

Proposed Commercial Development

Hudd Street and Mayne Road, Bowen Hills

TRAFFIC ENGINEERING REPORT

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 30 / 4 / 2012

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1. Introduction

1.1 Background

TTM Consulting has been engaged by Laing O'Rourke to prepare a traffic engineering report investigating a proposed commercial development. It is understood that a Development Application will be lodged with the Urban Land Development Authority (ULDA).

This development represents Stage 1 of a three stage redevelopment of the Queensland Rail land, bounded by Hudd Street, Mayne Road, the rail line and the Inner City Bypass.

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
- ▶ Road upgrades to be provided to mitigate the impact of the proposed development on the external road network, if any.
- ▶ 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
- ▶ Review of the traffic and transport aspects of the proposed development with reference to the Masterplan within the development precinct

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

- ▶ ULDA Bowen Hills Urban Development Area Development Scheme:
- ▶ Australian Standard 2890
- ▶ Queensland Complete Streets
- ▶ Austroads Guide to traffic Management

1.3 Site Location

The site is located at the intersection of Hudd Street and Mayne Road, Bowen Hills, as shown in Figure 1.1. The site has road frontages to both Hudd Street and Mayne Road and is currently occupied by a carpark, utilised by Queensland Rail as parking for train drivers.

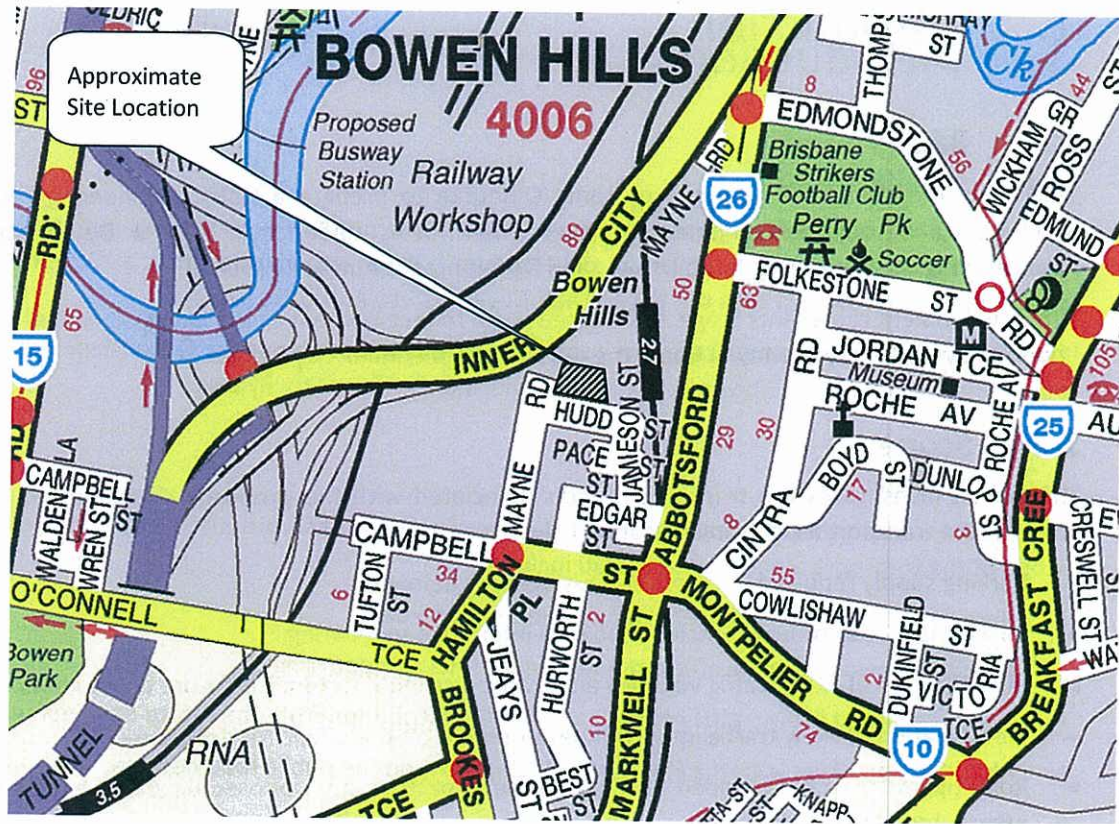


Figure 1.1: Site Location

1.4 Current Site Use

The site is currently occupied by approximately 90 parking spaces which are utilised by Queensland Rail train drivers. These spaces are to be reconstructed in an adjacent lot of the Queensland Rail land as part of this Stage 1 development.

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
Ground level retail/food	1,150m ²
Podium level business	2,065m ²
Commercial Office Space (inc basement)	34,409m ²
Total	37,624m ²

The above GFA will result in a plot ratio on the site of approximately 8, where GFA is calculated in accordance with ULDA requirements.

2.2 Access

The development plan includes a single access driveway, located at the northern end of the Mayne Road frontage. The characteristics of this access include:

- ▶ Driveway width at boundary of 9m
- ▶ Flare configuration consistent with a Brisbane City Council type B2 driveway crossover on the southern side of the access and a B1 flare on the north side.
- ▶ Standard priority controlled access (unsigned t-intersection rules)
- ▶ All turn movements allowed, however left-in/right-out will be minimal as there are no through road connections north of the site

The location of the driveway is opposite the access driveway to the Bowen Hills rail yards. There will be a slight offset of the driveways, giving the rail yard access priority over traffic movements to the proposed development.

2.3 Parking

The development proposal includes parking split between a single basement and four levels of podium parking. The assignment of parking spaces is provided to strictly limit the amount of traffic flow occurring during peak periods. The assignment of spaces is:

- ▶ 188 staff spaces, located in basement/ podium
- ▶ 50 office visitor, located in basement and podium
- ▶ 50 customer service centre/retail visitors, located in basement
- ▶ 76 pool car spaces, located in podium

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			
► Abbotsford Road	60kph	18m	6 (undivided)	23m	Arterial Road	BCC
► Hudd Street	50kph	6.5m	2 (undivided)	9.5m	Local Street	BCC
► Mayne Road	50kph	12.5m	2 (undivided, plus auxiliary lanes)	20.5m	Suburban Route	BCC
► Inner City Bypass	70kph	23m	4 (divided)	34m	Arterial Road	BCC
► Jamison Street	50kph	7m	2 (undivided)	10.5m	Local Street	BCC
► Campbell Street	60kph	12.5m	4 (undivided)	20m	Arterial Road	BCC

Mayne Road at the site frontage includes an auxiliary left turn lane into the rail yard site. This lane is separated from the main carriageway by a short raised median.

The intersection of Mayne Road and Hudd Street is priority controlled. The intersection of Mayne Road and Campbell Street is fully signalised.

3.2 Road Planning

TTM provides the traffic planning to the ULDA with respect to the future road requirements throughout the Bowen Hills UDA. The neighbourhood surrounding the development site is expected to undergo significant urban redevelopment in the coming years and, as such, is subject to significant road planning requirements. These include:

- The connection of Hudd Street east, bridging the rail corridor, to Abbotsford Road
- Widening of Hudd Street road reserve to accommodate a future 4 lane configuration
- Potential connection of Mayne Road, north, over the rail corridor, to Abbotsford Road
- Reconfiguration of the local road network, south of Hudd Street

In the wider road network, the Airport Link project, which is scheduled for completion by mid 2012, provides a connection to Bowen Hills at Campbell Street, 200m south of the development site. It is expected that the commencement of this new major road infrastructure will change traffic patterns on the major road network in the vicinity of the development site.

3.3 Public Transport and Pedestrian Facilities

Bowen Hills train station is located immediately east of the site. This station provides services to all Brisbane metropolitan lines. Services to most lines operate every 10 minutes (approximately) in peak periods and every 30 minutes in the off-peak. Connections to the CBD are far more regular, with service every few minutes.

