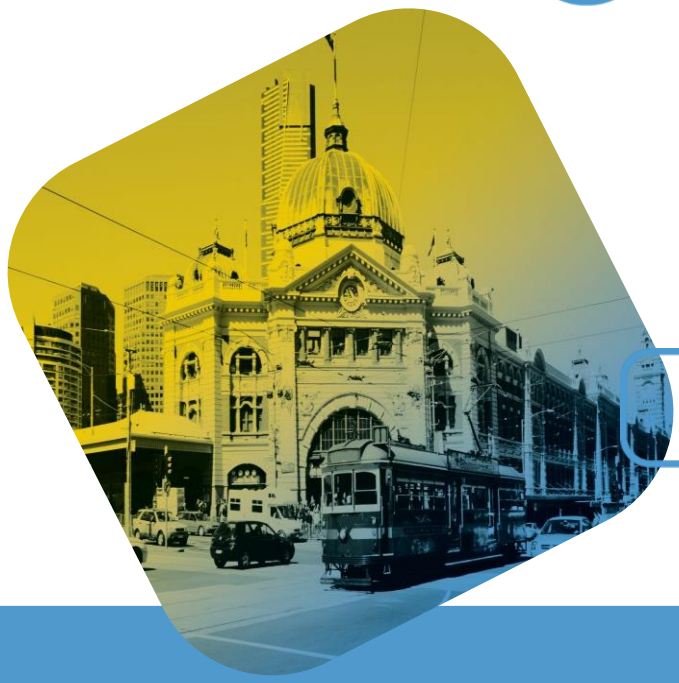
38°10'50.1"S
142°11'13.6"E

Tarrone Battery Energy Storage System (BESS): Tarrone, VIC



Traffic Impact Assessment

26 June 2024
Prepared for Umwelt

IMP2302021TIA01F01

Impact

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Contents

Tables

Figures

1 IMPACT® Snap Shot

Development Proposition

Location	38°10'50.1"S 142°11'13.6"E	Tarrone North Road & Riordans Road, Tarrone, VIC
Use	Battery Energy Storage System (BESS) - 200 MW / 400 MWh Capacity	
Access	Access to the site is afforded from the following locations: — Tarrone North Road for all construction and staff movements; and — Riordans Road for emergency access only.	
Car Parking	A detailed car park design has yet to be determined, however it is assumed that: — During construction, vehicles will be parked either at designated laydown areas, storage locations, or where construction activities are occurring. — During operations, operational and maintenance staff vehicles will be accommodated on-site within a vehicle parking area located adjacent to the site office.	

Statutory Controls

Access	
Access Design	Swept path analyses show that each Site Access will be able to cater for 26 metre B-double vehicles into and out of the site. An assessment of the ability of OSOM vehicles to access the site will need to be undertaken as part of the NHVR application process to confirm if any temporary traffic management measures will be required for the haulage of any over sized deliveries. With the recent TTS Expansion (which requires OSOM vehicle movements), it can be reasonable assumed that these vehicles can reach the local area.
Sight Distances	An on-site desktop assessment of sight distances along Tarrone Road North and Riordans Road has been undertaken and revealed that the proposed eastern Site Access point, facing southbound has a restricted sight line of approximately 250m. The intersection of Tarrone North Road and Riordans Road also has restrictive sightlines when facing the northbound direction of up to 120m visibility. In addition, the southern Site Access location along Riordans Road sight lines are restricted to approximately 150m when facing the eastbound direction. As advised by Council, areas where the vertical geometry impedes on sight lines, slow-points / warning signs are recommended to be provided. Notwithstanding, it is recommended that sightlines be confirmed on-site as part of the permit conditions / approval process.
Turn Warrants	If the intersection of Tarrone North Road / Site Access and Riordans Road / Site Access was a new intersection, with the proposed construction volumes, it would trigger a requirement for both a BAL and BAR to be provided. Notwithstanding, in discussions with the Moyne Shire Council, it is recommended that the pavement width be upgraded along the Tarrone North Road section from the existing TTS Extension to the proposed Site Access and Riordans Roads leading

	up the proposed Site Access. This upgrade will allow for vehicles to pass simultaneously and increase capacity.
Traffic Impact	
Construction Traffic	A total of 81 daily (two-way) movements are anticipated during the peak construction period. A total of 8 two-way movements for over-dimension vehicles (for the delivery of the BESS components) is expected during the entire construction phase (expected to occur during Stage 2). Alternatively, staff could be bussed to and from the site to reduce the number of light vehicle movements. It is noted that the anticipated construction traffic can be comfortably accommodated temporarily by Tarrone North Road and Riordans Road without any material impact on the operation or safety of this road.
Operational Traffic	As estimated by Umwelt the site will have up to four (4) daily vehicle movements associated with routine maintenance during operations. There will also be, on occasion some additional movements associated with more thorough maintenance. This level of traffic will be negligible and have no discernible impact on the operation of the surrounding road network.
Haulage Routes	Delivery and haulage routes along Tarrone North Road and Riordans Road are not pre-approved for the haulage of HML and B-doubles and will require a permit from Council (and NHVR). Construction Deliveries (26m B-doubles) Swept paths show that the proposed haulage vehicles are comfortably able to travel to/from the subject site and along the anticipated haulage route. Oversized and Overmass Deliveries It is to be noted that this current assessment takes into consideration vehicle sizes of up to 26m in length (B-doubles) and does not cater for the assessment of OSOM vehicle deliveries. Ultimately, this assessment will need to be undertaken as part of the NHVR application process to confirm if any temporary traffic management measures will be required. General Maintenance During Construction We expect the road pavement will be able to sufficiently cater to the vehicle traffic however likely have an impact on the road conditions during the construction stages. Accordingly, it is recommended that the applicant liaise with Council/DTP in respect to maintenance and repair work along the relevant sections of these roads during the construction period. Pavement Upgrades In response to Council's comments, we suggest that Tarrone North Road (between TTS access and Riordans Road) be upgraded to a similar standard to the previously upgraded road sections north of the TTS access. Council also suggested that they would require Riordans Road to be upgraded if this was to be used for access to/from the site. At a minimum, we suggest that this road be provided to an 'all weather' standard, with passing areas provided every 200m (or at a selected nominal distance).
Construction Timing	From discussions with Council, it is preferred that the project be scheduled to start once the existing Tarrone Terminal Station (TTS) Extension has been completed. The completion date for the TTS is expected to be late 2023 / early 2024.

	We understand that the proposed Tarrone BESS is expected to begin late Q2 / early Q3 in 2024 which will be outside of the TTS Extension project.
Traffic Management Plan	It is recommended that a detailed Traffic Management Plan (TMP) be prepared once the project design is complete and prior to commencement of the project construction to confirm the requirements, particularly for sight distances and for mitigation / management works.

Conclusion

— There are no traffic and transport grounds that should prohibit the issue of a permit

2 Introduction

2.1 Engagement

IMPACT® have been engaged by Umwelt on behalf of GPG Australia Pty Ltd to undertake an assessment of the traffic implications of the proposed Tarrone Battery Storage System (BESS) located in Tarrone, Victoria.

This Traffic Impact Assessment has been prepared to accompany a Planning Permit Application (PPA).

3 Tarrone BESS

3.1 Location

The proposed Tarrone Battery Energy Storage System (BESS) development is located north of Riordans Road and is located approximately 45 km north-west of Warrnambool Township as illustrated in Figure 1.

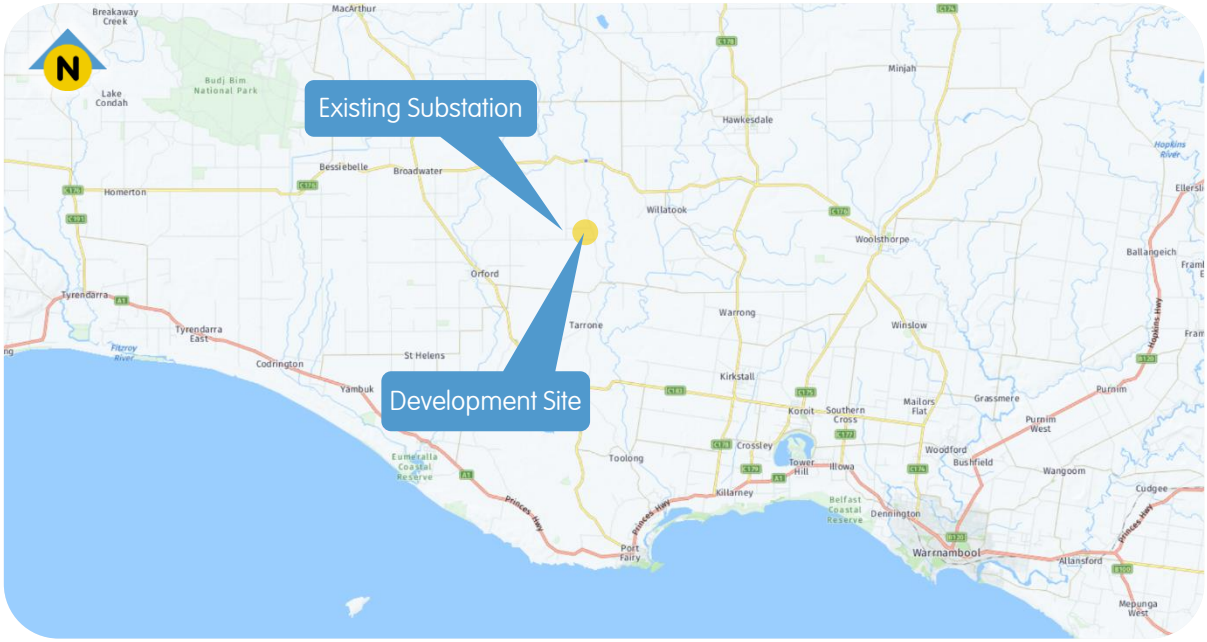


Figure 1 Location of Development Site

The project will store a maximum capacity of 200MW / 400MWh BESS and specifically will include a new 132kV bay to connect the proposed BESS to the grid.

3.2 Site Context

The subject land is comprised mainly of flat-lying open paddocks, which have historically been used for cropping and grazing activities.

The Tarrone Substation is currently located directly west of the development and is expected to provide a direct electrical connection for the proposed BESS facility.

3.3 Existing Road Network

3.3.1 Woolsthorpe-Heywood Road

Classified as an Arterial Road (managed by the Department of Transport and Planning (DTP)), Woolsthorpe-Heywood Road is aligned in an east-west direction and extends between the Woolsthorpe Township to the east before terminating at Tyrendarra-Ettick Road to the west.

