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In association with CRG Acoustics Pty Ltd



Proposed Service Station
902 Grosvenor Estate (Proposed Lot 28), Moranbah

**TRAFFIC ENGINEERING
ASSESSMENT**

Prepared For

Evans Long Pty Ltd

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DOCUMENT REGISTER

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- B - Detailed Results of SIDRA Analysis

1 INTRODUCTION

CRG Traffic Pty Ltd has been engaged by Evans Long Pty Ltd to prepare a traffic engineering assessment for a proposed service station at Moranbah.

This report has been prepared as part of a Development Application to be lodged with Economic Development Queensland (EDQ).

The following issues have been addressed as part of the assessment:

- Car parking supply & design;
- Service vehicle access;
- Access design;
- Road network impact.

2 DEVELOPMENT PROPOSAL

2.1 Location

As shown in Figure 2.1, the subject site is located within the Grosvenor estate located to the south of the Moranbah township. Within the estate, the subject site is located south of the existing McDonalds restaurant. The overall estate plan is shown in Figure 2.2.



Figure 2.1 – Location of Subject Site

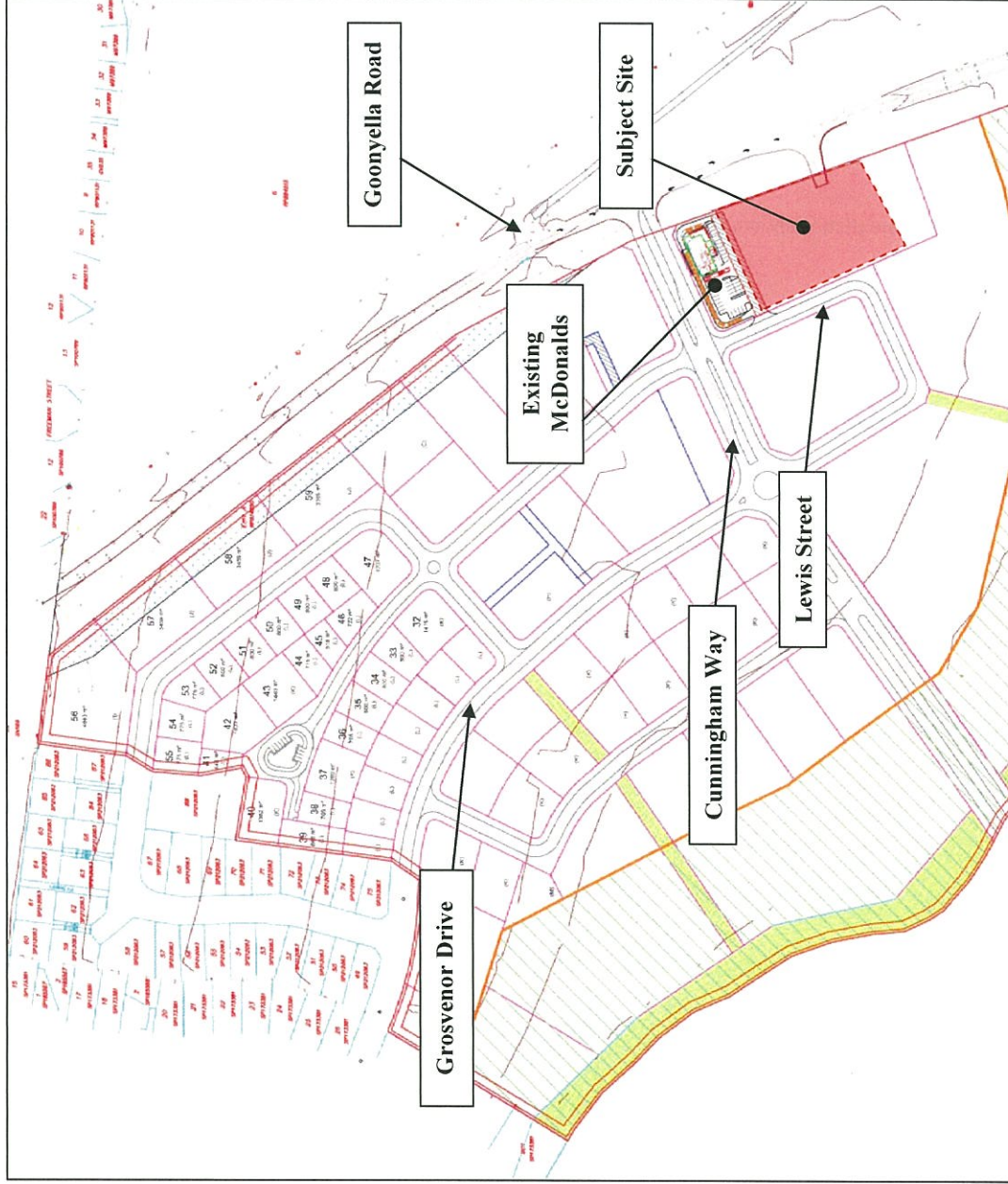


Figure 2.2 – The subject site in the context of the Grosvenor Estate plan

2.2 Development Proposal

The proposal is to establish a service station on the subject site with an ancillary service floor area (GFA) of 275 m².

Separate heavy vehicle fuel facilities will be provided. Primary access will be gained via Goonyella Road where a channelised right turn treatment has recently been constructed. Access arrangements for the proposed development will function for vehicles to enter the site from Goonyella Road and exit to Lewis Street.

A total of 23 car parking spaces are proposed to serve the development.

The proposed site plan is shown in Figure 2.2.