Brisbane Transport has bus routes that utilise Campbell Street, with the nearest on-street bus stop being located approximately 330m to the south of the site, on Hamilton Place near Jeays Road. This stop services route 393, which operates east-west across Bowen Hills, connection Newstead to Bowen Hills Station and the northern busway. It is understood this route will be redirected along Hudd Street, once it is connected to Abbotsford Road.

Buses also travel along Abbotsford Road with the nearest on-street stop approximately 150m from the site, adjacent to the train station. Routes serviced by these stops operate between the city and the wider northern suburbs.

Formal pedestrian footpaths are located on both sides of all roads in the vicinity of the site. Pedestrian connections over the train line are also provided at both ends of Bowen Hills train station, connecting the site to Abbotsford Road.

Dedicated onstreet cycle lanes are located east of Abbotsford Road around Perry Park. However, this part of the bikeway network is disconnected from other bikeways in the area.

4. Car Parking Arrangements

4.1 Council Parking Supply Requirement

ULDA parking requirements for this type of development, located in Precinct 1b of the UDA, are limited to 1 space per 200m² of GFA. For the 37,624m² of GFA, this equates to a maximum parking provision of 188 spaces.

The above parking supply is to include PWD parking in communal parking areas. The general requirement is a minimum of 1 PWD space per 100 standard spaces. As such, 2 PWD (Class 5) parking spaces are required.

The development brief also aims to provide a 6 star, as such, the development plan includes a significant number of small car bays, generally located adjacent to foyer entry points.

4.2 Estimated Practical Parking Demands

The proposed development is a purpose built facility for a long term government tenant. As part of the operation of this site, a number of different categories of car parking are required to cater for the operation of the site.

To meet these requirements, the following parking provision is proposed:

- ▶ 188 parking spaces for the major tenant to be utilised as staff parking
- ▶ 76 spaces to be reserved for pool cars
- ▶ 50 publically accessible spaces, reserved to service visitors to the major tenant
- ▶ 50 publically accessible spaces to service visitors to the customer service centre and retail

This will result in a total parking supply of 364 spaces, which is approximately 1 space per 103m².

Two of the uses above, namely pool cars and visitors, are to be provided in addition to the core parking provision for a commercial development, above the maximum 1 space per 200m².

Pool Cars

With respect to pool cars, these will be vehicles which are located on-site at all times, other than for official business of the tenant. Therefore, these vehicles will only be active during business hours and will remain stored on-site overnight. Again, these spaces are in addition to the core demand for staff.

Visitor Cars

The first use for visitors will be to access a proposed government customer service centre. It is generally considered impractical to expect the majority of irregular visitors from a wide variety of surrounding suburbs to utilise public transport to access this type of facility. As such, visitor parking is to be provided in addition to the core parking requirement of the site. The development will also provide visitor parking for the office uses, over and above staff parking.

Visitor parking on-site is considered necessary in this location given the lack of alternative provisions. For instance, in the CBD and Fortitude Valley, where a maximum parking rate of 1 space per 200m² applies, in addition to on-site parking and a limited on-street supply, there are also a large range of commercial parking sites, suitable for short term stay. There are no such facilities within a reasonable distance of this site and therefore any visitor parking demand would need to be fully catered for on-street.

This corresponds with the ULDA guidance (page 22 of the Bowen Hills Urban Development Area Development Scheme) to allow additional interim parking in the precinct, until such time as the railway station is upgraded.

TTM has reviewed the local on-street supply and determined that there are approximately 35 spaces available within 200m of the site. These spaces already have demand from surrounding uses, resulting in a free supply of 15 to 20 spaces. It is expected the proposal will produce visitor demand in excess of this, leading to a congested parking situation in the vicinity of the site.

Within the wider Precinct 1 area, a number of the surrounding sites will be redeveloped to mixed use as part of the urban renewal. As this occurs, the visitors to the site will be increasingly drawn from a local catchment. In particular, as the developing UDA results in an increased population, the customer service centre and retail/food uses will increasingly draw on the local population, reducing demand for visitor parking to the Stage 1 building.

It is therefore considered appropriate to provide additional, publically accessible parking, on this site given the lack of alternative parking options currently available. It should however be conditioned that a minimum of 76 spaces are provided as pool cars and that the visitor areas are available to the general public.

The impacts to external traffic operation of these spaces, above the development scheme allowance, are discussed further in Section 5 of this report.

4.3 Car Park Layout

Table 4.1 identifies the characteristics of the proposed parking area with respect to Australian Standards (AS2890.1). These standards are typically utilised for assessing developments within the UDA. For comparison, TTM has also included the corresponding Brisbane City Council requirements. The last column identifies the compliance of each design aspect. Where compliance with Council is not achieved, further information is provided below.

Table 4.1: Parking Supply Requirement

Design Aspect	AS2890.1 Requirement	Proposed Provision	Compliance	Council Requirement
Parking space length:				
▶ Standard bay	5.4m (min)	5.4m	Compliant	5.4m (min)
▶ Small Car	5.0m (min)	5.0m	Compliant	
Parking space width:				
▶ Staff	2.4m (min)	2.5m (min)	Compliant	2.4m (min)
▶ Visitor	2.6m (min)	2.6m (min)	Compliant	2.6m (min)

▶ Small Car	2.3m (min)	2.5m (min)	Compliant	2.3m (min)
▶ Disabled Access	2.4m (min) + 2.4m wide shared area	2.4m (min) + 2.4m wide shared area	Compliant	2.4m (min) + 2.4m wide shared area
Aisle Width:				
▶ Parking aisle	5.8m (min)	6.0m	Compliant	6.2m (min)
▶ 2-way circulation aisle/ramp	5.5m (min), plus clearances	6.5m	Compliant	6.5m (min)
▶ 1-way circulation aisle/ramp	2.9m (min), plus clearances	2.85m to wall	Not Compliant	3.0m (min), plus clearances
Parking envelope clearance - Column intrusion	0.25m into bay for 0.3m & 0.2m into bay for 1.2m at front of bay	No intrusions at front of bay	Compliant	0.2m into bay within 0.6m of front of bay
Parking envelope clearance - Column adjacent to bay	Located between 0.75m and 1.75m of aisle	Additional space width and column clearance provided	Compliant	Located between 0.8m and 1.8m of aisle
Parking envelope clearance – space adjacent to wall	Space 0.3m clear of wall	Space 0.3m clear of wall	Compliant	Space 0.3m clear of wall
Maximum Gradient:				
▶ PWD parking	1:40 (2.5%)	Level	Compliant	1:40 (2.5%)
▶ Parking bay	1:20 (5.0%)	1:20 (5.0%)	Compliant	1:15 (6.7%)
▶ Parking aisle	1:16 (6.25%)	1:20 (6.25%)	Compliant	1:20 (5.0%)
▶ Ramp	1:5 (20%)	1:6 (20%)	Compliant	1:6 (16.7%)
Maximum Ramp Transitions	12.5% summit 15.0% sag	16.7% 16.7%	Not Compliant Not Compliant	8%
Height Clearance				
▶ General Min.	2.2m (2.3m PWD)	2.3m	Compliant	2.3m
▶ Over PWD bay	2.5m	2.5m	Compliant	2.5m
Parking Aisle Extension	1m beyond last bay	1m beyond last bay	Compliant	2m beyond last bay

The proposed carpark layout generally complies with all requirements of AS2890.1 and is therefore considered suitable. It is also noted that the plan generally complies with Council requirements for parking configuration.

The exceptions to this are the width of the aisles on the basement ramp and the localised ramp grade transitions in the basement level.

Figure 4.1 identifies that the proposed ramp width to the basement is not sufficient to cater for one lane traffic due to the proposed columns down the centre of the ramp.



Figure 4.2 demonstrates how the ramp between RL12.5 and RL13.5 in the basement is to be amended. This results in a maximum peak grade of 1:12 (8.3%) and a maximum sag grade change of 1:8.5 (11.67%).



