

**Proposed Mixed Use Development
(Multi Unit Dwelling and Retail)
9-11 Bowen Bridge Road, Bowen Hills
Traffic Engineering Report**

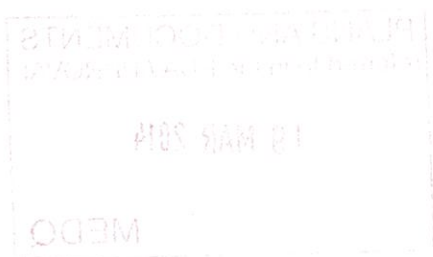
PLANS AND DOCUMENTS
referred to in the PDA APPROVAL

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MEDQ

Dameline Developments Pty Ltd

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1. Introduction

1.1. Background

TTM Consulting Pty Ltd (TTM) has been engaged by Dameline Developments Pty Ltd to prepare a traffic engineering report investigating a proposed mixed use (multi-unit dwelling and retail) development located at 9-11 Bowen Bridge Road in Bowen Hills. It is understood that a Development Application will be lodged with Economic Development Queensland (EDQ), formerly the Urban Land Development Authority (ULDA).

1.2. Scope

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

- Parking supply;
- Parking layout;
- 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;
- Suitability of facilities to provide for pedestrian and cyclist operation; and
- 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;
- Brisbane City Council Brisbane City Plan 2000 (for guidance);
- Australian Standards for Parking Facilities (AS2890);
- Department of Transport and Main Roads '*Road Planning and Design Manual*';
- Austroads '*Guide to Road Design*'; &
- Austroads '*Guide to Traffic Management*'.

1.3. Site Location

The site is located at 9-11 Bowen Bridge Road, opposite the Royal Brisbane and Womens Hospital (RBWH) as shown in Figure 1.1. The property description is Lot 11 and 12 on RP9940. The site has road frontages to Bowen Bridge Road on the west side and Walden Lane on the east side, and is currently occupied by a detached dwelling.

The site is located within 'Precinct 3: RBWH Precinct' of the Bowen Hills Priority Development Area (PDA); previously referred to as the Bowen Hills Urban Development Area (UDA).

