Appendix H. Stage 3 - Traffic Assessment (Tonkin, 2021)

Buronga Landfill Extension Project

Traffic Assessment: Environmental Impact Assessment

Prepared for Wentworth Shire Council

14 December 2021
Ref: 202597

tonkin

Building exceptional
outcomes together

Document History and Status

Rev	Description	Author	Reviewed	Approved	Date
A	Draft for Client Comment	BD	RB/NF		
C	Issued to Council				15/06/2021
D	Revised report following client review and community consultation	NF	NF	MS	3/09/2021
E	Minor amendments following DPI comments	NF		MS	14/12/2021

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Ref: 202597

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1 Introduction

Wentworth Shire Council has engaged Tonkin to prepare an Environmental Impact Statement for the Buronga Landfill Expansion Project in the far south west Riverine region of New South Wales (Figure 1). The Traffic Impact Assessment forms one component of the overall review of environmental factors for the proposed development. Wentworth Shire Council proposes to develop the project on a site within the Wentworth local government area (LGA), approximately 7 kilometres (km) north of the border between Victoria and New South Wales.

An increase in volume of waste from the current 30,000 tonnes per annum limit to 100,000 tonnes per annum is proposed for the current Buronga Landfill site, which triggers the need for and Environmental Impact Assessment (EIA) and referral of the Environmental Impact Statement (EIS). As the expansion requires a Development Application (DA) and will include waste from areas outside the council area, the Project is classified as a State Significant Development (SDD).

An Environmental Impact Statement (EIS) is a requirement of the approval process. This Traffic Impact Assessment (TIA) forms part of the EIS. It documents the traffic impact assessment methods and results, and the methods proposed to avoid and minimise associated traffic impacts, and the additional mitigation and management measures proposed to address any outstanding impacts not able to be avoided.

The three stages of the assessment have included;

1. Review of existing Environment and constraints;
2. Road Transport and Infrastructure Design, and
3. Environmental Impact Assessment.

The key tasks undertaken for the assessment has included but not limited to:

- Collation and review of data including traffic volumes and crash statistics
- Confirmation of vehicle types to be used to service the upgraded facility
- Detailed site inspection of the existing access on Arumpo Road and connections to Silver City Highway to understand:
  - the configuration of the existing roads and intersections
  - sight distances available at the intersections
  - existing signage
  - the condition of the existing roads, pavement and road structures
  - any constraints that may exist related to proposed changes to the road transport network
- Review the operation of the road network.
- Consultation with the road authorities to understand any particular concerns with the proposal that need to be addressed within the assessment.
- Preparation of concepts to address identified deficiencies and any upgrades required on the local road network.
- Assessment of impacts on the proposed transport route during both the construction and operational stages including
  - Existing and proposed traffic volumes
  - Level of service and road network performance
  - Safety of all road users
- Assessment of adequacy of the recommended upgrades, where operation mitigation measures to alleviate impacts are included.
- Recommendations for ongoing monitoring of road conditions.

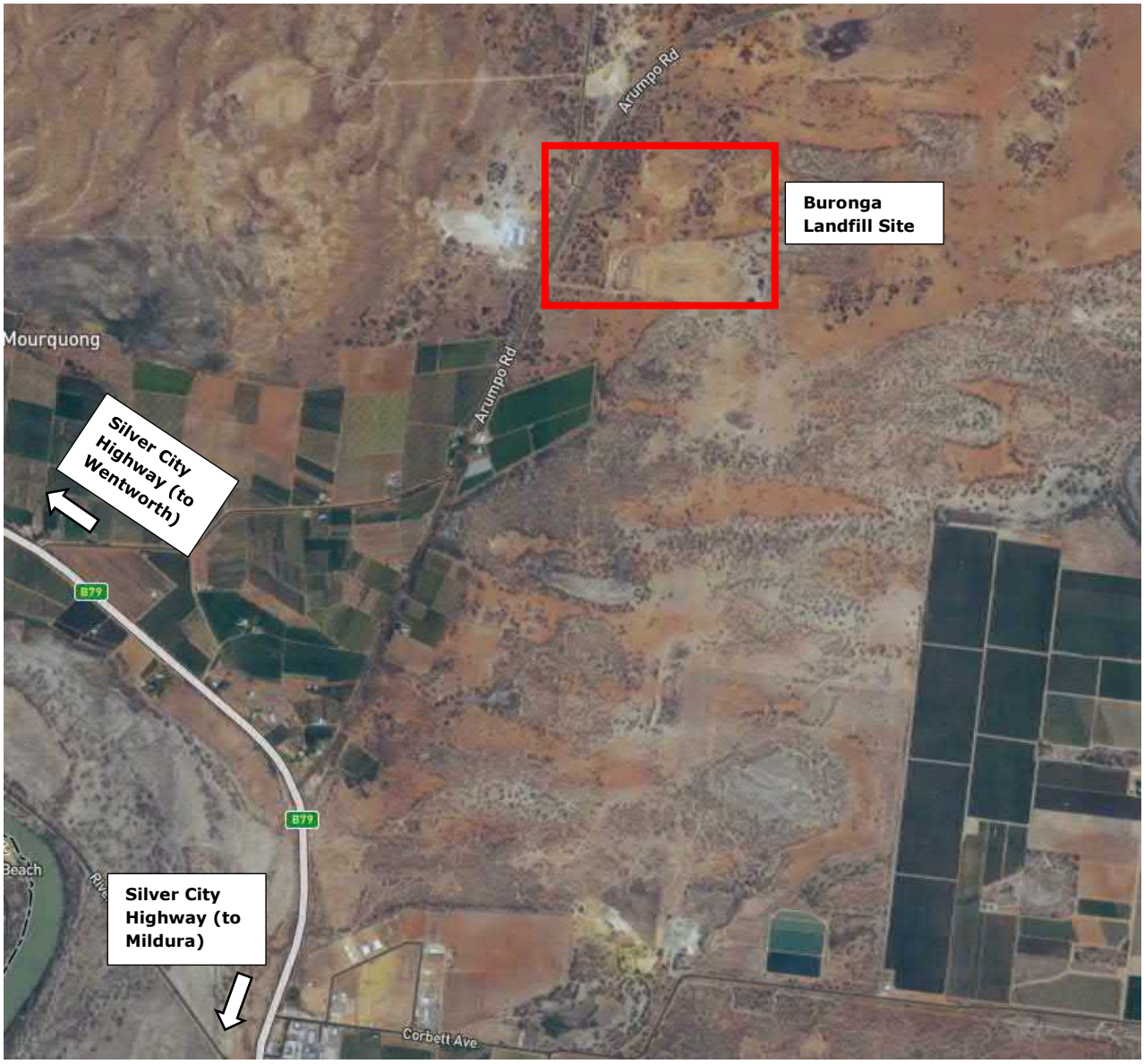


Figure 1 Site Locality for the Project

2 Methodology and Data Sources

The assessment has been undertaken with the relevant governmental assessment requirements, guidelines and policies, and in consultation with the relevant government agencies.

The assessment is based on the following general scope for matters to consider in a TIA which is defined by the NSW Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (RTA 2002).

- the existing locality and surrounding land uses;
- the existing road network and intersections;
- traffic generation characteristics of the project;
- traffic impacts of the project, and
- a summary of the assessed traffic impacts and any traffic management or mitigation measures.

