



# **Werris Creek Intermodal Freight Terminal Traffic Impact Assessment**

Prepared for  
**Crawford's Freightlines Pty Ltd**

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## Commonly Used Acronyms

<b>Abbreviation</b>	<b>Description</b>
AADT	Average Annual Daily Traffic
AUL	Auxiliary Left Turn Lane
AUR	Auxiliary Right Turn
BAL	Basic Left Turn Lane
BAR	Basic Right Turn Lane
CHL	Channelised Left Turn Lane
CHR	Channelised Right Turn Lane
DA	Development Application
HV	Heavy Vehicle
LPSC	Liverpool Plains Shire Council
LV	Light Vehicle
RMS	Roads and Maritime Services
TfNSW	Transport for NSW
SEE	Statement of Environmental Effects

# 1 Introduction

## 1.1 Background

Crawford's Freightlines Pty Ltd ("the Proponent") operate a private Intermodal Terminal located in at Werris Creek which will be referred to throughout this report as "the Development".

The Development is located at Werris Creek NSW Lot 41 in DP1126436. The site is situated south of Werris Creek passenger train station adjacent to the rail corridor. Access to the Development is via Werris Creek Road, then South Street, which becomes West Street and Loco Street onto Downton Street and then via a private access road at the boundary of Lot 23/24 in DP 8788. Refer to **Figure 1**.

This Traffic Impact Assessment (TIA) is to be included with the Statement of Environmental Effects (SEE) and Development Application (DA) to be submitted to Liverpool Plains Shire Council (LPSC).

All heavy vehicle (HV) traffic accessing Crawford's Freightlines intermodal terminal are required to approach the site from the south, in accordance with Conditions 86 to 90 (inclusive) of Conditions of Consent for DA37/2018-03. Conditions 86 to 90 were stipulated in the consent due to the geometry of the Werris Creek Road/South Street intersection being unsuitable for heavy vehicles approaching the site from the north to safely negotiate a right turn into South Street from Werris Creek Road.

By prohibiting the use of Single Street Werris Creek for heavy articulated vehicles servicing the Crawford's Freightlines Intermodal Terminal site, a significant commercial disadvantage is imposed on Crawford's by increasing the distance vehicles servicing the site are required to travel. This is particularly evident when considering heavy articulated vehicle movements north and south for freight not accessing the site is permitted through Single Street.

The Proponent is proposing to construct a new intersection on Werris Creek Road with a U-turn bay located on Lot 1 DP 357694 to enable HV traffic to travel from the north travel through Single Street, complete a u turn at Lot 1 DP 357694 and access the site from the South using the Werris Creek Road – South Street – West Street – Loco Street – Downton Street route.



Figure 1 - Locality Plan

1.2 Scope of the Report

The report has been prepared to accompany the SEE for the Development and assesses the traffic related impacts of the Development on the surrounding road network with reference to the RTA Guide to Traffic Generating Developments (RTA, 2002) and Austroads Road Design Guides (Austroads, 2017).

## 2 Existing Conditions

The following sections provide an overview of the existing conditions of the road network affected by the Development.

### 2.1 Roads

#### 2.1.1 Kamilaroi Highway

The Kamilaroi Highway (State Highway [SH] No. 29) provides a link from the New England Highway at Willow Tree through to the Mitchell Highway at Bourke. It is a major transport route for regional centres including Quirindi, Gunnedah, Narrabri, Wee Waa, Walgett, and Brewarrina.

The Kamilaroi Highway between Willow Tree and Gunnedah is identified from the TfNSW online interactive Restricted Access Vehicle Maps (RMS, Combined Higher Mass Limits (HML) and Restricted Access Vehicle (RAV) Map, 2019) as approved for B-doubles up to 26m in length.

In the vicinity of the Taylor's Lane intersection the Kamilaroi Highway is a two-lane / two-way sealed road. The two line marked travel lanes are approximately 3.5m wide and the seal width is approximately 8.5m. The posted speed limit of the Kamilaroi Highway at the intersection is 100km/h.

#### 2.1.2 Taylor's Lane

Taylor's Lane (Shire Road [SR] No. 53) is a local road which services existing properties at various intervals along its length. It also serves as a designated alternative route for heavy vehicle (HV) traffic to bypass the town of Quirindi. TfNSW online interactive Restricted Access Vehicle Maps (RMS, Combined Higher Mass Limits (HML) and Restricted Access Vehicle (RAV) Map, 2019) show Taylor's Lane as approved for B-doubles up to 25/26m in length.

The cross section of Taylor's Lane consists of a 7m seal on a 9m formation with approximately 300mm of local gravel pavement. The seal width is considered to be narrow for HV traffic. Pavement marking consists of a centre line only. The eastern section of the road has not been re-sealed for some time and as a result the centre line marking is significantly faded. The alignment is generally flat with winding horizontal curves.

#### 2.1.3 Werris Creek Road

Werris Creek Road (Main Road [MR] No. 130) is a regional road that provides a strategic link between the centres of Quirindi (to the south) and Tamworth (to the north) with Werris Creek. NSW online interactive Restricted Access Vehicle Maps (RMS, Combined Higher Mass Limits (HML) and Restricted Access Vehicle (RAV) Map, 2019) shows Werris Creek Road as approved for B-doubles up to 25/26m in length.

Werris Creek Road consists of two lanes varying between 3.2m to 3.5m in width with sealed shoulders of width varying from 0m to 1.0m. The horizontal and vertical alignments are generally good. Several sections of pavement failure are evident however the remaining wearing surface is in relatively good condition. The posted speed limit on Werris Creek Road is 100km/h. The speed limit is reduced to 80km/h approximately 300m south of the intersection with South Street.

#### 2.1.4 South Street

South Street is a local road that links Werris Creek Road to West Street and services two local properties along its 500m length as well as a service road linking to the ARTC service depot. The road consists of a 7m wide sealed pavement for the first 150m up to the rail level crossing. The remainder of the road consists of a gravel pavement approximately 7m in width between table drains. The road accommodates two-way traffic in a single lane, with enough width between table drains to allow passing. The alignment is flat and straight however South Street becomes West Street at a sharp right-angle bend. LPSC is the authority responsible for the road.

South Street has one rail level crossing at approximately CH150 (refer **Plate 1**). The rail crossing has passive controls only with no advanced warning signs. The north facing sign board for the passive controls on the ARTC service road is currently badly damaged.

Cross drainage consists of one causeway and one culvert. The causeway is approximately 30m in length and has no signage or delineation. The culvert crosses the road at 45 degrees and consists of



twin 450mm diameter RCP Class 4 drainage pipes with concrete headwalls. The gravel pavement widens to 9m at the culvert crossing (refer **Plate 2**).

There are no delineation or warning signs on the road and the posted speed limit is 50 km/h. The existing AADT on South Street is estimated to be less than 100vpd, excluding traffic generated by the Development.



**Plate 1 - South Street level crossing looking west**



**Plate 2 - Road narrowing on South Street at culvert**

### 2.1.5 West Street

West Street is a local road that links South Street to Loco Street and services two properties along its 650m length. The road is a low trafficked road that consists of a gravel pavement approximately 7m in width between table drains (refer **Plate 3 to 4**). The road accommodates two-way traffic in a single lane, with enough width to allow passing as necessary. The alignment is flat and straight however West Street joins South Street and Loco Street via sharp right-angle bends. LPSC is the authority responsible for the road.

An unsignposted causeway crosses West Street and is approximately 37m in length. There is no delineation or warning signs on the road and there is no posted speed limit. The existing AADT on West Street is estimated to be less than 100vpd, excluding traffic generated by the Development.



**Plate 3 - West Street looking north**



**Plate 4 - Drainage channel through West Street**

### 2.1.6 Loco Street

Loco Street is a local road that links West Street to Downton Street and is approximately 130m in length. The road is a low trafficked road that consists of a gravel pavement 8.5m in width between table drains (refer **Plate 5**). The road accommodates two-way traffic in a single lane. The alignment is flat and straight however Loco Street joins West Street and Downtown Street via sharp right-angle bends. LPSC is the authority responsible for the road.

There is one culvert crossing the road approximately 75m from the West Street bend. The culvert consists of twin 600mm diameter RCP Class 4 drainage pipes with concrete headwalls. There is no delineation of the culvert headwalls.

There is no delineation or warning signs on the road and there is no posted speed limit. The existing AADT on Loco Street is estimated to be less than 100vpd, excluding traffic generated by the Development.



**Plate 5 - Loco Street looking east**

### 2.1.7 Downton Street

Downton Street is a local road that links Loco Street to the Werris Creek sewage treatment facility to the north. The street is approximately 900m in length and services six dwellings. The road is a low trafficked road that consists of a gravel pavement approximately 5.5m to 6m in width between table drains (refer **Plate 6 to 7**). The road accommodates two-way traffic in a single lane, with enough width between table drains to allow passing. The existing horizontal alignment consists of a series of straights connected by sharp 90-degree bends. LPSC is the authority responsible for the road.

The first 50m of the road to the south has been widened to accommodate HV traffic access and egress from the Development.

There is one culvert crossing the road approximately 110m from the Loco Street bend. The culvert consists of one 400mm drainage pipe with stone and concrete headwalls. The culvert is delineated by two guide posts. Table drains only extend approximately 230m along Downton Street from the Loco Street bend. There is no drainage beyond this point.

There are no delineation or warning signs on the road and no posted speed limit. The existing AADT on Downton Street is estimated to be less than 100.



**Plate 6 - Downton Street looking south to the Development access**



**Plate 7 - The Development access looking east from Downton Street**

### 2.1.8 Bends Connecting South, West, Loco and Downton Streets

The four streets, South Street, West Street, Loco Street and Downton Street are connected via a series of sub-standard 90-degree bends (refer **Plate 8 to 10**). The bends vary in width between 6m and 16m. Typically, the drainage of the bends inner radius is poor with ponding and pavement failure evident on all bends. All bends are delineated by guide post.



Plate 8 - Bend from Loco Street to Downton Street



Plate 9 - Bend from West Street to Loco Street



Plate 10 - Bend from West Street to South Street

## 2.2 Intersections

### 2.2.1 Werris Creek Road and South Street

This intersection has a basic rural T-intersection configuration and is located just south of Werris Creek. Werris Creek Road is the priority road and the posted speed limit is 100km/h. The intersection includes sealed Basic Left (BAL) turn treatment into South Street (refer **Plate 11 to 12**).