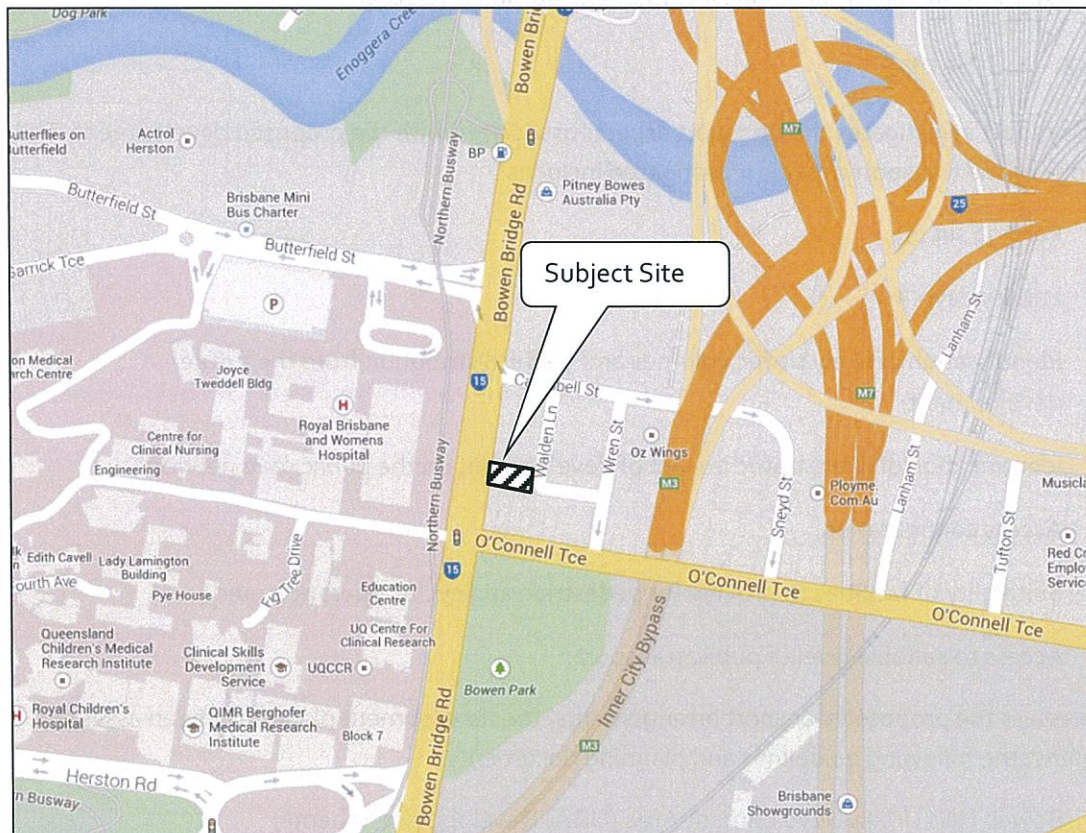


Figure 1.1: Site location

Source: Google Maps

2. The Proposed Development

2.1. Development Profile

The proposed land uses for this development are summarised in Table 2.1.

Table 2.1: Proposed land uses

Use	Area/Qty
Multiple Unit Dwellings	81 units (TOTAL)
• Studio	9 units
• 1 Bedroom	45 units
• 2 Bedroom;	27units
Retail	90m ² GFA

A copy of the proposed development ground floor and basement plans, prepared by Paton Architecture, is included in Appendix A for reference.

2.2. Parking

The development proposal includes the provision for 59 car parking spaces and 1 motorcycle space for residential use, spread across three basement levels.

Further information in relation to the proposed parking provisions is included in Section 4.

2.3. Access

The development scheme includes the following access arrangements:

- Walden Lane:
 - 6.2m Category 2 (combined entry/exit) drive way access;
 - Priority control; and
 - All turns permitted (although practically all entry movements will be right in).

Further information on the proposed access arrangements is included in Section 5.



3. Existing Transport Infrastructure

3.1. The Road Network

All roads in the vicinity of the subject site are administered by Brisbane City Council (BCC). Table 3.1 shows the characteristics of roadways near the subject site.

Table 3.1: Surrounding Road Characteristics

Road	Speed Limit	Lanes	Carriageway Width	Classification
Bowen Bridge Road	60kph	6	20.0m	Arterial Road
Walden Lane	50kph	2	5.1-6.0m	Local Road
Wren Street	50kph	1 (southbound only)	6.0m	Local Road
O'Connell Terrace	60kph	3 (plus parking)	12.0m	Suburban Route
Campbell Street	50kph	2 (plus parking)	12.0m	Suburban Route

Walden Lane is a narrow laneway which serves a purely access function and does not provide a thoroughfare for access to adjacent roads. Walden Lane contains limited on-street parking opportunities due to its narrow width. The intersections of Walden Lane with Campbell Street and Wren Street are both priority controlled T-intersections, with right-in/right-out movement restrictions at Wren Street due to the one-way nature of this street.

O'Connell Terrace is also one-way (westbound) only between Wren Street and Bowen Bridge Road. The intersections of Bowen Bridge Road with O'Connell Terrace and Campbell Street are signalised with pedestrian crossing opportunities. Metered/time restricted on-street parking spaces are provided on Campbell Street and O'Connell Terrace.

3.2. Road Planning

Initial pre-lodgement meetings held with BCC indicated that land dedications/road widening is required along both frontages of the site to allow for provision for a minimum 2m wide footpath/verge on Walden Lane and 3.75m wide footpath/verge along Bowen Bridge Road.