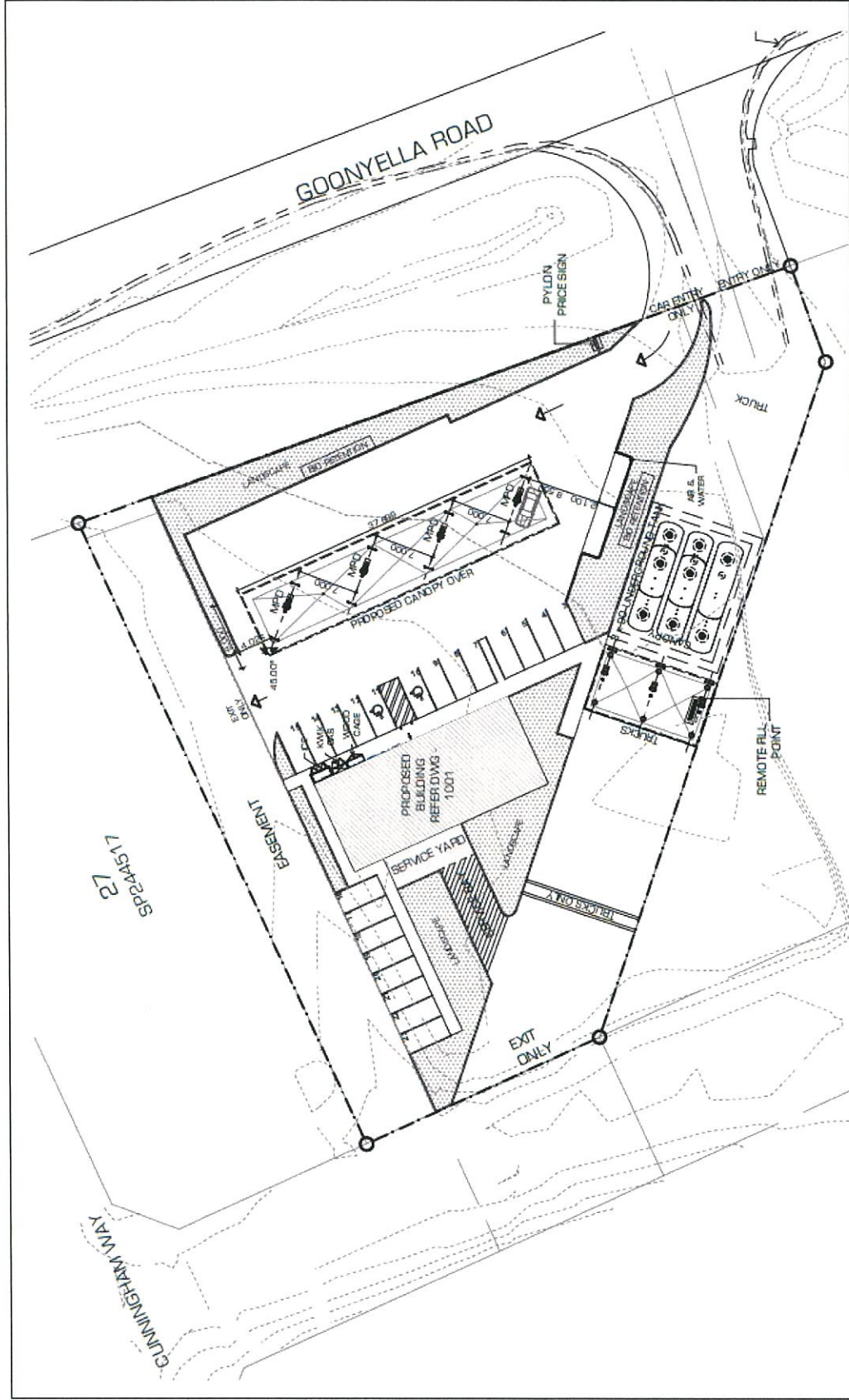


Figure 2.2 – Proposed Site Plan

3 EXISTING TRANSPORT NETWORK

3.1 Existing Roadway Conditions

Goonyella Road is a two lane roadway allowing north – south movement between Moranbah and Peak Down Highway. At the vicinity of the site Goonyella Road has a posted speed limit of 80 km / hr and provides a sealed roadway measuring seven metres. A one metre shoulder is also provided on both sides of the road.

Cunningham Way is a local access road, providing access to the recently constructed residential catchment located north of the proposed development. At the vicinity of the site Cunningham Way is a divided roadway and provides a single lane in each direction.

The Goonyella Road / Cunningham Way intersection is a priority controlled ‘Tee’ junction providing an auxiliary left and channelised right turn treatment into Cunningham Road.

The site access intersection is located approximately 100 metres south of the Goonyella Road / Cunningham Way intersection, and will function as entry and exit crossover allowing entry movements for all vehicle and left turn exit only for general traffic.

The existing Goonyella Road / Cunningham Way and Goonyella Road / Site Access intersections are shown in Figures 3.1 and 3.2 respectively.

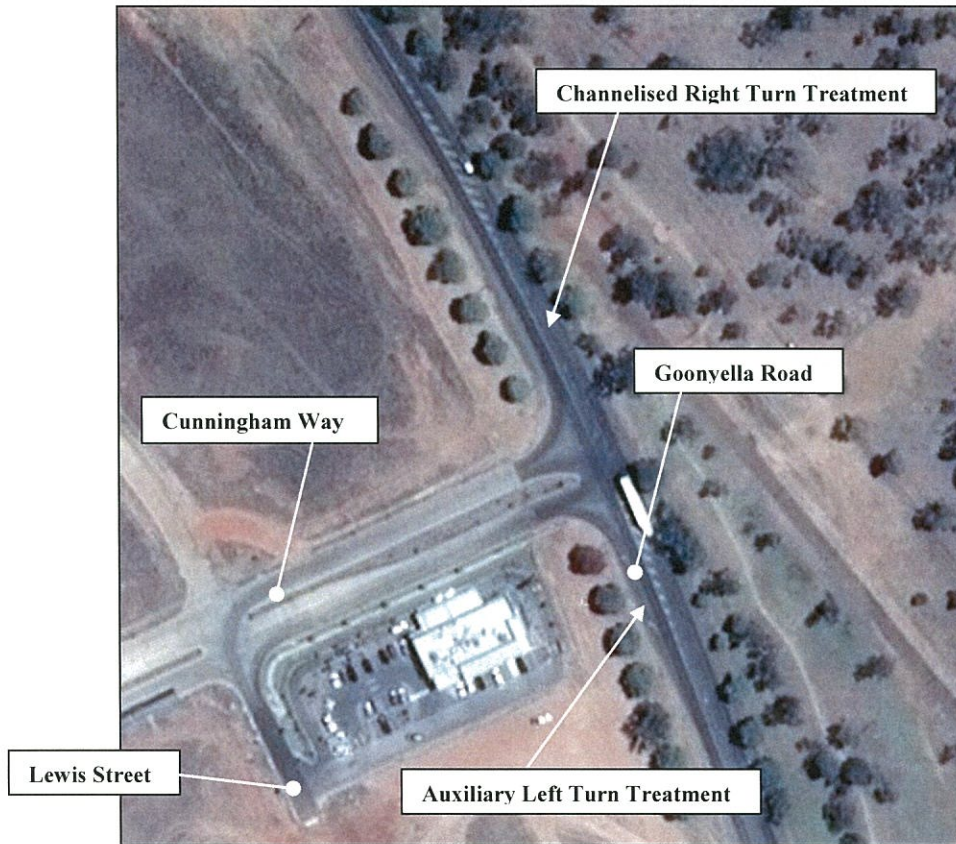


Figure 3.1: Goonyella Road / Cunningham Way Intersection



Figure 3.2: Goonyella Road / Site Access Intersection

3.2 Surveyed Traffic Volumes

Traffic surveys at the vicinity of the site have been provided by Mr Pierre Neethling from Isaac Regional Council. Counts undertaken in 2012 at the Goonyella Road / Mills Avenue intersection indicate that Goonyella Road was carrying in the order of 8438 vehicles per day (874 trips in peak hour periods). Summary of the traffic movements on Goonyella Road is shown below in Figure 3.3.