In addition to the above, the following Austroads Guidelines have been referred to in preparation of this report including the relevant TfNSW Supplements to Austroads guides:

- Austroads Guide to Road Design Part 3 – Geometric Design
- Austroads Guide to Road Design Part 4 – Intersections and Crossings - General
- Austroads Guide to Road Design Part 4A – Unsignalised intersections and signalised intersections
- Austroads Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings
- Austroads Guide to Pavement Technology Part 5 – Evaluation Treatment Design

The National Heavy Vehicle Regulator (NHVR) Performance Based Scheme (PBS) - Network Classification Guidelines have also been referred to in the preparation of the assessment.

This TIA will also address the requirements of the Secretary's Environmental Assessment Requirements.

A site inspection of the entrance to the current landfill on Arumpo Road indicated in Figure 1 together with the junction of Arumpo Road and the Silver City Highway was undertaken on 24 March 2021 to establish the existing road arrangements, geometry, sight distances and pavement conditions so as to identify any constraints to the development of the Project and develop measures to address any identified constraints.

3 Consultation with Stakeholders

Consultation with key stakeholders has involved discussions with Wentworth Shire Council and Transport for NSW (TfNSW) with the key points identified below.

Wentworth Shire Council (Roads and Engineering Department)

- Indicated that the access with the landfill should be upgraded to suit the largest vehicle required to access the landfill.
- No other comments

Transport for NSW (TfNSW)

- TIA needs to address where the additional landfill is expected to come from and how the landfill is expected to be processed on site, and in particular if it arrives from Victoria, the impact on George Chaffey Bridge needs to be addressed.
- Impacts on the state road network regionally to be addressed.

4 SEARS

The Secretary's Environmental Assessment Requirements as they relate to the traffic impact assessment are outlined below:

Transport for NSW

- TIA is to address the existing and anticipated additional traffic generation on the surrounding road network, vehicle types and volumes including peak traffic volumes, travel routes for vehicles accessing the development site.
- Consideration of the cumulative impacts of the potential traffic generation when added to existing traffic volumes on upon the surrounding road network.
- Address and provide recommendations for any mitigation measures necessary to address traffic related impacts generated by this development upon the surrounding road network during the lifetime of the project.
- Traffic related issues should be addressed in two distinct stages as follows:
  - Establishment phase i.e. transport of material and equipment/components for the construction of the development, including movement and parking of construction related vehicles.
  - Operational phase – ongoing traffic generation due to the operation, maintenance and serving of the project.
- Need to appropriately consider and minimise the impacts of the total traffic generation due to the development on the existing road infrastructure and maintain the safety, efficiency and standard of maintenance along the existing road network through the design, construction and operation of the development and any road works required to support the operation of the development.

The SEARs also outlines that 'the impact on safety and capacity of the surrounding road network and access points, using SIDRA modelling or similar to assess impacts from current traffic counts and cumulative traffic from existing and proposed developments'. Analysis of the impact of traffic on the capacity of the intersection was undertaken using the Austroads Guide to Traffic Management Part 6 to determine warrants to intersection turning treatments, rather than SIDRA modelling.

SIDRA is a program used to analyse the capacity and performance of intersections during peak hours on the road network. Given the current intersections of Silver City Highway and Arumpo Road, and Arumpo Road and the Buronga Landfill are existing T-junctions with relatively low base levels of traffic and both respectively perform at a satisfactory level, and there are no major increases expected to vehicle volumes at each of these intersections, the performances of each intersection are not expected to change with the estimated additional vehicles. Given only small increases in traffic during the peak hours was estimated, the use of SIDRA to model the impacts on the intersections was not deemed warranted.

5 Existing Road Network

Access to the Project Site is proposed to occur from Arumpo Road. Arumpo Road is in turn accessed by Silver City Highway, which links many of the towns that are likely to use the landfill.

5.1 Silver City Highway

5.1.1 Function and Geometry

The Silver City Highway is a two lane two-way road under the care and control of TfNSW. This section of the road is currently posted as a 100km/hr speed limit from approximately 1.5km from the intersection with Sturt Highway and is the primary route for transport linking Mildura in the south to Broken Hill in the north. The road extends from Buronga at the Sturt Highway in the south, to the Queensland/NSW border in the north and intersects other major highways including Sturt Highway, Calder Highway and Barrier Highway. Silver City Highway is used by light vehicles in Southern NSW as a means of linking nearby towns such as Buronga, Dareton and Wentworth. The Highway has approval for travel by B-double, Type (1) A-double, Modular B-triple, B-triple and AB-triple vehicles.

Silver City Highway is sealed, and edge lined, with sealed shoulders throughout the area between Buronga and Arumpo Road. Predominantly, Silver City Highway is a two-lane two-way road, with marked lane widths of 3.5m and sealed shoulder widths of 1.0m. Unsealed shoulders are approximately 1.5m. The Highway does not have any noticeable vertical alignment changes. There are a range of large horizontal curves that exist in the area of Arumpo Road and Buronga.

5.1.2 Road Condition

The condition of the Highway appears satisfactory with minimal rutting or surface defects suggesting the underlying pavement is in good condition.

5.1.3 Traffic and Safety

Daily traffic volumes were obtained from Austraffic traffic surveys, in March 2021. Traffic volumes are presented in Table 1 below. Traffic counts were taken over a two-week period.

Table 1 Historic and projected traffic volumes for Silver City Highway

Direction		Traffic Volume (veh/day)	Average Volume at Peak Hour (Peak Time)	Heavy Vehicle Percentage	85th Percentile Speed (km/h)
South of Arumpo Road Intersecti	Two-Way	2,999	274 (2pm)	22.7%	95
	Northbound	1,488	122 (6am)	21.4%	95
	Southbound	1,475	156 (2pm)	23.9%	93
North of Arumpo Road Intersecti	Two-Way	2,501	233 (2pm)	19.7%	103
	Northbound	1,256	103 (2pm)	19.3%	102
	Southbound	1,244	130 (2pm)	20.1%	104

Road width design standards for single carriageway rural roads are defined by the Austroads Guide to Road Design Part 3 (2021) and are based on daily traffic volumes. Based on Table 4.5 in the Guide, the minimum traffic lane width required is 3.5m, with a total shoulder of 2m, with minimum 1m sealed. The Silver City Highway within the vicinity of Arumpo Road currently meets the minimum cross-sectional requirements of the Guide based on existing traffic volumes.

The NHVR PBS - Network Classification Guidelines also detail minimum carriageway widths for heavy vehicle routes. Given Silver City Highway is gazetted for Level 3 vehicles (Type 1 Road Trains), the minimum lane and total shoulder widths required by the Guidelines are 3.3m and 1.5m respectively for the current traffic volumes. Silver City Highway currently exceeds this requirement.

A review of published crash data by the Centre for Road Safety Illustrates that there were 5 crashes within 2.5km of the intersection with Arumpo Road along Silver City Highway between 2015 and 2019. 3 of these crashes occurred between approximately 1.0km and 2.5km North of the Arumpo Road intersection. The three crashes included a cross-traffic collision at an intersection, a rear-end collision turning off the highway into a T-junction, and a vehicle that ran off the road. The final 2 crashes were at the intersection between Sturt Highway and Silver City Highway, approximately 2.5km south of the Arumpo Road intersection. These crashes included a rear end collision and a left-turn sideswipe. All crashes resulted only in minor injuries.

Figure 2 **Silver City Highway intersection with Arumpo Road facing south (left) and north (right)**

5.2 Arumpo Road

5.2.1 Function and Geometry

Arumpo Road is a sealed road under the care and control of the Wentworth Shire Council. The road has an 80km/h posted speed zone from the Silver City Highway and continues for approximately 2km and then increases to a 100km/h posted speed zone. Arumpo Road provides a link between Buronga and Mungo, extending north-east from the Silver City Highway. Arumpo Road has the approval for travel by B-double, Type (1) A-double and Modular B-triple vehicles.