In the vicinity of the site, Woolsthorpe-Heywood Road has been constructed with a sealed road pavement measuring approximately 6.0 metres, plus unsealed gravel shoulders allowing for one (1) of traffic in each direction.

A posted speed limit of 100km/hr applies to this section of road.

Traffic data indicates that this section of Woolsthorpe-Heywood Road carries up to 800 daily movements or 80 movements during the peak periods.

3.3.2 Tarrone North Road

Classified as a rural living access road (managed by Moyne Shire Council), Tarrone North Road is aligned in an north-south direction and extends between Woolsthorpe-Heywood Road to the north before terminating at Tarrone Lane to the south.

As part of the Tarrone Terminal Station (TTS) Extension project, Tarrone North Road between Woolsthorpe-Heywood Road and the existing TTS Site Access has been upgraded with a sealed pavement measuring approximately 7.0 metres wide allowing for one (1) lane of traffic in each direction. Its typical cross-section is shown in Figure 2.

Figure 2 Tarrone North Road facing South

The remaining section of Tarrone North Road from the existing TTS Extension Site Access to the intersection of Riordans Road currently consists of a single width pavement measuring approximately 4.0m with unsealed shoulders measuring 1.0-1.5 metres. Its typical cross-section is shown in Figure 3.

Figure 3 Tarrone North Road facing South towards Riordans Road

A default speed limit of 100km/hr applies to this section of road.

Data provided by Moyne Shire Council indicates that Tarrone North Road carries up to 54 daily movements on a typical day or up to six (6) peak hour movements, prior to construction of the TTS Extension.

3.3.3 Riordans Road

Riordans Road is classified as a rural access road (managed by Moyne Shire Council) and is aligned in an east-west direction and extends between Tarrone North Road to the east and Hamilton-Port Fairy Road to the west.

In the vicinity of the site, Riordans Road has been constructed with a gravel pavement in the order of 4.0 metres allowing for a single lane of traffic.

Its typical cross-section is shown in Figure 4.

Figure 4 Riordans Road facing East

A default speed limit of 100km/hr applies to this section of road.

No traffic data is available for Riordans Road and is conservatively assumed to carry 50 daily movements or five (5) peak hour movements.

3.3.4 Existing Crash Statistics

A review of the reported casualty accident history for the roads and intersections for the last five (5) years from 2014 to 2019, in the vicinity of the subject site has been sourced from the Department of Planning & Transport (DTP) Crash Database is depicted in Figure 5.

Figure 5 Crash Statistics in the Vicinity of the Subject Site (Source: DTP Crash & Casualty Statistics)

The data revealed that a total of four (4) crashes along Woolsthorpe-Heywood Road including, a fatality, serious and other injury types).

It is noted that the fatality involved was a result of a fallen tree due to adverse wind conditions and was not due to insufficient / substandard road alignment / infrastructure.

No crashes were recorded in the vicinity of the subject site, particularly along Tarrone North Road and Riordans Road and is therefore expected that the increase in traffic will not have any increased risks or impact to the road network.

3.3.5 Tarrone Terminal Substation Extension

The Tarrone Terminal Substation (TTS) Extension is situated west of Tarrone North Road, immediately north/west of the proposed BESS site and extends eastwards from the current 500 kV transmission substation. This extension is planned to link with the proposed Ryan Corner Wind Farm (RCWF) and Hawkesdale Wind Farm (HDWF) projects.

In 2022, a Traffic Management Plan (TMP) for the proposed TTS Extension was developed by AECOM which provides a plan on how traffic impacts are mitigated and assessed throughout the project construction lifecycle. This report also documents existing traffic conditions, anticipated construction traffic and proposed detour route for the transport of haulage components and the expected route for construction personnel as a result of Council / DTP liaison.

The report also documented that no road or intersection upgrades were recommended and will be subject to a transport operated conducted route assessment which is a requirement of the formal NHVR permitting process.

This TMP has undergone consultation with the respective authorities and was endorsed and approved by the Minister for Planning on 7 July 2022. Further, we understand that this project began construction in September 2022 and is expected to take approximately 16 months to complete / by late 2023, early 2024.

A snippet of the project footprint is shown in Figure 6.

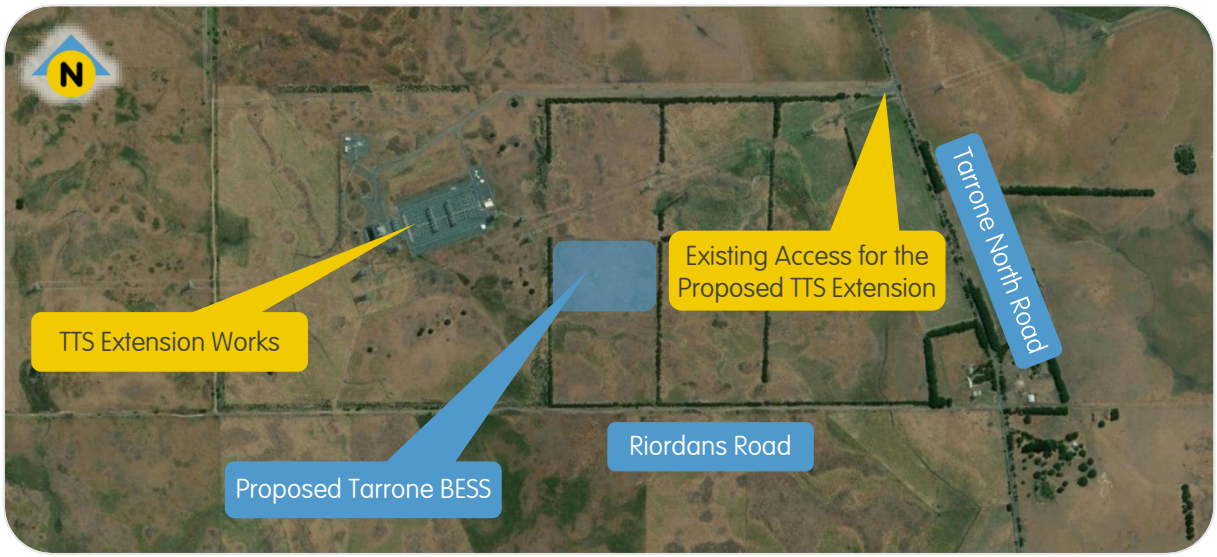


Figure 6 Proposed TTS Extension Site Plan (Source: AECOM)

3.4 DTP Road Network Limits

The DTP General Mass Limits (GML) and Concessional Mass Limits (CML) network in the locality of the development site is reproduced as Figure 7.

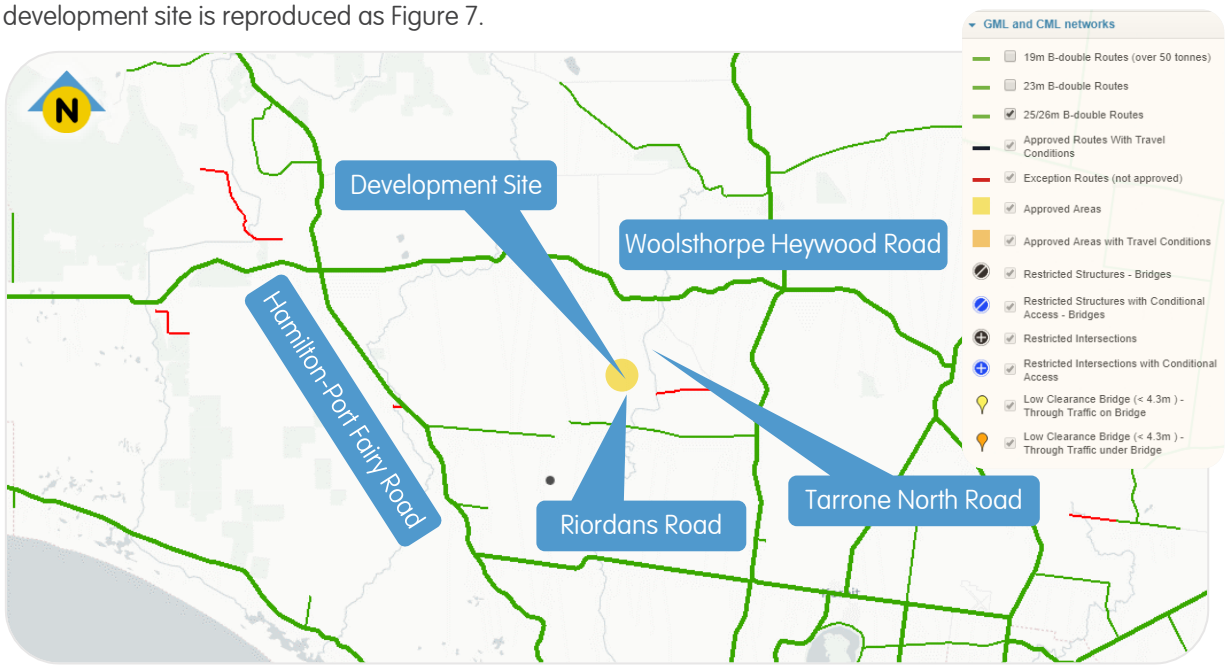


Figure 7 DTP Pre-approved B-Double & Higher Mass Limit (HML) Network

The DTP network plans confirm that the major route to the site (via Hamilton-Port Fairy Road) is pre-approved for HML and B-double vehicles. Accordingly, Tarrone North Road and Riordans Road which provides direct access to the site is not approved for access and will require an application to the satisfaction of Council.

3.5 Tarrone - Battery Energy Storage System (BESS)

IMPACT® have been advised that the project will consist of the installation of a BESS facility with a capacity to store up to 200 MW / 400 MWh of renewable energy with a total project lifespan of 30 years.

It is expected that an underground cable will be installed to connect the power transformers to the connection point east of the Tarrone Terminal Station

As shown in Figure 8 overleaf, the site encompasses the BESS facility located north of Riordans Road and is provided for by two (2) main access points, via the southern and eastern access roads.

An existing transmission line spans through the site spanning in a north-east/south-west direction and provides for a direct connect to the existing Substation.