As identified in Section 4.2, there are a number of proposed designations for the parking spaces within the basement level. Areas are to be designated to staff, visitors and pool cars. Each of these areas is to be secured to ensure access is limited to only those allowed to access the specified parking area. This includes reserving parking for staff with no public access, as well as ensuring staff do not utilise visitor spaces as all day parking.

As such, it is envisaged that several lines of security will be established throughout the development and that virtually all spaces will be behind at least one line of security.

Figures 4.3 and 4.4 identify an indicative parking designation and security points for the site. This generally includes:

- ▶ Basement parking to provide visitor parking – security point to provide ticket allowing 3 hour limit to remove commuter access.
- ▶ Podium level 1 to provide a mix of visitor parking and staff parking, with 3 security points:
 - The first to be passed by all cars – pool cars and staff with security access (via swipe card or similar) and tickets dispensed to visitors to limit parking to short term casual
 - Additional security points provide access for staff/pool cars only
- ▶ Podium levels 2 to 4 to provide pool parking and staff parking

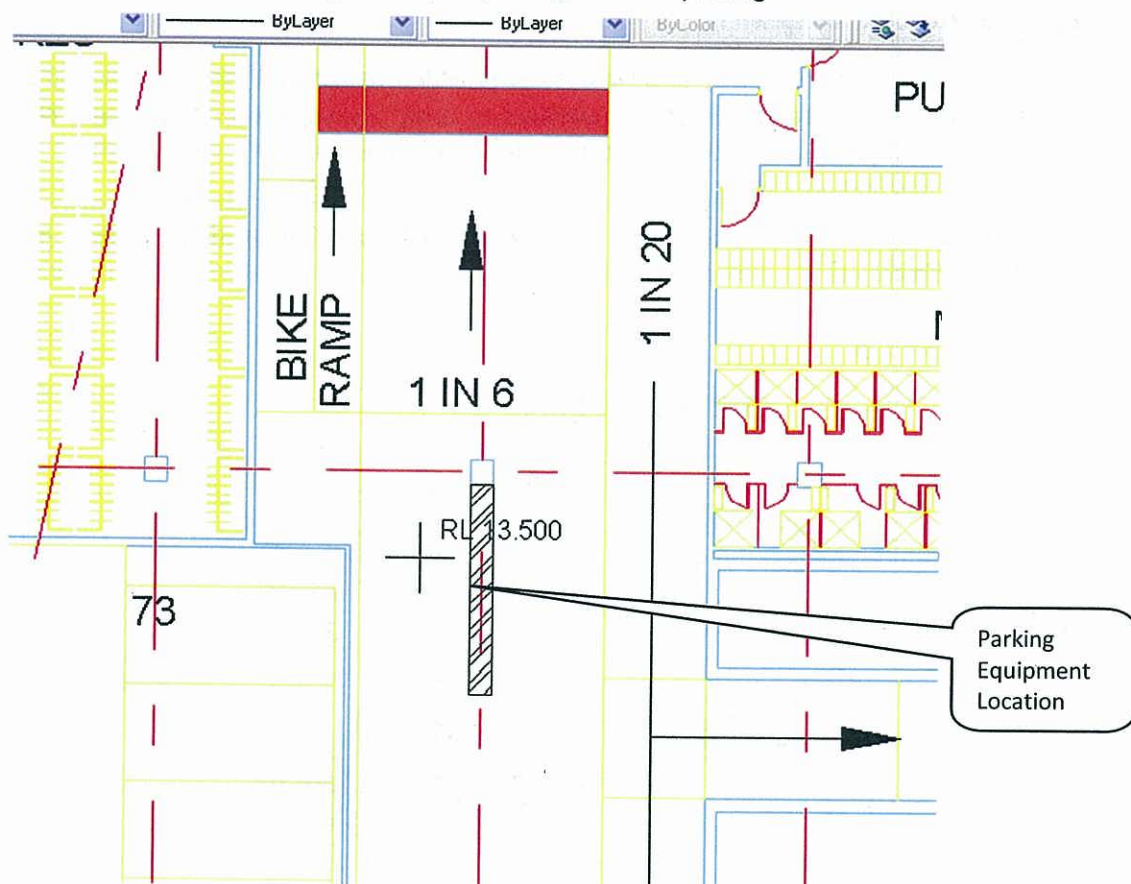


Figure 4.3: Potential Parking Equipment to Basement Level

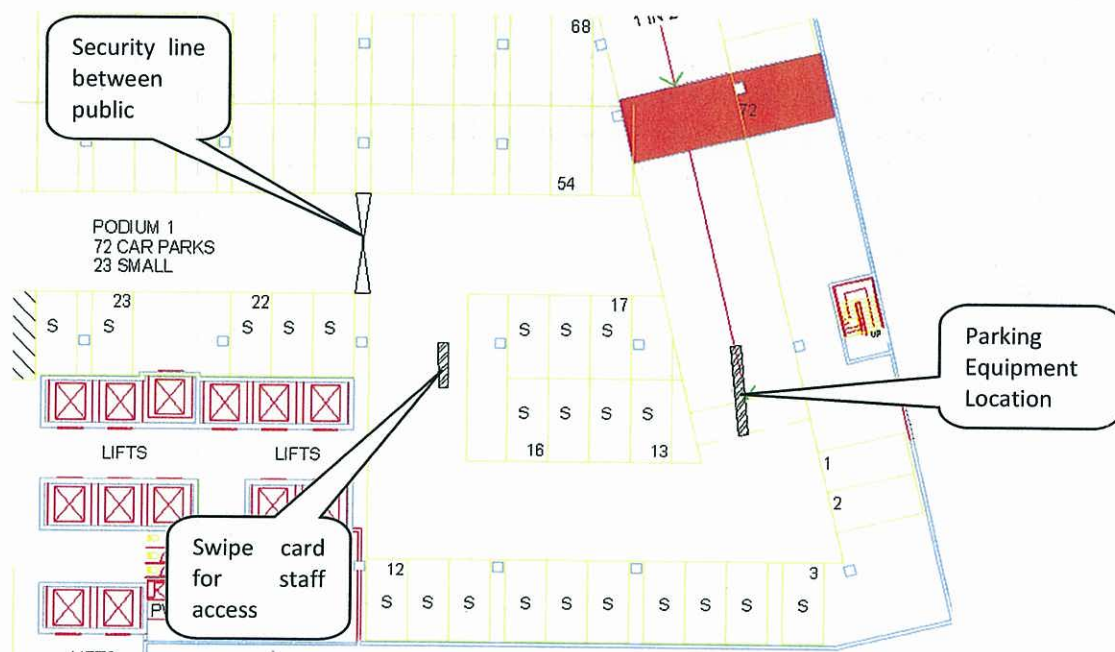


Figure 4.4: Parking Equipment to Basement Level

For the location shown in Figure 4.2, it is noted that the ground to podium ramp is 40m long. This is several meters longer than required for 5.5m level change at 1:6. As such, the top of the ramp can be level out to 1:20 to allow queuing at the access point.

The details of the security protocols may be determined at a later date as there are a range of different technologies and methodologies to manage this. However, it is noted that some degree of parking infrastructure, such as boom gates and ticket machines will be required to provide the parking security and restrictions. Therefore, localised aisle widening may be required to allow this infrastructure.

4.4 Cyclist Provision

The proposed development includes a 250 space, Austroads Class 2, cyclist parking facility in the basement. This includes the following end of trip provisions:

- ▶ 250 cyclist spaces within a communal, lockable cage
- ▶ Access to 250 lockers at 1 per space
- ▶ Access to 25 showers (1 per 10 cyclist spaces)
- ▶ Locker and shower facilities split 60% male, 40% female

Currently the development plans identify the full requirement which exceeds 1 space per 100m² of GFA across the site for staff. This provision is significantly in excess the Council Requirement of 1 space per 500m². TTM has also compared the provision against the QDC MP4.1 Sustainable Buildings Code. This recommends 1 space per 30 occupants, resulting in this supply catering for a population of up to 7,500 people.