On the approach to Silver City Highway, Arumpo Road has lane widths of 3.6m with an unsealed shoulder width of 1.0m. On the approach to the Buronga Landfill, Arumpo Road has lane widths of approximately 3.25m, with an unsealed shoulder width of 1.5m. There is localised seal widening at the junction with Mourquong Road, with the total sealed width increasing from 6.5m to 10m on the approaches to the junction. At the intersection to Buronga Landfill, there exists a wide sealed shoulder, likely designed to allow vehicles travelling straight to pass vehicles turning left into the landfill.

The road alignment is straight, with the exception of a large radius curve approximately 200m from the Silver City Highway, in the 80km/h section of road. There also exists a vertical crest curve south of the speed limit change 2km from the Silver City Highway.

5.2.2 Road Condition

The condition of Arumpo Road appears satisfactory with minimal rutting or surface defects suggesting the underlying pavement is in good condition.

5.2.3 Traffic and Safety

Daily traffic volumes were obtained from Austraffic traffic surveys, in March 2021. Traffic volumes are presented in Table 2 below. Traffic counts were taken over a two-week period.

Table 2 Traffic volumes for Arumpo Road

Direction	Traffic Volume (veh/day)	Average Volume at Peak Hour (Peak Time)	Heavy Vehicle Percentage	85th Percentile Speed (km/h)
Two-Way	478	47 (1pm)	24.6%	69
Eastbound	237	24 (6am)	23.25%	64
Westbound	241	28 (2pm)	26%	71

Based on Table 4.5 in the Austroads Guide, the minimum traffic lane width required is 3.1m, with a total shoulder of 1.5m, with minimum 0.5m sealed. In addition, the Guide outlines that a minimum 7.0m seal should be provided on designated heavy vehicle routes (or where the AADT contains more than 15% heavy vehicles). Based on the above, the majority (approximately 2.2km out of 2.6km) of Arumpo Road between the Silver City Highway and the Landfill access does not currently meet the minimum cross-sectional requirements of the Guide based on existing traffic volumes, with a total minimum seal width of 7.2m required consisting of 2x 3.1m lanes and 0.5m sealed shoulder. It is noted that current traffic volumes are close to the current Design AADT threshold.

Assessed against the NHVR PBS - Network Classification Guidelines the minimum lane and total shoulder widths required are 2.9m and 1.2m respectively for the current traffic volumes and Level 3 vehicles gazettal status. Arumpo Road currently exceeds this requirement.

A review of published crash data by the Centre for Road Safety Illustrates that there were no crashes along Arumpo Road within 15km of the Arumpo Road and Buronga Landfill intersection. Approximately 16 km north-east from the intersection, a single moderate injury crash from 2018 exists. This crash was caused by a vehicle losing control on a T-junction turn.

Figure 3 Arumpo Road – Travelling Away from to Silver City Highway (Left) and Between Silver City Highway and Buronga Landfill

5.3 Other Local Roads

5.3.1 Mourquong Road

The only other local road within the vicinity of the subject site is Mourquong Road. Mourquong Road is a local road primarily providing access to adjacent horticulture land including a small number of dwellings. It extends between Silver City Highway and Arumpo Road. Being primarily for local access, it is of lower standard and width than Arumpo Road, with a sealed width of approximately 4.8-5m. Mourquong Road is not gazetted for vehicles greater than semi-trailers. The current posted speed limit is 80km/hr.

Due to the current cross section standard, it is not expected that Mourquong Road will be utilised by development traffic, in particular heavy vehicles and would only be utilised by incidental light vehicles.

5.4 Silver City Highway/Arumpo Road Junction

At the intersection between Silver City Highway and Arumpo Road, there exists a deceleration and acceleration on Silver City Highway for left turns onto and from Arumpo Road respectively. There also exists an auxiliary right-turn treatment on Silver City Highway, with two lanes, allowing vehicles to pass a right-turning vehicle on a short left lane. These intersection treatments mean that Silver City Highway contains four lanes around the Arumpo Road intersection. The two central lanes remain with a width of 3.5m. The east-most deceleration lane and the west-most lane have widths of 3.0m at their largest. Shoulder widths are 0.5m, meaning that at Silver City Highway's widest point in the vicinity of Arumpo Road, the seal width is 14.0m.

The sight distance at the Silver City Highway / Arumpo Road intersection was assessed using Austroads Guide to Road Design Part 4A the Safe Intersection Sight Distance (SISD). For a posted speed limit of 100km/hr (assumed to be the operating speed) and based on the guidance presented in Austroads and the RMS Supplement to Austroads. The minimum required SISD is 262m based on a 2.5 second driver reaction time. Based on a site visit, sight distances were deemed to be acceptable, with sight distance deemed to be 300+ metres, despite horizontal curves existing on either side of the intersection.

Due to the location of the traffic counter on Arumpo Road, it can be determined that 24 vehicles enter the intersection from Silver City Highway and 28 vehicles exit the intersection onto Silver City Highway during the peak hours.

There exists a truck rest area directly opposite the intersection, as seen in Figure 4 below.

Figure 4 Truck rest area opposite Arumpo Road and Silver City Highway intersection

5.5 Arumpo Road/Buronga Landfill Junction

Road conditions upon entrance to Buronga Landfill are poor. There are is range of deformed areas and small potholes. There is widespread evidence of stripping, with some areas of the base exposed.

Figure 5 Entrance to Buronga Landfill Looking South

The sight distance has been checked at the Buronga Landfill junction with the Arumpo Road using Austroads Guide for SISD. The operating speed of the road is likely to be 100km/hr, and this equates to a SISD of 262m based on a reaction time of 2.5 seconds. Arumpo Road continues with negligible changes to horizontal alignment in the vicinity of the Buronga Landfill entrance. Sight distances appear to be in excess of 700m, and thus sight distances are met.

5.6 Landfill Traffic Volumes

The volumes of vehicles using the intersection can be determined using the volumes of traffic using the landfill weighbridge, as well as the volume of employee vehicles. Six employee vehicles are expected to access the landfill daily, assumed to be in light vehicles. There are an additional 24 light vehicles such as cars, utes and trailers carrying household waste that pass through the weighbridge. 4 light rigid trucks, 21 heavy rigid trucks, and a single articulated truck pass through the landfill weighbridge daily on average. This means that an average of 56 vehicles enter into the landfill each day equating to a total of 112 movements in and out of the landfill.

5.7 Warrants for Current Intersection Improvements

Rural intersection upgrade warrants are assessed from the combination of the peak hourly through and turning traffic movements which occur at the intersection. This will determine the need for turning lanes in accordance with current Austroads Guide to Traffic Management Part 6 and is shown in Figure 6 below.

There are separate design charts for roads with either 100 km/hr or higher design speeds or design speeds for lower than 100km/hr. As the speed limit on the major road at both the Silver City Highway/Arumpo Road junction and Arumpo Road/Landfill access junction is 100km/hr, the design chart for design speeds 100km/hr or greater is to be adopted. Additional left or right turn traffic lanes are only required where the combination of the major road peak hourly traffic volume and the minor road traffic exceeds the curve 1 as shown in the chart in Figure 6 below.