On-site measurements as detailed in Drawing No. 13BRT0578-SK2 included in Appendix B, indicates that the existing road reserve at the northern site boundary is 6.75m wide comprised of a 0.90m wide verge, 5.10m wide carriageway and 0.75m wide footpath. Based on the provision of a 1.5m property set-back, a 2m wide footpath on the development side and 5.50m wide carriageway can be facilitated. This will permit an interim road reserve width of 8.25m.

The 2m wide footpath is considered 'fit for purpose' given the fact that the proposed development and future development (at 71-77 O'Connell Terrace) will have pedestrian

entrances onto links other than (and in addition to) Walden Lane. As such it is considered that future pedestrian demands along Walden Lane will continue to be low.

Given the existing kerb alignment on the opposite side of Walden Lane it is considered that the required footpath width (on the opposite side) can be accommodated if and when adjacent lots are redeveloped. As shown in Drawing No. 13BRT0578-SK2 a verge widening of 1.25m on the opposite side of Walden Lane will permit an ultimate road reserve width of 9.50m.

It should be noted that the footpath widths on the opposite side of the lane between 16-18 Walden Lane and Campbell Street have a relatively consistent width of between 1.6 and 1.7m. Given that the site at 16-18 Walden Lane has only recently (10-15 years ago) been redeveloped it is unlikely that the footpath width on this side will change anytime soon.

In terms of widening, it is considered that the property set-back should only be provided between the corner of the lane (at 14 Walden Lane) and the property to the north (i.e. 13 Walden Lane).

Given the reduced forward visibility for southbound traffic on Walden Lane (especially around the corner) and the existing carriageway width between the subject site and Wren Street, which is an average of 5.2m, it is recommended in the interim that one-way operation (eastbound) is formally reinstated on this section of the lane. As shown on Drawing No. 13BRT0578-SK3 included in Appendix C, appropriate signage should be introduced including 'ENTRY PROHIBITED' signs at the intersection of Wren Street/Walden Lane and one-way directional signs along Walden Lane.

When the lots opposite (i.e. 14 Walden Lane) are redeveloped it is considered that the necessary widening (and corner truncation) can occur to facilitate the 5.5m wide carriageway for two-way operation.

To achieve the necessary footpath/verge width on Bowen Bridge Road, a 1.2m property setback is required, as is reflected in the development plans provided in Appendix A.

Subsequent negotiations with EDQ representatives have confirmed that these road widening can be provided in the form of volumetric dedications (generally only at ground level) to allow for basement construction below and building tower construction above these setback areas; given the significant implications that such land area losses have on the feasibility of this development given the constrained site area.

Other than these verge/footpath widening requirements, TTM are not aware of any other road or development projects which may impact or be impacted by the development proposal.

3.3. Public Transport, Pedestrian and Cyclist Facilities

The subject site has excellent connection to public transport and is located in close proximity to the elevated Northern Busway Station at the RBWH, which is located on the western side



of Bowen Bridge Road directly opposite the site. This busway station services in excess of 19 different bus routes (most connecting between northern suburbs of Brisbane and Fortitude Valley/Brisbane CBD) with approximately 1,100 Bus services running through the station (two-way) on a typical weekday. During morning and evening commuter peak-hours, the station has a one-way bus frequency (in direction of peak travel) of 1 bus every 70 seconds on average.

Direct access to the RBWH station is available via the signalised pedestrian crossings at the Bowen Bridge Road / O'Connell Terrace signalised intersection.

Walden Lane has limited pedestrian and cyclist facilities, however the wider area has numerous paths for pedestrians and cyclists. In addition, the RBWH Cycle Centre is located underneath the busway station on the western side of Bowen Bridge Road.

4. Car Parking Arrangements

4.1. Parking Supply Requirement

The Bowen Hills UDA Development Scheme (Precinct 3: RBWH Land Use Plan) details that the following parking supply is required for the site;

- For residential, on average of 1 space per dwelling (including visitor parking)
- For other commercial and retail, a maximum of 1 space per 50m² of floor space.

