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**'Icon' Mixed Use Development
19 Hercules Street Hamilton**

Traffic Engineering Report

PLANS AND DOCUMENTS
referred to in the PDA APPROVAL

12 DEC 2014

MEDQ

Wentworth Equities No 2 Pty Ltd

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1. Introduction

1.1. Background

TTM Consulting has been engaged by Wentworth Equities No 2 Pty Ltd to prepare a traffic engineering assessment of a proposed mixed use development in Hamilton. It is understood that this will form part of a Development Application to be submitted to EDQ (Economic Development Queensland).

1.2. Scope

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

- Traffic generation and impact on external roads
- Parking supply required to cater for development demand
- Parking layout to provide efficient and safe internal manoeuvring
- 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:

- ULDA (EDQ) Northshore Hamilton Urban Development Area, Development Scheme
- Australian Standard 2890.1, 2890.2 and 2890.6.
- BCC Transport, Access, Parking and Servicing Planning Scheme Policy

1.3. Site Location and Current Use

The site is located at 19 Hercules Street Hamilton, within the Northshore Hamilton Urban Development Area, as shown in Figure 1.1. The site has road frontages to both Hercules Street and a private road to be known as Main Street which is to be constructed along the southern boundary of the site. The majority of the site is currently unoccupied, however a small commercial building does exist on the Hercules Street frontage.

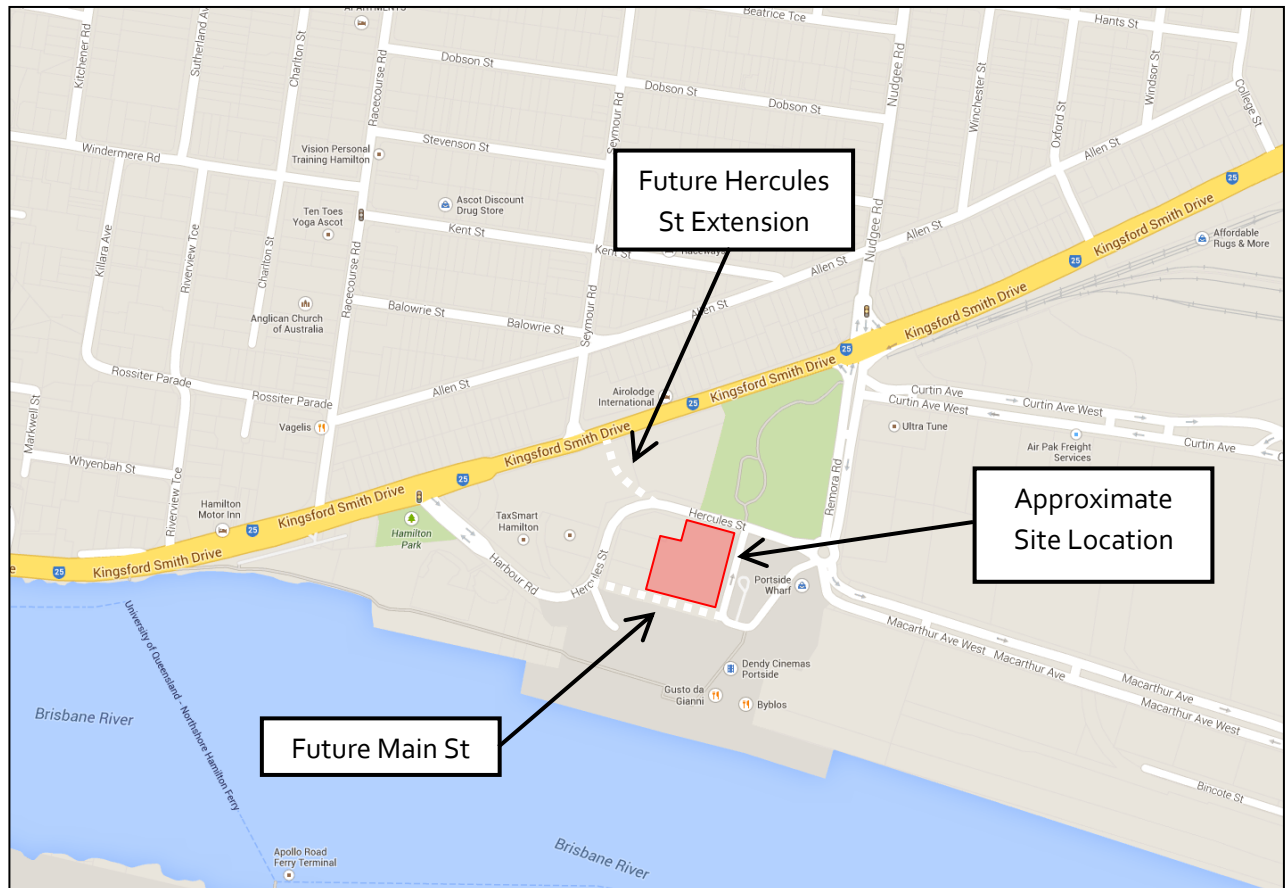


Figure 1.1: Site location

2. The Proposed Development

2.1. Development Profile

The proposed development comprises the following main elements:

- building 1 = 34 level hotel / residential
- building 2 = 31 level residential
- building 3 = 11 level residential
- building 4 = 18 level residential
- podium level retail including a supermarket
- 7 levels of basement parking.

The main characteristics of the proposed development are summarised in Table 2.1.

Table 2.1: Proposed Land Uses

Use	Area/Qty
Retail floorspace	4746m ² gfa
1-bedroom / studio apartment	x 351
2-bedroom apartment	x 177
3-bedroom apartment	x 32
Total apartments	x 560
Hotel rooms	x 227 (13178 m ² gfa)
Carparking	x 859
Vehicular Access	1 x 12m wide driveway on Hercules Street for the residential and retail. 1 x 6.5m wide driveway on Hercules Street for the service area 1 x 8.3m wide driveway on Main Street for the hotel carpark and porte cochere,
Servicing	Dedicated service area on the eastern boundary, accessed from Hercules Street, with bays for 1 x HRV, 2 x MRV and 2 x Vans
Bicycle Parking	x 628

The previous approval allows for approximately 1600m² gfa of retail uses, plus 582 residential units, with a total of 626 parking spaces.

3. Existing Transport Infrastructure

3.1. The Road Network

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	Form	Classification	Road Authority
Kingsford Smith Drive	60kph	4-lanes	Arterial	BCC
Hercules Street / Harbour Road	50kph	2-lanes including kerbside parking	Neighbourhood Access	BCC
Remora Road	50kph	2-lanes including kerbside parking	Neighbourhood Access	BCC
Macarthur Avenue	60kph	2-lanes including kerbside parking	Neighbourhood Access	BCC
<i>Main Street</i> (along the sites southern boundary)	20-30kph	2-lanes + kerbside parking	Local Access	private

The following intersection controls apply in the vicinity of the site:

- Kingsford Smith Drive / Hercules Street is a fully signalised t-intersection
- Kingsford Smith Drive / Remora Road / Nudgee Road is a fully signalised 4-way intersection
- Hercules Street / Remora Road/Macarthur Avenue is roundabout controlled.
- Hercules Street / Main Street is a priority controlled t-intersection

3.2. Road Planning

Brisbane City Council has a proposal for a significant upgrade of Kingsford Smith Drive between Theodore Street and Breakfast Creek Road, expanding the capacity from four to six lanes by constructing a retaining wall in the Brisbane River. As part of this project, a new road connection between Hercules Street / Harbour Road and Kingsford Smith Drive will be constructed, with the intersection of the two roads being a signalised t-intersection. The eastern end of this project, including the new road link and intersection, is shown in Figure 3.1.

