35°04'42"S
147°25'17"E

Wagga North BESS: Bavin Road, Bomen, NSW



Traffic Impact Assessment

16 December 2025
Prepared for NGH Consulting

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1 IMPACT® Snap Shot

Development Proposition

Location	35°04'42"S 147°25'17"E	Bavin Road, Bomen, NSW
Use	Battery Energy Storage System (BESS) - 120 MW / 480 MWh Capacity	
Access	One (1) new access track which will connect into Bavin Road via existing property access.	
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 analysis show that Site Access (once upgraded) will be able to cater for 26 metre B-double vehicles into and out of the site. Swept paths have also been prepared to demonstrate vehicle access into / out of Bavin Road from Byrnes Road. As demonstrated attached, once the recommended upgrades have been provided, 26m B-double vehicles will be able to travel through this intersection at the same time.
Sight Distances	**IMPACT®** has undertaken a sight distance assessment of the views available along Bavin Road (from the site access) and Byrnes Road (from Bavin Road) and can confirm that appropriate sight lines are available from each intersection, in accordance with the AustRoads Guide to Road design for SISD.
Turn Warrants	By virtue of the very low traffic volumes along Bavin Road, we do not expect that a left turn treatment should be required to facilitate access into the subject site. Given the extent of traffic travelling along Byrnes Road, it is recommended that a turn lane be constructed for construction traffic entering Bavin Road. We note however that constructing a right turn would be difficult, given the infrastructure / geometric constraints located close to the western side of Byrnes Road. Noting the above, it is recommended to restrict construction traffic to entering Bavin Road from the north only, and that a dedicated left-turn basic road widening be provided to cater for this movement.

Traffic Impact	
Traffic Generation	A peak of up to 162 daily (two-way) movements are anticipated during the peak construction period. Until Bavin Road, these vehicles will be travelling along the arterial road network, along roads that are pre-approved route for use by B-double, HML and OSOM vehicles. Accordingly, it is expected that these roads can adequately cater to the anticipated construction traffic with little impact. A SIDRA analysis of the Bavin Road / Byrnes Road intersection confirms that this intersection will operate within 'excellent' range during peak construction activities.
Operational Traffic	The site is estimated to have minimal daily vehicle movements, with sporadic car trips 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	Construction Deliveries (26m B-doubles) The proposed haulage route is contained along entirely pre-approved roads for B-double vehicles, until Bavin Road. A permit will be required from Council and NHVR to utilise Bavin Road for B-double access. Swept paths show that with the proposed upgrades, these haulage vehicles are comfortably able to travel to/from the subject site and along the anticipated haulage route. Heavy Vehicle Deliveries Requiring Escort In addition to the above, we note that there are also a couple of additional heavy vehicle deliveries which will ultimately require escort. It is expected that a specific permit from NHVR will be sought for each of these deliveries prior to construction commencing. Pavement Upgrades It is understood that the applicant has consulted with Council and agreed to upgrade the full extent of Bavin Road up until the site access. General Maintenance During Construction It is recommended that the applicant liaise with Council/TfNSW with respect to maintenance and repair work along the relevant sections of these roads during the construction period.
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 NGH Consulting on behalf of Ib Vogt to undertake an assessment of the traffic implications of the proposed Wagga North Battery Storage System (BESS) located in Bomen, NSW.

This Traffic Impact Assessment has been prepared to accompany a Development Application (DA).

3 Wagga North BESS - Proposal

IMPACT® have been advised that the project will consist of the installation of a BESS facility with a capacity to store up to 120 MW / 480 MWh of renewable energy with a total project lifespan of 40 years.

It is expected that an underground cable will be installed to connect the power transformers to the nearby Wagga North Terminal Station.

As shown in Figure 1, the site encompasses the BESS facility located adjacent to the terminal station, north of Bavin Road.

Access to the site will be accommodated by a new access track, which connects into Bavin Road to the south.

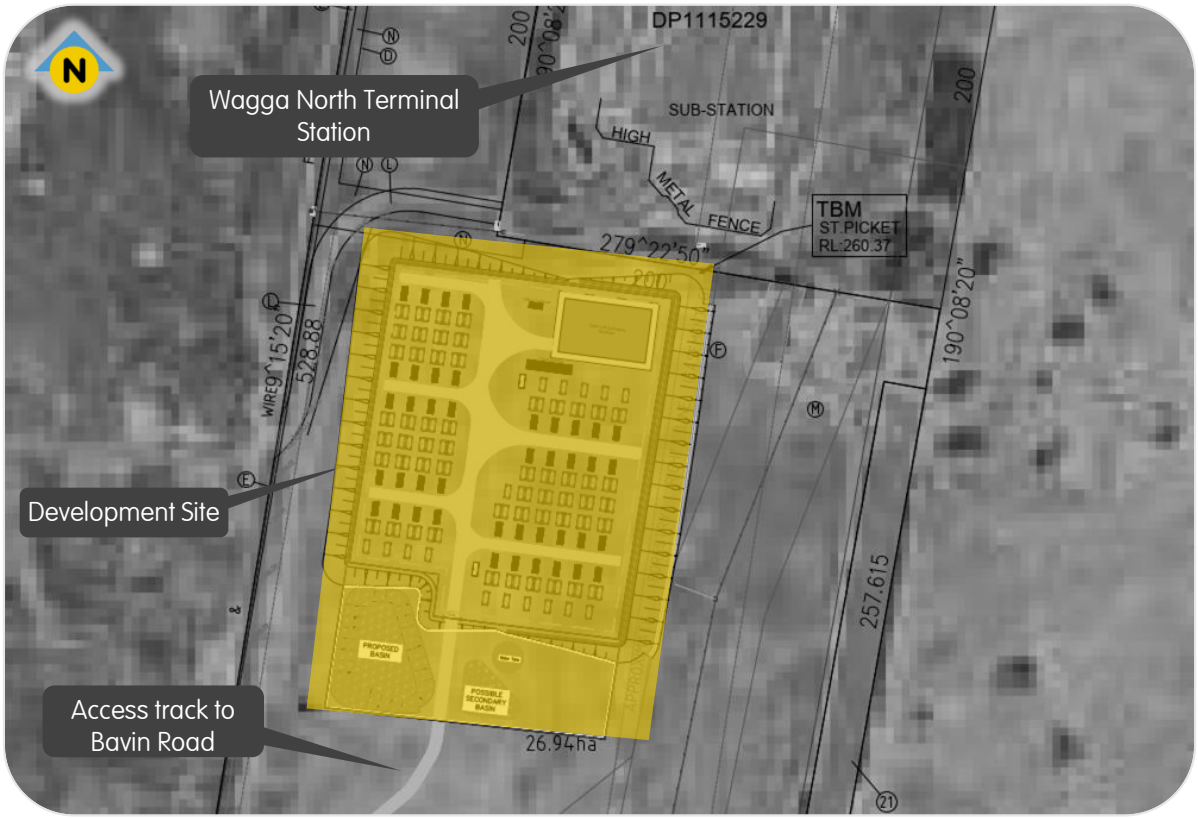


Figure 1 **Proposed Wagga North BESS Facility - Site Plan - Insert Updated Plan**

4 Site Context

4.1 Location

The proposed Waga North Battery Energy Storage System (BESS) development is located north of Bavin Road, Bomen, NSW and is located approximately 6 km north-east of the regional city Wagga Wagga as indicatively illustrated in Figure 2.



Figure 2 Location of Development Site

4.2 Existing Road Network

4.2.1 Bavin Road

Classified as a local road (managed by Wagga Wagga city Council), Bavin Road is aligned in a general east-west direction and extends between Byrnes Road (west) to Windmill Road (east). The road is unmade in parts, with some dwellings accessed via Byrnes Road to the west, and others via Windmill Road to the east (no through connection is available).

Bavin Road (extending east from Byrnes Road) has been constructed with a sealed pavement measuring approximately 5 metres in width for the first 240 metres. Thereafter, the road continues with an unsealed gravel pavement (approximately 5-6 metres wide), until it becomes unmade approximately 1.5 kilometres further to the east.

This road currently provides for lot access to three (3) dwellings.

Figure 3 provides a view of Bavin Road looking east from Byrnes Road. Figure 4 provides a view of Bavin Road looking west from the site access.

The default rural speed limit of 100km/hr applies to Bavin Road, with no posted speed limit.



Figure 3 Bavin Road facing east from Byrnes Road



Figure 4 Bavin Road facing west from the site access

4.2.2 Byrnes Road

Classified as a sub-arterial road (managed by Wagga Wagga City Council), Byrnes Road extends in a general north-south direction, ultimately providing a connection between Wagga Wagga and Junee.

Proximate to Bavin Road (and the subject site) Byrnes Road has been delivered with a sealed pavement measuring approximately 10 metres in width, which provides for a single lane of traffic in each direction, plus sealed shoulders.

A posted speed limit of 80 km/hr applies to Byrnes Road near the subject site.

A view of the Byrnes Road typical cross section is shown in Figure 5.



Figure 5 Byrnes Road facing north from Bavin Road

4.2.3 Existing Traffic Movements

4.2.3.1 Byrnes Road

Vehicle movement data provided by Council (and dated 19th - 27th July 2021) shows that Byrnes Road caters to the following approximate vehicle movements:

- Byrnes Road (north of Bavin Road)
  - Weekday average daily movements (total) 3,175 vehicles.
  - Weekday average heavy vehicles 1,140 vehicles.
- Byrnes Road (south of Bavin Road)
  - Weekday average daily movements (total) 3,260 vehicles per day.
  - Weekday average heavy vehicles 944 vehicles.

The data provided by Council does not provide an hourly breakdown - however it is generally accepted that peak movements represent approximately 10% of the daily totals (which translates to 310-330 peak period movements).

This aligns with observations made on-site, where more than 40 cars were observed in a 10-minute period (which equates to at least 240 vehicles an hour).

Note:

> Council have noted that facilities have opened recently which would likely have an impact on these counts, likely leading to an increase in the volumes observed.

4.2.3.2 Bavin Road

No traffic movement data was available for Bavin Road at the time of writing this report, however based on observations made during an inspection of the site, the following estimations were noted for this road:

- Bavin Road
  - No more than two vehicles observed across a 30-minute period;
  - Estimated peak traffic no more than 5 vehicles in an hour, and less than 50 vehicles a day.

4.2.4 Existing Crash Statistics

We have undertaken a review of the reported casualty accident history for the roads and intersections for a five (5) year from 2018 to 2022, in the vicinity of the subject site (which has been sourced from the Transport for NSW (TfNSW) Crash Database).

For the purposes of this assessment, the review focussed on incidents along the following roads, which will likely form part of the local haulage route:

- Bavin Road;
- Byrnes Road;
- Eunony Bridge Road; and
- Merino Street.

Figure 6 provides an illustration of these incidents in the context of the subject site.



Figure 6 Crash Statistics in the Vicinity of the Subject Site (Source: TfNSW LGA Crashes Map)

A review of this data shows that there was a total of 13 incidents recorded along these roads in this period.

Two (2) of these incidents resulted in a serious injury, three (3) in moderate injuries whilst the remaining eight were categorised as either minor injuries or walk away accidents; no fatalities were observed along this route.

Whilst multiple incidents were reported at the Merino Street / Byrnes Road and the Eunony Bridge / Hammond Avenue Roundabouts, thee accidents were generally different or as a result of different road conditions (and weren't necessarily the result of poor road design).

There were no incidents or crashes were recorded along Bavin Road itself.

We therefore do not expect that the increase in traffic will have an unreasonable increased impact on risk or safety to the general road network.

5 Traffic Generation

5.1 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;
- Heavy vehicles (HV) which are used for the delivery of BESS components, construction equipment and construction material; and
- Heavy vehicle (HV) deliveries requiring escort used for the delivery of the large substation components.

5.2 Adopted BESS Delivery Timeframes

IMPACT® are advised that the Wagga North BESS facility construction and delivery will occur across an approximate 12-18 month period (yet to be confirmed). The following indicative timeframes have been assumed for the construction stage of the project:

- Stage 1 - Early Works / Civil Construction - 6-9 months
- Stage 2 - Construction and Electrical Installation - 6-9 months

Following the full construction phase, the Commissioning Stage and Operations Stage will commence however it is expected that traffic volumes during these stages will be limited.

5.3 Assumptions and Traffic Volumes

Table 1 provides a breakdown / summary of estimated construction traffic movements during project delivery:

Table 1 Construction Traffic Volumes

Description	Staff	Two-way Trips		Daily Movements (Two-way)	HV Movements Requiring Escort**	Anticipated Peak Daily Construction Traffic
		Light Vehicles (per day)*	Heavy Vehicles (per day)			
Stage 1 - 6-9 months	30	40	20	60	-	60
Stage 2 - 6-9 months	90	120	40	160	2	162

*These movements are based on an average occupancy of 1.5 persons per vehicle, with carpooling for staff to be encouraged as much as possible.

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

Light vehicles are expected to generate up to 60 inbound movements during the morning peak and up to 60 outbound movements during the afternoon.

Heavy vehicle deliveries will be split generally across the typical working day or up to four (4) vehicles during each peak period (morning and afternoon).

A total of 64 inbound and subsequently, 64 outbound peak hour movements are expected during peak construction activities.

Note:

These volumes are estimates only, intended to conservative estimate the highest number of movements expected on a daily basis during construction. These values should be refined and confirmed during the preparation for construction (as part of the Traffic Management Plan - see Section 7).

5.4 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.

6 Traffic Impact Assessment

6.1 Vehicle Access Routes

As above, 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;
- Heavy vehicles (HV) which are used for the delivery of BESS components, construction equipment and construction material; and
- Heavy vehicle (HV) deliveries requiring escort used for the delivery of the large substation components.

The following sets out our initial assumptions in relation to the direction of travel for each of these vehicle categories.

6.1.1 General Traffic (Staff)

General traffic to / from the site will typically be comprised of staff and courier movements.

They will generally be comprised of light vehicles, likely utes and vans.

As noted above, there is scope to utilise car-pooling and shuttle bus services to reduce the overall number of these movements if required.

It is expected that most staff will generally reside in Wagga Wagga for the length of construction, and generally seek to travel to / from the site via Byrnes Rad and Eunony Bridge Road / Oura Road.

As noted above, there is expected to be up to 120 daily light vehicle movements generated by the site during peak construction activities (generally with 60 inbound movements in the morning and 60 outbound in the evening).

6.1.2 Heavy Vehicle Deliveries (General)

Heavy vehicle will form a vast majority of the delivery vehicles that travel to / from the subject site, generally for the purposes of:

- Aggregate / concrete deliveries
  - For the construction of hardstand areas and access tracks.
- Water Deliveries
  - For dust settling
- Battery Energy Storage System (BESS) components.
  - Components likely imported into Melbourne or Sydney

Generally speaking, it is expected that these deliveries would seek to leverage the major highways to get to the local area, and then travel to / from the site via either:

- Olympic Highway - Merino Street - Byrnes Road (north) - Bavin Road; or
- Sturt Highway - Eunony Bridge Road - Byrnes Road (south) - Bavin Road.

As noted above, the proposal is expected to generate no more than 40 daily heavy vehicle movement during peak construction activities. At the time of writing this report, the breakdown of specific heavy vehicle types (B-double, truck & dog, flat bed etc) is not known.

6.2 Road Network Limits

To understand the limitations of the existing road network, reference is made to pre-approved haulage routes set out by Transport for NSW (TfNSW) and the National Heavy Vehicle Register (NHVR)[1].

Figure 7 provides an illustration of roads which are included within the Higher Mass Limit (HML) network.



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

As highlighted above, Byrnes Road (and connecting roads Merino Street and Eunony Bridge Road) are pre-approved for the use of Higher Mass B-Double vehicles, providing a connection into the broader arterial road network to both the north and south.

Bavin Road is not approved for access and will require an application to the satisfaction of Council for the use of this road to use B-double construction vehicles.

6.2.1 Recommendations - Road Network Limits

Based on the foregoing, we note / recommend the following:

- Heavy Vehicle Deliveries (General)
  - Approaching from both the north and south is considered appropriate for these vehicles in the context of the pre-approved routes.
  - A permit will be required for the use of Bavin Road for these vehicles.

[1] https://maps.nhvr.gov.au/?view=Category&viewBy=Networks&networkLayerContext=NATIONAL_MAP&exemptionSetId=-2&networkIds=%5B5509%5D

6.3 Sight Distance Assessment

To ensure that vehicles are able to safely move into and out of the subject land, an inspection and assessment of the sight distance available at the following key locations has been undertaken:

- Site Access / Bavin Road; and
- Bavin Road / Byrnes Road.

Note: As part of an established road network, with no repeat incidents (refer Section 4.2.4) it is assumed that sight lines for other intersections further afield are appropriate.

6.3.1 Sight Distance Requirements

AustRoads Guide to Road Design - Part 4A: Unsignalised Intersections[2] 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 8.

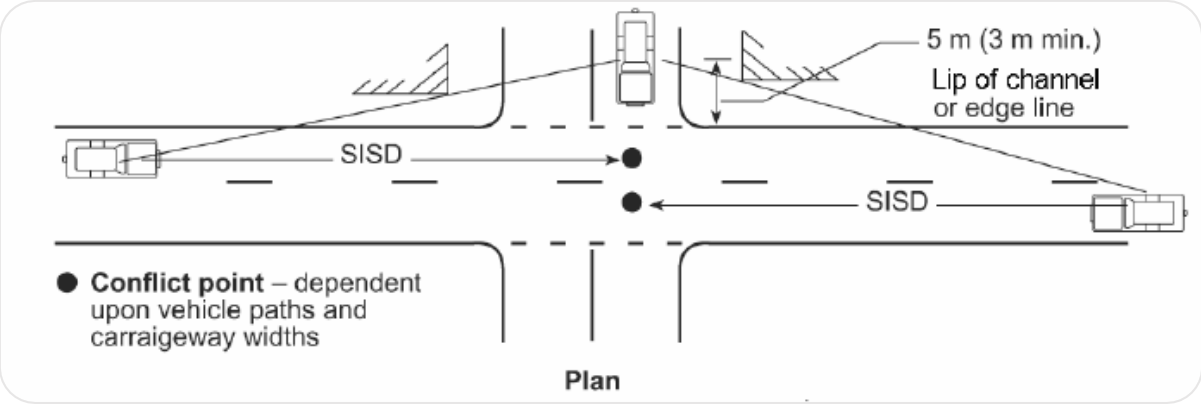


Figure 8 Guide to Measuring SISD for Unsignalised Intersections

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

The minimum SISD requirements can be determined for the following operating speeds as shown in Table 2.

Table 2 Sight Distance Requirements

Road	Speed Limit | Design Speed (km/h)	Sight Distance (m) Passenger Cars	Sight Distance (m) Heavy Vehicles
Bavin Road	100 | 110	300	366
Byrnes Road	80 | 90	226	269

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

6.3.2 Assessed Site Access Sight Distance

6.3.2.1 Site Access / Bavin Road

When on-site, it was observed / noted that sight lines between the site access point and Bavin Road were unobstructed without any vegetation or vertical / horizontal (i.e. bends and crests) impacting on sight lines.

Sight lines were observed to comfortably exceed 400 metres in each direction, as illustrated in Figure 9.

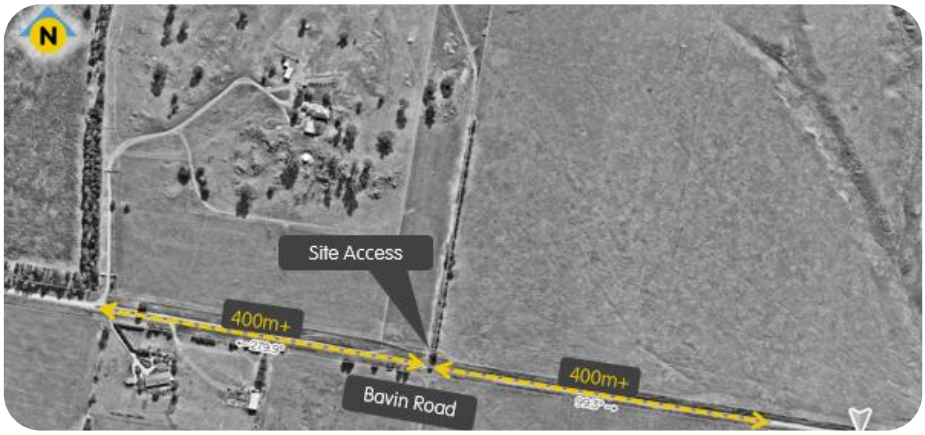


Figure 9 Sight Distance Assessment - Site Access / Bavin Road

6.3.2.2 Bavin Road / Byrnes Road

Whilst an existing intersection, the available sight lines were also measured between Bavin Road and Byrnes Road in each direction. On this occasion, sight lines along Byrnes Road were restricted due to a vertical crest (south) and a bend in the road (north). Noting these constraints, the following sight lines were observed / recorded:

- Bavin Road / Byrnes Road (south) 290m;
- Bavin Road / Byrnes Road (north) 280m

The available sight lines are also indicatively illustrated in Figure 10.



Figure 10 Sight Distance Assessment - Bavin Road / Byrnes Road

Based on the foregoing, we are satisfied that the available sight lines at each of these key locations are in accordance with the relevant design standards and therefore are not considered to present a safety risk.

6.4 Turning Lane Assessment

In addition to the above, reference has been made to AustRoads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings[3] (AGTM Part 6).

This document provides guidance on the warrants for various turn treatments at unsignalised intersections; based on turning volumes versus through traffic volumes.

They 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.