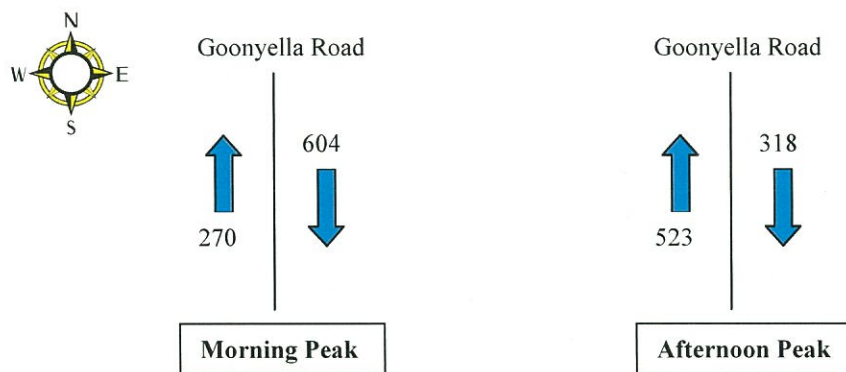


Figure 3.3 – Surveyed (2012) Peak Hour Traffic on Goonyella Road

3.3 Future Background Traffic Volumes

The below data has previously been provided by council for Goonyell Road at the vicinity of the subject site.

Goonyella Road

8201

Site Number 1

Chainage 11.58

	Start Date	End Date	No. Days	Count	AADT	%CV
1	19/07/2002	2/08/2002	14	30682	2191.57	
2	29/07/2003	20/08/2003	22	51796	2354.36	12.72
3	17/11/2004	1/12/2004	14	41265	2947.50	16.46
4	1/12/2004	15/12/2004	14	41790	2985.00	18.23
5	13/09/2005	28/09/2005	15	48640	3242.67	19.91
6	28/09/2005	12/10/2005	14	46725	3337.50	19.84
7	7/03/2006	21/03/2006	14	50438	3602.71	11.79
8	6/06/2007	20/06/2007	14	50969	3640.64	17.82

The above data indicates an annual growth rate of approximately 11% per annum. It is noted that the local road network has recently experienced significant growth in traffic volumes, however is anticipated to taper off due to the already developed area in the vicinity of the site. It is determine that a 5% annual growth rate provides a conservative realistic growth rate for the current and future traffic volumes on Goonyella Road.

The existing and future background traffic estimates on Goonyella Road are shown in Figures 3.4 and 3.5 respectively.

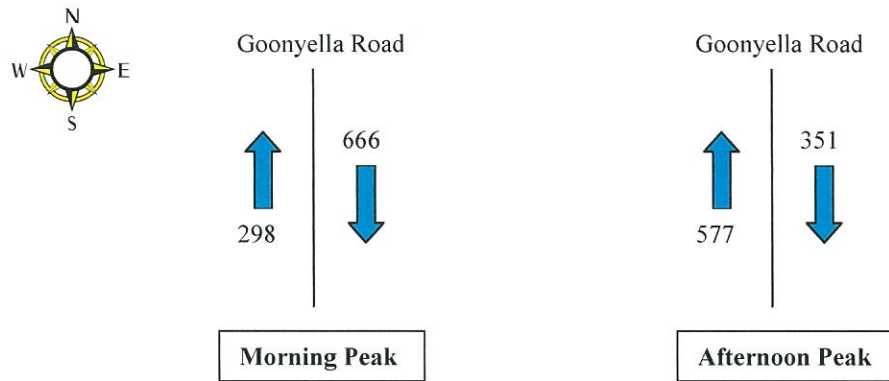


Figure 3.4 – 2014 Peak Hour Traffic Estimates

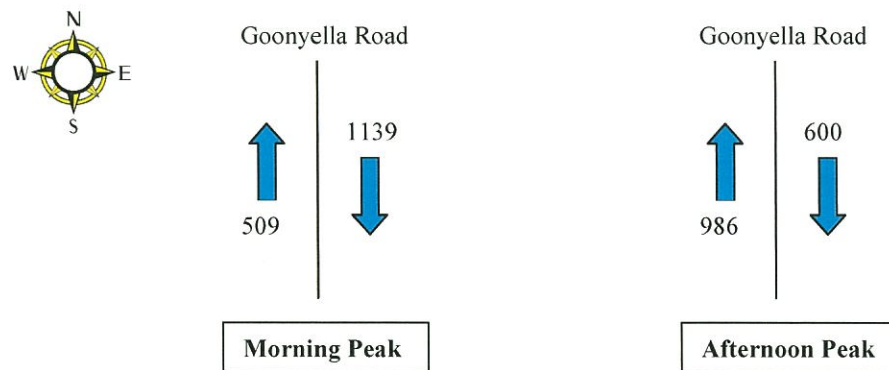


Figure 3.5 – 2025 Peak Hour Traffic Estimates

4 DEVELOPMENT TRAFFIC

4.1 Trip Generation

Development traffic generation rates have been sourced from the Department of Transport and Main Roads publication *Road Planning and Design Manual*. The following trip generation rate applies to the proposed development:

Service Station (with convenience store)
66 trips per 100m² GFA

Application of the above rate to the proposed development plan yields a traffic generation potential of 172 peak hour trips as follows:

Table 4.1 - Estimated Development Traffic Generation

Component	Morning Peak Hour			Afternoon Peak Hour		
	In	Out	Total	In	Out	Total
Primary Trips	9	9	18	9	9	18
Passing Trade	77	77	154	77	77	154
TOTAL	86	86	172	86	86	172

Distribution: AM -50/50, PM – 50/50

Due to the nature of the proposed use, the development will attract a high portion of drop-in trips from the passing traffic flow on Goonyella Road. It is anticipated that patrons will typically call in on their way to and from work and will therefore already be in the road network. A rate of 90% passing trade is considered to be appropriate and has been adopted in the analysis.