There is a give way control in place with a give way sign and hold line set back 12m from the through road edge line. Line marking consists of edge lines, centre lines and continuity line marking for the through road.

There is an intersection advanced warning sign on approach to the intersection on South Street, however there are no intersection advanced warning signs for the intersection on Werris Creek Road. There is no sightboard opposite the intersection.

The intersection is situated within an S-bend on Werris Creek Road where the road crosses the railway line. The rail level crossing is located immediately north of the intersection and has active controls including flashing lights. There are also flashing lights opposite the intersection to warn traffic approaching the rail crossing from South Street.

The intersection includes guardrail on the outside of the bends on Werris Creek Road. South Street joins Werris Creek Road on the outside of the southern S-bend within the guardrail section.

Sight distance to the south of the intersection exceeds 300m but is limited to about 15m north of the intersection as it is obscured by barrier rail and rail level crossing signage.



Plate 11 - Werris Creek Road looking north-east towards level crossing and intersection



Plate 12 - South Street looking towards Werris Creek Road intersection

### 2.2.2 Werris Creek Road and Taylor's Lane

The intersection of Werris Creek Road and Taylor's Lane is a basic rural T-intersection configuration and has been recently re-sealed. There is no give way or stop controls for the intersection. The intersection includes an Auxiliary Left (AUL) turn treatment and an Auxiliary Right (AUR) turn treatment on Werris Creek Road. Werris Creek Road is the priority road and the posted speed limit for both Werris Creek Road and Taylor's Lane is 100km/h. Signage includes a sight board opposite the intersection and advanced warning signs on the Taylor's Lane approach and Werris Creek Road.

The intersection is on a straight section of the Werris Creek Road and sight distance exceeds 300m in both directions. There is lane continuity line marking on Werris Creek Road but there is no hold line marking in Taylor's Lane (refer **Plate 13**). There is a gravel rural driveway opposite the T-intersection adjacent to the sight board.



Plate 13 - Werris Creek Road and Taylor's Lane intersection

### 2.2.3 Kamilaroi Highway and Taylor's Lane

The intersection of the Kamilaroi Highway and Taylor's Lane is a basic rural T-intersection configuration with give way controls (refer **Plate 14**). There is an AUL turn treatment into Taylor's Lane. There is also left turn curve widening out of the Taylor's Lane to accommodate the swept path of a HV. The Kamilaroi Highway is the priority road and the posted speed limit for both roads is 100km/h. Signage includes a single give way sign on the left side of Taylor's Lane, a sight board opposite the intersection and a T-intersection advanced warning sign on the Taylor's Lane approach.



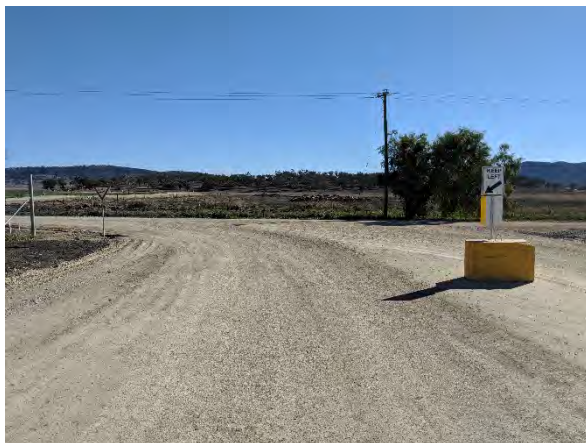
**Plate 14 - Kamilaroi Highway and Taylor's Lane intersection**

The intersection is located on the outside of a curve of the Kamilaroi Highway and sight distance is greater than 300m in both directions. There is continuity line marking at the intersection on the highway and a hold line in Taylor's Lane. There is a curve 70m east of the intersection on Taylor's Lane.

#### **2.2.4 Downton Street and the Development Access**

The Development access is situated 50m north of the intersection of Loco Street and Downton Street. The access road is a 14m wide gravel formation with widened shoulders for the left turn movement onto Downton Street to accommodate b-double trucks (refer **Plate 11 to 16**). A traffic dividing bollard set back approximately 16.5m from Downton Street has been provided with incorporated signage for both travel directions and speed limit signage for 10km/h when entering the Development.

The access has a single give way control on approach to Downton Street. The access road intersection has good sight distance to the north along Downton Street and, although situated close to the Loco Street and Downton Street bend, has unobstructed view of Loco Street to the Loco Street and West Street bend.



**Plate 15 - The Development access looking west to South Street and Loco Street bend**



**Plate 16 - The Development access looking east**

### **2.3 Level Crossings**

#### **2.3.1 Werris Creek Road near South Street Intersection**

The Werris Creek Road level crossing (south of Werris Creek) is a S-bend style single rail crossing with approaches being approximately parallel to the rail line. The crossing has active controls consisting of flashing lights and is located in an 80km/h speed zone. Werris Creek Road intersects with South Street approximately 30m south-west of the level crossing (refer **Plate 17 to 18**).



Plate 17 - Werris Creek Road level crossing aerial view



Plate 18 - Werris Creek Road level; crossing looking north-east

### 2.3.2 South Street near Werris Creek Road

The South Street level crossing consists of passive controls and is located in a 50km/h speed zone (refer **Plate 19**). The approach road alignment is straight and there is a rail maintenance facility access road running parallel with the rail line (refer **Plate 20**) which intersects South Street immediately west of the level crossing. There are passive controls on all legs of the intersection.



Plate 19 - South Street level crossing looking west



Plate 20 - South Street level crossing aerial view

## 2.4 Background Traffic Volumes

### 2.4.1 Current and Forecast Background Traffic Volumes

The AADT Werris Creek Road was determined using traffic data provided by LPSC collected between 26 April 2012 and 24 May 2012. The AADT for South Street has been estimated using a factor of 7.4 trips per dwelling obtained from the RMS updated traffic surveys (RMS, Guide to Traffic Generating Developments: Updated Traffic Surveys, 2013) to the RTA Guide to Traffic Generating Developments (RTA, 2002).

An analysis of the available data was undertaken to estimate the current background traffic volume for 2019 and a 10-year traffic volume forecast to 2029, based on an estimated 2% compound growth factor. **Table 1** provides a summary of the existing and estimated traffic forecast levels for the study area. As it is unlikely that the background traffic would increase based on the current land use, the current estimated AADT for South Street has also been used for the 2029 forecast AADT.

**Table 1 – Current and 10 Year Forecast Traffic Volumes**

Road	Counting Station Site	Current Background Traffic (2019)			Forecast Traffic (2029)		
		LV	HV	AADT	LV	HV	AADT
South Street	Estimated from RTA guidelines	60	7	67	60	7	67
Werris Creek Road	Just north of Escott Road (2012)	1926	446	2372	2348	543	2891

NB: LV = Light Vehicles; HV = Heavy Vehicles

#### 2.4.2 Background Traffic Peak Hour Volumes

As there is no peak hour traffic data available, peak hour times have been assumed based on general peak hour times observed in the study area as follows:

- AM Peak: 8:30am – 9:30am; and
- PM Peak: 3:00pm – 4:00pm.

Peak hour volumes on Werris Creek Road were estimated using the Austroads Design Guide (Austroads, 2017). A value for peak hour factor of 11% of AADT was selected. The peak hour volumes on South Street were estimated using the peak hour factors indicated in the RMS updated traffic surveys (RMS, Guide to Traffic Generating Developments: Updated Traffic Surveys, 2013) to the RTA Guide to Traffic Generating Developments (RTA, 2002). A value of 0.85 trips per dwelling was used.

**Table 2 - Peak Hour Traffic Volumes (veh/h)**

Road	2019	2029
Werris Creek Road	261	318
South Street	7	7

#### 2.5 Accident (Crash) Data

Crash data for the surrounding road network was obtained from the NSW Centre for Road Safety website (RMS, Crash and causality statistics - LGA view, 2018). The data available lists all crashes from 2012 to 2016. The crash data lists twelve accidents on the Transport Route (Kamilaroi Highway and Werris Creek Road) during this period as detailed in **Table 3**.

**Table 3 - Crash Data (2011 to 2015)**

Road Name	Crash ID	Year	Location	Road User Movement	Day or Night	Degree of Crash
Kamilaroi Highway	799963	2012	31° 26' 48.84" S 150° 36' 47.16" E	Entering carriageway after parking	Day	Non-casualty (towaway)
Kamilaroi Highway	846947	2013	31° 26' 40.2" S 150° 36' 37.08" E	Off carriageway left	Night	Serious Injury
Kamilaroi Highway	835297	2013	31° 26' 7.44" S 150° 35' 44.16" E	Off carriageway right into object	Night	Serious Injury
Kamilaroi Highway	1046500	2014	31° 25' 55.2" S 150° 35' 20.04" E	Head on Collision	Day	Fatal

Road Name	Crash ID	Year	Location	Road User Movement	Day or Night	Degree of Crash
Kamilaroi Highway	828545	2013	31° 24' 24.48" S 150° 34' 13.8" E	Off carriageway left off left hand bend into object	Dusk	Serious Injury
Kamilaroi Highway	797157	2012	31° 24' 7.92" S 150° 33' 29.16" E	Off carriageway right into object	Dusk	Moderate Injury
Kamilaroi Highway	851061	2013	31° 21' 51.48" S 150° 31' 18.12" E	Off carriageway left off right hand bend into object	Day	Non-casualty (towaway)
Kamilaroi Highway	1024831	2014	31° 21' 38.16" S 150° 31' 13.44" E	Off carriageway left	Night	Serious Injury
Werris Creek Road	1064873	2015	31° 25' 25.32" S 150° 39' 7.2" E	Rear End Collision	Night	Moderate Injury
Werris Creek Road	808820	2012	31° 24' 11.52" S 150° 38' 55.32" E	Off carriageway right into object	Day	Fatal
Werris Creek Road	1114280	2016	31° 22' 48" S 150° 38' 33.72" E	Off carriageway left	Night	Non-casualty (towaway)
Werris Creek Road	782182	2012	31° 21' 57.96" S 150° 38' 39.48" E	Straight through intersection	Day	Minor/Other Injury

Source: NSW Government Centre for Road Safety

Of the twelve incidents, eight of the reported crashes involve vehicles leaving the carriageway. The remaining incidents included one when re-entering traffic from the side of the carriageway, one instance of a vehicle traveling straight through an intersection, one rear end collision, and one head on collision.