Based on the above parking supply requirements, the required parking provision for the proposed land uses of this development is summarised in Table 4.1.

Table 4.1: Car Parking Supply Requirements

Use	Parking Rate per unit	Area/Qty	Parking Requirement
Multiple Unit Dwellings	1 space per unit	81 units	81 spaces
Commercial Tenancies	1 per 50m ² (maximum)	90m ²	2 spaces (maximum)
Total			81 parking spaces (approx.)

4.2. Proposed Parking Supply and Suitability

The development provides a total of 59 parking spaces and 1 motorcycle space, *with all spaces dedicated to the residential uses of the site*. No parking is to be provided for the small amount of retail space on the ground floor level, which is consistent with the maximum requirement detailed in the Bowen Hills UDA Development Scheme.

With respect to the residential parking provisions, a total of 59 car spaces for 81 units equates to provision of 0.73 spaces per unit; which is slightly below the 'average' requirement of 1 space per unit as detailed in the Bowen Hills UDA Development Scheme. If the motorcycle spaces were included in this calculation, the effective parking supply would increase to 0.74 spaces per unit.

TTM considers this proposed parking provision is acceptable given the close proximity of the site to the RBWH - with hospital staff likely to be the primary target as prospective residents/tenants who would have less need to own a car - and also the busway station which makes the site highly accessibly to the wider Brisbane area.

In addition, the proposed parking supply of 0.73-0.74 spaces per unit is consistent with (if not greater than) numerous other multi-unit residential developments approved within the Bowen Hills UDA area. Examples of this include:

- 24 Brookes Street: 36 units with 14 parking spaces = 0.38 spaces per unit.
- 332-334 Water Street ('Central Village Stages 1 and 2'): 325 units with 204 parking spaces = 0.63 spaces per unit.

- Corner Campbell Street & Hamilton Place ('Madison Heights'): 286 units with 204 parking spaces = 0.71 spaces per unit.
- 16 Hamilton Place ('The Chelsea'): 194 units with 138 parking spaces = 0.76 spaces per unit.
- The Green: 356 units with 289 parking spaces = 0.81 spaces per unit.

It is also understood that EDQ were generally satisfied with the proposed parking provision during a pre-lodgement meeting on Wednesday 11th December 2013.

Based on the above information, TTM consider the proposed provision for 59 car parking spaces and 1 motorcycle space is acceptable.

As shown in the development plans included in Appendix A, 1 PWD car parking space will be provided at ground level.

4.3. Car Park Layout

Table 4.2 identifies the characteristics of the proposed parking areas with respect to the requirements of the Australian Standard for Parking Facilities, Part 1: Off-street car parking (AS2890.1:2004) and Part 6: Off-street parking for people with disabilities (AS2890.6:2009). The last column identifies the compliance of each design aspect. The last column identifies the compliance of each aspect of the design. In the instances where compliance with the Australian Standards is not achieved, further information is provided below.

Table 4.2: Car Park Design Criteria

Design Aspect	AS2890.1 Requirement	Proposed Provision	Compliant
Parking Space Length: - Standard Space (Class 1A) - Small Car Space* - PWD Space (Class 6)^	5.4m (min) 5.0m (min) 5.4m (min)	5.4m 5.0m 5.4m	Yes Yes Yes
Parking Space Width: - Standard Space (Class 1A) - Small Car Space* - PWD Space (Class 6)^	2.4m (min) 2.3m (min) 2.4m (min) + 2.4m shared area next to bay	2.4m 2.3m (min) 2.4m (min) + 2.4m shared area next to bay	Yes Yes Alternative Solution
Parking Aisle Width	5.8m (min)	6.2m (min)	Yes
Circulation Road/Aisle	5.5m (min)	5.5m (min)	Yes
Parking envelope clearance – space adjacent to wall	Spaces 0.3m clear of walls	All spaces adjacent to walls offset 0.3m	Yes
Parking envelope clearance - Column adjacent to bay	Located between 0.75 and 1.75m from parking aisle	Located between 0.75 and 1.75m from parking aisle	Yes
Parking Aisle Extension	1.0m beyond last bay	Varies	Alternative Solution
Height Clearances: - General Minimum - Over PWD Space^	2.2m 2.5m	TBC	Alternative Solution

