

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 23/12/11

Traffic Impact Assessment

Carseldine Government Office Precinct

7 December 2011

Halcrow

halcrow

www.halcrow.com/australiasia

ABN: 45 061 920 849

© Halcrow Pacific Pty Ltd 2011

Email: brisbane@halcrow.com

Tel +61 (0)7 3169 2900

Brisbane, QLD 4000

Level 19, 215 Adelaide Street,

Brisbane

Email: sydney@halcrow.com

Tel +61 (0)2 9250 9900 Fax +61 (0)2 9241 2228

Sydney, NSW 2000

Level 22, 68 Pitt Street,

Sydney

Email: melbourne@halcrow.com

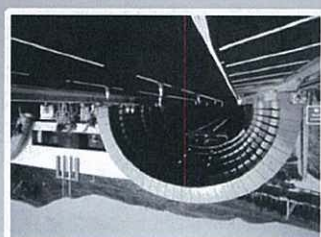
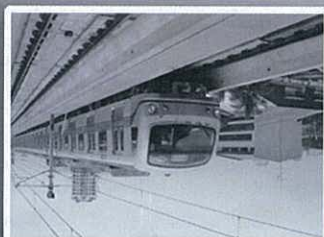
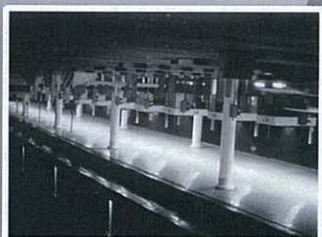
Tel +61 (0)3 8682 3900 Fax +61 (0)3 8682 3999

Melbourne, VIC 3000

Level 40, 385 Bourke Street,

Melbourne

Halcrow



Traffic Impact Assessment

Carseldine Government Office Precinct

Contents Amendment Record

This document has been issued and amended as follows:

Issue 1					
Rev	Description	Date	Prepared by	Checked by	Authorised by
A	Draft for internal comment	03/06/11	O'Reilly H	Hayward D	
B	Draft for internal review	06/06/11	O'Reilly H	Hayward D	Hulbert M
C	Draft for client review	06/06/11	O'Reilly H	Robertson T	Hulbert M
D	Draft for internal comment	06/07/11	Hayward D	Robertson T	
E	Draft for client review	05/08/11	O'Reilly H	Hayward D	Hulbert M
F	Draft for internal comment	12/08/11	O'Reilly H	Robertson T	
G	Draft final for internal comment	29/08/11	O'Reilly H	Robertson T	
H	Final for client issue	29/08/11	O'Reilly H	Robertson T	Hulbert M
I	Final for client issue	02/09/11	Robertson T	Robertson T	Hulbert M
J	Final for client issue	07/12/11	Hayward D	Hayward D	Hulbert M

Document Location

Y:\Consulting\Projects\JDBAAA - Carseldine GOP TIA\30 - Programme & Progress\32 - Reports\JDBAAA_r01_revJ_FINAL.doc

Halcrow

Melbourne

Level 40, 385 Bourke Street,
Melbourne, VIC 3000
Tel +61 (0)3 8682 3900 Fax +61 (0)3 8682 3999
Email: melbourne@halcrow.com

Sydney

Level 22, 68 Pitt Street,
Sydney, NSW 2000
Tel +61 (0)2 9250 9900 Fax +61 (0)2 9241 2228
Email: sydney@halcrow.com

Brisbane

Level 19, 215 Adelaide Street,
Brisbane, QLD 4000
Tel +61 (0)7 3169 2900 Fax +61 (0)7 3169 2999
Email: brisbane@halcrow.com

© Halcrow Pacific Pty Ltd 2011
ABN: 45 061 920 849

www.halcrow.com/australasia

Contents

1.	Introduction	1
	1.1 Background.....	1
	1.2 Existing Use.....	1
	1.3 Relevant Authorities.....	2
	1.4 Purpose of this Report.....	2
	1.5 Scope of the Assessment	2
2.	Site Proposal	4
	2.1 Site Description.....	4
	2.2 Site Plan	4
	2.3 Land Use	4
	2.4 Project Staging	4
	2.5 Proposed Car Parking Arrangements	4
	2.6 Proposed Service Vehicle Arrangements	5
	2.7 Proposed Vehicular Access Arrangements.....	5
	2.8 Proposed Surrounding Development.....	6
3.	Existing Transport Infrastructure	8
	3.1 The Road Network.....	8
	3.2 Road Planning	8
	3.3 Public Transport Facilities.....	9
	3.4 Active Transport Facilities.....	10
4.	Car Parking Arrangements	12
	4.1 Car Parking Requirements.....	12
	4.2 Adequacy of Proposed Car Parking Arrangements	13
5.	Existing Road Network Traffic Volumes.....	17
6.	Estimated Future Traffic Demands	18
	6.1 Site Generated Traffic.....	18
	6.2 Future Year Background Traffic.....	19
7.	Road Network Performance	26
	7.1 Performance Indicators.....	26
	7.2 Intersection Performance Analysis (2011)	27
8.	Vehicular Access Arrangements	37
	8.1 Access Driveway Requirements	37
	8.2 Adequacy of Proposed Access Driveway Arrangements.....	37
9.	Commercial Vehicle Servicing Arrangements	39
	9.1 Commercial Vehicle Servicing Requirements.....	39
	9.2 Adequacy of Proposed Commercial Vehicle Servicing Arrangements.....	39
10.	Active and Public Transport Arrangements.....	43
	10.1 Public Transport Arrangements	43
	10.2 Active Transport Arrangements	43
11.	TravelSmart Study.....	44
	11.1 Site Population.....	44
	11.2 Local Environment.....	45
	11.3 Public Transport Modes Servicing the Site	45
	11.4 Cycling and Walking	48

12.	Zillmere Contact Centre Survey	53
	11.5 Carpooling	50
	11.6 Traffic Congestion	51
	11.7 Vehicle Parking (car, motorbike, scooter)	51
	11.8 Flexible Work Arrangements	51
	11.9 TravelSmart Action Plan	52
13.	Conclusion	54
	12.1 Traffic Generation Survey Results	53

1. Introduction

1.1 Background

Halcrow Pacific Pty Ltd (Halcrow) was commissioned by the Department of Public Works (DPW) to undertake a Traffic Impact Assessment (TIA) for the proposed Carseldine Government Office Precinct (GOP). The proposed GOP is to be located on the previous campus of Queensland University of Technology (QUT) on Beams Road, Carseldine.

This report has been prepared to identify site generated traffic, traffic impacts to the existing road network and requirements for the internal servicing and car parking. It is understood that this report will be included with the overarching Material Change of Use (MCU) Application for the site.

1.2 Existing Use

The subject site, as shown in **Figure 1.1**, was previously used as the Carseldine campus for QUT. The university buildings on the site are currently vacant, while the childcare centre remains in operation.

Figure 1.1 Carseldine GOP Location



1.3 Relevant Authorities

This report has been prepared such that it is suitable for submission to the following assessment agencies:

- Brisbane City Council (BCC);
- Urban Land Development Authority (ULDA); and
- Department of Transport and Main Roads (DTMR).

It is expected that the outcomes of this report will assist these agencies in their transport assessment of the MCU Application for the Carseldine GOP.

1.4 Purpose of this Report

The purpose of this report is to identify site generated traffic and traffic impacts associated with the proposed Carseldine GOP, and the requirements of the internal layout for access, parking and servicing. Where impacts have been identified, appropriate mitigation strategies have been recommended. The assessment has been undertaken in accordance with the following reference resources:

- Traffic Impact Assessment (TIA): *Guidelines for Assessment of Road Impacts of Development (GARID)* (DTMR, 2006);
- Brisbane City Council *Transport, Access, Parking and Servicing Planning Scheme Policy (TAPSPS)* (BCC, 2000);
- Brisbane City Council *Transport, Access, Parking and Servicing Code (TAPS Code)* (BCC, 2000); and
- *Fitzgibbon Urban Development Area Development Scheme* (FUDA Development Scheme) (ULDA, 2009).

1.5 Scope of the Assessment

The analysis presented herein has considered the following components of the road network:

- Beams Road / Dorville Road intersection;
- Beams Road / Balcara Avenue intersection;
- Dorville Road / Denver Road intersection;
- Beams Road / Site Access intersection; and
- Dorville Road / Site Access intersection.

These components of the road network were selected on the basis of their proximity to the subject site and the expectation that site generated impacts would be greatest at these locations.

The study also assessed the adequacy of the site's vehicular access, car parking, commercial vehicle servicing, active transport, and public transport facilities in relation to the

proposed Carseldine GOP. It also provides traffic analysis of the potential benefits of the TravelSmart initiative, which DPW are planning to implement.

2. Site Proposal

2.1 Site Description

The subject site is located approximately 12 km north of the Brisbane CBD on the closed Carseldine campus of QUT, on the south-east corner of the Beams Road / Dorville Road intersection as depicted in **Figure 1.1**.

2.2 Site Plan

The proposed site plan for the Carseldine GOP is provided in **Appendix A**. The proposal has been developed by DPW and has been used as the basis of this assessment.

2.3 Land Use

The site is proposed to be used as an office park as a part of the Queensland Government's commitment of government office decentralisation to remove pressure from the Brisbane CBD. The proposed government office precinct will have a total gross floor area (GFA) of 18,122m² and will include a customer service counter, a call centre and ancillary uses, namely a cafe and gymnasium for exclusive use by staff (i.e. not open to the public).

The former QUT buildings were purpose built for use as a university. Consequently, the net lettable area (NLA) to GFA efficiency of the buildings is well below that expected of modern office buildings. This has the impact of overstating the GFA in terms of the space effectively usable for office space. Consequently, conventional traffic generation and parking rates which have been applied to the site's overall GFA have a degree of headroom in the planning.

The existing childcare centre, QUT research field station (Building G), lecture theatre and sports fields will remain in use.

2.4 Project Staging

The proposed Carseldine GOP is expected to be completed and operational prior to 2012.

2.5 Proposed Car Parking Arrangements

The subject site currently has provision for 560 line marked vehicle parking spaces which includes the following:

- 525 car parking spaces (42 of which are provided on the site's internal road);
 - 8 car parking spaces for the childcare centre;
 - 6 car parking spaces for the QUT research field station (Building G); and
 - 21 motorcycle parking spaces (15 of which are provided on the site's internal road).
- It should be highlighted that 3 car parking spaces are currently designated for persons with disabilities (PWD).

It is proposed that a further 40 visitor car parking spaces are provided for the customer call centre as part of the site which includes 30 spaces to the south of Building A and 10 spaces to the east of Building A.