4.2 Trip Distribution

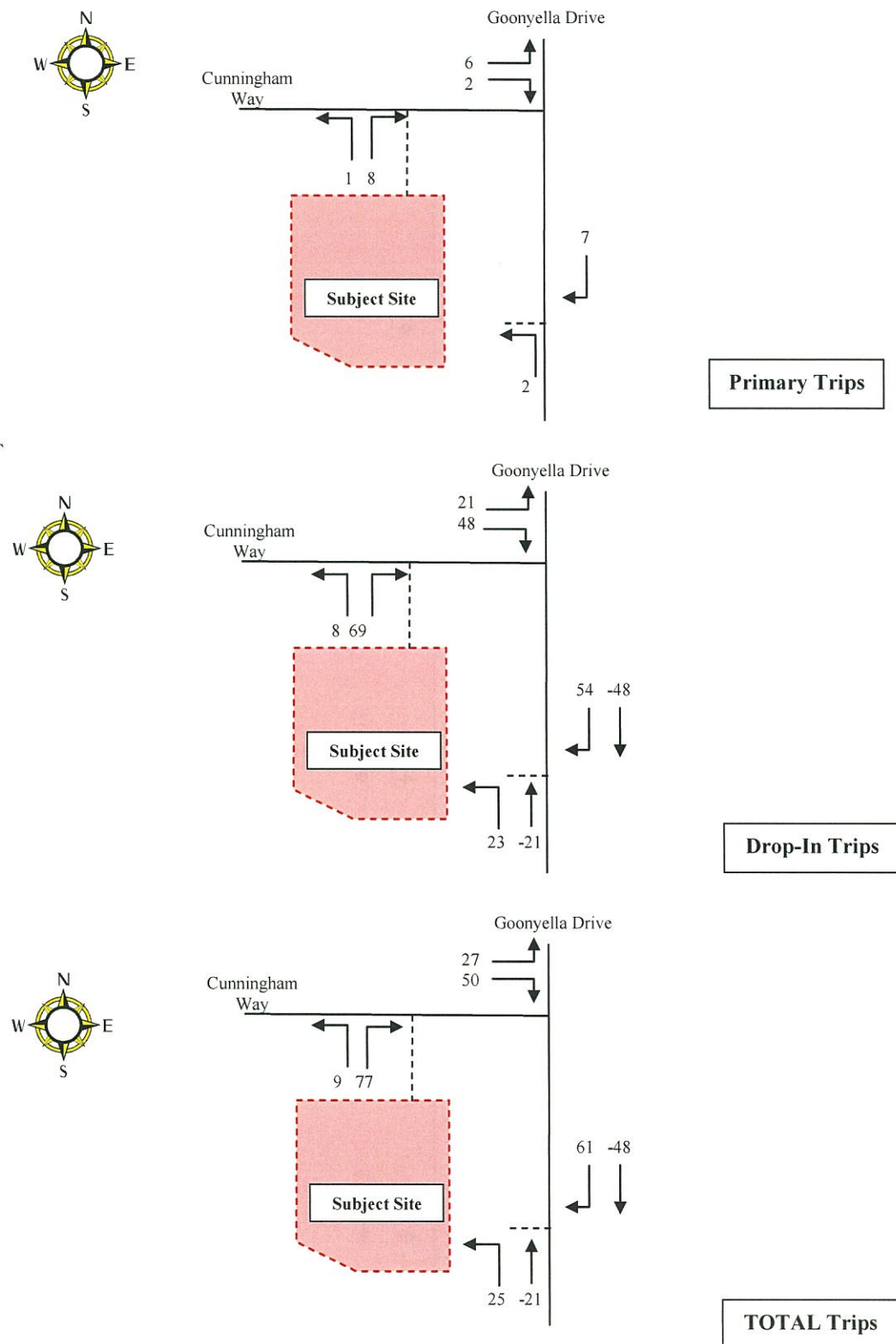
It is assumed that primary trips will distribute as follows:

To the north via Goonyella Road	65%
From the north via Goonyella Road	70%
To the south via Goonyella Road	25%
From the south via Goonyella Road	30%
To west via Cunningham Way	10%

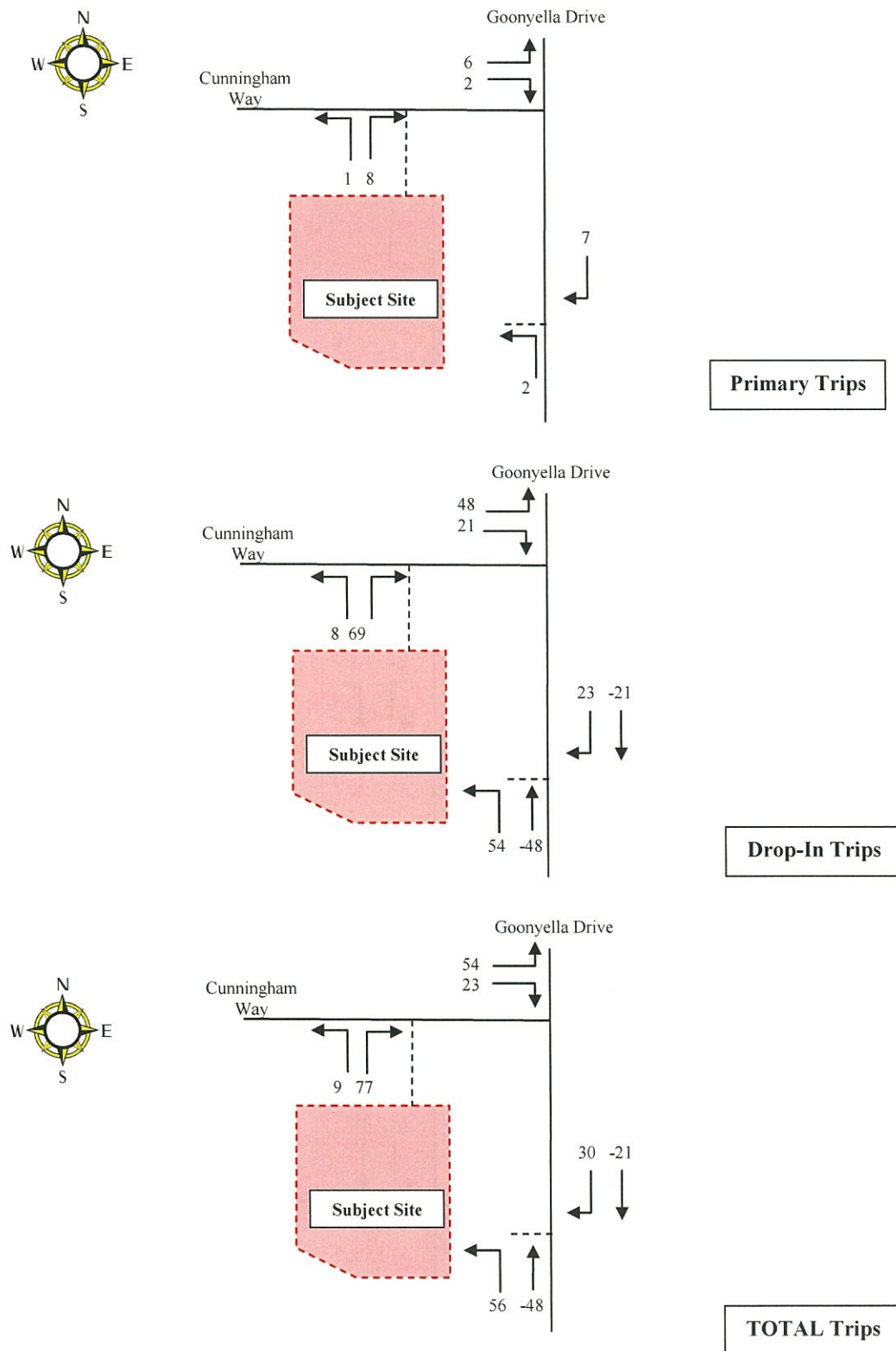
It is assumed the drop in trips to the development will distribute as follows:

Morning Peak Hour:	From the north via Goonyella Road	70%
	From the south via Goonyella Road	30%
Afternoon Peak Hour:	From the north via Goonyella Road	30%
	From the south via Goonyella Road	70%

Resultant estimates of peak hour traffic volumes are shown in Figures 4.1 and 4.2.