*Further commentary in relation to the number of Small Car spaces provided in the car park is detailed in Section 4.5.

^AS2890.6 requirement

The proposed car park layout generally complies with the design requirements of AS2890.1, however the following issues are resolved with alternative solutions.

PWD Parking Space

The PWD parking space has been design generally in accordance with the requirements set out in AS2890.6, however, it is intended that the adjacent shared area will perform the dual purpose of providing a turning/reversing area for one of the car lifts. This dual purpose is considered acceptable given the provisions set out in the Australian Standards which state in respect of the shared area: "an area adjacent to a dedicated space provided for access or egress to or from a parked vehicle and which may be shared with any other purpose that does not

involve other than transitory obstruction of the area, e.g. walkway, a vehicular aisle, dual use with another adjacent space”.

Parking Aisle Extension

AS2890.1 requires that at end aisles a 1m aisle extension is provided beyond the last parking bay. The development proposal includes end aisles on basement levels 1 and 2 which provide aisle extensions shorter than this. The impacted parking bays are designated as small car bays which have improved manoeuvring capabilities than a standard car. Figure 4.1 show that a small car can adequately access and egress the affected spaces.

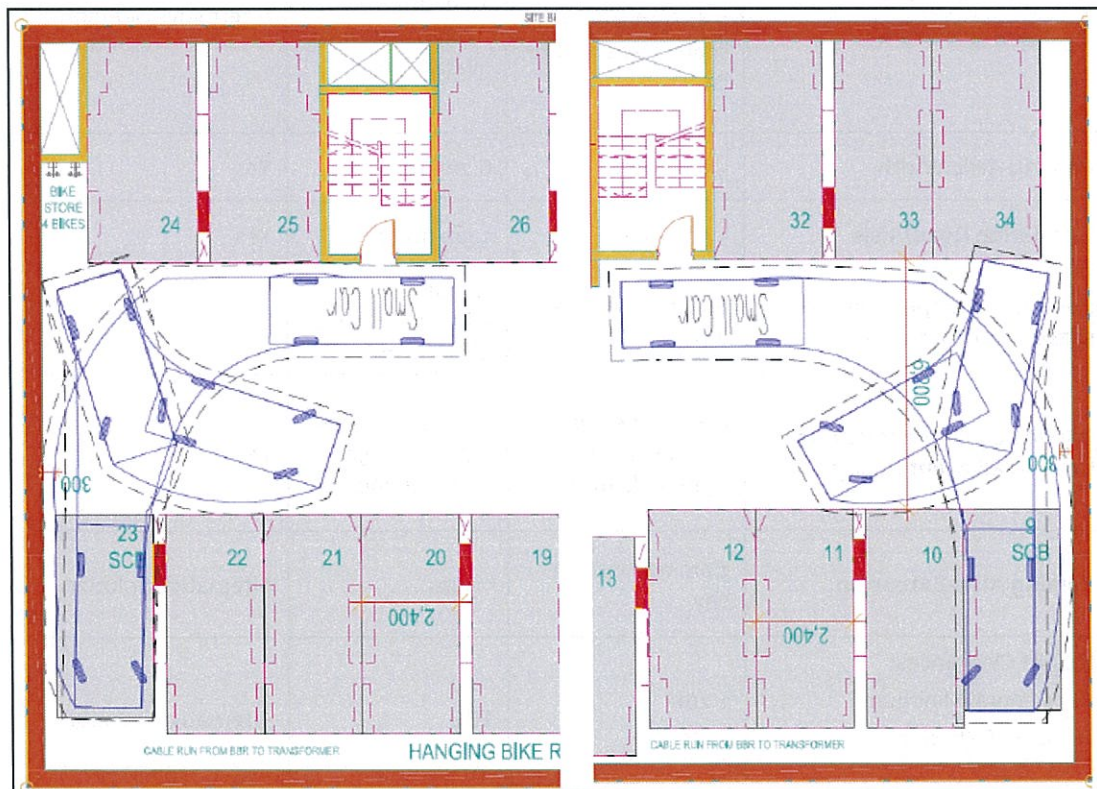