Council has announced that an in-principle agreement has been reached with the Queensland Investment Corporation and Queensland Motorways Limited to take over operational responsibilities and tolling rights to the Legacy Way tunnel and the GoBetween Bridge in a 50-year lease. Funding from this agreement will be directed towards the Kingsford Smith Drive upgrade, subject to State and Federal Government approval of the agreement.



Figure 3.1: Eastern End of Kingsford Smith Drive Upgrade

3.3. Public Transport and Pedestrian Facilities

Doomben and Ascot train stations on the Doomben line are located approximately 1200m to the northeast and northwest of the site respectively.

Northshore and Bretts Wharf Citycat ferry terminals are located approximately 1600m to the east of the site, and 600m to the west of the site respectively.

The nearest on-street bus stops are located 380m away on Racecourse Road (north of Allen Street), and 600m away on Kingsford Smith Drive near the Bretts Wharf Citycat ferry terminal. Both stops are serviced by bus routes 300 & 305, connecting the site with both Toombul Centro and the Brisbane CBD. These routes provide a weekday service generally every 15-20 minutes, and weekend services generally every 30 minutes. Figure 3.2 shows these bus routes.

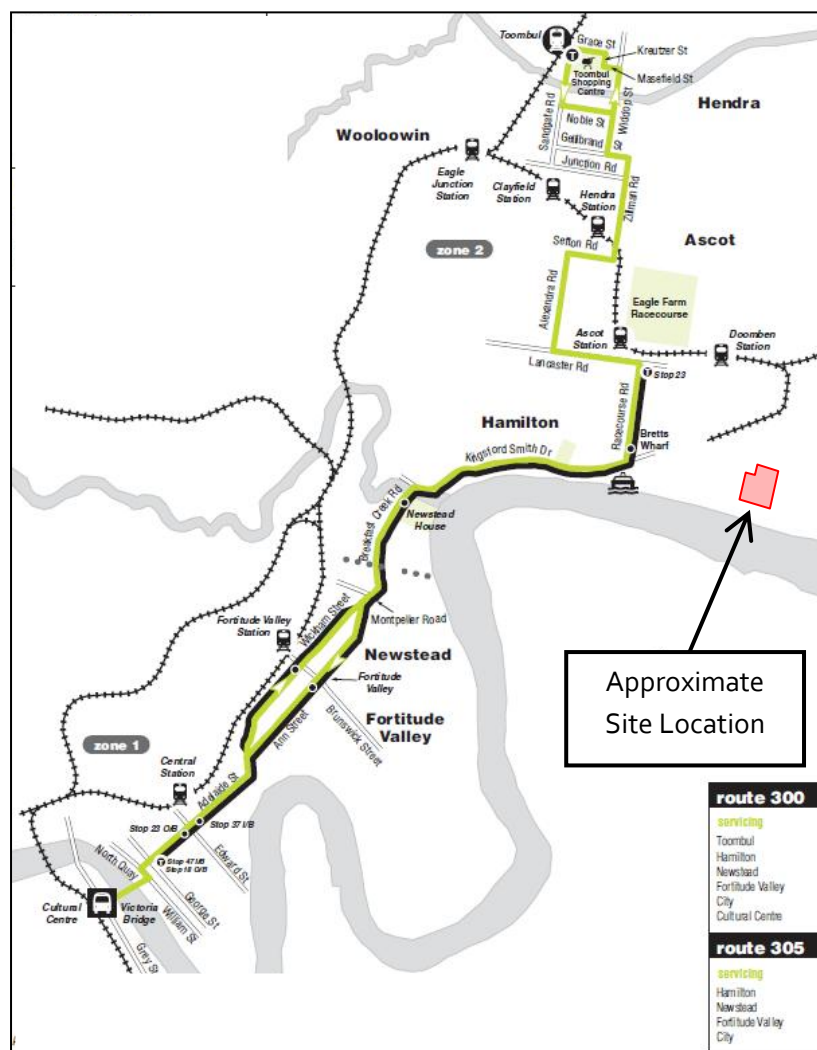


Figure 3.2: Local Bus Routes

Formal pedestrian footpaths are located on both sides of all roads in the immediate vicinity of the site, and signalised pedestrian crossings are incorporated into nearby intersections with Kingsford Smith Drive.

An off-road cycle path extends from the nearby cruise ship terminal westward toward Newstead, between Kingsford Smith Drive and the river's edge. Other on-street routes connect Kingsford Smith Drive to Doomben and Ascot train stations. Cycle routes in the vicinity of the site are shown in Figure 3.3.

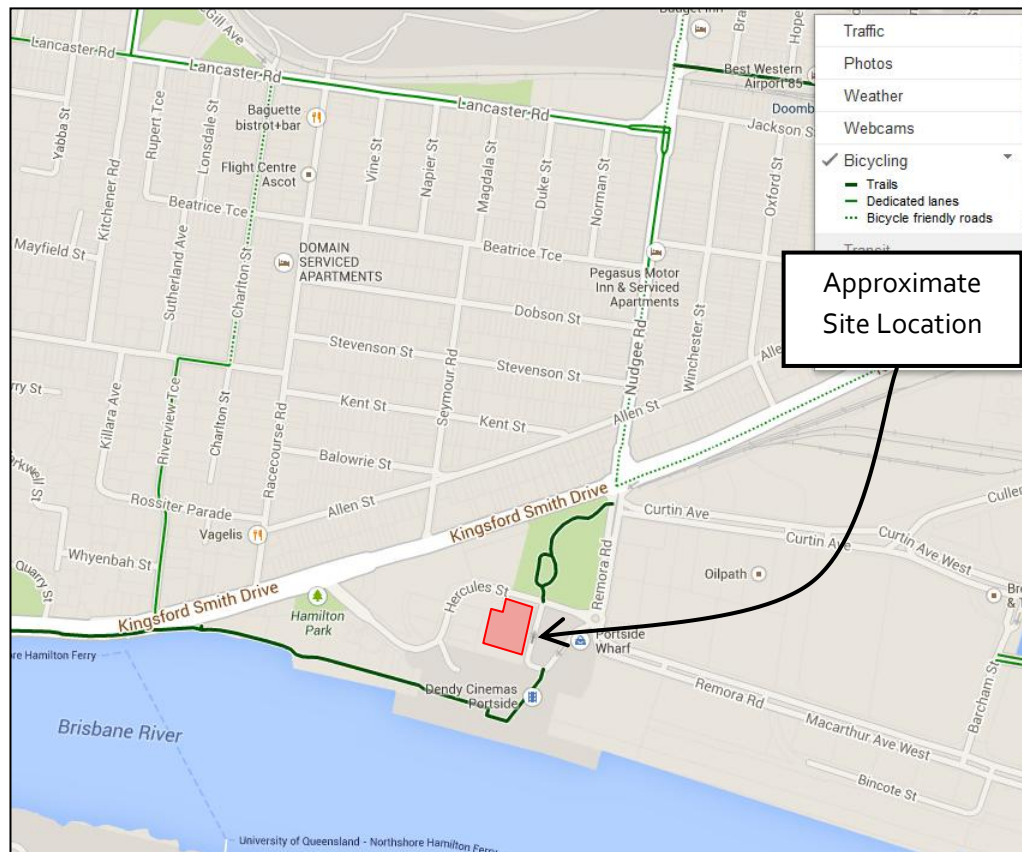


Figure 3.3: Local Cycle Routes

4. Impact Assessment

4.1. Background

Given that the final stage of the Kingsford Smith Drive upgrade will commence construction in the near future, any intersection traffic counts or assessment of the existing road layout is considered irrelevant.