For the purposes of this turning lane assessment, we make the following assumptions / notes:

- Up to 81 inbound vehicles are expected to travel to the site during peak construction activities;
  - Of these, 60 are expected to be attributed to general traffic (staff), with the remaining associated with heavy vehicle deliveries.
  - It is therefore expected / assumed that up to 60 of these will occur during the morning peak (when staff arrive at the site) with the remaining 21 inbound movements spread across the day.
- All movements will arrive / depart from the one direction
  - This assumes that all staff either arrive from the north, or the south along Byrnes Road.
- Q_m (or major road traffic volume) is calculated using the method outlined in Figure 2.27 of the AGTM Part 6.
  - The major road volumes are based on the observations during our recent site inspection, specifically:
    - No more than 5 peak vehicle movements along Bavin Road (two-way); and
    - Between 250-300 peak vehicle movements along Byrnes Road (two-way).

Note: These warrants apply to new intersections and does not apply to existing intersections or access points. Notwithstanding, given the influx of traffic as a result of construction activities, it is considered an appropriate point of reference in this instance.

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

6.4.1 Turning Warrants - Bavin Road / Site Access

As above, all vehicles will travel along Bavin Road and turn left into the subject site.

The following figure provides an illustration of these movements in the context of Bavin Road (100km/hr speed limit)

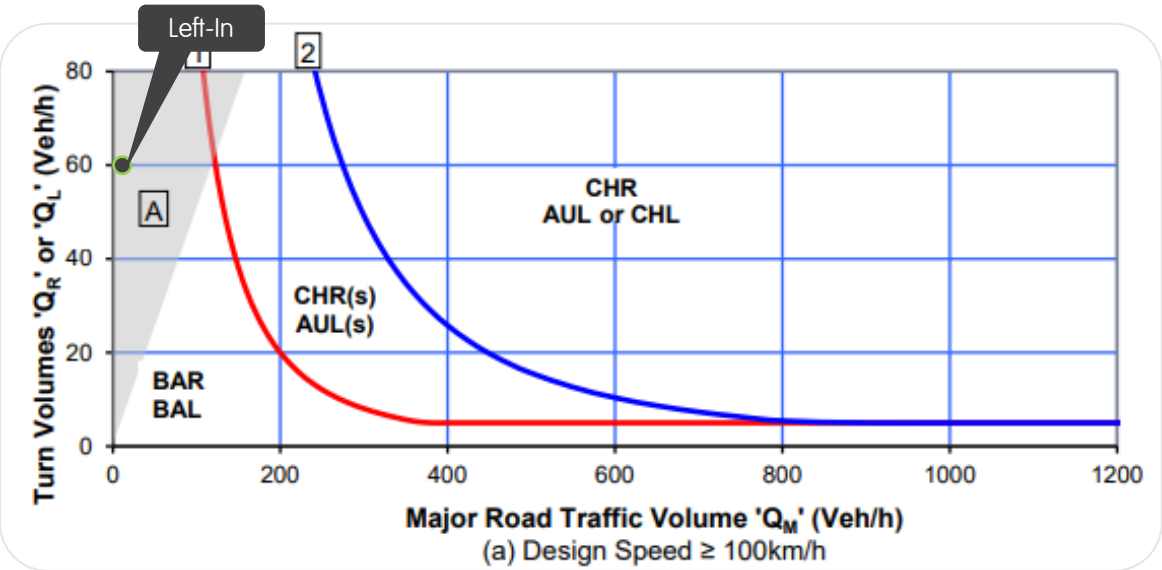


Figure 11 Warrants for Turn Treatments at Unsignalised Intersections - Bavin Road / Site Access

Based on the foregoing, we note that these movements would trigger a requirement to provide a Basic Left-Turn Treatment (BAL) for vehicles entering the site.

6.4.1.1 Recommendations

The above notwithstanding, given that the external traffic volumes are so low along Bavin Road and the intersection has adequate sightlines, we are satisfied that construction traffic can safely enter the subject site without additional width for a turn lane.

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

6.4.2 Turning Warrants - Bavin Road / Byrnes Road

The proposal will ultimately result in a significant increase of movement through the Bavin Road / Byrnes Road intersection (which does not currently have any turn treatments) and so an assessment has been done at this location also.

The following provides an illustration of these movements in the context of Byrnes Road (80km/hr speed limit, carrying approximately 330-350 peak period vehicle movements).

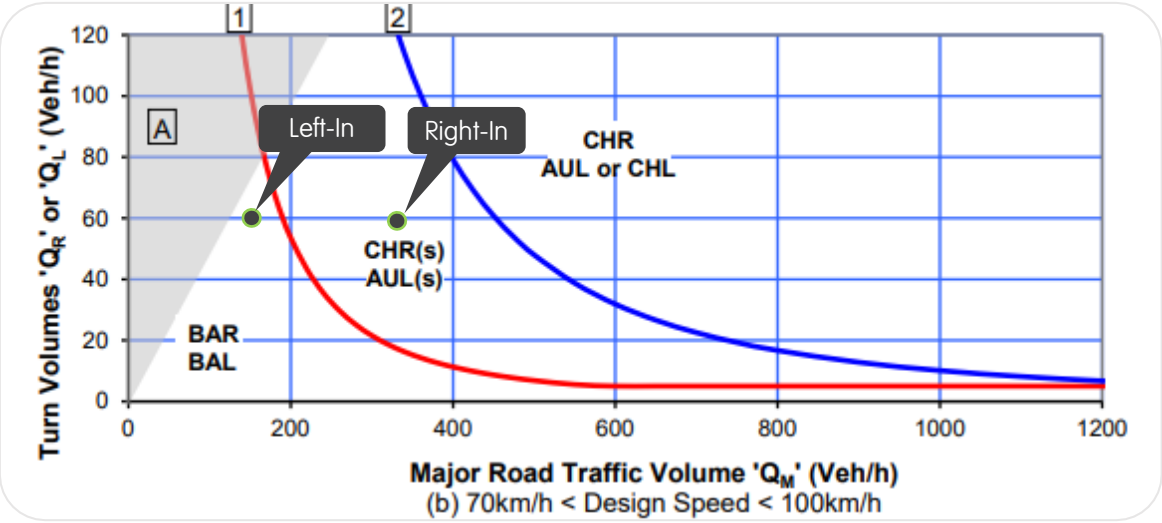


Figure 12 Warrants for Turn Treatments at Unsignalised Intersections - Byrnes Road / Bavin Road

As demonstrated above, if this level of traffic travelling through the intersection would warrant:

- Right Turn
  - A short channelised right turn lane (CHRs) if all vehicles were turning right into Bavin Road; or
- Left Turn
  - A basic left turn (BAL) if all vehicles were turning left into Bavin Road.

6.4.2.1 Recommendations

As above, the construction traffic would trigger a requirement to provide turning lanes / road widening for vehicles travelling left and right into Bavin Road from Byrnes Road.

On this occasion, we note that there are significant constraints with providing a right turn lane, most notably a high voltage power pole which is located approximately 5 metres from the edge of the existing road pavement.

In this regard we note that:

- Best practice road design aims to maximise the distance between kerbside structures and the edge of the road pavement.
- Widening the road to the west (i.e. providing for a right turn lane) would ultimately lead to the power pole being located within approximately 2 metres (or less) from the edge of the road pavement.
- This is considered to be very close to the road pavement - representing a significant safety risk.
- A safety barrier would be required to help offset this risk.
  - We note however that an appropriately design safety barrier would likely have an impact on the nearby property access at 171 Byrnes Road.
- Accordingly, it is likely that to provide for this turn lane, the high voltage power pole would likely need to be relocated.
  - Relocation of this power pole would be significant cost constraint to the project and also present as a major inconvenience to anyone that is relying on this power line.
  - It is also likely that any relocated power pole would still require a barrier treatment to be provided (in line with current best practice) and still have an impact on 171 Byrnes Road.

Based on the foregoing, we do not believe that provision of a right turn lane (CHRs or otherwise) would represent a viable solution in the context of this short-term construction traffic.

Accordingly, we recommend that the direction of travel for vehicles arriving to the site be restricted such that they are turning left into the site (i.e. all vehicles arrive from the north) and widening be provided for a basic left turn (BAL).

We note that a roundabout located approximately 3 kilometres north of Bavin Road, requiring vehicles to arrive at the site exclusively via the north would represent a maximum five (5) minute detour; depending on their origin, these vehicles could also travel to the site via Olympic Highway and Bomen Road.

We also note that similar restrictions have been observed / utilised on other similar projects in the past. A recent example is the recently approved traffic management strategy set out for the Goulburn River Solar Farm (TMP dated 18th December 2024)) which restricted construction movements to left-out at a certain location, ultimately resulting in a 10 kilometre detour.

Ultimately, they are planning to enforce this through employee contracts and haulage agreements. They will be leveraging monitoring equipment at the key intersection (and reviewing it at set intervals) to ensure compliance.

Accordingly, this outcome is considered appropriate (and sufficiently convenient) in the context of the subject site and construction traffic.

To support this outcome, we recommend that:

- Agreements / contracts be put in place with employees and haulage contractors which set out the project expectations with respect to the direction of travel when entering / leaving Bavin Road
  - They should highlight the risk associated with non-compliance and any reprimands that will be put in place.
- A camera be installed at the intersection of Bavin Road and Byrnes Road to record construction traffic travelling to / from the site.
  - Footage should be reviewed regularly to monitor compliance, and action taken accordingly for anyone found not to comply.
- Supplementary 'trucks crossing' signs or similar could also be used at this location to provide advanced warning to motorists driving along this road.

The above outcomes should be discussed and agreed with Council as part of any future detailed Traffic Management Control Plan for construction traffic travelling to / from the site.

6.5 Spatial Considerations

To confirm construction vehicles will be able to access the subject site, a swept path assessment has been undertaken to demonstrate how vehicles can move into and out of the site from the arterial road network.

Specifically, swept path analysis has been prepared for a 26m B-Double at the following locations:

- Bavin Road / Site Access; and
- Byrnes Road / Bavin Road
  - Swept paths include allowance for the recommended basic left turn (BAL) - discussed above.

The swept path assessment can be found attached as Appendix A.

6.5.1 Bavin Road / Site Access

The swept path assessment (see Appendix A) confirms that B-Double trucks will be able to enter and exit the site (using the proposed site access) within the existing Bavin Road pavement.

No additional pavement is required to physically cater to this movement.

6.5.2 Byrnes Road / Bavin Road

We note / recommend that construction traffic should be able to enter / exit Bavin Road (from Byrnes Road) at the same time.

The swept path assessment (see Appendix A) shows the additional pavement width required on Bavin Road and Byrnes Road to deliver the basic turn lane and accommodate concurrent vehicle movements for B-doubles.

The additional pavement can be delivered whilst remaining entirely within the existing road reserve and will not have any impact on private property.

Note:

> Given the roads along the proposed haulage route before this point are entirely pre-approved for use by B-doubles, we expect that they can physically cater to the proposed construction traffic.

6.6 Traffic Impact & Road Capacity

As above, the proposed development is projected to generate up to 162 additional movements per day (comprising 120 light vehicles, 40 heavy vehicles and 2 vehicles requiring escort) during peak construction activities (Stage 2).

It is expected that this will represent the absolute maximum daily movements expected, and that fewer movements are likely to be generated at times during Stage 2, and throughout Stage 1 as well.

6.6.1 Byrnes Road

Byrnes Road currently carries in the order of 3,300 daily vehicle movements. The temporary increase of 162 daily movements during peak construction activities represents an increase of approximately 5% and will not have a material impact on the operation of amenity of Byrnes Road (or the broader road network once distributed).

Once in operation, the traffic generated by the site (up to two daily movements) is not expected to be noticeable in the context of existing traffic on the road network.

6.6.2 Bavin Road

Bavin Road is local access road which currently provides for direct access to minimal lots and parcels of land.

This road has been sealed for approximately 240 metres from Byrnes Road and continues as an unsealed road from thereafter until the site access points.

Following an inspection of the subject site, we make the following recommendations to ensure that Bavin Road can conveniently and safely cater to proposed construction traffic:

- We recommend that the sealed portion of Bavin Road be extended by a further 40 metres (minimum) such that it is constructed past the local low point (see Figure 13)
  - During our inspection of the site, this low point was observed and noted to pool water;
  - It is expected that construction traffic would have a significant impact on the condition of the road at this location in wet months.



Figure 13 Bavin Road - Low Point

Once in operation, site generated traffic (up to two daily movements) will not have a material impact on the operation or safety of movements along this road.

Note:

It is understood that in consultation with Council, the proponent has agreed to upgrade the full extent of Bavin Road (i.e. from Byrnes Road until the site access) to avoid any ongoing issues with repair and maintenance.

6.6.3 Intersection Performance - Bavin Roads / Byrnes Road

To understand the impact that this additional traffic might have on the key intersection between these two roads, an analysis of the traffic conditions during peak construction activities was undertaken using SIDRA 10. Critical outputs of this network analysis software are:

Degree of Saturation (D.O.S.) - Defined as the ratio of the volume of traffic observed making a movement compared to the maximum capacity for that movement.

These are rated as follows:

D.O.S.	Rating
Up to 0.6	Excellent
0.6 to 0.7	Very Good
0.7 to 0.8	Good
0.8 to 0.9	Fair
0.9 to 1.0	Poor
Above 1.0	Very Poor

In evaluating intersection performance during capacity analysis and design the target maximum degree of saturation of the critical (maximum) movement is:

Unsignalised intersection: 0.80 (desirable) and 0.85 (maximum)

Signalised Intersection: 0.90 (desirable) and 0.95 (maximum)

95th Percentile (95%ile) Queue - Defined as the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour; and

Average Delay - Defined as the delay time, in seconds, which can be expected over all vehicles making a movement in the peak hour.

Anticipated Movements (Peak Construction)

As noted above, the proposal is expected to generate up to 160 daily movements and 60 peak period vehicle movements during peak construction activities (peak period movements are expected to be comprised of light vehicles associated with workers travelling to / from the subject site).

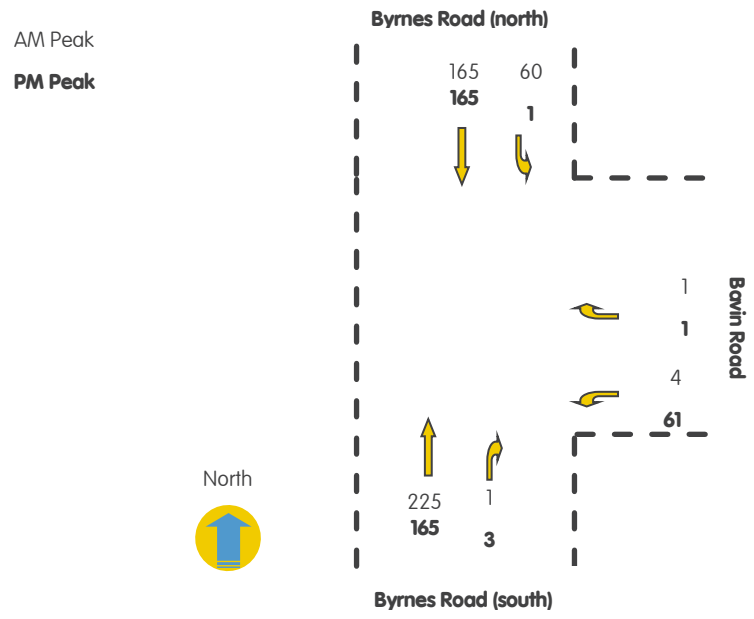
In addition to the above, the following assumptions were made in relation to vehicle movements at the Bavin Road / Byrnes Road intersection:

- Origin / destination for staff not known at the time of writing, accordingly conservatively assumed that all commuter peak movements will arrive from the south, travel past the site and then return to turn left into Bavin Road.
  - In reality, the total number of movements would likely be reduced, with some vehicles likely to arrive directly from the north.
- Existing peak movements along Byrnes Road adopted as 10% of the daily recorded movement (as described in Section 6.4), translating to a peak of 330 two-way movements along Byrnes Road.
- It is assumed that this traffic is broadly distributed 50/50 between northbound and southbound movement.
  - This was validated through observations made on-site during the daytime inspection.
- Bavin Road assumed to carry up to 5 existing peak period vehicle movements.
  - Site observations confirm that this is conservative, with minimal movements observed along Bavin Road.
  - For the purposes of this assessment it is assumed that mostl of these arrive from or depart to the Wagga CBD area.

Based on the above, the following movements have been adopted and modelled at this intersection.

Table 3 Combined Development Volumes - AM & PM Peak Hour

Development Volumes



Note:

In addition to the above peak period movements, a scenario testing the impact heavy vehicle access would have throughout the day was also undertaken, with heavy vehicles assumed to be distributed relatively evenly throughout the day.

The results of the analysis are summarised at Table 4 and Table 4, with SIDRA model outputs are provided as Appendix C.

Table 4 Performance - Commuter Peak (Peak Construction)

Intersection	Approach	AM Peak			PM Peak		
		DOS	Queue (m)	Delay (sec)	DOS	Queue (m)	Delay (sec)
Byrnes Road / Bavin Road	South	0.140	0	0	0.106	0	0
	East	0.001	0	8	0.049	1	8
	North	0.144	0	2	0.110	0	0
	Intersection	0.144	0	8	0.11	1	8

Table 5 Performance - Day time, heavy vehicles (Peak Construction)

Intersection	Approach	Midday		
		DOS	Queue (m)	Delay (sec)
Byrnes Road / Bavin Road	South	0.11	0	0
	East	0.007	0	10
	North	0.115	0	0
	Intersection	0.115	0	10

As demonstrated above, this intersection will operate in the 'Excellent' conditions range during the peak construction scenario, with minimal delays and queues.

Note:

Outside of this intersection, vehicles will disperse to (or arrive from) the broader road network via the north (and Merino Road / Olympic Highway) or south (and Oura Road / Eunony Bridge Road).

At the time of writing this report, the origin / destination for staff trips is not known and therefore an assessment of intersections farther afield isn't realistic.

Given the additional trips (60 inbound in the morning, or 60 outbound in the evening) in each peak period will be spread across these connections, it is expected / noted that the impact on intersection performance will be negligible.

Should further detailed assessment of intersections farther afield be required, we recommend that this be undertaken as a condition of consent, once more certainty around staff locations is known and can be modelled accordingly.

6.6.4 General Road Maintenance During Construction

In addition to the above, we also recommend that prior to construction the applicant / EPC contractor liaise with Council/TfNSW in respect to maintenance and repair work along the relevant sections of these roads during the construction period (in particular for Bavin Road).

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.

6.7 Heavy Vehicle Deliveries (Requiring Escort)

In addition to the typical BESS components, there will also be 1-2 heavier components which will require an escort when being delivered.

A specific Construction Traffic Management Plan for escorted OSOM vehicles will be developed following appointment of a construction team, once consent has been granted and all relevant vehicle details have been confirmed.

Notwithstanding, TfNSW and Council have advised that as part of this EIS submission, a concept level assessment is required to determine the likely impacts of critical intersections along the proposed haulage route to the subject site.

This concept level assessment is presented below and supported by swept path analysis presented in Appendix B.

It is noted that the detailed design of the transformer / battery has not yet been finalised by the project team, and thus the following dimensions set out within Table 6 and graphically in Figure 14 have been assumed for the purposes of this assessment (based on similar projects in the past). Based on these vehicle specifications, the vehicle transporting the BESS components is classified as a low-risk oversized vehicle.

Table 6 OSOM Vehicle Specifications

Limit Restrictions	Limit Specifications	Vehicle Specifications	Oversized / Overmass
Oversized	Greater than 19m in length	38m	✓
	Greater than 2.5m in width	4.9m	✓
	Greater than 4.3m in height	5.4m	✓
Overmass	Heavier than 42.5 tonnes	130 t	✓

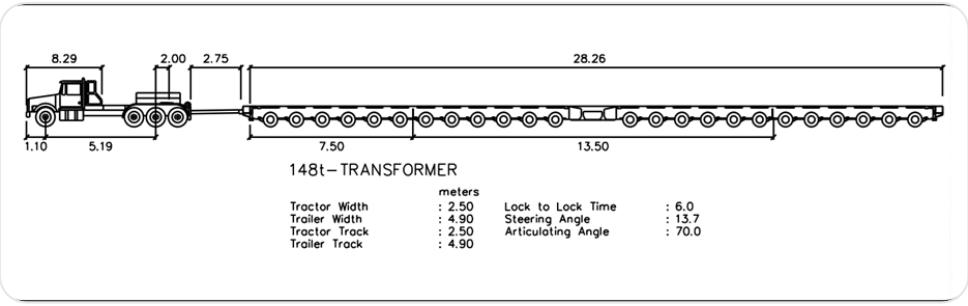


Figure 14 Proposed 14-Axle OSOM Vehicle

Note:

This is commensurate (albeit slightly smaller) than the vehicle which has been reviewed and approved as part of the HumeLink project.

6.7.1 Proposed OSOM Haulage Route

We note that the HumeLink project has recently received approval for a similar vehicle type to be hauled along the Sturt Highway up until the Elizabeth Avenue intersection (in Forest Hill).

Accordingly, on this occasion, it has been agreed with both Council and TfNSW that these vehicles will be able to arrive at Wagga along the Sturt Highway, following routes that have previously been approved by other projects. An analysis is therefore only required for the remaining route between Sturt Highway and the subject site.

Noting the above, the following route has been analysed for the purposes of this assessment:

- Sturt Highway turn right onto Eunony Bridge Road
- Eunony Bridge Road continue straight onto Byrnes Road
- Byrnes Road turn right onto Bavin Road.

A route assessment has been undertaken along the above route, and the associated works required have been highlighted in Table 7, with detailed swept paths attached as Appendix B for reference.

The swept paths undertaken utilise any existing mountable islands where deemed appropriate to facilitate the required manoeuvre, and if not applicable, highlights the extent of any civil works (e.g. signage removal, removal of medians etc.). In addition, all infrastructure removal works as a result of the OSOM manoeuvre will need to be reinstated to the satisfaction of the relevant road authority (Council / TfNSW).