Of the eight accidents involving vehicles leaving the roadway, six of these occurred at dusk or night, along open stretches of carriageway.



### 3 Development Traffic Generation

The Development will generate a mixture of Light vehicle (LV) traffic attributed to the site staff and visitors to the site as well as HV traffic attributed to general operations for the Development. The following analysis quantifies the traffic being generated and identifies the likely peak hour traffic volumes that coincide with the assumed peak hour period of Werris Creek Road.

#### 3.1 Light Vehicles

Currently the Development generates approximately 20 trips per day for full time employees. Staff include a mix of office workers, plant operators and general personnel. LV traffic generated from these employees for the operation of the Development are summarized in **Table 4**. Additionally, it is estimated that on average there will be at least 1 visitor per hour to the site.

**Table 4 – Light Vehicle Movements**

Source	Shift Times	Trips/year	Trips/day
Office staff	8 hour shift – with variable start/finish times between 7:30am to 4pm	1250	5
Plant operators and general staff	10 hour shift with variable start/finish times between 6am to 6pm	3750	15
General visitors	6am to 6pm	3000	12

It is expected that as freight movements through the Development increase, additional staff and operators will be required. However, the most likely scenario would be a split shift with an early afternoon changeover of staff. This scenario would not affect the current peak hour forecasts for the Development.

##### 3.1.1 Light Vehicle Travel Routes

There are approximately 14 trips per day generated from employees arriving from the north who either live in Werris Creek or areas north of Werris Creek, a further 6 trips per day are estimated to be generated from the north which are attributed to general visitors to the site. There are approximately 6 trips generated from employees arriving via Werris Creek Road travelling from Quirindi and other areas south of Werris Creek, and a further 6 trips per day are estimated to be generated from the south which are attributed to general visitors to the site.

The total daily trips and direction of travel have been summarised in **Table 5**.



**Plate 21 - LV car park for the Development**

**Table 5 - LV Trip Distribution**

Intersection	Arrival / Departure Direction	Trips/year	Trips/day
Werris Creek Road / South Street	North (Single Street)	5000	20
	South (Werris Creek Road)	3000	12

### 3.2 Heavy Vehicles

Currently, HV traffic is generated through site deliveries from various industries such as:

- Timber log transport from harvesting operations from plantations forests originating from Gilgandra, Nundle and Walcha areas;
- Semolina deliveries originating from Gunnedah and Tamworth;
- Leather products originating from Tamworth; and
- Other general freight originating from various locations.

The HV traffic generated by the Development is expected to increase as new customers are engaged for freight operations through the terminal. To account for future potential HV traffic generation the following industries have been considered in addition to the existing HV traffic generation:

- Cotton transport originating from the Gunnedah region;
- Grain transport originating from the Gunnedah region;
- Food products originating from the Tamworth area; and
- ISO tankers originating from the Tamworth area.

Analysis of the trip data indicates there is no daily peak hour for the Development related HV traffic. Deliveries from the various sources arrive periodically during operational hours. Occasionally, some HV's may arrive prior to the Development's scheduled start time. **Table 6** shows the expected yearly and daily heavy vehicle movements for the Development.

A detailed summary of estimated hourly trips expected to be produced by the Development available in **APPENDIX 2**.

**Table 6 – Estimated Heavy Vehicle Movements**

Industry	Frequency	Trucks/annum	Trips/day	Average Trips/hr
<b>Currently engaged industries</b>				
Timber logs	Daily	6,750	27	2.7
Semolina	Tuesday to Friday	1000	2	< 1
Leather Products	Monday & Wednesday	750	4	< 1
General Freight	Daily	250	1	< 1
<b>Potential future industries</b>				
Cotton Seed	Ginning Season (3 Months)	600	10	1
Grain	Seasonal (3 Months)	2,500	40	4
Food Products	Daily	5000	20	2
ISO Tankers	Daily	3000	12	1.5

To account for the worst worst-case scenario, intersection analysis has been undertaken considering all of the industries listed in **Table 6** operating concurrently.

### 3.3 Forecast Heavy Vehicle Travel Routes

Travel routes have been derived using the most likely route given the origin and destination of goods being transported. Travel routes for the Development are outlined in **APPENDIX 1**. The distribution of heavy vehicle movements is shown in **Table 7**.

**Table 7 – Heavy Vehicle Route Distribution**

Industry	Origin / Destination	ADT Route 1	ADT Route 2
Logging	Gilgandra	1	
	Nundle	16	
	Walcha		10
Semolina	Gunnedah	2	
	Tamworth		2
Leather Products	Gunnedah	3	
General Freight	Various		1
Cotton	Gunnedah	10	
Grain	Narrabri / Gunnedah	40	
Food Products	Tamworth	3	20
ISO Tankers	Tamworth		12
<b>Total</b>		<b>72</b>	<b>45</b>

## 4 Assessment and Recommendations

The following subsections review the anticipated impacts resulting from the proposed Werris Creek Intermodal Freight Terminal on the road network. Discussions relevant to the recommendations for impact mitigation or other controls are also included.

### 4.1 Roads

#### 4.1.1 Kamilaroi Highway

No safety or road related deficiencies were noted on the Kamilaroi Highway in the vicinity of Taylor's Lane intersection during the site inspection. It is considered that ongoing maintenance will be undertaken by TfNSW and/or LPSC, funded from routine maintenance programs.

The Kamilaroi Highway has been assessed as an approved B-double route and it is considered that traffic generated by the Development is a minor addition to the existing traffic load of the road.

#### 4.1.2 Taylor's Lane

No safety or road related deficiencies were noted on Taylor's Lane during the site inspection. It is considered that ongoing maintenance will be undertaken by TfNSW and/or LPSC, funded from routine maintenance programs.

Taylor's Lane has been assessed as an approved B-double route and it is considered that traffic generated by the Development is a minor addition to the existing traffic load of the road.

#### 4.1.3 Werris Creek Road

No safety or road related deficiencies were noted on Werris Creek Road during the site inspection. It is considered that ongoing maintenance will be undertaken by TfNSW and/or LPSC, funded from routine maintenance programs.

Werris Creek Road has been assessed as an approved B-double route and it is considered that traffic generated by the Development is a minor addition to the existing traffic load of the road.

#### 4.1.4 Gravel Roads Joining Werris Creek Road to Site Access (inclusive of South, West, Loco and Downton Streets and adjoining bends)

Table 3.4.2 of the LPSC Engineering Guidelines (LPSC, 2006) indicate that the pavement and formation width for rural residential and rural roads is to be 7m and 9m respectively.

As a result, South Street, West Street, Loco Street and Downton Street should be widened to meet LPSC minimum design standards as indicated above inclusive of the widening of existing culverts.

Sealing of the gravel roads in close proximity to residential dwellings should be undertaken to mitigate nuisance dust generated by the Development. Table 3.4.2 of the LPSC Engineering Guidelines (LPSC, 2006) indicate that the minimum seal width for rural residential and rural roads is 8m. Refer **Table 8** for details of recommended sections of seal.

**Table 8 - Sealing Work Schedule**

Street	Sealing Work Details
South Street	Seal from level crossing to 100m west of the same.

The lack of curve warning signs and chevrons is considered an existing deficiency along the road for all users. It is therefore considered that provision of these signs in accordance with the requirements of Manual for Uniform Traffic Control (Standards Australia, 2009) would be the responsibility of LPSC.

Depth indicators and floodway advanced warning signs should be installed at all floodways to provide road users with an indication of the depth of water over the floodway. This is considered an existing deficiency along the road for all road users and the provision of depth markers in accordance with Manual for Uniform Traffic Control (Standards Australia, 2009) would be the responsibility of LPSC.

Guide posts are only located at culverts and curves along the length of the road. This is considered to be an existing deficiency along the road for all road users and provision for guideposts in accordance

with the Manual for Uniform Traffic Control (Standards Australia, 2009) would be the responsibility of LPSC.

Guide posts have not been provided for the Loco Street culvert crossing. Guide posts should be installed in accordance with the Manual for Uniform Traffic Control (Standards Australia, 2009).

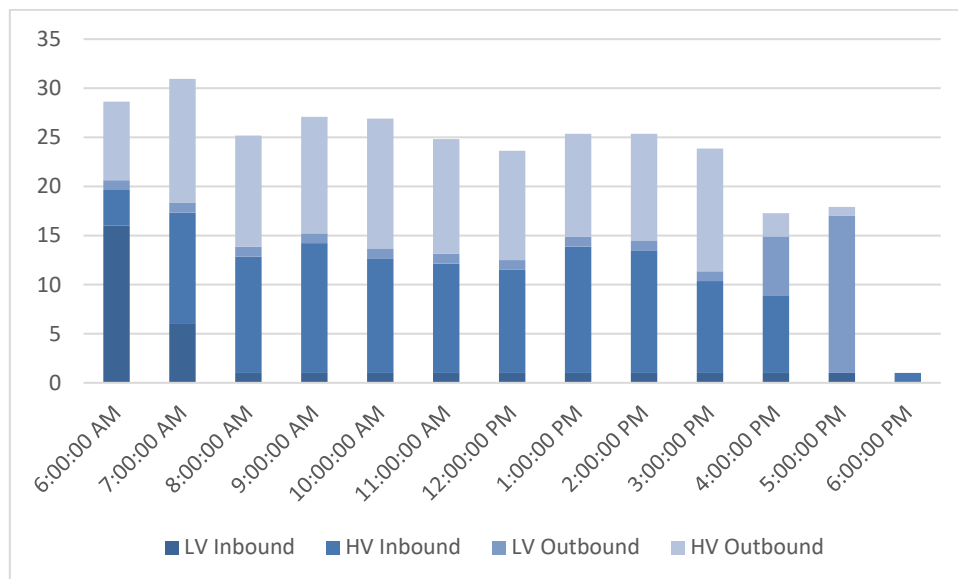
Rail crossing advanced warning signs should be installed on the approach to the South Street rail level crossing. This is considered to be an existing deficiency for all road users and the provision of rail crossing advanced warning signs in accordance with the Manual for Uniform Traffic Control (Standards Australia, 2009) would be the responsibility of LPSC.