TTM recommends that the proposed cyclist facilities are implemented in stages based on a demand need. This may extend to the facility providing a local cycle centre for the precinct and adjacent train station.

Further investigation is required with respect to the proposed cyclist access ramp. The current design is 1.2m wide and indicated at 1:6, with several right angle turns. This ramp will require a maximum grade of approximately 8% and a width of 1.5m to ensure safe and efficient access is provided. These requirements are more associated with down-hill movements, especially where the ramp turns at 90 degree bends.

The proposed development also includes more casual (Class 3) cyclist parking on the ground level for up to 44 visitors.

5. Traffic Impact Assessment

TTM has developed a comprehensive micro-simulation model for the Bowen Hills UDA. The purpose of this model is firstly to identify the road works and network upgrades required to cater for the intended urban renewal in accordance with the ULDA Development Scheme for Bowen Hills.

Secondly, the model is to be utilised to identify the expected impacts of a development which is not in accordance with the ULDA Development Scheme.

In developing this model TTM has made a number of assumptions regarding the expected development and traffic characteristics for each precinct of the UDA. For precinct 1b, TTM has identified a realistic GFA of approximately 100,000m². This accounts for significant land requirements for public space, including roads and the plaza, as well as a significant land dedication to the rail corridor.

While in planning terms these land uses may not necessarily restrict the developable GFA of the current site area, in practical terms, these land requirements significantly restrict the physical area available to create a building footprint. It is also understood that the geology of the site, which includes very hard rock across much of the site, makes it very difficult to provide basement and therefore significant podiums are required to provide for parking.

Since the development of the base model a number of likely infrastructure changes have been identified in this area. This includes the removal of the rail corridor widening requirement and uncertainty with respect to the Mayne Road connection to the north. The removal of these land requirements increases the potential footprint of the stage 2 building and as such, the overall base GFA in accordance with the ULDA Development Scheme in Precinct 1b, is likely to exceed 100,000m².

TTM has considered these factors when examining the traffic impact of the proposed development, relative to the planning scheme.

5.1 Estimated Development Traffic Generation

Parking within the development is significantly restricted with respect to an unconstrained commercial development. Furthermore, there are several specialist parking areas within the development. As such, the traffic generation for the proposed uses has been calculated based on first principles.

Surveys undertaken by TTM for the purpose of the ULDA modelling suggest that the peak hours for the local road network are 7.30am to 8.30am and 4.30pm to 5.30pm weekdays. The model also includes the shoulder peak periods, 30 minutes either side of these peaks. The following assessment considers both these peak periods and the shoulder periods.

Commercial Carpark

The standard traffic generation rate for commercial car parks, in accordance with Transport and Main Roads Standards is 2 vehicle movements per hour per 100m² of GFA, during peak periods. This relates to a standard parking provision of 1 space per 30 m² of GFA. This later figure can be converted to 3.33 spaces per 100m² of GFA. As such, there are 1.667 parking spaces for each traffic movement, or conversely 0.6 movements per bay.

That is, approximately 60% of parking spaces generate a vehicle trip during the peak period. As the proposed development has a restricted parking provision for this use (i.e. 1 space per 200m²), to determine the traffic generation, TTM utilises this ratio with respect to the parking supply.

The proposed development includes 190 staff spaces and as such, is expected to generate 114 vehicles per hour (vph) in the peaks, for these spaces.

These spaces will be split 80% (92 vph) inbound and 20% (22 vph) outbound in the AM peak, with the reverse in the PM peak.

Shoulder peaks have generally been modelled as 80% of the peak. This equates to 74vph in the peak direction and 18vph against the peak.

Visitor Parking

Typically office hours commence at 8.30am and finish at 5pm. As such, the requirements for visitors to attend the site for meetings and appointments are generally restricted to these times. It is also noted, that as with staff parking, only a portion of spaces are utilised at the commencement and conclusion of the day, with the peak likely to occur during the middle of the day.

Applying the same factors to visitors, as staff, it is expected that in the first and last hour of parking demand, traffic is generated at 60% of the number of bays. Therefore for the 50 spaces, 30 vehicle movements are expected in the first and last hour of operation.

Visitors will be expected to arrive from 15 minutes prior to the first appointment, therefore from 8.15am. Additional movements may occur before this, however these would be negligible. Similarly, virtually all visitors will have departed by 15 minutes after the last appointment, i.e. 5.15pm. As such, the 60vph are expected from 8.15am to 9.15am and 4.15pm to 5.15pm.

Comparing this to the AM peak hour (7.30am to 8.30am), an additional 8vph will be generated. A further 15vph will be generated in the shoulder peak period (8.30am to 9.00am). For PM peak hour (4.30pm to 5.30pm), an additional 23vph will be generated. A further 15vph will be generated in the shoulder peak periods (4.00pm to 4.30pm).

For the Customer Service Centre, the AM commencement is the same, however these sites typically close at 4.30pm. As such, the visitors are expected to generate an additional 8vph in the PM peak hour. A further 15vph will be generated in the shoulder peak period, as per the impact on the AM peak.

Pool Cars

Again TTM utilises the 605 generation for these movements. As such, the 80 pool cars will generate 48 movements in the peak hour. However, the difference for these vehicles will be the directional split. It is assumed that virtually all of these movements will be outbound in the AM peak and inbound in the PM peak.

Total Traffic Generation

The total traffic generation in the peak periods, above that estimated in the ULDA Development Scheme, is summarised in Table 5.1 below.

Table 5.1: Development Traffic Generation

Use	Staff (All Uses)	Pool Cars	Visitors		Total	Above UDA Allowance (excl staff)
			Commercial	CSC		
Parking Spaces	188	76	50	50	364	176
Maximum Generation (0.6vph per space)	113	46	30	30	219	106
7.00AM to 7.30AM						
▶ Total	45	23	0	0	68	23
▶ Inbound	36	0	0	0	36	0
▶ Outbound	9	23	0	0	32	23
7.30AM to 8.30AM						
▶ Total	113	46	8	8	175	62
▶ Inbound	91	0	8	8	107	16
▶ Outbound	22	46	0	0	68	46
8.30AM to 9.00AM						
▶ Total	45	19	15	15	94	49
▶ Inbound	36	2	12	12	62	26
▶ Outbound	9	17	3	3	32	23
4.00PM to 4.30PM						
▶ Total	45	19	15	15	94	49
▶ Inbound	9	17	3	3	32	23
▶ Outbound	36	2	12	12	62	26
4.30PM to 5.30PM						
▶ Total	113	46	23	8	190	77
▶ Inbound	22	46	0	0	70	46
▶ Outbound	91	0	23	8	122	31
5.30PM to 6.00PM						
▶ Total	45	23	0	0	68	23
▶ Inbound	9	23	0	0	32	23
▶ Outbound	36	0	0	0	36	0

The results identify the traffic volumes to be entered into the current base model and the ultimate development scenario. The volumes in the Total column, represent the values to be entered into the current base model to determine what, if any, ULDA infrastructure works are required to cater for the development.

The volumes in the last column are entered into the 2026 model, to determine if these traffic volumes will trigger any additional infrastructure requirements with respect to the development.

Existing Development Traffic

The current use on the site is to be relocated in to the Stage 2 lot. As such, in the short term, there will be no variation in the traffic generated by the existing uses. However, when considering the ultimate development scenario for Precinct 1b, it is assumed that all existing parking spaces for Queensland Rail will be removed and movements replaced by appropriate urban renewal developments.

5.2 Estimated Development Traffic Distribution

The distribution of development generation traffic is in accordance with that specified in the base TTM model parameters. This distribution provides identifies that staff and customers will generally approach the UDA from all directions, with the focus on trunk routes.