Table 7 Sturt Highway - Subject Site OSOM 'Pinch Points'

ID	Location	Coordinates	Works Required / Comments
IN-01	Sturt Highway / Eunony Bridge Road	35°07'32"S 147°25'14"E	Existing signage to be temporarily removed. Existing frangible light pole to be temporarily removed. Roundabout and traffic islands to be made mountable / trafficable.
IN-02	Eunony Bridge Road / Byrnes Road	35°06'00"S 147°24'10"E	Roundabout and traffic island to be made trafficable. Some signs to be temporarily removed.
IN-03	Byrnes Road / Bavin Road	35°05'05"S 147°24'22"E	No further modification work required*

* Upgrades have been proposed at this location as part of the following assessment (see below).

A bridge was observed along Eunony Bridge Road that vehicles will be required to traverse. Council have indicated that this bridge will have sufficient capacity to cater for proposed OSOM movements. We note however that this should be confirmed as part of the detailed haulage assessment prior to construction.

This investigation revealed that only minor modifications / works would be required along this local route to provided for OSOM access.

It is noted that any infrastructure (such as pavement or signage) that is temporarily removed or changed during these works / haulage, will be required to be reinstated post construction (as required by the relevant authority).

In addition, we note that the OSOM movement will require escort / pilot vehicles along the entire route, whereby these pilot vehicles will be responsible for stopping / temporarily holding traffic when delivery trucks move through relevant pinch points. These OSOM vehicles can utilise the full carriageway width with pilot cars used to hold up traffic where required to achieve the manoeuvre.

Further, it is noted that rear steering will be used by these vehicles at most intersections to assist in movement and minimising the extent of impact.

Based on the above, we are satisfied that this route is appropriate for transporting the over-size components from Sturt Highway to the subject site.

7 Traffic Management

7.1 Traffic Management - High Level

External

As above, once the above recommendations have been adopted, 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 Bavin Road and Byrnes Road, to assist in alerting drivers as to the possibility of trucks entering / exiting the intersection.

Additionally, a monitoring camera will be installed at this intersection to record construction movements into and out of Bavin Road.

The footage is to be reviewed at regular intervals (to be confirmed at a time closer to construction) or in response to a compliant, to ensure necessary corrective measures are taken to ensure compliance.

Note:

Any specific traffic management requirements for 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.

7.2 Traffic Mangement Plan

Subject to the appointment of a supplier / construction contractor and other considerations, aspects of the Wagga North 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 Wagga Wagga City Council, TfNSW, 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 construction 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.

8 Authoritiy Liaison

IMPACT® and the project team have engaged with Council (Wagga Wagga City Council) and Transport for NSW (TfNSW) to understand if they had any specific requirements relating to the proposed BESS development.

A meeting was held with both Council and TfNSW representatives on the 13th November 2024 and the following feedback was received from these authorities:

- An assessment of the proposed Over-Size, Over-Mass (OSOM) vehicles is required to be provided as part of any traffic impact assessment.
    - With a recent approval for the HumeLink project, a dedicated OSOM route has already been analysed up to the Sturt Highway.
    - This assessment therefore need only consider the local link / connection between Sturt Highway and the subject site.
- Council request that a copy of the terms for the ROW easement on 116 Bavin Road that provides legal access to the Bomen Electricity substation that the BESS will connect into.
- Council do not believe that the nearby power pole or stormwater pit are significant enough impediments to prevent the construction of an auxiliary right turn lane and that restricting the direction of travel for vehicles (to left-in / left-out) is not practical or enforceable.
- Council agree that Bavin Road should be sealed until past the dip, to prevent increased pavement deterioration.
- Given the increase in traffic along Bavin Road during construction, Council have suggested that the project would be responsible for maintenance of this road, and that it may need to be re-sheeted throughout the construction period.

The preceding assessment has been prepared and taken the above feedback into consideration. Please see below a brief response to each of the above points, and relevant sections in the report where this has also been addressed.

OSOM Vehicle Access

In response to this commentary and request from Council and TfNSW, a haulage assessment for a OSOM vehicle combination has been prepared (based on a similar past projects).

This assessment considered vehicle access from Sturt Highway through to the subject site and found no major concerns along this path (with access up until this point to remain consistent with the recently approved OSOM haulage route for the HumeLink project)

Section 6.7 (above) provides a breakdown of the assessment which was completed.

Terms of Easement Access

At the time of writing this report, **IMPACT**® did not have access to the terms of easement.

We are advised that this will be provided to Council by the project team as part of a separate document / process.

Right Turns and Travel Restrictions

Section 6.4.2.1 outlines the proposed strategy with respect to vehicle access to / from the subject land.

With respect to providing the turn lane infrastructure, we note that:

- Providing for a right turn lane will lead to the high voltage power pole being located within close proximity to the road pavement.
- A barrier would be required to help reduce the risk associated with the proximity of this poole to the road pavement.
    - Any future barrier provided at this location would most likely have an impact on the nearby 171 Byrnes Road property access.
    - Any barrier that doesn't impact on this access would be considered non-compliant / substandard.
- Noting the above, the power pole would likely need to be relocated should a right turn lane be constructed.
    - Relocating the power pole would be a significant cost and likely have negative impacts (albeit temporary) on anyone who relies upon this power line.
    - Additionally, it is likely that any relocated power pole would also require a barrier for protection (in line with current best practice road design standards).

Based on this assessment (and in the context of a short-term construction project) it wasn't considered feasible to construct the right turn lane.

It was therefore maintained that the direction of travel be restricted to left-in / left-out as outlined above.

Notably, we recommend that the site leverage techniques to enforce this movement such as:

- Employee and haulage contractor agreements which require people to adhere to the proposed vehicle access strategy.
    - Appropriate reprimands will be put in place for anyone found not to comply with these contracts.
- Monitoring devices were recommended at the intersection of Byrnes Road / Bavin Road to help monitor vehicle movement at this location
    - Footage to be reviewed regularly to help enforce compliance.

We are satisfied that this is an appropriate outcome in the context of what is proposed. Notably, this outcome is consistent with other similar developments (such as the Goulburn River Solar Farm - as described in Section 6.4.2.1)

Note:

> Subsequent consultation and liaison was held with Council on this topic, with Council tabling additional options that could be explored to provide a right turn lane for vehicles entering from Byrnes Road.
>
> A letter assessing the options provided by Council in relation to the right turn movements from Byrnes Road into Bavin Road can be found attached as Appendix D

Bavin Road Gravel & Sealed Pavement

Section 6.6 outlines the recommended strategy in relation to the road conditions and pavement along Bavin Road.

Outside of the proposed pavement upgrade (for the first portion of Bavin Road), we recommend that the applicant and Council form an agreement with respect to the upkeep and maintenance of Bavin Road during construction activities. This could form part of a condition of consent.

9 TransGrid Connection Works

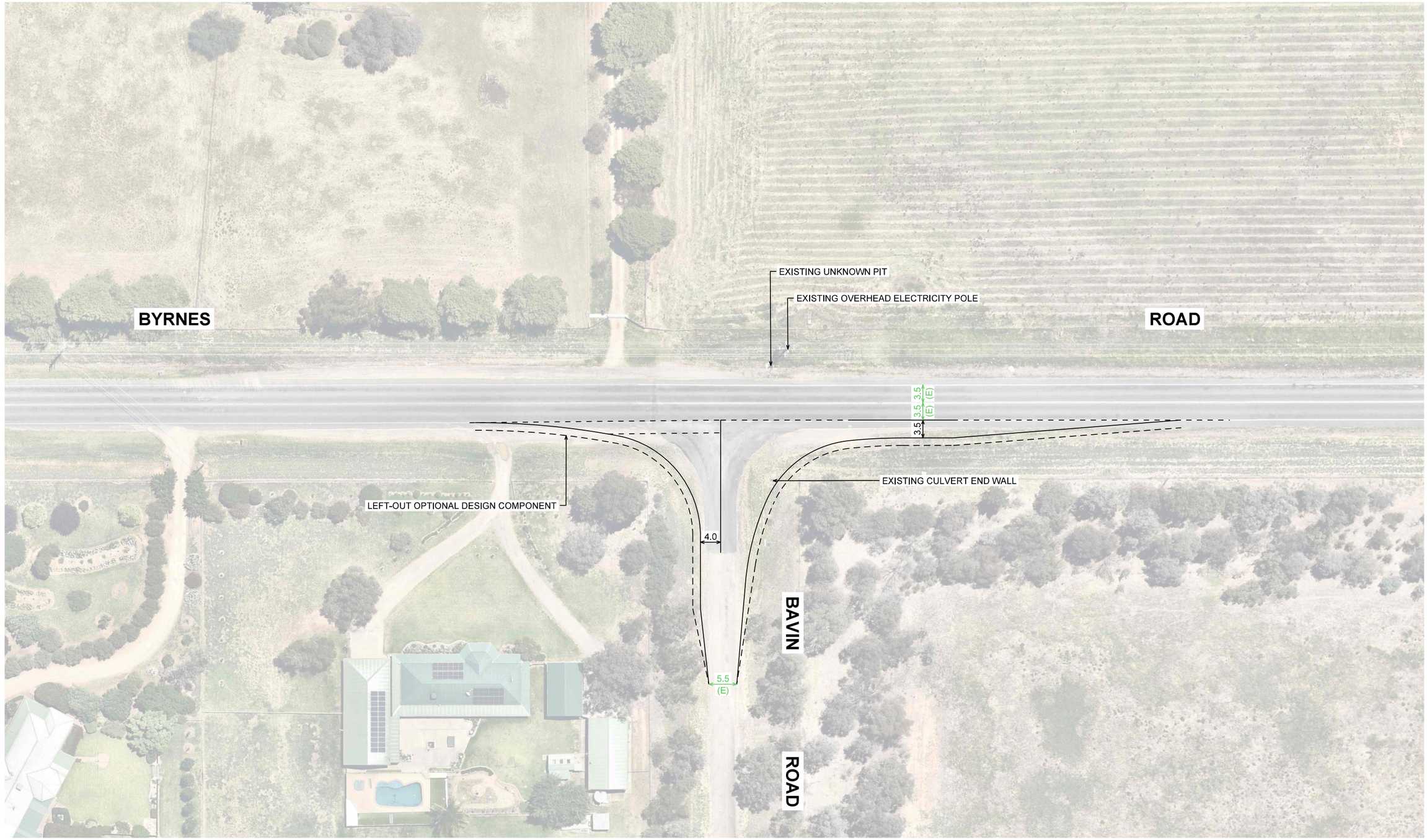
We understand that as part of the approval process, authorities have requested an assessment of the traffic impacts associated with the proposed TransGrid connection works.

This assessment, as provided in Appendix E, provides a high-level overview of expected construction traffic volumes, duration of works, impacts as a result of this BESS project and access arrangements. The assessment confirms that the works can be accommodated without requiring permanent intersection upgrades and that any traffic control measures be managed / implemented as part of the TMP during construction.

APPENDIX A
Conceptual Intersection Design & Swept Path Analysis

Design Vehicle

— 26m B-Double



GENERAL NOTES:
1. ALL DIMENSIONS ARE TO FACE OF KERB AND CHANNEL UNLESS NOTED OTHERWISE.
2. LOCAL ROAD - BEVIN ROAD (SPEED ZONE 100KM/H DEFAULT).
   DECLARED ROAD - BYRNES ROAD (SPEED ZONE 80KM/H).
3. BASE INFORMATION FROM NEARMAP AERIAL PHOTOGRAPHY DATED 14.12.2023

17/09/2024 10:52:27 AM

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Date **2024-09-17**
Drawn / Approved **CB / WD**

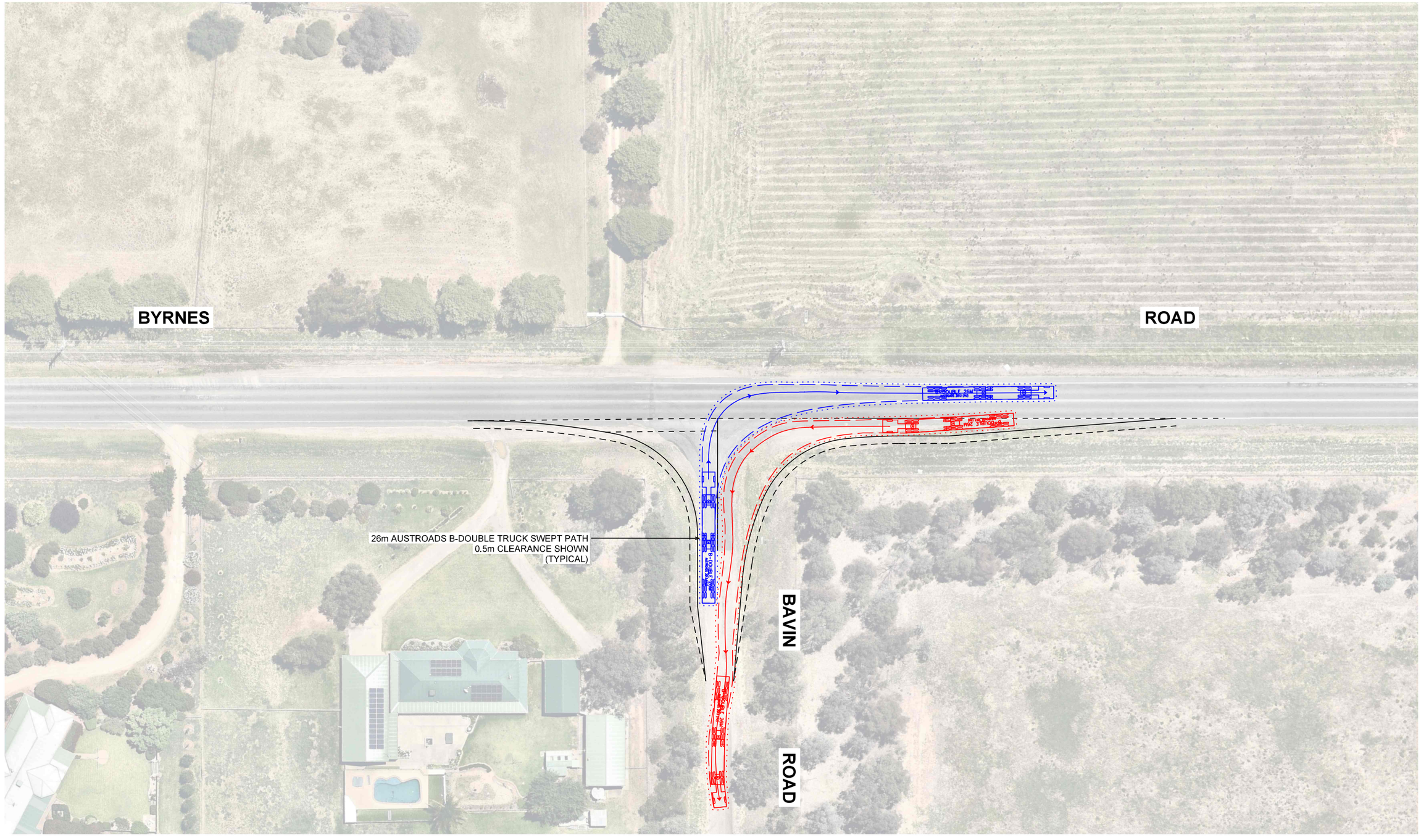
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BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

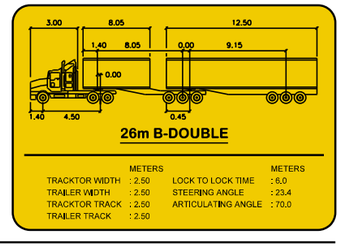
Title
CONCEPT INTERSECTION UPGRADE
BAL TREATMENT - CONCURRENT DESIGN VEHICLES
WITH LEFT-OUT OPTION

Status
PRELIMINARY

Drawing Number
IMP2405042 - DRG-06-01

Revision
A





26m B-DOUBLE

	METERS		METERS
TRACKTOR WIDTH	: 2.50	LOCK TO LOCK TIME	: 6.0
TRAILER WIDTH	: 2.50	STEERING ANGLE	: 23.4
TRACKTOR TRACK	: 2.50	ARTICULATING ANGLE	: 70.0
TRAILER TRACK	: 2.50		

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Date **2024-09-17**
Drawn / Approved **CB / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

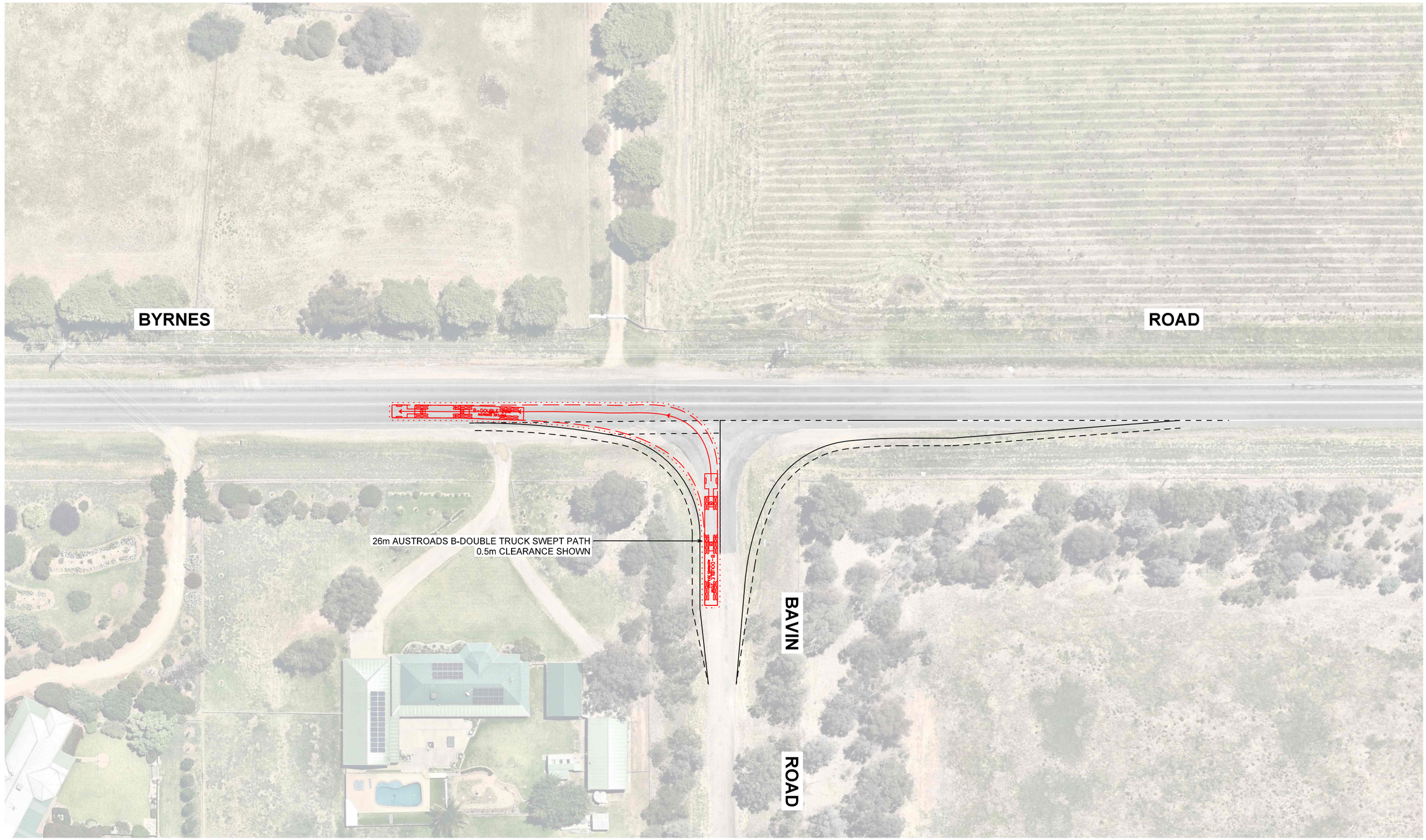
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SWEPT PATH ANALYSIS
26m AUSTROADS B-DOUBLE TRUCK

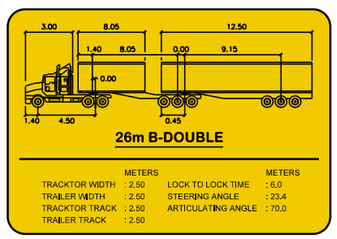
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1:750 @ A3

Client
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Date **2024-09-17**
Drawn / Approved **CB / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