## 4.2 Intersections

### 4.2.1 Peak Hour Traffic Volume

By analysing the detailed estimate of hourly HV and LV trips (refer **APPENDIX 2**), it is seen that the Development produces a morning peak hour traffic volume at around 7am and an afternoon peak hour at around 2pm. The morning peak hour is attributed to LV traffic arriving in the morning and is outside the estimated peak hour for Werris Creek Road. Therefore, these times will not be used for analysis.

Given the estimated background traffic morning peak hour for the area is 8:30am to 9:30am, the development traffic volume calculated for 9am has been used for intersection analysis. This maximises traffic through the analysed intersections to provide a worst-case scenario for analysis. This time slot also contains a higher percentage of HV traffic compared to the 7am peak hour for the Development. **Figure 2** shows the combined LV and HV traffic throughput for the Development distributed hourly.



**Figure 2 - Combined LV and HV Development Traffic Volume**

The resultant 10 year horizon peak hour traffic volumes through Werris Creek Road intersections with South Street and the new U-turn bay are shown in **Figure 3** and **Figure 4** respectively. These volumes have been calculated by combining the forecast 10 year horizon background traffic from **Section 2.4** and the detailed Development traffic volume analysis from **APPENDIX 2**.

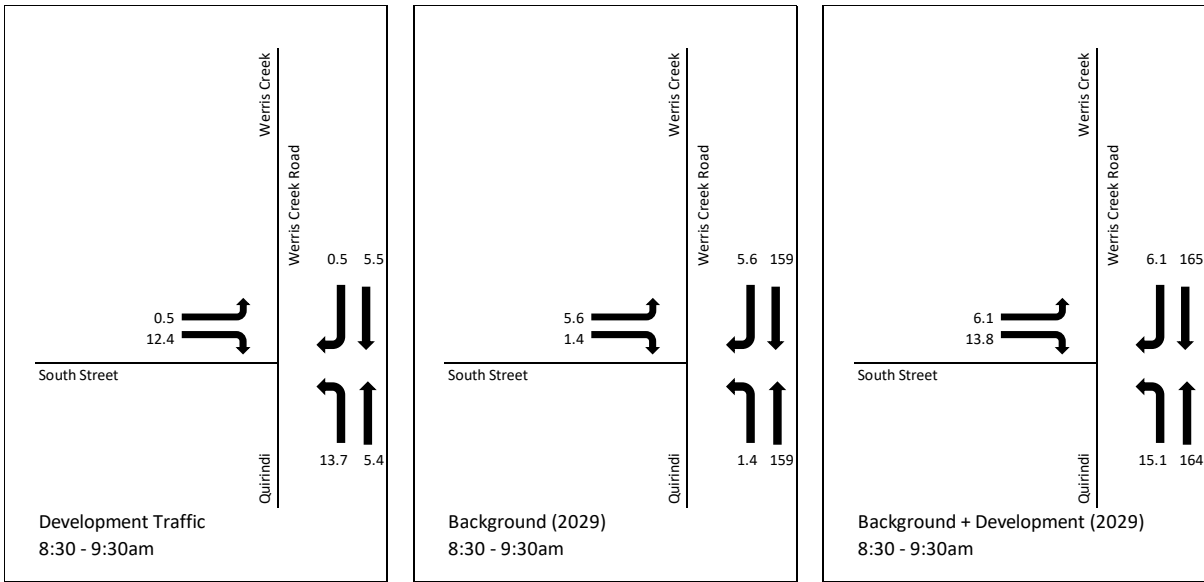


Figure 3 - Werris Creek Road and South Street intersection peak hour traffic volume generation

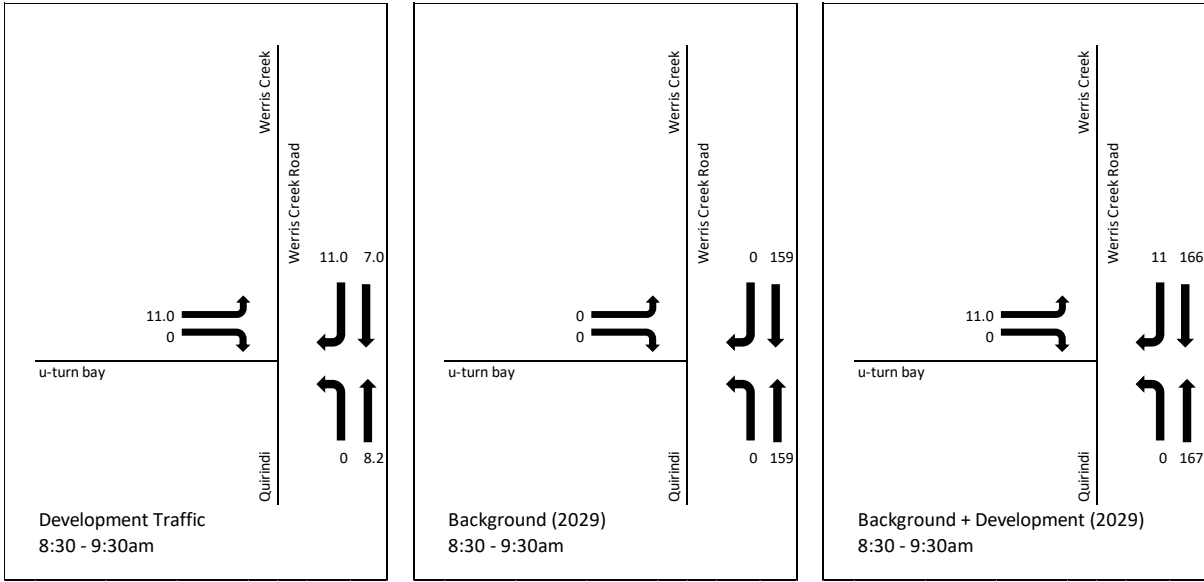


Figure 4 - Werris Creek Road and new U-turn bay intersection peak hour traffic volume generation

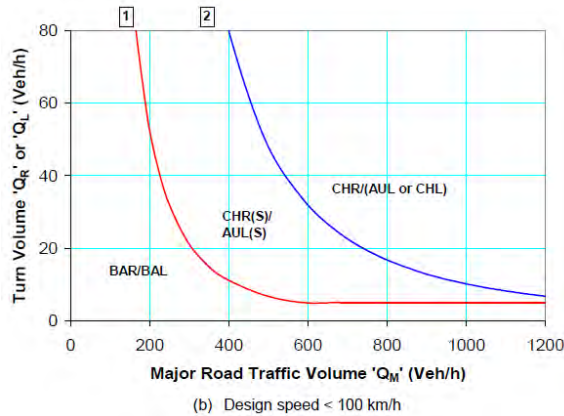
4.2.2 Swept Path Analysis

A check of the swept path of a 26m B-double vehicle was performed for the intersection (refer APPENDIX 3). The resultant diagrams indicate the intersection can accommodate the turning manoeuvres with the B-double vehicle whilst remaining in the dedicated travel lane on Werris Creek Road when approaching and departing to the south.

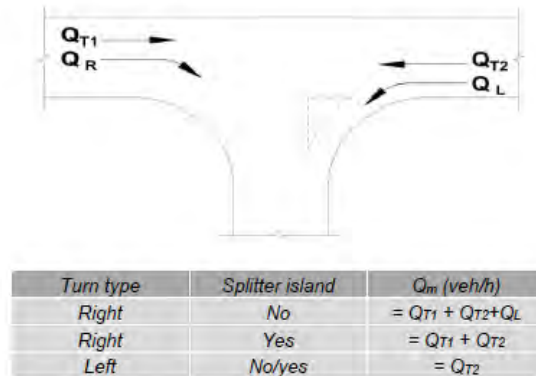
Analysis of the vehicle performing a turning manoeuvre when approaching from and departing to the north along Werris Creek Road shows that these turning movements cannot be performed safely with the current intersection configuration. In lieu of upgrading the intersection to accommodate these turning manoeuvres which may be cost prohibitive due to the proximity of the rail level crossing, the Proponent is proposing a U-turn bay located to the south of the Werris Creek Road and South Street intersection (refer APPENDIX 5).

### 4.2.3 Warrants for Basic, Auxiliary and Channelised Turn Treatments

Figure A10(b) of the Guide to Road Design Part 4 (Austroads, 2017), specifies warrants for providing left and right turn treatments at unsignalised intersections. The graph is reproduced below as **Figure 5** and shows the volumes of traffic at an intersection subject to a speed limits less than 100km/h.



**Figure 5 - Warrants for turn treatments – Design speed < 100km/hr**



Source: Arndt and Troutbeck (2006).

**Figure 6 - Calculation of the major traffic volume parameter**

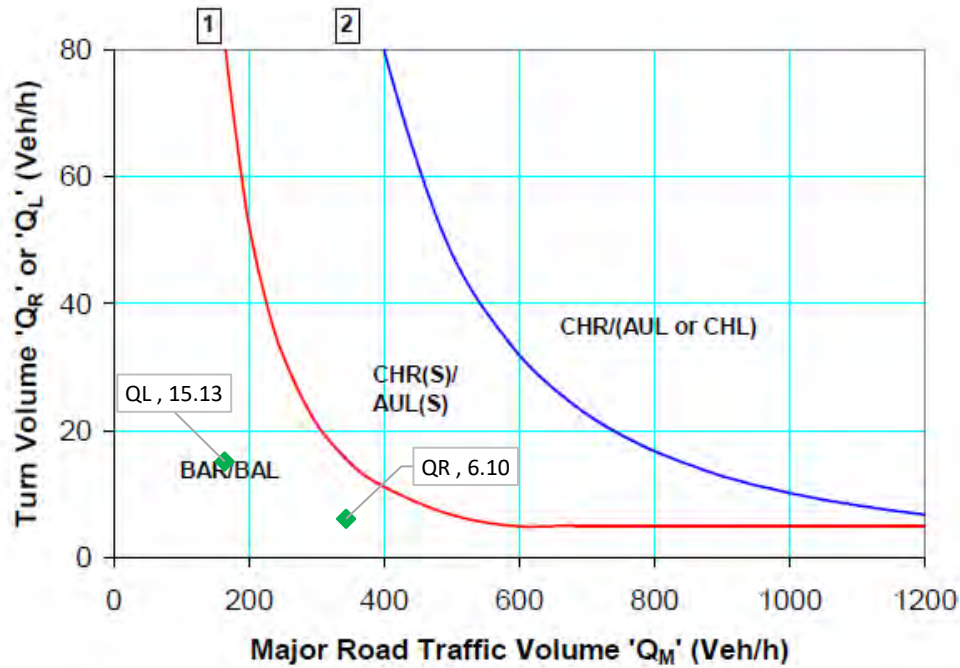
The major road traffic volume parameter  $Q_M$  from **Figure 5** is calculated according to the turn type being analysed. **Figure 6** shows the methods used to calculate the major road traffic parameters for each turn type based on the through traffic and turning traffic. The resultant intersection traffic volume parameters have been summarised in **Table 9**.