5.3 Outcomes of Assessment

TTM has provided a copy of the preliminary traffic impact assessment of the proposed development to the ULDA to be assessed in parallel with this application. This assessment includes the re-configuration of the local road network to remove the Mayne Road connection to Abbotsford Road, north of Precinct 1b, essentially establishing an amended base case for the model.

This has been undertaken as a preliminary assessment, due to the time constraints associated with the development application process. As such, the only cases assessed are the AM and PM peak periods in 2026.

This analysis compares the (amended) base case, with the development proposal. The base case includes an allowance for the site to be provided in accordance with the planning scheme (i.e. allowing 188 parking spaces for the proposed commercial GFA). The development case then allows for the impact of the additional 176 parking spaces and associated traffic as defined in Table 5.1.

A comparison of these two cases is then undertaken to identify any additional road works required as a result of the proposed development.

This preliminary analysis has focussed on the area through Precinct 1, including Hudd Street, Mayne Street, Campbell Street and Abbotsford Road. A broader check of the wider UDA road network has also been undertaken.

This assessment has identified that the impact of the additional development traffic on the local road network is negligible with no further works required to cater for the future operation of the UDA road network.

6. Site Access Arrangements

The vehicular access to the development is to be located on the Mayne Road frontage on the western side of the site. It will service both cars and service vehicles, with all turn movements provided. However it is noted that the nature of the local road network will result in virtually all vehicle movements being right-in/left-out.

To assess the suitability of the proposed access, TTM has assessed the crossover against Brisbane City Council requirements.

6.1 Council Requirements

With regard to site access, Council guidelines require the following:

- ▶ a low/medium turnover carpark with a capacity between 250 and 500 vehicles and access from a minor road to incorporate a 9.5m wide Type C1 driveway crossover.
- ▶ a driveway located on a minor road and catering for LRV/RCV service vehicles, to incorporate a 7m wide Type B2 driveway crossover
- ▶ a driveway on a minor road to be not less than:
 - 10m from a minor intersection
 - 20m from a major intersection
 - 3m from an adjacent driveway
 - 10m from a median break
 - Clear of queuing at signals
- ▶ Sight distance (for access to over 250 parking spaces from a 50kph minor road) to ideally be 90m, and a minimum of 70m.
- ▶ Sight distance to pedestrians is to incorporate 2m by 5m clear triangle adjacent to each side of the access driveway
- ▶ an exit queue capacity of 8 vehicles (i.e. 48m) is required for carparks with a capacity of 370 spaces
- ▶ the first 6m of driveway inside the site boundary to be no steeper than 1in20

6.2 Proposed Access Arrangements & Their Adequacy

The proposed access is to be provided as a 9m wide, modified type B2 driveway. This is considered an appropriate compromise between a dual carriageway, 9.5m wide type C2 access for cars and a 7m wide type B2 for service vehicles.

The crossover will provide a type B2 flare to the south, to facilitate the predominant right-in/left-out movement, with a type B1 flare to the north.

The location of the access is immediately south of the opposing access driveway to the QR Rail yards. The road configuration of the network in this locality is conducive to design speeds significantly less than 50km/hr, with a sharp bend in the road 40m north of the site, leading into a carpark area. In the future, this will be replaced by a 90 degree bend into the local road network of Precinct 1b. As such, while only 50m of sight distance is available to the north, this is considered appropriate, due to the low design speed.

To the south, sight distance is clear over 90m, through the Hudd Street intersection.

The major relaxation sought with respect to the access will be internal queuing. The current plan allows for 12m, equivalent to 2 cars. This queue zone is to the first internal intersection only, with no impact from parking space manoeuvring.

This intersection is configured as a t-intersection, with priority generally provided to inbound movements. The critical movement with respect to congestion into the queue zone, will be the right turn towards the basement, which is required to give way to traffic exiting the podium level.

TTM has reviewed the peak hour cases identified in Table 5.1. These identify that the peak hour movement to the basement (visitor car park) will be up to 30 vehicle per hour in the AM peak. At this time, the traffic flow will give way to up to 60 vehicles per hour, outbound from the podium levels. These traffic volumes are insufficient to disrupt the free flow operation of a t-intersection. As such, no significant queues are expected to form and free influx of vehicles to the site will be provided.

The current plans also identify a short ramp grade at the access of 1:6. This is not suitable for a queue zone, nor to be traversed by service vehicles. TTM has identified that a 1:20 grade can be accommodated from the site boundary, for a length of approximately 15m into the site, to achieve the ground floor level of RL15.5. This 1:20 ramp will terminate adjacent to the ramp down to the basement level (approximately at column grid line C).

This ramp will have some impact on headroom in the basement level. Under this location is the cyclist storage facility. As such, the back corner area of this facility may have a reduced standing height down to 1.5m. This is suitable as it is localised within the cyclist storage area, not a major thoroughfare or facilities area.

7. Service Vehicle Arrangements

To assess the required number of service bays for the development, TTM has referred to the Brisbane City Council requirements for service vehicles. Other service vehicle provisions are generally in accordance with AS2890.2.

7.1 Council Requirements

The proposed development includes both commercial and retail/food uses. For the commercial development, totalling approximately 36,000m², Council requires the following:

- ▶ Regular access from a minor road for a medium rigid vehicle
- ▶ Occasional access for a refuse collection vehicle
- ▶ Service bays to accommodate:
 - 1 LRV
 - 2 MRVs
 - 2 SRVs
 - 5 vans

For the retail/food development, totalling approximately 1,800m², Council requires the following:

- ▶ Regular access from a minor road for a LRV
- ▶ Occasional access for an articulated vehicle
- ▶ Service bays to accommodate:
 - 1 MRV
 - 2 SRVs
 - 2 vans

7.2 Estimated Service Vehicle Traffic Generation

Typically, for a mixed use development, it is appropriate to identify the service vehicle requirements for each individual use and then supply the maximum requirement for any individual use to provide for the full development. This can be achieved through the provision of a managed bay and through the demand share available through the various peak service vehicle requirements for each use.

As identified above, the maximum requirement is to service the commercial part of the development. As such, a loading bay comprising the following is considered appropriate:

- 1 LRV
- 2 MRVs
- 2 SRVs
- 5 vans

The requirement for occasional access for an articulated vehicle is also considered excessive for the scale and type of development. However, the 9m wide access an internal service area would potentially allow an AV to access the site, stand wholly in the site and reverse back onto Mayne Road.

7.3 Proposed Service Vehicle Arrangements & Their Adequacy

The development proposal includes a 5 bay service vehicle area, suitable to cater for the larger vehicle requirements. Vans can generally be accommodated on the basement level in the public parking area.

Figures 7.1 to 7.3 identify the critical turn vehicle movements for the LRV and MRV bays. TTM has identified one column to be relocated (at grid L6) to accommodate truck movements. The relocation of this column also facilitates a more practical solution for vehicle movements and priorities. The figures below also identify some additional line marking and priority definitions in this area.

As identified in Section 6 above, the grade of 1:6 shown at the access is to be amended to a maximum of 1:20.