**Figure 4.1 – Development Traffic Volumes
(Morning Peak Hour)**



**Figure 4.2 – Development Traffic Volumes
(Afternoon Peak Hour)**

5 TRAFFIC IMPACT ASSESSMENT

A SIDRA analysis has been undertaken for the Goonyella Drive / Site Access intersection. The intersection has been modelled under current (year 2014) and future (year 2025) traffic conditions with the proposed development traffic.

Criteria for evaluating the results of SIDRA analysis are provided as Appendix A

The results of the SIDRA analysis of the intersections are provided in Appendix B and are summarised in Tables 5.1.below.

Table 5.1: Summary of SIDRA Results

Scenario	Degree of Saturation	Average Delay (sec)	Right turn delay into the Site (sec)	95 th Percentile Right Turn Queue (m)
2014				
AM Peak Hour with development	0.334	0.8	10.0	1.7
PM Peak Hour with development	0.317	0.9	12.1	1.1
2025				
AM Peak Hour with development	0.589	0.5	11.6	2.1
PM Peak Hour with development	0.538	0.7	20.2	2.4

As shown in Table 5.1, the intersection will operate satisfactorily under current and future traffic volumes with minimal delays and vehicle queuing on all approaches.

It is noted that the existing Goonyella Road / Cunningham Way intersection has been assessed prior construction of the intersection with respect to the overall Grosvenor Estate development including the proposed service station. It is therefore concluded that the proposed development will not have any adverse impact upon the operation of Goonyella Road and the Goonyella Road / Cunningham Way intersection.

6 CAR PARKING SUPPLY AND DESIGN

6.1 Car Parking Supply

The Belyando Shire Planning Scheme does not specify a parking rate for service station developments. However, the Planning Scheme rate for 'Shop', being 1 space per 20m² of total use area, is typically applied to the service / retail area of a service station. Additional parking for a service station is generally only required if service bays (for a mechanical workshop) are proposed, which are not.

In accordance with the proposed development and planning scheme, as shown in Table 6.1, the following is required:

Table 6.1: Car Parking Requirements

Component	Planning Scheme Requirements
Shop (275m ²)	14 spaces

It is noted that the above calculation is conservative (high), given that it is based on Gross Floor Area, rather than Total Use Area which would generally exclude areas such as toilets and storerooms.

The proposal includes a total of 23 car parking bays and therefore exceeds Council's minimum requirement.

6.2 Car Parking Design

The proposed car parking facilities have been designed to comply with the relevant requirements specified in the Australian Standards publication '*Parking Facilities Part 1 – Off-Street Car Parking AS / NZ 2890.1:2004*' in respect of parking bay dimensions and aisle widths.

The proposed car parking has the following dimensions and characteristics:

Parking bay width	2.6 metres
Disability parking bay:	2.6 metres + 2.6 metres shared zone
Parking bay	5.4 metres
Aisle width:	6.6 metres

The proposed disability car parking bay has been designed to comply the Australian Standards publication '*Parking Facilities Part 6 – Off-Street Car Parking for People with Disabilities AS/NZS 2890.6:2009*'.

CRG has conducted a swept path analysis using an 85th percentile vehicle (i.e. Ford Falcon) to determine if such vehicles can manoeuvre in and out of the respective bays satisfactorily. Vehicle manoeuvring templates for a representative bays are shown in Figure 6.1.

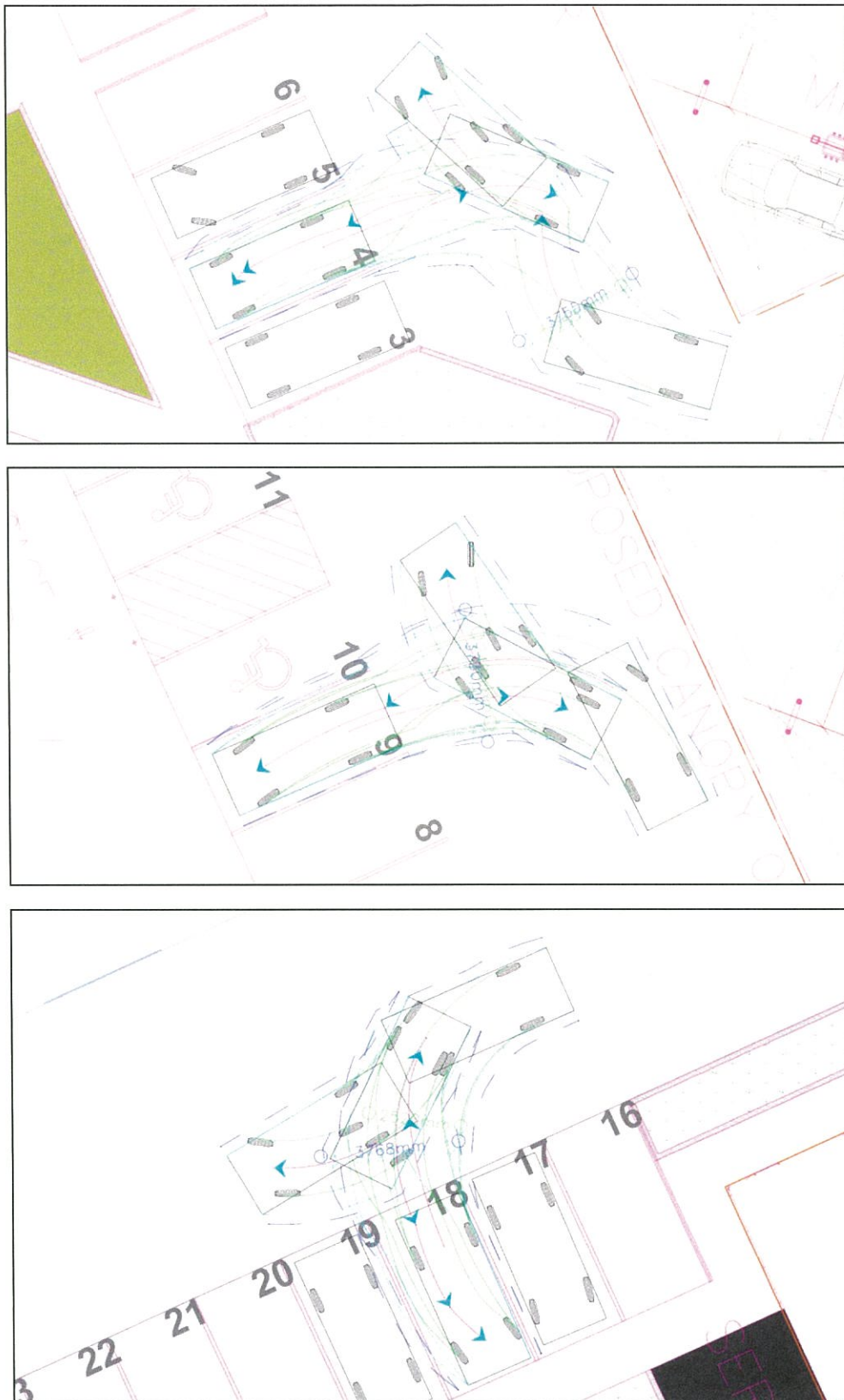


Figure 6.1 – 85th Percentile Vehicle Manoeuvring

7 SITE ACCESS

Access Arrangements

Primary access to the development will be gained from Goonyella Road. It is proposed that a shared, heavy and light vehicle access crossover will be provided from Goonyella Road allowing entry movements onto the development. All vehicles will exit the site from the proposed connection road linking to Cunningham Way and connect back to Goonyella Road via the Goonyella Road / Cunningham Way intersection.