**Table 9 - Intersection peak hour traffic volume parameters**

Parameter	Intersection Traffic Volumes (v/hr)	
	Werris Creek Road / South Street	Werris Creek Road / U-turn Bay
$Q_{T1}$	166.71	164.44
$Q_{T2}$	165.49	164.58
$Q_R$	5.6	14.13
$Q_L$	14.63	0.00
$Q_{M(R)}$	346.82	329.02
$Q_{M(L)}$	165.49	164.58

#### 4.2.3.1 Werris Creek Road and South Street Intersection

**Figure 7** shows the result of plotting the data from **Table 9** onto **Figure 5** for the Werris Creek Road and South Street Intersection. It can be seen that after accounting for background traffic growth of 2% up until 2029 and factoring in traffic generated by the Development, the warrant indicates that the intersection would require a combined Type BAR / BAL layout.



(b) Design speed < 100 km/h

Figure 7 - Werris Creek Road and South Street intersection AM Peak Hour (2029).

The BAL was recently widened and sealed to facilitate increased HV traffic movements into South Street and satisfies the BAL requirement of the warrant. Given the expected background traffic volume, the intersection provides enough left turn volume ( $Q_L$ ) capacity to accommodate a peak of approximately 40 veh/h.

The current intersection does not include a BAR which is considered an existing deficiency and would not be easily implemented given the proximity of the intersection to the rail level crossing on Werris Creek Road.

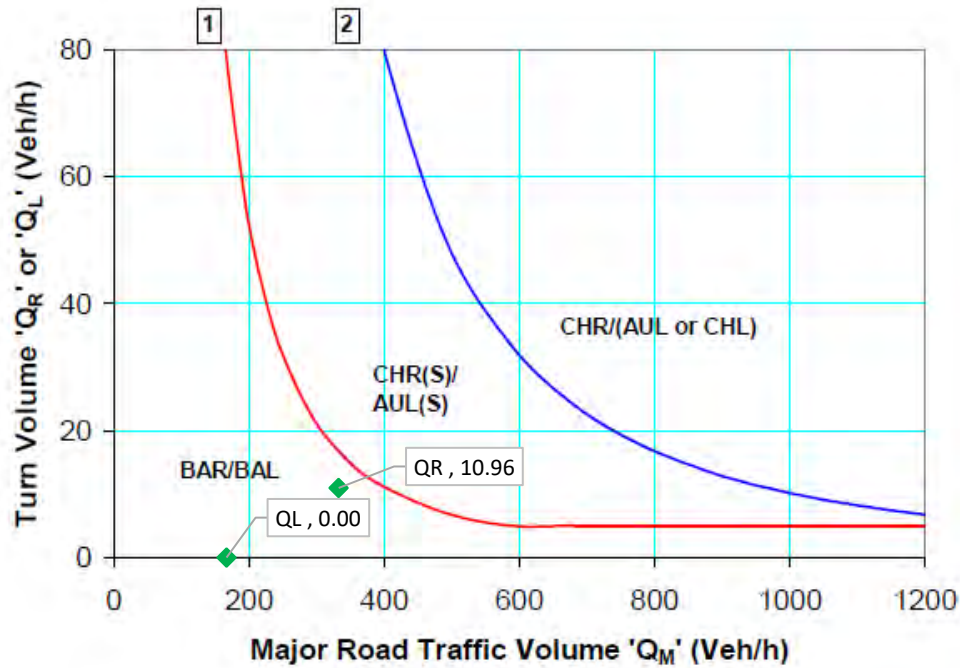
Due to the layout of the intersection and the wide turn path of HVs the Proponent has imposed right turn restriction at this intersection. Any increase in LV traffic is expected to be distributed throughout the day and is not expected to coincide with the Werris Creek Road peak hour. Therefore, any increase to right turn volumes ( $Q_R$ ) as a result of the Development will be minor.

#### 4.2.3.2 Werris Creek Road and New U-turn Bay

Figure 8 shows the result of plotting the data from Table 9 onto Figure 5 for the Werris Creek Road and New U-turn Bay intersection. It can be seen that after accounting for background traffic growth of 2% up until 2029 and factoring in traffic generated by the Development, the warrant indicates that the intersection would require a combined Type BAR / BAL layout.

The proposed intersection (refer APPENDIX 4) includes provision of an AUL and CHR. This arrangement more than satisfies the requirements for the traffic volumes discussed in this report and provides enough capacity for a significant future increase in right turn volume ( $Q_R$ ) and Werris Creek Road volumes ( $Q_m$ ).





(b) Design speed < 100 km/h

Figure 8 - Werris Creek Road and new U-turn bay intersection AM Peak Hour (2029)

#### 4.2.4 Downton Street and Development Access Road intersection

Given the development will be generating significant HV traffic volume at the T-intersection, it is recommended that truck warning signs be installed on the Downton Street approaches in accordance with the Manual for Uniform Traffic Control (Standards Australia, 2009). This would be the responsibility of the Proponent.

#### 4.3 Warning and Advisory Signs

There are no rail crossing advanced warning signs for the South Street level crossing. This is considered to be an existing deficiency for all road users and the provision of a rail crossing warning sign in accordance with the Manual for Uniform Traffic Control (Standards Australia, 2009) would be the responsibility of LPSC.

T-intersection advanced warning signs should be erected on the Werris Creek Road approaches to the intersection (refer Figure 9). This is considered to be an existing deficiency for all road users and provision of T-intersections advanced warning signs in accordance with the Manual for Uniform Traffic Control (Standards Australia, 2009) would be the responsibility of LPSC.



Figure 9 - T-intersection Warning Sign

Large truck advanced warning signs should be considered on the northern Werris Creek Road approach, warning road users of HV traffic entering and leaving the South Street intersection (refer **Figure 10**). Due to the frequency of trucks generated by the development and the limited sight distance looking north from the South Street leg of the intersection, provision of truck advanced warning signage is considered the responsibility of the Proponent.



Figure 10 - Truck Warning Sign

#### 4.4 Drivers and Heavy Vehicles

As there is unrestricted access for drivers of LV and HV vehicles to the Development site, it is recommended that a driver's code of conduct be developed. The code of conduct should clearly outline the expectations of all drivers, their responsibility whilst operating vehicles within the Development site and along the haulage route between the Development site and Werris Creek Road.

The code of conduct should be signposted on entry and exit to the Development site and should be included with site inductions.

Specific items identified during development of this TIA for inclusion in the driver's code of conduct are:

- HV drivers should be aware that there can be no left turn onto Werris Creek Road from South Street;
- HV drivers should be aware that there can be no right turn into South Street from Werris Creek Road;
- Drivers should be aware that the speed of 50km/h is to be strictly adhered to, for limiting dust generation; and
- Drivers travelling in opposing directions should not cross the level crossing on South Street at the same time.

## 5 Conclusion

An assessment of the traffic related matters associated with the Development has been undertaken and a summary of the proposed mitigation measures associated with the road network as discussed in this report are provided in **Table 10**.

Table 10 - Proposed Mitigation Measures

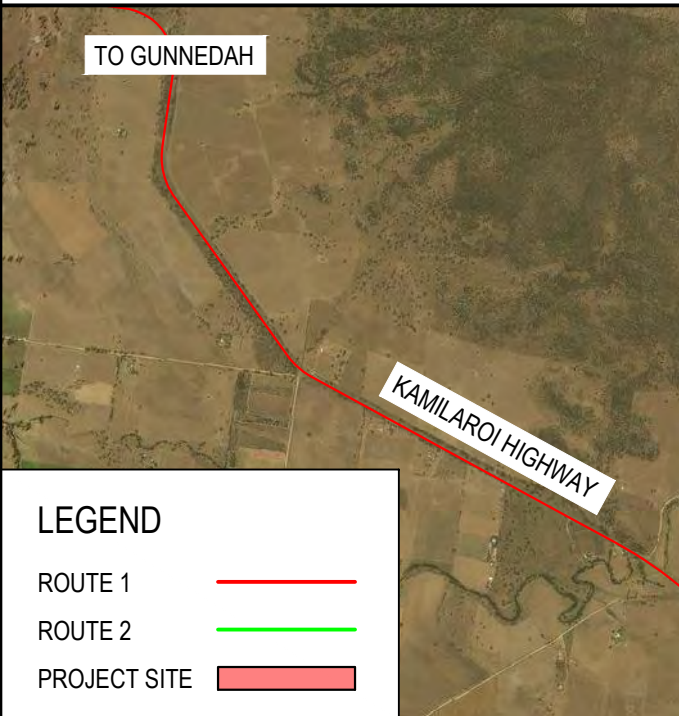
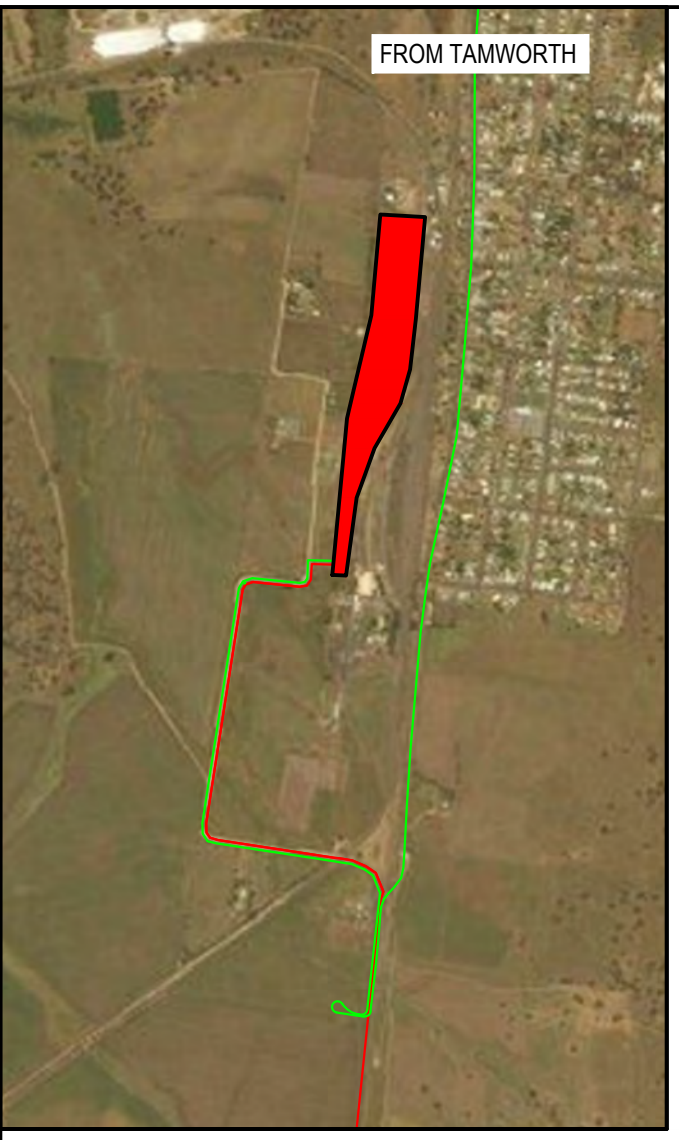
Location	Recommendations	Responsibility
Werris Creek Road and U-turn bay intersection	Provide new intersection compliant with Austroads and Transport for New South Wales specifications incorporating a minimum of BAL and BAR.	The Proponent
South Street	Widening of pavement and formation to 7 and 9 meters respectively inclusive of widening of existing culverts.	The Proponent
	Seal from level crossing to 100m west of the same.	The Proponent
	Provide depth indicators and floodway advanced warning signs as it is an existing deficiency to all road users.	LPSC
	Provide guide posts and delineators as this is an existing deficiency to all road users.	LPSC
	Provide rail crossing advanced warning signs to South Street level crossing as this is an existing deficiency to all road users.	LPSC

