ttm

TRAFFIC · PARKING · ACOUSTICS

Mixed Use Development
527 Gregory Tce, Fortitude Valley

Traffic Engineering Report

Terrace Office Park Planned Investment

Reference: 14BRT0599rep1

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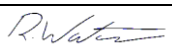
1	R.Watson			DA report	23/01/15
2	R.Watson			Updated DA report	12/03/15
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1. Introduction

1.1. Background

TTM Consulting has been engaged by *Terrace Office Park Planned Investment* to prepare a traffic engineering assessment of a proposed mixed use development (ie residential multi-unit, office and retail) in Fortitude Valley. As the site is located within the Bowen Hills Priority development Area (PDA), it is understood that this will form part of a Development Application to be submitted to the *Department of State Development, Infrastructure and Planning (DSDIP)*, rather than BCC.

1.2. Scope

This report investigates the transport aspects associated with the proposed development. The scope of the transport aspects investigated includes:

- Parking supply required to cater for development demand
- Parking layout to provide efficient and safe internal manoeuvring
- Identification of likely traffic volumes and traffic distribution from the future development
- Identification of likely traffic impact of development on the public road network
- Access configuration to provide efficient and safe manoeuvring between the site and the public road network
- Internal layout to provide efficient and safe internal manoeuvring for service vehicles
- Suitability of access and internal facilities to provide for pedestrian and cyclist operation
- Access to suitable level of public transport

To assess the proposed transport arrangements, the development plans have been assessed against the following guidelines and planning documents:

- Bowen Hills Urban Development Area (UDA) Development Scheme
- Australian Standard 2890
- Brisbane City Council Planning Scheme (Cityplan 2014), specifically the Transport, Access, Parking and Servicing Code & Planning Scheme Policy, and the Refuse Planning Scheme Policy.

1.3. Site Location and Current Use

The site is located on the south eastern corner of the Bowen Bridge Road / Gregory Terrace intersection, in Fortitude Valley, as shown in Figure 1.1. The site is currently occupied by two 4-storey commercial office buildings (approximately 7000sqm GFA and 180 parking spaces). The site has frontage to both Brunswick Street and Gregory Terrace, and the single existing site access driveway is located on the latter, adjacent to the eastern boundary.

Figure 1.1: Site location ***(sourced from Google Maps and Nearmap)***

2. The Proposed Development

2.1. Development Profile

The proposed development comprises two towers (one 25 levels, and one 30 levels) with 3 levels of basement parking. The key characteristics of the proposed development are summarised in Table 2.1.

Table 2.1: Proposed Land Uses

Use	Stage 1	Stage 2	Total
1-bedroom units	160	88	x 248
2-bedroom units	151	122	x 273
TOTAL UNITS	311	210	x 521
Office	0 sqm GFA	2524 sqm GFA	2524sqm GFA (2422sqm NLA)
Retail	361 sqm GFA	358 sqm GFA	719sqm GFA (617sqm NLA)
Carparking	586 car spaces (including 27 visitor, 25 office and 13 retail spaces)		
Vehicular access	1 x 9.5m Type C1 wide driveway located on Gregory Tce adjacent to the eastern boundary		
Servicing	Dedicated service bays for 1 x LRV, 1 x MRV and 1 x Van		
Bicycle parking	327 bicycle parking spaces.		

3. Existing Transport Infrastructure

3.1. The Road Network

All roads in the immediate vicinity of the site are administered by Brisbane City Council. The hierarchy and characteristics of roads in the immediate vicinity of the site are shown below in Table 3.1

Table 3.1: Local Road Hierarchy

Road	Speed Limit	Carriageway		Road Reserve Width	Classification	Road Authority
		Width	Lanes			
Gregory Tce	60 kph	12m	2 (plus parking on both sides)	20m	Suburban route	BCC
Brunswick St	60 kph	15m	5 (2 northbound, 3 southbound)	22m	Arterial route	BCC
Water St	50 kph	6m	1 (one-way)	13m	Neighbourhood access	BCC
Anderson St	50 kph	7m	2 (plus parking on 1 side)	14m	Neighbourhood access	BCC
Baxter St	50 kph	13m	2 (plus parking on both sides)	20m	Neighbourhood access	BCC

The intersections of Brunswick Street with both Gregory Terrace and Water Street are fully signalised, with all other intersections in the immediate vicinity of the site being priority controlled.

3.2. Road Planning

It is understood that to facilitate road widening and intersection upgrade, a land dedication of approximately 4.5m is required along the Brunswick Street frontage of the site, and also that a 10m x 3 chord truncation is required on the corner of Brunswick Street and Gregory Terrace. The concept plan for this upgrade, prepared by BCC, is shown, in part, in Figure 3.1.

This has been allowed for in the proposed development plan.