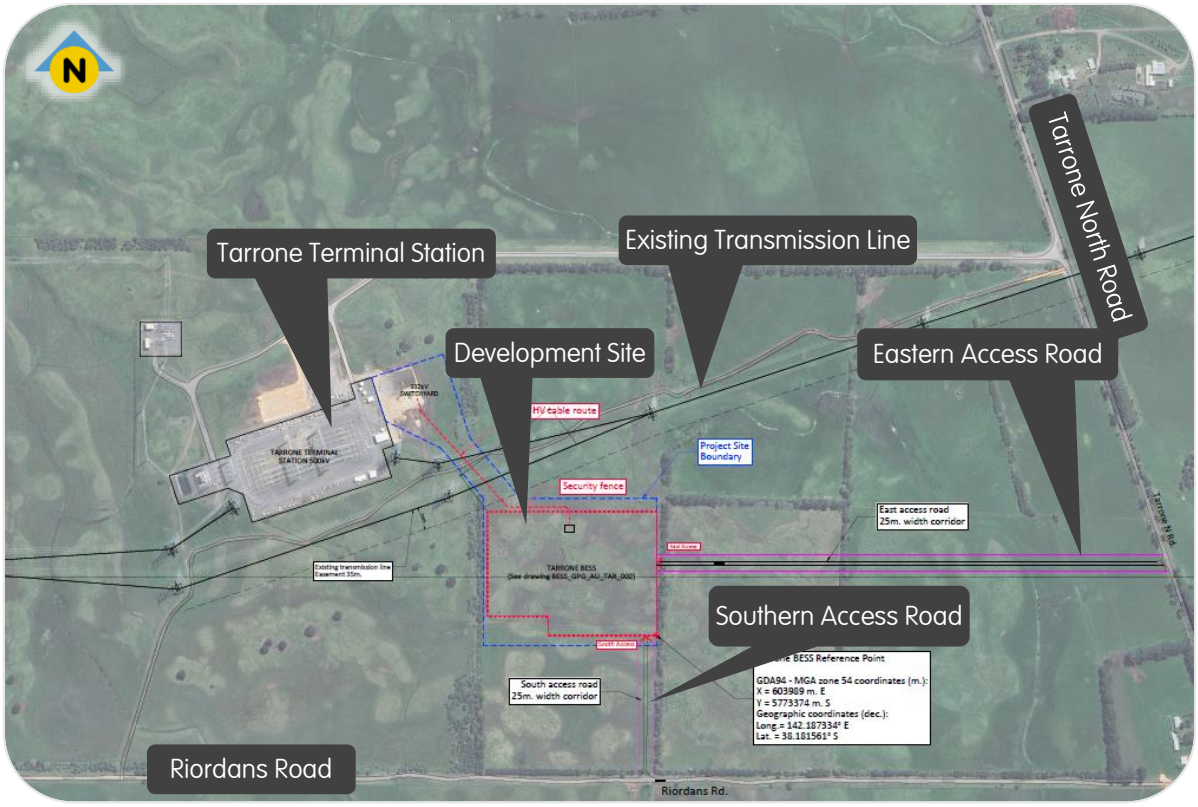


Figure 8 Proposed Tarrone BESS Facility - Site Plan

3.6 Authority Liaison

IMPACT® engaged Council (Moyne Shire Council) and Department of Transport and Planning (DTP) to understand if they had any specific requirements relating to the proposed BESS development. The feedback from the authorities is as follows:

- If access is provided via Riordans Road then road widening and pavement upgrades will be required for this road between Tarrone North Road and the Site Access;
- Additionally, the section of Tarrone North Road between the existing Site Access point for the TTS and Riordans Road will also need to be upgraded;
- Council confirmed that Tarrone North Road will need to be upgraded to a similar standard to that of the northern section between the existing TTS Site Access and Woolsthorpe-Heywood Road;
- Council's preference is to stagger the proposed development and wait until the TTS Extension has been completed; and
- Understanding the cumulative impacts of the proposed BESS and the on-going TTS Extension project, specifically how traffic will be managed if both projects coincide.

Notwithstanding the above, the information provided by Council will be leveraged to inform recommendations in the subsequent sections of the report.

4 Vehicle Access

4.1 Access Routes

IMPACT® have been advised that the project team will leverage the previously approved construction route adopted for the TTS Extension Project.

4.1.1 Coarse Aggregate and Fine Crushed Gravel

Coarse and fine gravel for the construction of hardstand areas and access tracks will be sourced locally from the Holcim Australia - Warrnambool Quarry located south-east of the subject site along Tarrone Lane.

4.1.2 Concrete Deliveries

We are advised that concrete deliveries will be sourced from Hanson's Warrnambool concrete facility.

4.1.3 Water Deliveries

We are advised that external water deliveries required for construction and dust suppression will be sourced from Lake Street, Koroit and access to the site from either Tarrone North Road and/or Riordans Road.

4.1.4 Battery Energy Storage System (BESS) Deliveries

4.1.4.1 Primary Access Routes

It is anticipated that deliveries of BESS components to the subject site will arrive from Geelong.

These routes are presented as follows and diagrammatically in Figure 9.

Haulage from Geelong

Geelong Port - Corio Quay Road (C115) - Melbourne Road / Princes Highway (A10) - Aberdeen Street (B140) - Hamilton Highway - Geelong Ring Road / Princes Highway (M1) - Cobden-Stonyford Road (C149) - Neylon Street / Cobden-Port Campbell Road (C164) - Cobden-Warrnambool Road (C167) - Princes Highway (A1) - Raglan Parade - Caramut Road (C174) - Mailors Flat Kororit Road (C183) - Penshurts-Warrnambool Road (C178) - Woolsthorpe-Heywood Road - Tarrone North Road - Subject Site.

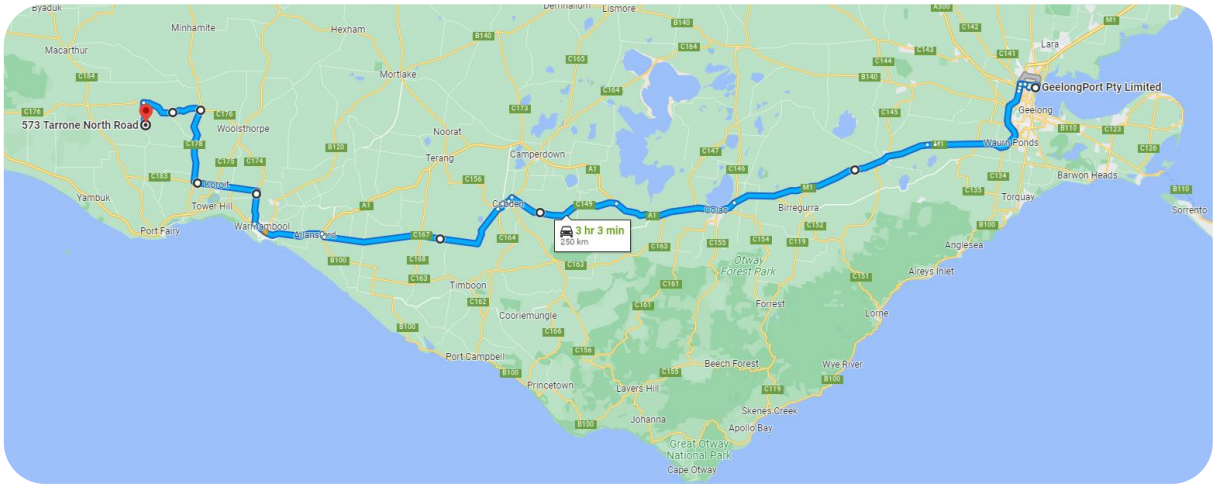


Figure 9 **Proposed Traffic Route from Geelong Port**

4.1.5 Construction Staff

During the delivery of the project, it is expected that staff will reside locally in either Port Fairy or Warrnambool.

IMPACT® are advised that a majority of staff are to travel to site via their individual vehicles. However, to reduce the overall traffic movements, buses should be considered for the transportation of staff to and from site.

4.2 Site Access

4.2.1 Access Corridor

The main access corridor to the site will be from Tarrone North Road and a private road located on the eastern boundary. The intention of this site access is to accommodate all staff and vehicle movements during the construction and maintenance stages.

Swept path analysis has been undertaken for the site access for 26m b-doubles and is shown in Appendix A.

4.2.2 Emergency Access

An Emergency Access point is proposed at the southern end of the site, provided through a private north-south road connecting to Riordans Road.

This location will be designated exclusively for emergency access only and will be gated and signposted to prevent any unauthorised access.

A concept design of the emergency access has been undertaken to show access for an 8.8m service vehicle as shown in Appendix A.

4.2.3 Pre-Approved Heavy Vehicle Routes

As highlighted in Section 3.3, Tarrone North Road which provides access to the site is not approved for access for B-doubles or HML vehicles and will require an application to the satisfaction of Council and/or NHVR.

Notwithstanding, Tarrone North Road was approved and is currently being used as part of the TTS Extension and noting Council's comments in-relation to pavement / road widening upgrades, we expect that this section of Tarrone North Road and Riordans Road will be deemed appropriate for the BESS construction traffic.

4.2.4 Oversized Overmass (OSOM) Vehicle Deliveries

IMPACT® are advised that the BESS Transformer components will be transported to site via OSOM vehicles of up to 53.5m in length.

It is to be noted that this current assessment takes into consideration vehicle sizes of up to 26m in length (B-doubles) and does not cater for the assessment of OSOM vehicle deliveries.

Ultimately, this assessment will need to be undertaken as part of the NHVR application process to confirm if / what temporary traffic management measures will be required for the transport of these longer and heavier OSOM vehicles.

Further, the TTS Extension would have leveraged a similar OSOM delivery route and is not expected to cause / trigger any major infrastructure works.

4.3 Sight Distance Assessment

4.3.1 Sight Distance Requirements

A desktop assessment of the sight distance available from the Site Access point has been undertaken using aerial imagery, Google Street View and images provided by the applicant. We note that an on-site assessment should be undertaken to validate the following sight distance review prior to construction.

AustRoads Guide to Road Design - Part 4A: Unsignalised Intersections[1] sets out the sight distance requirements for unsignalised intersections, including:

- Approach Sight Distance;
- Safe Intersection Sight Distances (SISD); and
- Minimum Gap Sight Distance.

The guide recommends that Safe Intersection Sight Distance (SISD) is the minimum distance that should be provided on the Major Road at any intersection.

SISD is measured as shown in Figure 10 overleaf.

