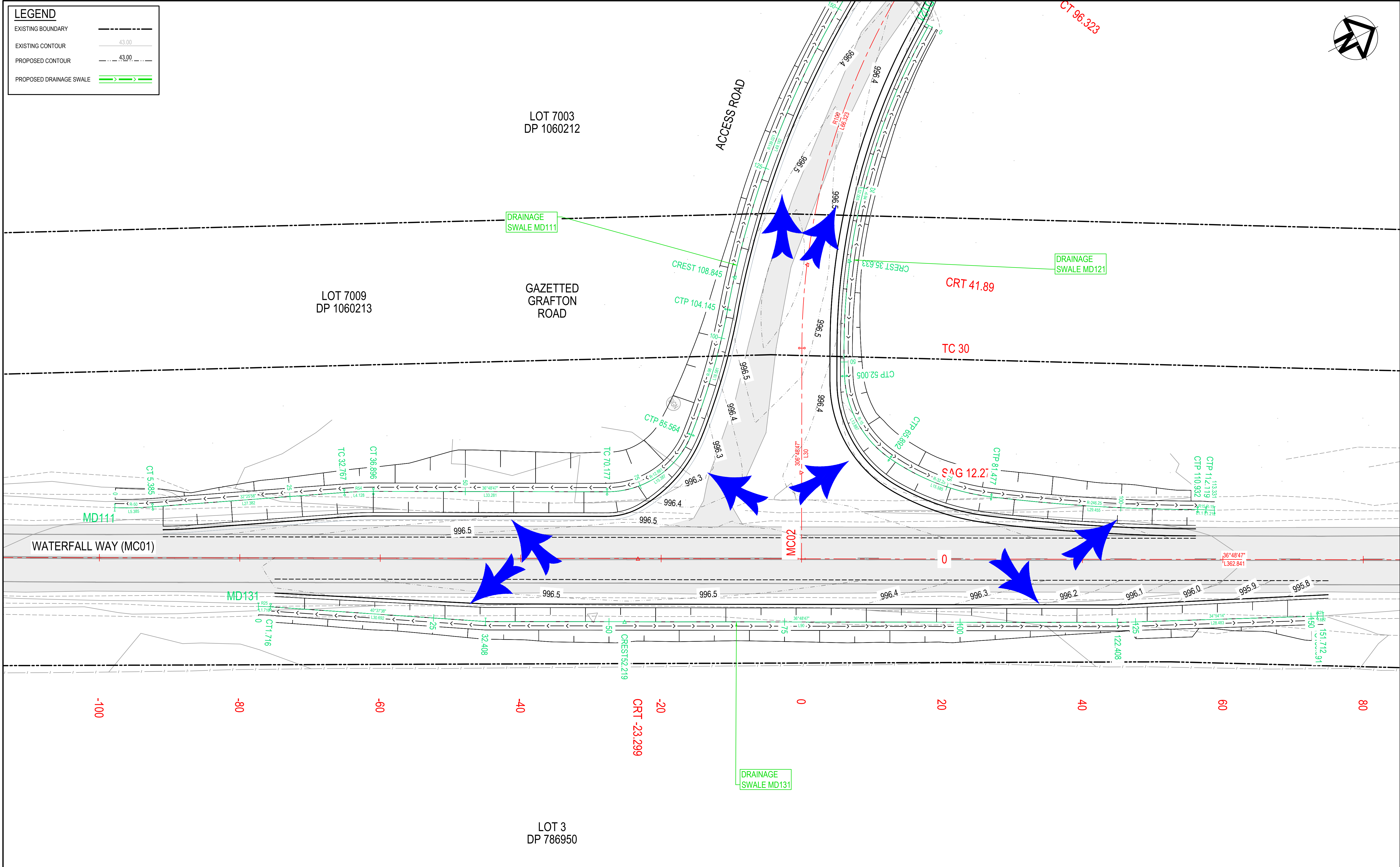
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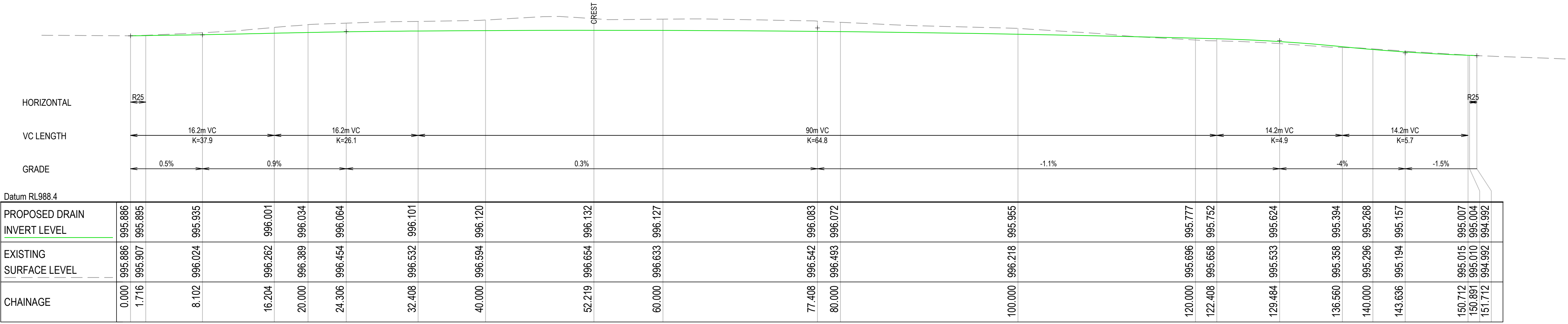
Scales	1:250	Drawn	EH
		Designed	EH
Grid	GDA2020	Checked	GB
Height Datum	AHD	Approved	

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	OVERSIZE OVERMASS (OSOM) VEHICLE TRACKING PLAN

Civil Engineers and Project Managers		
Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405		
at&l		
Status	FOR APPROVAL	A1
NOT TO BE USED FOR CONSTRUCTION		
Project - Drawing No.	24-1239-C303	Issue
		B

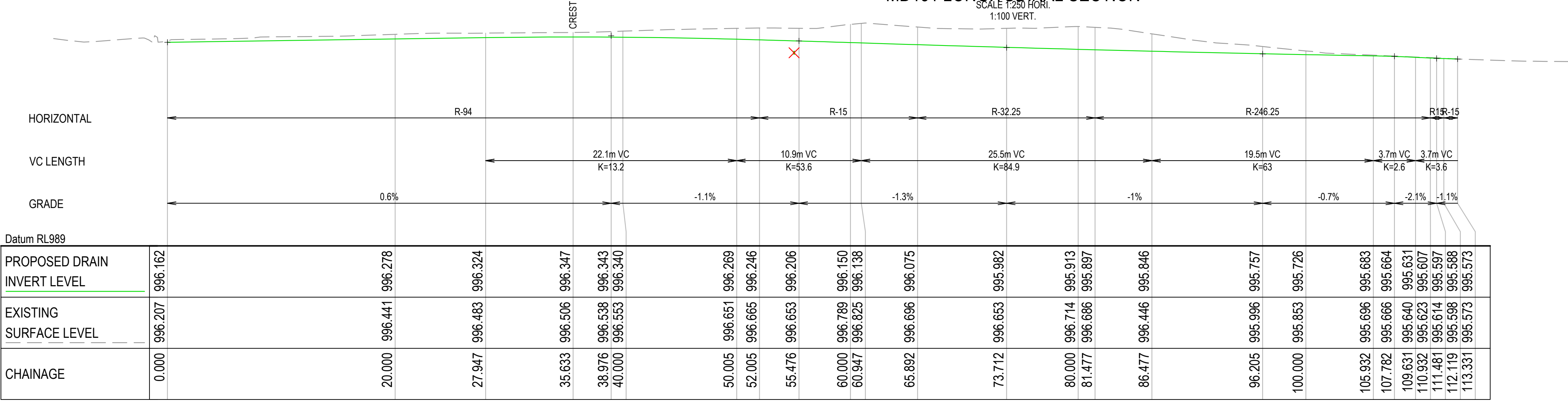


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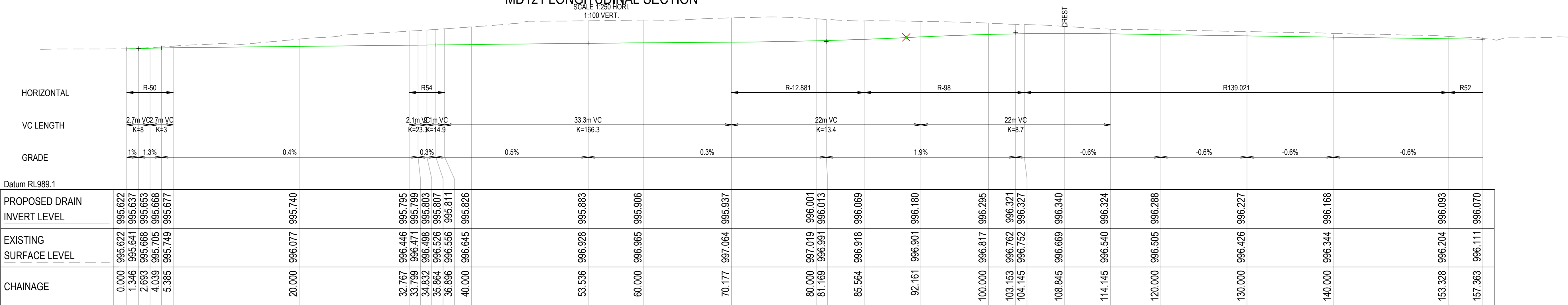
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EXISTING SURFACE LEVEL	995.886 995.907 996.024 996.262 996.389 996.454 996.532 996.594 996.654 996.633 996.542 996.493 996.218 995.696 995.658 995.533 995.358 995.296 995.194 995.015 995.010 994.992
CHAINAGE	0.000 1.716 8.102 16.204 20.000 24.306 32.408 40.000 52.219 60.000 77.408 80.000 100.000 120.000 122.408 129.484 136.560 140.000 143.636 150.712 150.891 151.712

MD131 LONGITUDINAL SECTION



Datum RL989	
PROPOSED DRAIN INVERT LEVEL	996.162 996.207 996.278 996.324 996.347 996.343 996.340 996.269 996.246 996.206 996.150 996.138 996.075 995.982 995.913 995.897 995.846 995.757 995.726 995.683 995.664 995.631 995.607 995.597 995.588 995.573
EXISTING SURFACE LEVEL	996.207 996.441 996.483 996.506 996.538 996.553 996.651 996.665 996.653 996.789 996.825 996.696 996.653 996.714 996.686 996.446 995.996 995.853 995.696 995.666 995.640 995.623 995.614 995.598 995.573
CHAINAGE	0.000 20.000 27.947 35.633 38.976 40.000 50.005 52.005 55.476 60.000 60.947 65.892 73.712 80.000 81.477 86.477 96.205 100.000 105.932 107.762 109.631 110.932 111.481 112.119 113.331

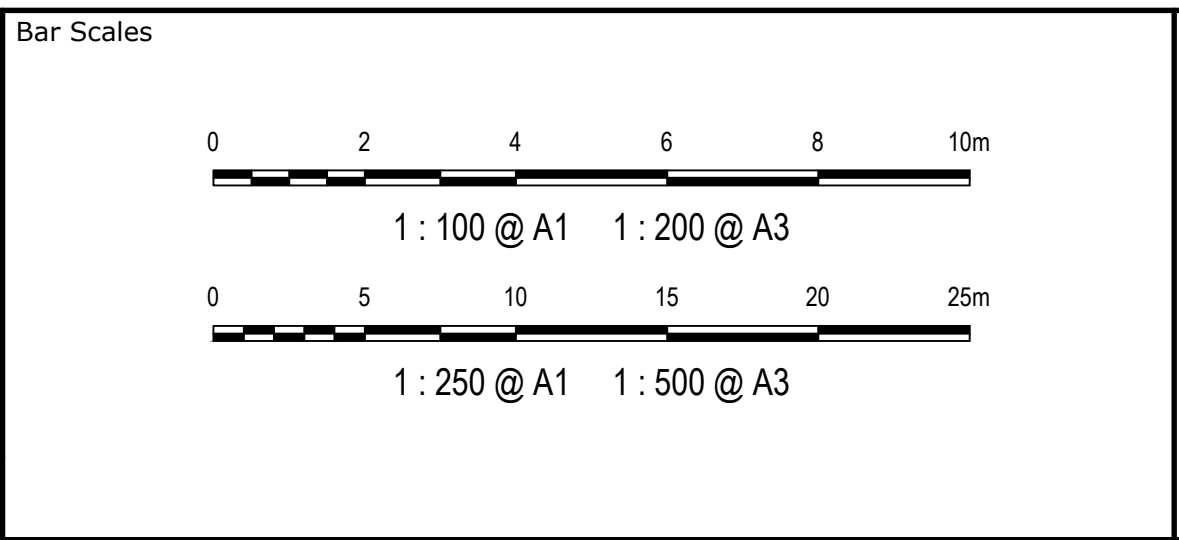
MD121 LONGITUDINAL SECTION



Datum RL989.1	
PROPOSED DRAIN INVERT LEVEL	995.622 995.637 995.653 995.668 995.677 995.740 995.795 995.799 995.803 995.807 995.811 995.826 995.883 995.906 995.937 996.001 996.013 996.069 996.180 996.295 996.321 996.327 996.340 996.324 996.288 996.227 996.168 996.093 996.070
EXISTING SURFACE LEVEL	995.622 995.641 995.653 995.668 995.677 996.077 996.446 996.471 996.498 996.526 996.556 996.645 996.928 996.965 997.064 997.019 996.991 996.918 996.901 996.817 996.762 996.752 996.669 996.540 996.505 996.426 996.344 996.204 996.111
CHAINAGE	0.000 1.346 2.693 4.039 5.385 20.000 32.767 33.799 34.832 35.864 36.896 40.000 53.536 60.000 70.177 80.000 81.169 85.564 92.161 100.000 103.153 104.145 108.845 114.145 120.000 130.000 140.000 153.328 157.363

MD111 LONGITUDINAL SECTION

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A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date



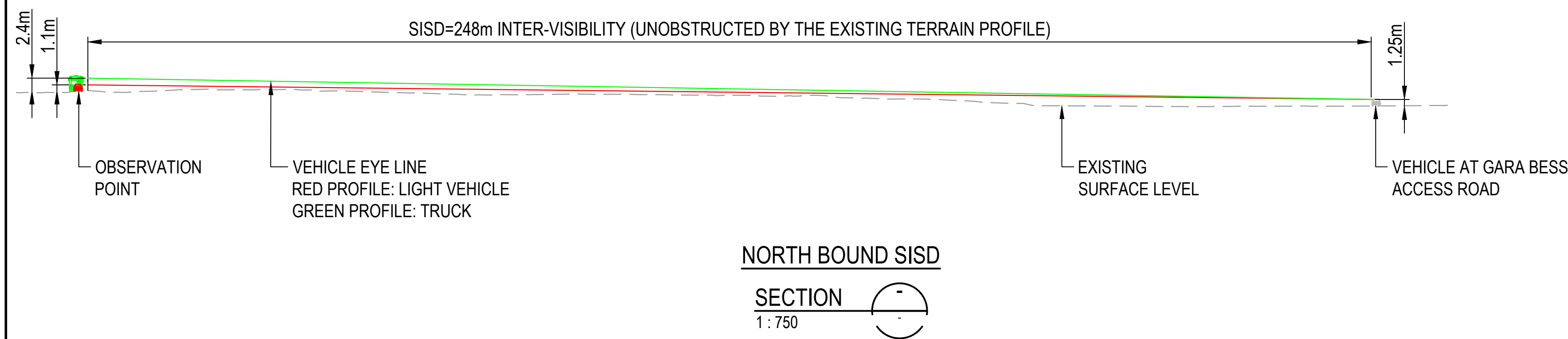
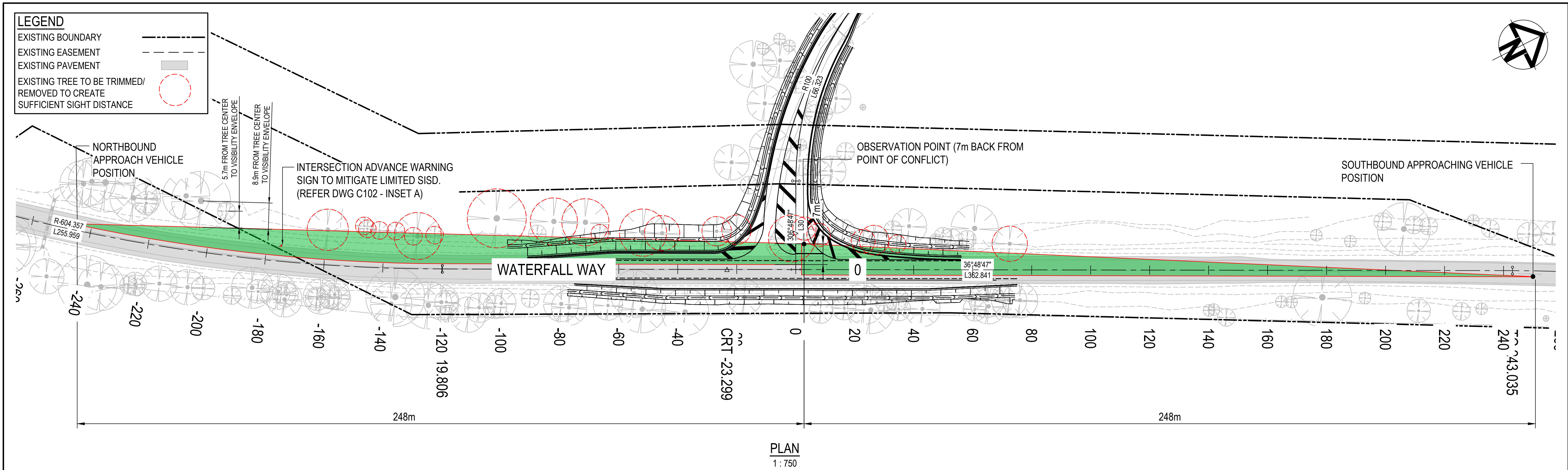
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Scales	1:100 (V) 1:250 (H)	Drawn	EH
Grid	GDA2020	Designed	EH
Height Datum	AHD	Checked	GB
		Approved	

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	STORMWATER LONGSECTIONS

Civil Engineers and Project Managers	
Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405	
Status	FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION	
Project - Drawing No.	24-1239-C411
Issue	B



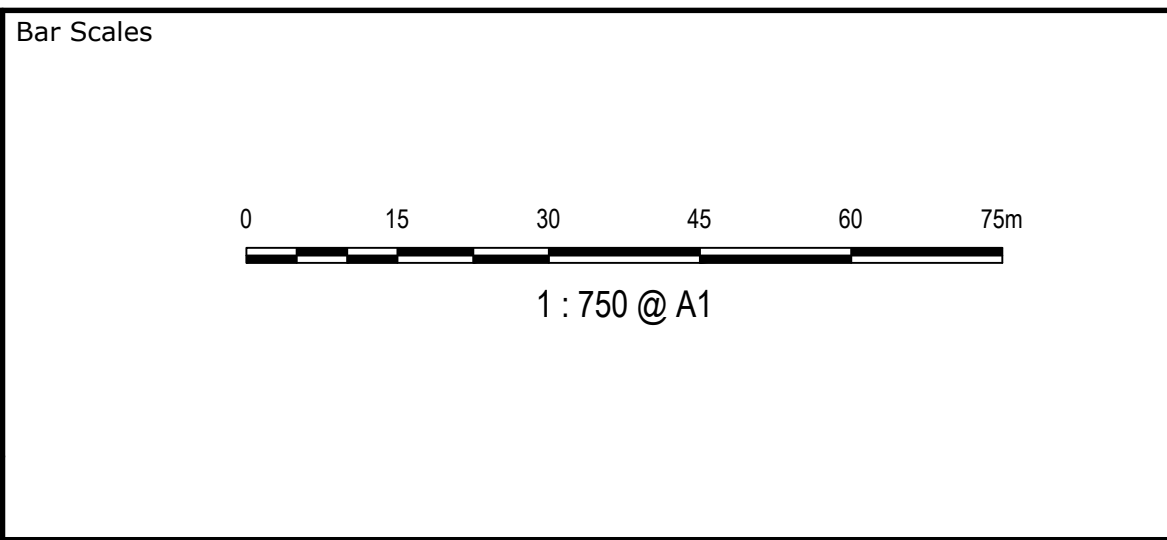
LEGEND

- EXISTING BOUNDARY
- SAFE INTERSECTION SIGHT DISTANCE (SISD) = 248m
(DESIGN SPEED 110km/hr)