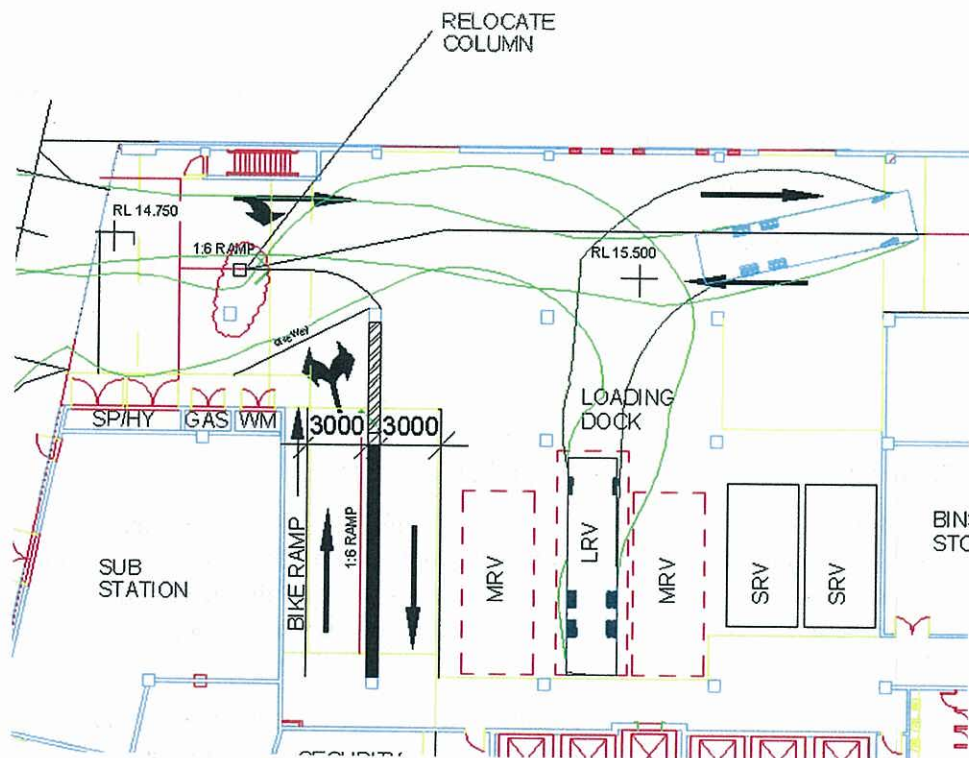


Figure 7.1: LRV Manoeuvring

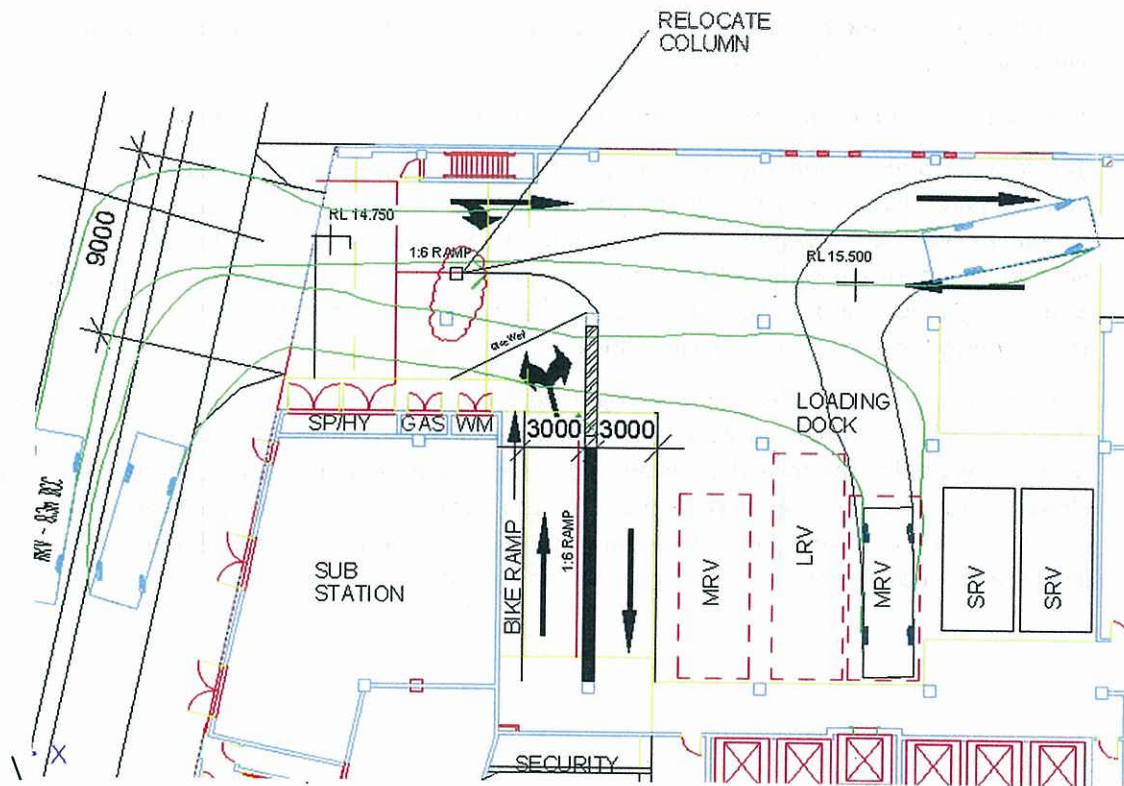


Figure 7.2: MRV Manoeuvring (1)

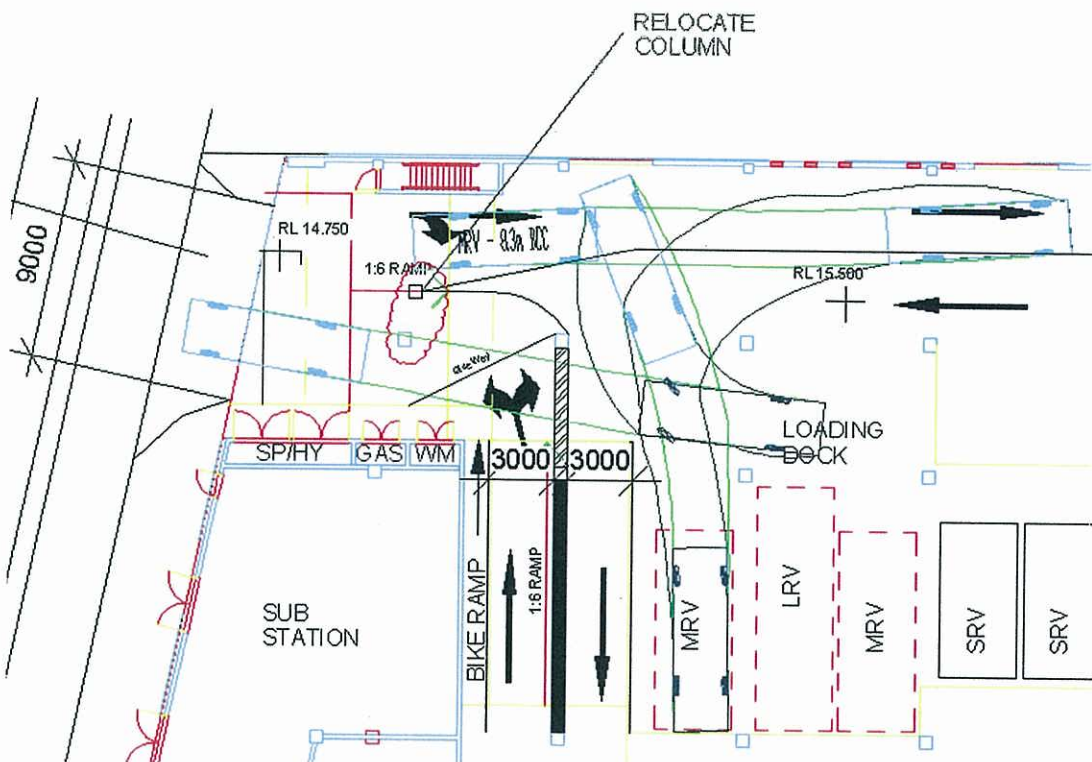


Figure 7.3: MRV Manoeuvring (2)

All movements in the preceding figures allow a minimum 300mm clearance (and general 500mm clearance) to all parts of the structure.

SRV access has also been tested, however is not considered a critical movement.

The turn diagrams identify that no vehicle will encroach on the podium level ramp. There will be some requirement for exiting trucks to give way to cars. This includes the requirement for MRV's to exit between column grids 5 and 6 (immediately adjacent to the basement ramp). These vehicles will both cross the basement ramp and merge with traffic exiting the podium level. Stringent give way priority control will be required, including potential provision of automated traffic controls to ensure that vehicle conflict is avoided.