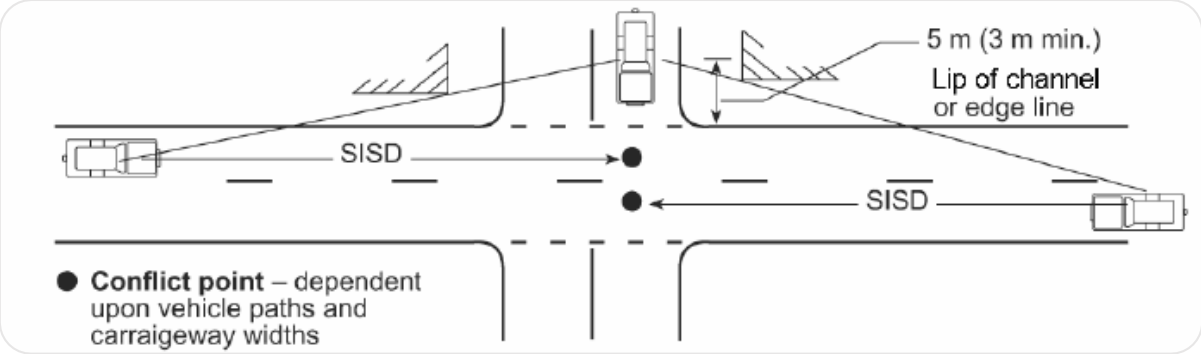


Figure 10 Guide to Measuring SISD for Unsignalised Intersections

The Austroads Guide provides SISD values for commuter vehicles at varying design speeds.

For a speed limit of 100km/hr (design speed of 110km/hr) which applies to Tarrone North Road and a reaction time of 2.5 seconds, Austroads stipulates an SISD of at least 300m.

4.3.2 Assessed Site Access Sight Distance

The site contemplates two (2) site access locations along the site's eastern boundary with access afforded via Tarrone North Road and from the southern boundary via Riordans Road (for emergency vehicles only).

The proposed site access located along Tarrone North Road is generally straight, flat and clear of vegetation to the north however in the southbound direction there is a vertical crest in the road which limits sight lines to approximate 250m.

As a result, at the intersection of Tarrone North Road and Riordans Road, sight lines are limited in the northbound direction with approximately 120m of visibility.

The southern site access location (for emergenc vehicles only) located along Riordans Road shows a vertical crest impeding on sight lines for vehicles facing the eastern direction and limits visibility to approximately 150m.

The sight distances available is illustrated in Figure 11 overleaf.

[1] AustRoads Guide to Road Design Part 4a: Unsignalised and Signalised Intersections, AustRoads 2017 Edition)

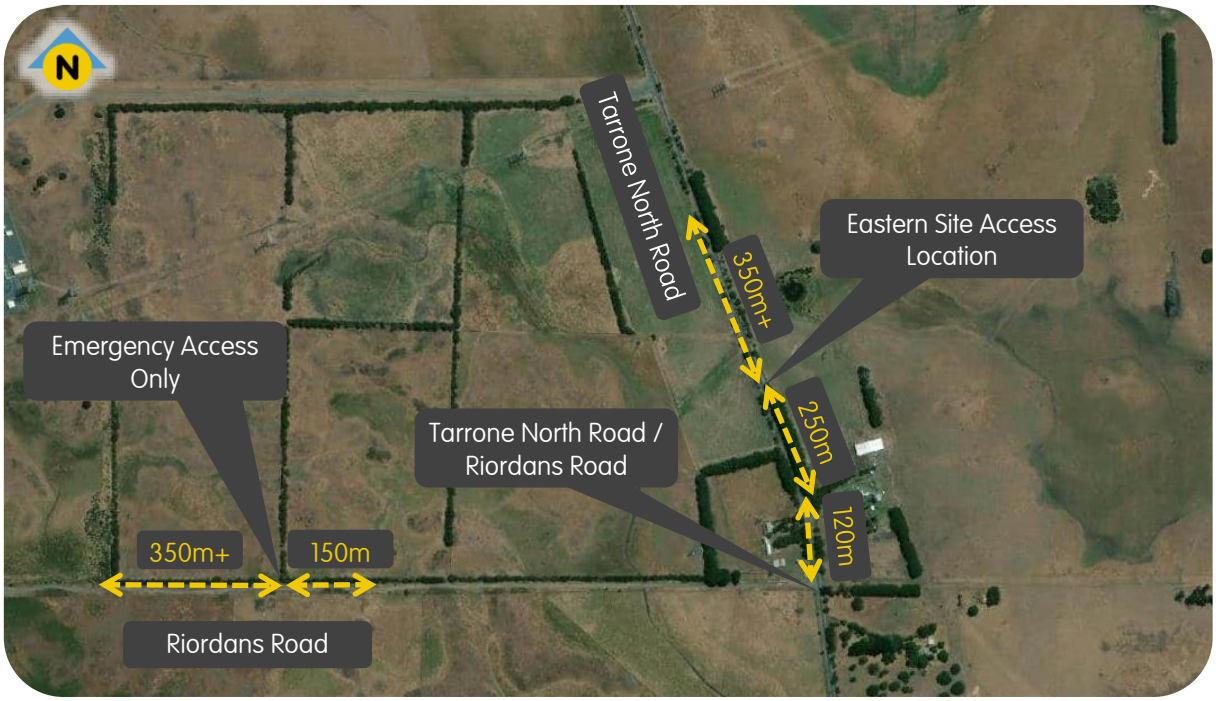


Figure 11 Sight Distance Assessment - Proposed Site Access Locations

Further, we are advised from Council that there are areas where the vertical geometry may impede on sight lines along Tarrone North Road and Riordans Road. Notwithstanding, should sight lines be restricted, possible slow points / warning signs should be provided during construction.

Notwithstanding, it is recommended that sightlines be confirmed on-site as part of the permit conditions / approval process.

5 Traffic Considerations

5.1 Traffic Generation

5.1.1 General

The access road network will typically limit internal construction traffic to internal access roads, with only deliveries and staff movements to and from the site required to travel across the external road network.

External traffic generated by the site will generally be split into three (3) board categories:

- General traffic generated by staff travelling to/from the subject site;
- Over Dimensional (OD) vehicles used for the delivery of the large substation components; and
- Other heavy vehicles (HV) which are used for the delivery of BESS components, construction equipment and construction material.

5.1.2 Adopted BESS Delivery Timeframes

IMPACT® are advised that the Tarrone BESS facility construction and delivery will occur across an approximate 15 month period. The following indicative timeframes have been assumed for the construction stage of the project:

- Stage 1 - Early Works / Site Preparation - 3 months
- Stage 2 - Full Site Construction - 12 months

Following the full construction phase, the Commissioning Stage and Operations Stage will commence however it is expected that traffic volumes will be limited to up to two (2) full-time staff.

5.1.3 Assumptions and Traffic Volumes

IMPACT® have been advised that during the peak construction periods, up to 100 staff on-site can be expected.

We understand that a total of eight (8) OD vehicle movements would be expected during Stage 2.

To understand the anticipated light and heavy vehicle movements, we have sought guidance from a similar sized project (BESS 200MW / 400 MWh), located in NSW.

This BESS site, during the peak daily construction period considered up to 80 light vehicle and 12 heavy vehicle movements with approximately 120 staff on-site.

Further, we understand that the site is expected to operate with up to 100 staff on site during the peak construction period.

Light vehicle movements are based on an average occupancy rate of 1.5 passengers per vehicle which equates to a peak movement of 67 vehicles.

Table 1 overleaf presents the key traffic movements expected during each stage.

Table 1 Construction Traffic Volumes

Description	Staff	Two-way Trips		Daily Movements (Two-way)	OD Movements (Two-way Movements)*	Anticipated Peak Daily Construction Traffic
		Light Vehicles (per day)	Heavy Vehicles (per day)			
Stage 1 - 3 months	50	33	12	45	-	45
Stage 2 - 12 months	100	67	12	79	8	81

* These are the anticipated two-way movements throughout the entire project Stage (not daily movements) for OD deliveries. Accordingly, for each loaded inbound haulage movement, there is typically one unloaded outbound movement. On average, it is expected that up to 1 OD movement will occur across a typical workday until the OD components have been delivered.

The assumptions above consider that the majority of workers will travel to and from the site via individual light vehicles. Whilst it is not specified, a further reduction in vehicle movements can be achieved by transporting workers to and from site via buses (13-seater buses).

5.1.4 Operation and Maintenance Traffic

For the majority of the time, the BESS facility is expected to operate with limited staff and generate minimal traffic movements.

Accordingly, apart from the initial construction phase, the proposal is anticipated to have a negligible impact upon traffic on the local road network. Details of likely traffic generation during the operation are estimated as follows:

- Daily routine maintenance to be carried out by two (2) people. It is assumed that the daily traffic generation will not exceed two vehicle movements per day to the local road network, with all other movements being internal to the site.
- Occasional maintenance will occur when components of the development need to be replaced, such as replacing BESS unit components. This is expected to occur only very occasionally, and will have no discernible impact on the external road network.
- Visitors to the site such as office based staff and courier deliveries etc.

The operation and maintenance traffic when compared to the construction traffic is expected to be minimal at most.

5.2 Traffic Impact

5.2.1 Vehicle Access Routes

Tarrone North Road is not approved for HML and B-double haulage and accordingly, a permit will be required from Moyne Shire Council (and NHVR) for the use of this road for construction traffic delivery vehicles. We expect that these roads can physically cater for the heavy vehicle traffic, however it may require some repair and maintenance during the construction period.

Note: A specific permit from NHVR will also be required to be obtained prior to any specific OSOM delivery.

5.2.2 Road Capacity

The proposed development is projected to generate up to 81 additional movements per day during peak construction activities (Stage 2).

This volume of traffic is not expected to have any material impact on the operation of Tarrone North Road and Riordans Road.

Tarrone North Road

Tarrone North Road is classified as a rural living access road which is indicatively designed to cater for 1,000 daily vehicle movements.

As discussed in Section 3.3.2, Tarrone North Road currently carries up to 54 daily movements or six (6) peak hour movements across a typical day.

During the construction stages of the project, Tarrone North Road can be expected to carry up to 135 daily vehicle movements.

This additional traffic can be comfortably accommodated by Tarrone North Road without any material impact on the operation or safety of this road.

Riordans Road

Riordans Road is classified as a rural access road which is indicatively designed to cater for in the order of 150 daily vehicle movements.

Currently no traffic volumes are available for Riordans Road, however it is conservatively assumed that this section of road carries in the order of 50 daily vehicle movements (with vehicles on this road likely to be property owners).

Accordingly, during the construction stages of the project, Riordans Road can be expected to carry up to 131 daily vehicle movements.

This additional traffic can be comfortably accommodated by Riordans Road, without any material impact on the operation or safety of this road.

5.2.3 Turning Lane Assessment

Reference has been made to AustRoads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings[2] (AGTM Part 6). This document provides guidance on the warrants for various turn treatments at unsignalised intersections, these warrants are reproduced as Figure 12.

Note: The above applies to new intersections and does not apply to existing intersections or access points. Notwithstanding, this has been referenced for information purposes.