Consequently the impact assessment will be limited to an ultimate, future year scenario with the full Kingsford Smith Drive upgrade in place.

In 2012 Parsons Brinkerhoff (PB) completed a traffic assessment of Northshore Hamilton for the combined precincts 1, 2 and 3 (in which the subject site is situated), for the ULDA. This assessment included the use of Brisbane City Councils North Brisbane Saturn model to estimate future year (2031) traffic volumes subsequent to the precincts being developed. The traffic volumes from this model assumed development on this site consistent with the existing approval.

It should be noted that future modelling is normally done for a design year 10 years beyond completion of the final stage of the proposed development. In this case, that design year is likely to be several years prior to 2031, however given that the PB modelling is restricted to 2031, this is the design year that will be adopted.

The assessment within this report will consider a) the 2031 weekday AM and PM peaks using the 'approved' development generation, sourced from the PB report, and b) the 2031 weekday AM and PM peaks for the development proposed within this application.

The net increase in site traffic generation between the approved and the proposed development will be added to the 'approved' development traffic included in the PB modelling to determine the overall traffic volumes relevant to the proposed development scenario.

Three key intersections have been assessed, as follows:

- Kingsford Smith Drive with Harbour Drive
- Kingsford Smith Drive with the Hercules Street extension
- Kingsford Smith Drive with Remora Road and Nudgee Road

4.2. Estimated Development Traffic Generation

Based on the recommended traffic generation rates contained within the NSW RTA *Guide to Traffic Generating Developments*, the estimated development traffic generation is as detailed in Table 4.1.

Table 4.1: Estimated Development Traffic Generation

Use	Area/Qty	Peak Hour Generation Rate	AM Peak Hour Generation	PM Peak Hour Generation
Retail	4330m ² gfa with 61 parking spaces	2vph / space	122vph (61in + 61 out)	122vph (61in + 61 out)
Residential apartment	x 568	0.5vph / apartment	284vph (28in + 256out)	284vph (256in + 28out)
Hotel rooms	x 227	0.25vph / room	57vph (29in + 29out)	58vph (29in + 29out)
TOTAL			464 vph (118in + 346out)	464 vph (346in + 118out)

This compares to the approved development which incorporates 1600m² gfa of retail uses (with 16 parking spaces) plus 582 residential units. The estimated development traffic generation of the approved development is estimated to have been as detailed in Table 4.2.

Table 4.2: Estimated Traffic Generation of Approved Development

Use	Area/Qty	Peak Hour Generation Rate	AM Peak Hour Generation	PM Peak Hour Generation
Retail	1600m ² gfa with 16 parking spaces	2vph / space	32vph (16in + 16 out)	32vph (16in + 16 out)
Residential apartment	x 582	0.5vph / apartment	292vph (29in + 263out)	292vph (263in + 29out)
TOTAL			324vph (45in + 279out)	324 vph (279in + 45out)

Thus the increase in site traffic generation compared to the approved development is 140vph (73in + 67out in the AM peak and 67in + 73out in the PM peak).

4.3. Estimated Distribution of Additional Site Traffic Generation

Figure 4.1 shows the broad distribution of traffic generated by the proposed development which is in excess of that associated with the approved development (ie that which has already been included in the Parsons Brinkerhoff (PB) modelling).

Note that this includes the hotel traffic which joins the network via the Main Street access driveway, and thus in reality has a slightly different routing, however given the hotel traffic is only a minor proportion of the total traffic, the adopted distribution is considered acceptable.

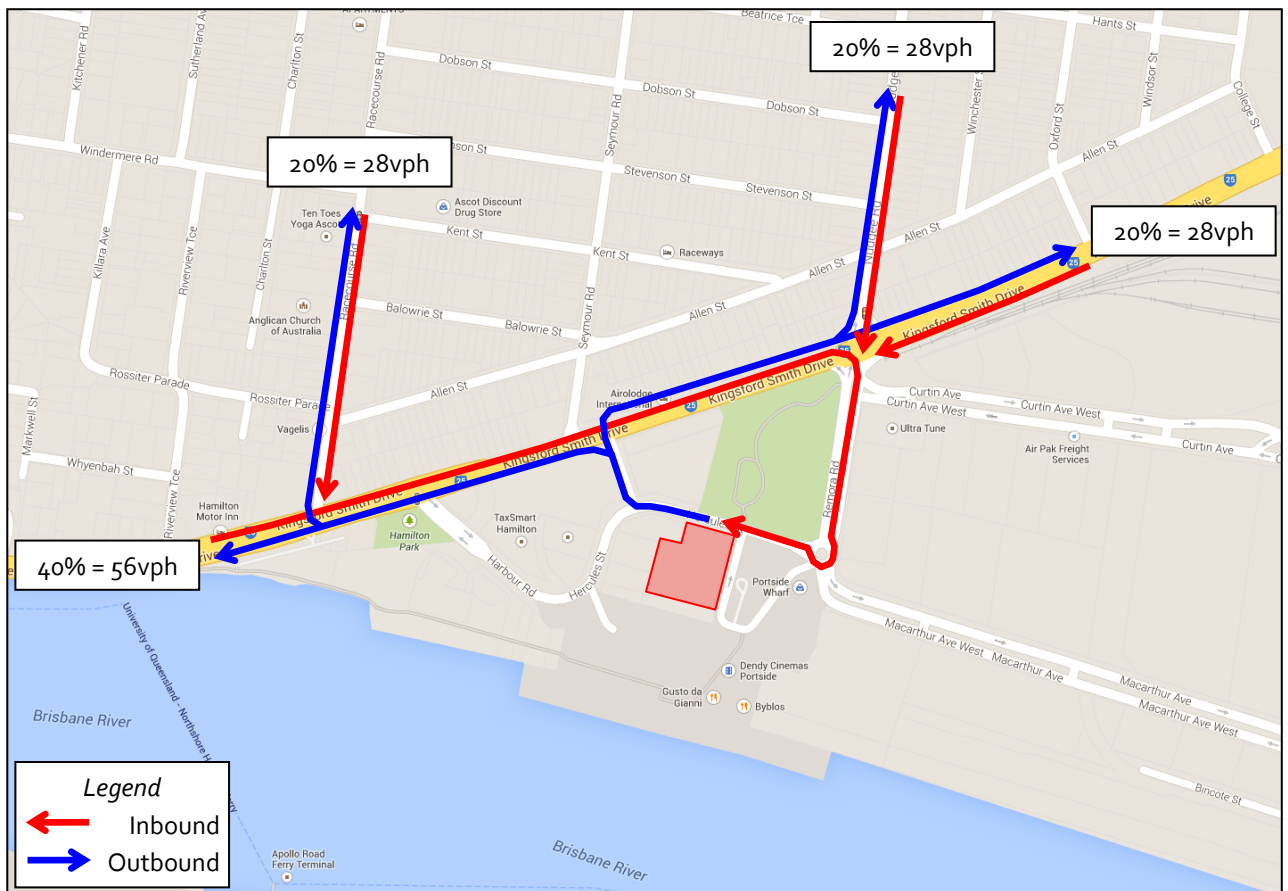


Figure 4.1: Estimated Distribution of Development Generated Traffic In Excess of Approved Development

4.4. Estimated Future (2031) Traffic Volumes (Approved Development)

Figure 4.2 shows the estimated 2031 AM and PM peak hour traffic volumes, sourced from the PB modelling, including traffic generated from the approved development.