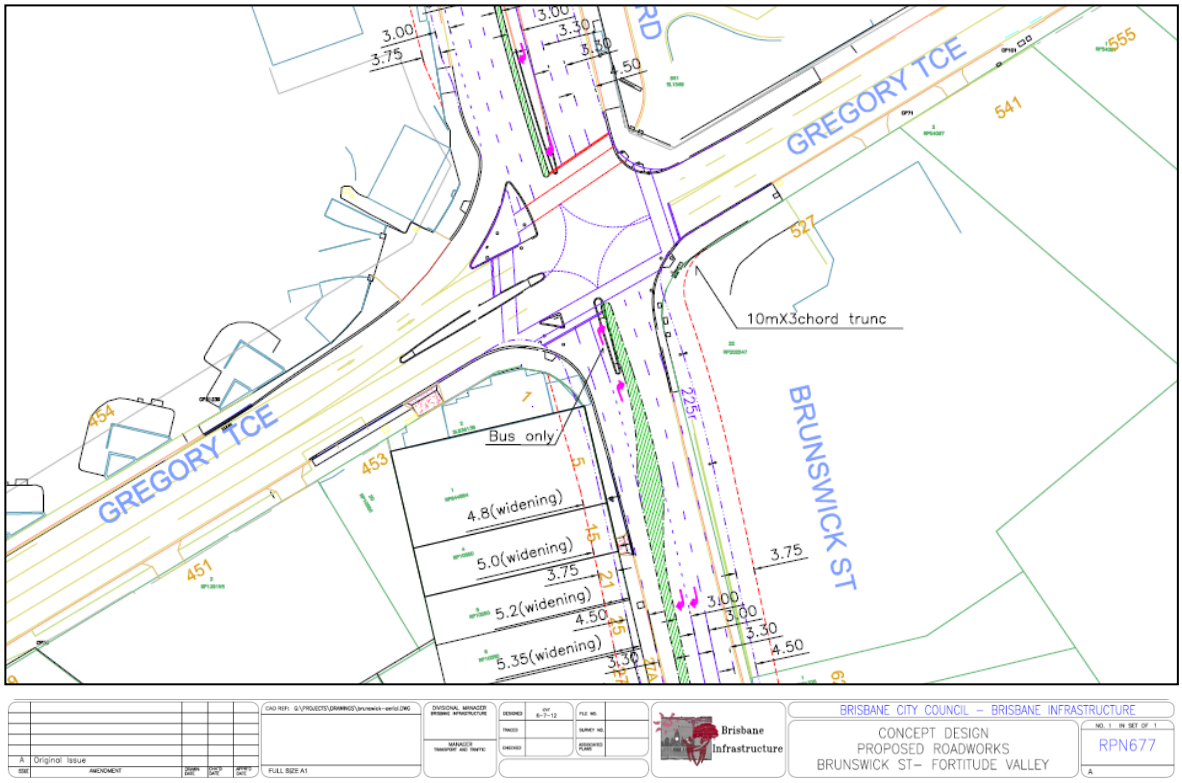


Figure 3.1: Intersection Upgrade Concept

3.3. Public and Active Transport

Fortitude Valley train station is located approximately 600m to the southeast of the site, and provides access to all train lines going through the central city.

RBH and RCH busway stations (on the Inner Northern Busway) are located approximately 500m north and northwest of the site respectively.

The closest on-street bus stops are located on Bowen Bridge Road approximately 50m north of the site, with additional stops on Gregory Terrace and Brunswick Street.

All streets immediate vicinity of the site provide footpaths on both sides of the road. The signalised intersection of Brunswick Street / Bowen Bridge Road / Gregory Terrace provides pedestrian crossings on all approaches, while the signalised intersection of Brunswick Street / Water Street provides crossings on three of the four approaches.

Whilst no dedicated cycle lanes are provided in the immediate vicinity of the site, Gregory terrace is identified in BCC mapping as a local cycle route, and Bowen Bridge Road / Brunswick Street are identified as secondary cycle routes.

The nearest CityCycle station s are located approximately 450m from the site at the Constance Street / St Pauls Terrace and Brunswick Street / Alfred Street intersections.

4. Impact Assessment

4.1. Surveyed Traffic Volumes

TTM conducted a traffic movement survey at the intersection of Gregory Terrace with Bowen Bridge Road / Brunswick Street on Wednesday the 22nd of October 2014, between 7am and 9am, and also from 4pm-6pm. The peak hours were found to be 7:30-8:30am, and 4:30pm-5:30pm. The results of the survey are shown in Figure 4.1.