Sight Distance

The proposed access arrangements are proposed to comply with the relevant requirements specified in AS / NZS 2890.1:2004. The proposed access location provides good Entering Sight Distance for drivers leaving the site in accordance with Section 3.2.4 (a) of AS/NZS 2890.1:2004. The access design also allows clear sight lines at the property boundary to ensure visibility between vehicles leaving the car park and pedestrians along the site frontage.

Queuing

As shown in Figure 7.1, there is provision for two 26 metre B-Doubles to queue in each lane, clear of the entry to the light vehicle fuelling / shop area. A truck stop (Figure 7.2) is located further to the south at the corner of Peak Downs Highway and Goonyella Road, approximately 11 kilometres from the subject site. The proposed queuing provisions is therefore considered to be acceptable given that the site is located within the township area and is unlikely to be used as a 'truck stop'

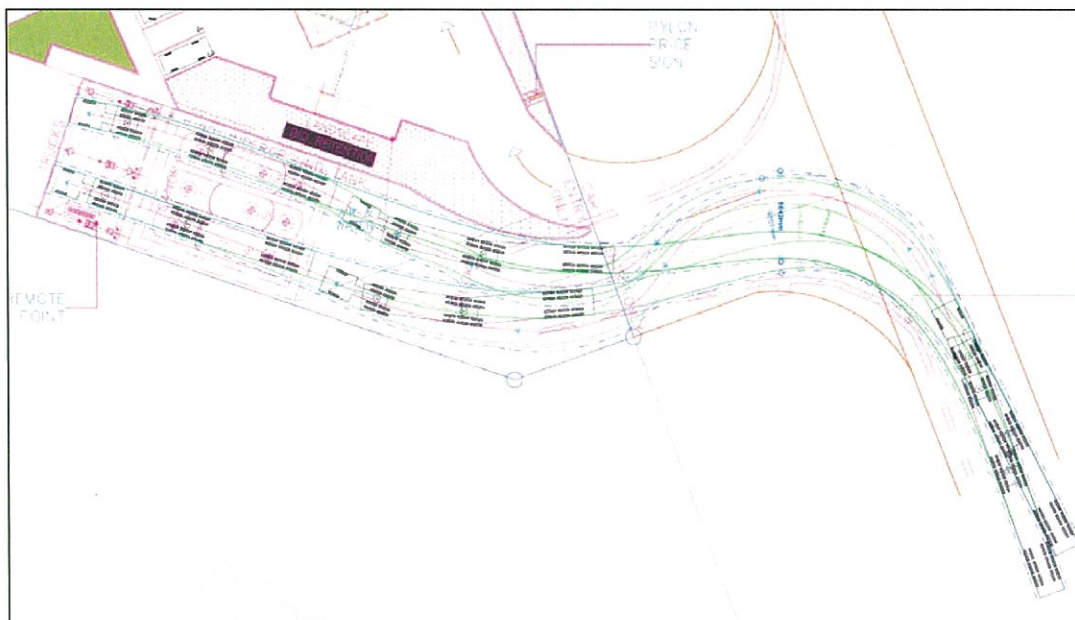


Figure 7.1 – Heavy Vehicle Queuing Arrangements