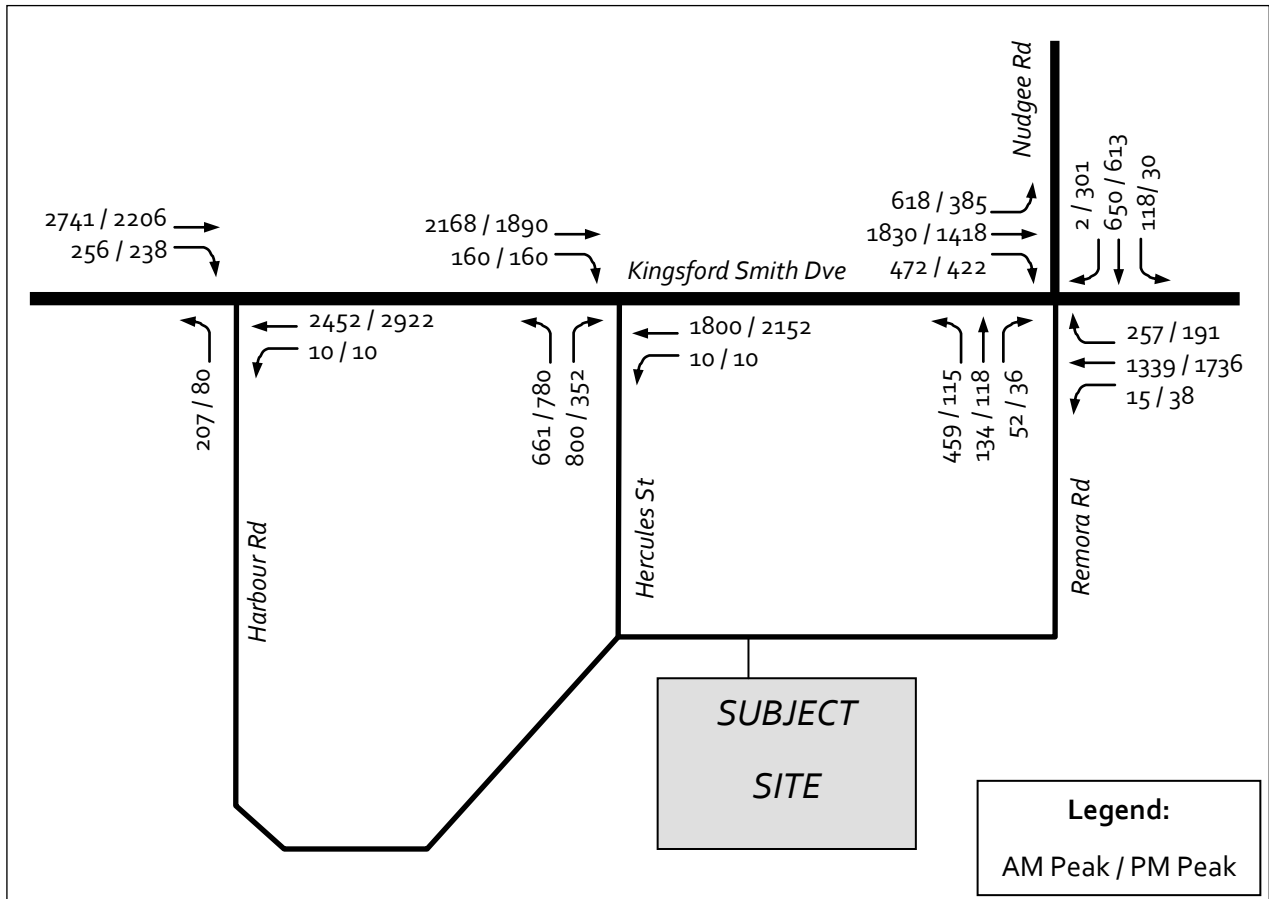


Figure 4.2: Future Base (2031) Peak Hour Traffic Volumes For The Approved Development Based on PB Modelling

4.5. Estimated Future (2031) Traffic Volumes (Proposed Development)

Figure 4.3 shows the estimated 2031 AM and PM peak hour traffic volumes, including any traffic generated from the proposed development which is in excess of the approved development.