In total, there are 586 parking spaces proposed for the Carseldine GOP which includes the above mentioned 525 existing car parking spaces, 21 existing motorcycle spaces and 40 proposed visitor spaces.

2.6 Proposed Service Vehicle Arrangements

Currently, each building within the site is provided with service vehicle parking areas. While the current provision of service bays on site is considered adequate, there is no official signage to dedicate these service bays.

2.7 Proposed Vehicular Access Arrangements

The site currently has four existing access locations as follows:

- Beams Road / Site Access – Existing priority controlled T intersection on Beams Road;
- Beams Road Set-Down – This is a set-down area with parking space for approximately 10 cars with a left-in / left-out only arrangement with Beams Road;
- Dorville Road Coach Access – This provides access to approximately 12 parking spaces via a one-way internal road and includes a Coach set-down area; and
- Dorville Road / Site Access – An existing priority controlled T intersection on Dorville Road. This access leads through the site to meet with the access on Beams Road.

The location of each of the existing accesses is shown in **Figure 2.1**.

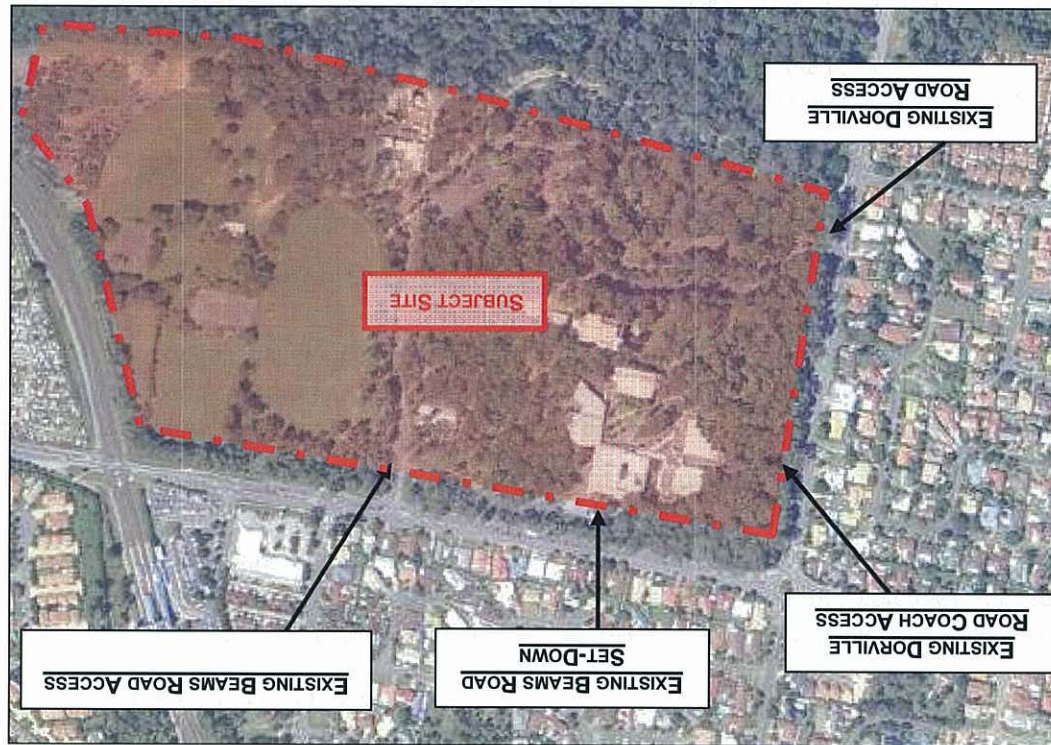


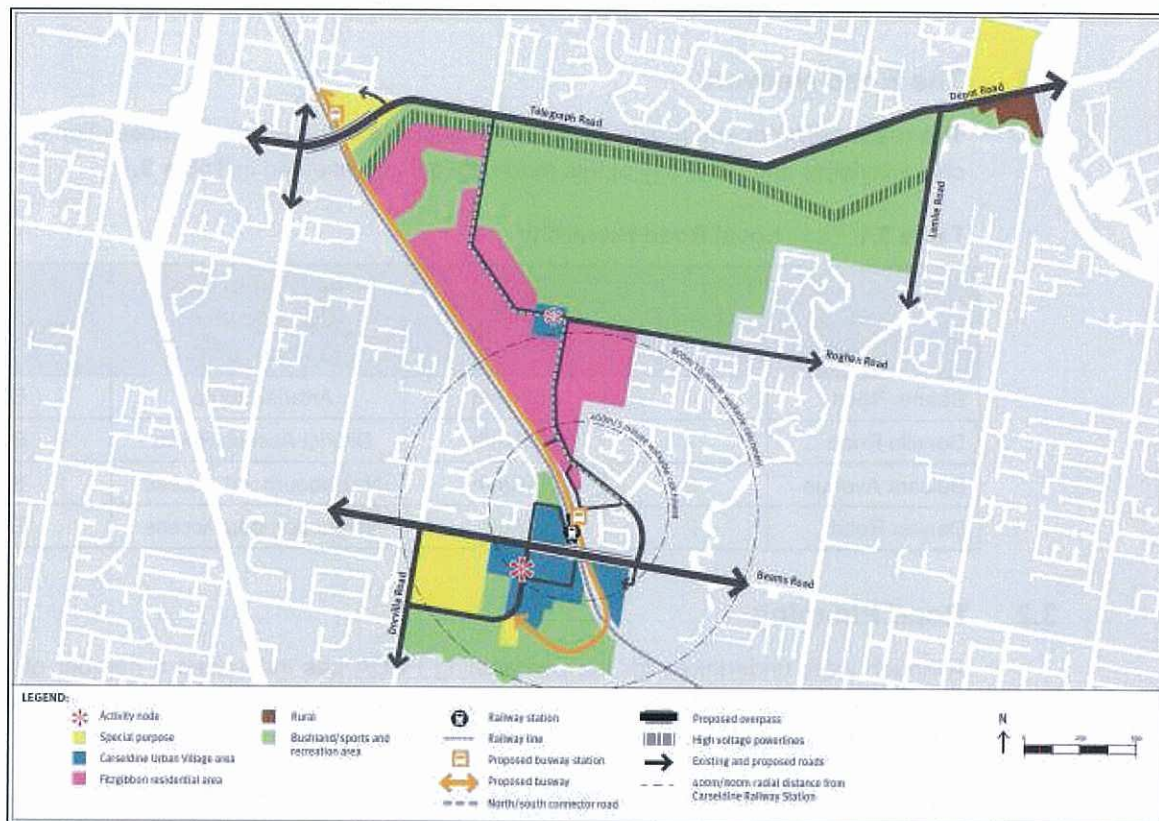
Figure 2.1 Vehicle Site Accesses

Vehicular access to the subject site is proposed to be provided by way of the three existing site access intersections along Beams Road and Dorville Road, while the set-down area on Beams Road will no longer be used.

2.8 Proposed Surrounding Development

The subject site is located immediately to the west of the proposed Carseldine Urban Village. This Urban Village forms part of the Fitzgibbon Urban Development Area (FUDA), which covers 295 hectares of land bounded by the Aspley State Schools to the south; Telegraph Road to the north; the Caboolture railway line and Dorville Road to the west; and the Gateway Motorway to the east. The FUDA, which was declared in July 2008, is positioned in close proximity to the Carseldine Railway Station and is intended to be transformed into a modern residential suburb developed on transit orientated principles. Details of the proposed FUDA structure plan are presented in **Figure 2.2**.

Figure 2.2 Fitzgibbon UDA Structure Plan



3. Existing Transport Infrastructure

3.1 The Road Network

The roads adjacent and proximate to the subject site come under the jurisdiction of BCC. The characteristics and hierarchy of this road network is presented in **Table 3.1**.

Table 3.1 Local Road Hierarchy

Road	Lanes	Posted Speed Limit	Road Hierarchical Classification (Source: BCC)	Jurisdiction
Beams Road	4	60km/h	Arterial Route	BCC
Dorville Road	2	60km/h	District Access Route	BCC
Balcara Avenue	2	50km/h	Neighbourhood Access	BCC
Denver Road	2	50km/h	Neighbourhood Access	BCC

3.2 Road Planning

Although work undertaken for the overarching FUDA has identified a number of proposed road network improvements, for the purposes of this study, it has been assumed that no network upgrades are proposed for the 2011 assessment year.

A map of the FUDA Structure Plan proposes that a busway will be provided through the subject site as shown in **Appendix B**. It should be highlighted that the alignment of this busway (should it proceed) may have an impact on the vehicular access and parking arrangements for the site in future years.

The Cardno Eppell Olsen traffic report¹ for the Carseldine Urban Village area (as identified in **Figure 2.2**), dated September 2010, proposed the following road upgrades for the intersections within the analysis area of the Carseldine GOP:

- Beams Road / Dorville Road – convert from a roundabout to a signalised intersection;
- Beams Road / Balcara Avenue – convert from a three-way (T) to a four-way signalised intersection including repositioning the existing Beams Road access road to realign with Balcara Avenue;
- Dorville Road / northern access – consolidation to one access crossover and restricted to left-in and left-out turning movements only; and
- Dorville Road / southern access – provision of a U-turn facility within the northern Dorville Road approach to accommodate Beams Road bound movements from the northern access.

The report does not provide any specific timeframes for the above road upgrades. However, it projects the Carseldine Urban Village to commence construction from 2012 and will continue through to 2024. The traffic analysis scenarios within the report are for the years of 2020 and 2026.

¹ Cardno Eppell Olsen, *Carseldine Urban Village*, for Urban Land Development Authority (September 2010)

As such, the traffic impact analysis within this study identifies measures to upgrade the existing road network (where appropriate) to ensure the Carseldine GOP operates satisfactorily through to 2021.

3.3 Public Transport Facilities

The subject site is located approximately 200 metres to the west of the Carseldine Railway Station. This station is located on the Caboolture Line which forms a strategic component of Queensland Rail's network and TransLink Transit Authorities public transport operations.

Proximate to the subject site, Brisbane Transport provides several bus routes that service the area, including routes 335 and 339 which depart from Taigum shopping centre to the east, and routes 340, 341 and 344 which depart from Beams Road along the subject site frontage.

The locations of the bus and train stops in relation to the Carseldine GOP site are presented in **Figure 3.1**. The walk distances presented in **Figure 3.1** are measured from the closest pedestrian access / egress point to the site and from the main entrance to the site at Building A. Key points to note are:

- Each of the bus stops are located within 450m walking distance to the main entrance to Building A;
- The Carseldine Railway Station is located approximately 200m from the site and within about 500m walking distance to the main entrance of Building A; and
- Employee parking spaces, within the site, are located within about 400m walking distance to the main entrance of Building A.