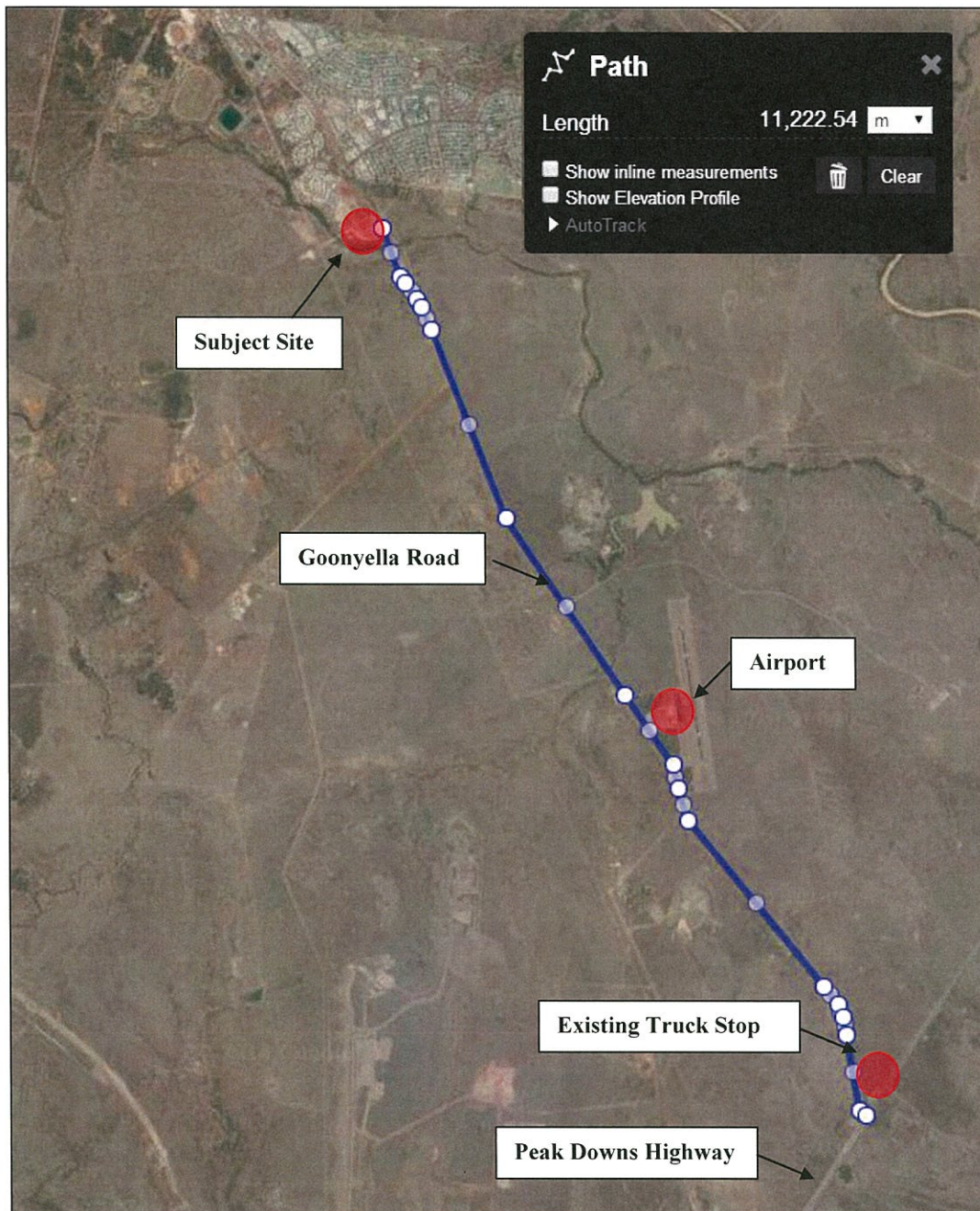


Figure 7.2 – Proximity to Nearest Truck Stop

8 PROVISION FOR SERVICE VEHICLES

The proposed service station provides separate refuelling locations for heavy and light vehicles. It is anticipated that a 19 metre Articulated Vehicle (AV) will enter the site from Goonyella Road and exit via Lewis Street. As shown in Figure 8.1, an AV can satisfactorily access the fill point for both sites.

The proposal also consists of a convenience store with a total GFA of 275m². A loading bay has been provided at the back of the store allowing a Medium Rigid Vehicle (MRV) to reverse into loading position whilst maintaining adequate clearance at all time. It is anticipated that an MRV will be sufficient for the size of the store proposed on site. Waste collection vehicles will service the site via the loading area at the rear of the service station building.

Turning template for an 8.8 metre Medium Rigid Vehicle (MRV) is shown in Figure 8.2.

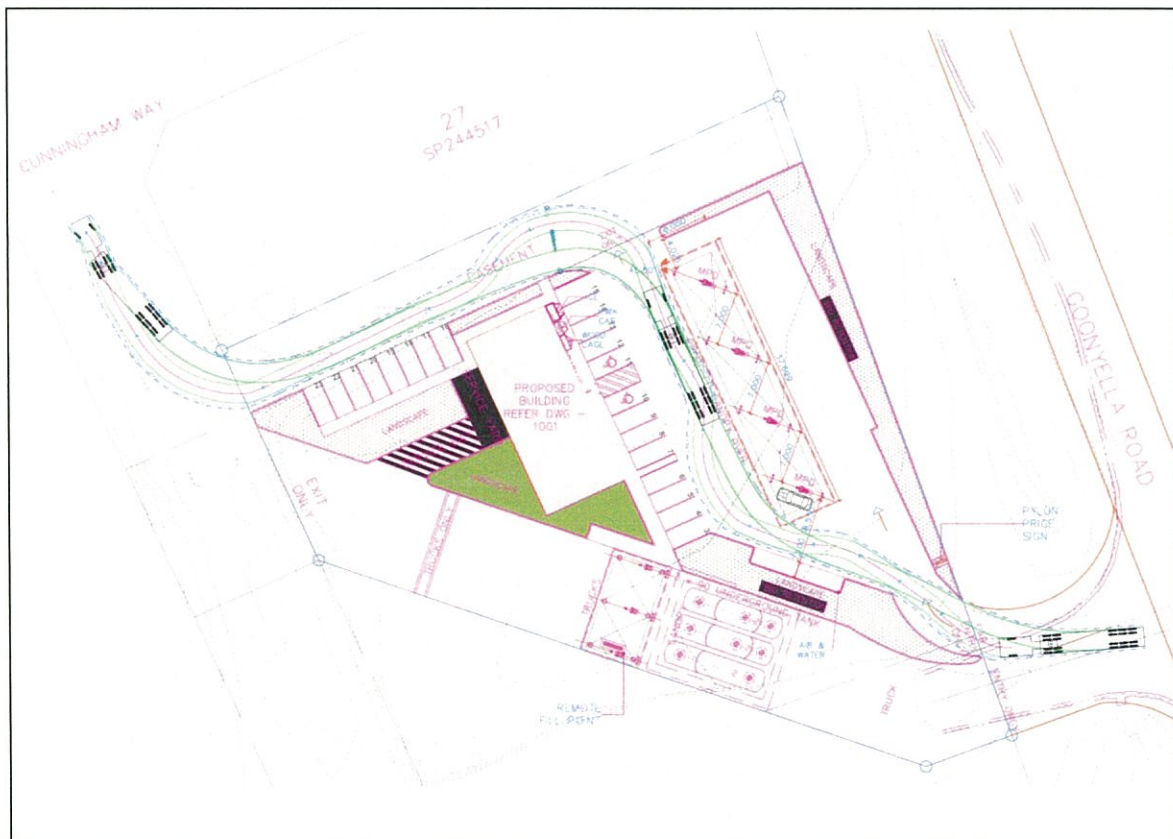


Figure 8.1 – Swept Path of a 19 metre Articulated Vehicle (AV)