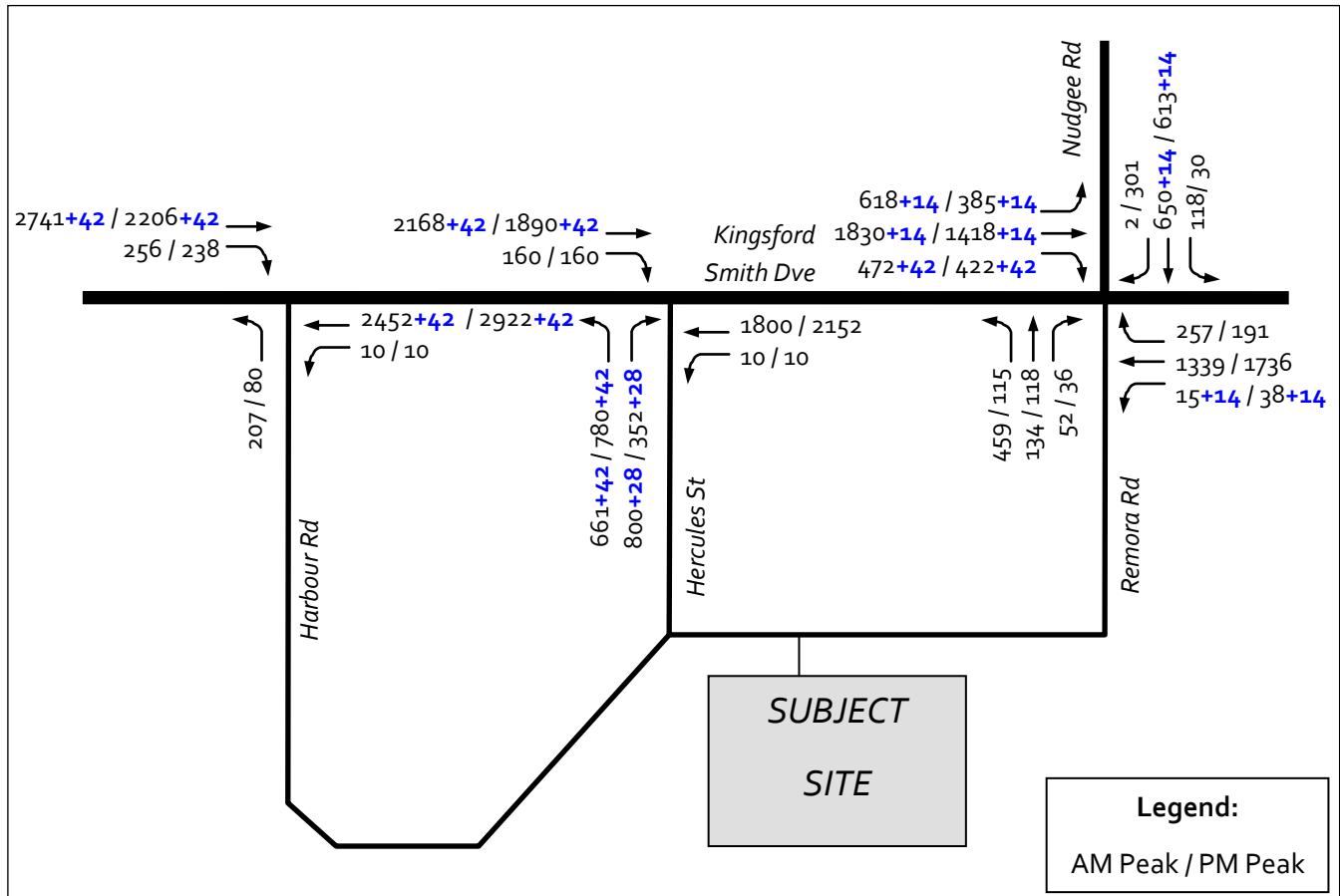


Figure 4.3: Future Base (2031) Peak Hour Traffic Volumes For The Proposed Development

4.6. Impact of Development Generated Traffic

The four surrounding intersection were analysed using Sidra computer software for the 2014 and 2027 base and project cases, for both AM and PM peak hours. The results are summarised in the following tables in terms of degree of saturation (DoS), delay and level of service (LoS) and queue length. Full results are included in Appendix B.

4.6.1. Kingsford Smith Drive / Harbour Road

Table 4.3: Summary Of Sidra Results for Kingsford Smith Drive / Harbour Road

KS Dve / Harbour Rd		2031 AM Approved Development	2031 PM Approved Development	2031 AM Proposed Development	2031 PM Proposed Development
DoS (%)	South	34.2	13.2	34.2	13.2
	East	70.0	83.3	71.1	84.5
	West	80.5	74.8	80.5	74.8
	Overall	80.5	83.3	80.5	84.5
Delay (s) & (LoS)	South	37.8 (D)	36.4 (D)	37.8 (D)	36.4 (D)
	East	9.4 (A)	15.1 (B)	9.5 (A)	16.4 (B)
	West	8.0 (A)	7.3 (A)	8.4 (A)	7.3 (A)
	Overall	9.7 (A)	11.9 (B)	10.0 (A)	12.6 (B)
Queue (m)	South	27.6	10.1	27.6	10.1
	East	146.8	235.0	151.5	248.9
	West	105.9	67.0	113.9	67.0
	Overall	146.8	235.0	151.5	248.9

The analysis indicates the following:

- The degree of saturation in all scenarios is below the 90% desirable maximum;
- Delays in all scenarios are low and within acceptable limits;
- Turn queues are contained within the turn pockets for the majority of the time;
- Additional development generated traffic (above what has already been approved) has minimal impact on any/all performance indicators;

4.6.2. Kingsford Smith Drive / Hercules Street

Table 4.4: Summary Of Sidra Results for Kingsford Smith Drive / Hercules Street

KS Dve / Hercules St		2031 AM Approved Development	2031 PM Approved Development	2031 AM Proposed Development	2031 PM Proposed Development
DoS (%)	South	100.0	86.1	100.0	85.8
	East	82.2	85.1	80.9	86.9
	West	99.0	74.7	99.3	78.0
	Overall	100.0	86.1	100.0	86.9
Delay (s) & (LoS)	South	42.4 (D)	42.5 (D)	43.3 (D)	42.0 (D)
	East	38.4 (D)	24.7 (C)	36.4 (D)	27.7 (C)
	West	92.3 (F)	20.8 (C)	94.2 (F)	22.6 (C)
	Overall	61.8 (E)	27.0 (C)	62.3 (E)	28.9 (C)
Queue (m)	South	194.0	111.9	217.9	117.7
	East	280.1	235.4	271.2	250.9
	West	574.4	165.3	594.1	182.0
	Overall	574.4	235.4	594.1	250.9

The analysis indicates the following:

- The degree of saturation in the PM peak scenarios is below the 90% desirable maximum;
- The degree of saturation in the AM peak scenarios is at 100%;
- Delays in all scenarios are generally within acceptable limits, and consistent with what would be expected at a major intersection on an arterial road, with the exception of the western approach of Kingsford Smith Drive in the AM peak hour, where the LoS drops to level F.
- Turn queues are generally contained within the turn pockets for the majority of the time, with the exception of the right turn lane from Hercules Street (south) in the AM peak;
- Queues on the eastern approach of Kingsford Smith Drive will extend back to the Remora Road intersection;
- Queues on the western approach of Kingsford Smith Drive will extend back to and beyond the Harbour Road intersection;

- Additional development generated traffic (above what has already been approved) has minimal impact on any/all performance indicators ie any and all performance deficiencies exist regardless of the additional development generated traffic.

4.6.3. Kingsford Smith Drive / Remora Road

Table 4.5: Summary Of Sidra Results for Kingsford Smith Drive / Remora Road

KS Dve / Remora Rd		2031 AM Approved Development)	2031 PM Approved Development)	2031 AM Proposed Development)	2031 PM Proposed Development)
DoS (%)	South	86.2	51.9	86.2	82.2
	East	90.5	92.6	90.5	89.8
	North	90.6	92.8	89.5	89.5
	West	87.9	92.9	90.5	88.8
	Overall	90.6	92.9	90.5	89.8
Delay (s) & (LoS)	South	39.4 (D)	49.4 (D)	41.0 (D)	56.3 (E)
	East	51.3 (D)	75.1 (E)	51.4 (D)	64.1 (E)
	North	65.9 (E)	76.3 (E)	64.1 (E)	69.5 (E)
	West	32.4 (C)	35.6 (D)	36.1 (D)	33.3 (C)
	Overall	42.6 (D)	57.8 (E)	44.4 (D)	51.8 (D)
Queue (m)	South	116.4	63.2	124.2	71.1
	East	207.3	388.5	208.9	358.8
	North	199.8	241.7	200.3	229.9
	West	295.4	193.0	318.2	185.6
	Overall	295.4	388.5	318.2	358.8

The analysis indicates the following:

- The degree of saturation in all scenarios is either at the 90% desirable maximum;
- Delays in the AM peak scenarios are generally within acceptable limits, and consistent with what would be expected at a major intersection on an arterial road, however delays in the PM peak hour scenarios are beyond what would normally be considered desirable;
- Turn queues are generally contained within the turn pockets for the majority of the time, with the exception of the right turn lane from Kingsford Smith Drive (east), particularly in the AM peak;
- Queues on the western approach of Kingsford Smith Drive will extend back to the Hercules Street intersection;
- Additional development generated traffic (above what has already been approved) has minimal impact on any/all performance indicators ie any and all performance deficiencies exist regardless of the additional development generated traffic.