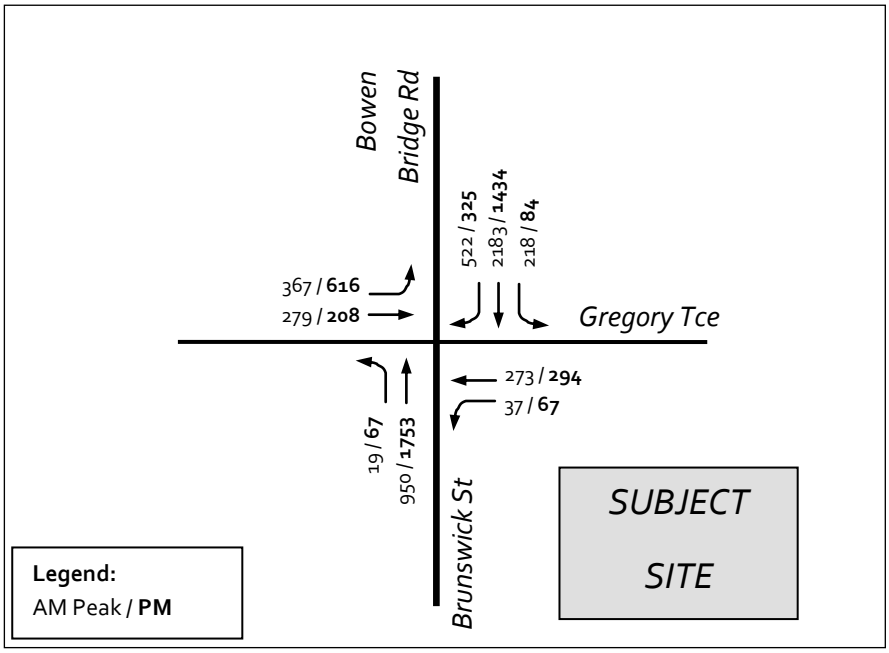


Figure 4.1: Surveyed Traffic Volumes

4.2. Estimated Traffic Generation

Residential traffic generation is based on the rates contained within the NSW RTA *Guide to Traffic Generating Developments.* Given the location in close proximity to the CBD (including Fortitude Valley and South Bank), the Royal Brisbane Hospital and QUT Kelvin Grove, and the ease of access to these locations by way of public transport (using both rail and busway), and the density of the proposed residential uses, the generation rate adopted has been that associated with high density residential uses within a metropolitan sub-regional centre.

As parking supply for the non-residential component is significantly constrained, traffic generation is based on average turnover of parking spaces (ie each space generates on average 2 trips per hour), rather than the RTA rates, which essentially assume unconstrained parking.

The estimated peak hour traffic generation associated with the proposed development is shown in Table 4.1

Table 4.1: Estimated Peak Hour Development Traffic Generation

Development Component	Quantity	Peak Hour Generation Rate	Estimated Peak Hour Generation
Existing Development			
Commercial office parking	≈7000sqm	2vph per 100sqm	140 (2-way)
Proposed Development			
Residential apartments	x 521	0.29vph per unit	151
Retail parking	x 13 spaces	2vph per space	26
Commercial office parking	2524sqm	2vph per 100sqm	50
TOTAL	na	na	227vph (2-way)
NET CHANGE	na	na	+87vph (2-way)

4.3. Estimated Traffic Distribution

The estimated broad traffic distribution of the additional development generated traffic is as follows:

- 50% (ie 44vph) to/from the west via the Gregory Terrace / Brunswick Street intersection
- 40% (ie 34vph) to/from the east via the Gregory Terrace / Brooks Street intersection
- 10% (ie 9vph) to/from the south via the numerous intersections on St Pauls Terrace

4.4. Conclusion

Based on the estimated generation and distribution, there is at most, one additional vehicle every 1 ½ minutes through the Gregory Terrace / Brunswick Street intersection. The intersection currently caters for over 4800vph in each of the peak hours, and consequently the additional development generated traffic represents less than 1% of this existing traffic. The impact of this additional development traffic on these adjacent major intersections is therefore considered to be insignificant.

Given the even lower level of development traffic through the Gregory Terrace / Brooks Street intersection, and the fact that it is only a t-intersection with fewer types of movements, the impact on this intersection is also likely to be insignificant.

As such no further impact assessment is considered necessary.

5. Site Access Arrangements

The proposed development incorporates a 586 space low turnover carpark, solely for use by residents and their legitimate visitors, and the limited office / retail parking. To access this parking facility, a 9.5m wide Type C1 vehicular access driveway (with painted central median island) is proposed, located on Gregory Terrace adjacent to the eastern boundary. This is the location of the existing site access driveway.

Table 5.1 identifies more specific characteristics of the proposed access driveway and compares them to the requirements of AS2890. The last column identifies the compliance of each design aspect. Where compliance with Australian Standards is not achieved, the alternative performance solution is further discussed below.