Figure 4.1: Small Cars Accessing End Bays at Basement Level

Minimum Height Clearance

The concept plans generally provide approximately 2.7m height clearance from floor to ceiling in basement areas and 3.6m in the ground floor area. Detailed design of structure/roof mounted services is yet to be undertaken, however, these shall be done taking cognisance of the general minimum 2.2m height clearance requirement and 2.5m requirement over the PWD space. It is proposed that services will be typically designed along the roof at the front of the standard/small parking spaces (however not the PWD space) at various locations throughout the car park, which may intrude slightly into the height clearance provided over a portion of the spaces. The acceptable intrusion zones where these services will be located will be restricted to the area as shown in Figure 4.2. This acceptable intrusion zone has previously

been agreed with BCC and adopted in the design of other basement car parks in the inner city area and so this design solution is considered acceptable in this instance also.

Over the PWD space, the allowance for intrusion at the front of the parking space will be as per Figure 2.7 of AS2890.6.

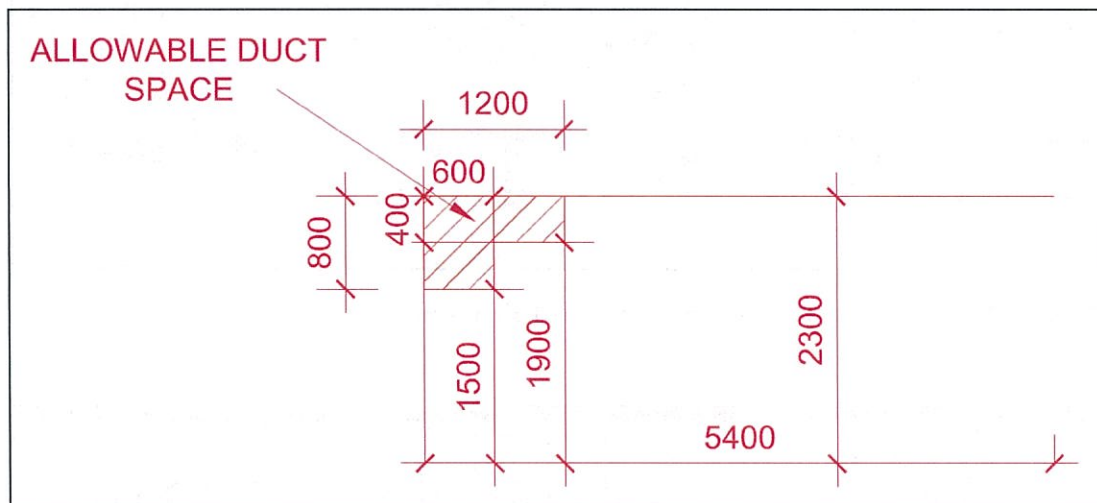


Figure 4.2: Acceptable Intrusion Zone for Services at front of Parking Spaces

Based on the information provided above, TTM considers the proposed car parking layout is acceptable through combination of AS2890 complaint solutions and alternative solutions (consistent with BCC provisions) deemed fit for use.