Silver City Highway contains 122 veh/hour travelling north towards the Arumpo Road intersection (according to the traffic count south of the intersection) and 130 veh/hour travelling south towards the intersection (according to the traffic count north of the intersection). Note that these vehicle volumes are based on the worst-case scenario, which in this case happens to be the peak hours of 6am and 2pm. Based on the Arumpo Road traffic count, it is assumed that at a maximum, 24 vehicles will turn onto Arumpo Road during the peak hour.

Figure 6 is used, with a design speed of larger than 100km/h, turn volumes of 24 veh/h, and major road volumes of 252 veh/h for the right-turn and 130 veh/h for the left-turn. Based on the figure, a basic left turn is adequate and a short channelised right turn lane is required. Currently, only auxiliary lanes exist for right turns.

The peak hour volume of vehicles along Arumpo Road is only 47 vehicles/hour. Only 56 vehicles enter the facility daily, and by taking an assumed 10% of the daily peak to inform the hourly peak, it is assumed 6 vehicles enter the intersection at peak time. Based on Figure 6, with the low volumes of traffic on Arumpo Road, it means that basic left and right turns are adequate upon the entrance to the landfill facilities.

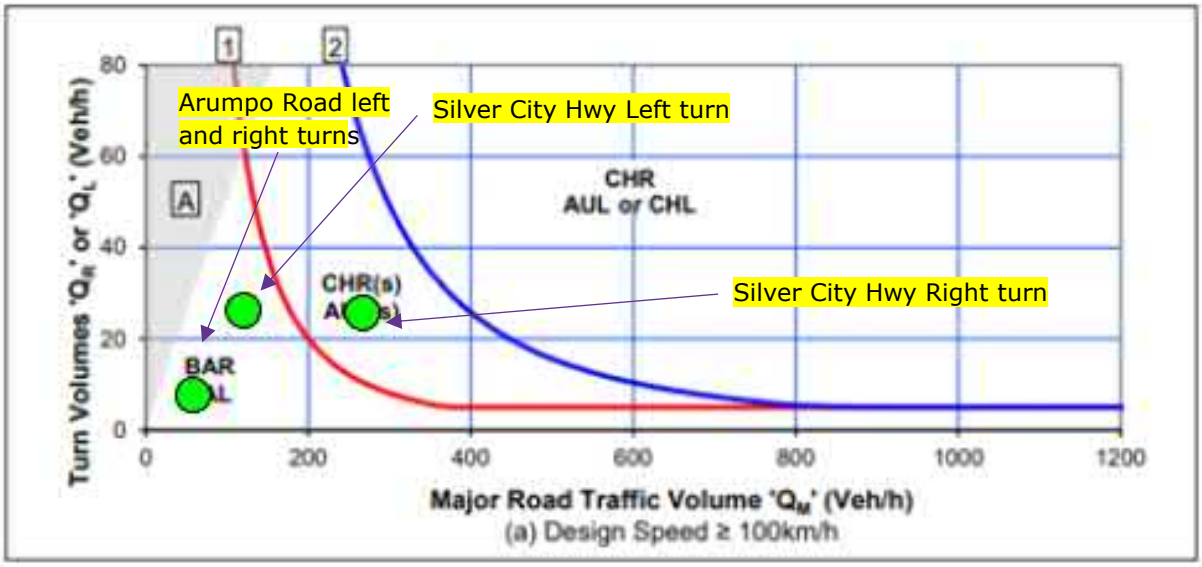


Figure 6 **Warrants for additional turn lanes at intersections on major roads**

6 Traffic and Parking Demands for the Proposal

6.1 Construction Generating Activities

Construction of the Project is expected to be prevalent and staged throughout the entire life span of the landfill facilities. Construction is expected to occur alongside operation of the current facilities. Whilst it depends on landfill cell capacity, it is projected that new cells will be required to be built approximately every 3-5 years. It is expected that there will be an average of 15 extra employees undertaking the construction of each cell.

Construction activities that are expected to occur include both the construction of additional landfill cells, as well as any intersection upgrades that may be necessary.

6.2 Site Access and Parking

Site access to the upgraded landfill is shown to occur at the entrance to the current landfill on Arumpo Road. The majority of waste at the landfill is from household waste, and all towns that would be expected to use the landfill facilities will require the use of the Silver City Highway. Approximately two thirds of the waste comes from Mildura, via commercial vehicles and rigid trucks. The remaining third of waste comes from the Wentworth, Buronga and Gol Gol areas, including via cars and trailers.

Limited parking facilities are present in front of the landfill offices, out of the way of landfill user traffic. Local users of the landfill would be expected to drop of their rubbish at designated points around the site and leave, thus there is no particular need for any upgrade to parking facilities. The same is applicable for commercial waste trucks. Currently only 6 staff are employed at the landfill facilities, however this is expected to increase to 10. This should not affect parking on site.

6.3 Traffic Generation

Traffic generation can be grouped into four separate scenarios, due to the need for construction and operation at the same time.

- Scenario 1 - Current Operation
- Scenario 2 - Current Operation and Initial Construction
- Scenario 3 - Future Operation
- Scenario 4 - Future Operation and Top-Up Construction

The first scenario is simply from the current landfill operation levels. Construction will begin simultaneously to the operation of the current landfill, creating an increase in volume. Once construction has been completed, it is expected that traffic volumes into the larger operating landfill will increase, as the facilities take on more waste from surrounding areas, including Mildura (once the current Mildura landfill reaches the end of its life). Finally, construction of new cells approximately every three years means there will be a combined volume of construction traffic as well as the increased operating traffic from the initial development.

A range of vehicles are expected to access the site, as outlined by Wentworth Shire Council. Light vehicles are the predominant vehicle type, closely followed by heavy rigid trucks. Light rigid trucks and articulated trucks occur daily but are in much lower volumes. The largest expected vehicle is a B-Double.

The current operation volumes are taken from weighbridge movements, combined with employee volumes. Wentworth Shire Council has provided a daily average of vehicles travelling through the landfill weighbridge, and the breakdown of this can be seen in Table 3. This equates to a total of 50 vehicles. Given there are 6 employees travelling daily, this takes the current operation total to 56 vehicles.

A range of assumptions are made in calculating the updated vehicle volumes:

- The majority of material during construction can be sourced from the landfill site itself. Geosynthetics, pipes and fittings, concrete, steel, pumps, etc for construction of resource recovery areas and landfill cells will be sourced externally. These materials will be predominantly transferred using heavy articulated trucks.
- Light vehicle traffic will not change much in future operations, as most light traffic from Mildura will drop off waste at existing local transfer stations.
- Current average daily volumes from commercial type vehicles are 7t/day, large high volume vehicles are 35t/day, and cars and trailers are 2t/day. Given these averages, on average there is 16,060 tonnes of waste delivered each year. This is approximately 3/5 of the total tonnage of the landfill. Given this information, it is expected that once the landfill is upgraded to 100,000 tonnes annual capacity, an average day would see it reaching 60,000 tonnes of waste annually. However, it is understood the landfill actually currently operates near capacity, therefore an additional peak profile has been developed based on 29,000t per year.
- Light vehicles predominantly come in from the NSW side of the river, and these are not expected to change.
- Heavy vehicles are expected to increase in volume from Mildura and will make up most of the difference in volume from 16,000 tonnes to 60,000 tonnes.
- Peak traffic is equal to 1.6x the average traffic (rounded). This means that at its peak, the landfill will experience 96,000 tonnes delivered in a year to the expanded site.
- As light and rigid vehicles are both expected to increase in volume, their predicted future operation volume will increase by the same factor. This increase is deemed to be approximately 3.8x to reach a volume of 60,000 tonnes.
- Employees increase from 6 to 10 with the increase in capacity of the landfill.