Location	Recommendations	Responsibility
	Provide rail crossing on side road advanced warning sign on the South Street approach to the Werris Creek Road T-intersection. This is considered an existing deficiency for all road users.	LPSC
	Repair passive level crossing controls on service road at level crossing.	ARTC
West Street	Provide depth indicators and floodway advanced warning signs as it is an existing deficiency to all road users.	LPSC
	Provide guide posts and delineators as this is an existing deficiency to all road users.	LPSC
Loco Street	Provide guide posts and delineators as this is an existing deficiency to all road users.	LPSC
Downton Street	Provide guide posts and delineators as this is an existing deficiency to all road users.	LPSC
	Provide truck warning signs to warn road users of HV traffic activity near the access driveway to the Development.	The Proponent
Curves on South, West, Loco and Downton Streets.	Provide curve warning signs and chevrons to all bends as it is an existing deficiency for all road users.	LPSC
Werris Creek Road	Provide T-intersection advanced warning signs on the Werris Creek Road approached to the South Street T-intersection. This is considered an existing deficiency.	LPSC
	Provide sight board for Werris Creek Road and South Street intersection. This is considered an existing deficiency.	LPSC
	Provide truck warning signs on the Werris Creek Road northern approach to the South Street intersection to warn road users of HV traffic activity at the intersection.	The Proponent
Development Site	Provide HV Drivers Code of Conduct inclusive of items identified in <b>Section 4.4</b> .	The Proponent
	Provide dust suppressant as required to manage nuisance dust on trafficable areas.	The Proponent

## 6 References

- Austrroads. (2017). Warrants for BA, AU and CH Turn Treatments. In *Guide to Road Design Part 4 - Intersections and Crossings: General*. Austrroads.
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- RTA. (2002). Land Use Traffic Generation. In *Guide to Traffic Generating Developments* (Version 2.2 ed.). RTA.
- Standards Australia. (2009). Traffic control devices for general use. In *AS 1742.2 Manual of uniform traffic control devices*. SAI Global.

# Appendix 1: Freight Route Map



**LEGEND**

- ROUTE 1 —
- ROUTE 2 —
- PROJECT SITE

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# WERRIS CREEK INTERMODAL FREIGHT TERMINAL

## ROUTE MAP



**constructive solutions**  
providing total solutions

# Appendix 2: Development Traffic Generation

**Werris Creek - Private Rail Infrastructure Facility Issue 2**

Client: Crawford's Freightlines

Days per Yr  
250

**Inbound  
Development Traffic**

Type	Current / Forecast	Route	Description	Origin / Destination	Traffic Volume														Total Daily	Total Yearly		
					From	6:00:00 AM	7:00:00 AM	8:00:00 AM	9:00:00 AM	10:00:00 AM	11:00:00 AM	12:00:00 PM	1:00:00 PM	2:00:00 PM	3:00:00 PM	4:00:00 PM	5:00:00 PM	6:00:00 PM				
					To	7:00:00 AM	8:00:00 AM	9:00:00 AM	10:00:00 AM	11:00:00 AM	12:00:00 PM	1:00:00 PM	2:00:00 PM	3:00:00 PM	4:00:00 PM	5:00:00 PM	6:00:00 PM	7:00:00 PM				
LV	Current	Single Street	Staff	Werris Creek / Tamworth	10	4														14	3500	
		Werris Creek Road	Staff	Quirindi	5	1															6	1500
		Single Street	Visitors	Various	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			6	1500
		Werris Creek Road	Visitors	Various	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			6	1500
		Total Hourly LV				16	6	1	1	1	1	1	1	1	1	1	1	1	0			32
<b>Grand Total LV</b>				<b>16</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>			<b>32</b>	<b>8000</b>	
HV	Current	Route 1 (current)	Logging	Gilgandra	1															1	250	
			Logging	Nundle	1.6	1.7	1.5	1.7	1.3	1.6	1.2	1.5	1.8	1.5	0.6						16	4000
			Semolina	Gunnedah				1				1									2	500
			Leather Products	Gunnedah					1				1						1		3	750
		Total Hourly Route 1				2.6	1.7	1.5	2.7	2.3	1.6	1.2	2.5	2.8	1.5	0.6	0	1			22	5500
	Route 2 (current)	Logging	Walcha	1.0	1.1	0.9	1.0	0.8	1.0	0.8	0.9	1.2	0.9	0.3							10	2500
		Semolina	Tamworth				1				1										2	500
		General				1														1	250	
		Total Hourly Route 2				1.0	1.1	1.9	2.0	0.8	1.0	0.8	1.9	1.2	0.9	0.3	0	0			13	3250
	Total Current HV				3.6	2.8	3.4	4.7	3.2	2.6	2.0	4.4	4.0	2.4	0.9	0	1			35	8750	
	Forecast	Route 1 (forecast)	Cotton	Gunnedah		1	1	1	1	1	1	1	1	1	1						10	2500
			Grain	Narrabri / Gunnedah Region		4	4	4	4	4	4	4	4	4	4	4					40	10000
			Total Hourly Route 1				0	5	5	5	5	5	5	5	5	5	0	0			50	12500
		Route 2 (forecast)	Food Products	Tamworth		2	2	2	2	2	2	2	2	2	2						20	5000
			ISO Tanker	Tamworth		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5							12	3000
Total Hourly Route 2				0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	2	2	0	0			32	8000		
Total Forecast HV				0	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	7	7	0	0			82	20500	
<b>Grand Total HV</b>				<b>3.6</b>	<b>11.3</b>	<b>11.9</b>	<b>13.2</b>	<b>11.7</b>	<b>11.1</b>	<b>10.5</b>	<b>12.9</b>	<b>12.5</b>	<b>9.4</b>	<b>7.9</b>	<b>0.0</b>	<b>1.0</b>			<b>117</b>	<b>29250</b>		
<b>Total Vehicles</b>				<b>19.6</b>	<b>17.3</b>	<b>12.9</b>	<b>14.2</b>	<b>12.7</b>	<b>12.1</b>	<b>11.5</b>	<b>13.9</b>	<b>13.5</b>	<b>10.4</b>	<b>8.9</b>	<b>1.0</b>	<b>1.0</b>			<b>149</b>	<b>37250</b>		
<b>Total Route 1 HV (current + forecast)</b>				<b>2.6</b>	<b>6.7</b>	<b>6.5</b>	<b>7.7</b>	<b>7.3</b>	<b>6.6</b>	<b>6.2</b>	<b>7.5</b>	<b>7.8</b>	<b>6.5</b>	<b>5.6</b>	<b>0.0</b>	<b>1.0</b>			<b>72</b>	<b>18000</b>		
<b>Total Route 2 HV (current + forecast)</b>				<b>1.0</b>	<b>4.6</b>	<b>5.4</b>	<b>5.5</b>	<b>4.3</b>	<b>4.5</b>	<b>4.3</b>	<b>5.4</b>	<b>4.7</b>	<b>2.9</b>	<b>2.3</b>	<b>0.0</b>	<b>0.0</b>			<b>45</b>	<b>11250</b>		
<b>Total Route 1 LV</b>				<b>5.5</b>	<b>1.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.0</b>	<b>0.0</b>			<b>12</b>	<b>3000</b>	
<b>Total Route 2 LV</b>				<b>10.5</b>	<b>4.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.0</b>	<b>0.0</b>			<b>20</b>	<b>5000</b>	