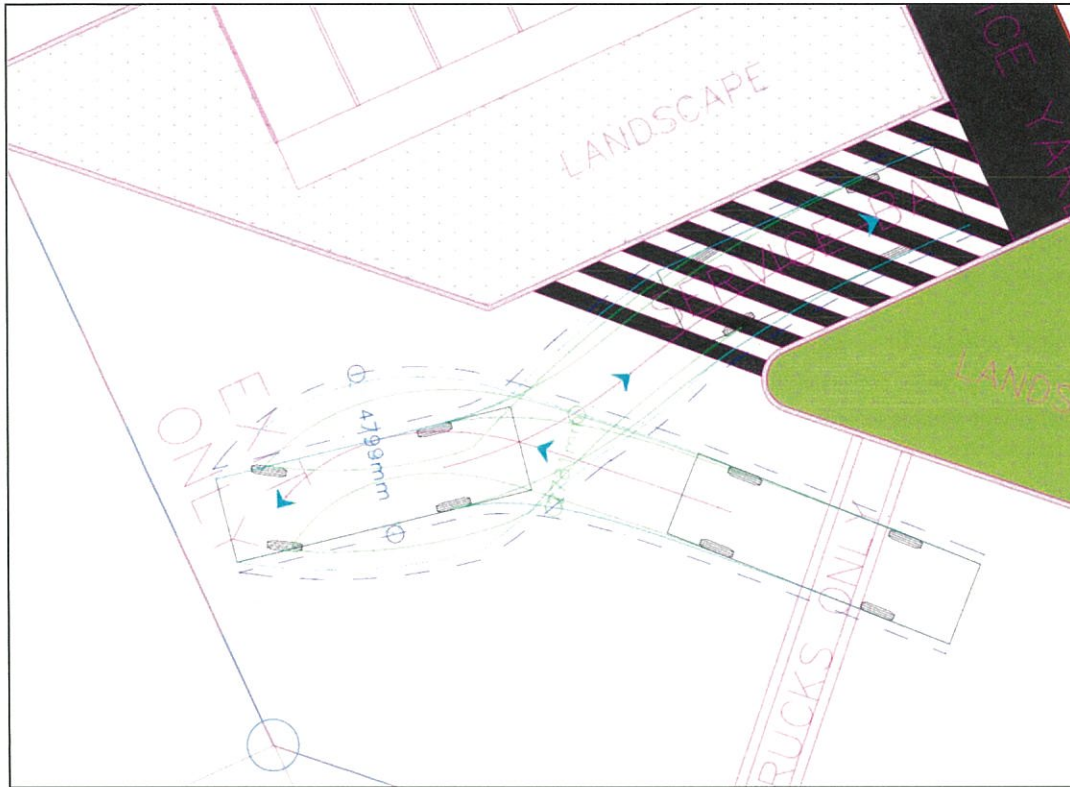


Figure 8.2 – Swept Path of an 8.8 metre Medium Rigid Vehicle (MRV)

9 SUMMARY OF CONCLUSIONS & RECOMMENDATIONS

- The subject site is located within the Grosvenor estate located south of the Moranbah township. Within the estate, the subject site is located immediately south of the existing McDonalds restaurant.
- The proposal is to establish a new service station on the subject site with a gross shop floor area of 275m².
- Primary access will be gained via Goonyella Road where a channelised right turn treatment has recently been constructed. Access arrangements for the proposed development will function for vehicles to enter the site from Goonyella Road and exit onto Cunningham Way.
- It is estimated that the proposed development will generate 172 peak hour vehicle trips comprising of 18 primary trips and 154 drop-in trips (passing trade).
- As discussed in Section 5, a capacity analysis of the proposed access intersection has been undertaken using SIDRA. The analysis indicates the intersection will operate satisfactorily under current and future traffic volumes with minimal delays and vehicle queuing on all approaches and movements.
- The proposal includes a total of 23 car parking bays which exceeds Council's minimum requirement.
- The geometric layout of the proposed car parking has been designed to comply with the relevant requirements of *AS / NZ 2890.1:2004* in respect of parking bay dimensions and aisle widths.
- As discussed in Section 8, it is anticipated that a 19 metre Articulated Vehicle (AV) will enter the development from Goonyella Road and exit onto Cunningham Way. An AV can satisfactorily access the fill point for the heavy vehicle station. A loading bay has been provided at the back of the store allowing a Medium Rigid Vehicle (MRV) to reverse into loading position whilst maintaining adequate clearance at all time.
- The proposed queuing arrangements are considered to be acceptable and will enable light and heavy traffic to queue within the site without impacting upon traffic flow on Goonyella Road.
- It is noted that parking has not been provided for heavy vehicles on the site. This is considered to be acceptable as the site is located within the township and there are other opportunities for truck drivers to park and dine within the local area.



APPENDICES

Appendix A – Criteria for Interpreting Results of SIDRA Analysis

Appendix B – Detailed Results of SIDRA Analysis

Appendix A – Criteria for Interpreting Results of SIDRA Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'		Good operation.
'B'	Good operation. Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
'C'	Satisfactory.	Satisfactory but accident study required.
'D'	Operating near capacity.	Near capacity and accident study required.
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.
'F'	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode.

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route).

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation.	Good operation.
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory.	Satisfactory but accident study required.
D	43 to 56	Operating near capacity.	Near capacity and accident study required.
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by **traffic signals**¹ both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout** or **GIVE WAY** or **STOP** signs, satisfactory intersection operation is indicated by a DS of 0.8 or less.

¹The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.

Appendix B – Detailed Results of SIDRA Analysis

MOVEMENT SUMMARY

Site: 2014 AM Peak - Goonyella Road - Site Access

Goonyella Road - Site Access
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Goonyella Road											
1	L	26	0.0	0.164	8.2	LOS A	0.0	0.0	0.00	1.03	49.0
2	T	292	0.0	0.164	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		318	0.0	0.164	0.7	NA	0.0	0.0	0.00	0.09	58.9
North: Goonyella Road											
8	T	651	0.0	0.334	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	64	0.0	0.062	10.0	LOS B	0.2	1.7	0.40	0.70	46.9
Approach		715	0.0	0.334	0.9	NA	0.2	1.7	0.04	0.06	58.5
All Vehicles		1033	0.0	0.334	0.8	NA	0.2	1.7	0.02	0.07	58.7

MOVEMENT SUMMARY

Site: 2014 PM Peak - Goonyella Road - Site Access

Goonyella Road - Site Access
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Goonyella Road											
1	L	59	0.0	0.317	8.2	LOS A	0.0	0.0	0.00	1.02	49.0
2	T	557	0.0	0.317	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		616	0.0	0.317	0.8	NA	0.0	0.0	0.00	0.10	58.7
North: Goonyella Road											
8	T	347	0.0	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	32	0.0	0.046	12.1	LOS B	0.2	1.1	0.55	0.80	44.9
Approach		379	0.0	0.178	1.0	NA	0.2	1.1	0.05	0.07	58.4
All Vehicles		995	0.0	0.317	0.9	NA	0.2	1.1	0.02	0.09	58.6

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: 2025 AM Peak - Goonyella Road - Site Access

Goonyella Road - Site Access
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Goonyella Road											
1	L	26	0.0	0.278	8.2	LOS A	0.0	0.0	0.00	1.06	49.0
2	T	514	0.0	0.278	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		540	0.0	0.278	0.4	NA	0.0	0.0	0.00	0.05	59.3
North: Goonyella Road											
8	T	1148	0.0	0.589	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	64	0.0	0.083	11.6	LOS B	0.3	2.1	0.53	0.80	45.4
Approach		1213	0.0	0.589	0.6	NA	0.3	2.1	0.03	0.04	59.0
All Vehicles		1753	0.0	0.589	0.5	NA	0.3	2.1	0.02	0.05	59.1

MOVEMENT SUMMARY

Site: 2025 PM Peak - Goonyella Road - Site Access

Goonyella Road - Site Access
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Goonyella Road											
1	L	59	0.0	0.538	8.2	LOS A	0.0	0.0	0.00	1.05	49.0
2	T	987	0.0	0.538	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		1046	0.0	0.538	0.5	NA	0.0	0.0	0.00	0.06	59.2
North: Goonyella Road											
8	T	609	0.0	0.313	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	32	0.0	0.109	20.2	LOS C	0.3	2.4	0.82	0.95	38.4
Approach		641	0.0	0.313	1.0	NA	0.3	2.4	0.04	0.05	58.4
All Vehicles		1687	0.0	0.538	0.7	NA	0.3	2.4	0.02	0.05	58.9

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

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

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.