Table 3 Daily traffic generated by the upgraded landfill

	Current Operation		Current Operation + Construction		Future Operation		Future Operation + Construction	
Vehicle Type	**Average**	**Peak**	**Average**	**Peak**	**Average**	**Peak**	**Average**	**Peak**
Light Vehicles	30	48	45	72	46	74	61	98
Light Rigid Trucks	4	6	5	8	15	24	16	26
Heavy Rigid Trucks	21	34	22	35	81	130	82	131
Articulated Trucks	1	2	3	5	2	3	4	6
TOTAL	**56**	**90**	**75**	**120**	**144**	**230**	**163**	**261**

It can be seen from the table above that daily traffic will be at its peak during periods where usual operation of the upgraded facilities is combined with construction of new cells.

6.4 Traffic Distribution

During periods where construction is taking place, it is expected that:

- 90% of construction vehicles will travel to and from the site from Victoria (Mildura)
- 5% of construction vehicles will travel to and from the site from Buronga
- 5% of construction vehicles will travel to and from the site from Wentworth

These percentages are likely due to the fact that most materials required for the landfill will be produced in Mildura. 5% of constructions vehicles in Buronga and Wentworth allow for employee vehicles, and also any materials that may be sourced from alternate sources in NSW.

During operating periods, it is expected that:

- 75% of vehicles will travel to and from the site from Victoria (Mildura)
- 15% of vehicles will travel to and from the site from Buronga/Gol Gol
- 10% of vehicles will travel to and from the site from Wentworth

The majority of light vehicles are from households in Wentworth Shire Council. The only increase expected from these areas are due to population increases. Household waste from Mildura is expected to increase, however this will travel to Buronga Landfill via waste processing facilities and rigid trucks. Note that these percentages are based on the closing of the Mildura Landfill, as it reaches the end of its life.

Using these assumptions, the following table is produced.

Table 4 Daily Traffic Generation per Area

	Current Operation + Construction		Future Operation		Future Operation + Construction	
Vehicle Type	**Average**	**Peak**	**Average**	**Peak**	**Average**	**Peak**
Mildura	17	27	66	106	83	133
Buronga	1	2	13	21	14	23
Wentworth	1	2	9	14	10	16
TOTAL	**19**	**30**	**88**	**141**	**107**	**171**

7 Impact Assessment

7.1 Traffic Volumes on the Road Network

The impact of additional traffic on the road network is expected to affect Silver City Highway and Arumpo Road. The existing daily traffic volumes (estimated baseline daily traffic volumes for the year 2021) for the Silver City Highway and Arumpo Road and the existing adequacy of the road design standards for these routes is discussed in Section 5.

The roadway Design Annual Average Daily Traffic (AADT) for single carriageway roads can be measured against the existing traffic lane and carriageway widths as indicated in the Austroads Guide to Road Design Part 3. Based on the existing cross sections of the road, the Design AADT for each road is below:

- Silver City Highway North - >3000 vehicles per day
- Silver City Highway South - >3000 vehicles per day
- Arumpo Road – 150-500 vehicles per day

The additional daily traffic volumes generated during the construction and operation stages are summarised for the affected travel routes (Silver City Highway & Arumpo Road) in the following sections.

7.1.1 Future Operational Traffic

The below table highlights the expected changes to AADT on key roads near the Buronga Landfill, following the upgrade of the facilities.

Table 5 Future daily traffic assessment for average operational traffic

Road Name	Current AADT	Additional Vehicles	Traffic Increase Percentage	New AADT
Silver City Highway (North of Arumpo Road)	2,501	9	0.35%	2,510
Silver City Highway (South of Arumpo Road)	2,999	79	2.64%	3,078
Arumpo Road	478	88	18.41%	566
George Chaffey Bridge	18,000	66	0.37%	18,066

The current AADT volumes sit below the expected design AADT based on road cross sections, however it is noted that Arumpo Road has deficient total seal width for the current AADT. These traffic volumes show a very little increase in traffic volume on Silver City Highway and Arumpo Road, however the increase on Arumpo Road will put it into the next Design AADT category (500-1000 vehicles per day), therefore it is recommended that the seal width is increased to 7.2m minimum as recommended by Austroads regardless of the development proceeding or not. No changes are proposed or recommended for Silver City Highway.

7.1.2 Construction Traffic

The below table highlights the expected effect of having more vehicles on the road due to construction work to the landfill.

Table 6 Future daily traffic assessment for a combination of average construction and operational traffic

Road Name	Current AADT	Additional Vehicles	Traffic Increase Percentage	New AADT
Silver City Highway (North of Arumpo Road)	2,501	1	0.04%	2,502
Silver City Highway (South of Arumpo Road)	2,999	18	0.60%	3,017
Arumpo Road	478	19	3.97%	497
George Chaffey Bridge	18,000	17	0.10%	18,017

The majority of vehicles come from Mildura and must cross the George Chaffey Bridge and Silver City Highway south of Arumpo Road. These volumes are low enough in comparison to the current AADT.

7.1.3 Construction and Future Operational Traffic

Construction will occur at regular intervals throughout the life of the facility, and simultaneously during the operation of the facilities. Thus, the construction and operation traffic is likely to have the greatest impact on the surrounding road network. The below table highlights the expected effect of having both construction and additional operation traffic on surrounding roads.

Table 7 Future daily traffic assessment for a combination of average construction and operational traffic

Road Name	Current AADT	Additional Vehicles	Traffic Increase Percentage	New AADT
Silver City Highway (North of Arumpo Road)	2,501	10	0.39%	2,511
Silver City Highway (South of Arumpo Road)	2,999	97	3.24%	3,096
Arumpo Road	478	107	22.38%	585
George Chaffey Bridge	18,000	83	0.46%	18,083

As identified under the existing conditions in Section 5 it was found that the Arumpo Road does not have sufficient seal width for the existing AADT based on the Austroads Guide to Road Design Part 3. With a combination of operational and construction traffic, the road AADT will move into the next design AADT category. While this does not increase the minimum seal width required, it does highlight that the seal width should be widened regardless of the development proceeding.

The AADT of Silver City Highway and George Chaffey Bridge is not largely altered enough to warrant any recommended upgrades due to the expanded Landfill.

7.2 Traffic Impact at Intersections

Given an increase in traffic in much of the surrounding road network, the ability of the intersection to handle the new influx of traffic is to be investigated. From Section 5 of this report, it was found that a maximum of 24 veh/h turn onto Arumpo Road. It was also found that a total of 56 vehicles turn into the landfill on any given day, with an assumption that 10% of these make the peak hour, taking the peak hourly rate to 6 veh/h.

Vehicles predicted to use the Silver City Highway and Arumpo Road, as well as the Arumpo Road and Landfill Entrance intersections are assessed again with reference to AGTM Part 6, but with additional vehicles at the intersection. As traffic during simultaneous operation and construction is largest, the peak volumes from those periods is used to analyse the intersection.

The peak additional daily traffic was calculated for each area surrounding the landfill facilities in Table 4. It is assumed that the 10% of expected peak traffic occurs during the peak hour. These peak hourly volumes are used to predict the increased major road and turning volumes. Additional vehicles entering the intersection are summarised in the table below.