NOTES

- 110kph DESIGN SPEED DETERMINED FROM SPEED SURVEY UNDERTAKEN ON WATERFALL WAY.
- A GENERALLY UNIFORM ROAD GRADE OF +1.2% HAS BEEN SURVEYED FROM SOUTHWEST TO NORTHEAST.
- A VERTICAL PROFILE OF THE SISD PATH HAS BEEN ASSESSED WHICH INDICATED NO ADDITIONAL OBSTRUCTIONS TO SISD.
- PARAMETERS AND CALCULATIONS AS PER AUSTRROADS GUIDE TO ROAD DESIGN (AGRD) AND THE TNSW SUPPLEMENT TO AGRD

B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date



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OTHER PURPOSE OTHER THAN
THAT ORIGINALLY INTENDED
WITHOUT THE WRITTEN
PERMISSION OF AT&L



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		Designed	EH
Grid	GDA2020	Checked	GB
Height Datum	AHD	Approved	

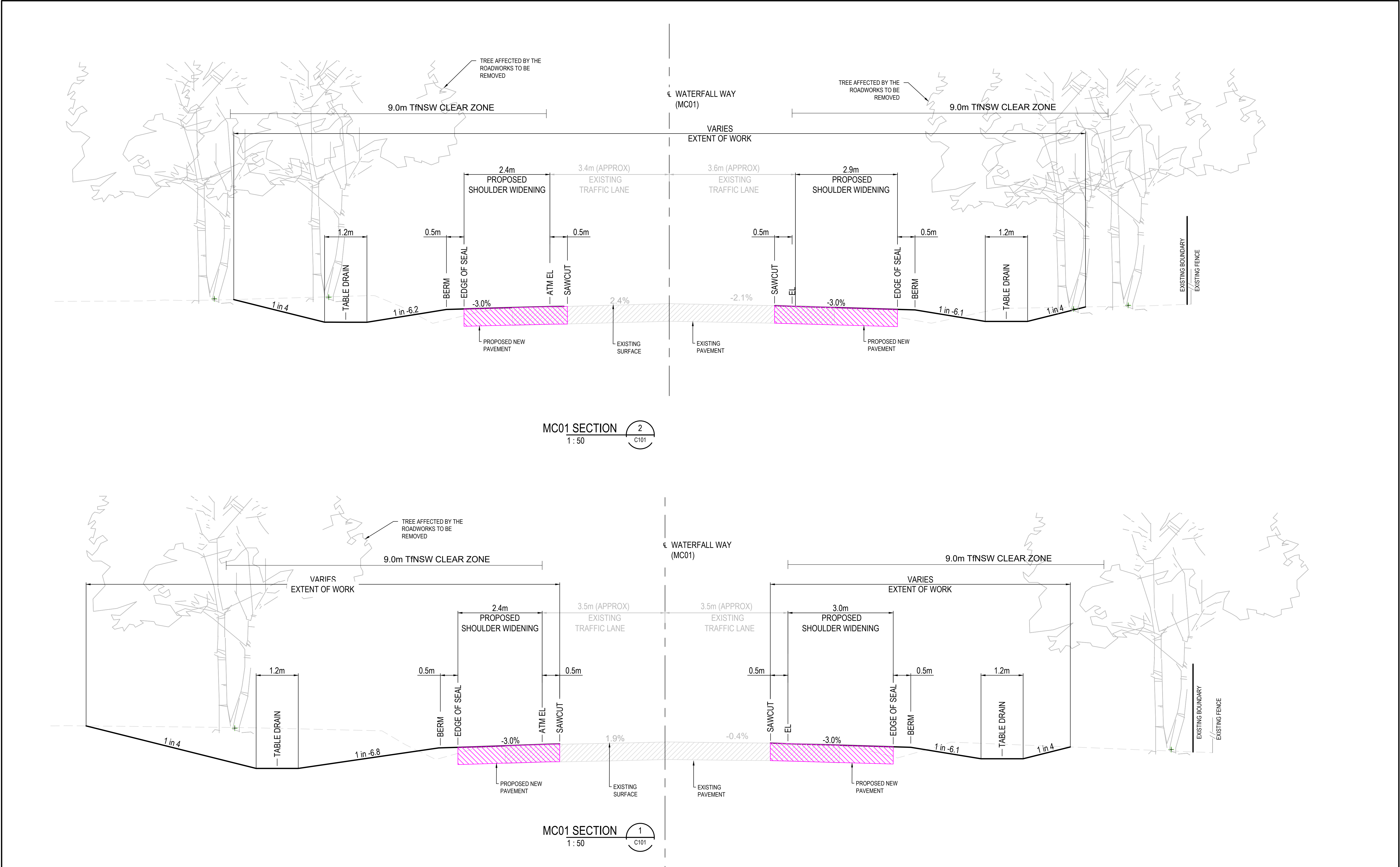
Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	SAFE INTERSECTION SIGHT DISTANCE (SISD) WATERFALL WAY PLAN

Civil Engineers and Project Managers

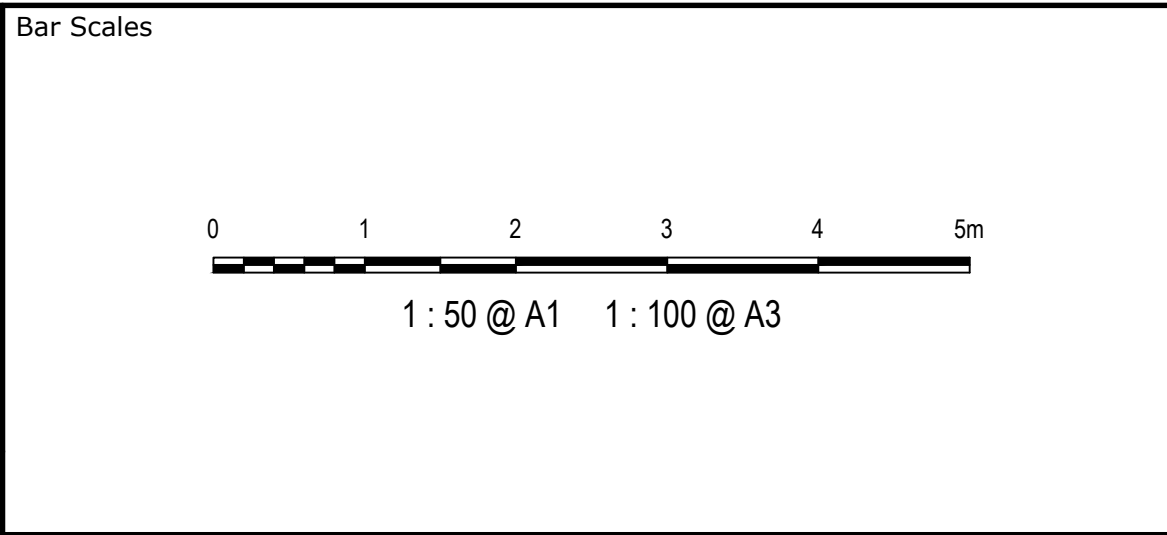
Level 10, 124 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
E info@atl.net.au
www.atl.net.au
ABN 96 130 882 405

at&l

Status	FOR APPROVAL NOT TO BE USED FOR CONSTRUCTION	A1
Project - Drawing No.	24-1239-C801	Issue B



B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date



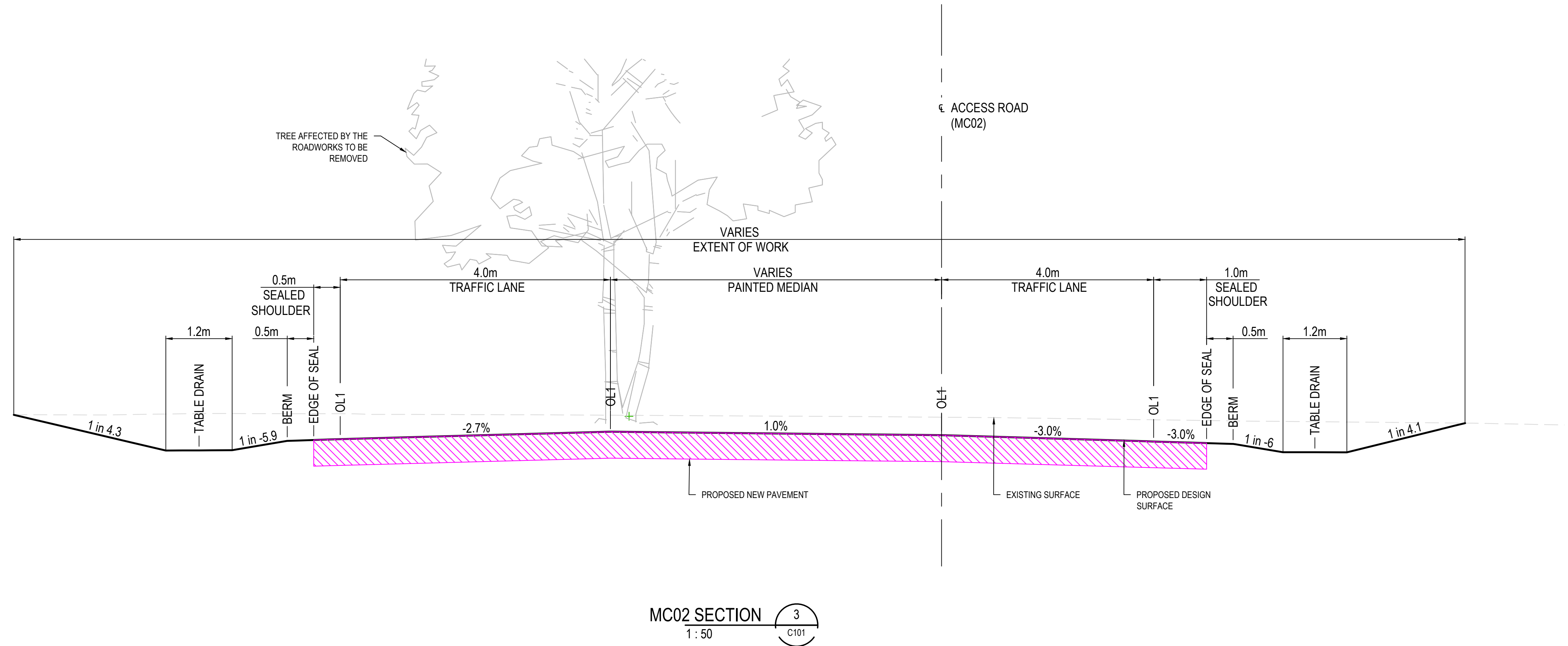
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Scales	1:50	Drawn	EH
		Designed	EH
Grid	GDA2020	Checked	GB
Height Datum	AHD	Approved	

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	TYPICAL SECTIONS SHEET 1

Civil Engineers and Project Managers	
Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405	
at&l	
Status	FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION	
Project - Drawing No.	24-1239-C901
Issue	B



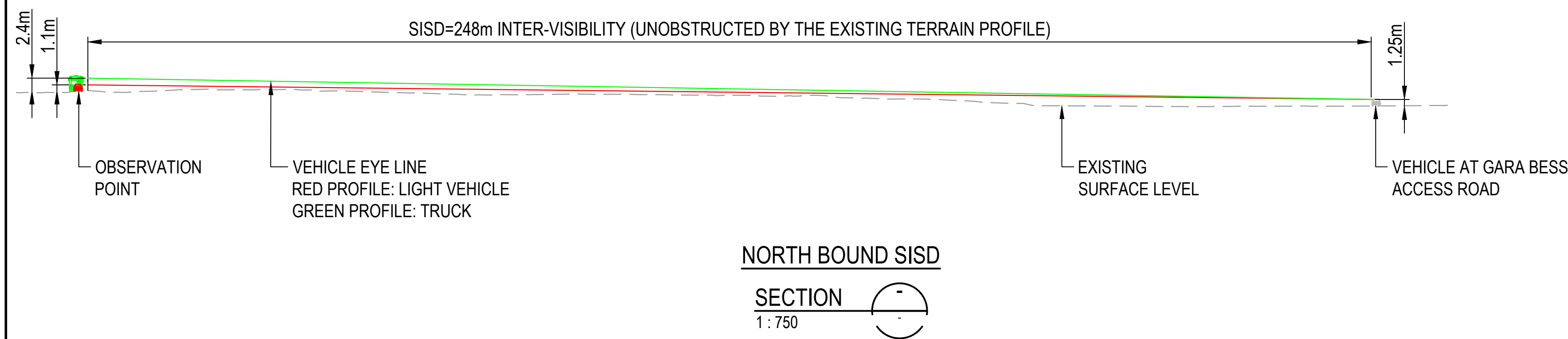
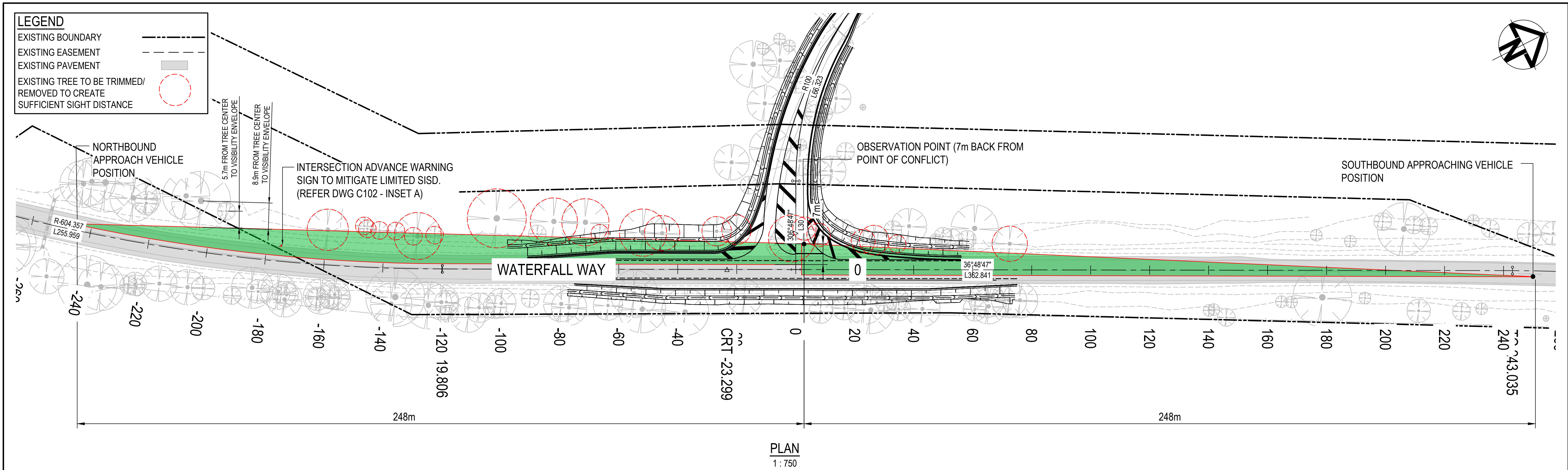
			Bar Scales		THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L	Client 	Scales		Drawn	EH	Project GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN	Civil Engineers and Project Managers		
			 1 : 50 @ A1 1 : 100 @ A3				Grid	GDA2020	Designed	EH			Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405	
							Height Datum	AHD	Checked	GB			Status	
									Approved				FOR APPROVAL	
												NOT TO BE USED FOR CONSTRUCTION		A1
Issue			Description		Date				Project - Drawing No.		Issue			
									24-1239-C902		B			

100mm on Original

Date Plotted: 4 Nov 2025 - 10:59AM File Name: F:\24-1239 Armidale\6.0 Drgs\Civil\Final\24-1239-C902.dwg

Appendix D

Sightline Analysis



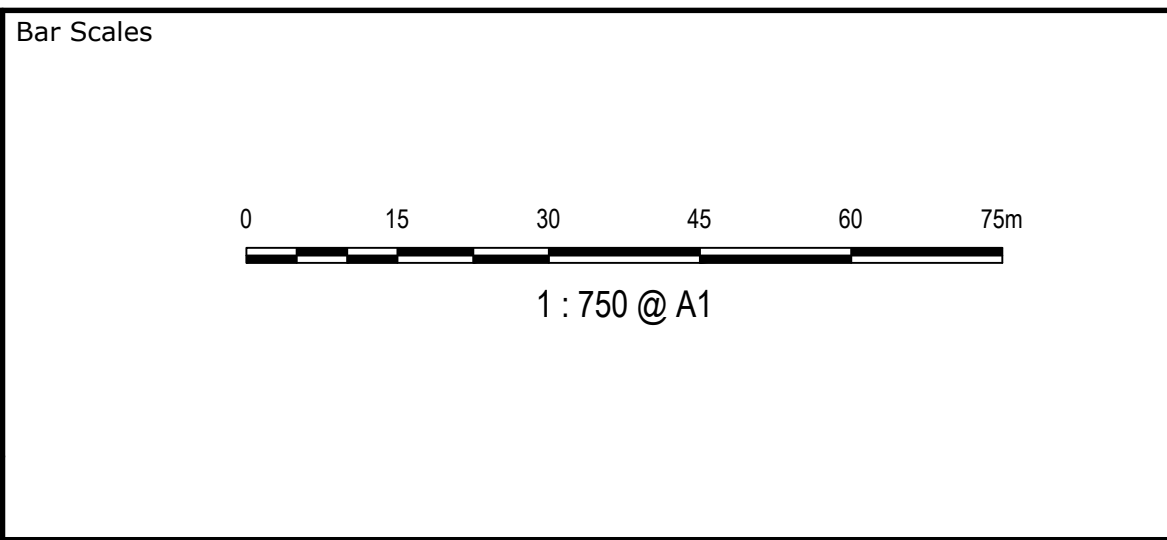
LEGEND

- EXISTING BOUNDARY
- SAFE INTERSECTION SIGHT DISTANCE (SISD) = 248m
(DESIGN SPEED 110km/hr)

NOTES

- 110kph DESIGN SPEED DETERMINED FROM SPEED SURVEY UNDERTAKEN ON WATERFALL WAY.
- A GENERALLY UNIFORM ROAD GRADE OF +1.2% HAS BEEN SURVEYED FROM SOUTHWEST TO NORTHEAST.
- A VERTICAL PROFILE OF THE SISD PATH HAS BEEN ASSESSED WHICH INDICATED NO ADDITIONAL OBSTRUCTIONS TO SISD.
- PARAMETERS AND CALCULATIONS AS PER AUSTRROADS GUIDE TO ROAD DESIGN (AGRD) AND THE TNSW SUPPLEMENT TO AGRD

B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date



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Scales	1:750	Drawn	EH
		Designed	EH
Grid	GDA2020	Checked	GB
Height Datum	AHD	Approved	

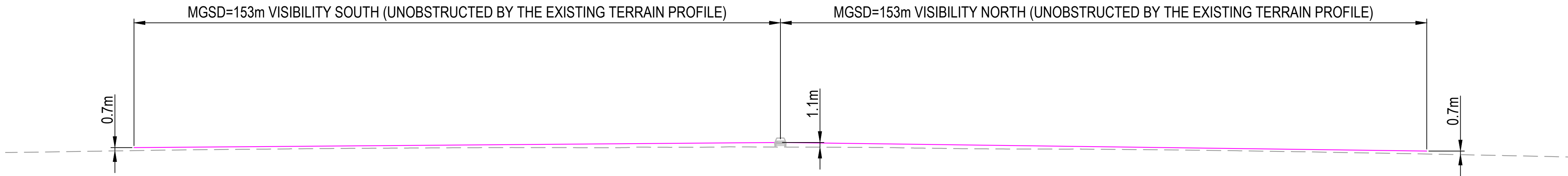
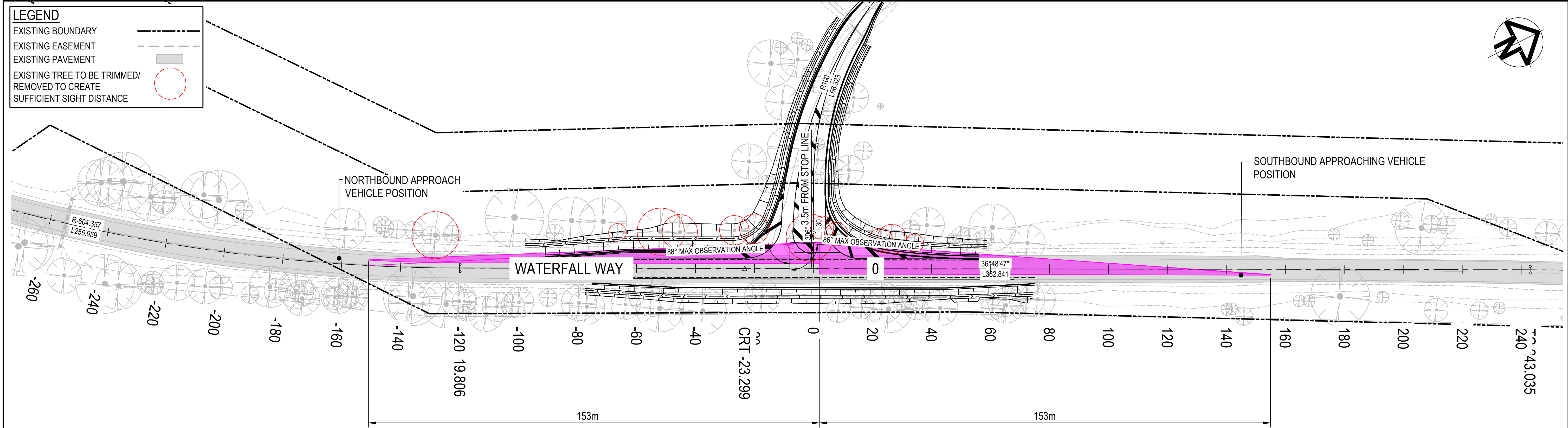
Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	SAFE INTERSECTION SIGHT DISTANCE (SISD) WATERFALL WAY PLAN