# Werris Creek - Private Rail Infrastructure Facility Issue 2

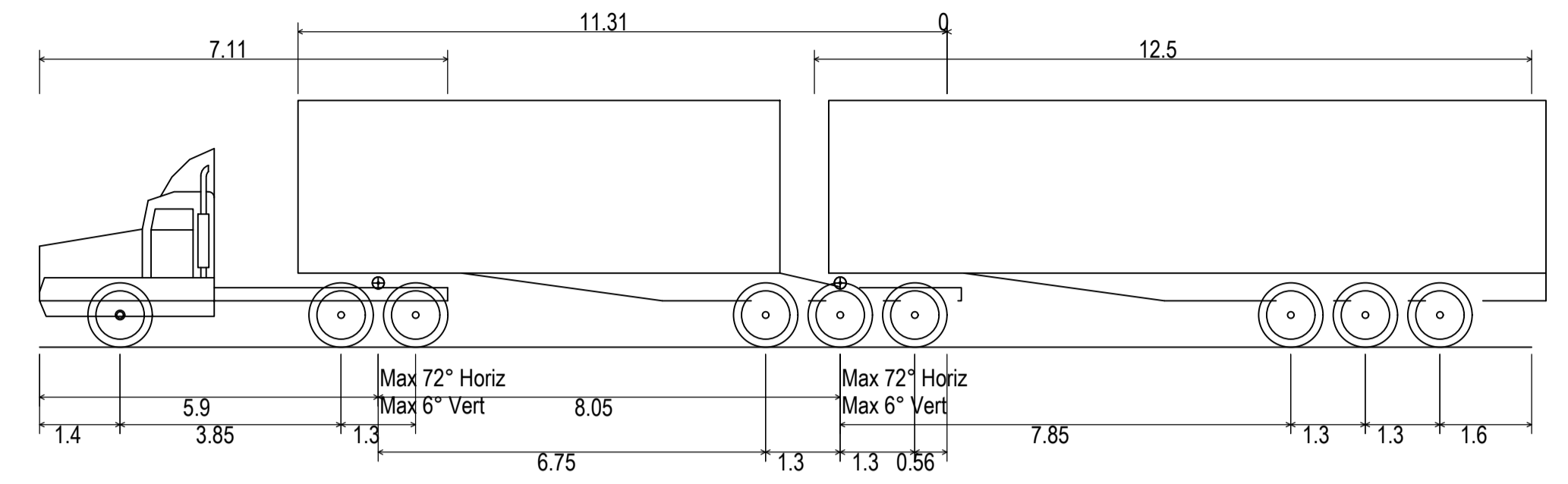
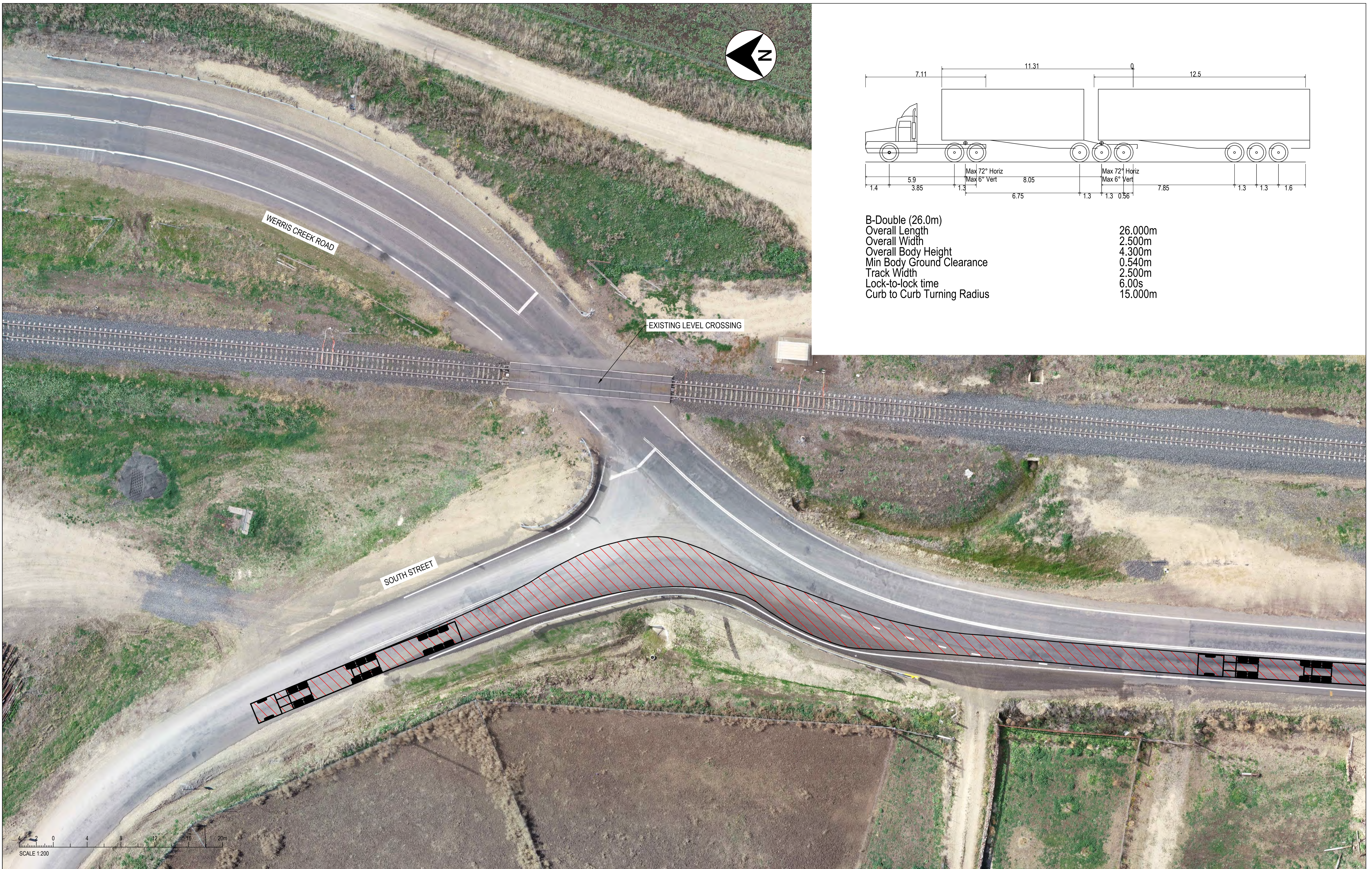
Client: Crawford's Freightlines

Days per Year

## Outbound Development Traffic

Type	Current / Forecast	Route	Description	Origin / Destination	Traffic Volume														Total Daily	Total Yearly		
					From	6:00:00 AM	7:00:00 AM	8:00:00 AM	9:00:00 AM	10:00:00 AM	11:00:00 AM	12:00:00 PM	1:00:00 PM	2:00:00 PM	3:00:00 PM	4:00:00 PM	5:00:00 PM	6:00:00 PM				
					To	7:00:00 AM	8:00:00 AM	9:00:00 AM	10:00:00 AM	11:00:00 AM	12:00:00 PM	1:00:00 PM	2:00:00 PM	3:00:00 PM	4:00:00 PM	5:00:00 PM	6:00:00 PM	7:00:00 PM				
LV	Current	Single Street	Staff	Werris Creek / Tamworth											4	10				14	3500	
		Werris Creek Road	Staff	Quirindi											1	5				6	1500	
		Single Street	Visitors	Various		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			6	1500	
		Werris Creek Road	Visitors	Various		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			6	1500	
		Total Hourly LV				1	1	1	1	1	1	1	1	1	1	1	6	16	0		32	8000
<b>Grand Total LV</b>				<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>6</b>	<b>16</b>	<b>0</b>		<b>32</b>	<b>8000</b>		
HV	Current	Route 1 (current)	Logging	Gilgandra															1	250		
			Logging	Nundle			1.6	1.7	1.5	1.7	1.3	1.6	1.2	1.5	1.8	1.5	0.6			16	4000	
			Semolina	Gunnedah	1					1										2	500	
			Leather Products	Gunnedah			1					1				1				3	750	
		Total Hourly Route 1				1	3.6	1.7	1.5	2.7	2.3	1.6	1.2	1.5	2.8	1.5	0.6	0		22	5500	
	Route 2 (current)	Logging	Walcha			1.0	1.1	0.9	1.0	0.8	1.0	0.8	0.9	1.2	0.9	0.3				10	2500	
		Semolina	Tamworth			1				1										2	500	
		General						1											1	250		
	Total Hourly Route 2				0	2.0	1.1	1.9	2.0	0.8	1.0	0.8	0.9	1.2	0.9	0.3	0			13	3250	
	Total Current HV				1	5.6	2.8	3.4	4.7	3.2	2.6	2	2.4	4	2.4	0.9	0			35	8750	
	Forecast	Route 1 (forecast)	Cotton	Gunnedah	1	1	1	1	1	1	1	1	1	1						10	2500	
			Grain	Narrabri / Gunnedah Region	4	4	4	4	4	4	4	4	4	4	4						40	10000
			Total Hourly Route 1				5	5	5	5	5	5	5	5	5	5	0	0	0		50	12500
Route 2 (forecast)		Food Products	Tamworth	2	2	2	2	2	2	2	2	2	2	2						20	5000	
		ISO Tanker	Tamworth			1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5						12	3000	
Total Hourly Route 2				2	2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	0	0	0			32	8000		
Total Forecast HV				7	7	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	0	0	0			82	20500		
<b>Grand Total HV</b>				<b>8.0</b>	<b>12.6</b>	<b>11.3</b>	<b>11.9</b>	<b>13.2</b>	<b>11.7</b>	<b>11.1</b>	<b>10.5</b>	<b>10.9</b>	<b>12.5</b>	<b>2.4</b>	<b>0.9</b>	<b>0.0</b>			<b>117</b>	<b>29250</b>		
<b>Total Vehicles</b>				<b>9.0</b>	<b>13.6</b>	<b>12.3</b>	<b>12.9</b>	<b>14.2</b>	<b>12.7</b>	<b>12.1</b>	<b>11.5</b>	<b>11.9</b>	<b>13.5</b>	<b>8.4</b>	<b>16.9</b>	<b>0.0</b>			<b>149</b>	<b>37250</b>		
<b>Total Route 1 HV (current + forecast)</b>				<b>6.0</b>	<b>8.6</b>	<b>6.7</b>	<b>6.5</b>	<b>7.7</b>	<b>7.3</b>	<b>6.6</b>	<b>6.2</b>	<b>6.5</b>	<b>7.8</b>	<b>1.5</b>	<b>0.6</b>	<b>0.0</b>			<b>72</b>	<b>18000</b>		
<b>Total Route 2 HV (current + forecast)</b>				<b>2.0</b>	<b>4.0</b>	<b>4.6</b>	<b>5.4</b>	<b>5.5</b>	<b>4.3</b>	<b>4.5</b>	<b>4.3</b>	<b>4.4</b>	<b>4.7</b>	<b>0.9</b>	<b>0.3</b>	<b>0.0</b>			<b>45</b>	<b>11250</b>		
<b>Total Route 1 LV</b>				<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>1.5</b>	<b>5.5</b>	<b>0.0</b>		<b>12</b>	<b>3000</b>		
<b>Total Route 2 LV</b>				<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>4.5</b>	<b>10.5</b>	<b>0.0</b>		<b>20</b>	<b>5000</b>		