4.6.4. Commentary

Overall it can be concluded that the two of the three intersections assessed here will be at or beyond capacity in 2031 (the exception being Harbour Road). Based on the results of the PB modelling, this will be the case regardless of whether the site is developed as per the approved development scheme, or the development scheme proposed in this application.

The impact on the performance (of all three intersections) of the marginal increase in site traffic generation brought about by the proposed increase in development on the site is very minor, and does not in itself result in any of the intersections operating beyond acceptable limits.

The analysis is consistent with the findings of the PB report, which concludes that the *"model is predicting high levels of traffic throughout the Hamilton area, both inside and outside of the Northshore UDA. This applies particularly to Kingsford Smith Drive, and Eagle Farm Road, and this results in delays at all points exiting Northshore."*

It should be reiterated that the 2031 analysis conducted in this assessment is several years beyond what would normally be considered the appropriate design year, and as such the results of the analysis will be somewhat worse than would otherwise be the case.

5. Site Access Arrangements

5.1. Proposed Access Arrangements and Their Adequacy

The proposed development incorporates a total of three driveway crossovers as follows:

- 1 x 12m wide driveway on Hercules Street for the residential and retail,
- 1 x 6.5m wide driveway on Hercules Street for the service area
- 1 x 8.3m wide driveway on Main Street for the hotel carpark and porte cochere,

Table 5.1 and Table 5.2 identify the characteristics of the proposed access driveway compared to the requirements of Australian Standard AS2890.1. The last column identifies the compliance of each design aspect. Where compliance with the standard is not achieved, the alternative performance solution is further discussed below.

Table 5.1: Proposed Hercules Street Access Arrangements

Design Aspect	AS2890.1 Requirement	Proposed Provision	Compliance
Western Hercules Street Driveway (residential / retail access serving ≈750 spaces from a non-arterial road)			
Crossover design	Category 4 divided crossover (between 13m and 19m wide)	12m divided, left-in / left-out	Alternative performance solution
Minimum separation from adjacent intersection	6m	Estimated as at least 35m	AS2890 Complaint
Desirable/minimum sight distance for 50kph road	69m/45m	Estimated as at least 70m	AS2890 Complaint
Queue storage capacity	10.5 vehicles = 63m (for up to 750 cars)	36m = 6 cars	Alternative performance solution
Gradient of first 6m	1 in 20 (5%)	1 in 20 (5%)	AS2890 Complaint
Eastern Hercules Street Driveway (service / loading area access from a non-arterial road)			
Crossover design	12.5m undivided	6.5m undivided	Alternative performance solution
Minimum separation from adjacent intersection	6m	≈50m	AS2890 Complaint
Desirable/minimum sight distance for 50kph road	69m/45m	Estimated as at least 50m	AS2890 Complaint
Queue storage capacity	No specific requirement for service vehicle driveway, however 40m is provided which satisfies practical requirements.		
Gradient of first 6m	1 in 20 (5%)	1 in 20 (5%)	AS2890 Complaint

Table 5.2: Proposed Main Street Access Arrangements

Design Aspect	AS2890.1 Requirement	Proposed Provision	Compliance
Main Street Driveway (hotel access serving ≈90 spaces plus porte cochere access from a private local road)			
Crossover design	Category 2 undivided crossover (between 6m and 9m wide)	8.3m wide divided	AS2890 Complaint
Minimum separation from adjacent intersection	6m	≈45m	AS2890 Complaint
Desirable/minimum sight distance for 30kph road	41m/25m (estimated figures for 30kph speed)	Estimated as at least 25m	AS2890 Complaint
Queue storage capacity	3 vehicles = 18m (for up to 100 cars)	At least 84m = 14 cars	AS2890 Complaint
Gradient of first 6m	1 in 20 (5%)	1 in 20 (5%)	AS2890 Complaint

5.2. Alternative Performance Solutions

The following aspect of the access design does not strictly satisfy the requirements of AS2890, and an alternative performance solution is proposed as discussed below.

Western Hercules Street driveway (retail/residential)

- **The design of the crossover** is in accordance with the Brisbane City Council Type C2 crossover, which is nominated as the appropriate design for up to 500 medium turnover parking spaces. Strict compliance with the BCC requirements would require a 15m wide Type C3 crossover. However, given the majority of parking spaces accessed from this driveway are low turnover residential spaces, and the fact that the driveway is restricted to left-in / left-out movements, it is considered that the proposed Type C2 crossover will operate safely and efficiently without the need for the additional width.
- **Queue storage** is appreciably less than the requirement of AS2890. It should be noted however that AS2890 bases queue storage requirements solely on parking numbers, and does not consider the likely turnover of the parking spaces eg it does not differentiate between, for instance, low turnover residential spaces or high turnover retail spaces.

Given that peak hour generation per parking space is 4 times higher for retail than residential (ie 2vph per space for retail, vs 0.5vph per space for residential), and the fact that over 85% of parking served from this driveway is residential, the effective number of spaces is considerably reduced, down to an estimated 260 spaces (ie $96 + 645/4$), and based on this figure, the 6 cars queuing provided is sufficient.

Eastern Hercules Street driveway (service / loading area)

- **The design of the crossover** is sufficient to accommodate the swept path of the largest design vehicle (ie an HRV), and is essentially compliant with BCC requirements for a 7m crossover. Given the low usage of this driveway, particularly by HRVs, the proposed crossover is considered acceptable.

5.3. Porte Cochere Operations

The hotel porte-cochere is located on the Main Street frontage of the site. Access to/from the porte-cochere is shared with entry to the hotel carpark. Traffic flow within the porte-cochere is in a clockwise direction.

The circulation aisle through the porte cochere has a minimum width of 3m, allowing passage by vehicles up to and including a 21-seat Coaster minibus. The facility is not suitable for larger vehicles.

There are two temporary setdown parking bays suitable for cars at the end of the porte cochere, with mini buses to park temporarily within the porte cochere itself.

All vehicles can approach (and depart) the porte-cochere from either direction on Main Street.

6. Car Parking Arrangements

6.1. EDQ Parking Supply Requirement

Based on the EDQ Northshore Hamilton Development Scheme, car parking requirements are as detailed in Table 6.1. It is understood that the 'long term' parking rates nominated on the development scheme are now applicable.

Table 6.1: EDQ Parking Supply Requirement

Use	Area/Qty	EDQ Rate (Long Term)	EDQ Requirement
Retail floorspace	4746m ² gfa	1/100m ² gfa (maximum)	48
Hotel floorspace	13178m ² gfa	1/100m ² gfa (maximum)	132
Residential apartments (tenants & visitors)	x 560	1/unit (maximum)	560
TOTAL			740

6.2. Proposed Parking Supply

The proposed parking supply consists of a total of parking spaces in 7 basement levels, as detailed in Table 6.2.

Table 6.2: Proposed Parking Supply

Level	Residential	Hotel	Retail	Total
Basement 1	0	59	48	107
Basement 2	0	59	48	107
Basement 3	129	0	0	129
Basement 4	129	0	0	129
Basement 5	129	0	0	129
Basement 6	129	0	0	129
Basement 7	129	0	0	129
Total	645	118	96	859

The proposed parking supply essentially provides 2 parking spaces for the 3-bedroom apartments, and 1 parking space for all other apartments. Whilst it is acknowledged that this is marginally beyond what the development scheme permits, it is not excessively so, and it is considered unlikely that the additional parking supply will result in any significant additional traffic generation.