Civil Engineers and Project Managers

Level 10, 124 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
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ABN 96 130 882 405

at&l

Status	FOR APPROVAL NOT TO BE USED FOR CONSTRUCTION	A1
Project - Drawing No.	24-1239-C801	Issue B



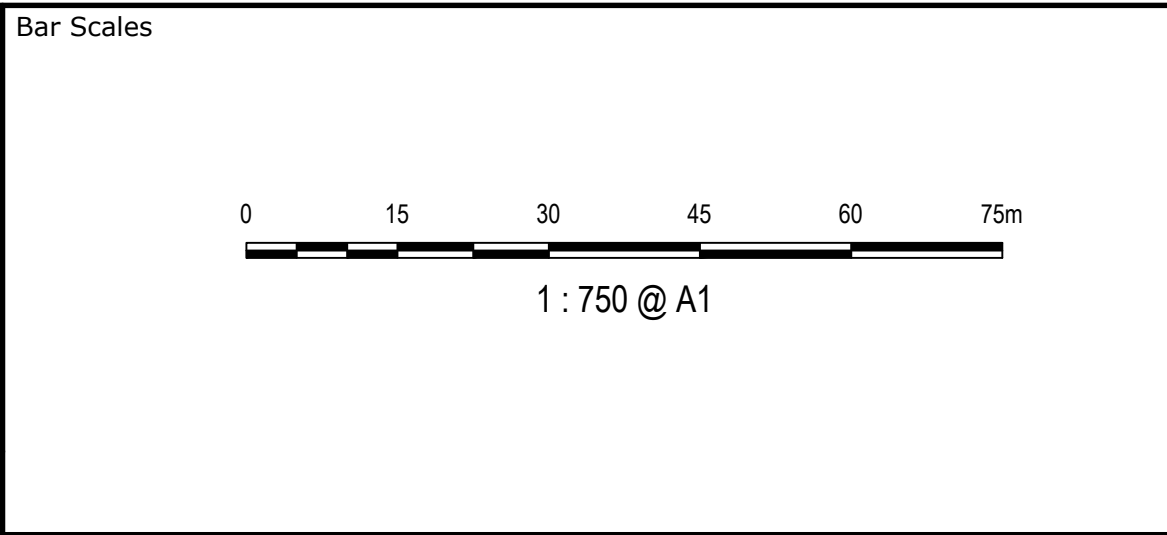
LEGEND

- EXISTING BOUNDARY
- MINIMUM GAP SIGHT DISTANCE (MGSD) = 153m
(DESIGN SPEED 110km/hr, 5 SEC GAP ACCEPTANCE)

NOTES

- 110kph DESIGN SPEED DETERMINED FROM ADDITIONAL BUFFER.
- A GENERALLY UNIFORM ROAD GRADE OF +1.2% HAS BEEN SURVEYED FROM SOUTHWEST TO NORTHEAST.
- A VERTICAL PROFILE OF THE MGSD PATH HAS BEEN ASSESSED WHICH INDICATED NO ADDITIONAL OBSTRUCTIONS TO SIGHT.
- PARAMETERS AND CALCULATIONS AS PER AUSTRROADS GUIDE TO ROAD DESIGN (AGRD) AND THE TNSW SUPPLEMENT TO AGRD

B	ISSUED FOR APPROVAL	04/11/2025
A	ISSUED FOR APPROVAL	15-10-25
Issue	Description	Date



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		Designed	EH
Grid	GDA2020	Checked	GB
Height Datum	AHD	Approved	

Project

GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN

Title

MINIMUM GAP SIGHT DISTANCE (MGSD) SITE ACCESS PLAN

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Status	FOR APPROVAL	A1
NOT TO BE USED FOR CONSTRUCTION		
Project - Drawing No.	24-1239-C802	Issue
		B

Appendix E

Site Access Prior to Intersection Upgrade



Model is in ground units scaled at point 240418027
(SM19256) E 382533.196 N 6620608.042
MGA2020 Zone 56 GCS 0.999609 - 1/csf 1.000391

VARIABLE MESSAGE SIGN (VMS) TO BE
INSTALLED WITH TWO ALTERNATING
MESSAGES TO WARN VEHICLES TO
REDUCE SPEED LIMIT FOR NORTH-EAST
BOUND TRAFFIC

LEGEND

 SIGNAGE LOCATION

APPROVER

THE UNDERSIGNED HAS OBTAINED THE SAFEWORK NSW "TRAFFIC
CONTROL WORK TRAINING CARD" CERTIFICATION.

CERTIFICATE NO: TCT0056802
PAUL CAI

REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	KR	PC	PD	14/10/25



PROJECT

ARMIDALE ENERGY STORAGE PARK

TITLE

TRAFFIC GUIDANCE SCHEME (TGS)

DWG No. 24009CAD001
FIGURE 1

DATE STAMP 14 October 2025

PROJECT No. 24009

SCALE 1:2500 @A3

REV. A

TRAFFIC MANAGEMENT NOTES:

1. NOT ALL DIMENSIONS SHOWN ARE TO SCALE.

2. LOCATION OF SIGNS ARE TO BE CONFIRMED ON-SITE TO ENSURE APPROPRIATE VISIBILITY.

3. ALL SIGNS TO BE MINIMUM SIZE A.

4. ALL WORKERS WILL BE CONFINED TO THE DEDICATED WORKS AREA SHOWN ON THE PLAN.

5. ALL TRAFFIC CONTROL PLANS ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE TfNSW "TRAFFIC CONTROL AT WORK SITES" MANUAL, VER 6.1 (2022) AND AUSTRALIAN STANDARDS AS1742.3:2019 MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, PART 3: TRAFFIC CONTROL DEVICES FOR WORKS ON ROADS.

6. THIS TRAFFIC CONTROL PLAN MUST BE SETUP BY A PERSON HOLDING AN "APPLY TRAFFIC CONTROL PLANS" (YELLOW TICKET) AND THE TfNSW TRAFFIC CONTROL AT WORK SITES CHECKLIST SHALL BE COMPLETED PRIOR TO IMPLEMENTATION.

7. IT IS THE SITE FOREMAN'S RESPONSIBILITY TO ENSURE THE FOLLOWING:

- THE INTEGRITY OF ALL TRAFFIC CONTROL MEASURES THROUGH TO THE FINAL REMOVAL. THIS INCLUDES DAILY CHECKS OF ALL SIGNS AND DEVICES. THE CORRESPONDING RECORDS OF CHECKS SHALL BE KEPT ON FILE FOR AUDITING PURPOSES.
- VEHICULAR ACCESS AND SERVICING REQUIREMENTS ARE TO BE MAINTAINED AT ALL TIMES TO ADJACENT PROPERTIES AFFECTED BY TRAFFIC CONTROL MEASURES
- PEDESTRIAN ACCESS AROUND THE WORK AREA TO BE MAINTAINED AT ALL TIMES.
- AT ALL TIMES UP-TO-DATE COPY OF "TRAFFIC CONTROL AT WORK SITES" SHOULD BE AVAILABLE FOR REFERENCE AND IMPLEMENTATION AS REQUIRED ON-SITE
- IF THERE IS NO DESIGNATED SITE FOREMAN, THE RESPONSIBILITY SHALL FALL ON THE CONTRACTOR OF WORKS

9. ALL WORKERS MUST ADHERE TO THE APPLICABLE SAFE WORK DISTANCE AS DESCRIBED IN AS1742.3:2019

10. ALL DISTANCES BETWEEN SIGNS ARE TO BE IN ACCORDANCE WITH THE SECTION 4.3.2 OF AS1742.3:2019. HOWEVER, MODIFICATIONS MADE TO SUIT SITE CONDITIONS.

11. ALL CONSTRUCTION VEHICLE ACTIVITY SHOULD BE MINIMISED, WHERE POSSIBLE, DURING PEAK PERIODS.

12. ROAD WORK SIGNS TO BE COVERED OR REMOVED WHEN WORKERS ARE NOT ON SITE.

13. NO TRUCK QUEUING OR PARKING WILL BE PERMITTED IN ANY PUBLIC ROAD.

14. NO PROPOSED WORKS ZONE FOR THE SITE.

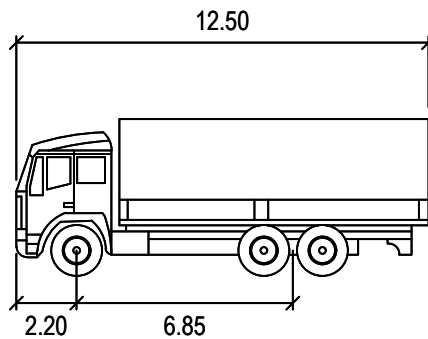
15. VEHICLES ALREADY ON THE ROAD WILL HAVE A RIGHT OF WAY. AS SUCH EVERY VEHICLE LEAVING THE SITE MUST WAIT UNTIL A SUITABLE GAP IN TRAFFIC ALLOWS THEM TO EXIT.

16. ADJOINING PROPERTIES AND SIDE ROADS WILL NOT BE AFFECTED BY THE WORKS.

LEGEND

- VEHICLE BODY ENVELOPE
- 0.5m VEHICLE BODY
CLEARANCE ENVELOPE

PRE-CONSTRUCTION DESIGN VEHICLE PROFILE



12.5m TRUCK

	METERS
WIDTH	: 2.50
TRACK	: 2.50
LOCK TO LOCK TIME	: 6.0
STEERING ANGLE	: 36.6

NOTES

1. AS AN ALTERNATIVE TO PROVIDE TEMPORARY PAVEMENT, THE EXISTING PAVEMENT EXTENTS CAN ACCOMODATE THIS VEHICLE PROVIDED THE ENTIRE WIDTH OF THE WATERFALL WAY CARRIAGEWAY CAN BE UTILISED. THIS ALTERNATIVE WILL REQUIRE TWO-WAY TEMPORARY TRAFFIC MANAGEMENT APPROVAL.

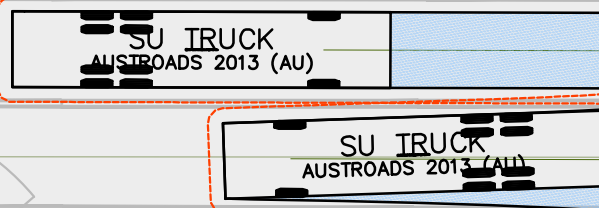
LOT 7003
DP 1060212

GAZETTED
GRAFTON
ROAD

ACCESS ROAD

EXTENT OF TEMPORARY PAVEMENT TO
ACCOMODATE VEHICLE PATH
(40m²)

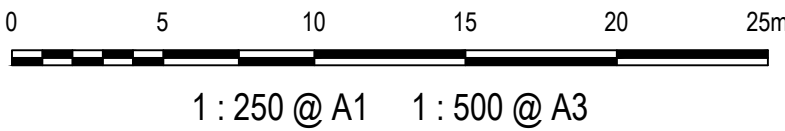
WATERFALL WAY (MC01)



LOT 3
DP 786950

P2	PRE-CONSTRUCTION VEHICLE CHANGED	05-11-25
P1	ISSUED FOR COORDINATION	09-10-25
Issue	Description	Date

Bar Scales



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Client



Scales

1:250

Grid

GDA2020

Height
Datum

AHD

Drawn

EH

Designed

EH

Checked

Approved

Project

GARA BESS (ARMIDALE)
STRATEGIC INTERSECTION
DESIGN

Title

PRE-CONSTRUCTION
VEHICLE TRACKING

Civil Engineers and Project Managers

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Status
**FOR INFORMATION
NOT TO BE ISSUED FOR CONSTRUCTION**

Project - Drawing No.
24-1239-SKC04

A1

Issue
P2

Appendix F

OSOM Route Study



GARA BESS

OSOM Route Study

Date: October 2025
Client: Jane Bai
ACEnergy
Type: Desktop Survey
Rev: 3

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Revision History

Revision	Date	Details	Prepared	Checked	Approved
0	03/09/2024	First issue	ICW	SK	JJM
1	19/11/2024	Revised with client comments	ICW	SK	JJM
2	30/09/2025	Revised to address TfNSW comments	ICW	SK	JJM
3	28/10/2025	Revised with client comments	ICW	AC	JJM

Disclaimer

This report has been prepared for advisory purposes only. Information provided within the report is based on data provided by the Client as well as publicly available information and, to the best of ARES Project Services Pty Ltd's knowledge and experience, is accurate at the time of publication. All proposed routes, methodologies and schedules described in this report are subject to approval and issue of permits from the relevant stakeholders. Transport equipment is based on ARES Project Services Pty Ltd vehicles and trailers, and swept path analysis results may differ if using equipment by third parties.

ARES Project Services Pty Ltd accepts no responsibility or liability for the use of this report by any third party. The disclosure or distribution of this report to third parties is not permitted unless written approval is granted by ARES Project Services Pty Ltd.

Introduction

Gara BESS (or Battery Energy Storage System) is a renewable energy development located near Armidale in New South Wales. The facility has a proposed capacity of 400MW and storage of 1760MWh and is currently in the planning and approvals stage.

The project is located approximately 10km east of Armidale, in the New England region of NSW. It is ideally situated to connect directly into the nearby 330kV transmission network.

ARES have been tasked by our customer, ACEnergy, to undertake a Route Survey from the Port of Newcastle to site. The purpose of the study is to determine the pinch points along the route and give best estimates of modifications and works required to enable oversize overmass (OSOM) cargo to be brought to site.

The study is designed for those involved in the project that have a limited knowledge of transportation, including a comprehensive outline of the routes and actions required to achieve delivery.





01

Overview

Project Overview

The Gara BESS is a renewable energy development in the New England region currently in the planning and approvals stage.

Scope of Survey

Gara BESS is located just off Waterfall Way, approximately 10km east of the town of Armidale in NSW.

ARES has been tasked with surveying the route from the proposed Port of Import (Port of **Newcastle**) to the project site. The survey will include everything up to the site entrance. The turn into the site entry point was assessed by others and is not included in this report.

This is a desktop survey, relying on existing aerial imagery from sources such as Google and Nearmaps. ARES has also previously driven the transport route as far as Tamworth and has included data gathered from that trip in this assessment.

We recommend that a physical survey of the entire route is completed at a later stage, once the route is confirmed and final OSOM component dimensions are known, to verify the results of this desktop survey.

Port of Import

The Port of Newcastle serves as a vital import/export hub into much of northern and central-west NSW. Much of its operation is driven by coal exports via Kooragang Island. However in recent years the port has invested heavily in expanding and diversifying its capabilities to handle a variety of other cargoes and ships.

The primary berth for break bulk cargo is Mayfield

Berth 4, which has a large storage area (~120,000sqm) adjacent to the berth. This berth has processed some large projects in the recent past, including multiple wind farms, so it will have no issues handling the components for this project.

Newcastle Port has excellent connections to both road and rail. For heavy vehicle traffic, the primary route out of the port is via Industrial Drive and then Pacific Hwy. Curfews are in place for the Newcastle Metro area which have to be observed when using heavy vehicles.

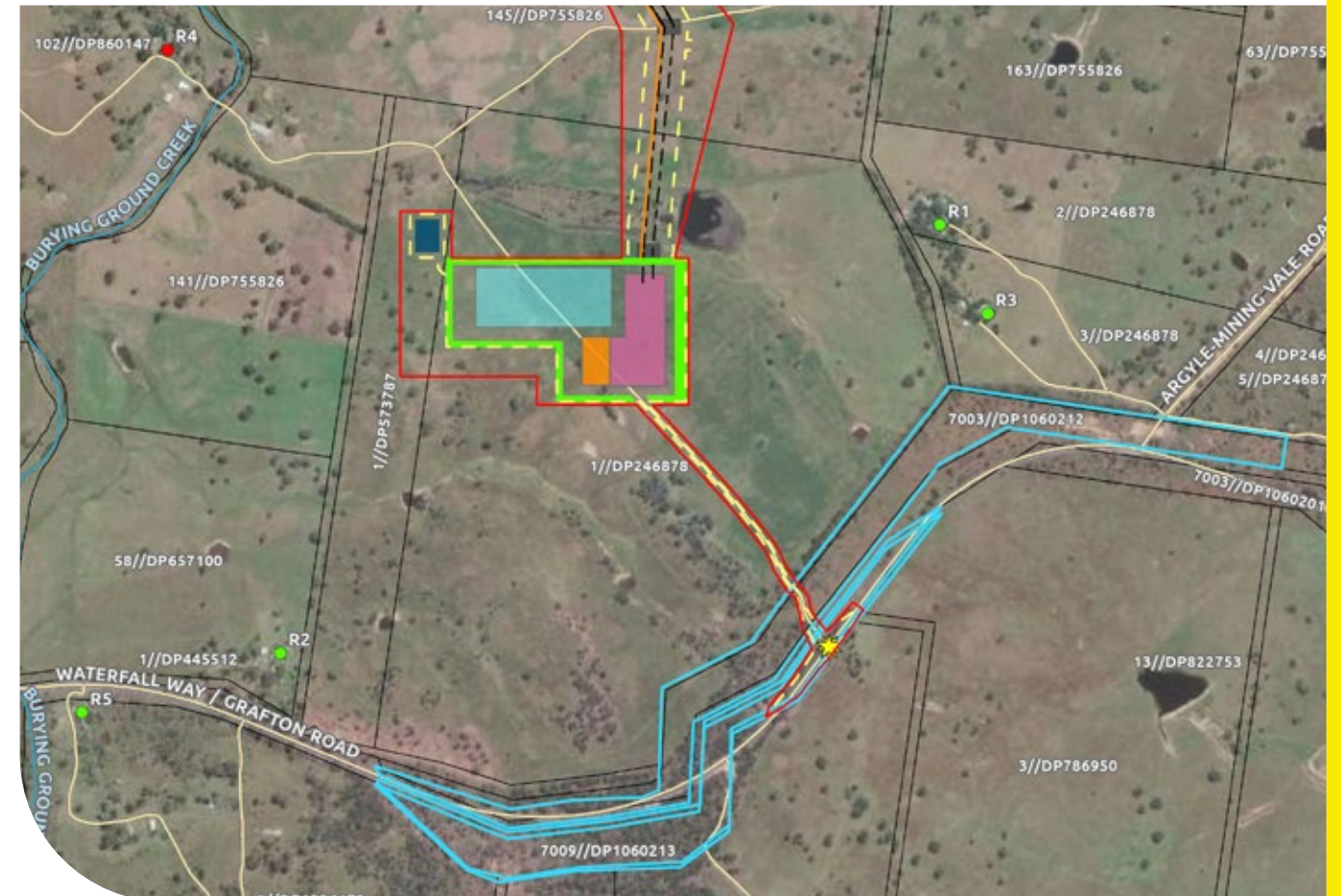
Site

The project site is accessed via a site entry point off Waterfall Way east of Armidale. Refer to the opposite page for a site overview of the project.

Swept path analysis of the site entrance has been conducted by others as part of the Traffic Impact Assessment for the project, and is not covered in this report.



Above: Aerial view of Port of Newcastle, Mayfield Berth 4, showing berth and storage area. **Below:** Site overview of the Gara BESS facility.



Transport Methodology

Specialized cargo requires specialized transport solutions.



Above: ARES transporting a 170-ton transformer on a custom trailer. Below: Schematic of proposed transformer platform trailer for Gara BESS.

Cargo Dimensions

The majority of deliveries to the project will be in gauge and able to be delivered under gazette. The largest oversize, overmass (OSOM) component of the project is the delivery of the two main transformers with the following proposed weight and dimensions:

- Length: 10.2m
- Width: 3.9m
- Height: 4.2m
- Weight: 187 tons

This combination will be able to pass under all height restrictions on the proposed route, with the trailer able to hydraulically lower further by approximately 200mm for additional height clearance if required.

The transformer is classified as a 'High Risk' OSOM Load" by Transport for NSW due to its weight and dimensions. An OSOM Transport Management Plan (TMP) will be required and approved by TfNSW prior to transport.