Given the above points, the site is considered to be well serviced area, as the Department of Local Government and Planning's Transit Orientated Development principles state that 800m is an acceptable walking distance.

The frequencies of each public transport service within the vicinity (ie. a 200m buffer) of the Carseldine GOP site are presented in **Table 3.2**, and as such the site is considered to be well serviced by public transport.



Table 3.2 Carseldine GOP Site – Public Transport Service Frequencies

Service Provider	Mode	Route	Major Destinations	Peak Hour Services	Off Peak Services
Brisbane Transport	Bus	335 / 339	Taigum Chermiside Brisbane CBD	4 per hour	2 per hour
Brisbane Transport	Bus	340 / 341 / 344	Chermiside Brisbane CBD	8 per hour	3 per hour
Queensland Rail	Train	Ipswich - Caboolture	Caboolture Brisbane CBD Ipswich	7 per hour	4 per hour
Total				19 per hour	9 per hour

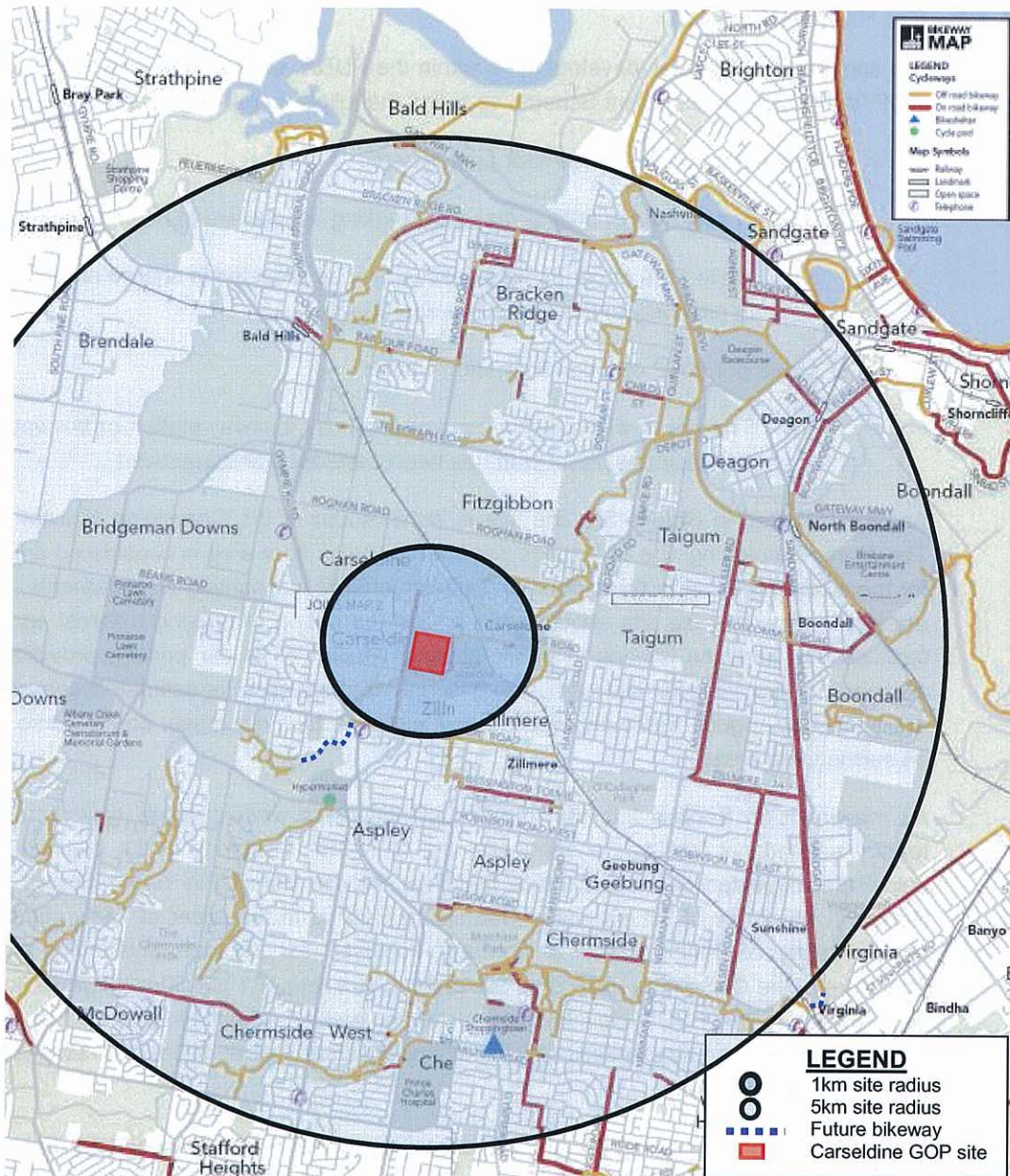
3.4 Active Transport Facilities

There are existing cycle routes along the Cabbage Tree Creek through Carseldine, Sandgate Road, and a connection between the Carseldine precinct and the subject site. Shared cycle / pedestrian paths are currently provided on both Beams Road and Dorville Road, however these paths are not wide enough to meet requirements from AUSTRROADS Guide to Road Design Part 6a: Pedestrian and Cyclist Paths.

The BCC bikeway map for the area surrounding the proposed Carseldine GOP is presented in Figure 3.2. As presented in Figure 3.2, the Carseldine GOP site is well serviced by on

and off road bikeways for areas within a 2km radius and is well connected to the area northeast of the site (e.g. Sandgate).

Figure 3.2 BCC Bikeway Map – Carseldine GOP Site



4. Car Parking Arrangements

4.1 Car Parking Requirements

4.1.1 Car Parking Provision

For commercial and retail developments within the FUDA, such as the proposed Carseldine GOP, the FUDA Development Scheme specifies the following parking supply requirements:

- 1 space per 30m² of gross floor area, where:
 - A minimum of 50% of these car parking spaces are to be provided on site.
 - Up to 50% of car parking spaces may be provided in shared or other facilities in proximity to the site where appropriate.
- 1 space per 50m² of gross floor area, where:

- The site is within 400 metres of a railway, busway station or busway stop or an employee travel plan has been developed and approved.

As demonstrated in **Figure 3.1**, the site is within 400m of the Carseldine Railway Station. Therefore, the parking rate of 1 space per 50m² of gross floor area is considered appropriate for this site. In relation to the proposed Carseldine GOP car parking arrangements, Halcrow are of the view that the site should not exercise the option of utilising external car parking facilities (eg. kerbside parking in public streets) as part of its car parking provision. This approach of providing on-site car parking supply that satisfies its estimated demands is in accordance with good traffic engineering practice as it does not create any adverse impacts on surrounding areas.

As mentioned in Section 2.3, the former QUT buildings were purpose built for use as a tertiary educational facility. Consequently, the NLA/GFA efficiency of the buildings is well below that expected of modern office buildings. Advice from DPW has indicated that the NLA/GFA efficiency of the proposed Carseldine GOP is in the order of 74%, compared to approximately 85%-90% which is normally achieved for purpose built office buildings. Therefore, if the Carseldine GOP provides parking at a rate of 1 per 50m² of gross floor area as required by the FUDA Development Scheme, parking would be provided at a supply greater than required by standard office buildings which are within 400m of a railway, busway station or busway stop.

The parking spaces required for the site according to the FUDA Development Scheme are presented in **Table 4.1**.

Table 4.1 Proposed Site Fitzgibbon UDA Car Parking Provision Requirement

Land Use Type	Car Parking Rate	Land Use GFA	Car Parking Requirement
Office Site within 400m of a railway station	1 space per 50m ² GFA	18,122m ²	363 parking spaces

Brisbane City Council (BCC) specifies that one car park for every 100 parking spaces provided should be reserved for PWD and 2% of car parking spaces can be allocated for motorcycles.

4.1.2 Car Parking Layout

The FUDA Development Scheme does not specify its own car parking layout design requirements. Alternatively, BCC's *Transport, Access, Parking and Servicing Planning Scheme Policy (TAPSPSP)* has been adopted for assessing the adequacy of the Carseldine GOP proposal which specifies the following car parking layout requirements:

- Employee / Commuter parking space widths: 2.4m
- Minimum width of dedicated PWD parking space: 2.4m
- Minimum shared area width for PWD parking space: 2.4m
- Parking space lengths: 5.4m
- Parking spaces/aisles next to walls/obstructions: 0.3m wider than standard
- Parking aisle width: 6.2m
- Two-way circulation aisle width: 5.5m
- One-way circulation aisle width: 3m
- Maximum car parking space gradient: 1:20
- Maximum ramp gradient: 1:6
- Minimum 2m ramp transition for grade changes >8%: 1:8
- Terminated aisle design: 2m aisle extension or, 8m effective aisle width
- Maximum gradient for parking spaces, circulation and parking aisles in employee carparking areas gradient: 1:10

4.2 Adequacy of Proposed Car Parking Arrangements

4.2.1 Proposed Car Parking Provision Adequacy

The proposed provision of 586 parking spaces available to the Carseldine GOP are made up of the following:

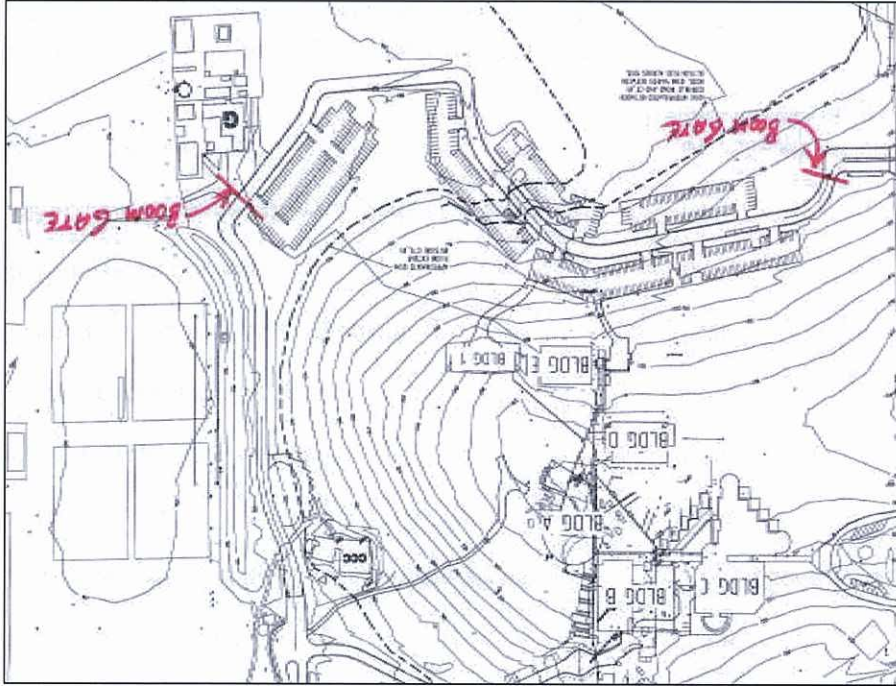
- 525 existing car parking spaces (42 of which are provided on the site's internal road);
- 21 existing motorcycle parking spaces (15 of which are provided on the site's internal road) (i.e. 5% of total parking spaces);
- 30 new visitor parking spaces to the south of Building A; and
- 10 new visitor parking spaces east of Building A.