Table 8 Future Intersection Volumes (Daily)

	Current Major Road Volume	Current Turn Volume	Peak Additional AADT	New Major Road Volume	New Turn Volume
Silver City Highway (North of Arumpo Road)	130	24	16	132	26
Silver City Highway (South of Arumpo Road)	252	24	156	268	40
Arumpo Road	47	6	171	64	22

The increase in traffic at each intersection does not change the required intersection treatment from what was outlined in Section 5.6, according to the Austroads Guide to Traffic Management Part 6. This is demonstrated in Figure 7 below.

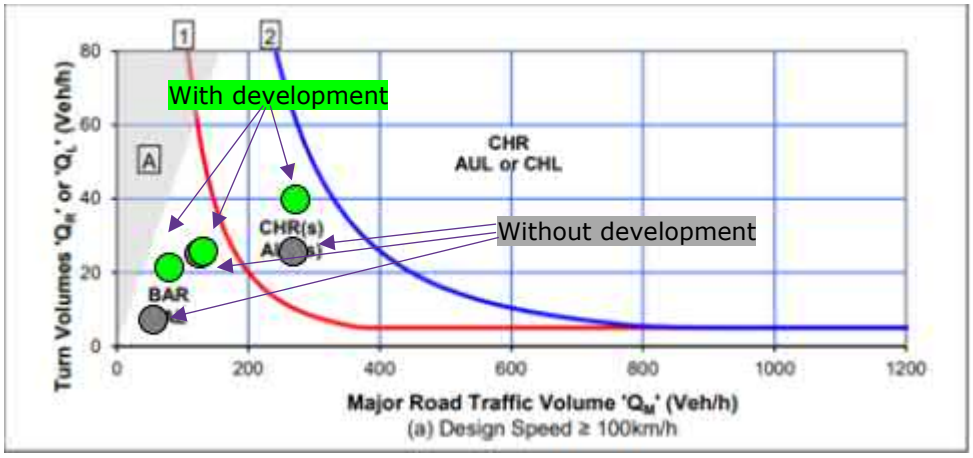


Figure 7 Updates to the warrants for additional turn lanes at intersections with future volumes

Note that this assumes a worst case scenario that the peak traffic of the road network coincides with the peak hour traffic of the landfill.

Based on the above assessment the recommended infrastructure improvements to facilitate vehicle access to the Project Site are discussed in the sections below.

7.2.1 Arumpo Road

As previously identified, Arumpo Road currently has deficient seal width to meet the requirements of Austroads. The minimum seal width required to meet the current and forecast AADT for the development is 7.2m, including minimum 3.1m lanes, 1.5m total shoulder with minimum 0.5m sealed. The current seal width is as narrow as 6.5m. It is estimated that approximately 2.2km of Arumpo Road between Silver City Highway and the Landfill access is narrower than the minimum. While the minimum lane widths are currently met, the seal width is not wide enough. Regardless of whether the development proceeds or not, the Arumpo Road should be widened to meet the minimum widths as required by Austroads. This is expected to involve reworking of the existing unsealed shoulders and sealing to meet the minimum total seal width. It is recognised that this work will need to be funded and should be undertaken prior to the landfill reaching its expanded capacity.

7.2.2 Arumpo Road/Buronga Landfill Intersection

According to the Austroads Guide to Road Design Part 4A, a minimum 7.0m width between the edge of a widened shoulder at the centreline must be implemented to allow for vehicles to pass turning vehicles. Currently this width does not exist.

Figure 8 Widened shoulder on Arumpo Road, directly in front of Buronga landfill entrance

The design of BAL and BAR turns on Arumpo Road can be seen in Appendix B. This includes approximate total areas of pavement that are required to be widened to allow for B-Double and AB-Triple vehicles. The landfill is expected to only require the entrance of B-Doubles; however, the road is gazetted for AB-Triples. A BAR and BAL turning movement for AB-Triples is undertaken in case the landfill requires the entrance of AB-Triple vehicles in the future.

7.2.3 Silver City Highway/Arumpo Road Intersection

Currently an AUR turn exists on Silver City Highway, when a CHR(s) turn in theory is preferable. However, the length of the additional auxiliary lane, plus the addition of a truck parking area, means that the current auxiliary lane is considered appropriate. Currently, the additional lane near Arumpo Road runs for approximately 500m. This length not only allows for vehicles to avoid right-turning vehicles onto Arumpo Road, but also allows room for trucks to enter and exit the parking area to the east of Silver City Highway. The truck parking area may also be a limitation on a potential CHR intersection, because the design of a CHR may limit the ability of heavy vehicles to turn into and out of the parking area.

Given the length of the current auxiliary lane, it is recommended to maintain the current intersection layout.

7.3 Traffic and Transport Management

The proposed intersection treatments would be incorporated into a Construction Traffic Management Plan, which will utilise Austroads and TfNSW guidelines for the major road intersection operations and worksite traffic control throughout the project construction period.

Temporary traffic control arrangements will be required during construction of public road improvements. During construction period, the largest vehicles which are anticipated to be visiting the site are B-Doubles. Additional traffic management will not be required during the solely operational phases.

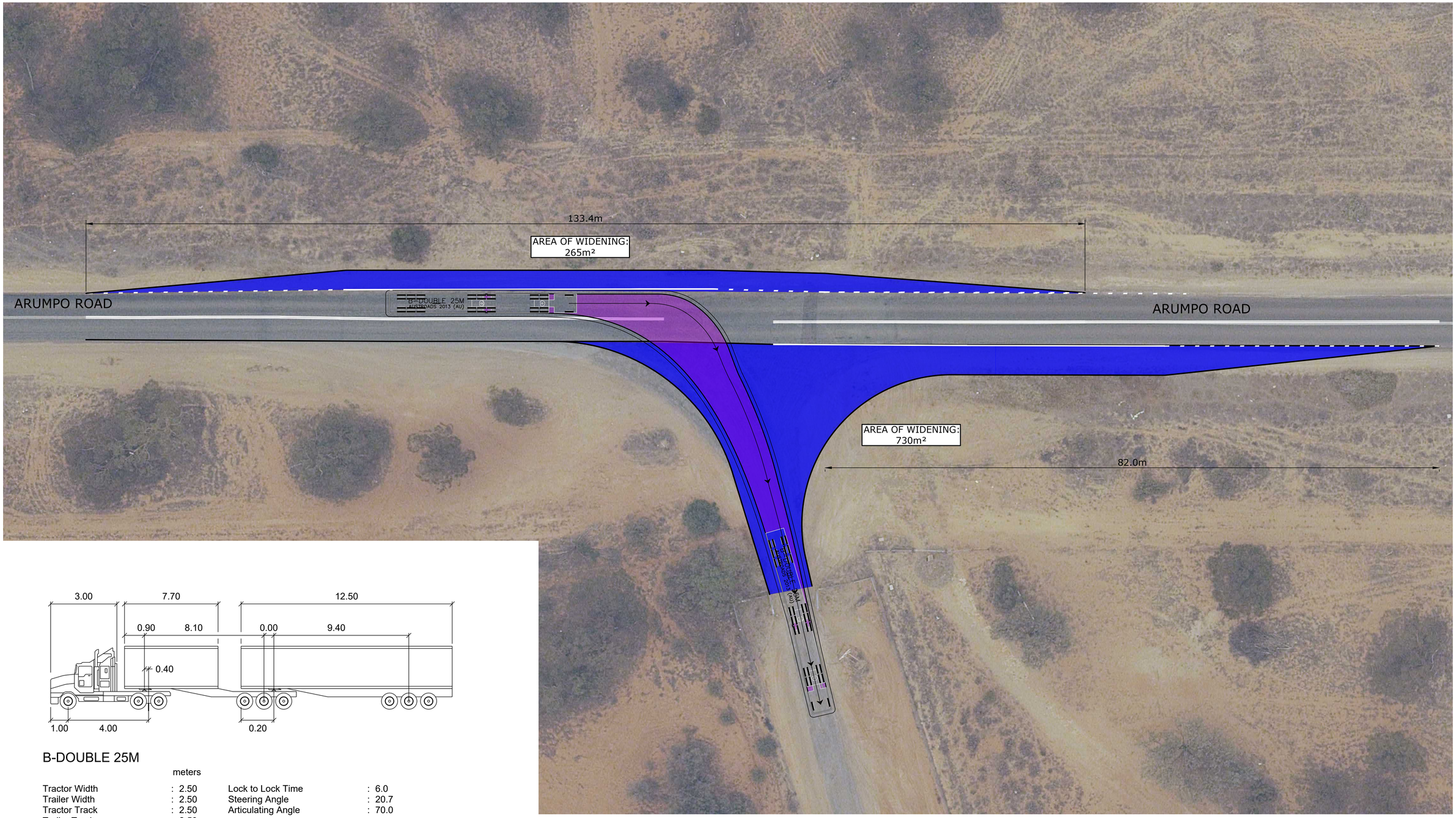
A Transport Management Plan would be required for any oversize and/or overmass vehicles travelling to the site. It is a comprehensive document describing how an oversize and/or overmass movement will be safely carried out in NSW and is required to be submitted to TfNSW prior to obtaining a permit for these movements.