Equipment

Due to the weight of the load, it will need to be transported on a large 18-axle platform trailer. A trailer of this size and complexity will require the engagement of a specialist heavy haulage company with access to such trailing equipment.

Refer to the equipment schematic shown below for a mock-up of the proposed transport arrangement. Overall dimensions are:

- Length: 56m (including rear block truck)
- Width: 4.2m
- Height: 5.3m
- Gross Combination Mass: 319 tons
- Mass per Axle: 15 tons

Pilots & Escorts

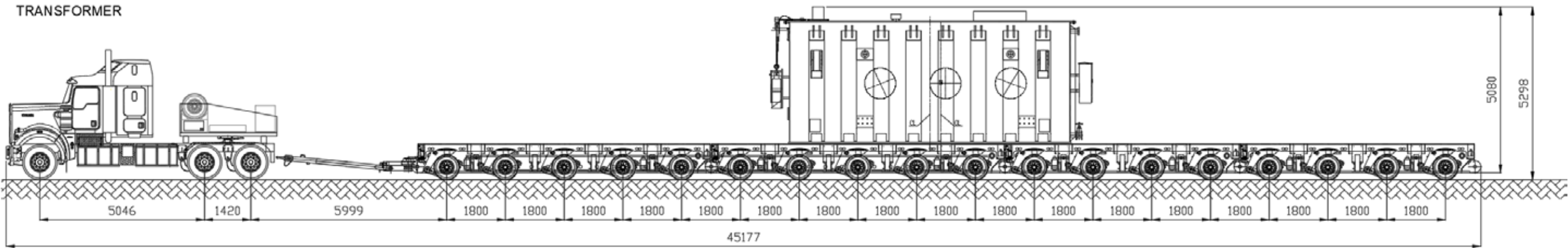
The load will be accompanied by both NSW police escort vehicles and oversize pilot vehicles. NSW police will carry out all required traffic management and control at pinch points, whilst the pilot vehicles will provide advanced warning (front and rear) of the OSOM load's approach and assist the police escorts as directed.

If any street furniture such as signs need to be removed for the load to pass, the pilots will perform this task and replace the items once the load is through.

Subject to final confirmation by TfNSW and transport permit conditions, the following will be required for this load:

- 2 NSW Police escorts
- 4 Pilot vehicles (including 1 steerer)

TRANSFORMER

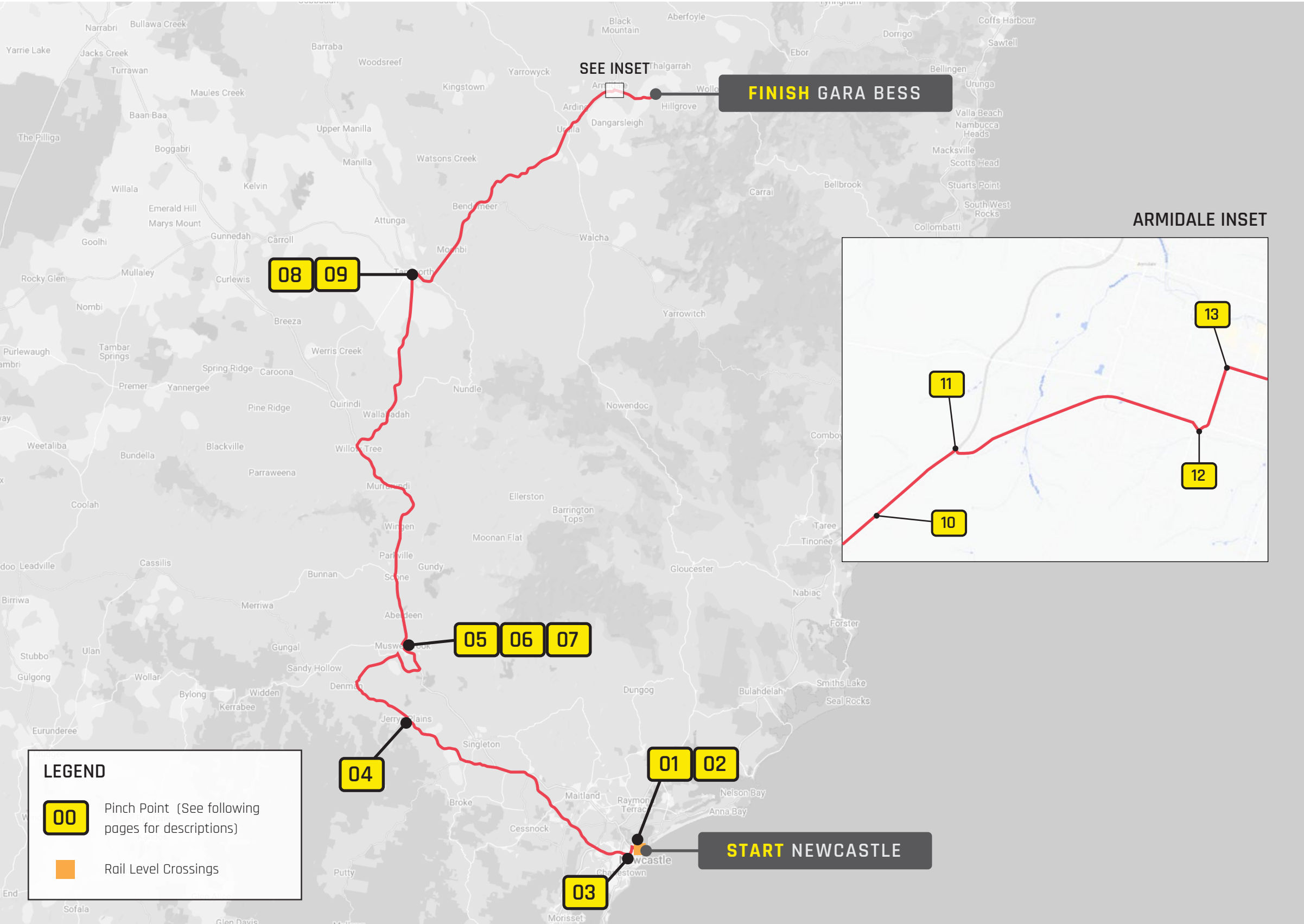




02

Route Assessment

Route Overview



ROUTE

0.0 KM	START - Newcastle
0.5 KM	Quayside Cl
1.9 KM	Selwyn St
2.0 KM	George St
8.5 KM	Industrial Dr
13.4 KM	Newcastle I.C.B.
15.1 KM	Newcastle Rd
18.2 KM	Thomas St
23.1 KM	Newcastle Link Rd
71.3 KM	Hunter Expy
135.8 KM	Golden Hwy
153.7 KM	Denman Rd
164.3 KM	Thomas Mitchell Dr
173.1 KM	New England Hwy
173.7 KM	Bell St
174.6 KM	Victoria/Market St
328.3 KM	New England Hwy
330.7 KM	Scott Rd
435.6 KM	New England Hwy
439.4 KM	Uralla Rd
440.4 KM	Kentucky St/Dangar St
	Barney St/Waterfall Way
451.7 KM	FINISH - Gara BESS

The return journey is expected to be the reverse of the above except using the New England Hwy through Singleton rather than the Golden Hwy.

NHVR Route ID: 1U9XD-5 v2
[INTERACTIVE MAP LINK](#)

General Route Notes

Newcastle to Gara BESS

Road Quality

The transport route will be primarily along the NSW state highway and motorway network, which is generally designed to a higher specification and able to handle heavier and higher volumes of traffic. The route is fully paved.

The route generally follows the approved NSW OSOM Load Carrying Vehicle Network, with a couple of deviations in Muswellbrook required to bypass the rail overpass there.

Overhead Structures

The usual route out of Newcastle toward New England involves taking Industrial Drive and Maitland Rd to the Hunter Expressway, with a maximum height clearance of 6.2m at the Tarro Interchange overpass.

Due to the Hexham Straight Widening project, OSOM access is restricted through Hexham and loads will need to take the Newcastle Inner City Bypass to Jesmond and Newcastle Link Rd to eventually join up with the Hunter Expy. This route has a much lower height restriction of **5.25m** clearance.

At Muswellbrook, the rail overpasses just before reaching the town centre have a clearance of **5.26m**. These will need to be bypassed although more due to width than height.

At Armidale, the Queen Elizabeth Drive overpass of the New England Hwy has an officially listed clearance of **4.9m** (sign states **5.1m**) and will need to be avoided.

Overhead Power Lines

In general, a travel height below around 5.5m is not an issue with respect to power lines. Loads above 4.6m travel height will require a high load permit from the power authorities prior to travel.

We recommend that an overhead power line survey is conducted closer to the date of transport to confirm that no lines need to be lifted or modified to accommodate the OSOM loads for this project.

The route traverses through the Ausgrid and Essential Energy distribution networks.

Bridges and Culverts

On the route, ARES identified one structure of concern - the rail overpass at Kentucky St and Dangar St in Armidale. This bridge has been assessed by the asset owner (UGL Regional Linx - ref: HVA-24-1348) and found to be conditionally suitable for the load under consideration.

A bridge assessment request for other non-UGL bridges on the route has been performed - refer to report PT2885A attached in Appendix.

Rail Crossings

There are rail level crossings along the route. Permissions will be required from rail authorities to travel through these crossings. Approvals may also be required when travelling over railway lines on bridges.

Road Works

There are planned roadworks and road upgrade projects along the route which will need to be considered when planning for transport of OSOM components to the



Above: Kentucky St rail overpass in Armidale

Project. These include:

- Pacific Hwy, Hexham Straight Widening project - addition of extra lane each direction, new Ironbark Crk bridges. Scheduled to finish in 2026.
- Newcastle Inner City Bypass - Rankin Park to Jesmond - new interchange at Newcastle Rd. Scheduled to finish in 2025.
- EnergyCo Port to REZ upgrades - Central West Orana - scheduled to finish Q1 2026.

Close co-ordination with Transport for NSW will be required once dates firm up for the project to ascertain which projects are active at the time of transport, and whether there are special conditions or access restrictions for OSOM loads (e.g. detours, speed restrictions, width restrictions etc).

Approvals

Transport permits will need to be obtained from the National Heavy Vehicle Regulator (NHVR) prior to travel. The permit process includes getting feedback from state transport authorities as well as any local councils along the route.



Above:
Janet St overpass of Newcastle Inner City Bypass - 5.25m height clearance

Below:
Queen Elizabeth Dr overpass of New England Hwy at Armidale - 4.9m height clearance



Pinch Point

01

RIGHT TURN
Selwyn St &
Industrial Dr

The OSOM load will exit the Port of Newcastle via Selwyn St then turn onto Industrial Dr via George St. The turn is wide and can be done with no modifications, although the length and width of the combination means that the full width of the road will be required on George St. Police escorts will need to control and manage traffic whilst the turn is being taken.

Note: this intersection is being upgraded as part of NSW EnergyCo's Port to REZ upgrades for Central West Orana REZ. The upgrades will make the corners wider and easier to negotiate.

Estimated time to complete this turn: less than 1 minute.



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			PROJECT:	Gara BESS	SCALE NTS
			DRAWING TITLE:	SWEPT PATH DRAWING	SHEET NO:
		DRAWN BY:	DRAWING NAME:	Route Survey	REV
		DRAWN DATE:			
	CHECKED BY:	ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115			

Pinch Point

02

LEFT TURN
Maitland Rd & Newcastle
Inner City Bypass

In order to avoid the Hexham Straight Widening (HSW) project as much as possible, the load will need to make a sharp left turn onto the Newcastle Inner City Bypass. The load will cross over the centre median onto the incorrect side of the Bypass, requiring police to hold northbound traffic until the load returns to the correct side of the road.

Estimated time to complete this turn: less than 1 minute.



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			PROJECT:	Gara BESS	SCALE NTS
			DRAWING TITLE:	SWEPT PATH DRAWING	SHEET NO:
		DRAWN BY:	DRAWING NAME:	Route Survey	REV
		DRAWN DATE:			
	CHECKED BY:	ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115			

Pinch Point

03

RIGHT TURN
Newcastle Inner City
Bypass & Newcastle Rd

The Rankin Park to Jesmond section of the Newcastle Inner City Bypass is currently under construction, with the new overpass of Newcastle recently being lifted into place. The transformer will take the new offramp and right hand turn onto Newcastle Rd to pass underneath the NICB extension overpass. There are no issues with taking this turn. We recommend that this intersection is re-assessed closer to the transport date to confirm the final position of all road furniture and to ensure there are no changes which would result in a clash.

Estimated time to complete this turn: less than 1 minute.



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			DRAWING TITLE:	SWEPT PATH DRAWING	SHEET NO:
		DRAWN BY:	DRAWING NAME:	Route Survey	REV
		DRAWN DATE:			
	CHECKED BY:				
ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115					

Pinch Point

04

S TURN
Golden Hwy,
Jerrys Plains

The Golden Hwy passes through the town of Jerrys Plains. This S-bend is manageable with the transformer trailer with no modifications required. Police escorts will need to halt traffic north of the S-bend whilst the trailer is making its way through the town.

Note: these two turns are being upgraded as part of NSW EnergyCo's Port to REZ upgrades for Central West Orana REZ. The upgrades will make the corners wider and easier to negotiate.

Estimated time to complete this turn: 1-2 minutes



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		PROJECT:	Gara BESS	SCALE NTS
		DRAWING TITLE:	SWEPT PATH DRAWING	SHEET NO:
	DRAWN BY: DRAWN DATE: CHECKED BY:	DRAWING NAME:	Route Survey	REV
ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115				

Pinch Point

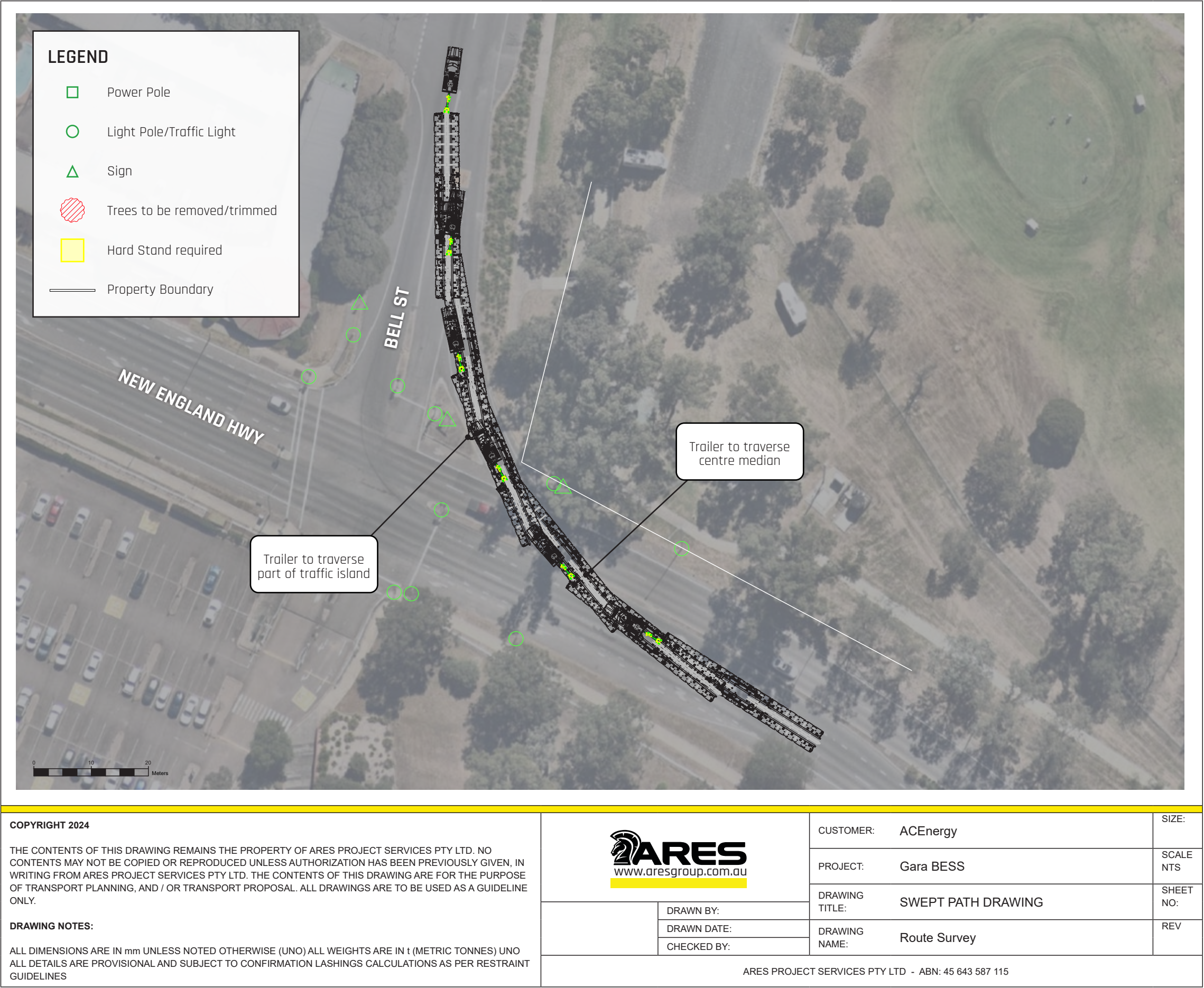
05

RIGHT TURN
New England Hwy
& Bell St

To bypass the Muswellbrook rail overpasses, the transformer combination will take the overheight bypass via Bell and Victoria Sts. The turn onto Bell St is too tight to take conventionally and the opposing slip lane will need to be used. Police escorts will need to control traffic to allow the contraflow manoeuvre to proceed.

The trailer will traverse over the centre median strip on New England Hwy as well as part of the traffic island on Bell St.

Estimated time to complete this turn: less than 1 minute.



Pinch Point

06

LEFT TURN
Bell St &
Victoria St

The overheight bypass at Muswellbrook continues with a bridge over the railway line and then a left turn onto Victoria St. This turn can be managed with no modifications, although police escorts will need to control traffic in all directions whilst the turn is being taken as the trailer will need to use the full width of Victoria St when turning. The trailer will run over the concrete traffic island while turning.

The bridge has been assessed by UGL Regional Linx and found to be suitable for the load.

Estimated time to complete this turn: less than 1 minute.



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		PROJECT:	Gara BESS	SCALE NTS
	DRAWN BY: DRAWN DATE: CHECKED BY:	DRAWING TITLE:	SWEPT PATH DRAWING	SHEET NO:
		DRAWING NAME:	Route Survey	REV
	ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115			

Pinch Point

07

RIGHT TURN
Market St &
New England Hwy

The overheight bypass rejoins the New England Hwy at a roundabout on Market St. This is too tight to take conventionally so the load will need to take the wrong side around the roundabout. No modifications are required. Police escorts will need to control traffic whilst the load crosses the intersection.

Estimated time to complete this turn: less than 1 minute.



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		PROJECT:	Gara BESS	SCALE NTS
		DRAWING TITLE:	SWEPT PATH DRAWING	SHEET NO:
	DRAWN BY: DRAWN DATE: CHECKED BY:	DRAWING NAME:	Route Survey	REV
ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115				

Pinch Point

08

RIGHT TURN
New England Hwy
& Scott St

In Tamworth, the transformer load will need to take the heavy vehicle bypass of the town centre via Scott Rd. The initial right turn onto Scott Rd will require taking the roundabout on the incorrect side. Police escorts will need to control traffic in all directions whilst this turn is made.

The OSOM load will use the existing concrete sections of the centre medians when turning.

Two road signs which are already removeable will need to be temporarily removed at this corner.

Estimated time to complete this turn: less than 1 minute.

Note: This intersection is currently planned to be upgraded with the roundabout to be replaced by traffic signals. ACEnergy commits to ongoing communication with the project team, particularly prior to transport permit applications. Traffic efficiency and cumulative impacts will be assessed as required should an overlap occur between the this intersection upgrade and Gara BESS OSOM deliveries, subject to the availability of road upgrade design and project information.