Of these 586 parking spaces, 40 are visitor parking spaces, resulting in a provision of 546 parking spaces available to employees (ie. 525 car and 21 motorcycle spaces). It is acknowledged that while there are 21 motorcycle parking spaces provided, only 2% of the total employee parking allocation (ie. 10 spaces) of these spaces can be included in the total employee car parking spaces provided. This equates to a total parking provision for employees of 535 spaces.

To distinguish the visitor parking from the staff parking, it is proposed to install boom gates for staff access only as shown in **Figure 4.1**.

It is proposed to provide 20 service counters within the customer service centre in Building B. The provision of 40 visitor parking spaces is expected to adequately address the expected demand for parking for the centre.

Figure 4.1 Proposed Boom Gates to Segregate Car Parking Areas



The provision of 535 staff parking spaces for an office site is well above the requirements of the FUDA Development Scheme of 363 parking spaces (nb. where the site is within 400m of a railway station).

As an adjunct to this study, Halcrow has also undertaken a desktop Travelsmart assessment of the Carseldine GOP. The Travelsmart assessment, which is presented in **Section 11**, indicates that the Carseldine GOP will be able to operate with 535 car parking spaces for employees in a manner that does not impede on the amenity of the surrounding road network.

In relation to car parking provision for Persons With Disabilities (PWD), BCC specifies that one car park for every 100 parking spaces provided should be reserved for PWD. This equates to a need for six PWD parking spaces for the site. The proposed PWD provision of nine (9) spaces is greater than the recommended requirement, as follows:

- Three existing spaces adjacent to Building B;

- Three proposed spaces adjacent to Building E; and
- Three proposed spaces adjacent to Building A with the visitor parking spaces.

The provision of 535 employee car-parking spaces against a total site GFA of 18,112m² yields an equivalency rate of 1 per 34m² GFA. When considering the NLA/GFA deficiency (approx. 11% reduction as inferred in Section 4.1.1) from purpose built office buildings, the equivalency rate reduces to 1 per 31m² GFA. This rate far exceeds the rate of 1 per 50m² GFA as required by the FUDA development scheme, and is almost in accordance with parking rates for sites not located in areas of excellent public transport connections.

With regards to managing the car parking demands of the existing sports fields and lecture theatre on the site, these land uses will operate outside of business hours and will therefore use the parking spaces provided for the Carseldine GOP without impacting on employees and visitors to the offices.

4.2.2 Proposed Car Parking Layout Adequacy

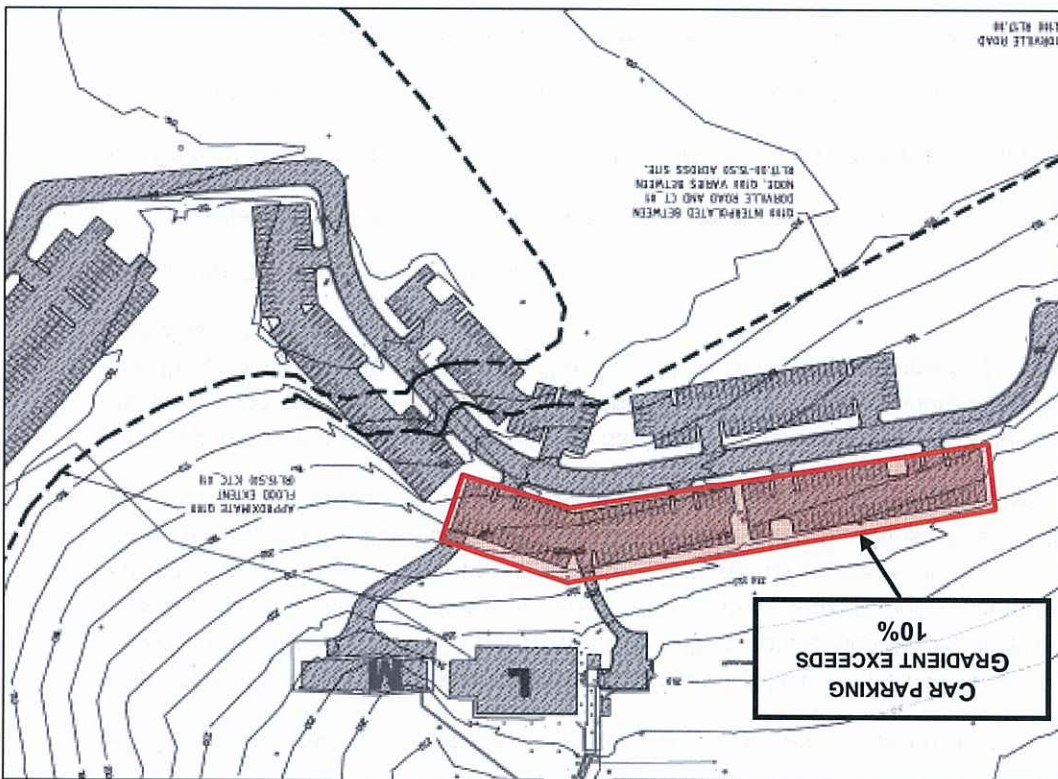
The proposed car parking layout incorporates the following dimensions:

- Parking spaces measure 2.4m wide x 5.4m long – *BCC requirements are satisfied*
- Minimum parking aisle width of 6.2m – *BCC requirements are satisfied*
- Minimum two-way circulation aisle width of 5.5m – *BCC requirements are satisfied*
- Effective terminated parking aisle widths of 8m – *BCC requirements are satisfied*
- Maximum gradient of parking aisle and spaces – *BCC requirements NOT satisfied*

The proposed car park layout for the Carseldine GOP is generally in accordance with BCC requirements with the exception of the gradient of the north-western section of the car parking area.

Upon review of the information available to Halcrow, it appears that the car parking area highlighted in **Figure 4.2** exceeds the BCC specified maximum gradient of 10%. It is therefore recommended that a detailed review of the as-constructed nature of these parking areas be undertaken. Upon completion of this review, should the parking area be found to be exceeding the maximum gradient of 10%, it is recommended that the car parking area be re-designed and re-constructed such that gradients are within BCC requirements.

Figure 4.2 Existing Car Parking Area Steep Gradients



5. Existing Road Network Traffic Volumes

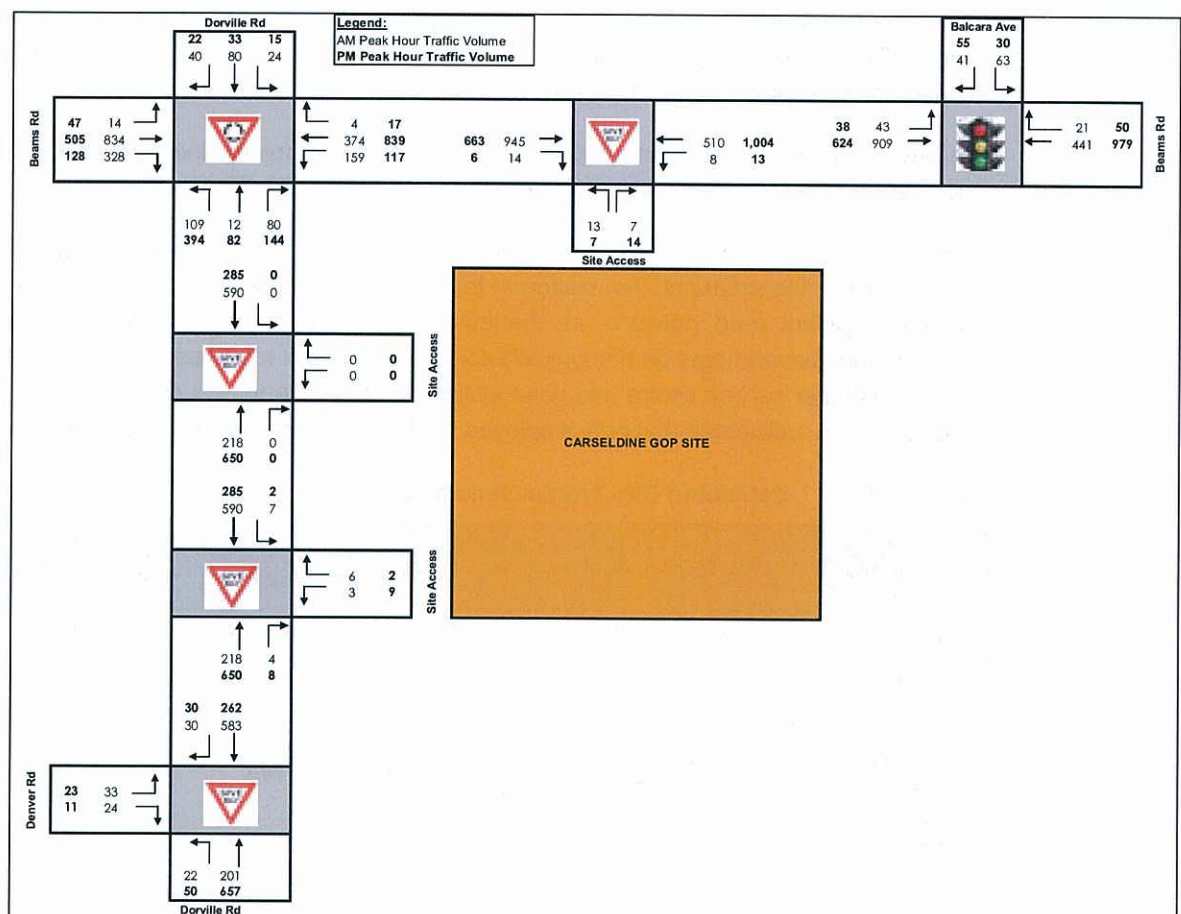
Traffic surveys were undertaken at the following intersections:

- Beams Road / Dorville Road intersection;
- Beams Road / Balcara Avenue intersection; and
- Dorville Road / Denver Road intersection;

These surveys were undertaken by AusTraffic Traffic Surveys (ATS) on Thursday 13th May 2010 (6:00AM – 9:00AM and 4:00PM – 7:00PM) after being commissioned by Cardno Eppell Olsen as a part of their assessment of Precincts 1, 2 and 3 of the FUDA for the ULDA.