The proposed retail parking supply of 96 spaces equates to a supply rate of 1 space per 50sqm. Whilst it is acknowledged that this is in excess of what the development scheme permits, it is considered a commercial reality that providing parking at only 1 space per 100sqm will be dramatically short of satisfying demand, and as such would contribute to the underperformance of the retail component. The proposed rate of parking provision is considered the minimum supportable.

The proposed hotel parking supply of 118 spaces equates to a supply rate of 1 space per 111sqm, which complies with the Northshore Hamilton Development Scheme.

Of the above total parking supply, 49 spaces (or 4% of the total) are PWD spaces. This supply comprises 10 retail spaces (10% of total), 4 hotel spaces (3.4% of total) and 35 residential spaces (5.4% of total), thus comfortably satisfying a requirement for 1-2%.

In addition to the above proposed car parking, a total of 18 retail motorcycle parking spaces are split over basement levels 1 and 2.

TTM consider the proposed parking supply and allocation to be appropriate.

6.3. Car Park Layout

The car parking arrangements consist of seven basement levels, with the upper two used by the hotel and retail components, and the bottom five levels allocated to residential users. The hotel parking is completely separate from the retail parking with no interconnection. Retail and residential users will access the site via the main driveway on Hercules Street, whilst hotel traffic will utilise the driveway on Main Street.

Control equipment is to be installed as follows:

- at the bottom of the Hercules Street entry ramp (in basement 1) to control retail and residential parking;
- at the bottom of the Main Street entry ramp (in basement 1) to control hotel parking.

Table 6.3 identifies the characteristics of the proposed parking area with respect to the Australian Standards requirements. The last column identifies the compliance of each design aspect.

In general the design comfortably complies with the requirements of Australian Standards, and where departures occur, they are very minor in nature.

Table 6.3: Australian Standards Carpark Requirements and Proposed Carpark Characteristics

Design Aspect	AS2890 Requirement	Proposed Provision	Compliance
Parking space length (min)			
▶ Standard space	5.4m	5.4m	AS Compliant
▶ Parallel space	5.9m	5.9m	AS Compliant
Parking space width (min):			
▶ Residential	2.4m	2.7m	AS Compliant
▶ Retail	2.6m	2.7m	AS Compliant
▶ Hotel	2.5m	2.7m	AS Compliant
▶ PWD	2.4m (+2.4m shared zone)	2.5m (+2.5m shared zone)	AS Compliant
▶ Parallel space	2.1m	2.1m	AS Compliant
Aisle Width (min):			
▶ Residential parking aisle	5.8m	5.8-6.5m (generally at least 6.2m)	AS Compliant
▶ Hotel parking aisle	5.8m	5.8-6.5m (generally at least 6.2m)	AS Compliant
▶ Retail parking aisle	6.2m	6.2-6.5m	AS Compliant
▶ One-way circulation aisle	3.0m	3.3m minimum	AS Compliant
▶ Two-way circulation aisle	5.5m	5.45m	Essentially AS Compliant
▶ Ramp	6.1m (inc. 0.3m kerbs)	7.1m	AS Compliant
Parking envelope clearance:			
▶ Permissible column location near front of bay	between 0.75m and 1.75m of aisle 0.3m	Generally between 0.75m and 1.75m of aisle. In a small number of cases they are located elsewhere, however extra 300mm space width allows for this.	AS Compliant
▶ Min clearance to adjacent side wall		0.3m	0.3m
Maximum Gradient:			
▶ PWD parking	1:40 (2.5%)	Essentially flat	AS Compliant
▶ Parking aisle	1:16 (6.25%)	Essentially flat	AS Compliant
▶ Ramp	1:5 (20%)	1:6 (16.67%)	AS Compliant
Max. allowable change of grade (before transitions are required)	12.5% at summit & 15.0% at sag	No greater than 10% at both summit and sag	AS Compliant
General / PWD height clearance	2.2m / 2.5m	At least 2.2m / 2.5m	AS Compliant
Terminated aisle treatment	1m past last bay	At least 1m past last bay	AS Compliant

7. Service Vehicle Arrangements

7.1. Practical Requirements

The different components of the development require the following servicing facilities:

Residential - residential furniture truck (MRV / LRV), refuse collection vehicle (RCV), and trades vans

Retail - large delivery trucks (MRV / LRV), refuse collection vehicle (RCV), and delivery vans

Hotel - large delivery trucks (MRV), refuse collection vehicle (RCV), and delivery / trades vans

7.2. Proposed Service Vehicle Arrangements

A dedicated and consolidated service area is located along the eastern boundary of the site, catering for all the different components of the development. All service vehicles will approach the site on Hercules Street from the east, and depart to the west, via the dedicated left-in/left-out service vehicle driveway.

Given the various users in the service area, a service vehicle management plan should be implemented to ensure safe and efficient operation.

Swept path manoeuvring diagrams, for the relevant design vehicles (generated using *Autotrack* computer software) are included in Appendix C.

The proposed service vehicle provisions are as detailed in Table 7.1.

Table 7.1: Proposed Service Vehicle Provisions

Use	Vehicle Type	Bay Size	Notes
Retail (the two large anchor tenancies)	HRV	1 bay ≈14m x 5m	Weekend use to be minimised
Retail (minor tenancies)	MRV	1 bay ≈10m x 4m	
Hotel	MRV	1 bay ≈10m x 4m	
Shared use	Van	2 bays, ≈5.4m x 3m, located on apron	
Residential furniture trucks	MRV	No dedicated bay - parks on apron.	Weekends and out of business hours only
Refuse collection - retail	RCV	No dedicated bays, collection conducted on apron	Retail compactor located adjacent to HRV bay. Different collections to be coordinated through management plan.
Refuse collection - hotel	RCV		
Refuse collection - residential	RCV		

8. Pedestrian and Bicycle Facilities

Pedestrian movement along the northern and southern boundaries of the site is provided for within the verges of Hercules Street and Main Street respectively. North-south movement through the site is achieved via the open air pedestrian spine through the ground level retail tenancies.

The Development Scheme nominates the following targets for bicycle parking supply:

- 1 resident space per dwelling = 560 spaces
- 1 residential visitor space per 400sqm = 33 spaces
- 1 retail staff space per 200sqm NLA = 24 spaces
- 1 retail customer space per 1000sqm NLA = 5 space
- TOTAL = 622 spaces

The proposal includes a total of 628 bicycle parking spaces, distributed over all parking levels (except level 2), and thus achieves the targets nominated in the development scheme.

9. Summary and Conclusion

9.1. Impact Assessment

The impact on three key intersections (Kingsford Smith Drive with Harbour Drive, the Hercules Street extension and Remora Road / Nudgee Road) has been assessed in this report.

Overall it can be concluded that the two of the three intersections assessed here will be at or beyond capacity in 2031 (the exception being Harbour Road). Based on the results of the PB modelling, this will be the case regardless of whether the site is developed as per the approved development scheme, or the development scheme proposed in this application.

The impact on the performance (of all three intersections) of the marginal increase in site traffic generation (14,0vph in the peak hours) brought about by the proposed increase in development on the site is very minor, and does not in itself result in any of the intersections operating beyond acceptable limits.