8 Summary and Conclusions

The traffic impacts from the proposed Buronga Landfill extension have been assessed and the key findings are as follows:

- The BAR intersection at the junction of Arumpo Road and Buronga Landfill currently is not to the standards outlined by Austroads and will need to be upgraded.
- Silver City Highway have an appropriate cross section and geometry to meet Austroads standards despite the influx of future volumes due to the landfill.
- Arumpo Road currently has deficient seal width to meet Austroads standards, regardless of whether the development proceeds. It is recommended that Arumpo Road is widened to meet the minimum seal width of 7.2m as required by Austroads.
- There will be no adverse effects from the Buronga Landfill on the George Chaffey Bridge, due to the low increase in traffic volumes from Mildura, in comparison to the volumes that the bridge is exposed to.
- The intersections of Silver City Highway and Arumpo Road, and Arumpo Road and the Buronga Landfill have appropriate sight distance.
- Future traffic volumes were based on assumptions of the usage of surrounding areas, as well as Traffic Engineering experience.
- The junction between Silver City Highway and Arumpo Road may require a CHR treatment, however due to the length of the current auxiliary lane and constraints of a nearby heavy vehicle pullover point, the current AUR treatment may be deemed to be retained.
- The largest volumes of traffic caused by the Buronga Landfill development are in periods when construction upgrades of the landfill coincides with future operation volumes. This increase is equal to 10 vehicles on Silver City Highway (North of Arumpo Road), 97 vehicles on Silver City Highway (South of Arumpo Road), 107 vehicles on Arumpo Road, and 83 vehicles on George Chaffey Bridge.
- Intersection upgrades are not required due to the increased volumes caused by the landfill upgrades.

Appendix A – Proposed Intersection Upgrades



B-DOUBLE 25M

meters

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Trailer Width	: 2.50	Steering Angle	: 20.7
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

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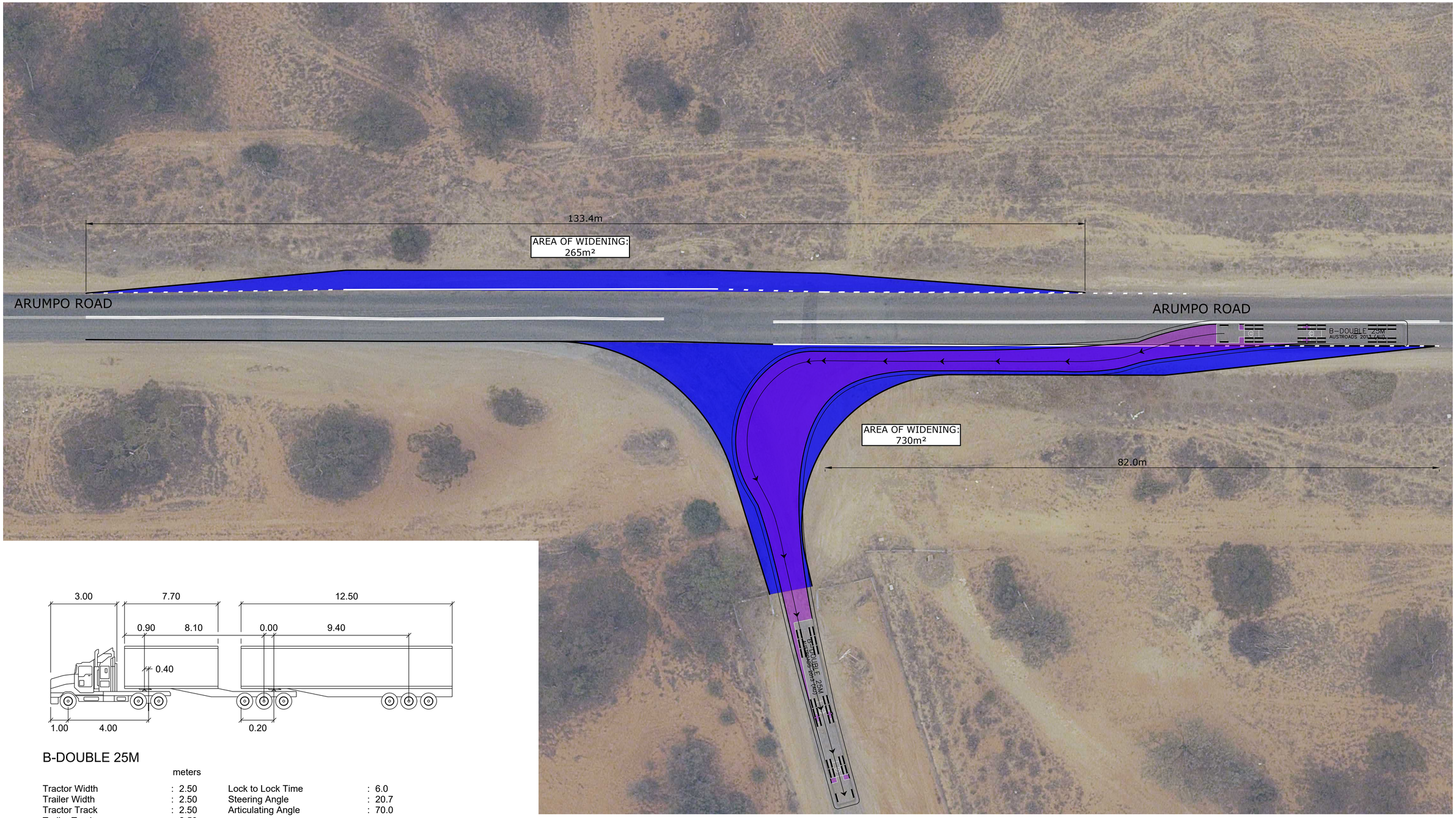