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			PROJECT:	Gara BESS	SCALE NTS
			DRAWING TITLE:	SWEPT PATH DRAWING	SHEET NO:
		DRAWN BY:	DRAWING NAME:	Route Survey	REV
		DRAWN DATE:			
	CHECKED BY:	ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115			

Pinch Point

09

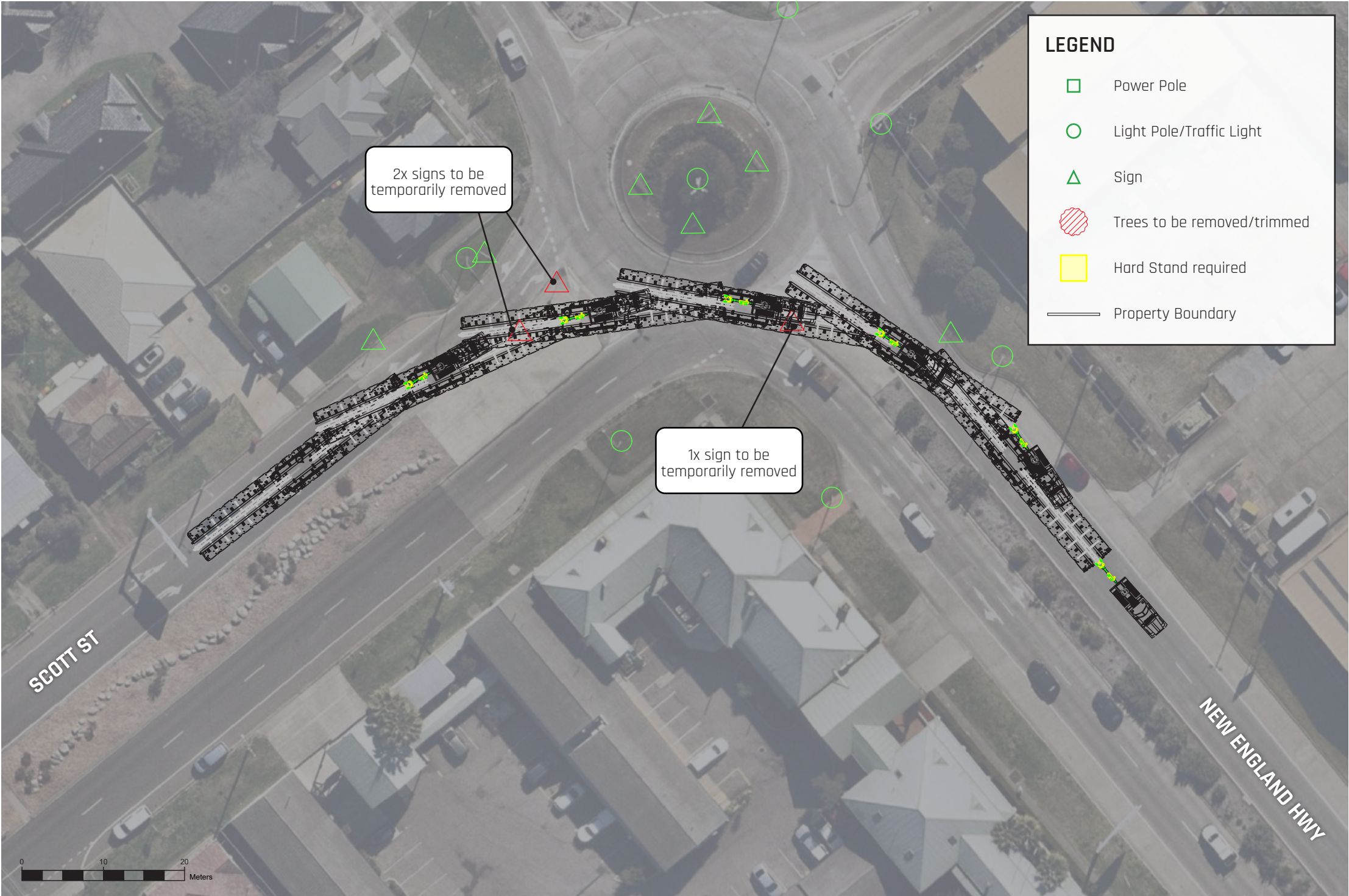
RIGHT TURN
Scott St &
New England Hwy

Similar to the previous turn, the load will need to use the incorrect side of the roundabout to rejoin the New England Hwy at Scott St. Police will once again need to control traffic during the manoeuvre.

The OSOM load will use the existing concrete sections of the centre medians when turning.

Three signs which are already removeable will need to be temporarily removed at this corner.

Estimated time to complete this turn: less than 1 minute.



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DRAWN BY:

DRAWN DATE:

CHECKED BY:

CUSTOMER: ACEnergy

PROJECT: Gara BESS

DRAWING TITLE: SWEPT PATH DRAWING

DRAWING NAME: Route Survey

SIZE:

SCALE NTS

SHEET NO:

REV

ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115

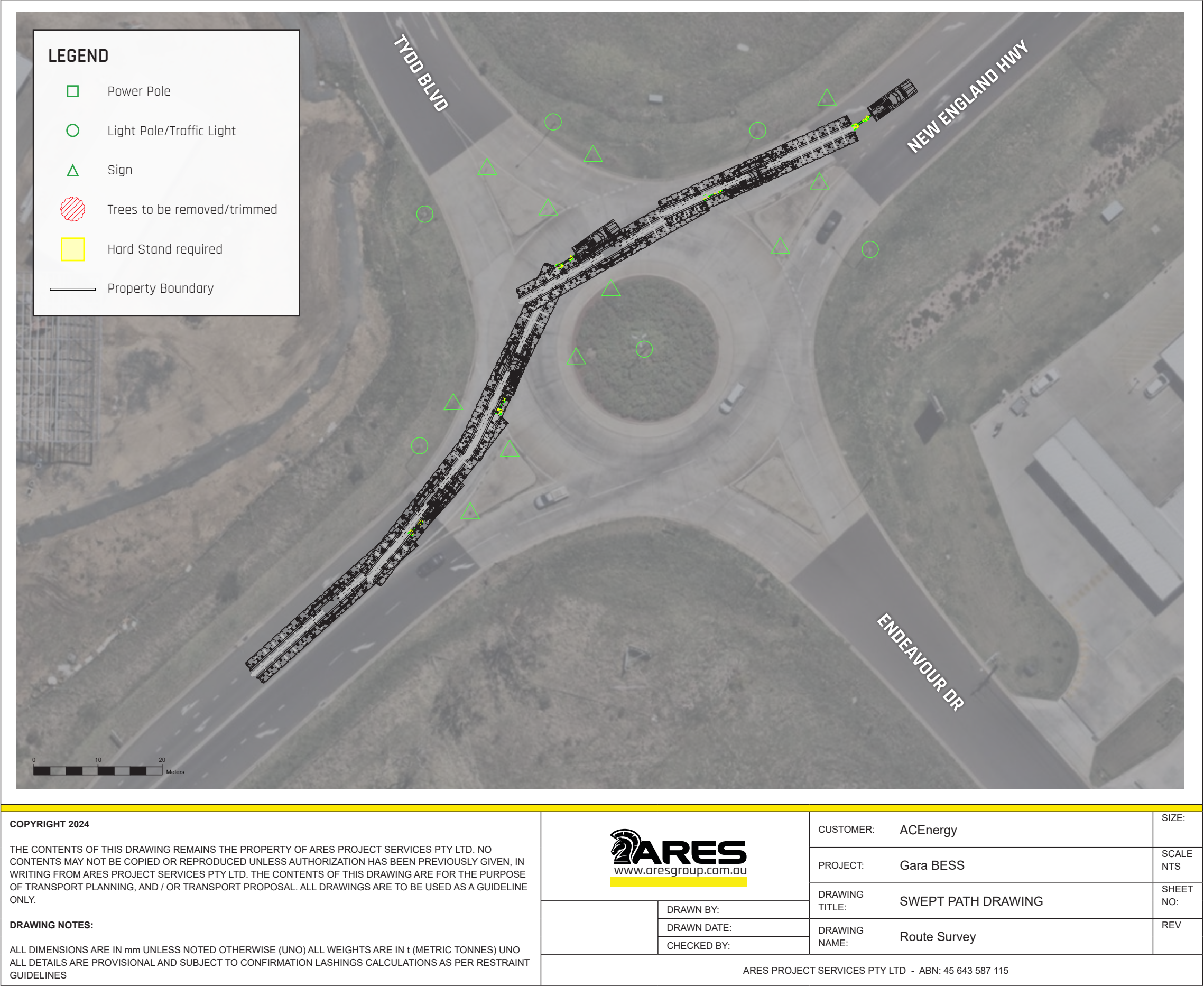
Pinch Point

10

ROUNDAABOUT
New England Hwy,
Armidale Airport

At Armidale Airport, a roundabout has recently been constructed at the intersection with Tydd Boulevard and Endeavour Drive. This roundabout is wide with two lanes available as well as a trafficable annulus and will require no modifications.

Estimated time to complete this turn: less than 1 minute.



Pinch Point

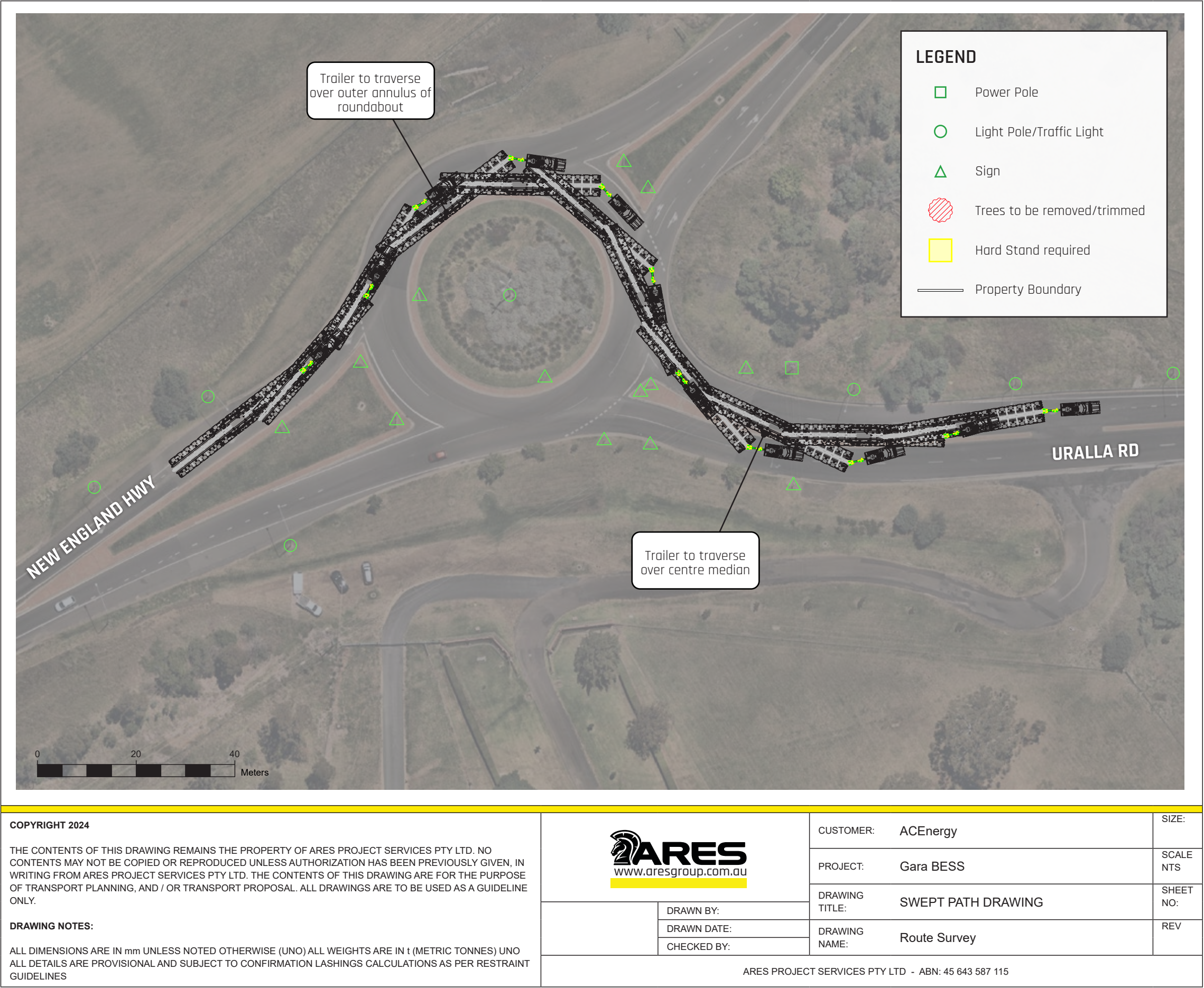
11

RIGHT TURN
New England Hwy
& Uralla Rd

Just past the Armidale regional airport, the combination will need to turn onto Uralla Rd if taking Route 1. This roundabout can be taken conventionally, although the load will still cross over to the incorrect side of the road on Uralla Rd, requiring police escorts to hold westbound traffic briefly.

The transformer load will use the outer annulus of the roundabout as well as travel over the median strip on Uralla Rd.

Estimated time to complete this turn:
approximately 1 minute.



Pinch Point

12

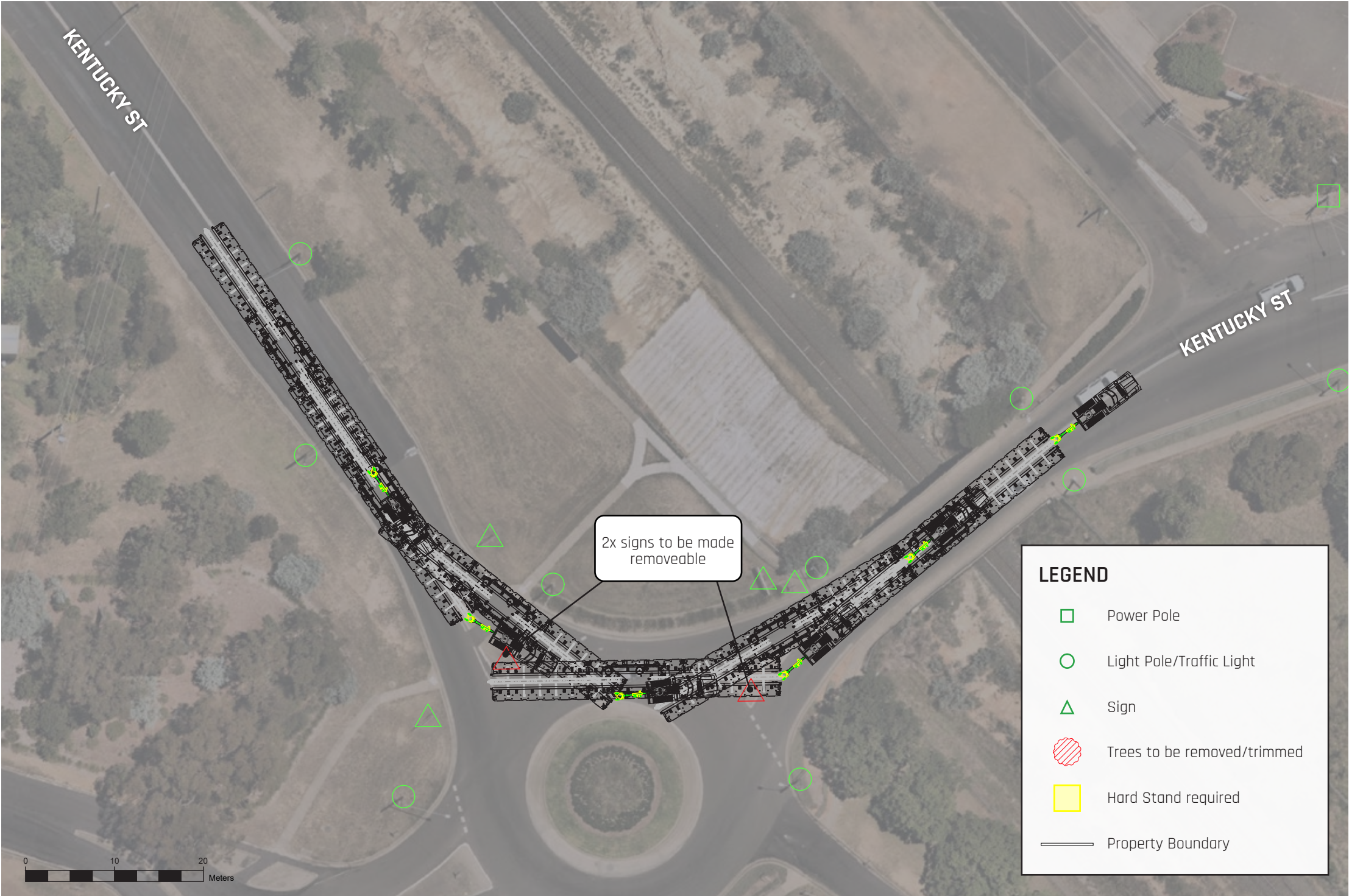
LEFT TURN
Kentucky St,
Armidale

This turn is quite tight for such a large trailer and extra care will need to be taken to ensure the trailer is taken around the corner safely.

The bridge over the railway line has signs stating that only one HV is allowed over at one time. It has been assessed by UGL Regional Linx as being suitable for the proposed transformer load.

The trailer will traverse the two traffic islands as it turns. Two signs on the traffic islands will need to be made removeable to make way for the trailer.

Estimated time to complete this turn: less than 1 minute.



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DRAWN BY:

DRAWN DATE:

CHECKED BY:

CUSTOMER: ACEnergy

PROJECT: Gara BESS

DRAWING TITLE: SWEPT PATH DRAWING

DRAWING NAME: Route Survey

SIZE:

SCALE NTS

SHEET NO:

REV

ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115

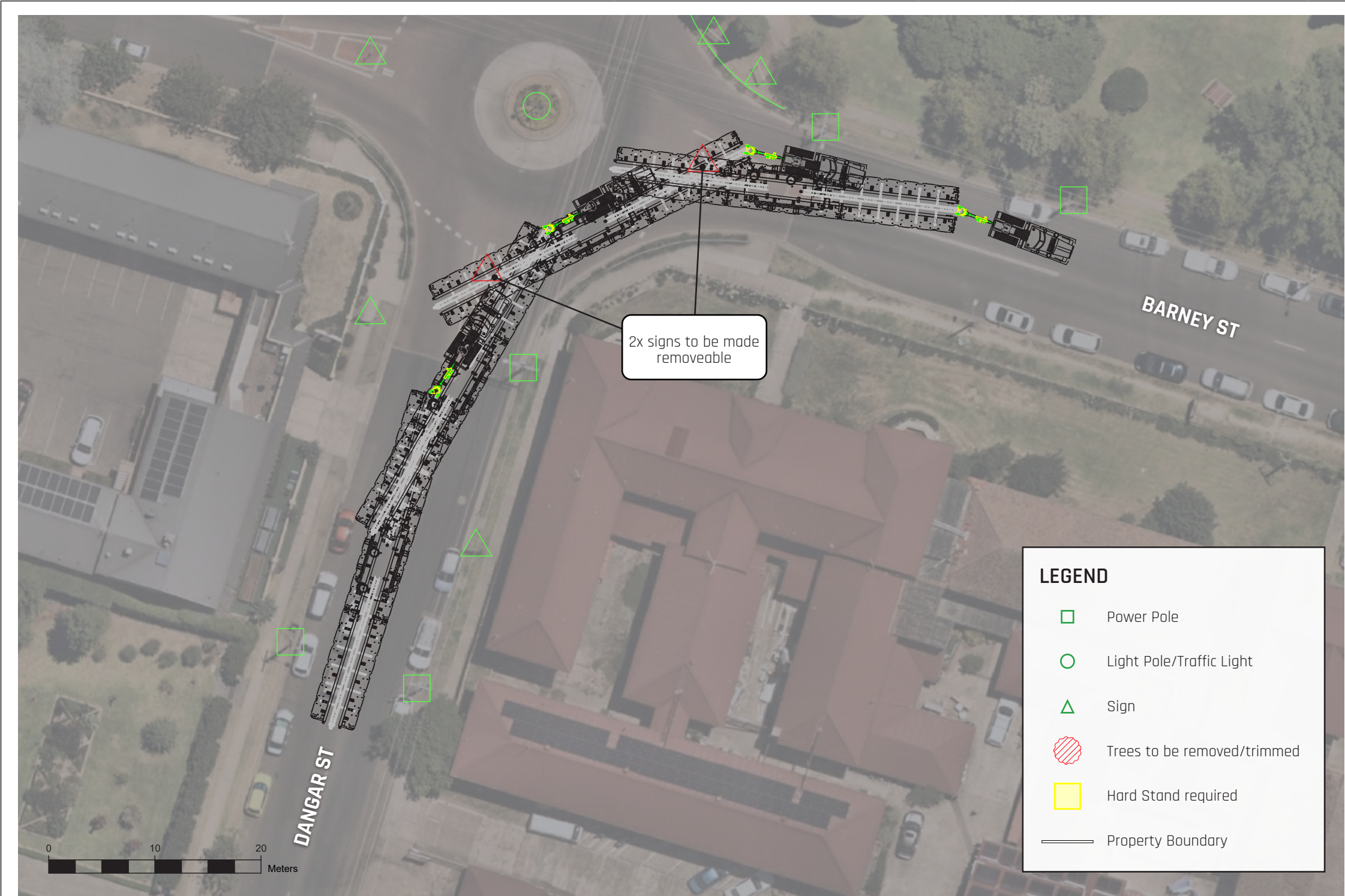
Pinch Point

13

RIGHT TURN
Dangar St &
Barney St

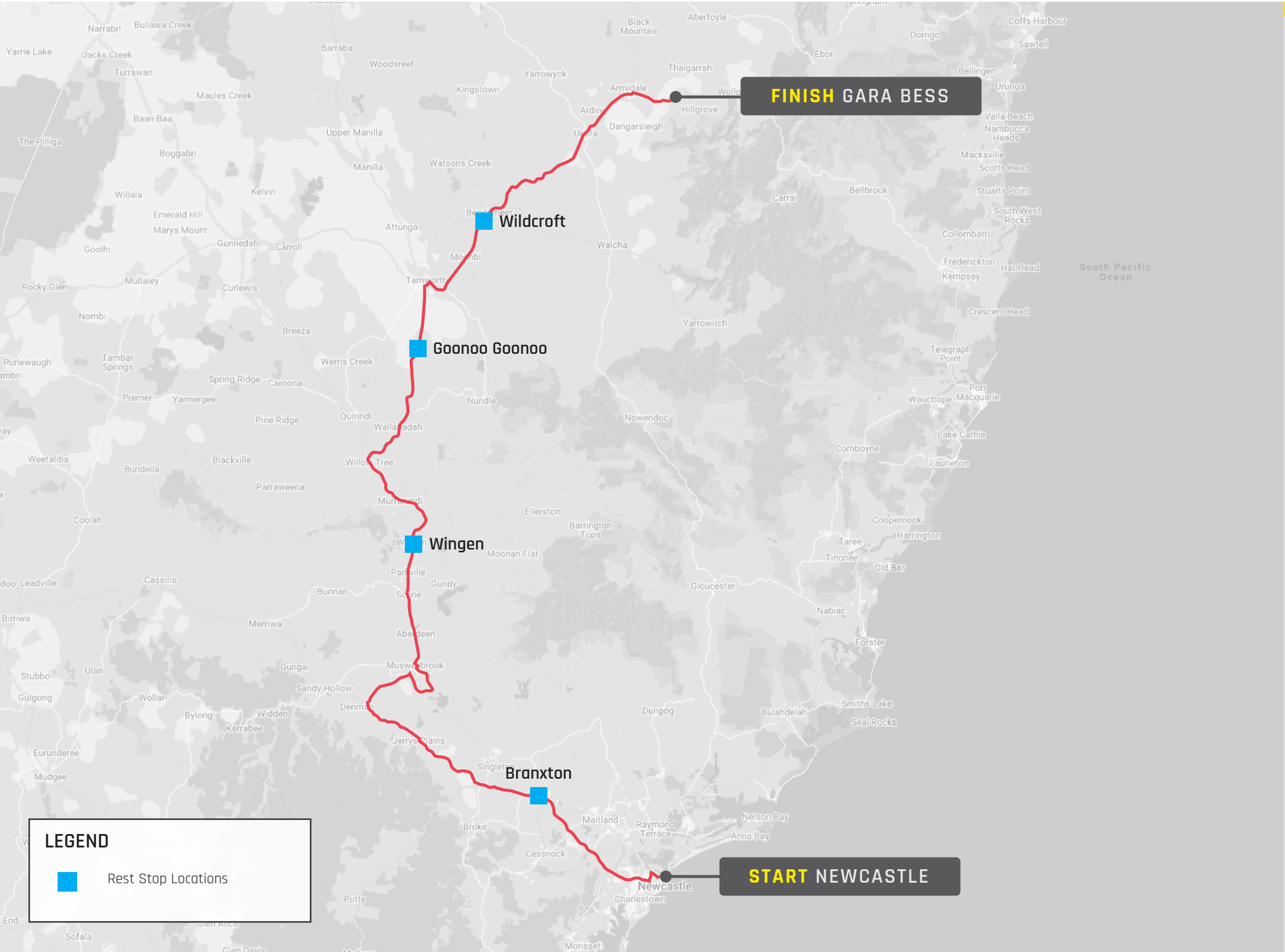
At this roundabout, the trailer will need to take the incorrect side to make the turn, traversing two traffic islands. Two signs will need to be made removeable on these islands and the police escorts will need to hold traffic during the manoeuvre.

Estimated time to complete this turn: less than 1 minute.



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			PROJECT: Gara BESS		SCALE NTS
			DRAWING TITLE: SWEPT PATH DRAWING		SHEET NO:
		DRAWN BY:		DRAWING NAME: Route Survey	REV
		DRAWN DATE:			
		CHECKED BY:			
ARES PROJECT SERVICES PTY LTD - ABN: 45 643 587 115					

Rest Stops



ARES expects the load to travel at an average speed of 50-60 kilometres per hour, including allowances for bridge slowdowns and manoeuvring at pinch points. With a trip distance of 450km, this means the journey should take around 8-9 hours of driving time.

We have assessed required rest stops based on fatigue management requirements and have proposed four stops to be used for this load per below. Please note that this is not meant to be an exhaustive list and there are other rest stops and pullover areas along the route which may be used for emergencies or breakdowns.

No.	KP	Rest Stop Name	GPS Link
01	61.4	Branxton Truck Parking Area	GPS
02	218	Wingen	GPS
03	307	Goonoo Goonoo Rest Area	GPS
04	362	Wildcroft Rest Area N/Bound	GPS

The following pages show swept path analysis of each rest stop including ingress/egress, space requirements and any modifications required.

01 Branxton Truck Parking Area



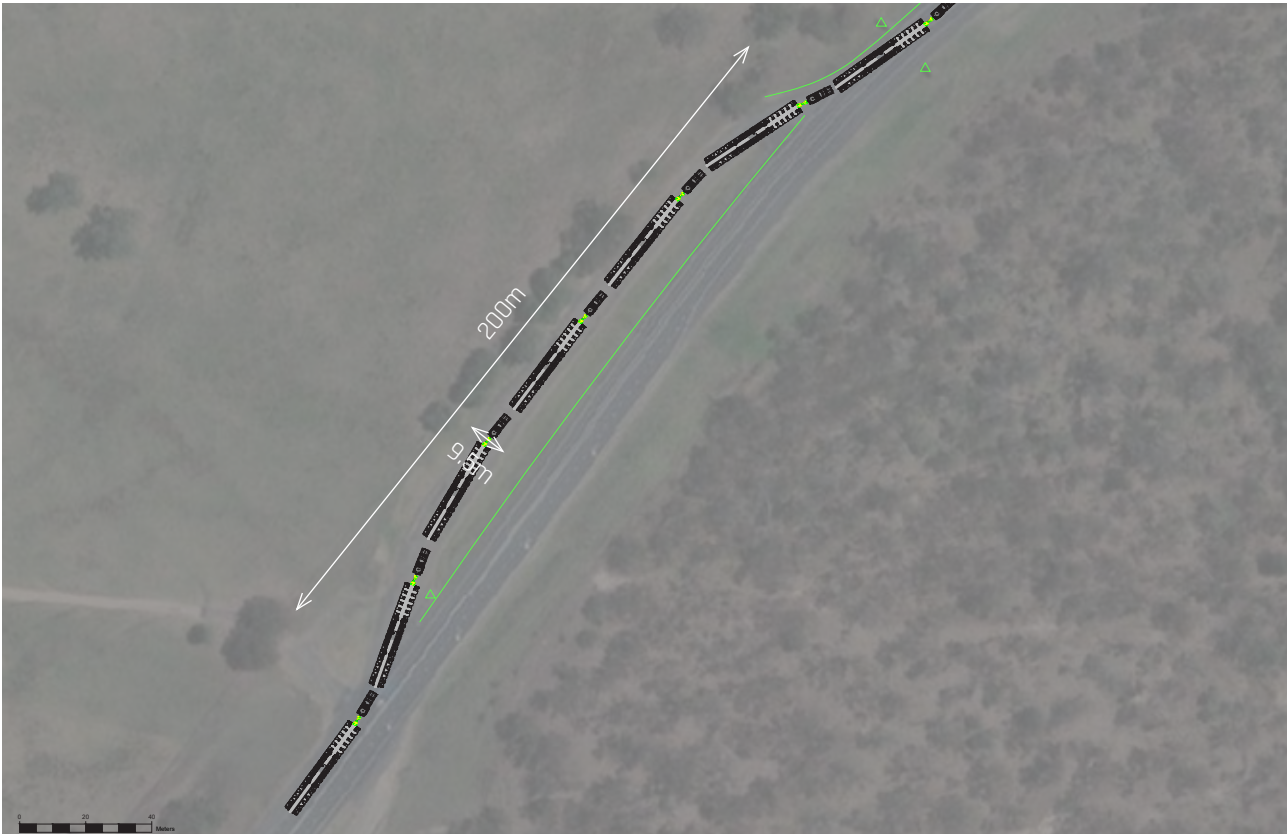
02 Wingen



03 Goonoo Goonoo Rest Area



04 Wildcroft Rest Area Northbound





03

Conclusion

Conclusion

A brief outline of the report's major findings and any recommendations for actions.



...transport of OSOM components to Gara BESS is feasible.

Summary

Following our desktop survey and analysis, ARES believe that transport of the oversize overmass (OSOM) components for the Gara BESS project from the **Port of Newcastle** is feasible along the proposed transport route, with only some minor modifications required to make the route suitable for the largest OSOM loads.

There are no issues with using the Mayfield 4 berth at Newcastle to receive the cargo. This facility has been used for many major infrastructure projects and has plenty of storage space available adjacent to the berth should short- or long-term storage be required.

The route sticks to NSW State Roads when travelling through Armidale, using Uralla Rd, Kentucky St, Dangar St and Barney St. This route crosses over a railway overpass on Kentucky St/Dangar St which has existing restrictions for heavy vehicle travel, but has been assessed and confirmed by the asset owner UGL Regional Linx to be suitable for the proposed loads.

The route involves bypassing Hexham, Muswellbrook and Tamworth. The Hexham bypass in particular will require liaison with Transport for NSW due to the ongoing extension of the Newcastle Inner City Bypass from Rankin Park to Jesmond.

The Muswellbrook bypass will require the approval of

Muswellbrook Council as it detours off State Roads.

The project site has a single proposed access point off Waterfall Way. The design for this access point was assessed for swept path by others and is assumed to be suitable for the OSOM load under consideration.

Next Steps

Based on the findings in this route survey, we recommend the following actions:

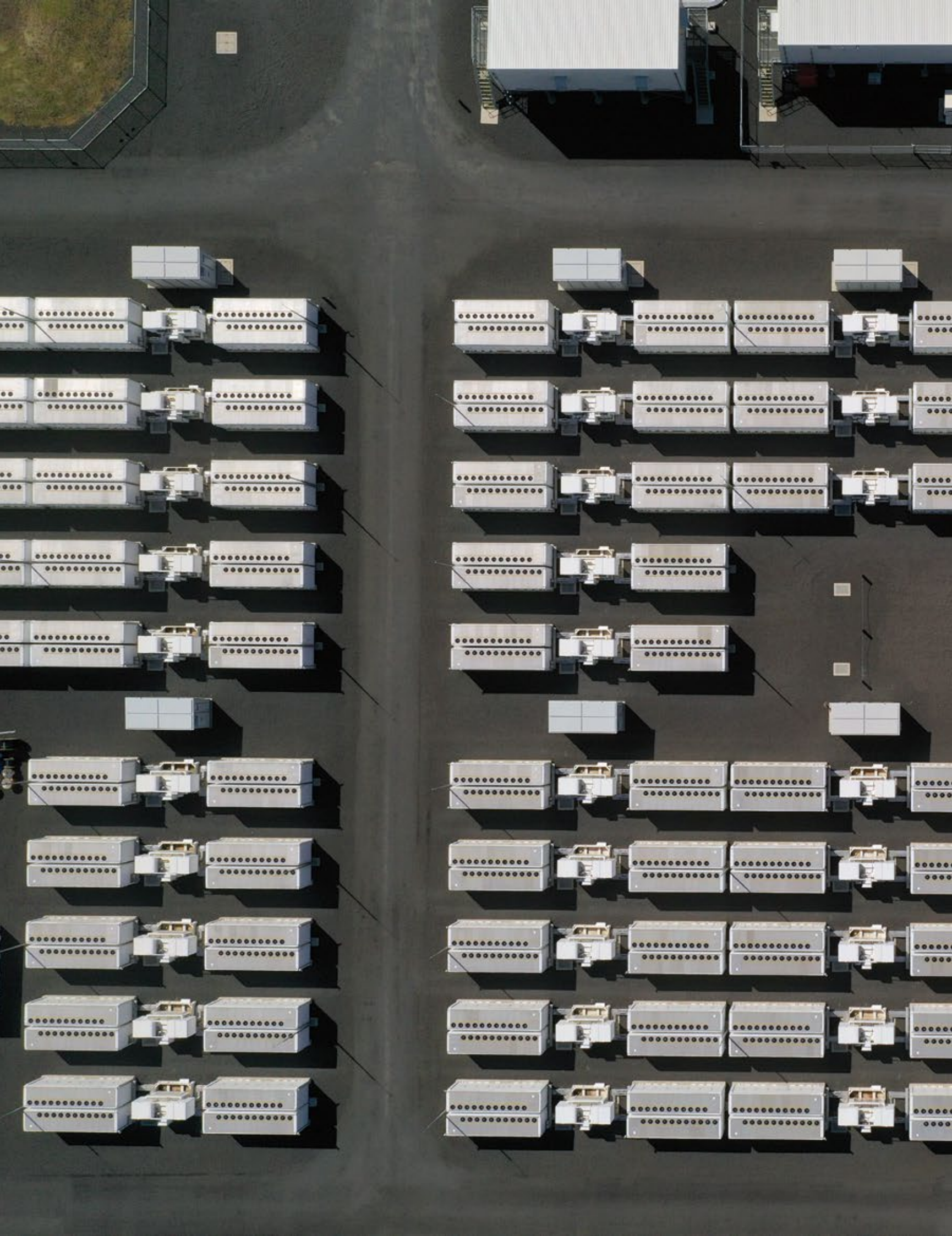
- Initiate dialogue with TfNSW regarding timing of major upgrade projects and any impacts, especially the Newcastle I.C.B. extension and Hexham Straight Widening projects
- Confirm final weights and dimensions of selected transformer
- Conduct a physical survey of the route to validate the results of this desktop survey closer to transport date

Summary of Road Modifications

The following table lists all required modifications to allow transport of OSOM components to take place.

Pinch Point	Road/Intersection	Modifications Required	Risk
02	Maitland Rd & New-castle I.C.B.	Centre median to be modified	Medium
05	New England Hwy & Bell St	Centre median and traffic island to be modified	Medium
06	Bell St & Victoria St	Traffic island to be modified	Medium
08	New England Hwy & Scott Rd	2x signs to be removed (already removeable)	Low
09	Scott Rd & New England Hwy	3x signs to be removed (already removeable)	Low
11	New England Hwy & Uralla Rd	Centre median to be modified, roundabout outer annulus to be assessed and modified if required	Medium
12	Kentucky St, Armidale	Traffic islands to be modified, 2x signs to be made removeable	Medium
13	Dangar St & Barney St	Traffic islands to be modified, 2x signs to be made removeable	Medium

Risk Ratings: Low - minor modifications such as signs or minor civils only.
Medium - moderate works including civils and removal of power and lighting assets.
High - requires 3rd party stakeholder input/approvals, or large scope of upgrades



04

Appendices

PT2885 Mayfield North to Metz for JASON MILLAR INVESTMENTS PTY LTD
Route A - Journey ID 1U9X0-5 v2

VEHICLE CONSIDERED:

Permit No.:	2885	Date Received:	26/09/2024
Vehicle Description:	Prime mover + 18x8 Platform + Push truck		
Item Carried:	Transformer		
Item Weight:	187		
Axle Width:	4.2		
Axle Spacings:	3.2, 1.2, 6.0, 1.8x17		
Axles:	2, 44, 888888888888888888		
Wheels per Axle:	0-00, 000000000000000000	15.0 t platform axles	
Tyre Dimensions:	279mm on Prime Mover, 190m Platform		
Gross Weight per Axle:	6, 18.5, 270, 6, 18.5		
Total Weight:	319.00		
Axle Summary:	18x8		
Weight Summary:			
Tonne per Axle Group 1:	15.0		
Tonne per Axle Group 2:			
Width:	4.2		
Length:	56		
Height:	5.3		
Starting Point:	Mayfield		
Destination:	Armidale		
Route Requested:	Selwyn St/ George St (CCL), Industrial Dr (316), Maitland Rd/Pacific Hwy (10), New England Hwy (9), John Renshaw Dr (588), Hunter Exp (6011), New England Hwy (9), Golden Hwy (27), Denman R (209), Thomas Mitchell Dr (CCL), New England Hwy (9), Bell St/ Victoria St/ Market St (CCL), New England Hwy (9), Scott St (CCL), Marius St/ New England Hwy (9), Martin St/ Queen Elizabeth Dr/ Niagara St/ Barney St/ Grafton Rd (CCL) NHVR Journey ID - 1U9X0-5 Alt - 2 Selwyn St/ George St (CCL), Industrial Dr (316), Maitland Rd/Pacific Hwy (10), New England Hwy (9), John Renshaw Dr (588), Hunter Exp (6011), New England Hwy (9), Golden Hwy (27), Denman R (209), Thomas Mitchell Dr (CCL), New England Hwy (9), Bell St/ Victoria St/ Market St (CCL), New England Hwy (9), Scott St (CCL), Marius St/ New England Hwy (9), Uralla Rd/ Kentucky St/ Dangar St/ Barney St/ Grafton Rd (CCL)		
Pre. Investigation No.:	This report is for Journey ID: 1U9X0-5 v2		
Start/Finish Point:			
Pre. Investigation No.:			
Start/Finish Point:			
Pre. Investigation No.:			
Start/Finish Point:			

Route:

The route assessed is as above. No alternative route was assessed.

Axle spacings must not be less than above and weights must not be greater than above.

ASSUMPTION:

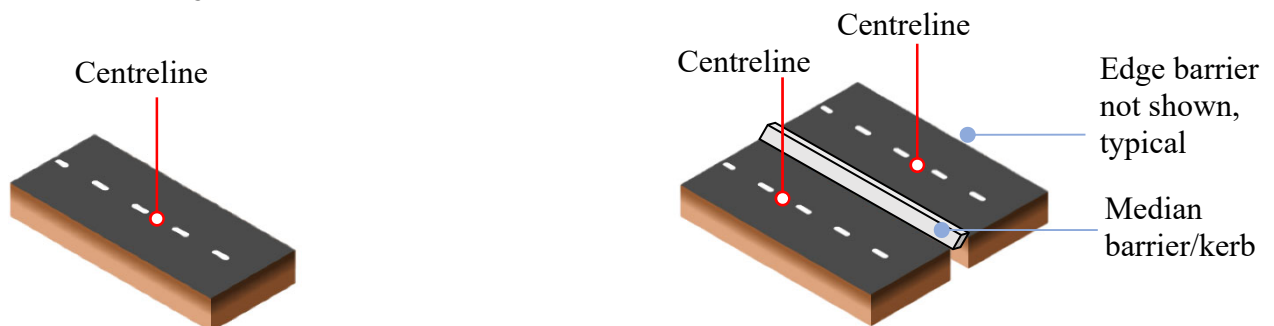
In assessing the bridges on the route, the assumption has been made that the bridges are in fair to good condition, and do not have any inadequacies.

Route: As Above (TRAVEL IN BOTH DIRECTIONS, RETURN UNLADEN)

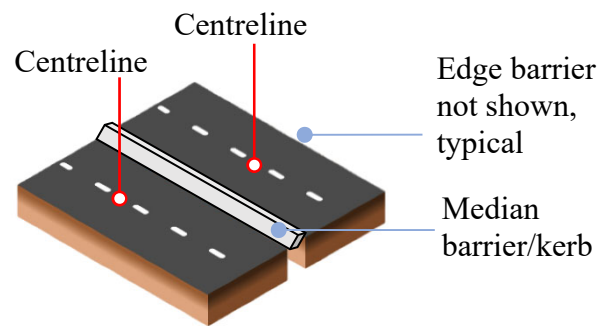
The vehicle travelling as a permit vehicle can be permitted to travel over the requested route as shown in this permit subject to the following:

1. The vehicles travel on all the bridges on the route at a speed not exceeding 10 km/h with no sudden braking or acceleration. No other vehicles are permitted on the bridge while the Permit vehicle is on the bridge
2. The vehicle shall travel only along centreline of the carriageway of all the bridges

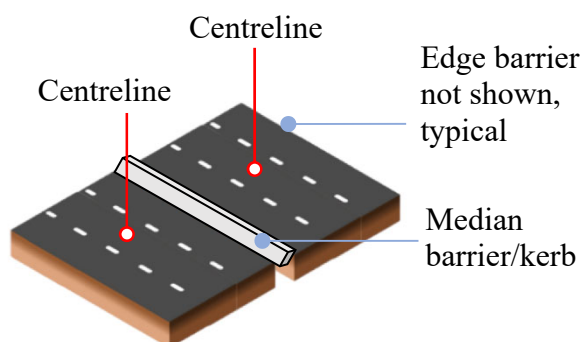
Note: The centreline of the carriageway on the bridge is the centreline of the roadway between the faces of the barriers/kerbs.