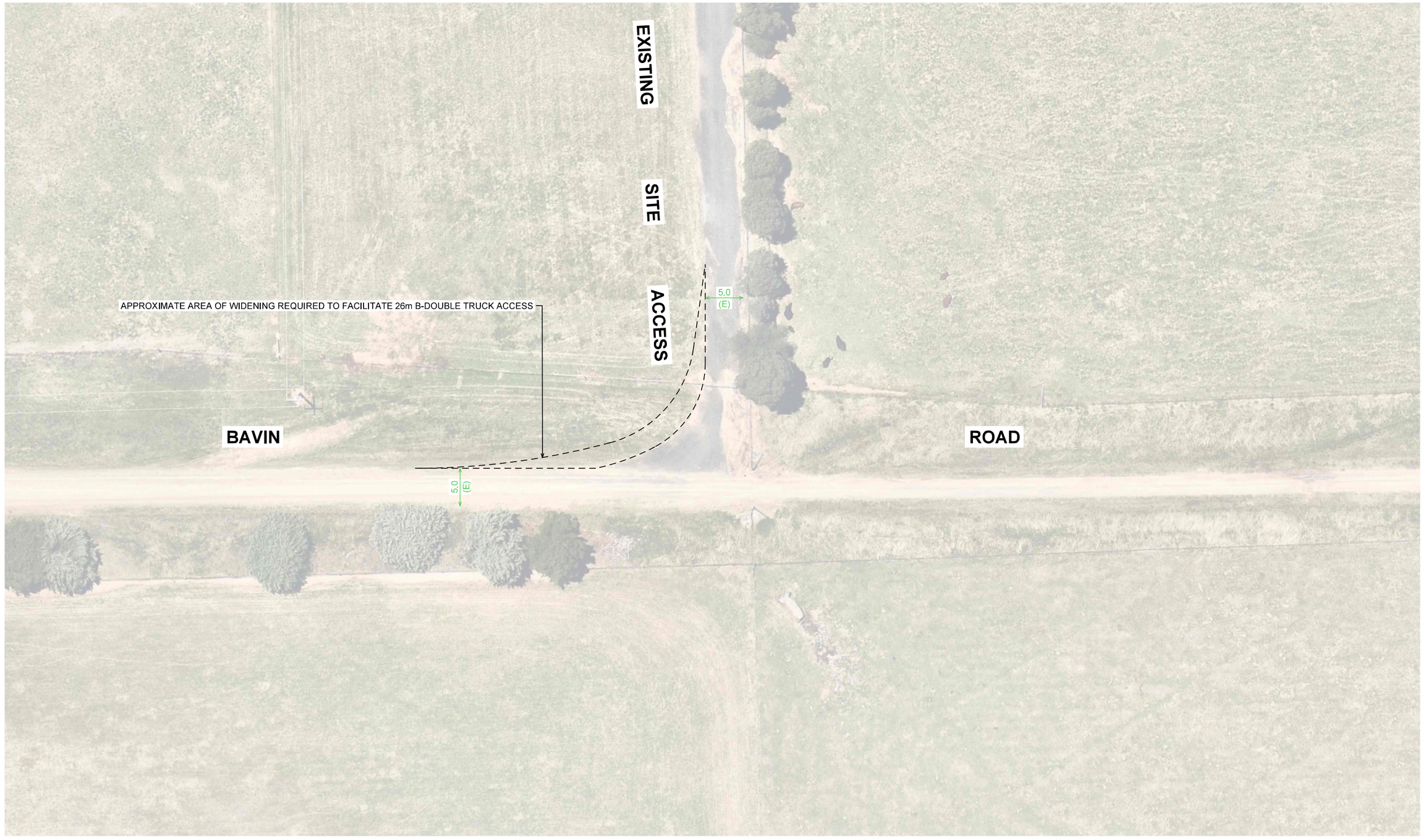
Title
CONCEPT INTERSECTION UPGRADE
SWEPT PATH ANALYSIS
26m AUSTROADS B-DOUBLE TRUCK

Status
PRELIMINARY

Drawing Number
IMP2405042 - DRG-06-03

Revision
A

17/09/2024 10:52:29 AM



GENERAL NOTES:
1. ALL DIMENSIONS ARE TO FACE OF KERB AND CHANNEL UNLESS NOTED OTHERWISE.
2. LOCAL ROAD - BAVIN ROAD (SPEED ZONE 100KM/H DEFAULT).
3. BASE INFORMATION FROM NEARMAP AERIAL PHOTOGRAPHY DATED 14.12.2023

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Date **2024-09-17**
Drawn / Approved **CB / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

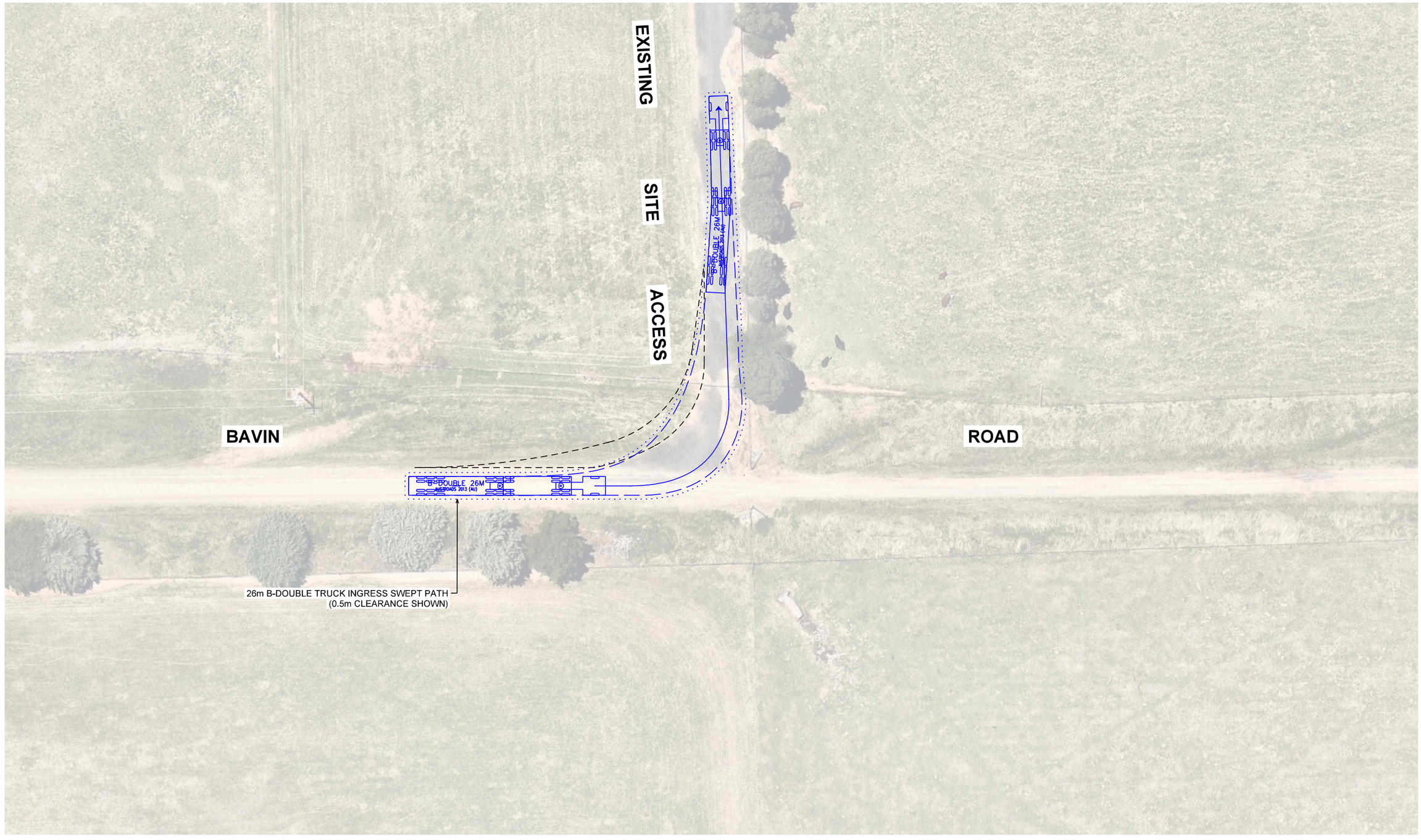
Title
EXISTING SITE ACCESS ASSESSMENT
PROPOSED WIDENING

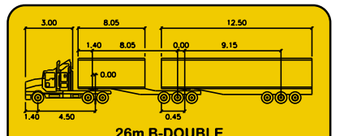
Status
PRELIMINARY

Drawing Number
IMP2405042 - DRG-07-01

Revision
A

17/09/2024 3:33:31 PM





26m B-DOUBLE

	METERS		METERS
TRACKTOR WIDTH	: 2.50	LOCK TO LOCK TIME	: 6.0
TRAILER WIDTH	: 2.50	STEERING ANGLE	: 23.4
TRACKTOR TRACK	: 2.50	ARTICULATING ANGLE	: 70.0
TRAILER TRACK	: 2.50		

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Date **2024-09-17**
Drawn / Approved **CB / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

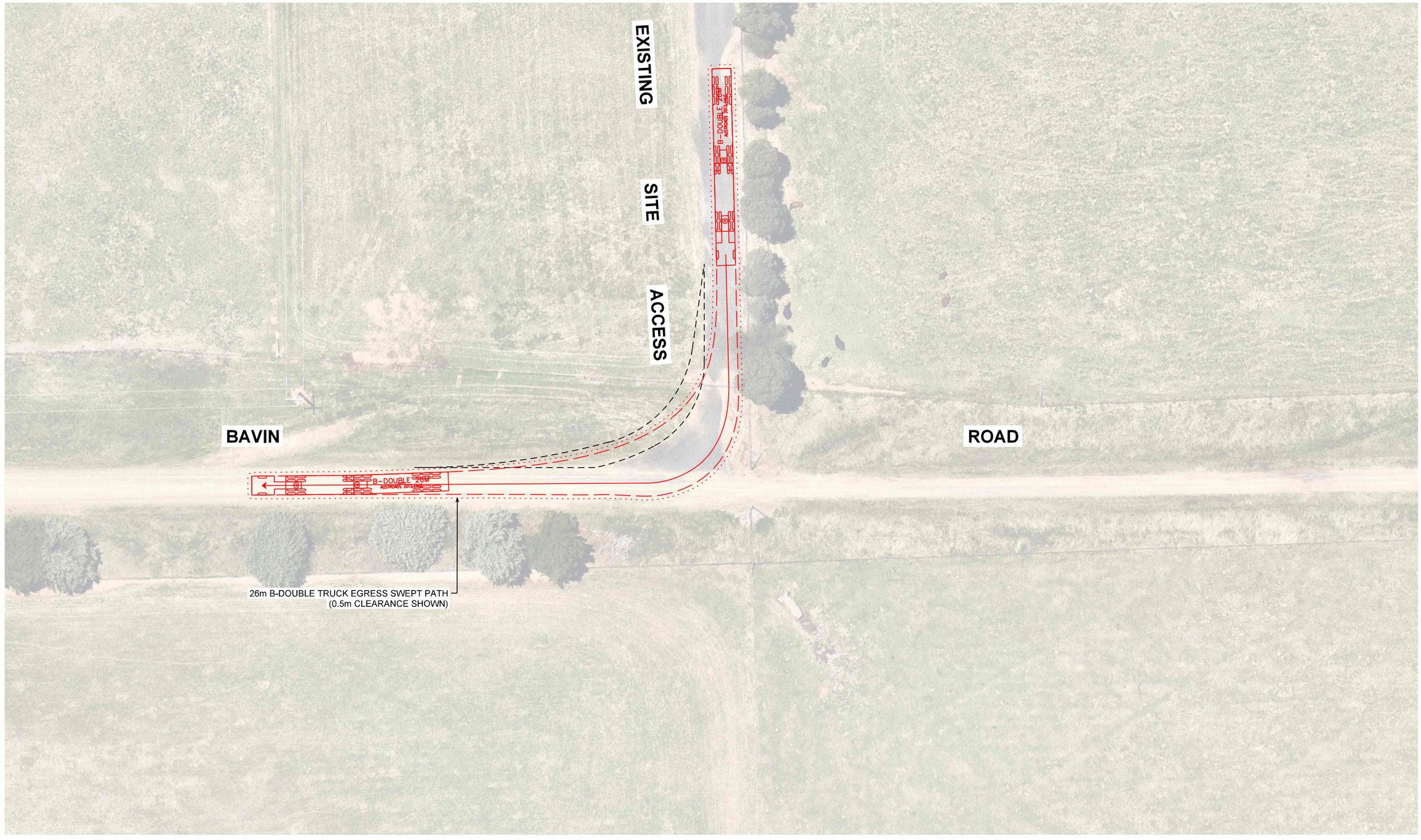
Title
EXISTING SITE ACCESS ASSESSMENT
SWEPT PATH ANALYSIS
26m B-DOUBLE TRUCK

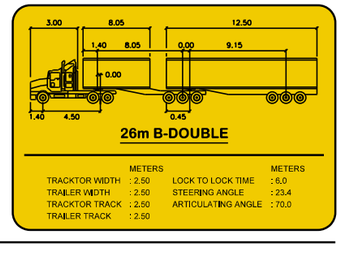
Status
PRELIMINARY

Drawing Number
IMP2405042 - DRG-07-02

Revision
A

17/09/2024 3:33:33 PM





26m B-DOUBLE

	METERS		METERS
TRACKTOR WIDTH	: 2.50	LOCK TO LOCK TIME	: 6.0
TRAILER WIDTH	: 2.50	STEERING ANGLE	: 23.4
TRACKTOR TRACK	: 2.50	ARTICULATING ANGLE	: 70.0
TRAILER TRACK	: 2.50		

NGH

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Client
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Date **2024-09-17**
Drawn / Approved **CB / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

Title
EXISTING SITE ACCESS ASSESSMENT
SWEPT PATH ANALYSIS
26m B-DOUBLE TRUCK

Status
PRELIMINARY

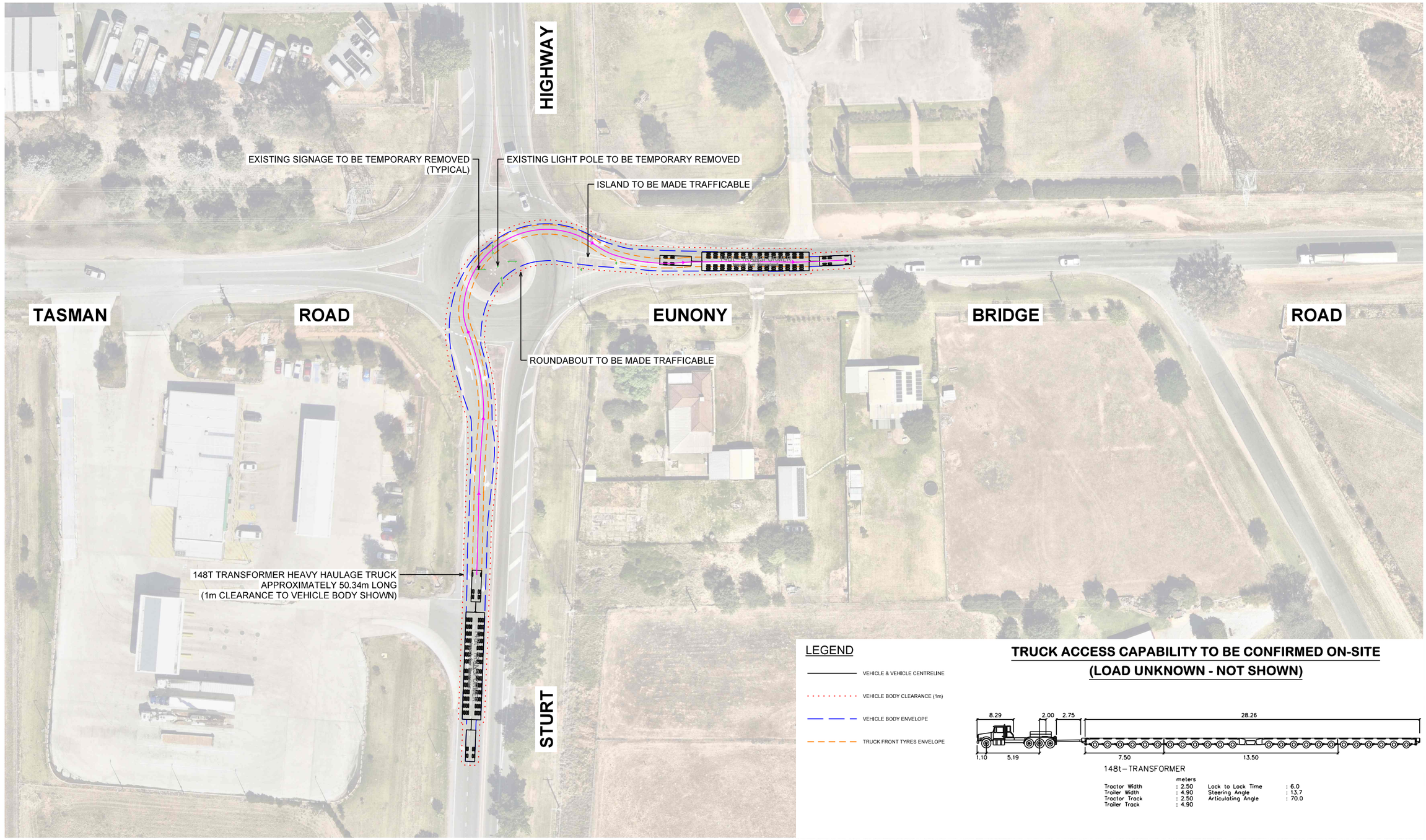
Drawing Number
IMP2405042 - DRG-07-03

Revision
A

17/09/2024 3:33:33 PM

APPENDIX B
OSOM Swept Path Assessment

38m Long, 14 Axle OSOM Vehicle



LEGEND

- VEHICLE & VEHICLE CENTRELINE
- VEHICLE BODY CLEARANCE (1m)
- VEHICLE BODY ENVELOPE
- TRUCK FRONT TYRES ENVELOPE

TRUCK ACCESS CAPABILITY TO BE CONFIRMED ON-SITE
(LOAD UNKNOWN - NOT SHOWN)

148t – TRANSFORMER

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 4.90	Steering Angle	: 13.7
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 4.90		

GENERAL NOTES:
1. ALL DIMENSIONS ARE TO FACE OF KERB AND CHANNEL UNLESS NOTED OTHERWISE.
2. LOCAL ROADS - EUNONY BRIDGE ROAD (SPEED ZONE 60KM/H).
   - TASMAN ROAD (SPEED ZONE 60KM/H).
   DECLARED ROADS - STURT HIGHWAY (SPEED ZONE 60KM/H).
3. BASE INFORMATION FROM NEARMAP AERIAL PHOTOGRAPHY DATED 16.11.2024

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Date **2025-01-17**
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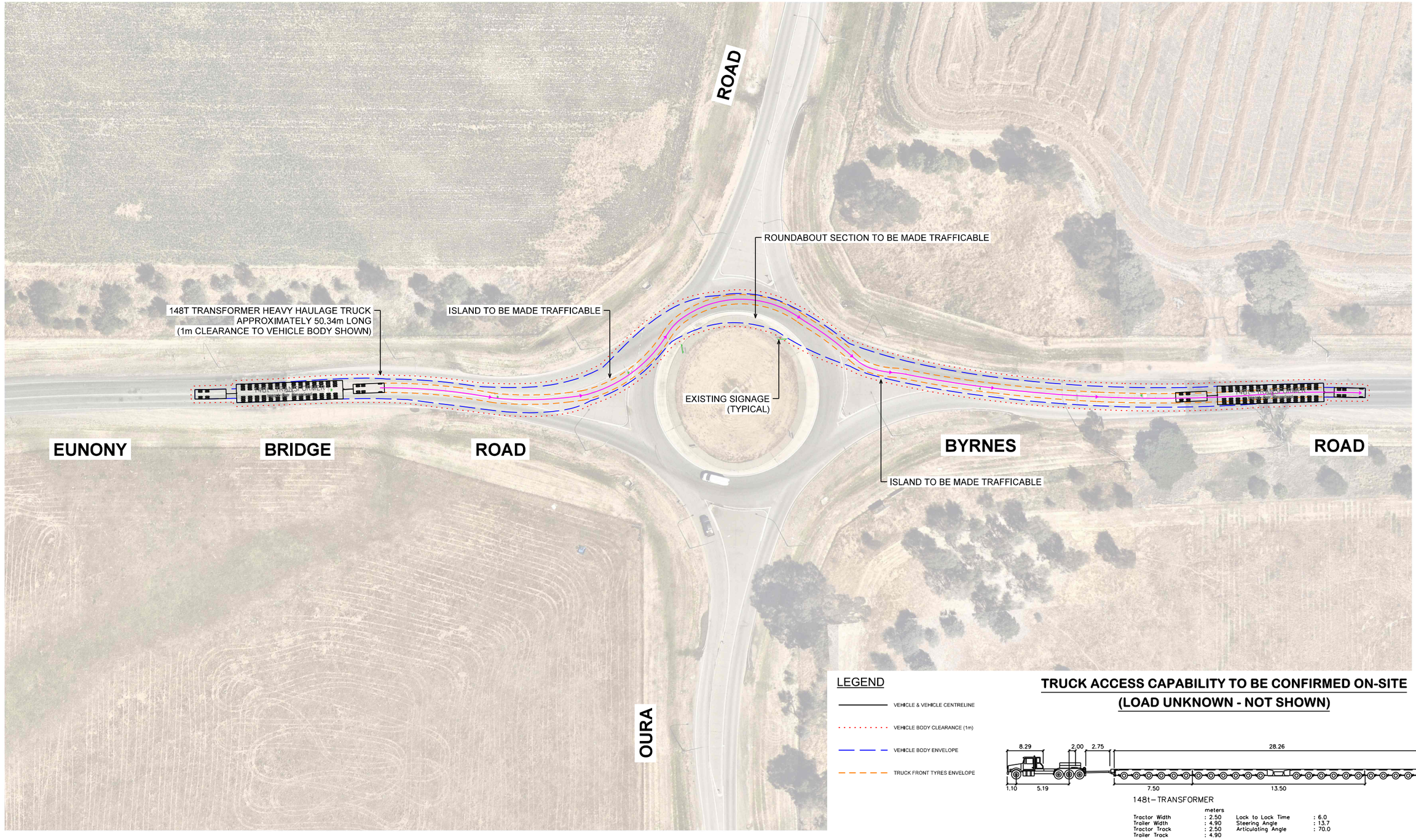
Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

Title
O.S.O.M HEAVY TRANSPORT ROUTE ASSESSMENT
PRELIMINARY SWEPT PATH ANALYSIS - 148T HAULAGE
STURT HWY/EUNONY BRIDGE RD, E WAGGA WAGGA

Status
PRELIMINARY

Drawing Number
IMP2405042 - DRG-08-01

Revision
A



LEGEND

- VEHICLE & VEHICLE CENTRELINE
- VEHICLE BODY CLEARANCE (1m)
- VEHICLE BODY ENVELOPE
- TRUCK FRONT TYRES ENVELOPE

TRUCK ACCESS CAPABILITY TO BE CONFIRMED ON-SITE
(LOAD UNKNOWN - NOT SHOWN)

148t – TRANSFORMER

	meters		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 4.90	Steering Angle	: 13.7
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 4.90		

GENERAL NOTES:

1. ALL DIMENSIONS ARE TO FACE OF KERB AND CHANNEL UNLESS NOTED OTHERWISE.
2. LOCAL ROADS - EUNONY BRIDGE ROAD (SPEED ZONE 80KM/H).
   - OURA ROAD (SPEED ZONE 80KM/H).
   DECLARED ROADS - BYRNES ROAD (SPEED ZONE 80KM/H).
3. BASE INFORMATION FROM NEARMAP AERIAL PHOTOGRAPHY DATED 16.11.2024

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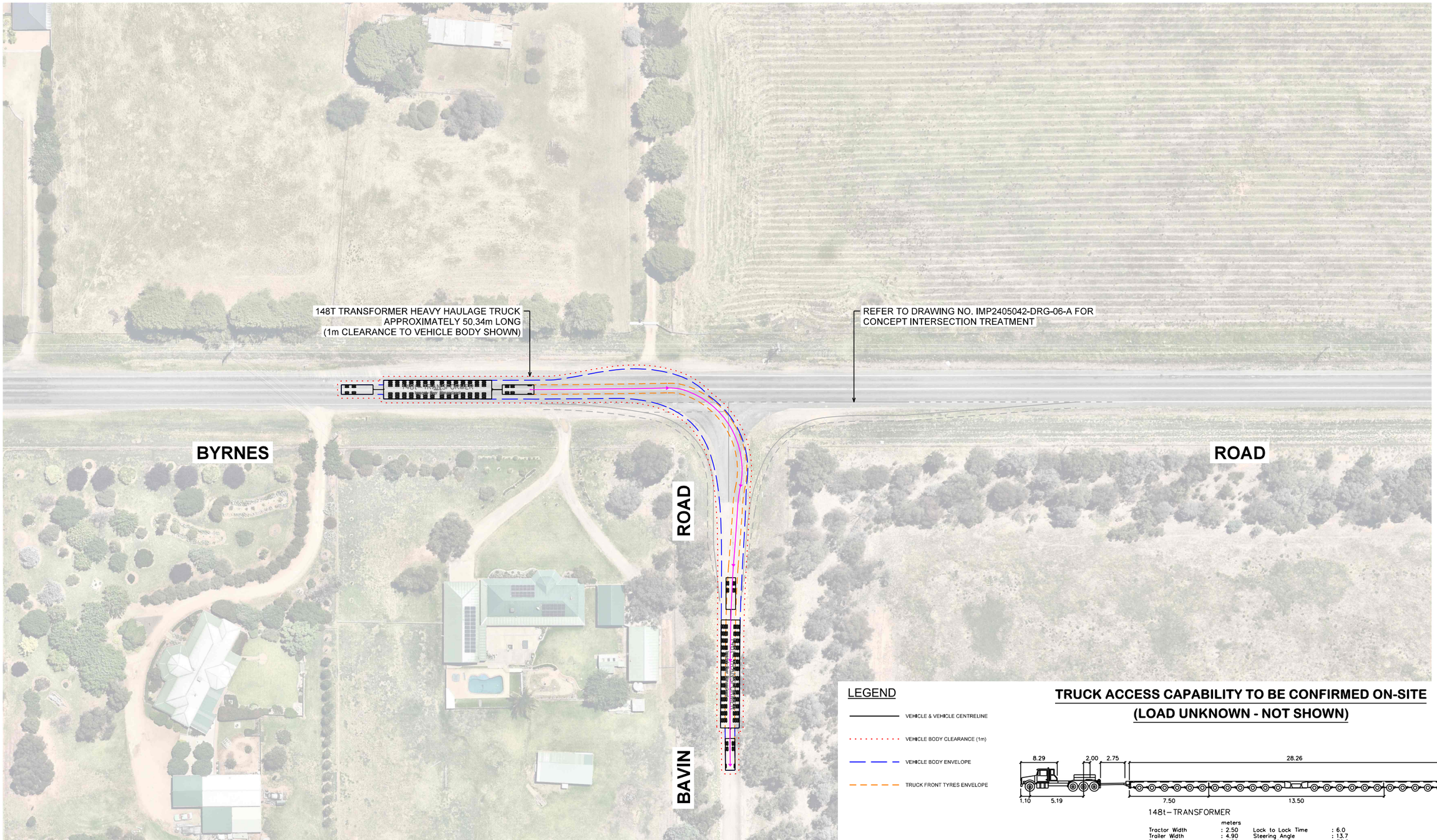
Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

Title
O.S.O.M HEAVY TRANSPORT ROUTE ASSESSMENT
PRELIMINARY SWEPT PATH ANALYSIS - 148T HAULAGE
OURA RD/BYRNES RD, E WAGGA WAGGA

Status
PRELIMINARY

Drawing Number
IMP2405042 - DRG-08-02

Revision
A



LEGEND

- VEHICLE & VEHICLE CENTRELINE
- VEHICLE BODY CLEARANCE (1m)
- VEHICLE BODY ENVELOPE
- TRUCK FRONT TYRES ENVELOPE

TRUCK ACCESS CAPABILITY TO BE CONFIRMED ON-SITE
(LOAD UNKNOWN - NOT SHOWN)

148t – TRANSFORMER

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 4.90	Steering Angle	: 13.7
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 4.90		

GENERAL NOTES:
1. ALL DIMENSIONS ARE TO FACE OF KERB AND CHANNEL UNLESS NOTED OTHERWISE.
2. LOCAL ROADS - BAVIN ROAD (SPEED ZONE 100KM/H DEFAULT).
   DECLARED ROADS - BYRNES ROAD (SPEED ZONE 80KM/H).
3. BASE INFORMATION FROM NEARMAP AERIAL PHOTOGRAPHY DATED 16.11.2024

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Client
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Date **2025-01-17**
Drawn / Approved **WH / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

Title
O.S.O.M HEAVY TRANSPORT ROUTE ASSESSMENT
PRELIMINARY SWEPT PATH ANALYSIS - 148T HAULAGE
BYRNES RD/BAVIN RD, E WAGGA WAGGA

Status
PRELIMINARY

Drawing Number
IMP2405042 - DRG-08-03

Revision
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APPENDIX C
SIDRA Intersection Outputs

Intersection Layout

AM Lane Summary

PM Lane Summary

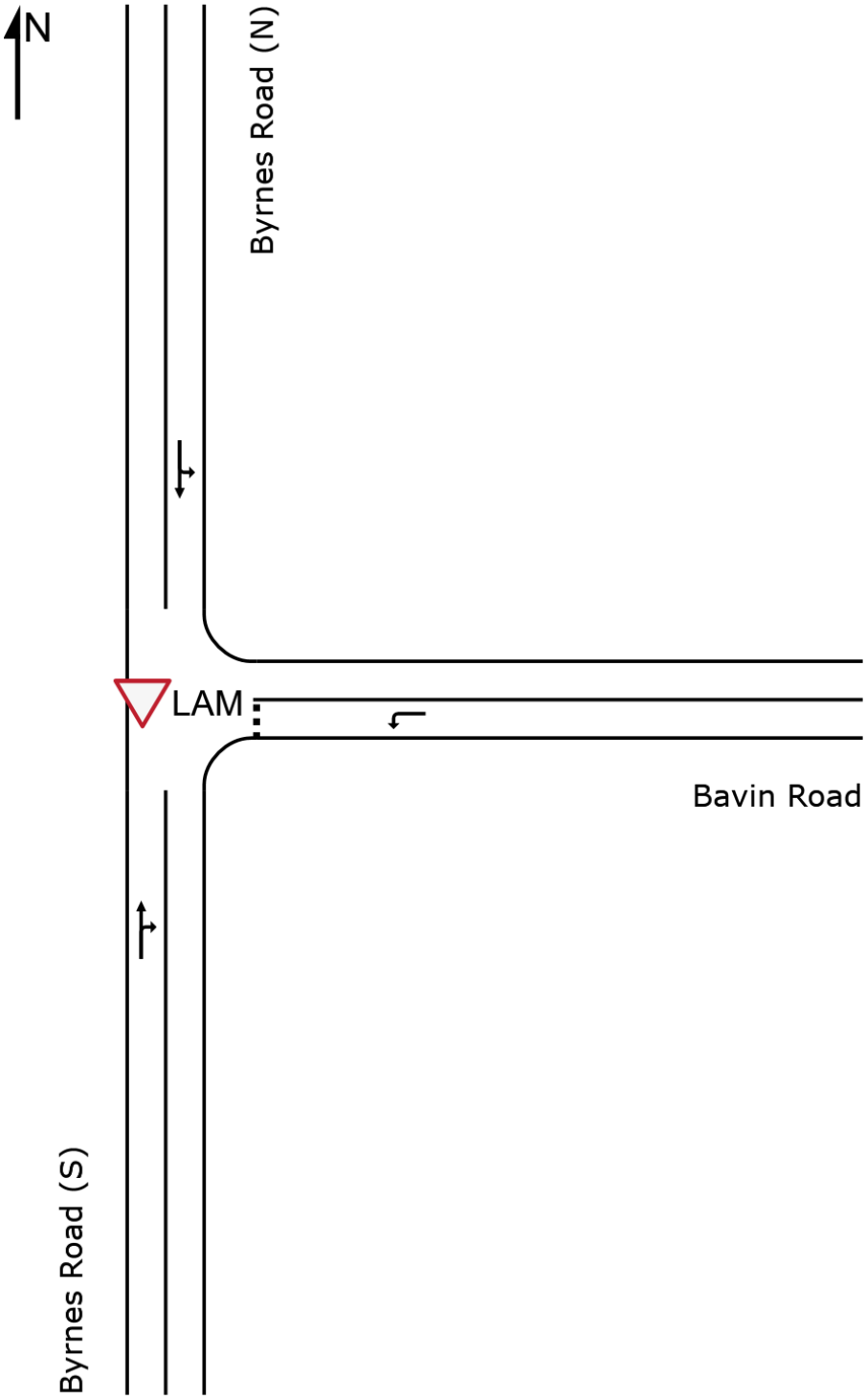
Midday - HV Summary

SITE LAYOUT

Site: [LAM] Byrnes Road / Bavin Road - AM Peak (Folder1)

New Site
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

Site: [LAM] Byrnes Road / Bavin Road - AM Peak (Folder1)

Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Byrnes Road (S)															
Lane 1	237	21.3	237	21.3	1697	0.140	100	0.2	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	237	21.3	237	21.3		0.140		0.2	NA	0.0	0.3				
East: Bavin Road															
Lane 1	1	0.0	1	0.0	1369	0.001	100	7.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1	0.0	1	0.0		0.001		7.5	LOS A	0.0	0.0				
North: Byrnes Road (N)															
Lane 1	237	26.6	237	26.6	1644	0.144	100	1.9	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	237	26.6	237	26.6		0.144		1.9	NA	0.0	0.0				
All Vehicles	475	23.9	475	23.9		0.144		1.0	NA	0.0	0.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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.

Approach Lane Flows (veh/h)

South: Byrnes Road (S)

Mov. From S To Exit:	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	233	4	237	21.3	1697	0.140	100	NA	NA
Approach	233	4	237	21.3		0.140			

East: Bavin Road

Mov. From E To Exit:	L2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	1	0.0	1369	0.001	100	NA	NA
Approach	1	1	0.0		0.001			

North: Byrnes Road (N)

LANE SUMMARY

Site: [PM] Byrnes Road / Bavin Road - PM Peak (Folder1)

Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Byrnes Road (S)															
Lane 1	174	29.0	174	29.0	1637	0.106	100	0.0	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	174	29.0	174	29.0		0.106		0.0	NA	0.0	0.1				
East: Bavin Road															
Lane 1	67	0.0	67	0.0	1369	0.049	100	7.6	LOS A	0.2	1.4	Full	500	0.0	0.0
Approach	67	0.0	67	0.0		0.049		7.6	LOS A	0.2	1.4				
North: Byrnes Road (N)															
Lane 1	174	36.0	174	36.0	1580	0.110	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	174	36.0	174	36.0		0.110		0.0	NA	0.0	0.0				
All Vehicles	415	27.2	415	27.2		0.110		1.3	NA	0.2	1.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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.

Approach Lane Flows (veh/h)

South: Byrnes Road (S)

Mov. From S To Exit:	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	173	1	174	29.0	1637	0.106	100	NA	NA
Approach	173	1	174	29.0		0.106			

East: Bavin Road

Mov. From E To Exit:	L2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	67	67	0.0	1369	0.049	100	NA	NA
Approach	67	67	0.0		0.049			

North: Byrnes Road (N)

LANE SUMMARY

Site: [LMid] Byrnes Road / Bavin Road - Midday Peak

(Folder1)

Output produced by SIDRA INTERSECTION Version: 10.0.5.217

New Site
Site Category: (None)
Give-Way (Two-Way)
Site Scenario: 1 | Local Volumes

Lane Use and Performance

	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Byrnes Road (S)															
Lane 1	179	31.1	179	31.1	1619	0.111	100	0.0	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	179	31.1	179	31.1		0.111		0.0	NA	0.0	0.1				
East: Bavin Road															
Lane 1	6	83.3	6	83.3	890	0.007	100	9.7	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	6	83.3	6	83.3		0.007		9.7	LOS A	0.0	0.3				
North: Byrnes Road (N)															
Lane 1	179	37.9	179	37.9	1559	0.115	100	0.3	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	179	37.9	179	37.9		0.115		0.3	NA	0.0	0.0				
All Vehicles	364	35.3	364	35.3		0.115		0.3	NA	0.0	0.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
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.

Approach Lane Flows (veh/h)

South: Byrnes Road (S)

Mov. From S To Exit:	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	178	1	179	31.1	1619	0.111	100	NA	NA
Approach	178	1	179	31.1		0.111			

East: Bavin Road

Mov. From E To Exit:	L2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	6	6	83.3	890	0.007	100	NA	NA
Approach	6	6	83.3		0.007			

APPENDIX D
Byrnes Road Right Turn Review

IMPACT Traffic Engineering Pty Ltd
ABN: 78 611 424 107

Level 17, 31 Queen Street, Melbourne, Victoria 3000
impactaustralia.com.au

16 December 2025
Reference: IMP2405042LET02F01

35°04'39.0"S 147°25'20.7"E

ib vogt
C/- Sarah Hillis
NGH Consulting
35 Kincaid Street,
Wagga Wagga NSW 2650

Dear Sarah,

PROJECT: WAGGA NORTH BESS TRANSGRID ASSESSMENT
SITE ADDRESS: BYRNES ROAD, WAGGA WAGGA NSW

Preamble / Background

An application has been lodged to develop some land located on the northern side of Bavin Road for the purposes of a Battery Energy Storage System (BESS).

As part of the application works, it was revealed that an intersection upgrade at Bavin Road / Byrnes Road would be required to help safely manage construction vehicle movements to / from the land.

The application ultimately considered widening Bavin Road and constructing a Basic Left Turn (BAL) on Byrnes Road to help traffic turn into the Bavin Road. To facilitate this movement, it was proposed for construction traffic to take a detour / arrive only from the north along Byrnes Road; this was proposed in place of right turning treatments due to the difficulty of widening to the west.

Council have since reviewed the application and proposed upgrade strategies and suggested that a detour is not an appropriate outcome due to the risk of staff vehicles disobeying / ignoring the proposed detour.

Rather, Council have suggested that widening to the east and providing a right turn lane for vehicles entering into Bavin Road would be viable and their preferred outcome.

IMPACT® have been engaged by NGH Consulting on behalf of ib vogt to undertake a review of the viability of providing road widening to the west and constructing a short right turn lane along Byrnes Road. The following sets out our review.

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35°04'39.0"S 147°25'20.7"E

Council Proposal

As above, Council have suggested that the road be widened to the east to help facilitate a short right turn lane in the middle of the road. The Council Plan, 'Option 1, C0000 001' shows the widening to the east to provide sufficient space for the short turn lane.

IMPACT® have reviewed this plan and note the following with respect to the design:

- Proposed lanes / geometry within Byrnes Road is generally consistent with the required design standards.
    - It does seek to provide shorter deceleration length than typically accepted, on the basis that some deceleration will occur within the through lane.
- The plan does not make any allowance for widening of Bavin Road.
- The plan does not provide / show any allowance for shoulders along Byrnes Road.

Council's proposed Option 1 has been reproduced as an annex to this letter.

A more detailed review of the Council plan with respect to operation shows:

- Swept paths were not prepared to accompany the design, however we are confident that larger construction traffic would not be able to enter and exit Bavin Road at the same time.
    - Notably, inbound traffic would not be able to pass and outbound truck (or car) that is waiting to exit the site.
- This would therefore require outbound vehicles to exit before inbound traffic does.
    - This is an acceptable outcome for left turning vehicles (as there is no confusion in priority), however for right turning vehicles - this could lead to confusion, noting the inbound truck should have right of way.
- We note however that there isn't sufficient space for vehicle to turn left out of Bavin Road whilst remaining within their own carriageway.
    - Left turning vehicles would ultimately need to cross over the central traffic lanes to exit - where an inbound truck would be waiting.
    - Ultimately, this could lead to traffic being stuck when trying to enter / exit Bavin Road.

Based on the foregoing, we do not believe that the Council design is appropriate as currently shown, with no ability for inbound and outbound construction trucks to get past one another.

IMPACT® CHR(s) Design vs Council Design

Noting the above, **IMPACT®** have prepared a revised version of the right turning option that was offered by Council. This design as well as a comparison with the Council design can also be found attached as an Annex to this letter.

The key differences between the two design are:

- The alternate design prepared by **IMPACT®** provides additional width at Bavin Road to ensure that inbound and outbound construction traffic can travel past one another at the corner.
- Additional width has been shown on the outer eastern edge of the new road carriageway to reflect the unsealed gravel road shoulder.

35°04'39.0"S 147°25'20.7"E

Review of **IMPACT**® Design

As illustrated in the drawing attached as an annex to this letter, the design we have presented is largely similar to Council's design along Byrnes Road itself, with the key differences being the additional width for the shoulder plus widening of Bavin Road to facilitate vehicle movement.

Ultimately, this meant that:

- The edge of the revised road pavement at the intersection itself is less than 1.5 metres from a sign which identifies a nearby gas main.
  - **IMPACT**® are advised that the proximity of the gas main to the new road (and construction activities of the road) would possibly lead to the gas main being impacted (and therefore needing to be relocated).
- The edge of the widened road lane is approximately 5.5 metres from an existing power pole.
  - Ultimately, the proposal brings this roadside hazard closer to the road.
  - Current design practice is to deliver a safety barrier protection system wherever a roadside hazard is within close proximity to a road.
    - Under previous standards, this hazard would have been considered to be within the nominated clear zone.
  - Accordingly (based on current design practice), consideration would need to be given to installing the barrier or removing the hazard.
    - As this pole is located immediately adjacent an existing property access, it isn't possible to provide roadside protection (barriers) without impacting this access.
    - The utility operator has already expressed their concerns with the cost and impact shifting power poles in this area would have.
  - The risk associated with the proximity of the change would therefore fall onto the parties completing the upgrades and the responsible authority.
    - **IMPACT**® are advised that the project team is not comfortable with this outcome, and that it would ultimately be subject to Council (as the road authority) absorbing all risk associated with the proximity of this utility pole to the new road pavement.

These two key risk items ultimately impact the viability of providing an extension of the road to the east (and therefore providing the right turn lane).

35°04'39.0"S 147°25'20.7"E

Conclusion

Based on the foregoing, we maintain our position that the most viable (and safest) option for the proposal is to provide Basic Left Turn widening to the north of Bavin Road and to reroute construction traffic such that it arrives from the north.

Once in operation, with minimal movements generated by the land, there would be minimal risk / likelihood of an incident as a result of turning traffic.

Note:

> All traffic generated by the site is subject to an employee agreement which would be used to enforce the direction of travel to / from Bavin Road.

We trust that the above and below is satisfactory. Should any further information be required, please contact the undersigned.