Table 5.1: Proposed Access Arrangements

Design Aspect	AS2890 Requirement	Proposed Provision	Compliance
Crossover design	11m wide divided crossover	9.5m wide BCC Type C1 with painted central median island	**Alternative Solution**
Minimum separation from adjacent intersection	6m	40m, which is as far as possible on the subject site	Compliant
Desirable/minimum sight distance	83m/65m	Estimated as not less than 85m in either direction	Compliant
Queue storage capacity	12 cars = 72m (for up to 600 cars)	≈42m = 7 cars to first parking space	**Alternative Solution**
Gradient of first 6m	1 in 20 (5%)	Essentially flat	Compliant

5.1. Alternative Performance Solutions

The following aspects of the access design do not strictly meet Councils Acceptable Solutions, and alternative performance solutions are proposed as discussed below.

Crossover Design: The proposed 9.5m wide BCC Type C1 crossover is considered acceptable for the following reasons a) it still provides separation of inbound and outbound traffic, by way of a painted median, and b) the significant half-road width of Gregory Terrace at this point (approximately 6m) provides generous manoeuvring space directly adjacent to the crossover, ensuring that cars do not cross the centreline of either the road or the driveway.

Queue Storage: Councils queue storage requirement is based solely on the number of parking spaces gaining access via the driveway. It ignores the type of user and the likely turnover / traffic generation of the parking facility. In effect, Councils queue storage requirement for a given number of (for instance) supermarket parking spaces, is identical to that of the same number of residential spaces, despite the obvious difference between the two.

Given that the traffic generation of the 586 primarily high density residential spaces is 227vph (as calculated in the previous section), and that this is only approximately 19% of that generated by 586 supermarket spaces (ie 1172vph), the potential for queuing and the need for queue storage is correspondingly lower.

In effect, the traffic generation, potential for queuing and the need for queue storage of 586 primarily high density residential spaces is equivalent to that of 114 supermarket spaces. Councils requirement for queue storage for 114 supermarket spaces is 5 car lengths, or 30m. This practical requirement is comfortably satisfied by the 7 car queue storage provided, and consequently TTM consider the proposal to be acceptable.

6. Car Parking Arrangements

6.1. Council Parking Supply Requirement

The parking supply requirements nominated in *the Bowen Hills Urban Development Area (UDA) Development Scheme* are detailed in Table 6.1.

Table 6.1: Council Parking Supply Requirement

Use	Area/Qty	DSDIP Rate	DSDIP Requirement	Proposed Supply
Residential apartment (including visitors)	x 421	Average of 1 / unit (incl. Visitors)	521	521 resident spaces + 27 visitor spaces
Office	2524sqm GFA	Maximum of 1/100sqm GFA	25	25
Retail	719sqm GFA	Maximum of 1/50sqm GFA	14	13
TOTAL			560	586

6.2. Proposed Parking Supply

The proposed total parking supply consists of 586 parking spaces distributed over four levels of basement parking as follows:

Table 6.2: Proposed Parking Supply

Use	Residential Tenant	Residential Visitor	Office	Retail	Total
B1	19	27	25	13	84
B2	167	0	0	0	167
B3	167	0	0	0	167
B4	168	0	0	0	168
TOTAL	**521**	**27**	**25**	**13**	**586**

Thus the proposed office and retail parking, do not exceed, and therefore comply with the DSDIP requirements.

The residential tenant parking supply equates to a supply rate of 1.05 per unit, which is essentially compliant with the requirement for an average of 1 per unit. This level of supply allows for 1 resident parking space per unit plus additional residential visitor parking at a rate of 0.05 spaces per unit.

This level of visitor parking supply is consistent with the nominated BCC rate for the CBD (ie 0.05 per unit), and is considered appropriate in this location given its close proximity to both the CBD and three train / busway stations. It is not expected that this moderate level of visitor parking supply will encourage significantly greater car use, however not providing this supply will result in an increase in on-street kerbside parking demand in Gregory Terrace.

BCC guidelines require that PWD spaces be provided at a rate of 1 per 50 standard, non-allocated spaces. This then applies to the 65 non-residential tenant spaces, and equates to 2 PWD spaces, which are located within basement-1, with one space located in the vicinity of each of the two lift cores.

6.3. Car Park Layout

The carpark is located in four basement levels, with the lower three reserved for residential tenants, and the upper basement shared by residential visitors, commercial and retail uses.

Table 6.1 identifies the characteristics of the proposed parking area with respect to the AS2890 requirements. The last column identifies the compliance of each design aspect. Where compliance with Council is not achieved, the alternative performance solution is further discussed below.