Bridge supporting single carriageway with two-way traffic with any line marking in middle – Permit vehicle to travel along centreline of carriageway



Bridge supporting two carriageways with median barrier/kerb as divider between carriageway – Permit vehicle to travel along the centreline of each carriageway



Bridge supporting two carriageways with three lanes each way traffic with median barrier or kerb as divider between carriageway – Permit vehicle to travel along centreline of middle lane / carriageway.

3. The platform's gross loading is to be equally distributed between all axles of the platform
4. Northern Region's concurrence is obtained to the movement of the vehicles over the route
5. Transport firm is required to obtain approval from UGL/ARTC, Sydney Trains (formerly Railway Access Corporation or State Rail Authority), NSW Ports, and Department of Land and Water Conservation or private infrastructure owners for travel over their infrastructure
6. Councils' approval is obtained by the transport firm for travel over the structures on the route maintained by the Councils, and for travel over the local roads
7. The transport firm shall satisfy itself that adequate height clearance is available under the overhead structures on the above route. The firm should refer to Region for further details
8. The transport firm shall satisfy itself that the vehicle width including load can navigate the bridges on the above route. The firm should refer to Region for further details
9. This approval is for the direction of route from Mayfield North to Metz along the route stated above, with travel in both directions, return unladen.

Cost of assessment is \$1,000.00+GST.

Titus Khor
A/ Senior Bridge Engineer
Bridge Assessment and Evaluation
20 December 2024

UGLRL Asset No	Road Name and Suburb	Asset Type	Status	Comments/Restrictions
OBN00577A	Dangar Street Armidale	Overbridge	Conditionally Approved	Conditionally approved. - Maximum speed of 10km/h with no sudden braking or acceleration - Vehicle to ensure load passes above traffic barriers. - Vehicle to enroll in IAP/TMA. - Vehicle to use OBM system or weighbridge. - Vehicle to drive at the centre of the bridge with no other vehicles allowed. Note: To meet above conditions, traffic control and/or police escort would be required.
OBN00336A	New England Highway Murulla	Overbridge	Conditionally Approved	Conditionally approved.

				- Maximum speed of 10km/h with no sudden braking or acceleration - Vehicle to ensure load passes above traffic barriers. - Vehicle to enroll in IAP/TMA. - Vehicle to use OBM system or weighbridge. - Vehicle to drive at the centre of the bridge with no other vehicles allowed. Note: To meet above conditions, traffic control and/or police escort would be required.
OBN00290A	New England Highway Muswellbrook	Overbridge	Conditionally Approved	Conditionally approved. - Maximum speed of 10km/h with no sudden braking or acceleration - Vehicle to ensure load passes above traffic barriers. - Vehicle to enroll in IAP/TMA. - Vehicle to use OBM system or weighbridge. - Vehicle to drive at the centre of 2 lanes with no other vehicles allowed. Note: To meet above conditions, traffic control and/or police escort would be required.
OBN00288A	Bell Street Muswellbrook	Overbridge	Conditionally Approved	Conditionally approved. - Maximum speed of 10km/h with no sudden braking or acceleration - Vehicle to ensure load passes above traffic barriers. - Vehicle to enroll in IAP/TMA. - Vehicle to use OBM system or weighbridge. - Vehicle to drive at the centre of the bridge with no other vehicles allowed. Note: To meet above conditions, traffic control and/or police escort would be required.
OBC33241A	Golden Highway Mount Thorley	Overbridge	Conditionally Approved	Conditionally approved.

				- Maximum speed of 10km/h with no sudden braking or acceleration - Vehicle to ensure load passes above traffic barriers. - Vehicle to enroll in IAP/TMA. - Vehicle to use OBM system or weighbridge. - Vehicle to drive at the centre of the bridge with no other vehicles allowed. Note: To meet above conditions, traffic control and/or police escort would be required.
OBC07170A	Pacific Highway Kooragang Island	Overbridge	Conditionally Approved	Conditionally approved. - Maximum speed of 10km/h with no sudden braking or acceleration - Vehicle to ensure load passes above traffic barriers. - Vehicle to enroll in IAP/TMA. - Vehicle to use OBM system or weighbridge. - Vehicle to drive at the centre of 2 lanes with no other vehicles allowed. Note: To meet above conditions, traffic control and/or police escort would be required.

This recommendation is issued for the load configuration and restrictions on the UGLRL Asset as listed above only.

This recommendation is issued for the period from the Issue Date above, up to and including the Expiry Date above, unless cancelled by UGLRL or surrendered by the Applicant. To allow for consideration and processing of any extension if required, Applicants should allow for a timeframe of one month. An application for extension can be made by contacting UGLRL on heavyvehicle@uglregionallinx.com.au

This recommendation is **not** a permit or notice under the Heavy Vehicle National Law. All Applicants must make their own enquiries and comply with the requirements of the National Heavy Vehicle Regulator and/or road manager, to obtain permits required under the Heavy Vehicle National Law. Further information can be found at the NHVR website at www.nhvr.gov.au.

Meysam Rad
Principal Bridge and Structures Engineer



Ares Project Services PTY LTD

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Melbourne VIC, 3004

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F: +61 3 8560 7020
E: enquiries@aresgroup.com.au
W: www.aresgroup.com.au

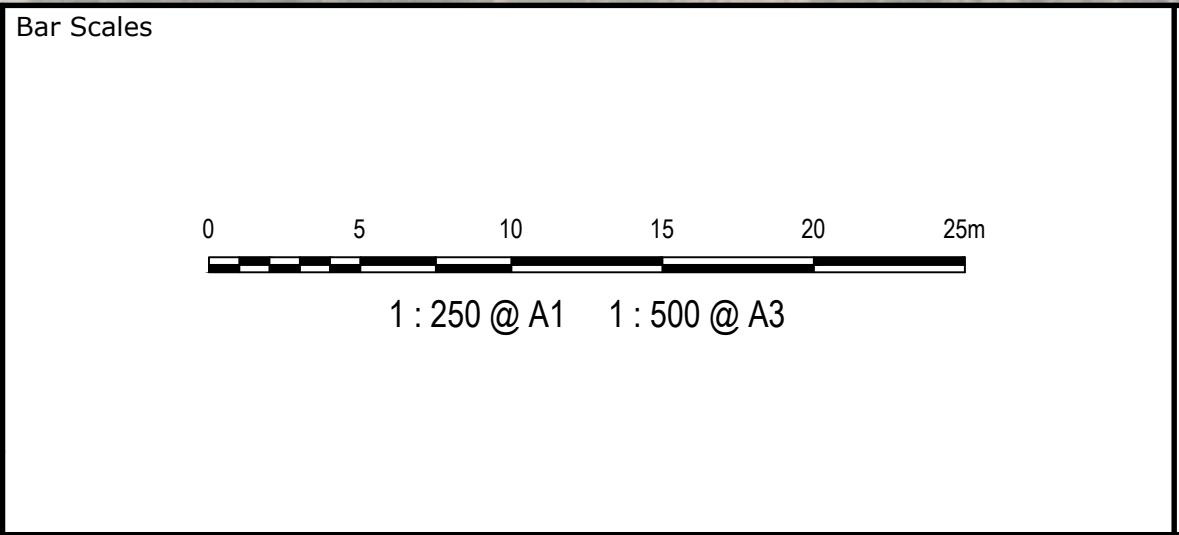


Appendix G

Strategic Designs for OSOM Access



P2	ISSUED FOR COORDINATION	12-11-25
P1	ISSUED FOR COORDINATION	31-10-25
Issue	Description	Date



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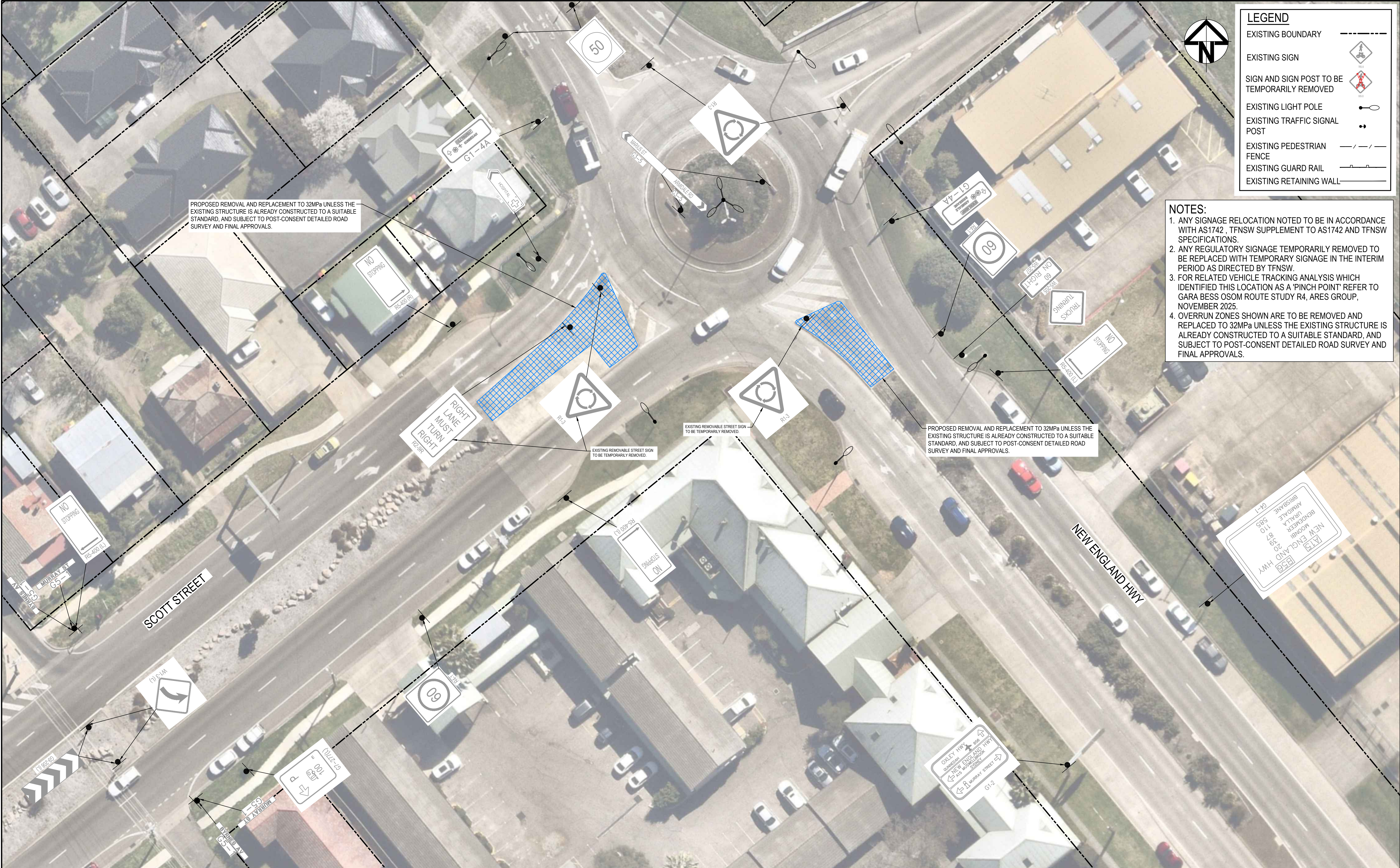


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		Designed	EH
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Height Datum	AHD	Approved	

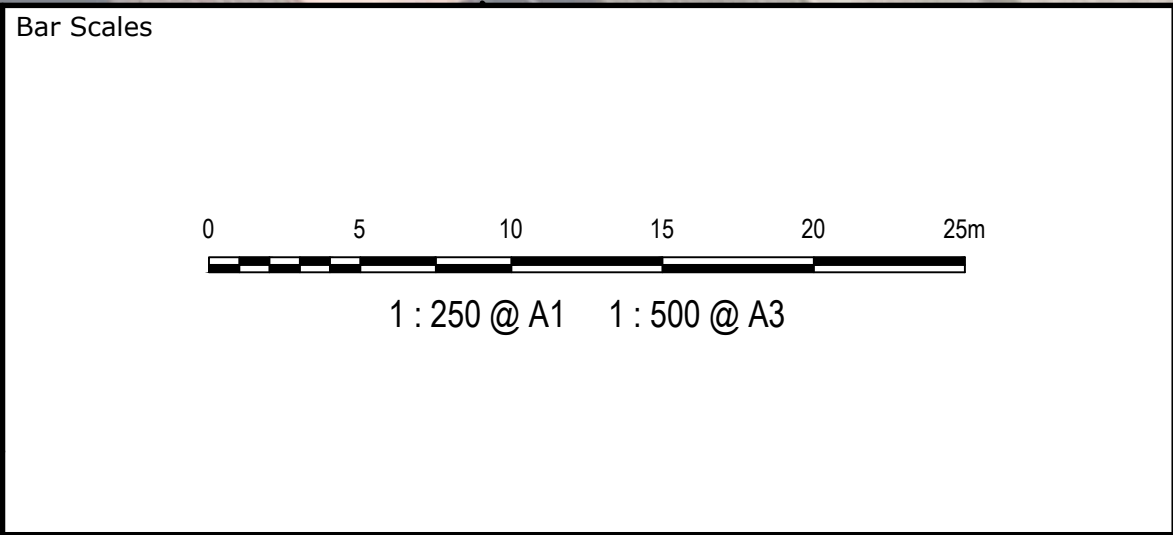
Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	PINCH POINT 05 NEW ENGLAND HWY & BELL STREET MUSWELLBROOK

Civil Engineers and Project Managers	
Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405	
at&l	
Status	FOR INFORMATION
NOT TO BE ISSUED FOR CONSTRUCTION	
Project - Drawing No.	A1
24-1239-SKC07	Issue P2

- NOTES:
1. ANY SIGNAGE RELOCATION NOTED TO BE IN ACCORDANCE WITH AS1742 , TFNSW SUPPLEMENT TO AS1742 AND TFNSW SPECIFICATIONS.
 2. ANY REGULATORY SIGNAGE TEMPORARILY REMOVED TO BE REPLACED WITH TEMPORARY SIGNAGE IN THE INTERIM PERIOD AS DIRECTED BY TFNSW.
 3. FOR RELATED VEHICLE TRACKING ANALYSIS WHICH IDENTIFIED THIS LOCATION AS A 'PINCH POINT' REFER TO GARA BESS OSOM ROUTE STUDY R4, ARES GROUP, NOVEMBER 2025.
 4. OVERRUN ZONES SHOWN ARE TO BE REMOVED AND REPLACED TO 32MPa UNLESS THE EXISTING STRUCTURE IS ALREADY CONSTRUCTED TO A SUITABLE STANDARD, AND SUBJECT TO POST-CONSENT DETAILED ROAD SURVEY AND FINAL APPROVALS.



P2	ISSUED FOR COORDINATION	12-11-25
P1	ISSUED FOR COORDINATION	31-10-25
Issue	Description	Date



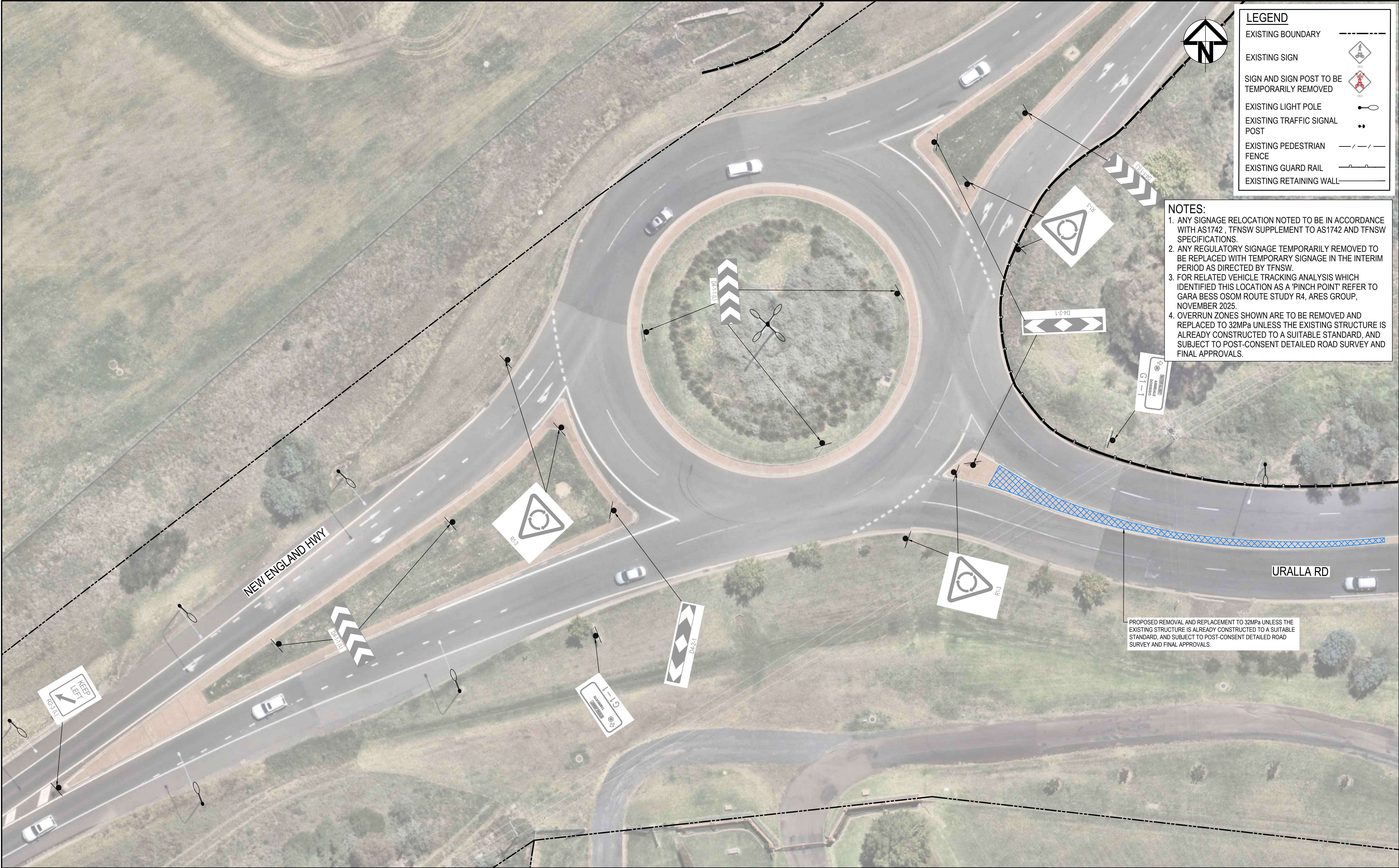
THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L



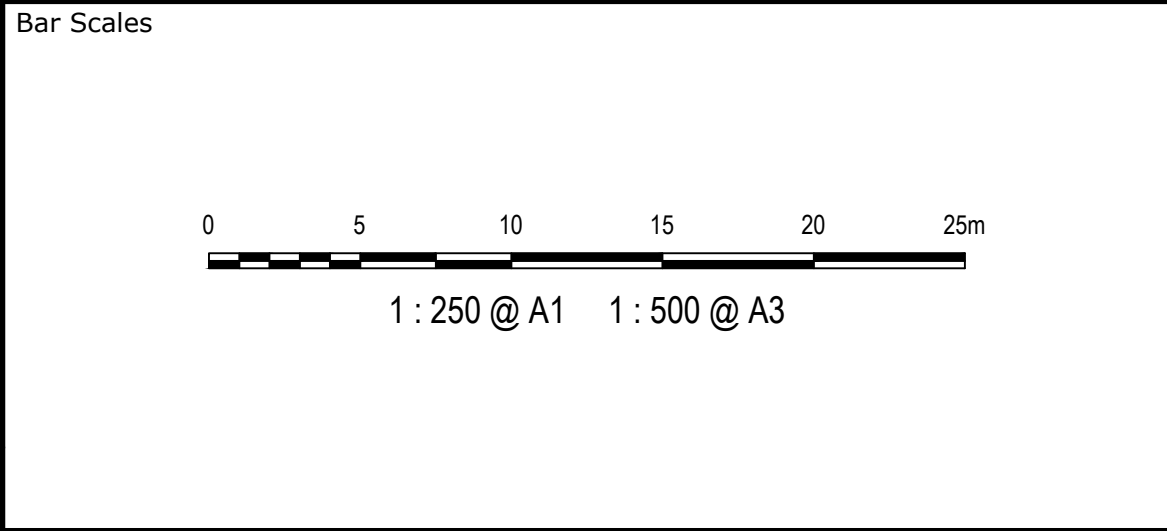
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		Designed	EH
Grid	GDA2020	Checked	
Height Datum	AHD	Approved	