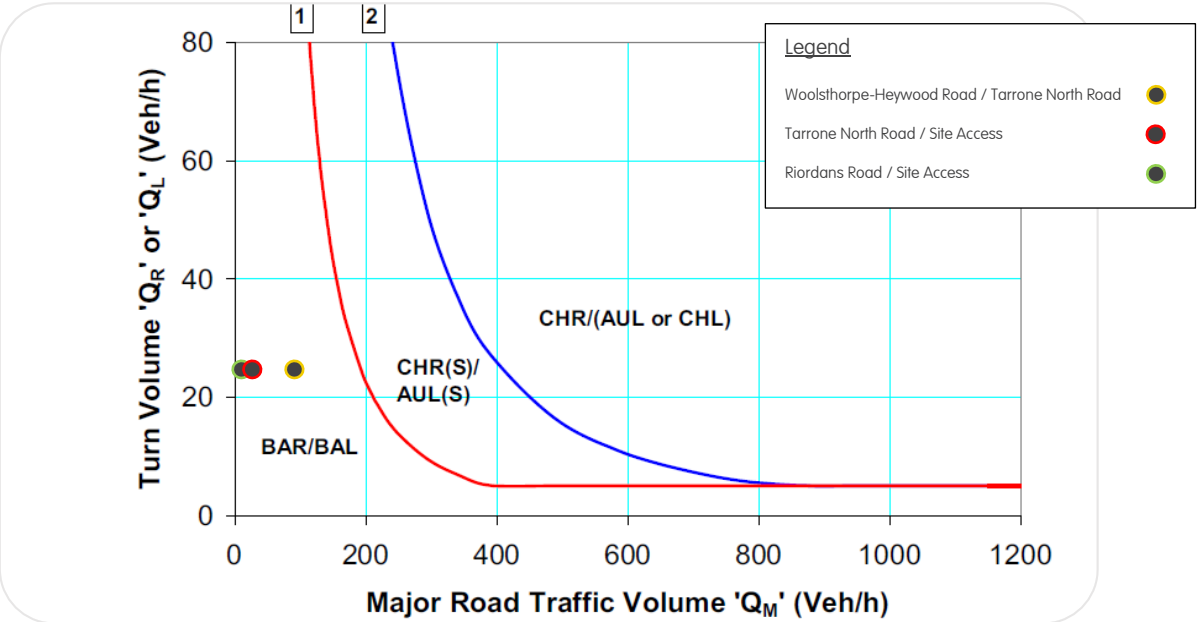


Figure 12 Warrants for Turn Treatments at Unsignalised Intersections

Note: Q_m (or major road traffic volume) is calculated using the method outlined in Figure 2.27 of the AGTM Part 6.

These warrants provide guidance on where a full-length deceleration lane must be used and where a shorter lane, designated Auxiliary Left Turn Lane (AUL) and Channelised Right Turn (CHR), may be acceptable based on traffic volumes.

The warrants apply to turning movements from the major road only, with the applicable traffic flows being peak hour flows.

Existing Traffic Volumes

Traffic data suggests that Woolsthorpe-Heywood Road carries in the order of 800 vehicles per day on average. Generally, a 'rule of thumb' is that peak hour traffic flows are approximately 10% of daily traffic volumes. Accordingly, about 80 vehicles (combined east and west) are expected during peak hours on average, with approximately 40 vehicles in each direction.

As described in Chapter 3.3.2 and 3.3.3, Tarrone North Road is expected to carry up to six (6) peak hour movements whilst Riordans Road is expected to carry up to five (5) peak hour movements.

Site Generated Traffic

The proposal is projected to generate in the order of 81 daily vehicle movements during the peak construction period, of which 41 are expected to be inbound vehicle movements. It is conservatively assumed that 50% of these movements will occur during the peak period, equating to approximately 21 vehicles going into the site.

[2] AustRoads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings, AustRoads 2017 Edition)

Turning Lane Treatments

Coinciding with the existing traffic along Tarrone Road North and Riordans Road, guidance taken from Figure 12 illustrates that this intersection triggers the need to provide a Basic Left-Turn Treatment (BAL) and a Basic Right-Turn Treatment (BAR).

Notwithstanding, given that the external traffic volumes are low and the intersection has adequate sightlines, it is recommended that the road width / road shoulder be used for passing vehicles (this would only be necessary during the construction stages).

It is noted that the assumptions mentioned assume that all staff will travel to site via their own private vehicles. Accordingly, it is recommended that buses be considered for the transportation of staff to and from the site in order to reduce the impact of traffic movements along Tarrone North Road and Riordans Road.

Further, supplementary 'trucks crossing' signs or similar could be used to provide advanced warning to motorists driving along this road.

5.2.4 General Road Maintenance During Construction

Accordingly, prior to construction it is recommended that the applicant liaise with Council/DTP in respect to maintenance and repair work along the relevant sections of these roads during the construction period.

This liaison can be used to help ensure that the impact of construction related traffic movements on the external road network is minimal and managed appropriately.

This will be warranted during the construction phase, however once the construction has been completed, the traffic generated from the site is expected to be minimal and no additional maintenance or repair work is expected to be necessary.

5.2.5 Pavement Upgrades

In consultation with Council, it is recommended the section of road between Riordans Road and Tarrone North Road and Tarrone North Road between the proposed Site Access location and the existing TTS Site Access be upgraded and widened to an 'all weather' standard pavement to facilitate the anticipated construction vehicles.

5.3 Other Impacts

5.3.1 Noise Impacts

Further consideration for the noises generated from the Battery Energy Storage Systems (BESS) and substation devices have been assessed and prepared by Marshall Day Acoustics.

5.3.2 Construction Schedule

At the time of writing this report, we understand that the proposed neighbouring development, the TTS Extension is currently on-going and is scheduled to be completed in 2024.

In discussions with the authority, specifically Council, it is their recommendation that this project (Tarrone BESS) be scheduled to begin once the TTS Extension has been completed in order to avoid impacts to both developments.

It is our recommendation that the project team liaise with Council and the neighbouring TTS Extension project to establish a preferred starting time.

Notwithstanding, we understand that the proposed Tarrone BESS is anticipated to begin late Q2 / early A3 2024 which is expected to be outside of the TTS Extension works.

6 Traffic Management

6.1 Traffic Management - High Level

External

As above, the proposal isn't expected to have any material impact on the operation of the external road network.

Supplementary 'trucks crossing' signs could be provided along the Tarrone North Road and Riordans Road approaches to the Site Access, to assist in alerting drivers as to the possibility of trucks entering / exiting the site.

Note: Any specific traffic management requirements for the Site Access construction will be outlined within a Traffic Management Plan for these works at a time closer to construction. Any specific traffic management device required to build the access point will be outlined and justified within this TMP.

Internal

We expect that a detailed list of internal traffic management strategies will be provided when the TMP is prepared for the subject site (see below).

Notwithstanding, we expect that such management devices will ultimately include (but not necessarily be limited to):

- A reduced speed limit on internal roads (20km/hr for example);
- Radio communications between construction vehicles at all times;
- Flashing lights on all construction vehicles;
- Induction and training procedures for all drivers and staff; and
- Warning signs to be provided at any 'critical' points within the site.

6.2 Traffic Management Plan

Subject to the appointment of a supplier / construction contractor and other considerations, aspects of the Tarrone BESS facility (the project) may be subject to review.

In addition, construction / work programs for the project will not be fully resolved until closer to the project commencement. As such, subject to commencement timeframes, there is potential for changes to the existing road conditions and BESS haulage assumptions as considered within this report.

Based on the foregoing, and our experience with similar projects, we expect that a detailed Traffic Management Plan (TMP) will need to be prepared prior to the commencement of the project to confirm any mitigation measures and management works required at that time.

The TMP is likely a condition of any Development Consent issued for the BESS and would be developed in consultation with the Tarrone Regional Council, DTP, and any other relevant stakeholders to provide a more accurate indication of traffic impacts and generally identify responsibilities for road maintenance and upgrades throughout the construction period.

In general, the TMP should include:

- Confirmation of the BESS construction timeframe and work stages;
- Confirmation of expected traffic volumes generated by the BESS facility for all work stages
- Identification of all HV and OD vehicle haulage routes for all work stages;
- A mechanism to review identified haulage route road conditions prior to the commencement of works;

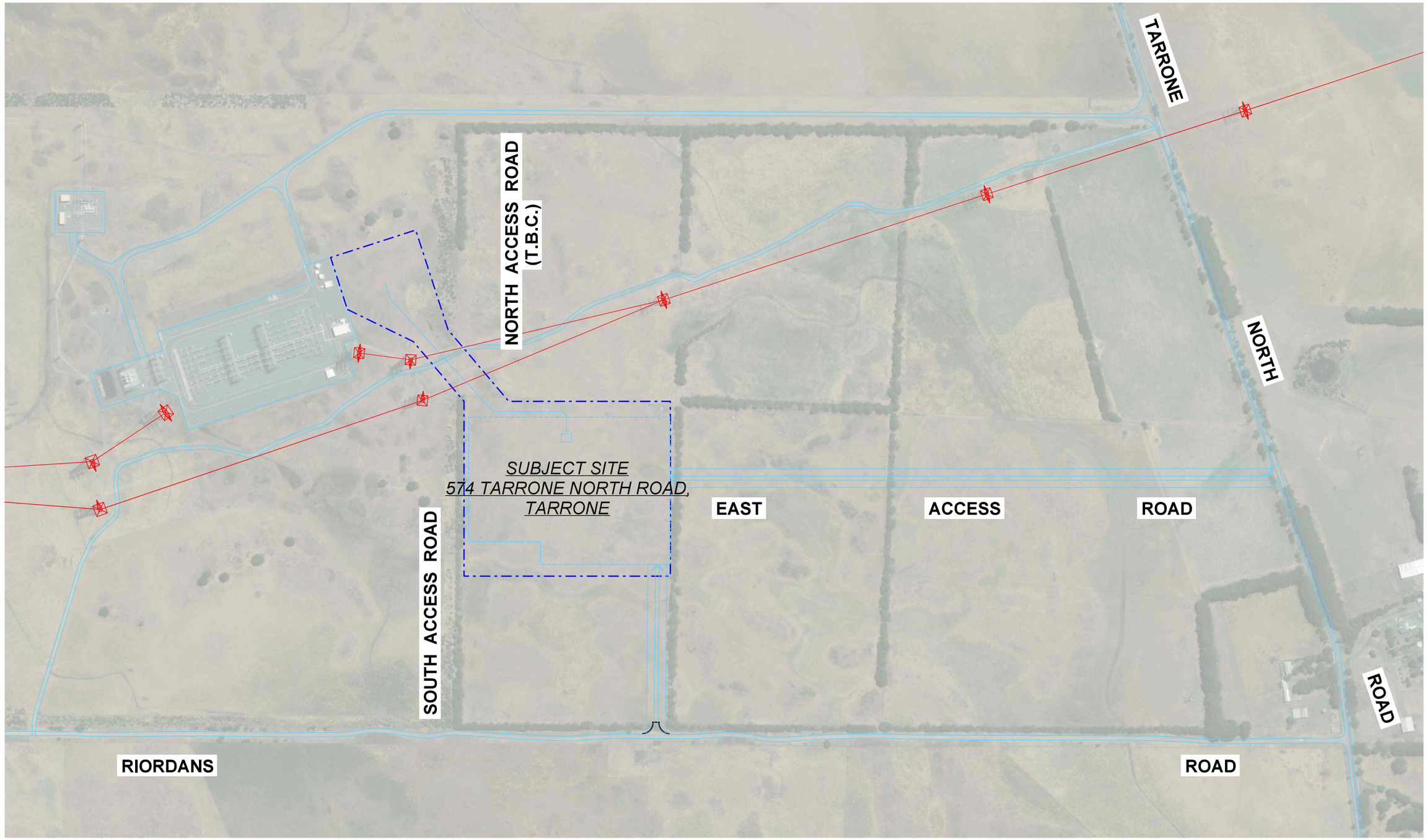
- Mechanisms/agreements (if deemed necessary) to maintain haulage route roads and road infrastructure, including local public roads used by site traffic, during construction works and to reinstate roads to at least pre-construction conditions;
- Qualify any requirement for specific work stage construction traffic management plans;
- Qualify and identify any relevant mechanisms for OD vehicle permits and traffic management requirements; and
- Confirm on-site the adequacy of available sight distances along the Riordans Road from the Site Access.