4.4. Car Lift Operation

The development proposal includes a car lift between the ground level and car parks in the basement levels. The purpose of this car lift is to facilitate safe movement between each of the levels and provide parking efficiently given the site has limited width providing two-way ramps between basement levels is not a feasible option.

A dedicated waiting/manoeuvring area is provided on the ground floor area to allow vehicles to drive in/reverse out of each of the car lifts. Should another vehicle be queuing on the ground level at the same time as a vehicle is waiting/standing in the manoeuvring area, these vehicles can stand on the main driveway/parking aisle. The basement levels each provide 1 waiting bay, which is considered suitable as this will only cater for vehicles exiting the car park from each level, and therefore other drivers could simply wait in their car bay (or again in the parking aisle) until the first vehicle has moved into the car lift. Figure 4.3 and Figure 4.4 shows that a B99 vehicle can adequately manoeuvre to/from the car lifts via the reversing bays as required.

Figure 4.3: B99 Accessing Car Lifts via Reversing Bays at Ground Level

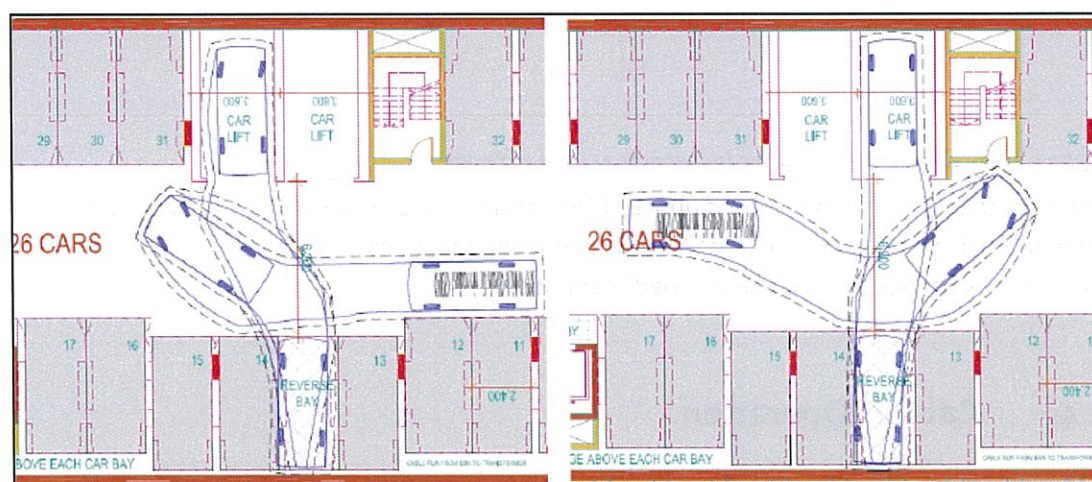


Figure 4.4: B99 Accessing Car Lifts via Reversing Bays at Basement Level

The lift will take approximately 15 seconds to travel between the ground and basement 1 car park and 30 seconds between the ground and basement 2 car park. Allowing for manoeuvring from waiting bays into and from the car lift a cycle time of 50 seconds to the first basement level and 70 seconds to the second basement level is considered appropriate. As such the average time to move a vehicle from one level to another is 60 seconds.

With the two lifts in operation, this provides a capacity of 120vph (60 vehicles per lift). As detailed further in Section 6.2, the peak traffic generation (and therefore peak demand for use of the car lifts) is expected to be in the order of 19vph. As such, with a capacity of 120vph the proposed lift operation provides capacity for more than 6 times the expected site traffic generation. This does not include trips originating / finishing at the ground level which would

not use the car lifts. As such the lift capacity is likely to be more than 7 times greater than the vehicle generation of basement levels 1 and 2.

The lifts will have a default position depending on the time of day and the direction of the peak movements at that time. For example, during the morning period each lift would have a default position for Basement Levels 1 and 2 to cater for the primary demand for vehicles exiting the car park. In the evening periods, both lifts will default to the ground level to cater for the primary demand for vehicles entering the car park. This variable default positioning of the car lifts will help reduce the wait times for respective cars, improving the efficiency of the car lifts to cater for the peak traffic flows.