Table 6.3: Council Carpark Requirements and Proposed Carpark Characteristics

Design Aspect	AS2890 Requirement	Proposed Provision	Compliance
Parking space length	5.4m	5.4m	Compliant
Parking space width (min):			
► Residential tenant	2.4m	2.4m	Compliant
► Residential visitor	2.4m	2.6m	Compliant
► Retail / Office employee	2.4m	2.6m	Compliant
► Retail / Office customer	2.6m	2.6m	Compliant
► PWD	2.4m (+2.4m shared zone)	2.4m (+2.4m shared zone)	Compliant
Aisle Width (min):			
► Parking aisle (residential)	5.8m	6.2m	Compliant
► Parking aisle (office / retail)	6.2m	6.2m	Compliant
► Circulation aisle / ramp	6.1m ie (5.5m+0.3m kerbs)	6.8m (6.2m + 0.3m clearance on each side)	Compliant
Parking envelope clearance:			
► Permissible column location near front of bay	between 0.75m and 1.75m of aisle	between 0.75m and 1.75m of aisle	Compliant
► Min clearance to adjacent side wall	0.3m	0.3m	Compliant
Maximum Gradient:			
► Parking aisle	1:16 (6.25%)	Maximum of 1:16 (6.25%)	Compliant
► Ramp	1:6 (16.67%) for cars, 1:6.5 (15.4%) for trucks	1:6.5 (15.4%)	Compliant
Max. allowable change of grade (before transitions are required)	12.5% at summit & 15% at sag	8.3% at both sag and summit	Compliant
Ideal / minimum height clearance	2.3m / 2.2m	2.7m minimum	Compliant
Terminated aisle treatment	1m past last bay	Generally 1m past last bay	Compliant

7. Service Vehicle Arrangements

7.1. Practical Requirements

Whilst not strictly applicable to this development, the BCC TAPS policy has been referred to as the starting point for determining an appropriate servicing arrangement. The approach often taken for mixed use developments is to adopt the highest number of van bays for any use, the highest number of SRV bays for any use, and so on.

Table 7.1: Practical Servicing Requirements

Use	Extent	Van Bays	SRV Bays	MRV Bays
Retail	719sqm	1	1	1
Office	2524sqm	1	0	1
Max of any use	**-**	**1**	**1**	**1**

The residential component of the development is required to cater for the vehicle types listed below, however no dedicated bays are necessary, as the non-residential loading bays can be shared.

- a residential refuse collection vehicle (RCV),
- a trades van and
- a residential furniture truck (MRV or LRV).

The estimated maximum number of service vehicles visiting the site is as follows:

- residential furniture truck (LRV or MRV) = 4 per weekend day, 2.5hr stay using LRV or MRV bay
- refuse collection vehicle (RCV) = 1 per weekday, 20 minute stay using LRV bay
- trades van (for residential units) = 4 per weekday, 60 minute stay, using onsite van bay
- retail / office deliveries = 12 per weekday, 15 minute stay, using LRV, MRV or van bay

This totals 93 vehicles per week, with an average of 17 per weekday and 4 per weekend day.

7.2. Proposed Service Vehicle Arrangements and Their Adequacy

It is proposed to use Councils 10.3m long rear-lift RCVs for refuse collection, whilst furniture trucks will be either LRV or MRV sized.

Three separate service bays (an LRV, an MRV and a van) are proposed within a dedicated service zone near the front of the site, at basement-1 level. The bay dimensions, which comfortably satisfy the requirements of AS2890 and / or BCC standards , are as follows:

- LRV = 12m x 4.5m
- MRV = 12m x 4.5m
- Van = 5.4m x 3.4m

The vertical clearance over the entire service area, including manoeuvring areas, is no less than 7m.

Whilst service vehicle manoeuvring will occur in the main entry aisle, it is considered acceptable for the following reasons:

- visibility of the manoeuvring area from vehicles entering the site is very good
- the number trucks larger than an SRV is unlikely to exceed 4 per day
- additional space is available to the south of the service area to allow large trucks to temporarily stand clear of through traffic, prior to reversing into one of the service bays.

Swept paths for both an LRV and an MRV, generated using *Autotrack* software, are contained within Appendix B. Given a 10.3m rear-lift RCV is smaller than an LRV, this too will have suitable manoeuvring.

8. Pedestrian and Bicycle Facilities

Pedestrian movement around the ground plane is facilitated by significant open space both between and around the two buildings. Entry to the buildings is via the residential lobby in building 1, and separate residential and commercial lobbies in building two, all of which face inward onto the central pedestrian zone.

Connections to the external pedestrian network are made in the north western corner of the site near the Gregory Terrace / Brunswick Street intersection, the south western corner of the site, and the southern boundary adjacent o the heritage listed drill hall, and from there on to Diggles Close.

The pedestrian routes within and around the site are shown inFigure 8.1 .

Figure 8.1: Pedestrian Routes Within and Around the Site

The Bowen Hills UDA development Scheme has set the following bicycle parking targets:

Table 8.1: Bicycle Parking Targets

Use	Target Rate	Extent	Target Supply	Proposed Supply
Residential Tenant	1 per unit	521	521	260
Residential Visitor	1 per 400sqm	47933-3039 = 44894	112	52
Retail / office staff	1 per 200sqm NLA	3039sqm NLA	15	12
Retail / office visitors	1 per 1000sqm NLA		3	3
Total	**-**	**-**	**651**	**327**

Whilst the retail and office provision essentially satisfies the target supply, being just 3 spaces short, the residential tenant and visitor supply is proposed at approximately half the target rate.