The observed peak hours for the intersections were identified to be generally consistent across the intersections surveyed. The identified peak hours were 7:30AM to 8:30AM and 4:45pm to 5:45pm. The traffic count data is presented in Figure 5.1.

Figure 5.1 Existing (2010) Carseldine GOP Road Network Peak Hour Traffic Volumes



6. Estimated Future Traffic Demands

6.1 Site Generated Traffic

6.1.1 Estimated Site Traffic Generation

While the ULDA have specified a trip generation rate for commercial components of 2.88 vehicle trip ends (vte) per 100m² GFA, Halcrow believe this to be unreasonably high in comparison to accepted standard traffic generation rates for office developments in the NSW Roads and Traffic Authority's (RTA) *Guide to Traffic Generating Developments* and DTMR's *Road Planning and Design Manual*. These sources both cite traffic generation for commercial developments to be 2 vte per 100m² GFA as shown in **Table 6.1**. It is considered that this rate is more applicable to an office development, which would generate less traffic than other commercial uses.

As a further measure of estimating appropriate traffic generation for the site, Halcrow surveyed the traffic generation of the Zillmere Contact Centre as provided in **Section 12.1**. The survey results found that the Zillmere Contact Centre had an approximate peak hour traffic generation rate of 1-1.5vte per 100m² GFA. As the use for the Zillmere Contact Centre is similar to that proposed for the Carseldine GOP, the results of the survey demonstrate that the ULDA specified traffic generation rate of 2.88 vehicle trip ends (vte) per 100m² GFA would not be appropriate for this assessment.

In view of the above traffic generation rates, Halcrow have applied the traditional office traffic generation rate of 2 vte per 100m² GFA to the Carseldine GOP TIA.

It should also be noted that while the customer service centre is expected to generate trips at a higher rate, it is estimated that customer trips will not be generated during the peak periods on the adjacent road network, as the business hours of customer service centres for Government Departments do not typically coincide with peak road operations. Thus, the GFA of the customer service centre has been included in the GFA for the office component of the project as it is anticipated that only employee related trips will be generated at this time.

Table 6.1 Estimated Site Traffic Generation

Land Use	Trip Generation Rate	Source	Land Use Scale	Trips Generated
Office	2vte / 100m ² GFA	RTA	18,122m ² GFA	362vph
Childcare Centre	0.8vte / child	RTA	70 children	56vph
QUT Research Facility	5 trips based on existing staff movements	QUT Research Facility	N/A	5vph
Total				423vph

As presented in **Table 6.1**, the site is expected to generate in the order of 423 vehicle trip ends (vte) during both the AM and PM peak periods. The vehicle trips associated with the office and the customer service centre will be additional trips on the road network, while the trips generated by the childcare centre and the QUT Research facility are existing trips.

The existing sports fields and lecture theatre within the site will continue to generate trips, however these will be outside the opening hours of the GOP and the peak hours of the adjacent road network.

The café and gymnasium on site are for staff use and are considered to be ancillary to the office precinct. Therefore, additional trips associated with these uses are not expected to be generated on the external road network. These areas are included in the office GFA and the staff are therefore included in the trips generated by the office use.

6.1.2 Estimated Site Traffic Distribution

Distribution of traffic generated by the site was based on the following assumptions:

- 50% of employees would access the site via the Beams Road / Site Access intersection;
- 50% of employees would access the site via the Dorville Road / Site Access intersection; and
- An 80%:20% inbound:outbound split has been applied to the trip generation for the morning peak with the inverse applied during the evening peak.

The distribution of trips was based on most appropriate routes that employees would use to travel to and from the North, South, East and West of the site. These routes were determined based on a review of the greater road network surrounding the site. This distributions included the following assumptions for the majority of trips to and from the site:

- Employees travelling from the south and west that would be using Gympie Road would access the site via Dorville Road;
- Employees travelling from the North and North-west along Gympie Road would access the site via the Beams Road / Dorville Road roundabout and enter the site via Dorville Road access or the Beams Road access;
- Employees travelling from the North and the South along the Gateway Motorway would access the site via Beams Road from the east and use the Beams Road access; and
- A small percentage of trips were assumed to take more local routes to and from the site using Dorville Road and Balcara Avenue.

The estimated traffic distribution and generation movements for the site are presented in **Figure 6.1** and **Figure 6.2** respectively.

6.2 Future Year Background Traffic

6.2.1 Base Year Traffic Demands (2011) – Without Carseldine GOP

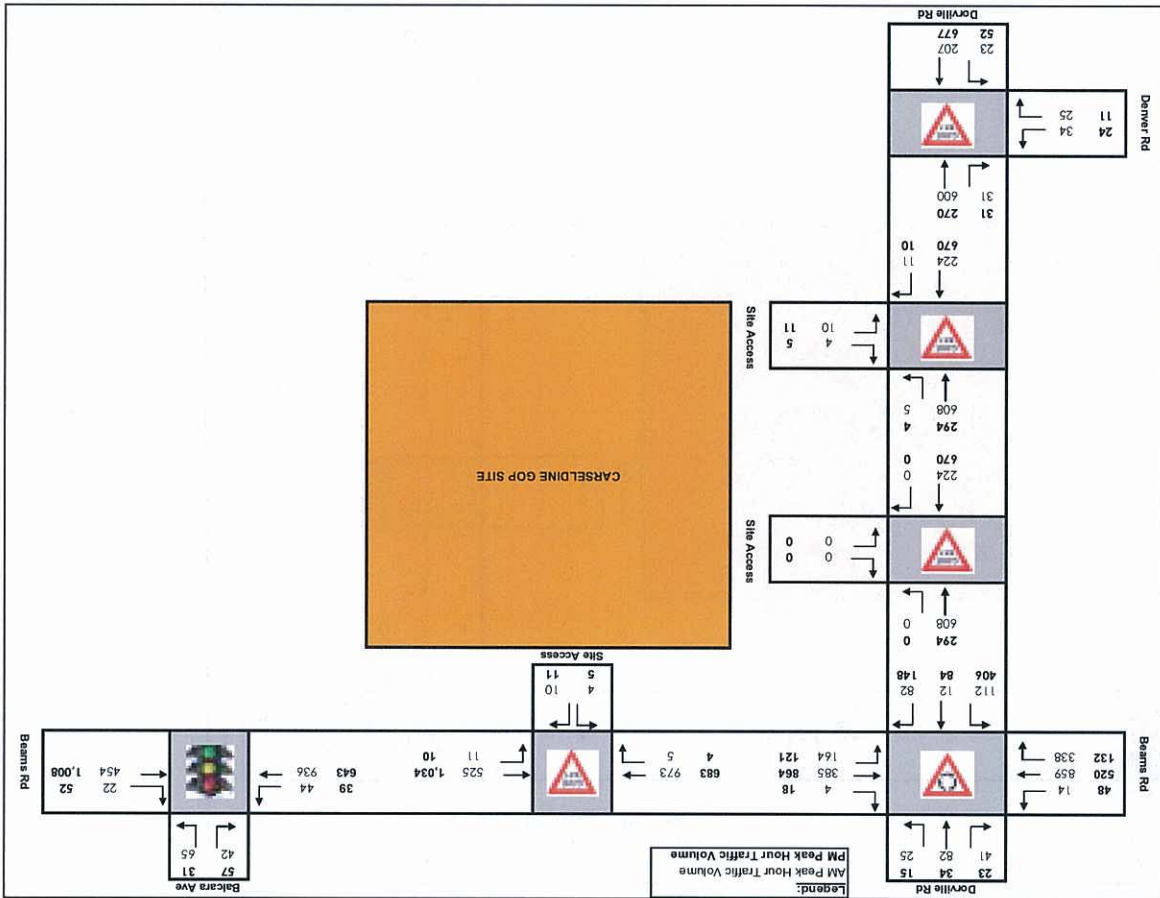
In order to determine the traffic impacts of the site on the surrounding road network in 2011, an annual growth rate of 3% has been applied to all traffic volumes for a period of one year. The estimated 2011 base case traffic volumes are presented in **Figure 6.3**.

Legend:
 AM Peak Hour Traffic Volume
 PM Peak Hour Traffic Volume

Approaches and Traffic Volumes:

- Doreville Rd (Northbound):**
 - Left: 0 (AM), 0 (PM)
 - Through: 16 (AM), 41 (PM)
 - Right: 16 (AM), 41 (PM)
- Doreville Rd (Southbound):**
 - Left: 10 (AM), 41 (PM)
 - Through: 1 (AM), 3 (PM)
 - Right: 0 (AM), 0 (PM)
- Stalcara Ave (Eastbound):**
 - Left: 0 (AM), 0 (PM)
 - Through: 101 (AM), 25 (PM)
 - Right: 93 (AM), 23 (PM)
- Stalcara Ave (Westbound):**
 - Left: 0 (AM), 0 (PM)
 - Through: 93 (AM), 23 (PM)
 - Right: 0 (AM), 0 (PM)
- Site Access (North):**
 - Left: 11 (AM), 43 (PM)
 - Through: 25 (AM), 99 (PM)
 - Right: 0 (AM), 0 (PM)
- Site Access (South):**
 - Left: 0 (AM), 0 (PM)
 - Through: 0 (AM), 0 (PM)
 - Right: 0 (AM), 0 (PM)
- Doreville Rd (Southbound - Bottom):**
 - Left: 0 (AM), 0 (PM)
 - Through: 0 (AM), 0 (PM)
 - Right: 0 (AM), 0 (PM)

Figure 6.3 Estimated Base Year (2011) Base Case Peak Hour Traffic Volumes



[illegible]