Please note that this is not an exhaustive list, and that the final TMP requirements would be as per those outlined in the Development Consent.

APPENDIX A
Swept Path Analysis

Design Vehicle

- 26m B-Double
- 8.8m Service Vehicle



GENERAL NOTES:
1. ALL DIMENSIONS ARE TO FACE OF KERB AND CHANNEL UNLESS NOTED OTHERWISE.
2. LOCAL ROADS - TARRONE NORTH ROAD (SPEED ZONE 80KM/H).
   - RIORDANS ROAD (SPEED ZONE 80KM/H).
3. BASE INFORMATION FROM BING MAPS AERIAL PHOTOGRAPHY AND
   BESS_GPG_AU_TAR_001 Tarrone BESS_Site Survey Rev1 updated_03.dwg DATED 11.07.2023

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Client
UMWELT

Date **2024-06-26**
Drawn / Approved **SG / HM**

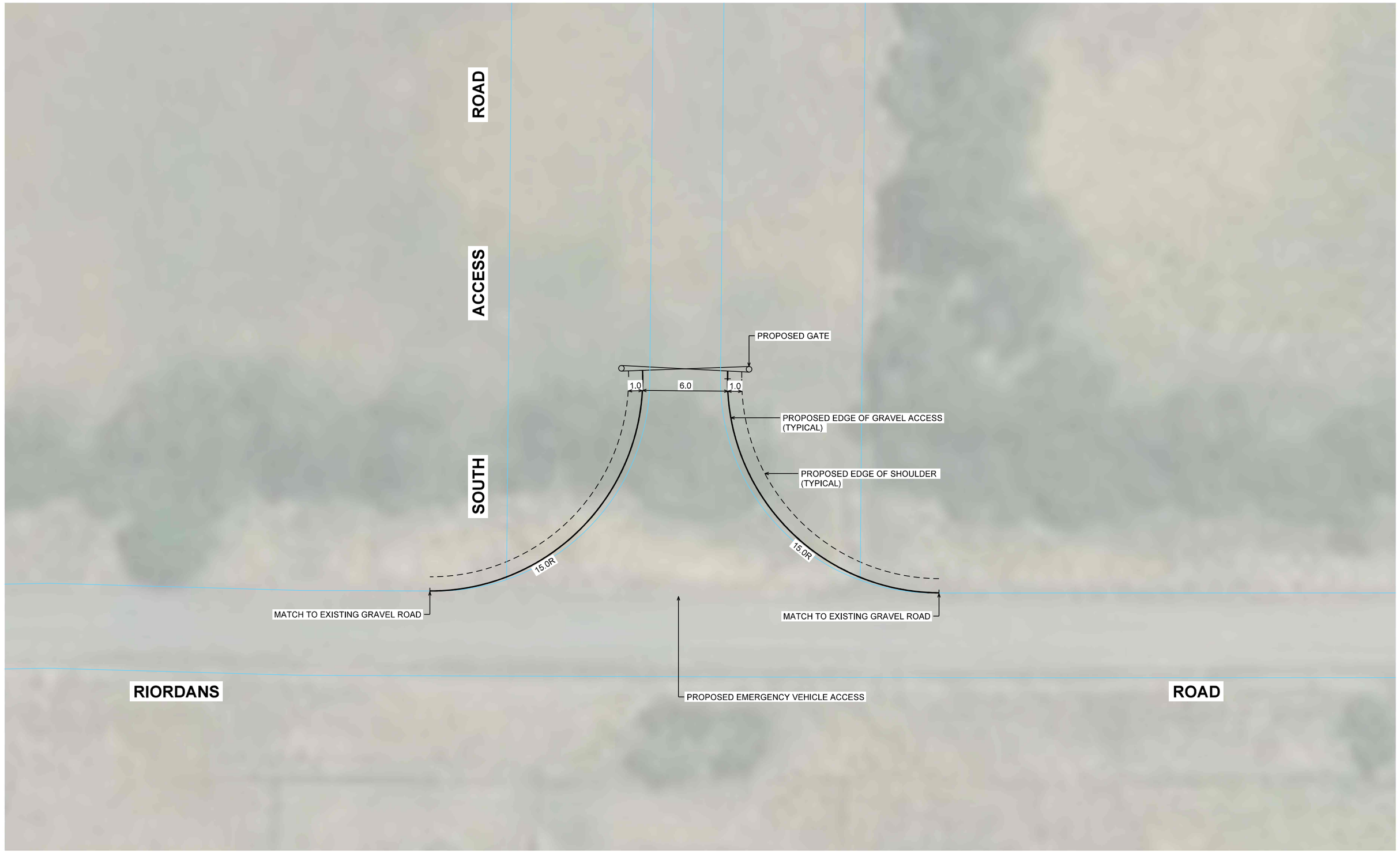
Project
TARRONE BESS
574 TARRONE NORTH ROAD, TARRONE
MOYNE SHIRE COUNCIL

Title
TRAFFIC AND TRANSPORT ASSESSMENT
SITE LAYOUT PLAN

Status
PRELIMINARY

Drawing Number
IMP2302021 - DRG-01-01

Revision
C



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Date **2024-06-26**
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Project
TARRONE BESS
574 TARRONE NORTH ROAD, TARRONE
MOYNE SHIRE COUNCIL

Title
TRAFFIC AND TRANSPORT ASSESSMENT
PROPOSED EMERGENCY VEHICLE ACCESS (CONCEPT)

Status
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Drawing Number
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Revision
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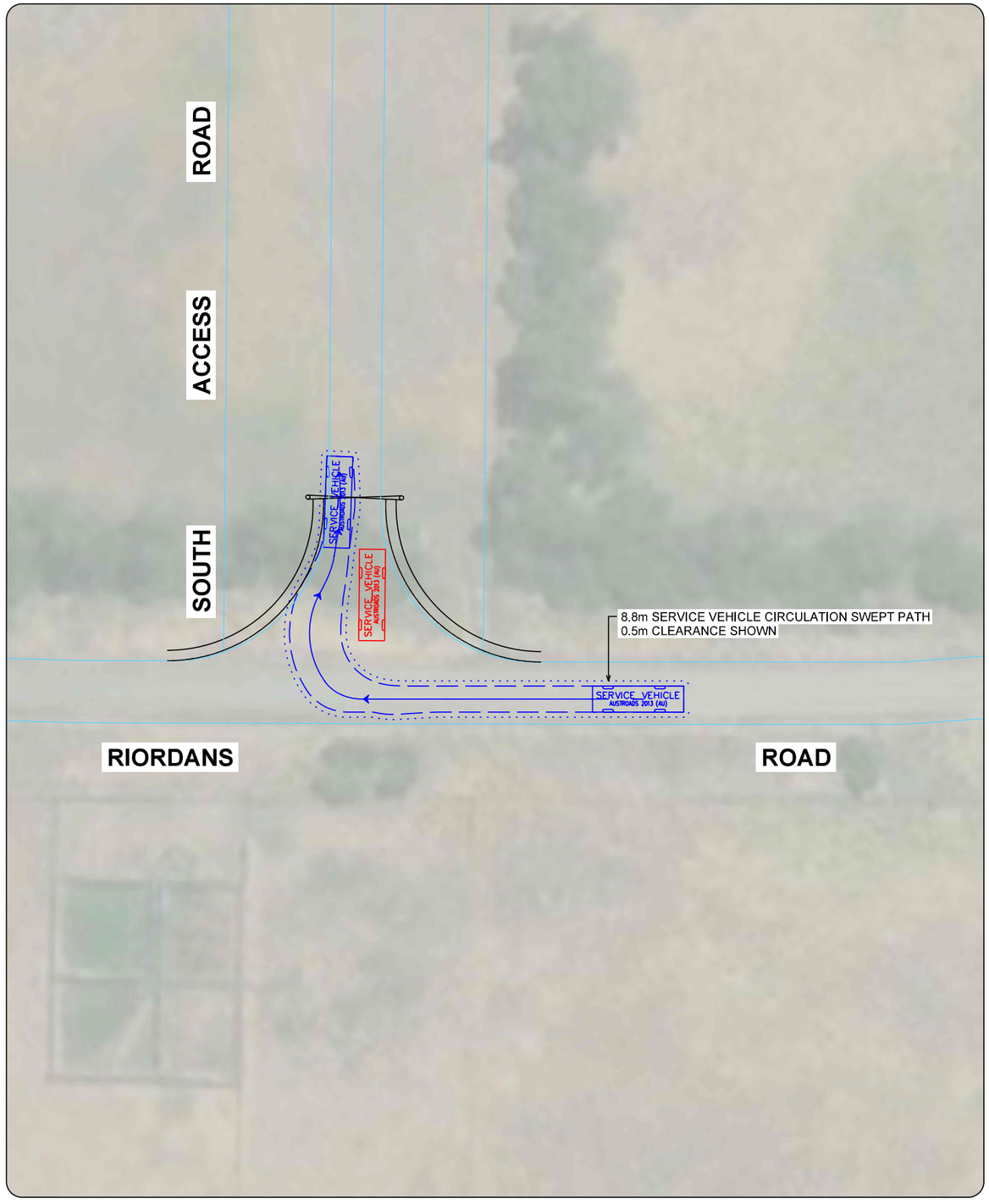