With respect to refuse collection, the height clearance in the basement is likely to be limited to 4.5m. As such, any refuse collection arrangements established with a commercial collector will need to ensure that the collection system allows for limited height clearance vehicles. This will not allow for standard overhead collection of industrial refuse bins and will more likely be limited to rear load refuse collection. This refuse collection is likely to occur off peak, allowing full utilisation of the service vehicle area for standing and manoeuvring.

8. Structure Plan Integration

The proposed development forms Stage 1 of the redevelopment of the Queensland Rail land. This is also classified as precinct 1b in the ULDA Bowen hills Development Scheme. Part of the requirements with respect to this an application over this site is to provide a structure plan proposal over the entire precinct, to ensure that the proposed development is complimentary to the ultimate precinct planning.

Following discussions with the ULDA, it has been identified that several options with respect to the structure plan for the precinct would be appropriate as to allow flexibility for the future scenario. These options are primarily concerned with the provision of a road/laneway running north/south between the site and Bowen Hills train station and the solutions provided to activate as much podium as practical through the precinct.

With respect to these options, there are a number of key principles regarding pedestrian movement, vehicle access (road connections) and bus movements.

8.1 Proposed Structure Plan

While several options have been prepared, the general components of the plan with respect to transport remain relatively consist.

The structure plan allows for three stages. The first is the subject site, located wholly within Precinct 1b of the UDA at the intersection of Hudd Street and Mayne Road. Stage 2 is the balance lot of the Queensland Rail land (and Precinct 1b) which includes land to the north and east of the subject site. Stage 2 also has road frontages to both Hudd Street and Mayne Road. Stage 3 is a proposed as a building over the rail corridor at the southern end of Bowen Hills Station, fronting Hudd Street. While this development will be connected to Precinct 1b, including an access from the precinct, the site is generally located within the UDA Precinct 1.

8.2 Road Network

The Bowen Hills Development Scheme identifies that both frontage roads are to receive significant upgrades as part of the proposed urban renewal. Huss Street is to be widened to a 4 lane road and connected over the rail line to Abbotsford Road. All identified land resumption requirements with respect to these upgrades are to be sourced from the southern side of Hudd Street, with no land requirement from Precinct 1b.

The primary structure plan issue with respect to this connection relates to the bridging of the rail corridor. To provide a road level 6.4m above the rail line, it is necessary to commence grading up to the bridge at a point on Hudd Street adjacent to the eastern boundary of Stage 1. As such, any structure planning for the section of land between stage 1 and Bowen Hills Station must address that the existing road level of Hudd Street will ultimately be raised.

Mayne Road is also proposed to cross the rail line to provide an additional connection to Abbotsford Road further north. However, advice from the ULDA is that this connection is now doubtful and should not be included in current structure planning.

The final road requirement for structure planning is to provide access to Stage 2 and the train station from Mayne Road. Original concepts identified a need for a loop road around Stage 1, connecting Mayne Road to Hudd Street, adjacent to the train station.

TTM has reviewed this proposal and identified that the completion of this loop road is not a necessity of the Masterplan. As discussed in the following sections, the requirement for buses to circulate this portion of the site is no longer required. As such, a connecting loop is unnecessary for this function. Also discussed below are the implications of a loop road on pedestrian connectivity.

TTM has also identified a number of issues with providing a road connection to Hudd Street. Firstly, the future regrading of Hudd Street will alter the level at which an intersection is formed. This may impact the timing and staging of the provision of a road connection. Additionally, with Mayne Road no longer likely to provide a connection to the north, the functionality of Hudd Street will shift more towards traffic flow, rather than access. Therefore, reducing the priority and number of intersections along Hudd Street is desirable. Finally, any additional intersection connections to Hudd Street may be in conflict with the bridge structure, or its approaches, both directly and indirectly due to road configuration requirements.

As such, the road link between Stage 1 and Bowen Hills Station is considered undesirable.

The benefits of the link are that the road network through Precinct 1b will be completed. Removing this link requires that any road into the precinct is provided as a cul-de-sac, enclosing the neighbourhood. As such, options have been provided for the structure plan to cater for this road link.

If the link is provided, it is recommended that it is provided as a one-way, left-out exit to Hudd Street. The road section should also be narrow,, low speed and potentially incorporate shared zones, to retain the integrity of pedestrian movements in the area.

With respect to the development proposal, the ground floor tenancies will be approximately 1.5mm above the potential street level for this link. As such, the development will not have any direct access onto this frontage for pedestrians or vehicles. Therefore, from the options produced, the proposed development will compliment any combination of local road requirements.

8.3 Bus Movement

Translink has provided further advice that a bus station is no longer required in this location. This is due to only a limited number of potential services (including the existing route 393) which could utilise a bus station. As an alternative, it is proposed that bus stops are provided on Hudd Street to provide convenient linkages to Bowen Hills train station.

The proposed four lane configuration will accommodate kerb-side bus stops, with no requirement for indented bus bays. This will adequately cater for the occasional nature of bus movements in Hudd Street.

With respect to the development proposal, the pedestrian access to the site generally addresses the Hudd Street frontage. As such, the development is more appropriately serviced by bus facilities on Hudd Street, than internal to Precinct 1b.

8.4 Pedestrian Connectivity

All options for the structure plan identify a plaza space to be developed between the subject site and Bowen Hills Station. It is preferable that this space is reserved largely for pedestrian amenity only for movement between the station and the local development precincts. This plaza will potentially provide a publically accessible space along the entire precinct frontage to the rail corridor. This enables access to proposed enhanced crossings of the rail corridor to facilitate pedestrian movements across the rail corridor at either end of the train station.

The development of this plaza is considered integral to the wider structure plan and the access

Locally, the intersection of Hudd Street and Mayne Road is ultimately expected to be signalised, providing local pedestrian connections across the adjacent road frontages to access surrounding development areas.

The development proposal provides all pedestrian access points to the Hudd Street frontage, with the primary access point at the intersection of Mayne Road. Pedestrian access will also be provided in the south eastern corner of the site, fronting Hudd Street. This will provide direct access to the plaza area, through to the train station.

8.5 Conclusion

Access to the site, with respect to vehicles and pedestrians, will be focussed on the existing road frontage. As such, the development of Stage 1 will not significantly impact the opportunity to further develop the structure plan area. This will allow any of the proposed options to be further explored in the future.

9. Recommendations

9.1 Impact on Surrounding Road Network

Preliminary assessment of the proposed development indicates that the development will not have a significant impact on the future UDA road network. As such, no further mitigating road works are required.

The site will be limited to its standard transport infrastructure charges contribution under the ULDA Bowen Hills Development Scheme.

9.2 Development Access

The access is recommended as a 9m wide modified type B2 intersection. This will include a Type B2 flare to accommodate the predominant movement to and from the south. A type B1 flare is then provided to the north.

The access grade is to be amended to 1:20, which will impact localised head clearances in the cyclist storage area in the basement.

Finally, the development access will provide 2 cars queue provision. This is expected to be sufficient on the basis that the first internal intersection will need to cater for 190 vehicles per hour, most of which will occur without significant conflict and therefore limited queuing.

9.3 Car Parking Arrangements

The proposed development exceeds the allowable maximum for this area by 176 spaces. As discussed in section 4 of this report, the limitation of parking to 1 space per 200m² in other urban areas is usually supplemented with paid commercial car parks.

This area currently provides no such facility. As such, the additional parking will initially allow the development of the individual lot in an area where further development of the transport network is proposed in the future.

Additionally, the traffic generated by the expanded carpark, is considered appropriate to be contained within the proposed future development of the road network.