B-DOUBLE 25M

meters

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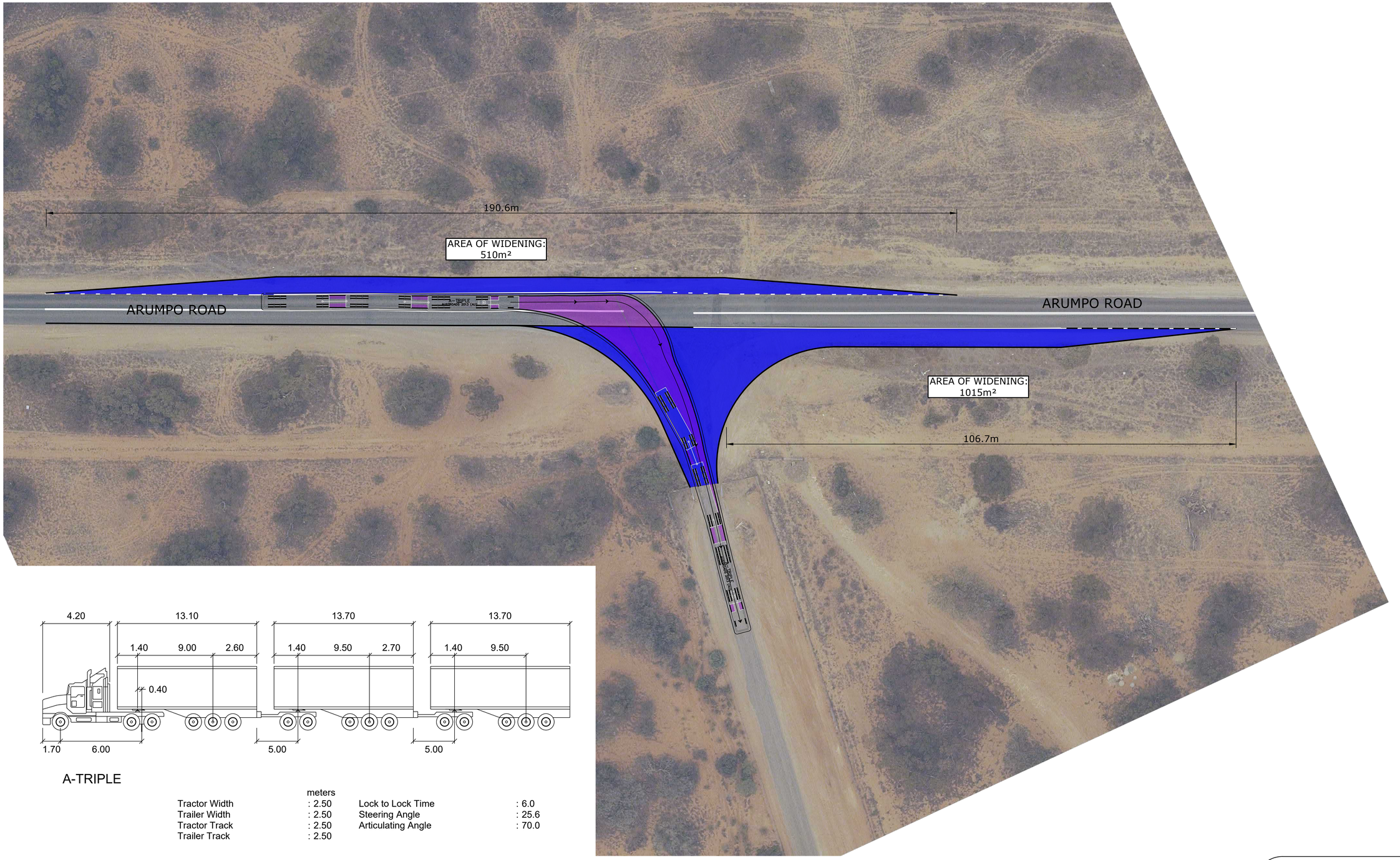

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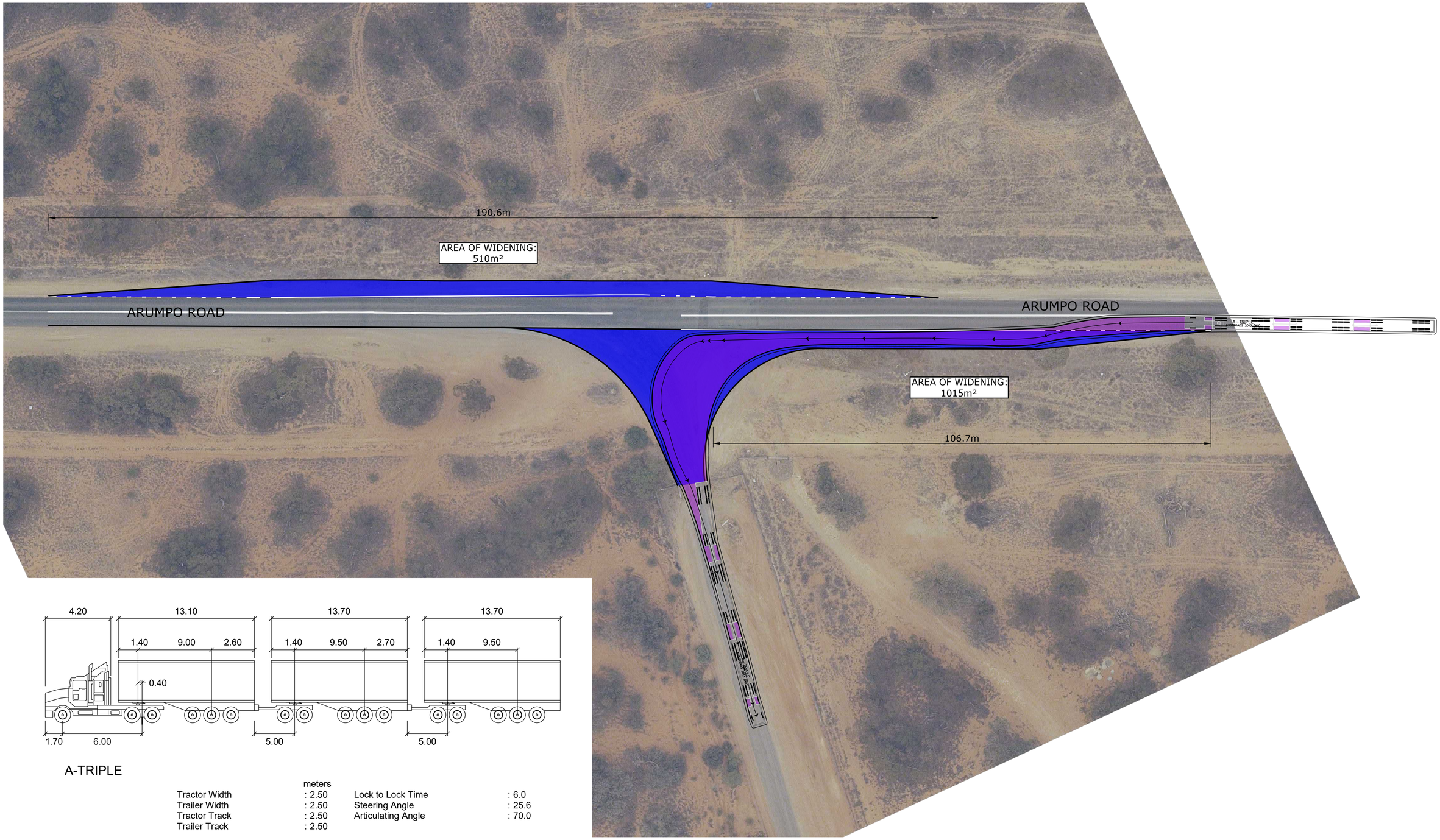

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