JDBAAA_r01_revJ_FINAL.doc 24

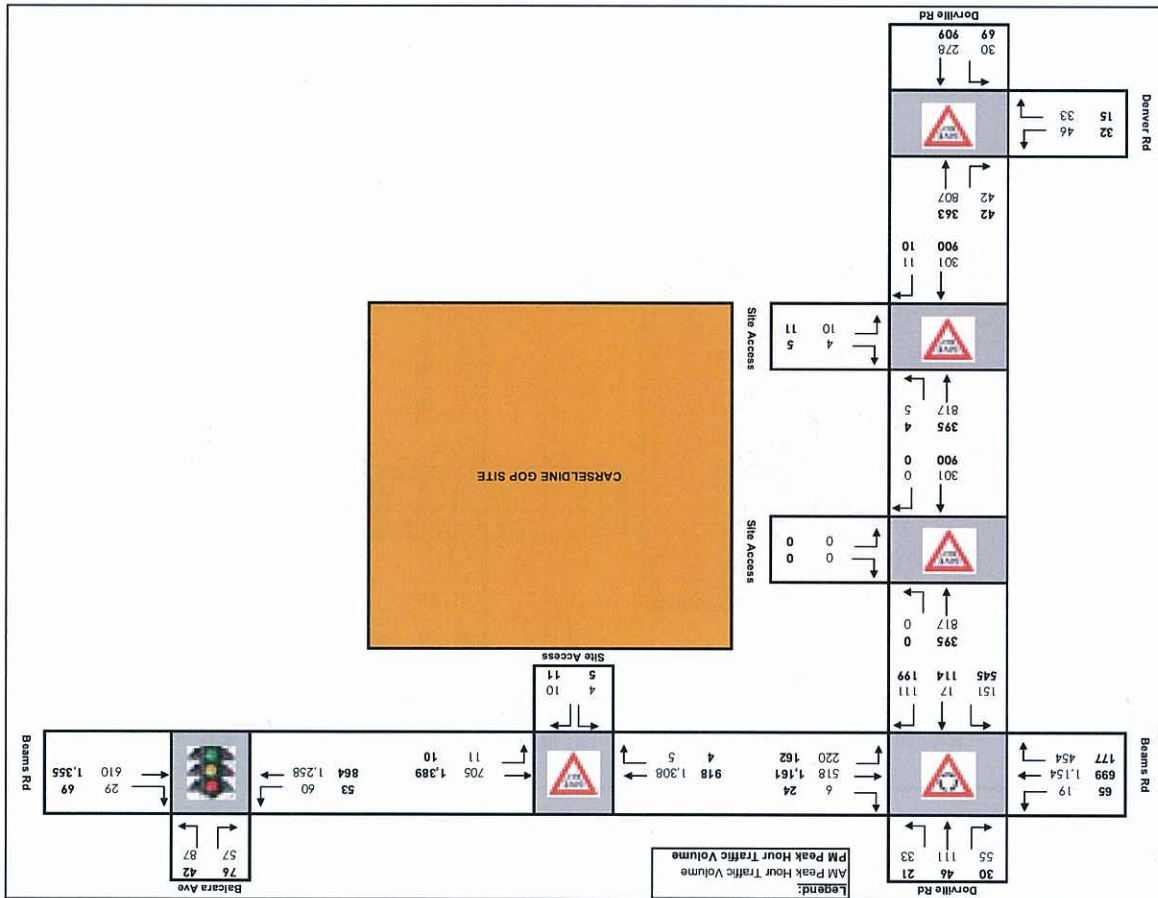
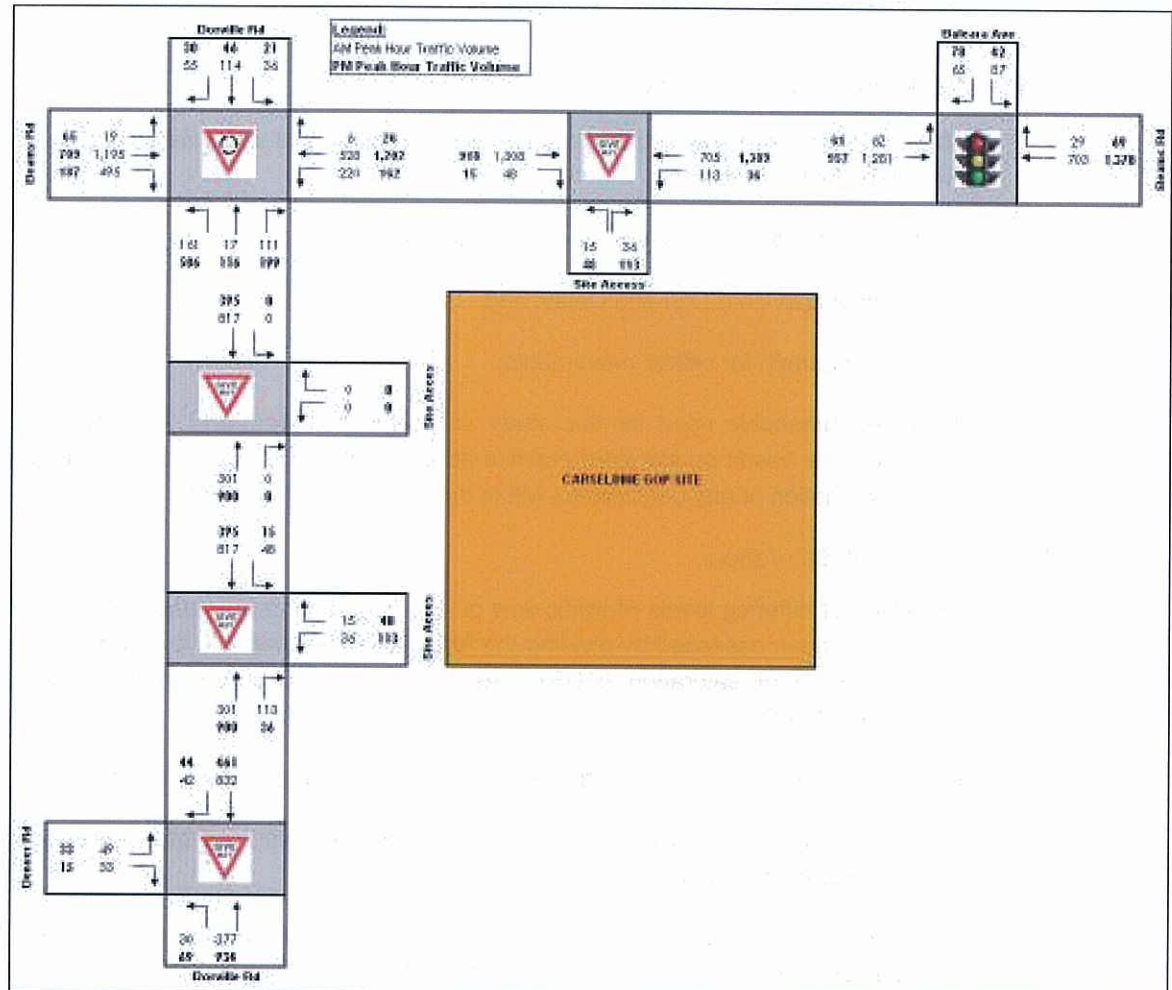


Figure 6.6 Estimated Future Year (2021) Project Case Peak Hour Traffic Volumes



7. Road Network Performance

7.1 Performance Indicators

Three primary measures of performance are generally used when assessing the operations of intersections. These are:

- Degree of Saturation (DOS) and practical capacity;
- Level of Service (LOS) and Delay; and
- Queue Length for critical movements.

Allowable thresholds used for this study are defined in **Sections 7.1.1 to 7.1.3**. These thresholds are based on standard practice adopted within Queensland and form the basis of the determination of any deficiencies within the existing road network.

7.1.1 Degree of Saturation

The effect of differing levels of traffic flow on the operating performance of intersections has traditionally been assessed by dividing the intersection volume with its capacity – referred to as the degree of saturation (DOS). As traffic volumes approach the capacity of the intersection, the DOS approaches the theoretical capacity of 1.

The practical DOS is a threshold that is set below the theoretical capacity so that:

- A safety margin is allowed for, so that fluctuation in traffic can be accommodated for in intersection design; and
- To avoid the unstable conditions that occurs near the theoretical capacity. As the DOS exceeds the practical capacity and nears the theoretical capacity, rapid increases in delay, queue length and number of stops are usually observed.

The practical DOS thresholds that have been adopted for in this study are presented in **Table 7.1**. These thresholds are published within the Department of Transport and Main Roads (DTMR) "Guidelines for Assessment of Road Impacts of Development".

Table 7.1 Practical Degree of Saturation at Intersections

Intersection Type	Practical DOS (Xp)
Priority (give-way) Controlled	0.80
Roundabout	0.85
Signalised Intersection	0.90

7.1.2 Level of Service and Delay

Levels of service (LOS) and delay definitions are shown in **Table 7.2**. These values are industry accepted thresholds published by the New South Wales (NSW) Roads and Traffic Authority (RTA).

Table 7.2 Level of Service (NSW RTA) – All Intersection Types

Level of Service	Control Delay per vehicle in seconds (includes geometric delay)	Comments
A	$d \leq 14.5$	Good operation
B	$14.5 < d \leq 28.5$	Good with acceptable delays and spare capacity
C	$28.5 < d \leq 42.5$	Satisfactory
D	$42.5 < d \leq 55$	Nearing capacity
E	$55 < d \leq 70.5$	At capacity, requires upgrade or other control mode
F	$70.5 < d$	

Source: Adapted from the RTA Guide to Traffic Generating Developments (RTA, 2002)

7.1.3 Queue Lengths

The SIDRA queue lengths reported herein are 95th percentile queues. This means that 95% of the time, queue lengths will not exceed the specified queue length.

Queue lengths are deemed acceptable if queuing is contained within given storage areas. Where queuing exceeds the short lane capacity, queue lengths can also be deemed acceptable provided that queues do not impact upon major adjacent conflict points (e.g. an adjacent through lane).

7.2 Intersection Performance Analysis (2011)

Analysis results for 2011 and 2021 obtained using SIDRA Intersection V5.0 are provided below for 'with' and 'without' site development scenarios. The SIDRA movement summaries for all scenarios are provided in **Appendix C**.

7.2.1 Beams Road / Dorville Road Intersection

The intersection layout used for the SIDRA analysis for the Beams Road / Dorville Road roundabout intersection is shown in **Figure 7.1**. Analysis results are provided in **Table 7.3**.