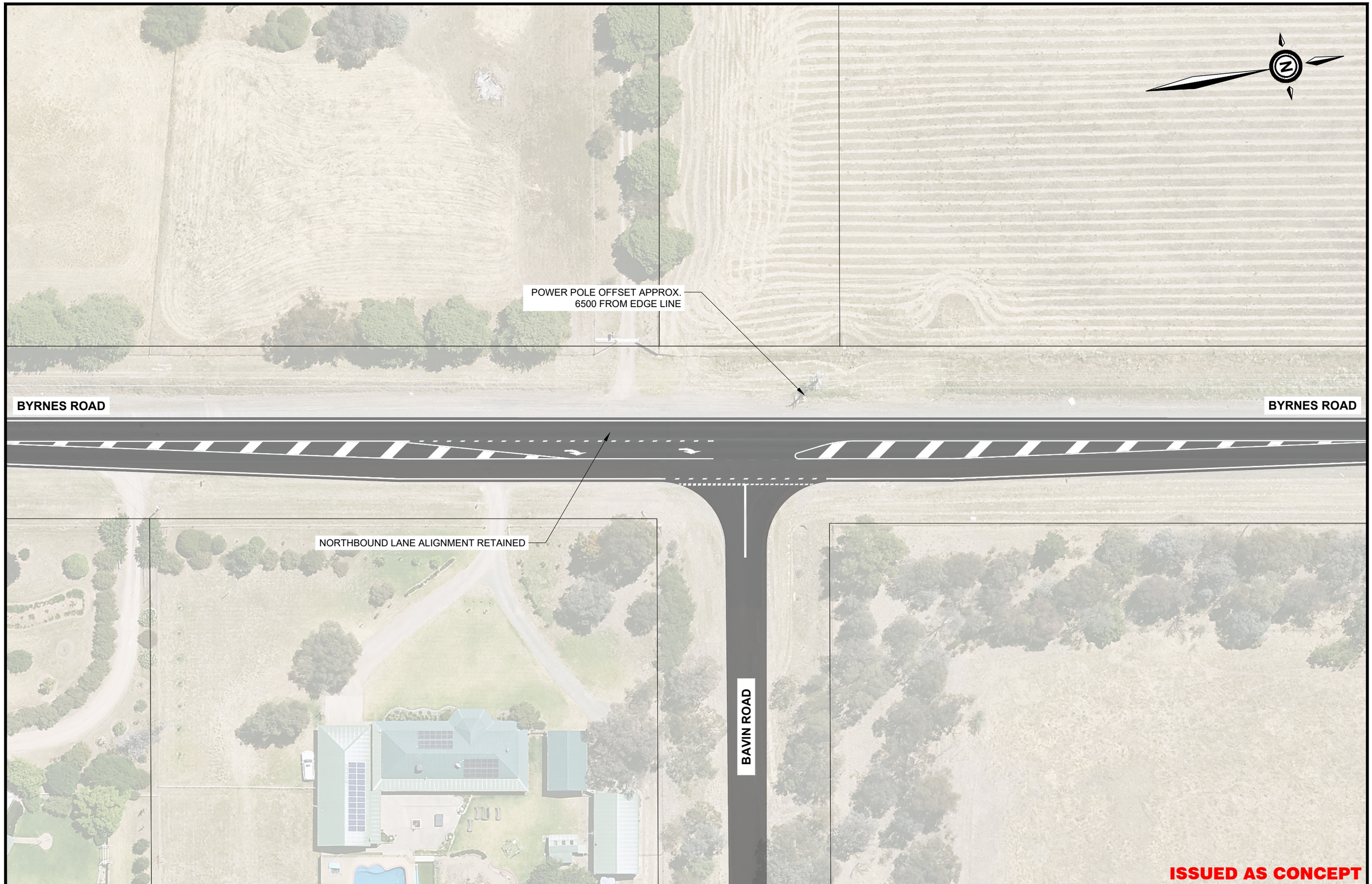
KIND REGARDS,



Henry Ma
Senior Engineer / Transport Modeller
M: 0455 195 276
E: henry@impactaustralia.com.au

Enc:

- Council Road Widening 'Option 1'
- **IMPACT®** Concept Plan IMP2405042-DRG-11-A



ISSUED AS CONCEPT

REVISION	AMENDMENT :	ISSUED

SCALE : A3 PLAN 1:600 0 5 10 15 20 25 METRES

CO ORDS : GDA94 MGAZ55

DATUM : AHD

AUTHORISED : G. PAXTON DATE : 06.11.2025

DRAWN : G. PAXTON DATE : 06.11.2025

City of Wagga Wagga

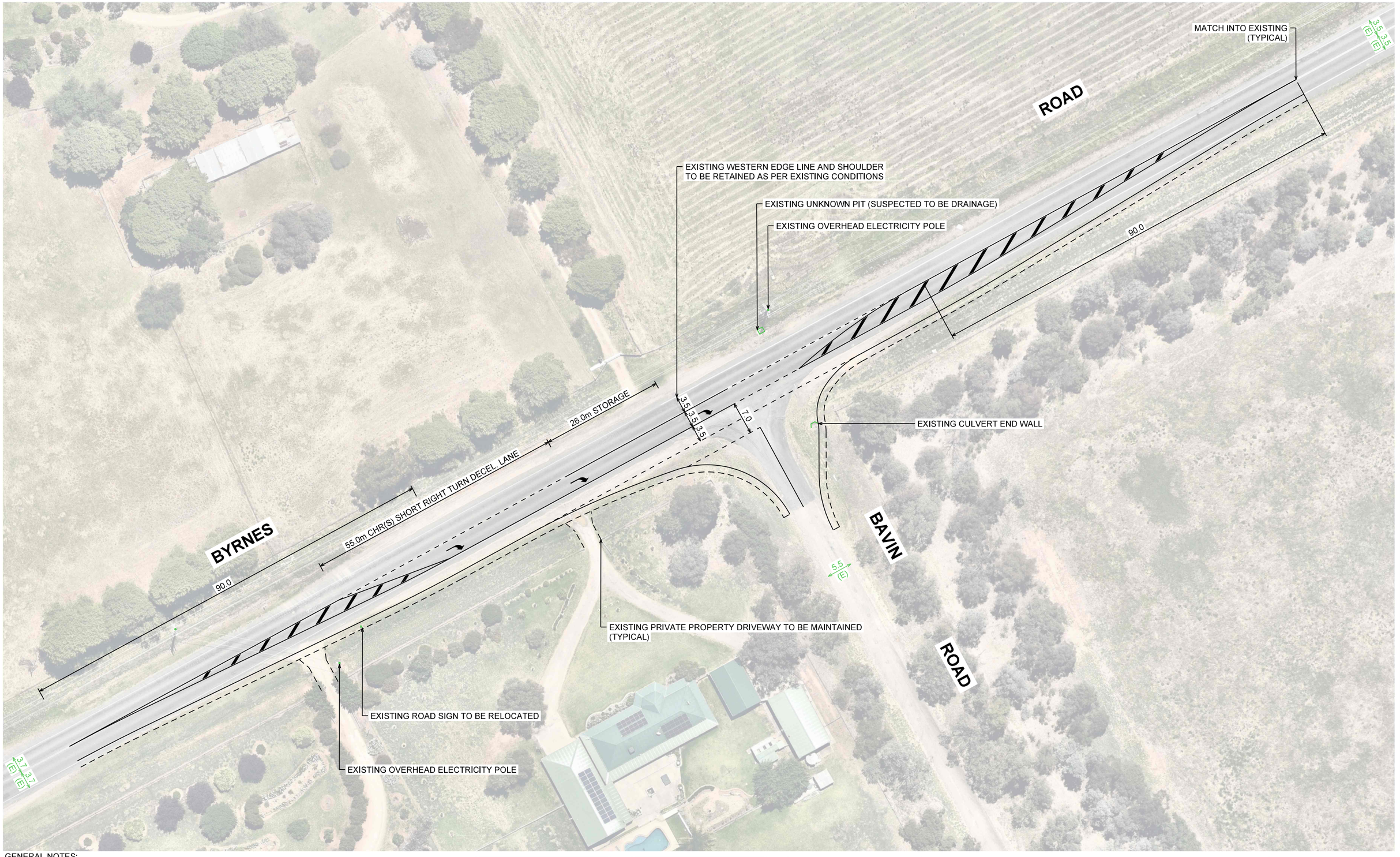
City Engineering : Design Services

PROJECT :

BYRNES ROAD
INTERSECTION UPGRADE CONCEPT
BYRNES ROAD - BAVIN ROAD
OPTION 1 - NORTHBOUND LANE RETAINED

PLAN REGISTRATION : C 0000 001

SHEET NUMBER : ISSUE : 1



GENERAL NOTES:
1. ALL DIMENSIONS ARE TO FACE OF KERB AND CHANNEL UNLESS NOTED OTHERWISE.
2. LOCAL ROAD - BEVIN ROAD (SPEED ZONE 100KM/H DEFAULT).
   DECLARED ROAD - BYRNES ROAD (SPEED ZONE 80KM/H).
3. BASE INFORMATION FROM NEARMAP AERIAL PHOTOGRAPHY DATED 14.12.2023

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SCALE
1:750 @ A3

Client
NGH CONSULTING

Date **2025-11-28**
Drawn / Approved **CB / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

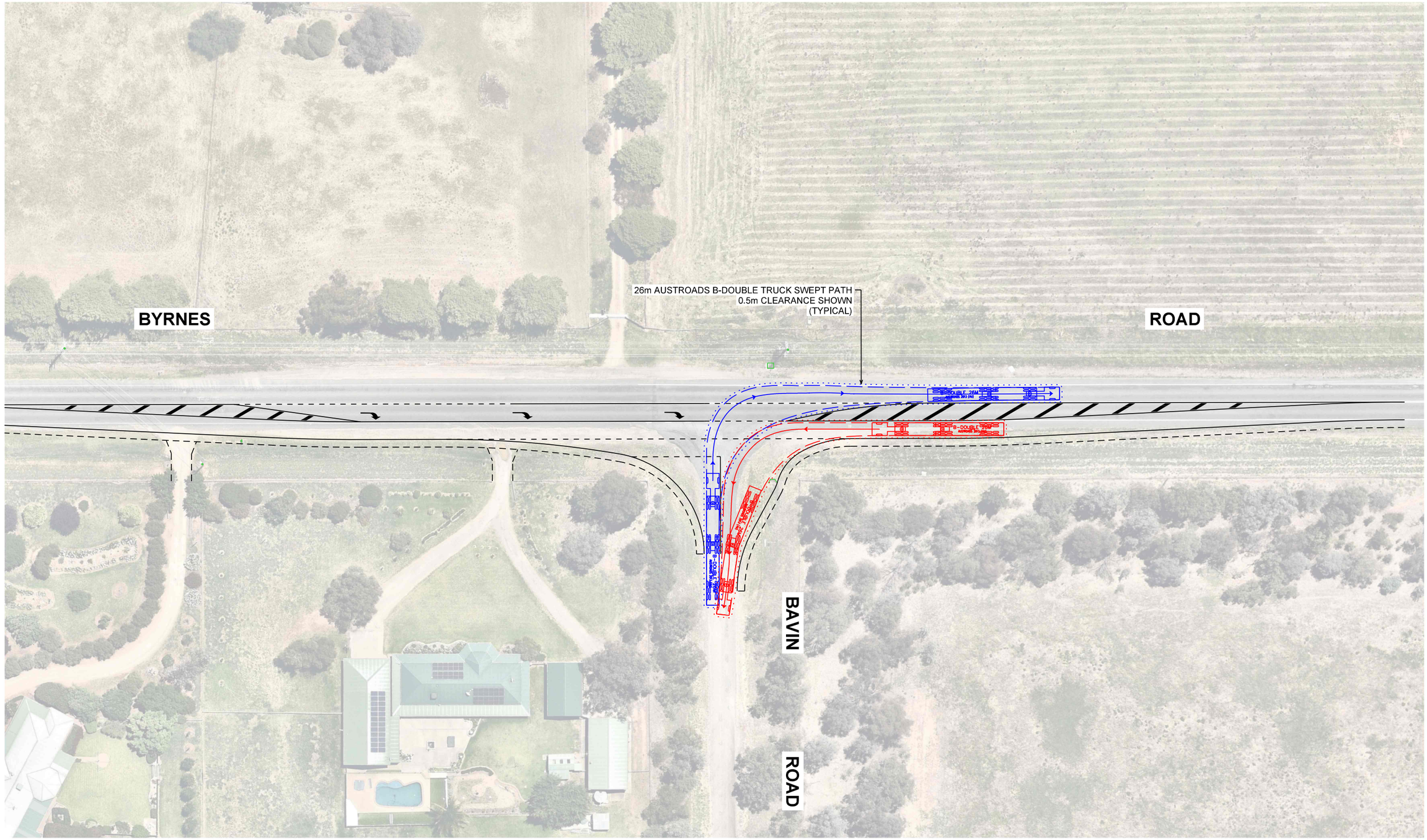
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CONCEPT INTERSECTION UPGRADE
CHANNELISED RIGHT TURN
CHR(S) SHORT TURN LANE COMPONENT ADOPTED

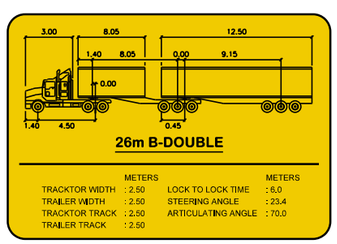
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NGH CONSULTING

Date **2025-11-28**
Drawn / Approved **CB / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

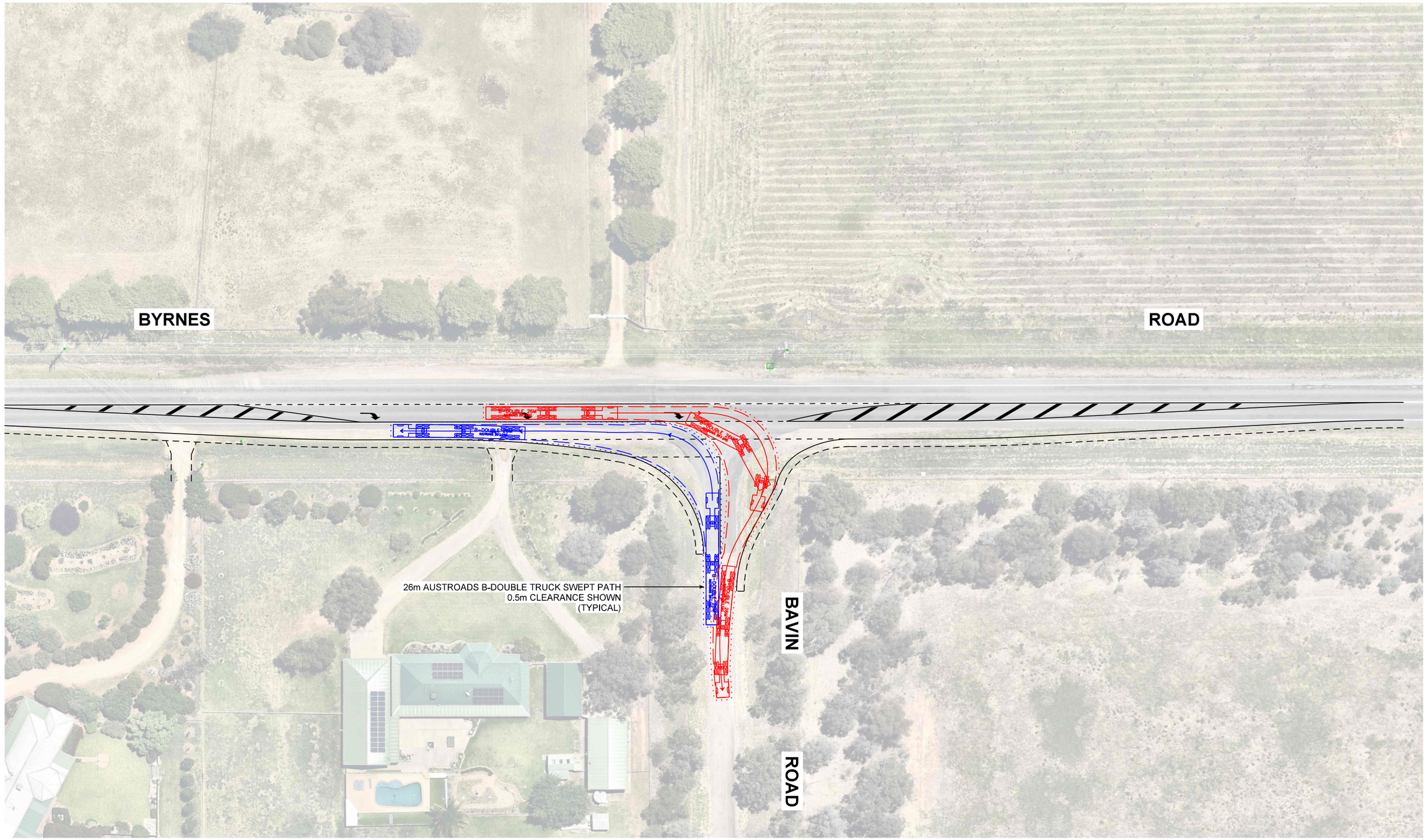
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SWEPT PATH ANALYSIS
26m AUSTROADS B-DOUBLE TRUCK

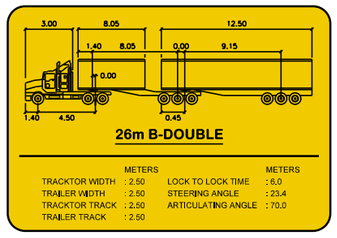
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Client
NGH CONSULTING

Date **2025-11-28**
Drawn / Approved **CB / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

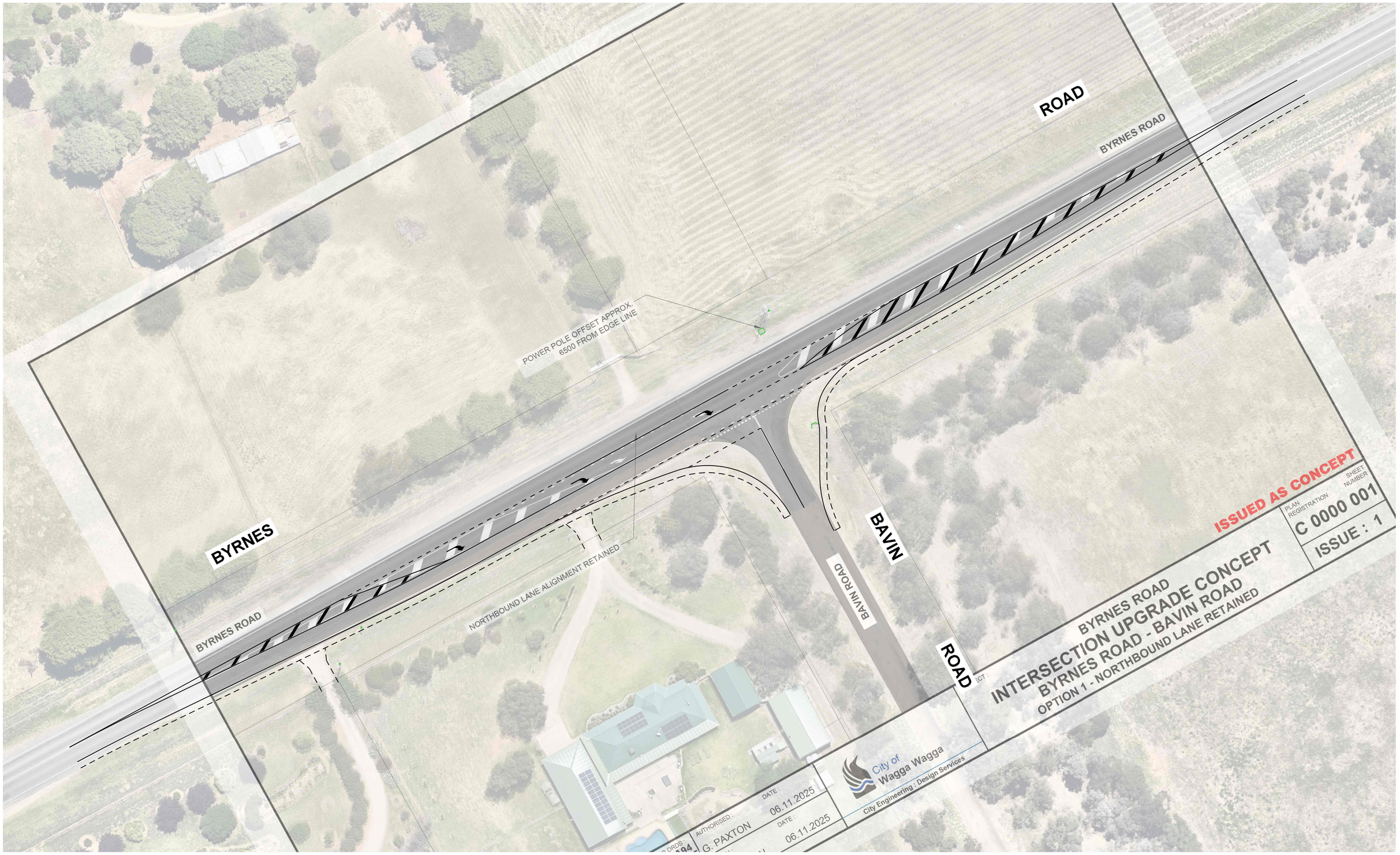
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CONCEPT INTERSECTION UPGRADE
SWEPT PATH ANALYSIS
26m AUSTROADS B-DOUBLE TRUCK

Status
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Drawing Number
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Client
NGH CONSULTING

Date **2025-11-28**
Drawn / Approved **CB / WD**

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BAVIN ROAD, EUNANOREENYA, N.S.W.
CITY OF WAGGA WAGGA

Title
CONCEPT INTERSECTION UPGRADE
CHANNELISED RIGHT TURN
COMPARISON TO COUNCIL OPTION 1 DESIGN PDF

Status
PRELIMINARY

Drawing Number
IMP2405042 - DRG-11-04

Revision
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APPENDIX E
TransGrid Assessment Letter

35°04'39.0"S 147°25'20.7"E

ib vogt
C/- Sarah Hillis
NGH Consulting
35 Kincaid Street,
Wagga Wagga NSW 2650

Dear Sarah,

PROJECT: WAGGA NORTH BESS TRANSGRID ASSESSMENT
SITE ADDRESS: BYRNES ROAD, WAGGA WAGGA NSW

Preamble

IMPACT® have been engaged by NGH Consulting on behalf of ib vogt to undertake an assessment of the traffic implications associated with the proposed grid connection works between the proposed Wagga North BESS and the existing Transgrid substation located immediately north of the site.

A Traffic Impact Assessment (IMP2405042TIA01F03) was previously prepared to support the Development Application (DA) for the BESS, however we understand that the authorities have requested further information specifically relating to the traffic impacts associated with the grid connection works.

This memorandum presents the key findings and recommendations from the assessment.

Proposed Works

To enable connection between the proposed BESS site and the existing substation, access will require via an existing east-west easement intersection at Byrnes Road to the west of the site.

Figure 1 illustrates the locality of the site in context to the road network.



Figure 1 **Overview of Subject Site & Proposed Access Point**

35°04'39.0"S 147°25'20.7"E

Existing Conditions

Byrnes Road

Classified as a sub-arterial road (managed by Wagga Wagga City Council), Byrnes Road extends in a general north-south direction, ultimately providing a connection between Wagga Wagga and Junee.

Byrnes Road is constructed with a sealed pavement measuring approximately 10 metres in width, which provides for a single lane of traffic in each direction flanked by 1.5m shoulders on both ends of the carriageway. A posted speed limit of 80 km/hr applies to Byrnes Road near the subject site.

Vehicle movement data provided by Council (and dated 19th - 27th July 2021) shows that Byrnes Road caters for approximately 330 peak period movements of which up to 33% consist of heavy vehicles.