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	PINCH POINT 09 SCOTT STREET & NEW ENGLAND HWY TAMWORTH

Civil Engineers and Project Managers	
Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405	
Status	FOR INFORMATION
NOT TO BE ISSUED FOR CONSTRUCTION	
Project - Drawing No.	A1
24-1239-SK10	Issue P2



P2	ISSUED FOR COORDINATION	12-11-25
P1	ISSUED FOR COORDINATION	31-10-25
Issue	Description	Date



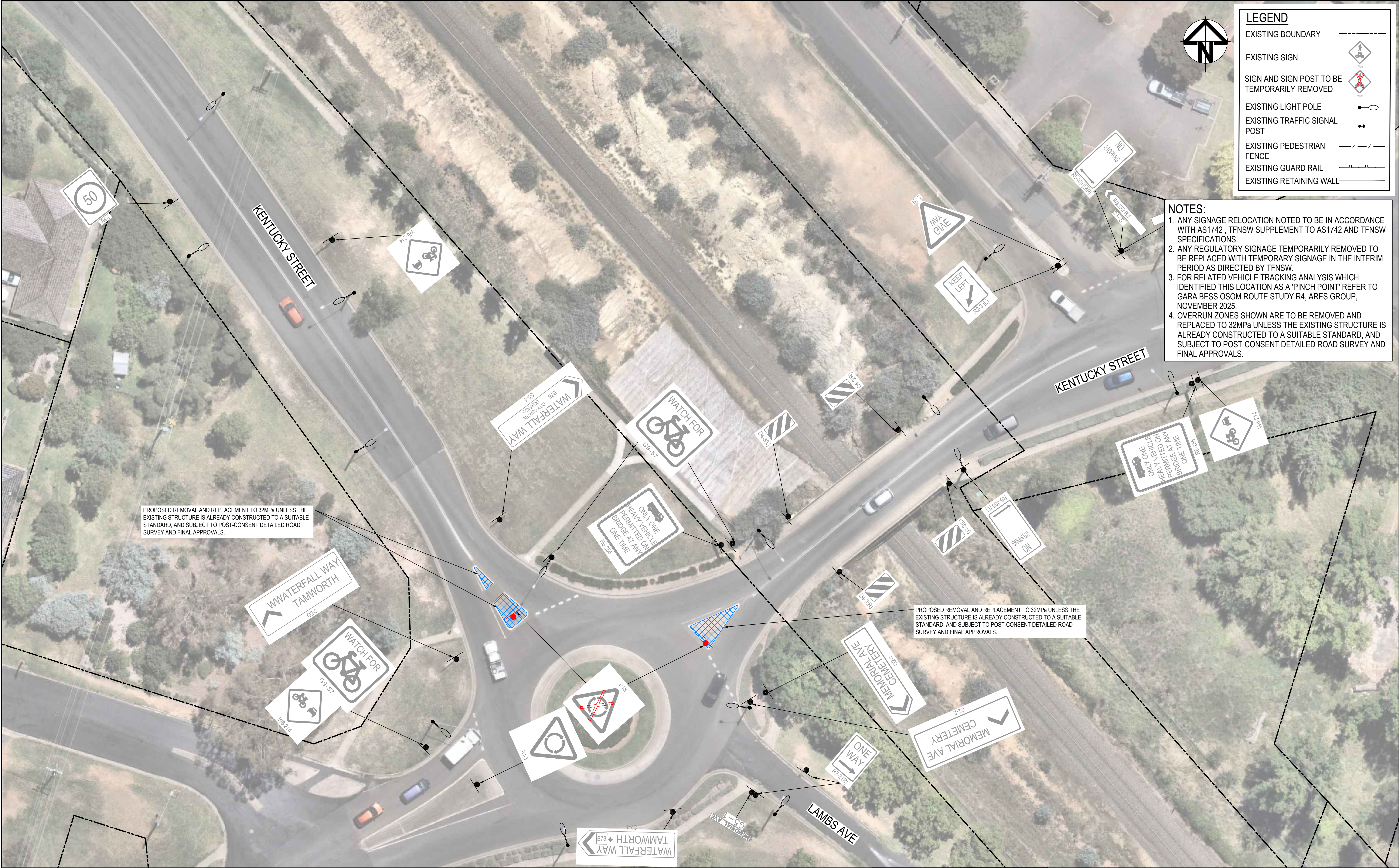
THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L



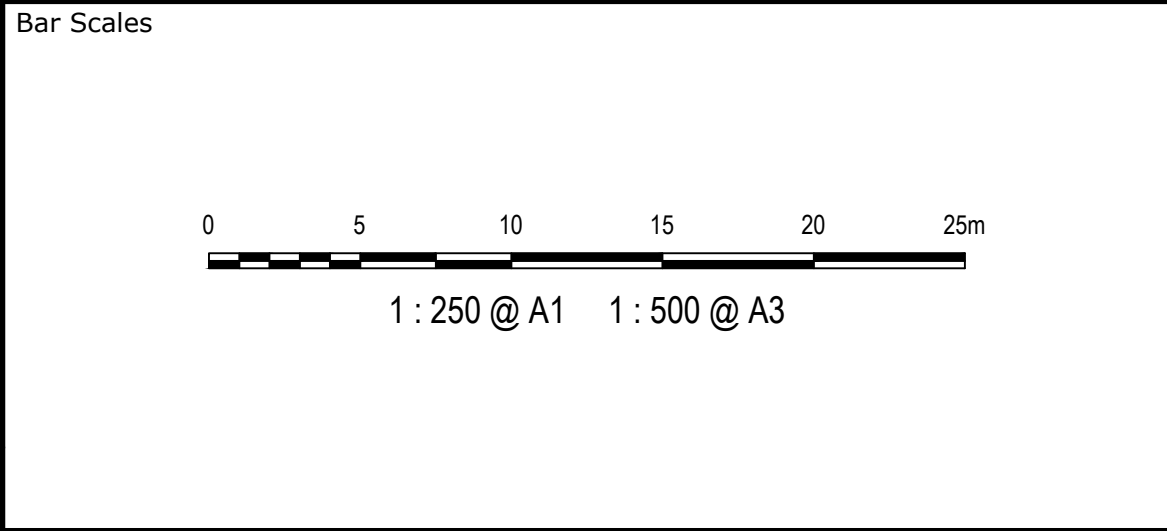
Scales	1:250	Drawn	PT
		Designed	EH
Grid	GDA2020	Checked	
Height Datum	AHD	Approved	

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	PINCH POINT 11 NEW ENGLAND HWY & URALLA RD ARMIDALE

Civil Engineers and Project Managers		
Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405		
at&l		
Status	FOR INFORMATION NOT TO BE ISSUED FOR CONSTRUCTION	A1
Project - Drawing No.	24-1239-SKC11	Issue P2



P2	ISSUED FOR COORDINATION	12-11-25
P1	ISSUED FOR COORDINATION	31-10-25
Issue	Description	Date



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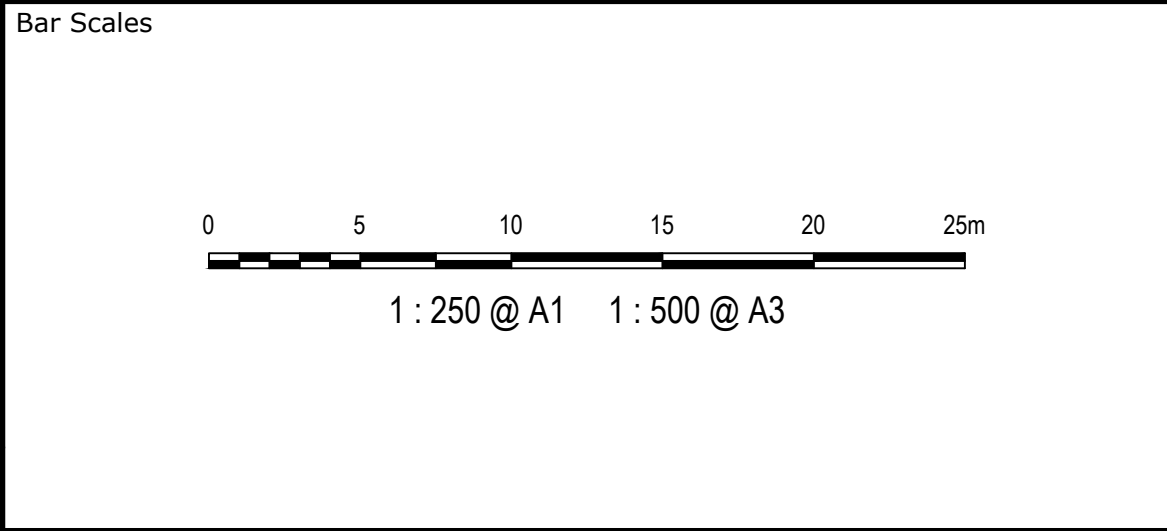
Scales	1:250	Drawn	PT
		Designed	EH
Grid	GDA2020	Checked	
Height Datum	AHD	Approved	

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	PINCH POINT 12 KENTUCKY STREET, ARMIDALE

Civil Engineers and Project Managers	
Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405	
at&l	
Status	FOR INFORMATION
NOT TO BE ISSUED FOR CONSTRUCTION	
Project - Drawing No.	24-1239-SKC12
Issue	P2



P2	ISSUED FOR COORDINATION	12-11-25
P1	ISSUED FOR COORDINATION	31-10-25
Issue	Description	Date



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Scales	1:250	Drawn	PT
Grid	GDA2020	Designed	EH
Height Datum	AHD	Checked	
		Approved	

Project	GARA BESS (ARMIDALE) STRATEGIC INTERSECTION DESIGN
Title	PINCH POINT 13 DANGAR STREET & BARNEY STREET ARMIDALE

Civil Engineers and Project Managers		Level 10, 124 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@atl.net.au www.atl.net.au ABN 96 130 882 405
		
Status	FOR INFORMATION <u>NOT TO BE ISSUED FOR CONSTRUCTION</u>	A1
Project - Drawing No. 24-1239-SKC13		Issue P2

Appendix H

TfNSW Response to EIS

The table below summarises updates to this report to address TfNSW's requests for additional information regarding the assessment of pre-construction and peak construction impacts.

Response to TfNSW Information Requests Regarding Pre-Construction and Peak Construction

Additional Information Requested	Section Addressed
Pre-Construction minor works	
1. A complete assessment of BESS pre-construction minor works is required which includes:	
a) Assessment of traffic volumes and identify the types of vehicles that will be used during this period, including the largest design vehicle.	2.7
b) Perform a swept path analysis for the largest heavy vehicle at the existing intersection, ensuring it can navigate within the existing pavement. If the design vehicle cannot turn easily, implement necessary mitigation or temporary works.	4.7.3 Appendix E
c) Assess existing Safe Intersection Sight Distance (SISD) and propose measures to achieve compliance.	4.7.2 Appendix D
d) Identify AM/PM peak hour traffic volumes and proposed volumes during this time. The traffic volumes during the AM/PM peak hours are to be comparable to the existing land use.	4.1.3
e) Identify measures to minimise project-related traffic during peak periods, like carpooling or shuttle buses.	4.1.1
f) Outline methods to monitor and enforce traffic volumes during peak hours and other proposed mitigation measures.	4.14
g) Provide a timeline and schedule for pre-construction minor works.	2.4.1
h) Describe how to inform the community and stakeholders about increased traffic.	4.14
i) Specify the hours for pre-construction minor works.	2.5
j) Assess traffic associated with any temporary workforce accommodations during the pre-construction minor works period.	4.1.1
k) Identify any necessary temporary widening or works for the design vehicle.	4.7.3 Appendix E
Note: Temporary traffic controls are not allowed at intersection undergoing pre-construction minor works unless otherwise agreed with TfNSW.	Noted
Traffic Analysis Peak of Construction	
2. The application proposes primary site access via Waterfall Way. To ensure compliance with forecast traffic demands, it is recommended that appropriate caps and vehicle restrictions be imposed as conditions of approval to support the suitability of the BAL/BAR treatment. Should traffic volumes exceed these thresholds, a higher-grade intersection treatment (AUL) and/or other mitigation measures including the relocation of the site access point may be required to be considered.	Noted and agreed by ACenergy

Items pertaining to the Strategic Concept Design Amendments for the Project access intersection with Waterfall Way have been addressed by others, and the table below summarises updates to the plans to address TfNSW's requests for amendments. Appendix C of this report presents the updated plans.

Response to TfNSW Information Requests Regarding Strategic Concept Design Plans

Additional Information Requested	Comment
Strategic Concept Design Amendments	
3. <i>The strategic concept designs prepared for the project access intersection with Waterfall Way require the following amendments:</i>	
a) <i>Minimal line-marking and delineation has been shown. Insufficient information has been provided to assess proposed widening works, crossfall etc. Documentation is to be revised with the required delineation details as per TfNSW technical standards.</i>	Refer to Appendix C of this report. Drawing C102 has been prepared which provides a greater level of detail for line-marking and delineation including audio tactile linemarking and guide posts. References to TfNSW delineation manual have been provided.
b) <i>Proponent is to clarify if the Audio Tactile Line Marking (ATLM) will be reinstated.</i>	Refer to Appendix C of this report. Drawing C102 labels where audio tactile line marking is to be reinstated. On the eastern side, within the extent of works, it is proposed to not reinstate the audio tactile line marking as the checking vehicle turn paths would consistently drive over it.
c) <i>The typical cross section requires the following updates:</i> i. <i>Plan demonstrates V drains, Table drains are required.</i> ii. <i>Batter slopes need to be Austroads compliant.</i> iii. <i>All drainage structure information is to be provided including drainage lines. Insufficient information is provided to assess vertical alignment and drainage guidelines.</i>	Refer to Appendix C of this report. Typical cross section drawings C901 and C902 and other affected drawings have been updated to provide only table drains and no V drains; batter slopes within the clear zone to be max 6:1 in fill and 4:1 in cut. No drainage infrastructure is proposed to manage stormwater; proposed drainage swales will capture all stormwater generated and tie-in to the existing table drains provided on both sides of Waterfall Way. A stormwater plan (Drawing C401) and drains longsections (Drawing C411) have been prepared to show the intersection stormwater management.
d) <i>A Sight Distance Safety Plan is to be submitted for formal review and consideration. The plan should clearly demonstrate that adequate sight distances are provided in accordance with relevant design standards (Austroads Guide to Road Design Part 4A). It must identify any existing constraints – such as vegetation, roadside structures, or topographical features – that may impede visibility and outline proposed mitigation measures where necessary. This may include vegetation management, signage improvements or geometric adjustments to ensure safe turning movements and compliance with minimum sight distance requirements for all vehicle types.</i>	Refer to Appendix D of this report. A sight distance plan of S1SD is provided as Drawing C801 and for MGSD as Drawing C802. The drawings show achievement of sight distance with the vegetation removal measures detailed for the posted speed of 100 km/h. S1SD for design speed 110 km/h is not achievable due to the presence of existing trees within a privately owned land parcel. Speed surveys have identified the 85th percentile speed of eastbound traffic is less than 100 km/h approaching the intersection location (Section 3.5). To mitigate the limited sight distance south of the site the following measures have been implemented: i. The site access road has been realigned to intersect with Waterfall Way at 90 degrees. ii. 'Stop' control has been provided for vehicles turning onto Waterfall Way (Drawing C102). iii. To maximise visibility from the stop hold line, the hold line has been brought as close to Waterfall Way as allowable. The central painted median has been expanded to accommodate this while allowing for the applicable vehicle turn paths. iv. An advance warning W2-4L sign has been provided south of the intersection (Drawing C102)

Additional Information Requested	Comment
e) Submitted documentation appears to identify a potential issue for vehicles heading eastbound sighting a vehicle stopped at the minor road, may also be reduced due to the hold line set back. Proponent to confirm compliant SISD and supplement with an approach sight distance check.	Hold line setback has been minimised as detailed in 3(d) above.
f) The proponent is to provide clarity on the cadastre and confirm if land acquisition is required.	Land acquisition is not required to accommodate the extent of the intersection works.
g) All required signage, including stop signage is to be demonstrated on the plans.	In addition to line-marking and delineation, Drawing C102 (Refer to Appendix C of this report) provides all signage proposed.

Items pertaining to the OSOM route assessment have been addressed by others, and the TfNSW comments and amendments made in response are summarised below. The updated OSOM Route Study is included as Appendix F to this report.

Response to TfNSW Information Requests Regarding OSOM Vehicles

Additional Information Requested	Comment
The high-risk OSOM route assessment scope and mitigation measures	
4. Consistency Check	
h) A consistency check is to be submitted for the section of the route along EnergyCo's Port to Central West Orana REZ works and the Port to New England REZ works. For the Port to New England REZ works, EnergyCo is currently developing its Port to REZ strategy, including potential haulage routes for OSOM movements (construction and operational), funding and delivery arrangements. Until this strategy is complete, the timing and final nature of road upgrades along the New England REZ route is uncertain. TfNSW recommends, based on the above, that the proponent determine a contingency for the route and secure all relevant approvals.	The route follows the existing heavy vehicle routes out of Newcastle and through Muswellbrook/Tamworth. As no information is currently available for the New England Orana REZ route, it has not been considered in the OSOM Route Study (Appendix F of this report).
i) NHVR Route ID has not been provided. This is required to ensure a complete assessment of route considerations has been provided. See advisory note.	Route ID 1U9X0-5 v2 - refer to page 15 of the updated OSOM Route Study (Appendix F of this report).
j) Bridge and culvert assessments are required for the route. See advisory note.	Completed – refer to TfNSW report PT2885A and UGLRL report HVA-24-1348. These have been referenced on page 16 of the updated OSOM Route Study (Appendix F of this report).
k) The updated information will need to clarify how long traffic will be stopped (TfNSW notes traffic cannot be stopped for more than 10 minutes) at each complex pinch point that is required to be negotiated on the state road network.	Timing has been added to each pinch point page of updated OSOM Route Study report (Appendix F of this report).

Additional Information Requested	Comment
l) <i>The route study demonstrates that TfNSW assets will be traversed by the high-risk OSOM. The impacted infrastructure will be required to be identified and strategic concept designs provided for any works required. The proponent can consider changing the vehicle configuration, changing the route or to modify / temporarily remove the infrastructure. Examples of road upgrades or modifications to this type of infrastructure include pavement strengthening, removal or partial removal of the infrastructure, or removal and replacement with a suitable alternative that complies with Austroads and TfNSW requirements.)</i>	TfNSW identified that pinch points 5, 8, 9, 11, 12, and 13 would require modifications. Advice was received via email from TfNSW (Alexandra Long) dated 4 November 2025. These are all noted in the updated OSOM Route Study report and summarised on page 51 of the OSOM Route Study. Strategic designs have been completed and are included as Appendix G of this report.
m) <i>Any other TfNSW projects along the route should be noted and identified in the route study.</i>	Refer to page 17 of the OSOM Route Study (Appendix F of this report).
n) <i>TfNSW is seeking to modify the intersection of New England Highway and Scott Road at South Tamworth by replacing the current roundabout with Traffic signals. As such, the layout and affects (sic) on the proposed turn path will be impacted. Intersection is to be reviewed.</i>	The OSOM Route Study (Appendix F of this report) is based on the existing conditions of the intersection of New England Highway and Scott Road at South Tamworth. TfNSW advised the concept design of the intersection upgrade will become available by May 2026, however, intersection upgrade timeline is yet to be advised. ACEnergy has made contact with the project team. Given the lack of information to enable further assessment, ACEnergy commits to ongoing communication with the intersection upgrade project team, particularly prior to transport permit applications. Traffic efficiency and cumulative impacts will be assessed as required should an overlap occur between the New England Highway/Scotts Road intersection upgrade and Gara BESS OSOM deliveries, subject to the availability of intersection upgrade design and project information.
o) <i>Works by the Rankin Park to Jesmond project have finalised the layout at Jesmond. The proposed route is to be reviewed and the impacted intersection is to be verified as being suitable.</i>	Refer to Pinch Point 03 of updated OSOM Route Study (Appendix F of this report) which includes latest aerial imagery of the Jesmond interchange.
p) <i>The pull-over bays and rest areas have been identified with swept paths. Plans to be updated to identify and demonstrate full dimensions.</i>	Refer to pages 46-47 of updated OSOM Route Study (Appendix F of this report).
q) <i>Rail requirements and crossing are to be considered. See advisory notes.</i>	These will be part of the standard Class 1 OSOM permit application process. Rail crossings are mentioned on page 16 of OSOM Route Study (Appendix F of this report).
r) <i>The proposal does not identify if there are any concerns/issues at the new roundabout near Armidale Airport. Plans to be reviewed and updated.</i>	Refer to new Pinch Point 10 in updated OSOM Route Study (Appendix F of this report).

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