Figure 7.1 Beams Rd / Dorville Rd – Existing Intersection Layout

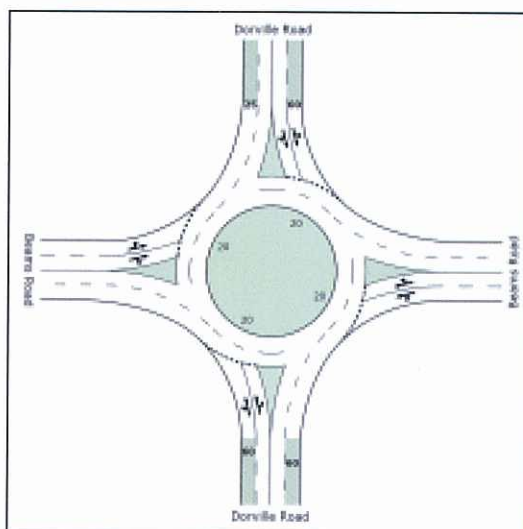


Table 7.3 Beams Rd / Dorville Rd Intersection – Existing Intersection Layout

Scenario	AM Peak			PM Peak				
	DOS	Ave. delay (sec)	LOS	Queue Length (m)	DOS	Ave. delay (sec)	LOS	Queue Length (m)
2011 No Carseldine GOP	0.46	8.2	A	28.4 ^a	0.48	8.3	A	23.9 ^b
2011 With Carseldine GOP	0.50	8.4	A	31.6 ^a	0.54	8.5	A	29.1 ^b
2021 No Carseldine GOP	0.64	9.3	A	51.2 ^a	0.80	10.3	B	61.5 ^b
2021 With Carseldine GOP	0.68	9.6	A	56.7 ^a	0.89	11.6	B	86.4 ^b

^a Longest queue on Beams Road West Approach
^b Longest queue on Dorville Road South Approach

The analysis results provided in **Table 7.3** indicate that intersection of Beams Road / Dorville Road is currently experiencing acceptable levels of service and this is expected to continue into the future year. The DOS is below the acceptable practical capacity of 0.85 for roundabouts for the base year, with and without the site, and for the future year without the site. A minimum LOS B is provided across the intersection during both the AM and PM peak periods in the base and future years. 95th percentile queues are not expected to impact upon adjacent intersections.

However, it is estimated that with the addition of the traffic generated by the site, the roundabout in its current configuration will exhibit operations above acceptable performance levels by 2021 with a maximum DOS of 0.89 (exceeding maximum allowable practical capacity of 0.85 for roundabouts) for the southern Dorville Road approach.

In order to ensure the roundabout configuration operates at acceptable performance levels in 2021, Halcrow recommends that the southern approach of the roundabout is altered to accommodate left turns from the two approach lanes (i.e. one short left turn lane plus a shared all movements lane). The proposed alteration is shown in **Figure 7.2** and analysis results are summarised in **Table 7.4**.

Figure 7.2 Beams Rd / Dorville Rd – Upgraded Intersection Layout

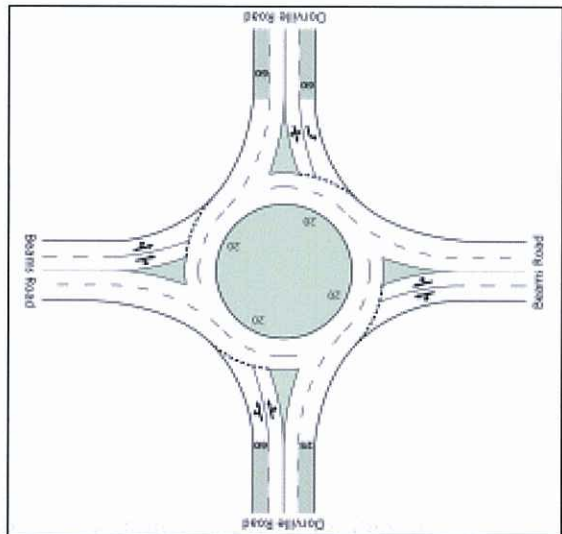


Table 7.4 Beams Rd / Dorville Rd Intersection – Upgraded Intersection Layout

Scenario	AM Peak				PM Peak			
	DOS	Ave. delay (sec)	LOS	Queue Length (m)	DOS	Ave. delay (sec)	LOS	Queue Length (m)
2021 With Carseldine GOP	0.68	9.6	A	56.7 ^a	0.76	10.7	B	55.1 ^b

^a Longest queue on Beams Road West Approach

^b Longest queue on Dorville Road South Approach

SIDRA analysis of the intersection under this alternate configuration indicates that the intersection will operate satisfactorily through to 2021 with a maximum DOS of approximately 0.76 for the southern approach on Dorville Road as shown in **Table 7.4**.

7.2.2 Beams Road / Balcara Avenue Intersection

The intersection layout used for the SIDRA analysis for the Beams Road / Balcara Avenue signalised intersection is shown in **Figure 7.3**. Analysis results are provided in **Table 7.5**.

Figure 7.3 Beams Rd / Balcara Ave – Existing Intersection Layout

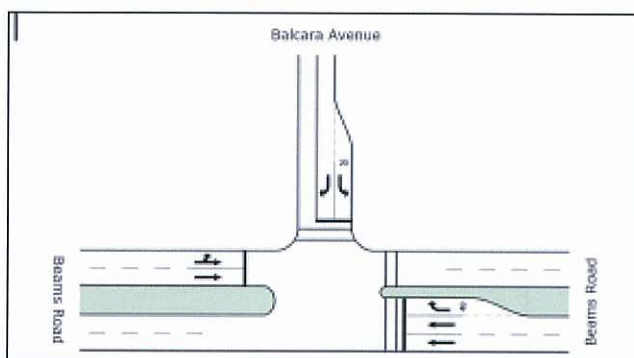


Table 7.5 Beams Rd / Balcara Ave Intersection - Existing Intersection Layout

Scenario	AM Peak				PM Peak			
	DOS	Ave. delay (sec)	LOS	Queue Length (m)	DOS	Ave. delay (sec)	LOS	Queue Length (m)
2011 No Carseldine GOP	0.55	19.1	B	156.2 ^a	0.38	13.1	B	94.1 ^b
2011 With Carseldine GOP	0.55	18.4	B	158.7 ^a	0.39	13.2	B	102.4 ^a
2021 No Carseldine GOP	0.74	21.8	C	234.5 ^a	0.51	14.1	B	136.2 ^b
2021 With Carseldine GOP	0.74	21.1	C	237.4 ^a	0.52	14.4	B	140.2 ^a

^a Longest queue on Beams Road West Approach

^b Longest queue on Beams Road East Approach

The analysis results provided in **Table 7.5** indicate that intersection of Beams Road / Balcara Avenue is currently experiencing acceptable levels of service and this is expected to continue into the future year. The DOS is well below the acceptable practical capacity of 0.9 for

signalised intersections and a minimum LOS C is provided across the intersection during both the AM and PM peak periods in the base and future years. 95th percentile queues are relatively long and are expected to extend beyond the existing access to the site on Beams Road to the West of the intersection. However, this is not expected to be a long term issue due to the proposed realignment of the site access with the Beams Road / Balcara Avenue signalised intersection as discussed in **Section 7.2.4**. There is negligible difference between the without and with site development scenario results.

7.2.3 Dorville Road / Denver Road Intersection

The intersection layout used for the SIDRA analysis for the Dorville Road / Denver Road priority controlled intersection is shown in **Figure 7.4**. Analysis results are provided in **Table 7.6**.

Figure 7.4 Dorville Rd / Denver Rd – Existing Intersection Layout

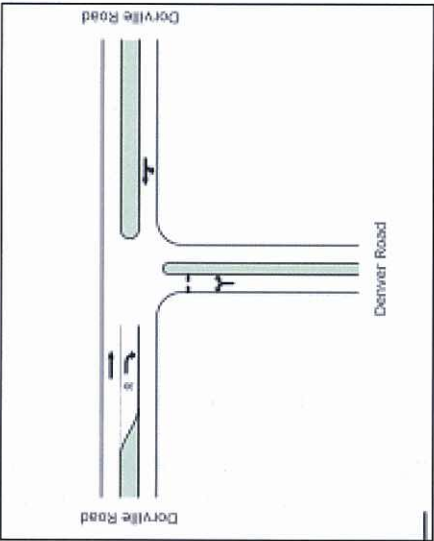


Table 7.6 Dorville Rd / Denver Rd Intersection – SIDRA Results

Scenario	AM Peak						PM Peak	
	DOS	Ave. delay (sec)	LOS*	Queue Length (m)	DOS	Ave. delay (sec)	LOS*	Queue Length (m)
2011 No Carseldine	0.32	1.3	B	2.3 ^a	0.40	1.4	C	2.9 ^a
2011 With Carseldine	0.34	1.3	B	2.8 ^a	0.41	1.3	C	3.0 ^a
2021 No Carseldine	0.44	1.4	B	3.5 ^a	0.53	1.9	D	7.3 ^a
2021 With Carseldine	0.50	1.4	B	4.2 ^a	0.55	1.9	D	8.1 ^a

*LOS based on worst movement for the intersection
^a Longest queue on Denver Road West Approach

The analysis results provided in **Table 7.6** indicate that intersection of Dorville Road / Denver Road is currently experiencing acceptable levels of service and this is expected to continue into the future year. The DOS is well below the acceptable practical capacity of 0.80 for priority controlled intersections for the base year and future year, with and without the site. A

minimum LOS D is provided across the intersection during both the AM and PM peak periods in the base and future years. 95th percentile queues are short and are not expected to impact upon adjacent intersections. The addition of the site will not result in the need for upgrade works at this intersection.

7.2.4 Beams Road / Site Access Intersection

The intersection layout used for the SIDRA analysis for the Beams Road / Site Access priority controlled intersection is shown in **Figure 7.5**. Analysis results are provided in **Table 7.7**.