Existing Operations / Businesses

Two (2) existing businesses currently operate east of Byrnes Road and the Easement Access, KJ Warden (electrical supply) and Prixcar Service (logistics and freight).

Both sites are serviced by on-site parking facilities that accommodate staff vehicles and heavy vehicles (B-doubles).

This easement is used as the primary access route for both light and vehicle movements associated with these operations and is controlled by a sliding security gate.

In consultation with these businesses, the following movements are generated on a daily basis:

- Heavy vehicles 30 - 35 movements per day; and
- Light vehicles 45 - 50 movements per day.

Assuming that 50% of the light vehicle movements, e.g. predominately staff arrive to site in the morning, this equates to approximately 25 inbound movements during the morning peak and 25 outbound movements during the afternoon peak.

Heavy vehicle movements are generally split across the day and typically avoids travelling during peak periods. Notwithstanding, it is assumed that up to four (4) heavy vehicle movements will occur during the peak periods.

Pre-approved Road Network

Byrnes Road and connecting roads Merino Street and Eunony Bridge Road are pre-approved for the use of Higher Mass B-double vehicles and provide a broader connection to the arterial road network to both the north and south.

Crash Statistics

We have undertaken a review of the reported accident history for Byrnes Road from 2019 to 2023, in the vicinity of the subject site (sourced from the Transport for NSW (TfNSW) Crash Database).

A review of this data shows that there was a total of two (2) incidents recorded along Byrnes Road in this period. One (1) of these incidents resulted in minor injury while the other resulted in moderate injuries; no fatalities were observed along this road.

No crashes were recorded at the intersection of Byrnes Road and the existing Easement access.

35°04'39.0"S 147°25'20.7"E

Traffic Generation - Transgrid Connection Works

General

It is understood that the existing access point currently accommodates for vehicles up to 26m in length.

No over-dimensional vehicles will be required as part of the connection works.

Traffic Volumes

The following vehicle movements for the construction of the underground cable have been provided by Transgrid:

- Heavy vehicles 3 vehicles per day; and
- Light vehicles 7 vehicles per day.

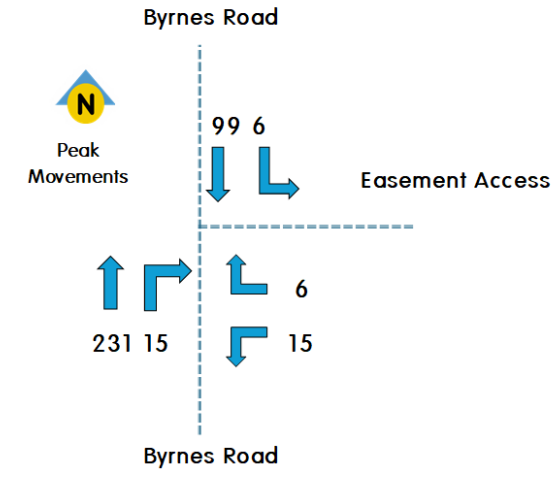
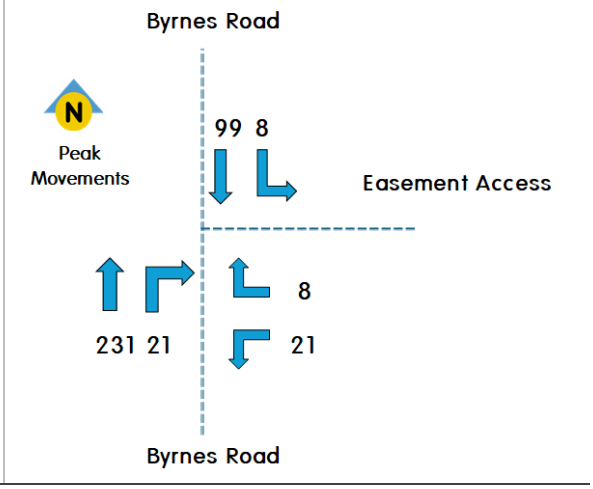
For the purposes of this assessment, it is assumed that all seven (7) light vehicles and one (1) heavy vehicle form part of the peak inbound movements.

It is noted that the above volumes represent a worst-case scenario and are not expected to occur on a daily basis throughout the 6-week construction period.

No traffic distribution data was provided however it is assumed that 70% (231 movements) of traffic will arrive to/from the south via the Wagga Wagga township and the remaining 30% (99 movements) will arrive to/from the Junee Township to the north.

Table 1 illustrates the comparison between the existing traffic movements and the anticipated construction traffic movements during the peak period. These volumes represent a conservative assessment as staff are expected to arrive during the morning peak and depart during the afternoon peak.

Table 1 Turning Movement Diagram

Existing Movements	Existing Movements + Construction Traffic
	

35°04'39.0"S 147°25'20.7"E

Operation and Maintenance Traffic

Once the connection between the BESS and the Transgrid substation is complete, ongoing traffic associated with operation and maintenance is expected to be negligible with access through the Easement only required on occasion when any Transgrid repairs (or similar) are required.

Traffic Impact Assessment

Sight Distance Assessment

The site distance at Byrnes Road / Easement Access has been assessed in accordance with Austroads Guide to Road Design Part 4A. The guideline recommends Safe Intersection Sight Distance (SISD) as the minimum standard for visibility at unsignalised intersections.

Byrnes Road currently operates with a posted speed limit of 80 km/hr (90 km/hr design speed) and therefore requires a minimum SISD of 226m (2.5 second reaction time).

Assessed Site Access Sight Distance

An assessment of the sight distance available from the site access point has been undertaken using aerial imagery.

The available sight lines were measured between at Byrnes Road in each direction with the following sight lines were observed:

- Site Access / Byrnes Road (south) 300m;
- Site Access / Byrnes Road (north) 460m

The available sight lines are also indicatively illustrated in Figure 2.



Figure 2 Sight Distance Assessment - Bavin Road / Byrnes Road

Based on the foregoing, we are satisfied that the available sight lines exceed the minimum requirement.

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35°04'39.0"S 147°25'20.7"E

Turning Lane Assessment

Reference has been made to Austroads Guide to Traffic Management Part 6, which outlines warrants for turn treatments at unsignalised intersections based on peak hour turning and through traffic volumes.

To provide a conservative assessment, it is assumed that construction traffic for the Transgrid connection will overlap with the construction of the BESS.

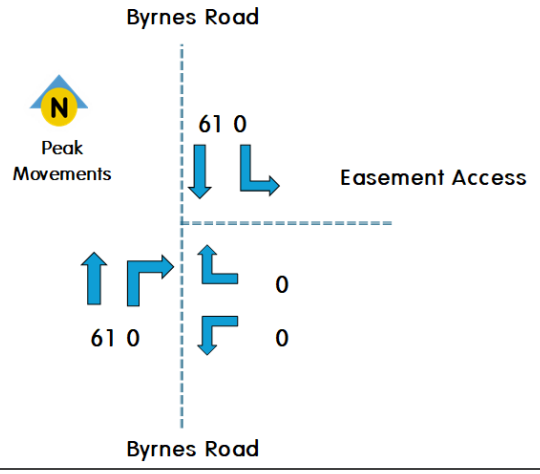
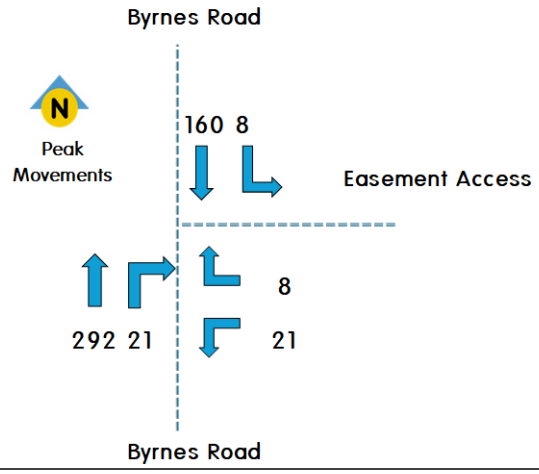
The BESS site is anticipated to generate a peak of up to 162 daily movements (or 81 peak inbound movements) during Stage 2.

Based on the TIA (IMP2405042TIA01F03), construction traffic associated with the BESS will travel north along Byrnes Road, continue past Bavin Road and undertake a U-turn manoeuvre at the roundabout at Byrnes Road, West Bomen Road and East Bomen Road. Construction vehicles will then travel past the Easement Access and turn left into Bavin Road.

For the purposes of this turning lane assessment and as summarised in Table 2, the following assumptions are considered:

- Through volumes extracted from traffic data obtained from Council;
- Existing traffic movements generated at the current intersection Easement Access;
- Transgrid construction traffic movements obtained from Lb Vogt; and
- Background traffic from the Wagga BESS construction vehicles.

Table 2 Cumulative Construction Traffic

Wagga North BESS Traffic	Cumulative Traffic
	

The following turn lane parameters are applied to the turn warrants as shown in Figure 3.

- Qm: 461 veh/hr (right-turn)
- Qm: 160 veh/hr (right-turn)
- Q_R: 21 veh/hr
- Q_L: 9 veh/hr

35°04'39.0"S 147°25'20.7"E

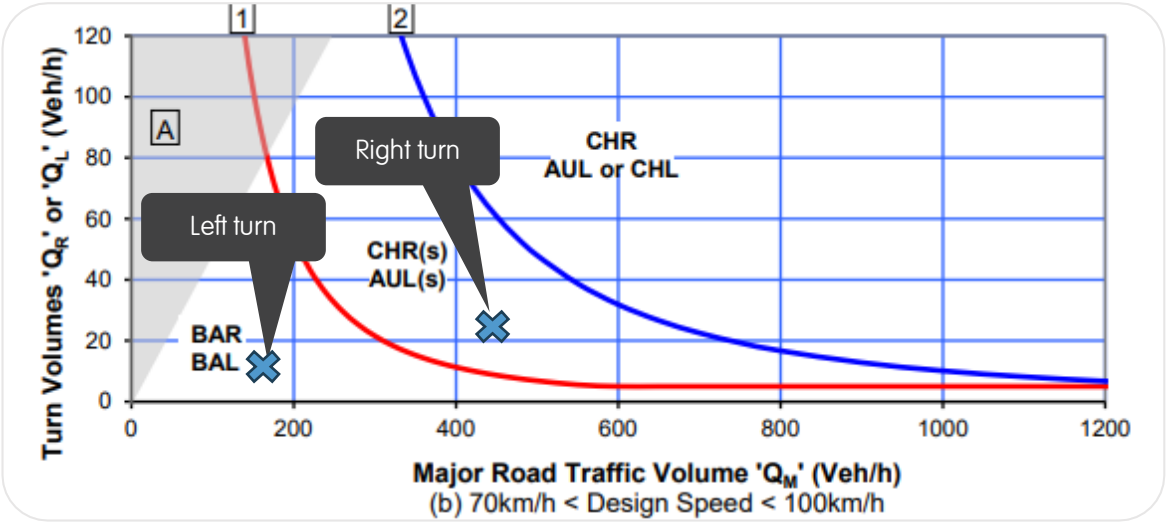


Figure 3 Warrants for Turn Treatments at Unsignalised Intersections - Site Access

Based on the above, the traffic that will travel to and from this intersection will warrant the following:

- CHR(s): A short channelised right-turn lane; and
- BAL: A basic left-turn lane.

While the intersection of Byrnes Road and the Easement Access meets the warrants for a CHR(s) and a BAL based on the peak hour volumes, the provision of this infrastructure is not considered necessary noting the following:

- Short-term nature of the works: the construction traffic is temporary with movements limited and not expected to warrant unnecessary permanent infrastructure upgrades;
- Disruption to existing operations: any formal upgrade works will unnecessarily disrupt the operation for the neighbouring businesses;
- Existing road geometry: Byrnes Road currently provides adequate shoulder width and sight distances to accommodate safe deceleration and turning manoeuvres; and
- Conservative assessment: the turn lane analysis is considered conservative as it assumes that the peak Wagga BESS construction traffic will coincide with the Transgrid works. In addition, it also assumes that the existing operations (from KJ Warden and Prixcar Services) will operate during the same peak period as these works, all of which are unlikely to occur simultaneously.

It is therefore recommended to utilise the existing road width for construction vehicles accessing the Easement. To further support safe access at this intersection, the installation of temporary advanced warning signage and traffic management is recommended to manage movements to and from the Easement Access during the construction period.

Furthermore, it is noted that irrespective of construction traffic generated by the TransGrid traffic, Byrnes Road and the Easement Access would still warrant the same intersection treatment (e.g. CHR(s) and BAL).

35°04'39.0"S 147°25'20.7"E

Traffic Impact

The proposed works will result in an increase of eight (8) vehicle movements (1 vehicle movement every 8 minutes on average) and given the low volume and temporary nature of these works, the impacts to the surrounding road network is expected to be negotiable.

In addition, a SIDRA intersection analysis was undertaken for the peak period at Byrnes Road and the Easement Access which indicated a DOS of 0.21 with average delays of five (5) seconds and occurring at the access.

Queue lengths were also minimal and confirms that the intersection has sufficient capacity to cater for the construction traffic.

Spatial Considerations

To confirm if the existing intersection can accommodate access, a swept path assessment was undertaken using 26m B-doubles at Byrnes Road and the Easement Access.

The swept paths demonstrated that B-doubles will be able to enter and exit within the existing road pavement and that no additional widening will be required.

A review of the internal access confirmed that the existing road width is generally adequate to support two-way vehicle movements. It is also recommended that traffic management measures be implemented on-site to direct construction vehicles to the designated work area.

Neighbouring Development - Hydrogen Park Wagga Wagga

Located to the south-east of the Brynes Road / Easement Access, the proposed Hydrogen Park Wagga Wagga project by AIGA is currently subject to an investment decision, which is not expected until late 2025. Figure 4 illustrates the Hydrogen Park project in context with the proposed TransGrid Works.



Figure 4 **Proposed Hydrogen Park Project (Source: AGIG)**

35°04'39.0"S 147°25'20.7"E

The Hydrogen Park Wagga Wagga project is expected to generate significantly higher construction and operational traffic volumes and involve a longer construction duration compared to the proposed TransGrid works. While no traffic assessment has been made publicly available for that project, its scale suggests it would likely trigger the need for higher-order intersection turn treatments.

In contrast, the TransGrid works are short-term (approximately 6-weeks), will generate low and infrequent volumes and will not result in any permanent change to land use or long-term traffic generation. In addition, given the current status of the Hydrogen Park project, peak construction activities are unlikely to overlap with the proposed TransGrid works.

Accordingly, intersection upgrades are not considered necessary as part of this project, with any traffic control measures to be managed / implemented as part of the Traffic Management Plan (TMP) during construction.

Should you require any further information, please do not hesitate to contact us.

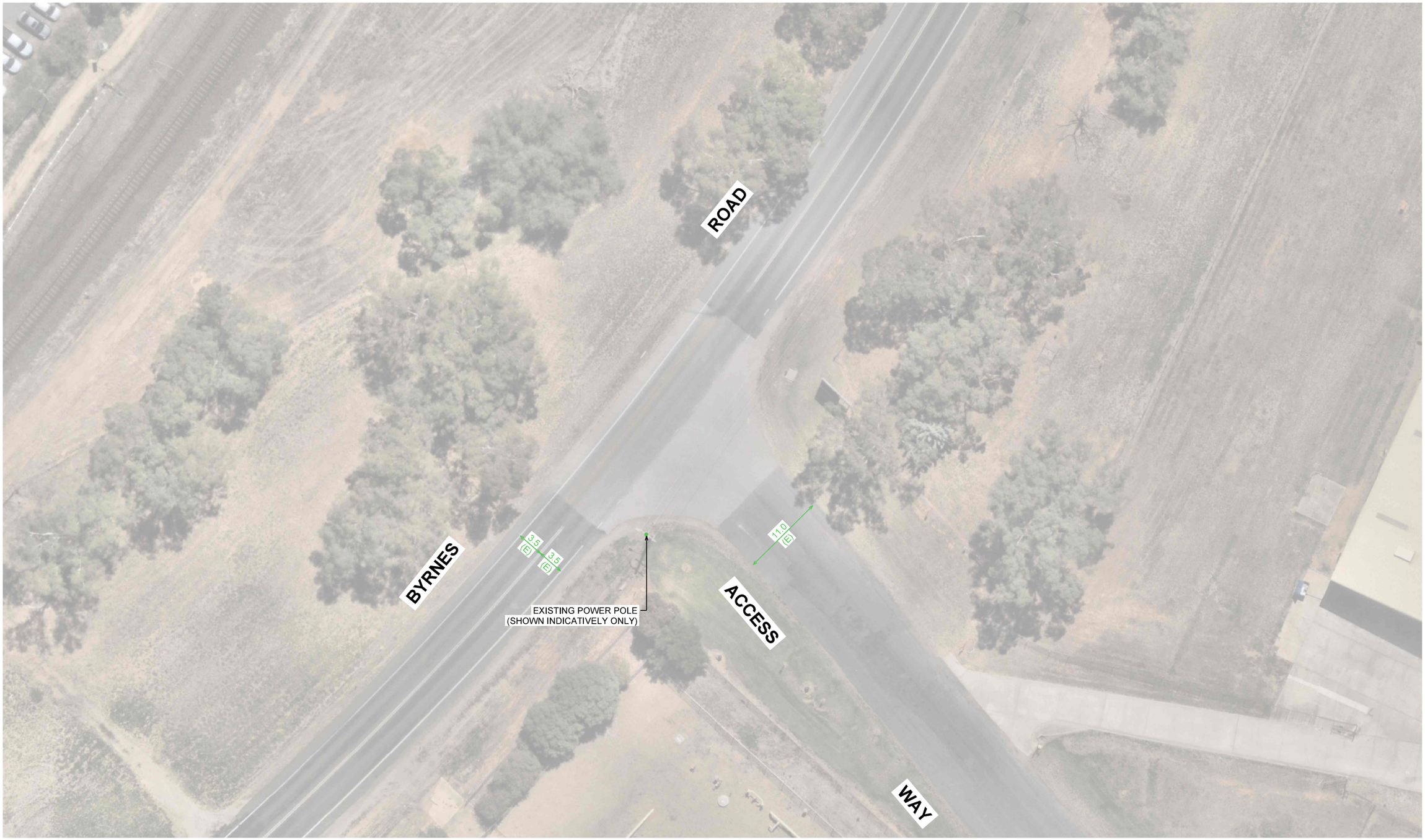
KIND REGARDS,



Henry Ma
Senior Engineer / Transport Modeller
M: 0455 195 276
E: henry@impactaustralia.com.au

Enclosed: Acceptance of Proposal

Enc: Swept Path Assessment IMP2405042-DRG-09-A



GENERAL NOTES:
1. ALL DIMENSIONS ARE TO FACE OF KERB AND CHANNEL UNLESS NOTED OTHERWISE.
2. DECLARED ROADS - BYRNES ROAD (SPEED ZONE 80KM/H).
3. BASE INFORMATION FROM NEARMAP AERIAL PHOTOGRAPHY DATED 24.02.2025

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Date 2025-08-01
Drawn / Approved WH / HM

Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BYRNESS ROAD EUNANOREENYA, NSW
CITY OF WAGA WAGA

Title
TRAFFIC AND TRANSPORT ASSESSMENT
SITE ACCESS

Status
PRELIMINARY

Drawing Number
IMP2405042 - DRG-09-01

Revision
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Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BYRNESS ROAD EUNANOREENYA, NSW
CITY OF WAGA WAGA

Title
TRAFFIC AND TRANSPORT ASSESSMENT
SITE ACCESS

Status
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BYRNESS ROAD EUNANOREENYA, NSW
CITY OF WAGA WAGA

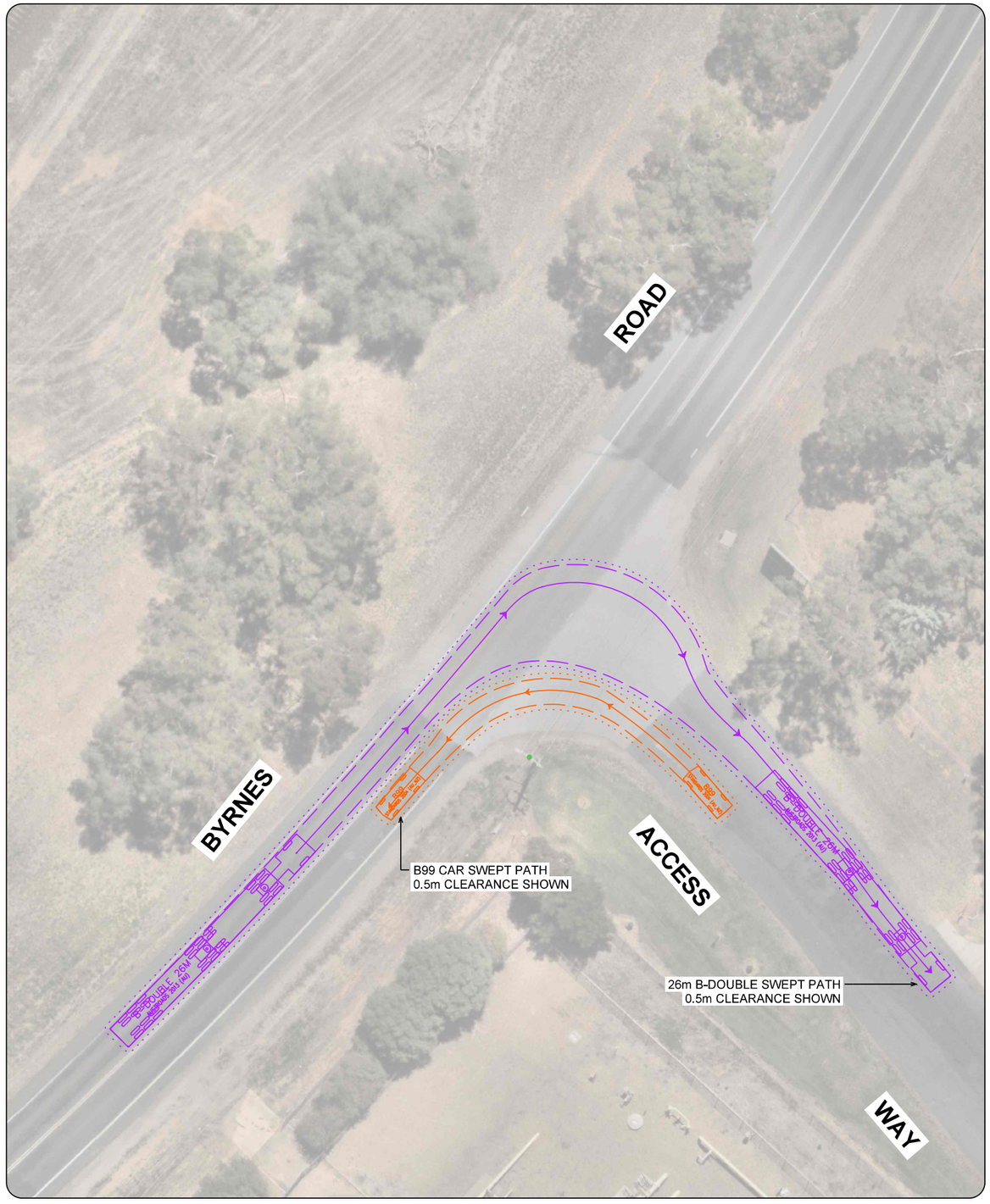
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SITE ACCESS