TTM consider the residential bicycle parking provision to be acceptable, primarily based on the following data which has been sourced from the 2013 *National Cycling Participation Survey* (chapter 7), published by *Austroads*:

- 26% of Australian dwellings have 4 or more occupants. It is considered reasonable to assume these are primarily larger detached dwellings, and not multi-unit dwellings.
- 70% of bicycle participation in Brisbane is by people under 18 years of age. This suggests that the average household bicycle ownership would be significantly affected by (ie increased) by dwellings with children.
- 23% of Brisbane dwellings have 3 or more working bicycles. Given the above two dot points, it is considered reasonable to assume these are primarily larger detached dwellings, as the percentage correlates well with the number of dwellings with 4+ people, and that there are one or more children living in the dwelling. It is far less likely that these dwellings are MUDs given their smaller size and lower probability of housing families.
- If these 23 % of larger dwellings are removed from the calculations, the average number of working bicycles per household for the remaining 77% of households, is 0.58.

Given that this final rate of 0.58 is an average for all dwellings with up to 3 residents, and that MUDs are at the smaller end of this range, which also includes smaller detached dwellings and townhouses, a rate for MUD tenants of 0.5 spaces per unit is considered appropriate.

The proposed provision is consistent with these findings and is considered sufficient to cater for the practical demand.

With respect to residential visitor bicycle parking, the same study found that only 8% of cycling trips in Brisbane were for the purpose of visiting friends or relatives. Given this very low demand, it is considered that the proposed rate of provision of 1 space per 10 units (resulting in 50 spaces) will comfortably satisfy the demand for these users.

Consequently, TTM consider that the proposed bicycle parking supply is appropriate for the development, and will cater for the practical demands.

The retail/commercial spaces and the residential visitor spaces in separate cages located on basement-1 beneath building-2, whilst the residential tenant parking is split over basements 2, 2 and 4, beneath building-1.

9. Summary and Conclusion

9.1. Impact on Surrounding Road Network

It is estimated that the proposed development will generate an additional 87vph in the peak hour. This equates to, at most, one additional vehicle every 1 ½ minutes at the Gregory Terrace / Brunswick Street intersection. The intersection currently caters for over 4800vph in each of the peak hours, and consequently the additional development generated traffic represents less than 1% of this existing traffic. The impact of this additional development traffic on these adjacent major intersections is therefore considered to be insignificant. Given the even lower level of development traffic through the Gregory Terrace / Brooks Street intersection, and the fact that it is only a t-intersection with fewer types of movements, the impact on this intersection is also likely to be insignificant. As such no further impact assessment is considered necessary.

9.2. Development Access

The proposed development incorporates a 586 space low turnover carpark, solely for use by residents and their legitimate visitors, and the limited office / retail parking. To access this parking facility, a 9.5m wide Type C1 vehicular access driveway (with painted central median island) is proposed, located on Gregory Terrace adjacent to the eastern boundary. This is the location of the existing site access driveway. The access arrangements generally comply with Council requirements, however alternative performance solutions are proposed for a) the driveway width, and b) the queue storage. TTM believe that these performance solutions satisfy practical requirements.

9.3. Car Parking Supply

Overall, the proposed parking supply is 586 parking spaces (including 2 PWD spaces).

The proposed office and retail parking comply with the DSDIP requirements.

The residential tenant parking supply equates to a supply rate of 1.05 per unit, which is essentially compliant with the requirement for an average of 1 per unit. This level of supply allows for 1 resident parking space per unit plus additional residential visitor parking at a rate of 0.05 spaces per unit, which is considered an appropriate visitor parking supply in this location. It is not expected that this moderate level of visitor parking supply will encourage significantly greater car use, however not providing this supply will result in an increase in on-street kerbside parking demand in Gregory Terrace.

BCC guidelines require that PWD spaces be provided at a rate of 1 per 50 standard, non-allocated spaces. This then applies to the 65 non-residential tenant spaces, and equates to 2 PWD spaces, which are located within basement-1, with 1 space located in the vicinity of each of the two lift cores.

9.4. Car Park Design

The carpark is located in four basement levels, with the lower three reserved for residential tenants, and the upper basement shared by residential visitors, commercial and retail uses.

The requirements of AS2890 are satisfied in all respects, and consequently the carpark design is considered acceptable.

9.5. Service Vehicle Arrangements

It is proposed to use Councils 10.3m long rear-lift RCVs for refuse collection, whilst furniture trucks will be either LRV or MRV sized. Three separate service bays (an LRV, an MRV and a van) are proposed within a dedicated service zone near the front of the site, at basement-1 level. The bay dimensions, including a 7m vertical clearance, comfortably satisfy the requirements of AS2890. Given the good visibility, generous aisle dimensions/geometry and low usage the location of the service bays at the bottom the of the entry ramp is considered acceptable.