Figure 7.5 Beams Rd / Site Access Intersection Layout – Existing Layout

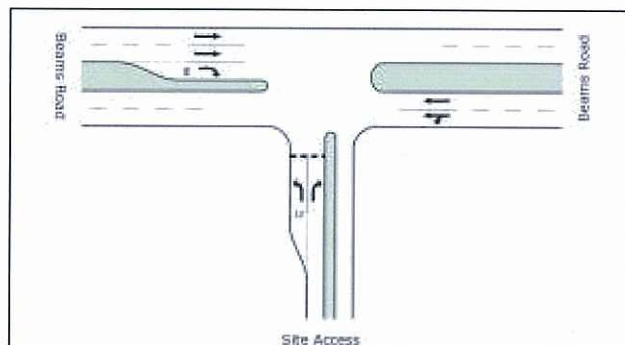


Table 7.7 Beams Rd / Site Access Intersection – SIDRA Results

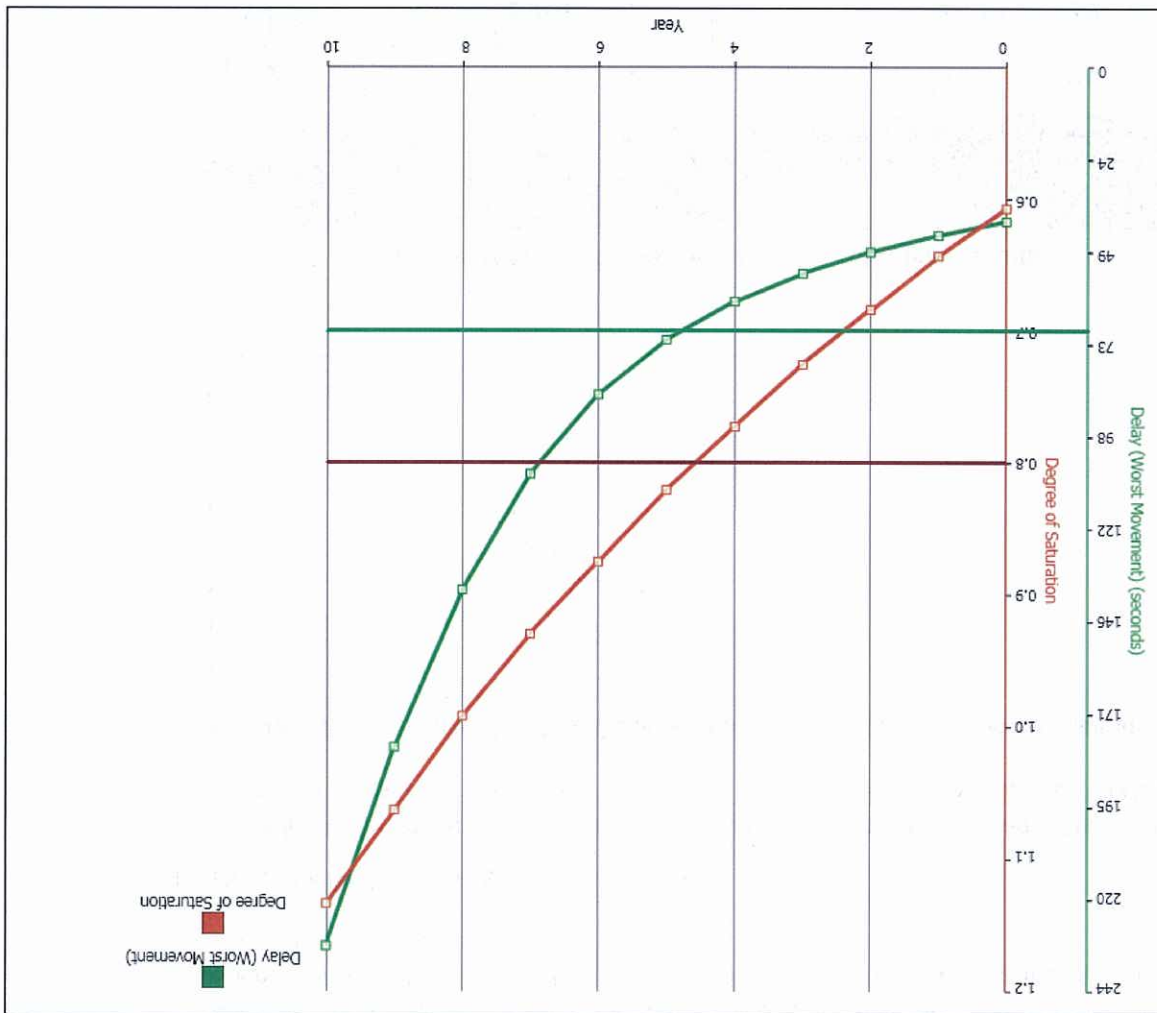
Scenario	AM Peak				PM Peak			
	DOS	Ave. delay (sec)	LOS	Queue Length (m)	DOS	Ave. delay (sec)	LOS*	Queue Length (m)
2011 No Carseldine GOP	0.27	0.3	C	0.7 ^a	0.29	0.4	D	1.9 ^a
2011 With Carseldine GOP	0.27	1.5	C	2.9 ^a	0.61	3.3	E	24.0 ^a
2021 No Carseldine GOP	0.37	0.3	C	1.3 ^a	0.39	0.4	E	3.0 ^a
2021 With Carseldine GOP	0.37	1.4	C	4.6 ^a	>1	15.4	F	156.6 ^a

*LOS based on worst movement for the intersection

^a Longest queue on Site Access South Approach

The analysis results provided in **Table 7.7** indicate that the Beams Road / Site Access intersection is expected to experience unacceptable 2021 peak period operations with the addition of the traffic generated by the site during the evening peak period. This is due to the right turn movement into Beams Road which is projected to provide a DOS of more than the theoretical capacity of 1 (n.b. maximum allowable practical capacity of 0.8) and a LOS F for the existing intersection configuration. As demonstrated in **Figure 7.6**, the site access intersection design life is approximately 4 years. Thus, an alternative solution to the existing intersection layout will be required in approximately 2015.

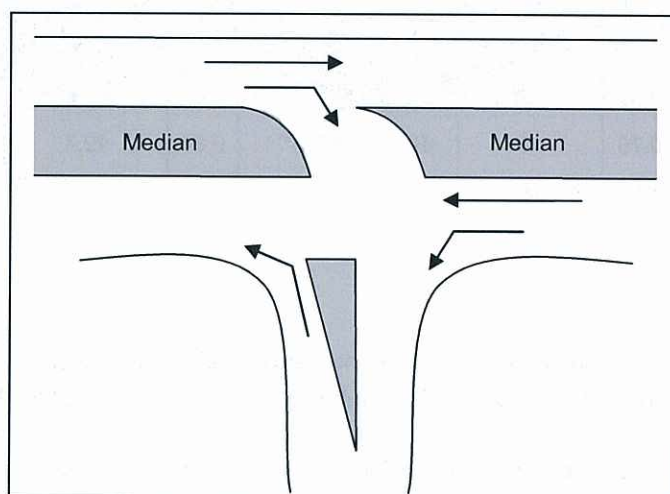
Figure 7.6 Beams Rd / Site Access Intersection Layout – Design Life



Solution Option 1

In order to achieve an appropriate level of performance with the inclusion of site traffic through to 2021, Halcrow recommends the banning of right turn movements into Beams Road. This measure can be achieved by either extending and modifying the median on Beams Road so that right turn movements into the site are only allowed, or by channelising the approach of the site access for left turn movements only through concrete build-outs and minor approach carriageway re-alignments as shown in **Figure 7.7**.

Figure 7.7 Beams Rd / Site Access Intersection Layout – Banned Right Turn



It is anticipated that this measure will result in the originally estimated 113vph right turns into Beams Road in the PM Peak (see **Figure 6.4**), to consequently turn left into Beams Road and perform a U-turn at the Dorville Road roundabout in order to travel east on Beams Road.

An analysis from first principles of the intersection with the right turn movement into Beams Road banned indicates that the intersection will operate satisfactorily through to 2021 with a maximum DOS of approximately 0.68 for the left turn movement into Beams Road as shown in **Table 7.8**. This analysis was undertaken using first principles within SIDRA, to allow SIDRA to more accurately analyse the priority controlled intersection.

Table 7.8 Beams Rd / Site Access Intersection – Solution 1 – SIDRA Results

Scenario	AM Peak				PM Peak			
	DOS	Ave. delay (sec)	LOS	Queue Length (m)	DOS	Ave. delay (sec)	LOS*	Queue Length (m)
2021 With Carseldine GOP	0.32	2.5	B	2.6 ^a	0.68	5.0	D	27.4 ^a

*LOS based on worst movement for the intersection

^a Longest queue on Site Access South Approach

Analysis of the Beams Road / Dorville Road roundabout as a result of the additional U-turn movements indicates that the intersection will operate near the practical capacity by 2021 with an estimated maximum DOS of 0.84 occurring for the southern Dorville Road approach as demonstrated in **Table 7.9**. Given that it is proposed that the Beams Road / Site Access intersection will be upgraded to a four-way signalised intersection with Balcara Avenue with the construction of the Carseldine Urban Village by 2020-2026, it is envisaged that the roundabout configuration will operate satisfactorily with the Carseldine GOP through to when the signal upgrade is required.

Table 7.9 Beams Rd / Dorville Rd Intersection – Solution 1 – SIDRA Results

Scenario	DOS	Ave. delay (sec)	LOS*	Queue Length (m)	AM Peak				PM Peak											
	DOS	Ave. delay (sec)	LOS	Queue Length (m)	DOS	Ave. delay (sec)	LOS	Queue Length (m)	DOS	Ave. delay (sec)	LOS	Queue Length (m)								
2021 With Carseldine	0.70	10	B	57.8 ^a	0.84	12.7	B	69.0 ^b												
													Longest queue on Beams Road West Approach				Longest queue on Dorville Road South Approach			

Solution Option 2

An analysis of the proposed four-way signalised intersection at Beams Road / Balcara Avenue / Site Access was undertaken for the 2021 future year with the site traffic. This was undertaken using the layout shown in **Figure 7.8**. This intersection was analysed using a 4 phase arrangement with a 100 second cycle time. The results of the analysis are summarised in **Table 7.10**.

Figure 7.8 Beams Rd / Site Access Intersection Layout – Signalised 4way Layout

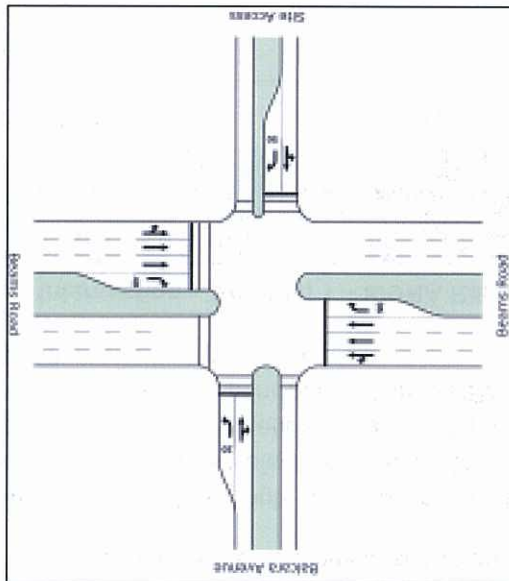


Table 7.10 Beams Rd / Balcara Ave / Site Access Intersection – SIDRA Results

Scenario	2021 With Carseldine			2021 With Carseldine			2021 With Carseldine			2021 With Carseldine		
	DOS	Ave. delay (sec)	LOS	Queue Length (m)	DOS	Ave. delay (sec)	LOS	Queue Length (m)	DOS	Ave. delay (sec)	LOS	Queue Length (m)
	0.73	32.3	C	159.3 ^a	0.79	36.1	D	172.9 ^b				
Longest queue on Beams Road West Approach												
Longest queue on Beams Road East Approach												

The analysis results provided in **Table 7.10** indicate that proposed signalised intersection of Beams Road / Balcara Avenue / Site Access is expected to experience acceptable performance results in the 2021 future year with the site. The DOS is expected to be below the acceptable practical capacity of 0.90 for signalised intersections for the base year and future year, with and without the site. A minimum LOS D is provided across the intersection