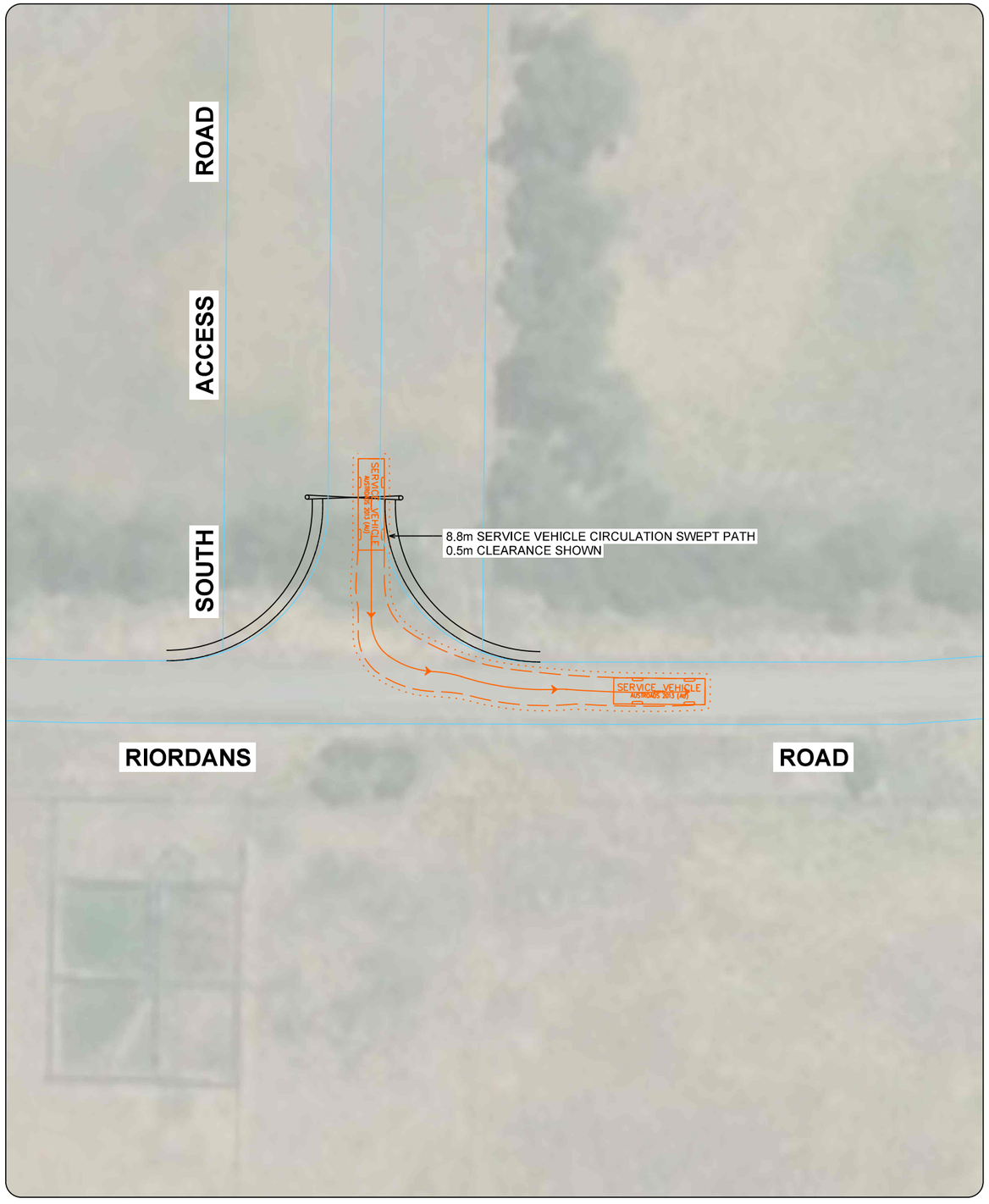

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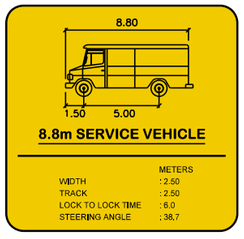

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Project
TARRONE BESS
574 TARRONE NORTH ROAD, TARRONE
MOYNE SHIRE COUNCIL

Title
TRAFFIC AND TRANSPORT ASSESSMENT
SWEPT PATH ANALYSIS
8.8m SERVICE VEHICLE - DESIGN VEHICLE

Status
PRELIMINARY

Drawing Number
IMP2302021 - DRG-01-03

Revision
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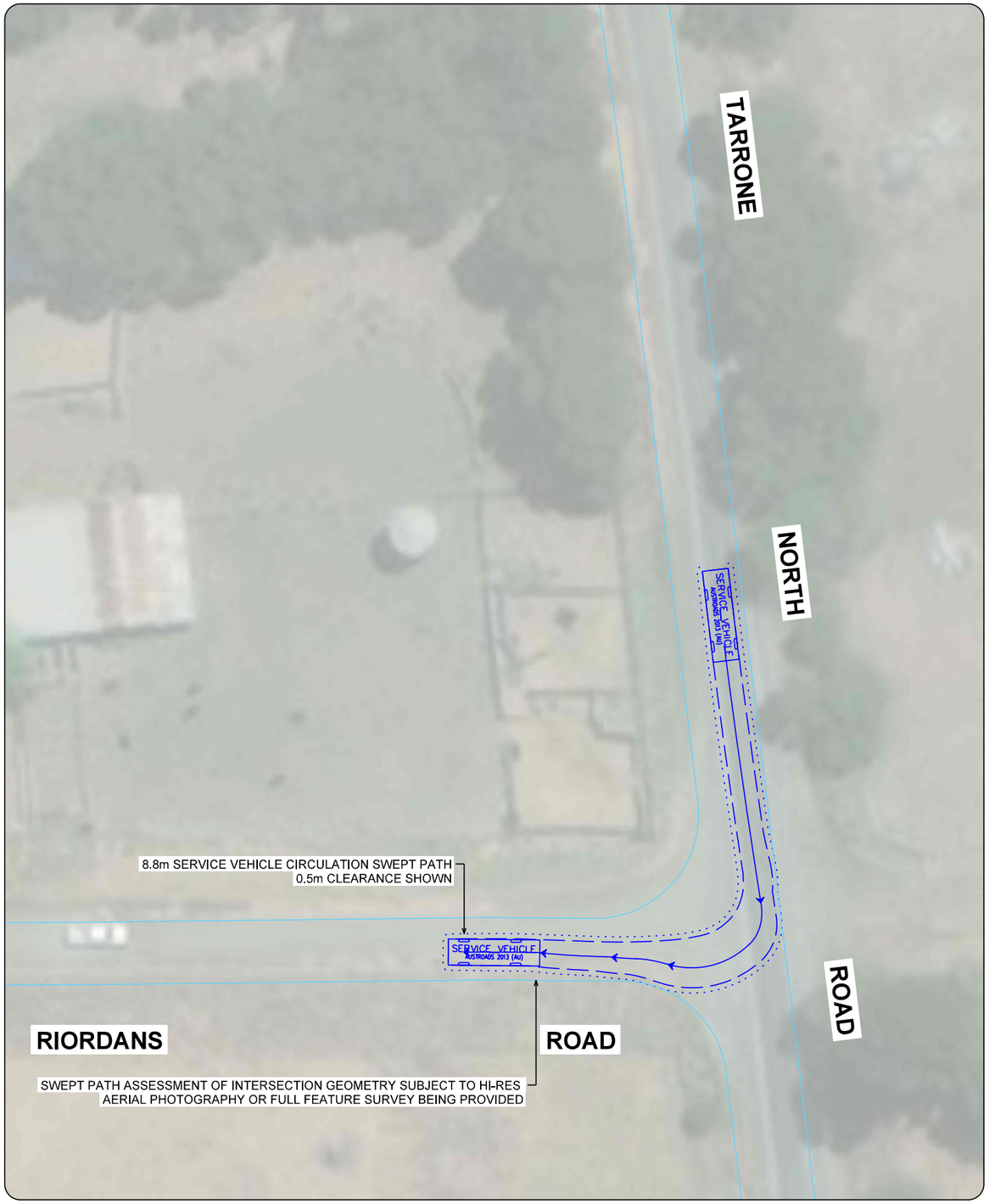