Queuing onto Walden lane from the lift operation would only occur when incoming traffic is dominant i.e. the PM peak. For queuing to occur, both lifts would have to be active, with 2 cars in the waiting bays and a further four cars queuing to access the lifts. This equates to a total of 8 vehicles being or waiting to be relocated at the same time. This occurrence is considered highly unlikely as this relates to almost a half of the sites predicted peak traffic inflow of 13vph (as detailed further in Section 6.2) occurring within say a 2 minute window.

Based on the above information, TTM consider the proposed car lift arrangements to facilitate vehicle movements between the basement parking levels is a suitable solution, and the provision for two lifts to service the two basement levels (total of 52 car parking spaces) is more than sufficient to cater for the expected turnover of the car parking spaces ensuring free movement of vehicles internal to the development.

4.5. Proportion of Small Car Bays

Small car bays comprise 7% of parking supply within the development. Following a review of vehicle registration in the Herston area through the DTMR website it is noted that approximately 40% of vehicles registered in this suburb can be categorised as small cars. As such the proposed level of small car parking supply is well below typically small car usage in the area and is considered sufficient for use.

5. Site Access Arrangements

5.1. Access Location & Design

The proposed development will be accessed off Walden Lane given that it is the lowest order road fronting the development. The access will generally facilitate all movements, however, given the form of the surrounding road network it is expected that most traffic will turn right in and right out of the access.

In accordance with the requirements of AS2890.1 the characteristics of the access arrangements are as follows:

- A 6.2m wide Category 2 combined entry/exit driveway crossover is provided. The proposed access driveway has been designed to accommodate the largest expected service vehicle accessing the site, as detailed further in Section 7. - AS2890.1 requires a minimum 3.5-5.5m wide Category 1 combined entry/exit driveway crossover for access to up to 100 parking spaces from a local road.
- The location of the site access is not located within 5m to any other adjacent accesses; with the closest being to the open air car park located on the site directly to the south with provides access onto Walden Lane on the outside of the 90-degree bend in the road. - AS2890.1 requires a minimum 5m separation between adjacent accesses on local roads.
- Sight distance from the access location looking north towards Campbell Street (as shown in Figure 5.1) is in the order of 50m, which satisfies the minimum requirement of 45m in accordance with AS2890.1 for a 50kph road.



Figure 5.1: Sight Distance from Access Looking North (Towards Campbell Street)

As discussed previously, given the reduced forward visibility for southbound traffic on Walden Lane (especially around the corner) and the existing carriageway width between the subject site and Wren Street, which is an average of 5.2m, it is recommended in the interim that one-way operation (eastbound) is formally reinstated on this section of the lane. As shown on Drawing No. 13BRT0578-SK3 included in Appendix C, appropriate signage should be introduced including 'ENTRY PROHIBITED' signs at the intersection of Wren Street/Walden Lane and one-way directional signs along Walden Lane.

- The development provides 10m of queuing to the first parking space and 25m to the car lifts. This queuing provision will be sufficient given the low turnover and small scale of the car park. As previously highlighted in Section 4.4, the capacity of the lift arrangements is expected to not result in any internal queuing back onto Walden Lane.
- The maximum grade of the first 6m of the driveway within the property boundary is no greater than 1:20 (5%) - AS2890.1 requires maximum 1:20 grade over first 6m.
- Given the constrained nature of the site, the required pedestrian site splays at the access have not been fully achieved.

It is anticipated that pedestrian movements not associated with the development proposal would be extremely low. Notwithstanding this, it is recommended that appropriate signage be installed advising drivers of the potential for oncoming pedestrians, and pedestrians for the potential of vehicles exiting the site.

Based on the above information, TTM consider the proposed access arrangements for the development are acceptable.