## Appendix 3: Swept Path Diagrams



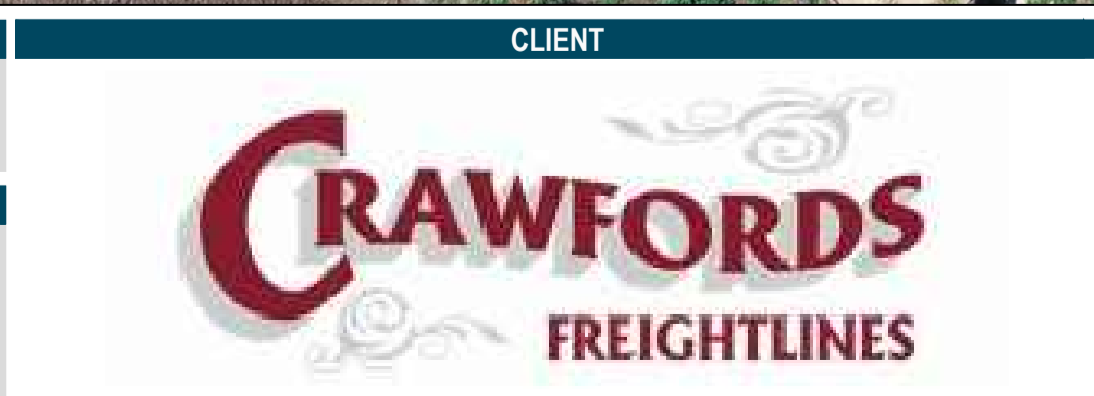
B-Double (26.0m)	26.000m
Overall Length	26.000m
Overall Width	4.300m
Overall Body Height	0.540m
Min Body Ground Clearance	2.500m
Track Width	6.00s
Lock-to-lock time	15.000m
Curb to Curb Turning Radius	

REV	DATE	REVISION DETAILS
A	26-08-19	FOR INTERNAL REVIEW

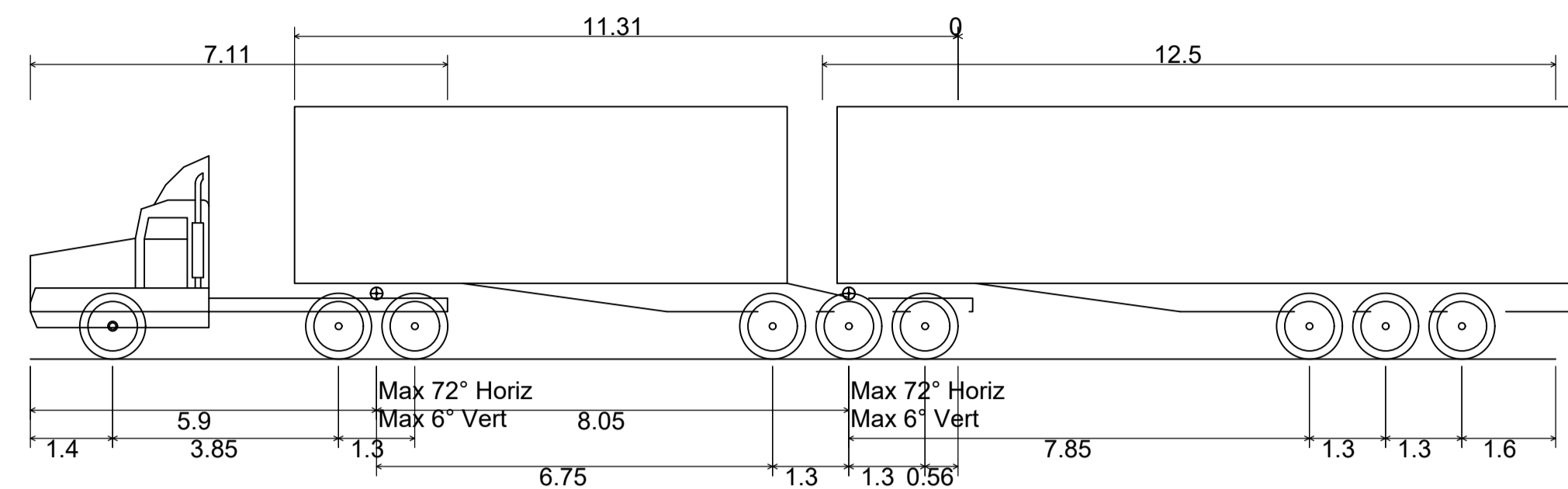
APPROVED
JM

DRAWN
L. YOUNG
DESIGNED
CHECKED
J. MALVERN
APPROVED
J. MALVERN

PROJECT
MR63 SOUTHERN GATEWAY INTERSECTION TIA
DRAWING TITLE
SOUTH STREET & WERRIS CREEK ROAD SWEEP PATHS 01



PRELIMINARY	
CSPL PROJECT No.	201992
SIZE	A1
DRAWING NUMBER	201992-010
REV	A



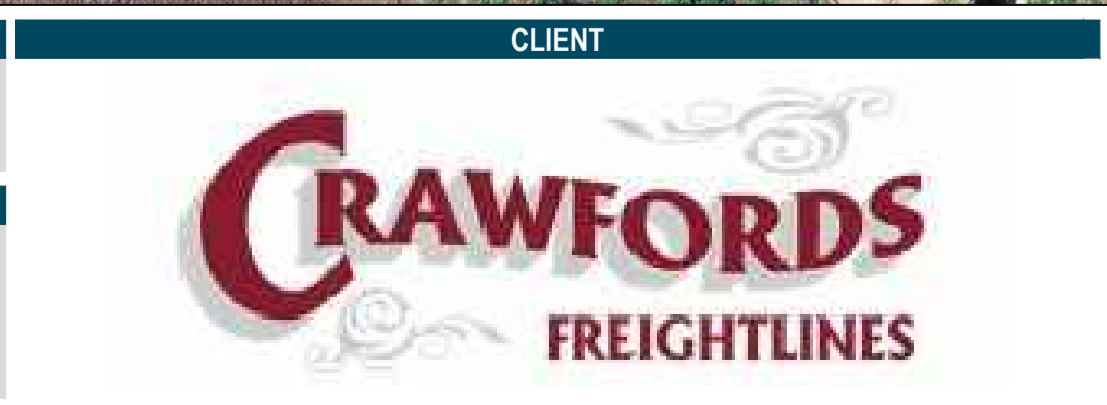
B-Double (26.0m)	
Overall Length	26.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	15.000m

REV	DATE	REVISION DETAILS
A	26-08-19	FOR INTERNAL REVIEW

APPROVED
JM

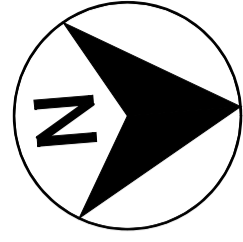
DRAWN
L. YOUNG
DESIGNED
CHECKED
J. MALVERN
APPROVED
J. MALVERN

PROJECT
MR63 SOUTHERN GATEWAY INTERSECTION TIA
DRAWING TITLE
SOUTH STREET & WERRIS CREEK ROAD SWEEP PATHS 02



PRELIMINARY	
CSPL PROJECT No.	201992
SIZE	A1
DRAWING NUMBER	201992-011
REV	A

# Appendix 4: Concept U-turn Bay



UNSEALED U-TURN FACILITY TO CATER FOR B-DOUBLE MOVEMENTS

ADJOINS MAIN DRAWING

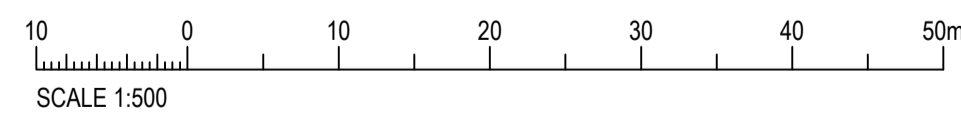
TO WERRIS CREEK

INSET  
1:500

FROM QUIRINDI

ADJOINS INSET

WERRIS CREEK ROAD

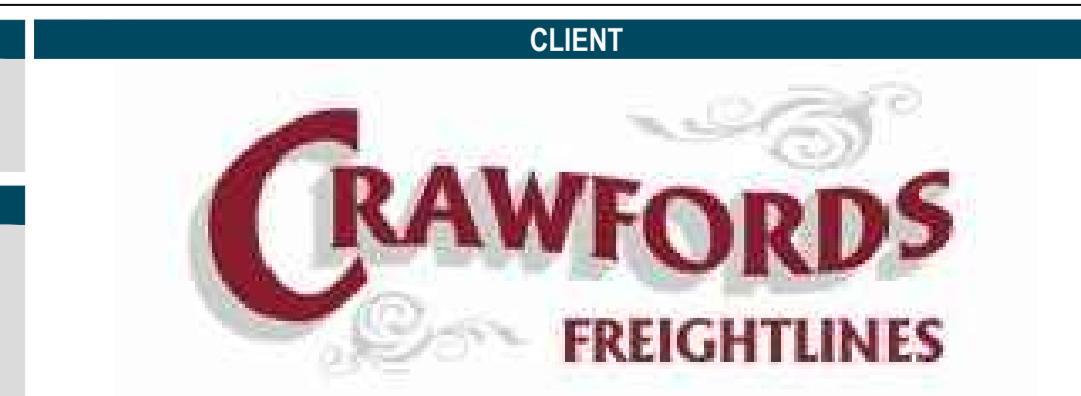


MAIN DRAWING  
1:500

REV	DATE	REVISION DETAILS	APPROVED
0	26-08-19	FOR INTERNAL REVIEW	JM

DRAWN
L. YOUNG
DESIGNED
L. YOUNG
CHECKED
J. MALVERN
APPROVED
J. MALVERN

PROJECT
MR63 SOUTHERN GATEWAY INTERSECTION TIA
DRAWING TITLE
WERRIS CREEK ROAD & SOUTH STREET INTERSECTION



STRATEGIC	
CSPL PROJECT No.	201992
SIZE	A1
DRAWING NUMBER	201992-SK01
REV	0

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