9.4 Service Vehicle Arrangements

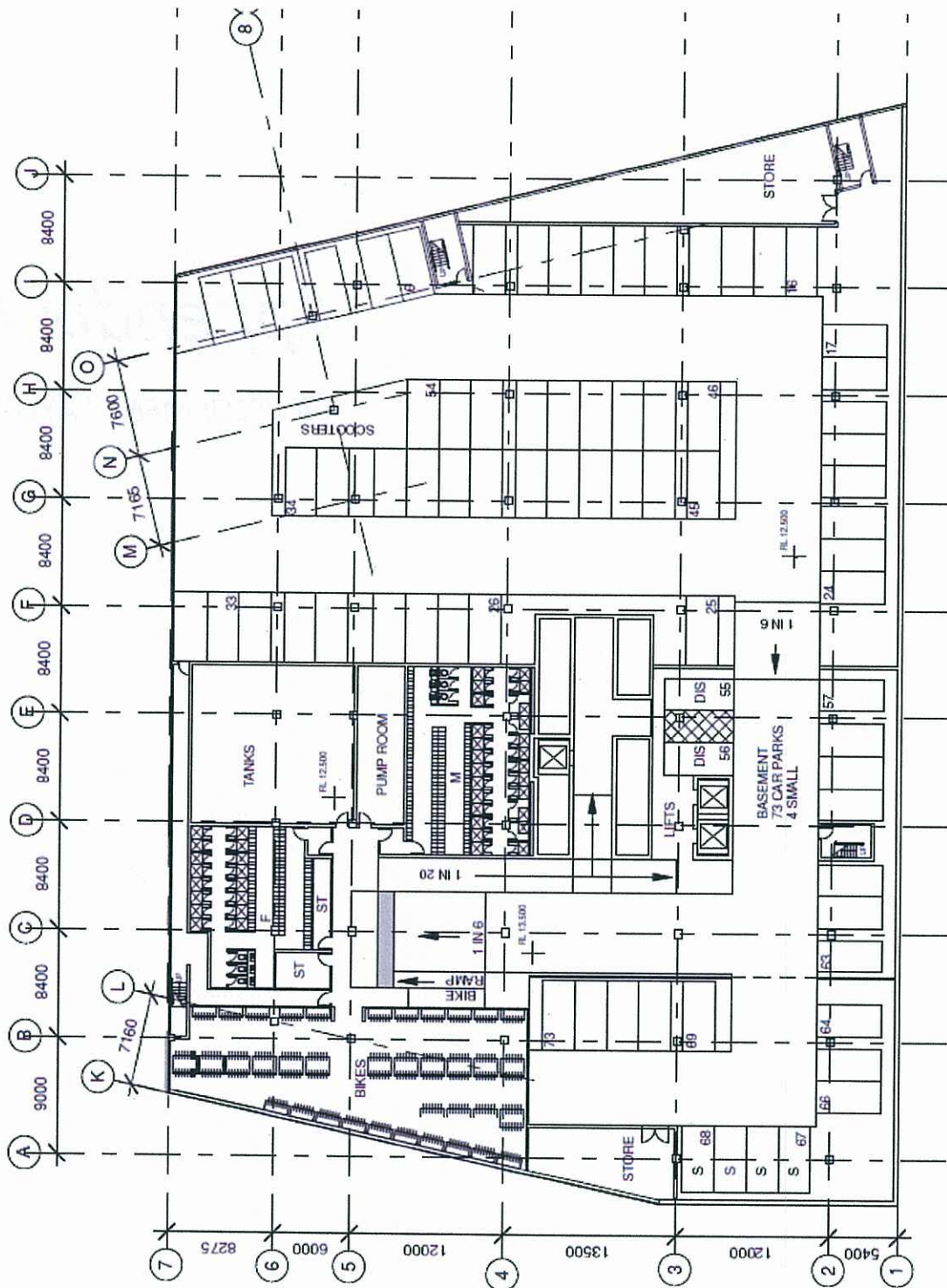
The proposed service vehicle arrangements are consistent with Council and AS2890.2 requirements. TTM has identified a column near the access driveway which must be relocated to accommodate service vehicle manoeuvring and to clarify other vehicle movements and priorities.

It is also recommended that several parking bays, in the publically accessible basement level, are reassigned to accommodate service vehicle loading for vans.

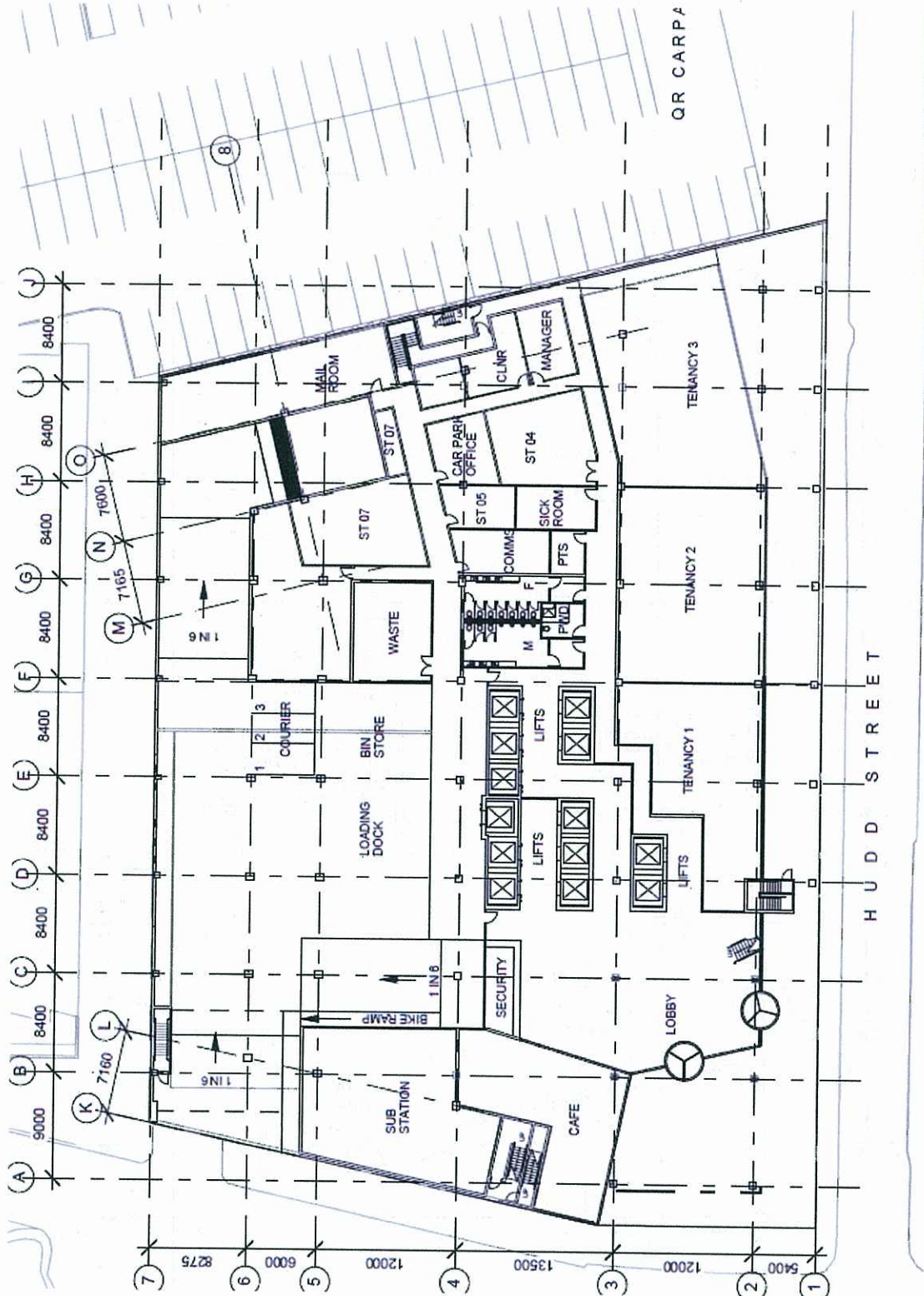
Appendix A

DEVELOPMENT LAYOUT

Basement Level 1



Ground Level



Podium Level (Typical)