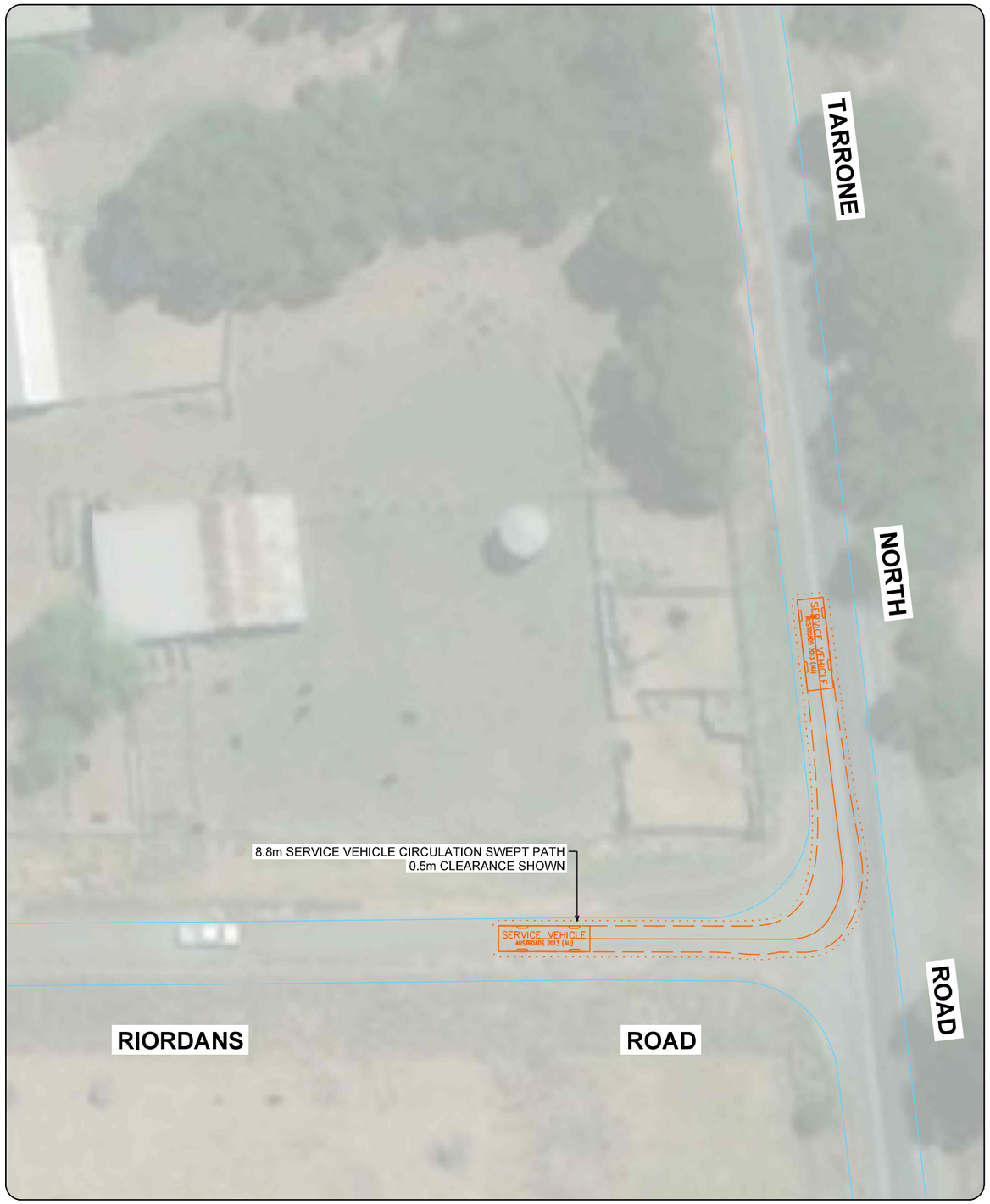

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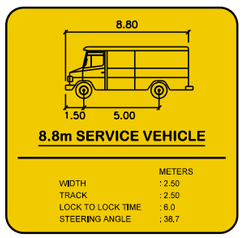

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Project
TARRONE BESS
574 TARRONE NORTH ROAD, TARRONE
MOYNE SHIRE COUNCIL

Title
TRAFFIC AND TRANSPORT ASSESSMENT
SWEPT PATH ANALYSIS
8.8m SERVICE VEHICLE - DESIGN VEHICLE

Status
PRELIMINARY

Drawing Number
IMP2302021 - DRG-01-04

Revision
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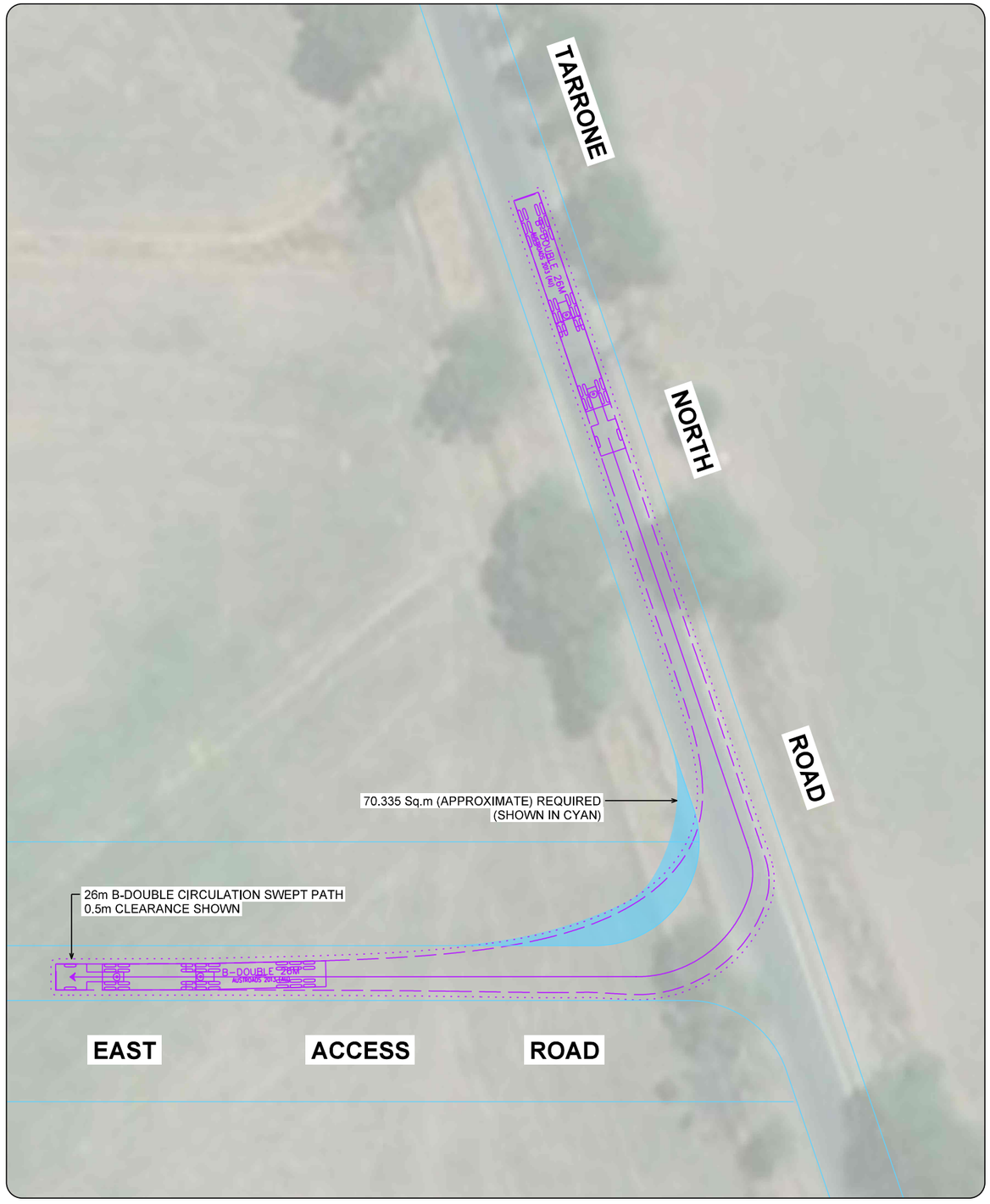

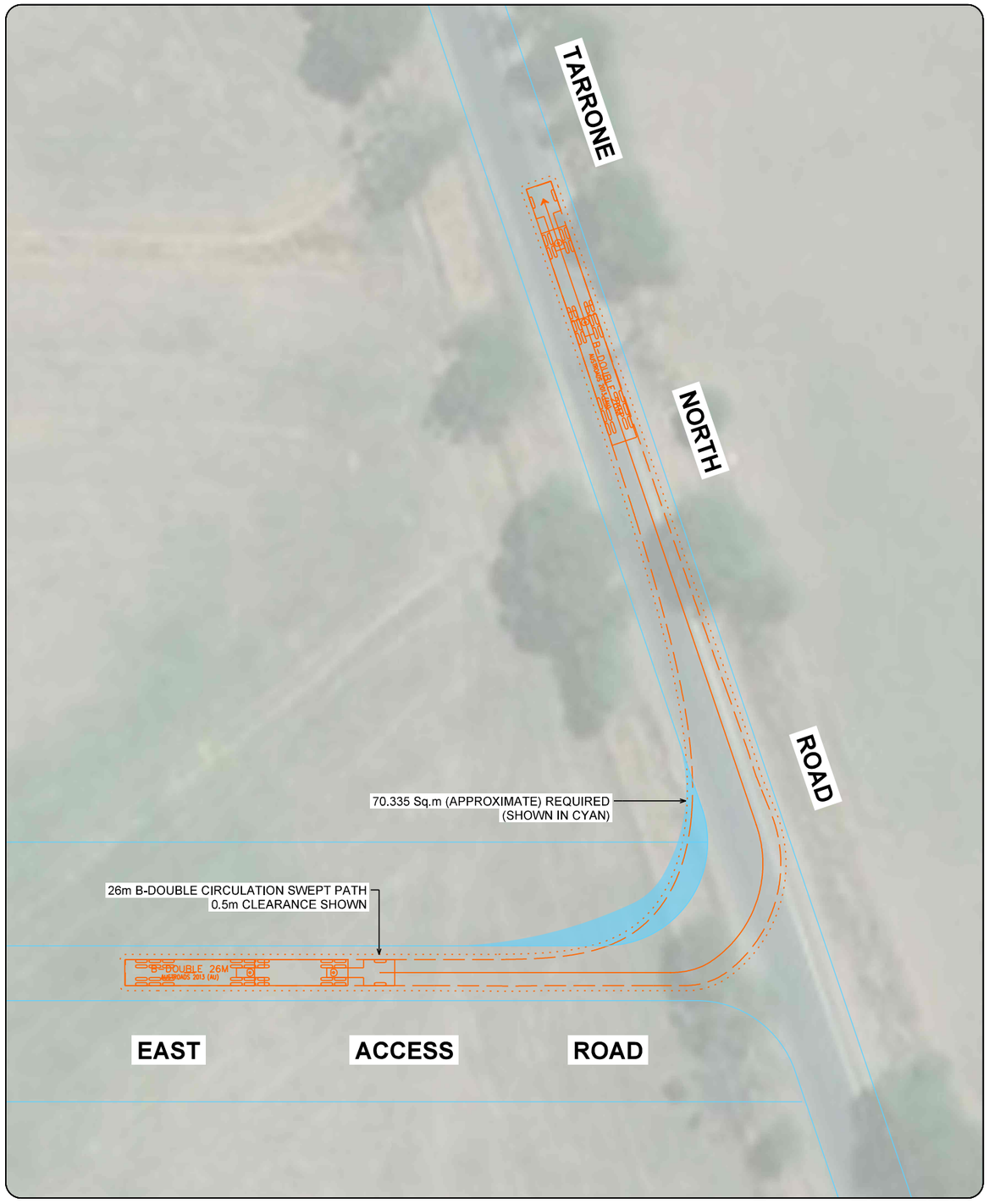

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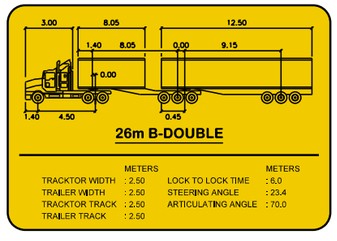

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Date **2024-06-26**
Drawn / Approved **SG / HM**

Project
TARRONE BESS
574 TARRONE NORTH ROAD, TARRONE
MOYNE SHIRE COUNCIL

Title
TRAFFIC AND TRANSPORT ASSESSMENT
SWEPT PATH ANALYSIS
26m B-DOUBLE - CHECK VEHICLE

Status
PRELIMINARY

Drawing Number
IMP2302021 - DRG-01-05

Revision
C


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PLAN
Imaginative