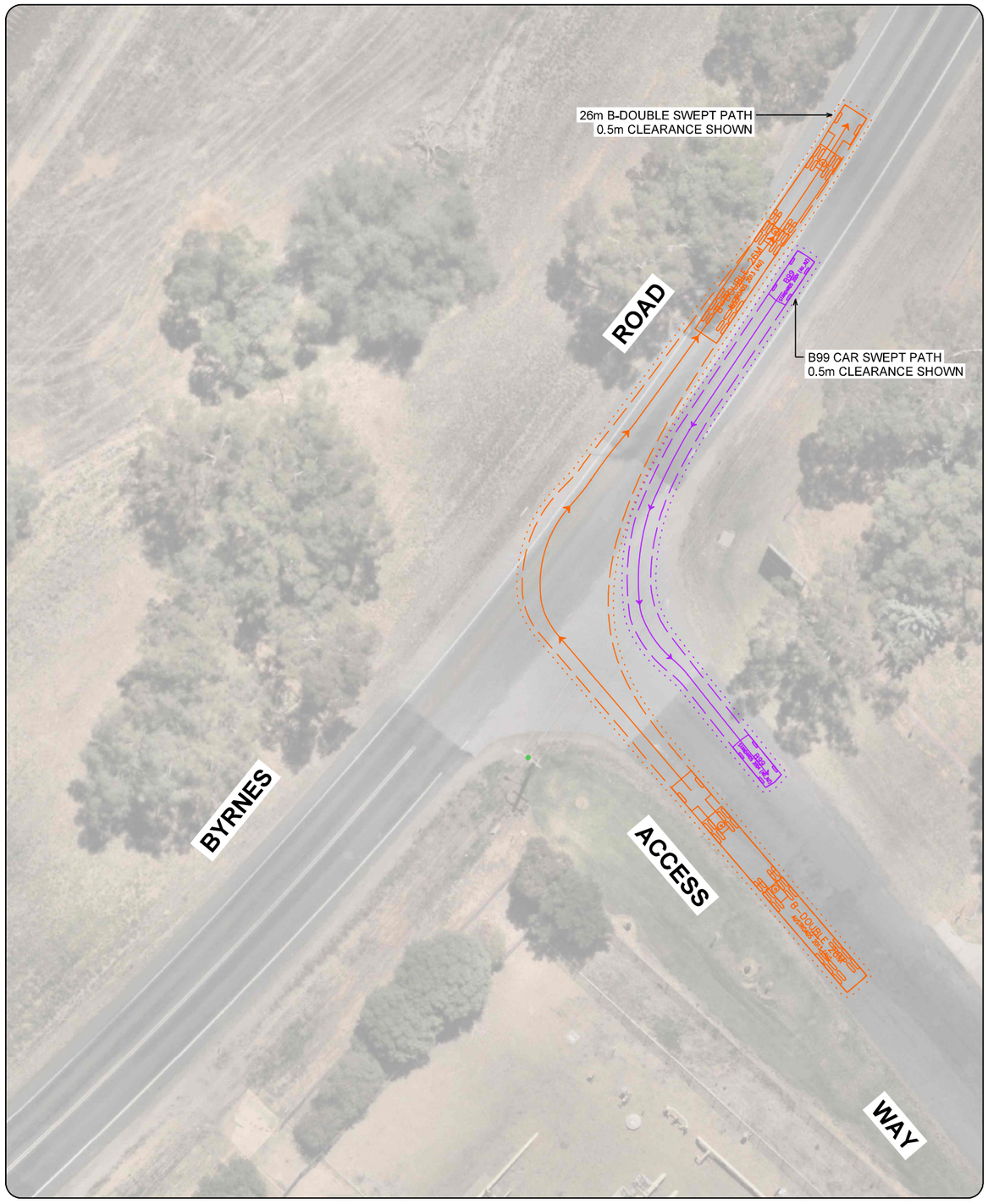
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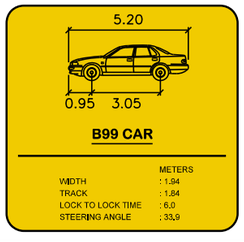
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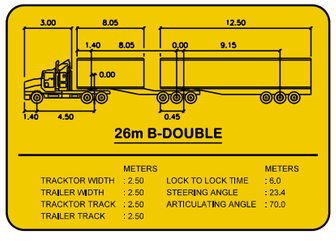






B99 CAR

	METERS
WIDTH	: 1.94
TRACK	: 1.84
LOCK TO LOCK TIME	: 6.0
STEERING ANGLE	: 33.9



26m B-DOUBLE

	METERS		METERS
TRACKTOR WIDTH	: 2.50	LOCK TO LOCK TIME	: 6.0
TRAILER WIDTH	: 2.50	STEERING ANGLE	: 23.4
TRACKTOR TRACK	: 2.50	ARTICULATING ANGLE	: 70.0
TRAILER TRACK	: 2.50		

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Project
PROPOSED WAGGA NORTH BESS DEVELOPMENT
BYRNESS ROAD EUNANOREENYA, NSW
CITY OF WAGA WAGA

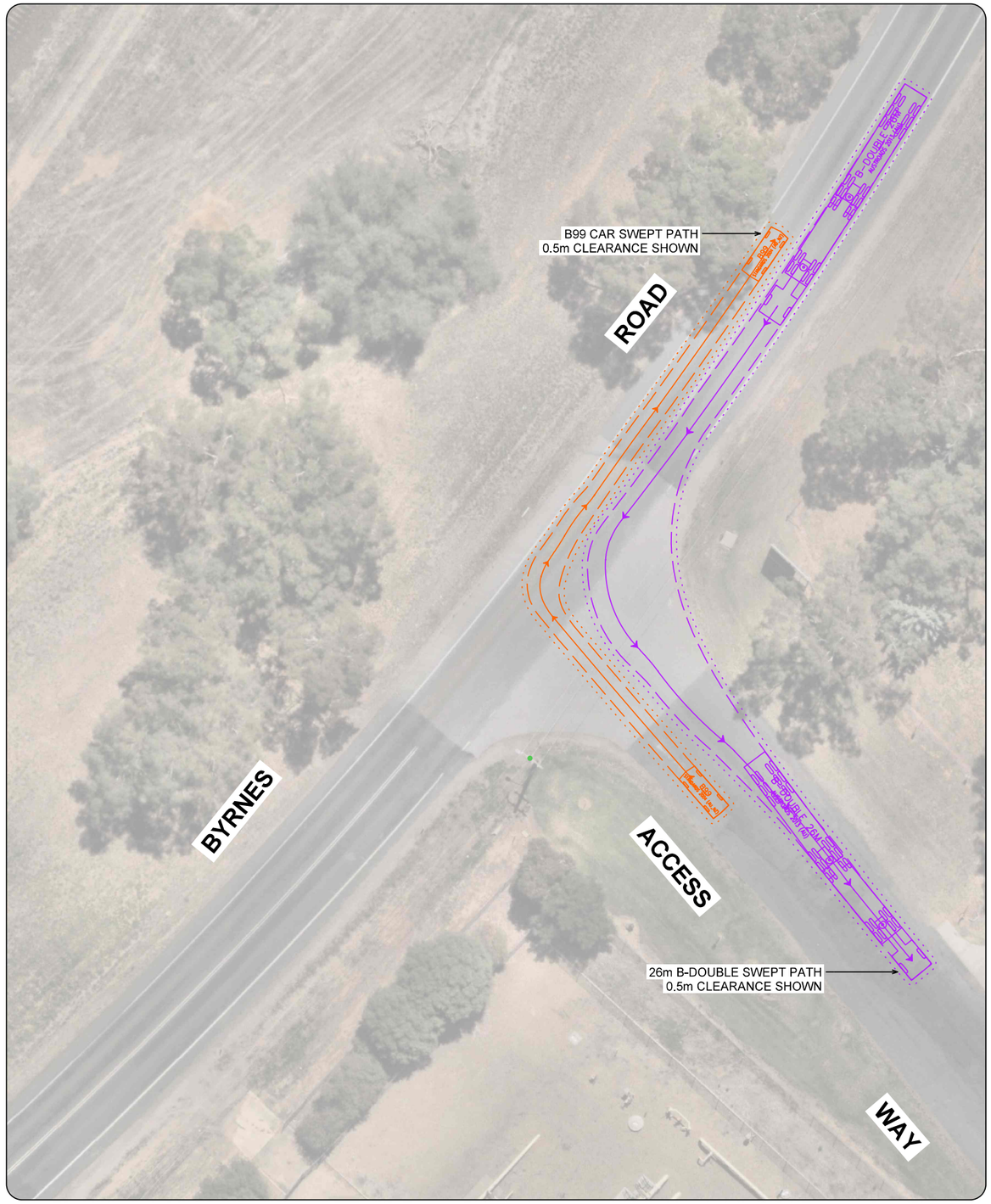
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SWEPT PATH ANALYSIS
B99 CAR AND 26m B-DOUBLE

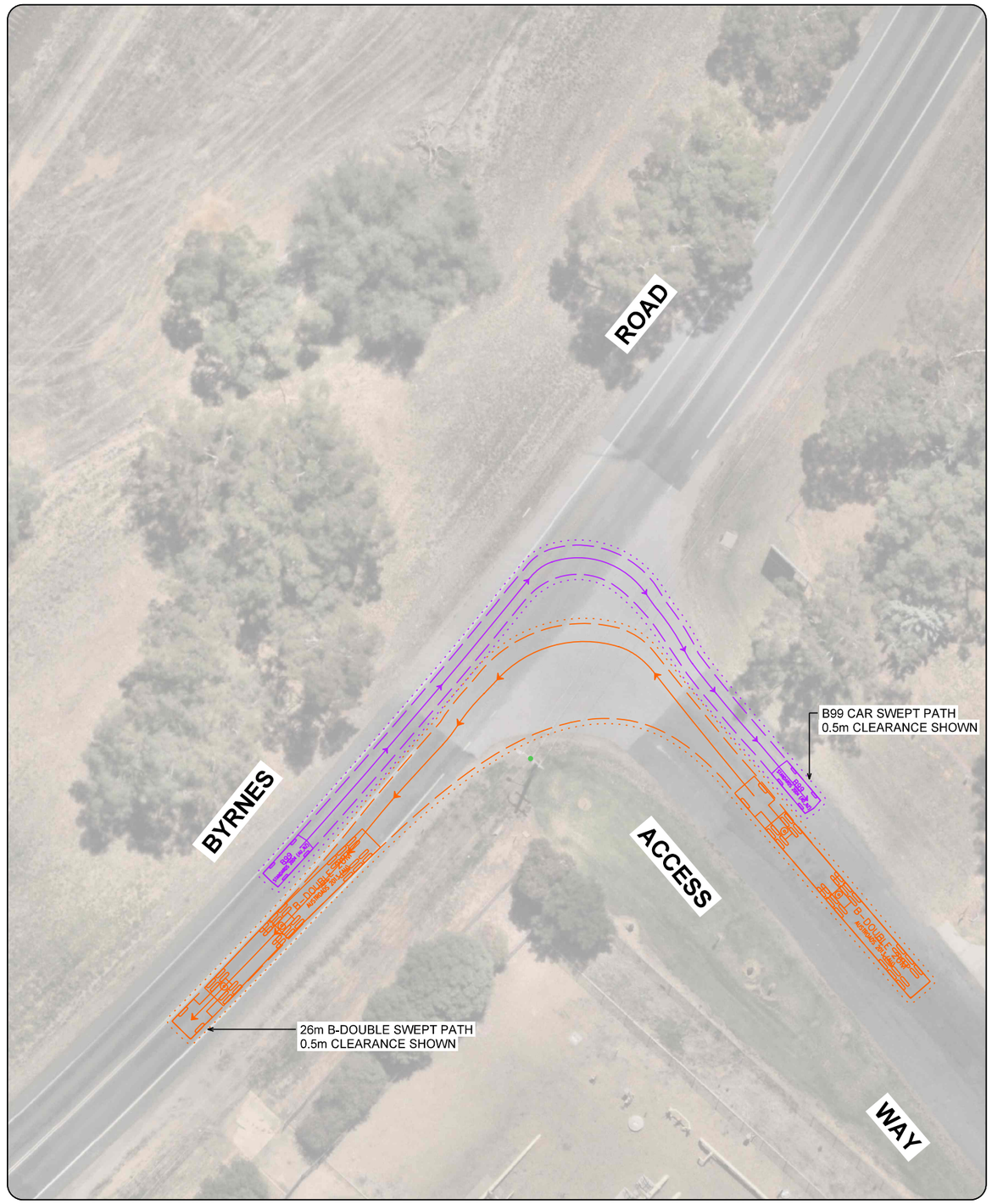
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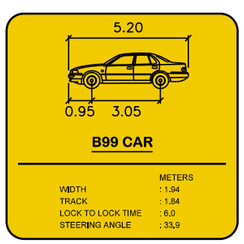
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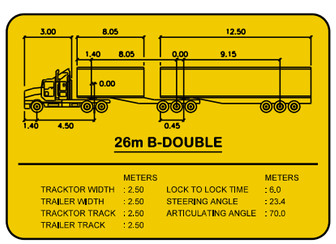






B99 CAR

	METERS
WIDTH	: 1.94
TRACK	: 1.84
LOCK TO LOCK TIME	: 6.0
STEERING ANGLE	: 33.9



26m B-DOUBLE

	METERS		METERS
TRACKTOR WIDTH	: 2.50	LOCK TO LOCK TIME	: 6.0
TRAILER WIDTH	: 2.50	STEERING ANGLE	: 23.4
TRACKTOR TRACK	: 2.50	ARTICULATING ANGLE	: 70.0
TRAILER TRACK	: 2.50		

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CITY OF WAGA WAGA

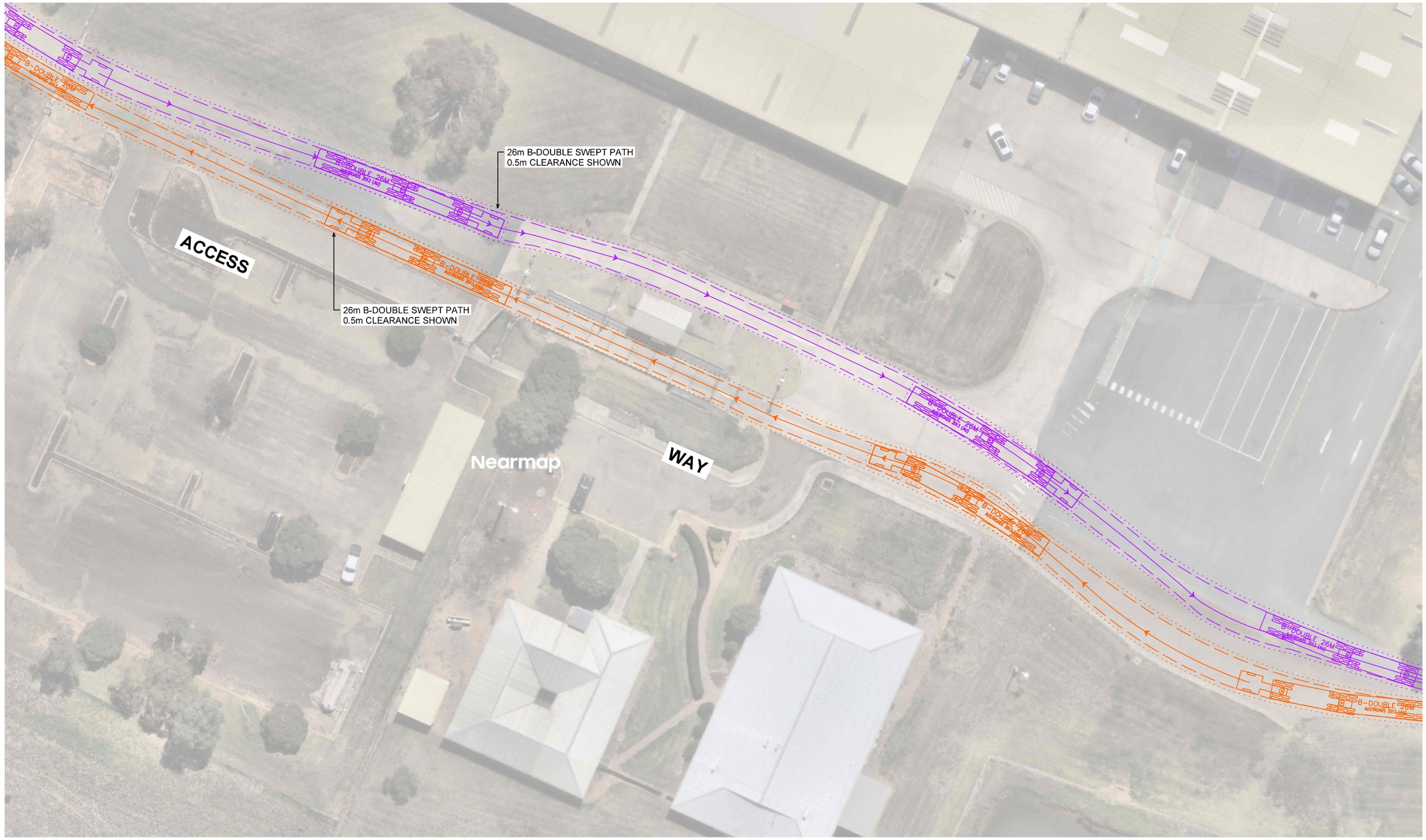
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SWEPT PATH ANALYSIS
B99 CAR AND 26m B-DOUBLE

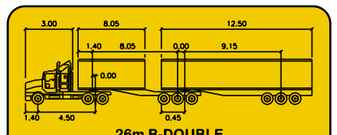
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26m B-DOUBLE

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TRAILER WIDTH	: 2.50	STEERING ANGLE	: 23.4
TRACKTOR TRACK	: 2.50	ARTICULATING ANGLE	: 70.0
TRAILER TRACK	: 2.50		

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BYRNESS ROAD EUNANOREENYA, NSW
CITY OF WAGA WAGA

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

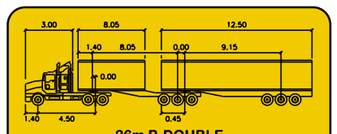
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26m B-DOUBLE

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TRAILER WIDTH	: 2.50	STEERING ANGLE	: 23.4
TRACKTOR TRACK	: 2.50	ARTICULATING ANGLE	: 70.0
TRAILER TRACK	: 2.50		

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CITY OF WAGA WAGA

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

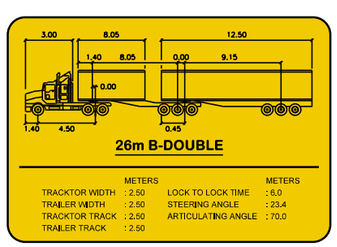
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26m B-DOUBLE

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TRAILER WIDTH	: 2.50	STEERING ANGLE	: 23.4
TRACKTOR TRACK	: 2.50	ARTICULATING ANGLE	: 70.0
TRAILER TRACK	: 2.50		

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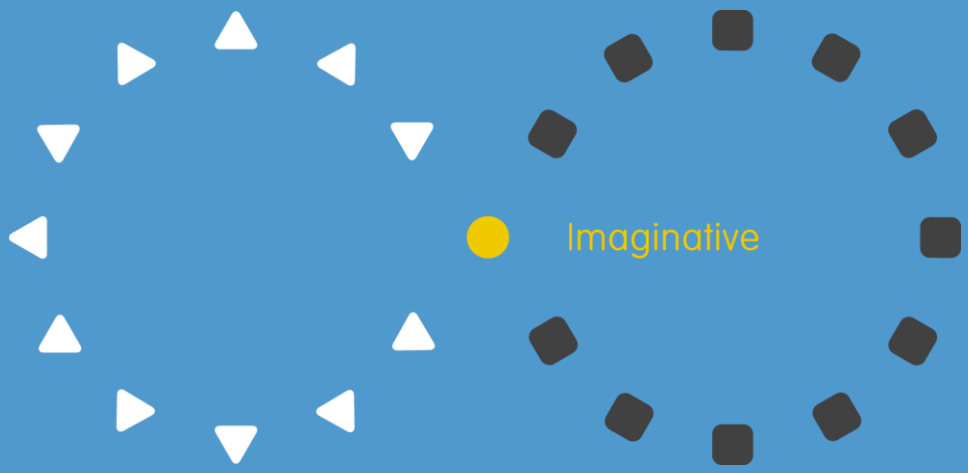
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