Al design vehicles, up to and including LRVs, MRVs and 10.3m rear-lift RCV can manoeuvre onsite, with both entry and departure always in a forward motion.

9.6. Pedestrian and Bicycle Facilities

Excellent pedestrian connectivity is provided both within the site, and to adjacent land, and is facilitated by significant open space both between and around the two buildings.

Whilst the proposed bicycle parking provision (327 spaces) does not meet DSDIPs target, it does, in TTMs opinion, satisfy practical demands, based on the findings of the 2013 *National Cycling Participation Survey* (chapter 7), published by *Austroads.*

Based on the assessment contained within this report, TTM see no significant traffic engineering reason why the proposed development should not be granted the relevant approvals.

Appendix A Development Plans


nettletontribe
plans
ground
1:400
527 Gregory Terrace
09 MARCH 2015
PAGE 25
cottage
drill hall
LOADING BAY BELOW
Substation
Switch
Plant
FCR
lower
Retail
Residential Lobby
Retail
Retail
Residential Lobby
Commercial Lobby
Commercial
plant room
PWD
brunswick street
Cromwell

nettletontribe

plans

basement 1

1:400

CAR PARKING

LEVEL	RESI.	VISITOR	COMM.	RETAIL	TOTAL
B1	19	27	25	13	84

Cromwell

nettletontribe

plans

basement 2, 3 and 4

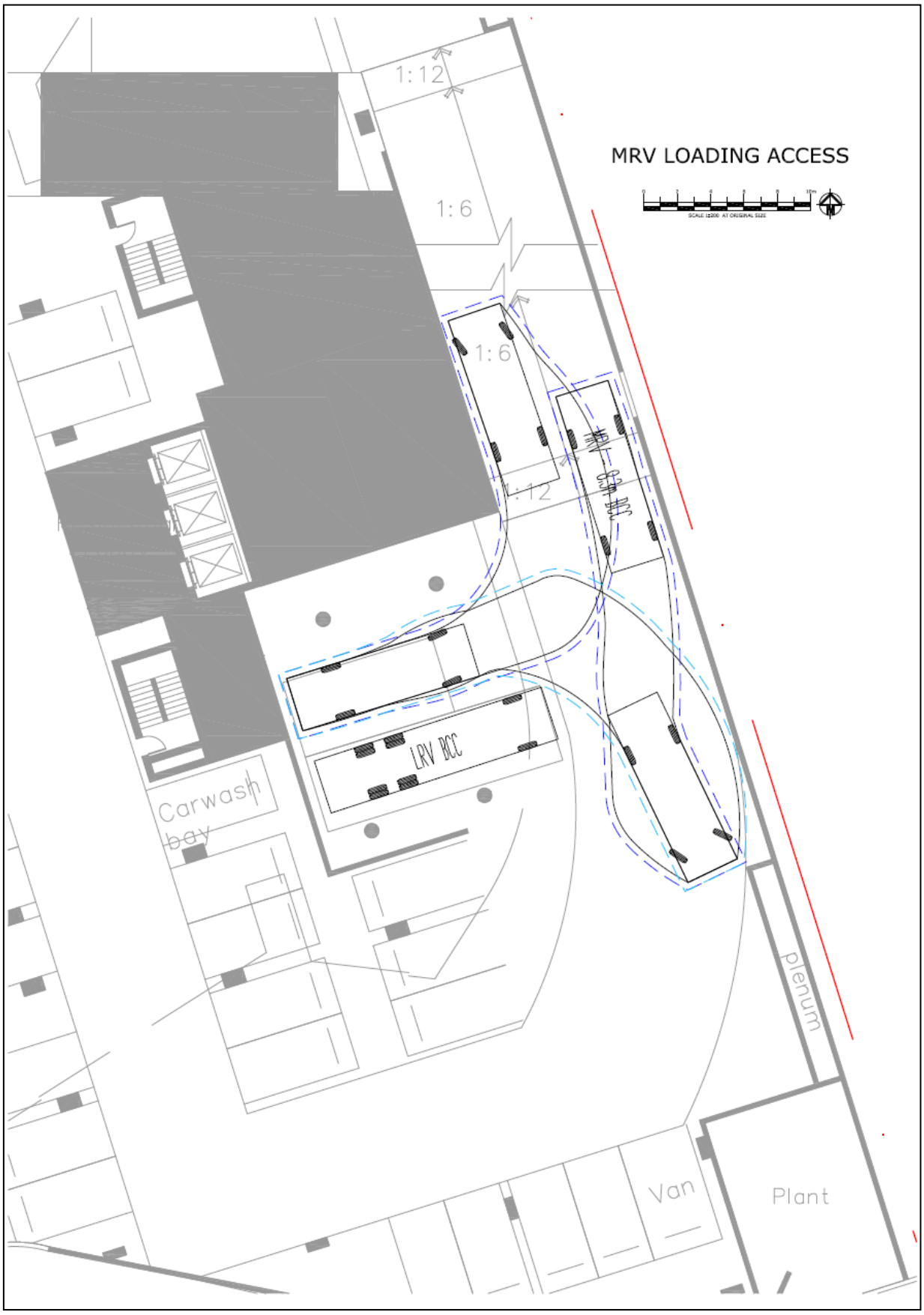
1:400

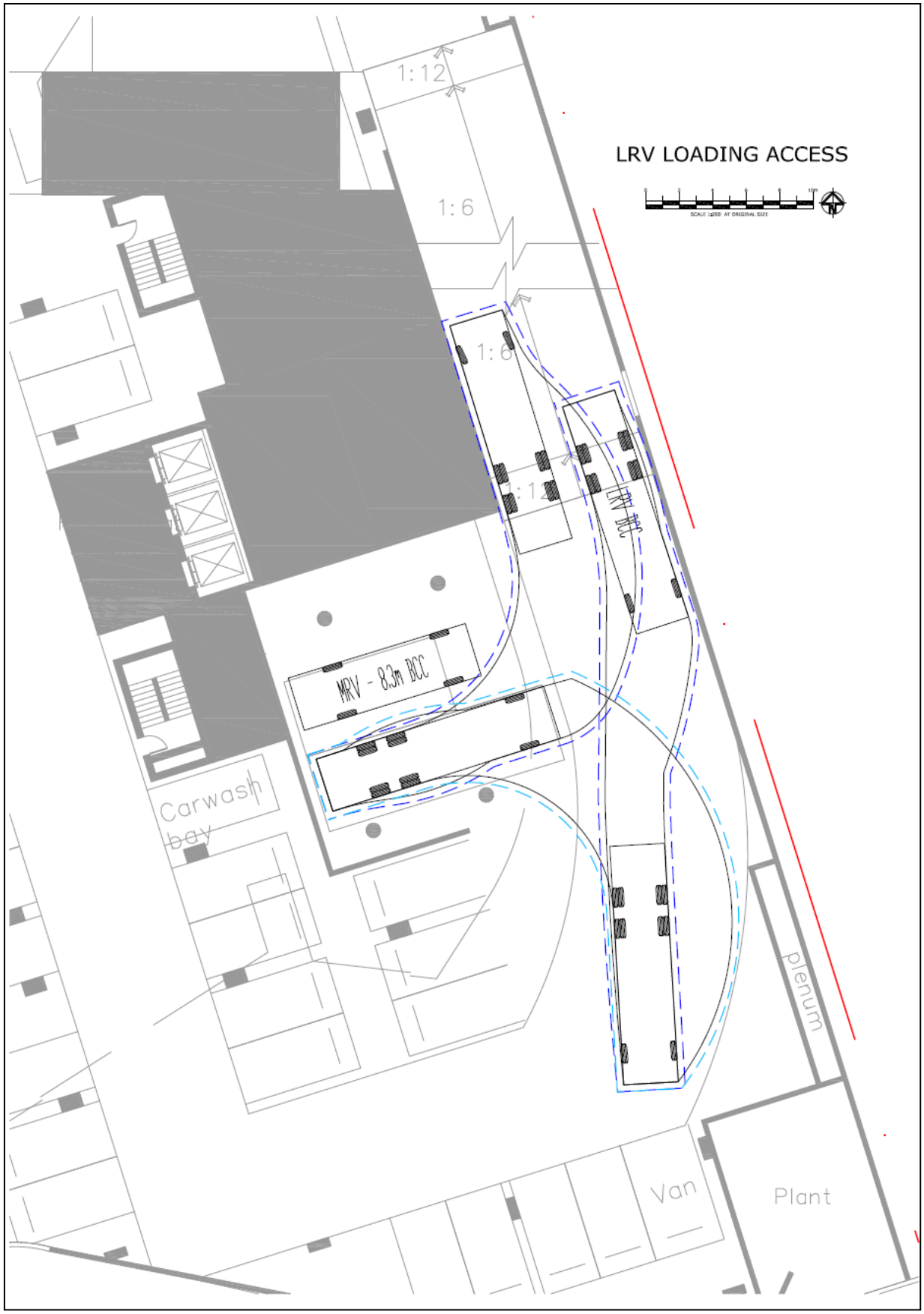
CAR PARKING

LEVEL	RESI.	VISITOR	COMM.	RETAIL	TOTAL
B2	167	/	/	/	167
B3	167	/	/	/	167
B4	168	/	/	/	168

Cromwell

Appendix B Swept Path Manoeuvring Diagrams


MRV LOADING ACCESS
1:12
1:6
1:6
1:12
MRV BCC
LRV BCC
Carwash bay
Plenum
Van
Plant


LRV LOADING ACCESS
1:12
1:6
1:6
1:12
MRV - 8.3m BCC
LRV BCC
Carwash bay
Plenum
Van
Plant