The analysis is consistent with the findings of the PB report, which concludes that the *"model is predicting high levels of traffic throughout the Hamilton area, both inside and outside of the Northshore UDA. This applies particularly to Kingsford Smith Drive, and Eagle Farm Road, and this results in delays at all points exiting Northshore."*

It should be reiterated that the 2031 analysis conducted in this assessment is several years beyond what would normally be considered the appropriate design year, and as such the results of the analysis will be somewhat worse than would otherwise be the case.

9.2. Development Access

The proposed development incorporates a total of three driveway crossovers as follows:

- 1 x 12m wide driveway on Hercules Street for the residential and retail,
- 1 x 6.5m wide driveway on Hercules Street for the service area
- 1 x 8.3m wide driveway on Main Street for the hotel carpark and porte cochere,

In general the access arrangements comply with the requirements of Australian Standards. The width of the two Hercules Street crossovers essentially satisfies the alternative design standard of the BCC TAPS policy, and the queue storage on the main Hercules Street driveway satisfies a practical assessment.

9.3. Car Parking Supply

A total of 859 car parking spaces (including 49 PWD spaces) plus 18 motorcycle spaces, are proposed.

The proposed residential parking supply essentially provides 2 parking spaces for the 3-bedroom apartments, and 1 parking space for all other apartments. Whilst it is acknowledged that this is marginally beyond what the development scheme permits, it is not excessively so, and it is considered unlikely that the additional parking supply will result in any significant additional traffic generation.

The proposed retail parking supply of 96 spaces equates to a supply rate of 1 space per 50sqm. Whilst it is acknowledged that this is in excess of what the development scheme permits, it is considered a commercial reality that providing parking at only 1 space per 100sqm will be dramatically short of satisfying demand, and as such would contribute to the underperformance of the retail component. The proposed rate of parking provision is considered the minimum supportable.

The proposed hotel parking supply of 118 spaces equates to a supply rate of 1 space per 111sqm, which complies with the Northshore Hamilton Development Scheme.

TTM consider the proposed parking supply and allocation to be appropriate

9.4. Car Parking layout

The car parking arrangements consist of seven basement levels, with the upper two used by the hotel and retail components, and the bottom five levels allocated to residential users. The hotel parking is completely separate from the retail parking with no interconnection. Retail and residential users will access the site via the main driveway on Hercules Street, whilst hotel traffic will utilise the driveway on Main Street. Control equipment is to be installed at both main entry driveways. In general the design comfortably complies with the requirements of Australian Standards, and where departures occur, they are very minor in nature.

9.5. Service Vehicle Arrangements

A dedicated and consolidated service area is located along the eastern boundary of the site, catering for all the different components of the development. All service vehicles will approach the site on Hercules Street from the east, and depart to the west, via the dedicated left-in/left-out service vehicle driveway.

Given the various users in the service area, a service vehicle management plan should be implemented to ensure safe and efficient operation.

Swept path manoeuvring analysis for the relevant design vehicles indicates that appropriate manoeuvring can occur onsite, with no impact on the external road network.

9.6. Pedestrian and Bicycle Facilities

Pedestrian movement along the northern and southern boundaries of the site is provided for within the verges of Hercules Street and Main Street respectively. North-south movement through the site is achieved via the open air pedestrian spine through the ground level retail tenancies.

The proposal includes a total of 628 bicycle parking spaces, distributed over all parking levels (except level 2), and thus achieves the targets nominated in the development scheme.

9.7. Conclusion

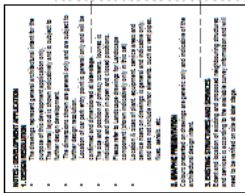
Based on the assessment contained within this report, the internal generally satisfies the relevant design standards, and where the small number of departures occur they are minor in nature, and satisfy either an alternative design standard, or a practical assessment.

The impact of the additional development traffic (compared to the approved scheme) is minimal, and consistent with what has been assumed when designing the local road network.

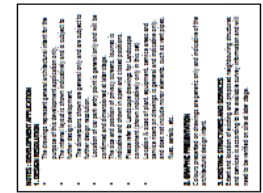
Consequently, TTM see no traffic engineering reason why the proposed development should not be granted the relevant approvals.

Appendix A Development Plans











Appendix B Results of Sidra Analysis

KINGSFORD SMITH DRIVE / HARBOUR ROAD

MOVEMENT SUMMARY

Site: 2031 AM Approved Gen

14BRT0013 Icon
KS Dve / Harbour Rd
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harbour Rd (s)											
1	L	218	5.0	0.342	37.8	LOS D	3.8	27.6	0.91	0.78	29.4
Approach		218	5.0	0.342	37.8	LOS D	3.8	27.6	0.91	0.78	29.4
East: KS Dve (e)											
4	L	11	5.0	0.700	18.3	LOS B	19.8	144.7	0.68	0.95	42.1
5	T	2581	5.0	0.700	9.4	LOS A	20.1	146.8	0.69	0.64	45.3
Approach		2592	5.0	0.700	9.4	LOS A	20.1	146.8	0.69	0.64	45.3
West: KS Dve (w)											
11	T	2885	5.0	0.779	4.7	LOS A	14.5	105.9	0.44	0.41	51.3
12	R	269	5.0	0.805	44.1	LOS D	10.3	75.3	0.99	0.92	27.2
Approach		3155	5.0	0.805	8.0	LOS A	14.5	105.9	0.48	0.45	47.7
All Vehicles		5964	5.0	0.805	9.7	LOS A	20.1	146.8	0.59	0.55	45.6

MOVEMENT SUMMARY

Site: 2031 PM Approved Gen

14BRT0013 Icon
KS Dve / Harbour Rd
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harbour Rd (s)											
1	L	84	5.0	0.132	36.4	LOS D	1.4	10.1	0.87	0.74	30.0
Approach		84	5.0	0.132	36.4	LOS D	1.4	10.1	0.87	0.74	30.0
East: KS Dve (e)											
4	L	11	5.0	0.833	23.9	LOS C	32.0	233.8	0.82	1.00	38.4
5	T	3076	5.0	0.833	15.1	LOS B	32.2	235.0	0.82	0.82	40.1
Approach		3086	5.0	0.833	15.1	LOS B	32.2	235.0	0.82	0.82	40.1
West: KS Dve (w)											
11	T	2322	5.0	0.627	3.5	LOS A	8.0	58.6	0.31	0.28	53.3
12	R	251	5.0	0.748	42.2	LOS D	9.2	67.0	0.98	0.88	27.9
Approach		2573	5.0	0.748	7.3	LOS A	9.2	67.0	0.37	0.34	48.9
All Vehicles		5743	5.0	0.833	11.9	LOS B	32.2	235.0	0.62	0.60	43.4

MOVEMENT SUMMARY

Site: 2031 AM Proposed Gen

14BRT0013 Icon
KS Dve / Harbour Rd
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harbour Rd (s)											
1	L	218	5.0	0.342	37.8	LOS D	3.8	27.6	0.91	0.78	29.4
Approach		218	5.0	0.342	37.8	LOS D	3.8	27.6	0.91	0.78	29.4
East: KS Dve (e)											
4	L	11	5.0	0.711	18.4	LOS B	20.5	149.4	0.69	0.95	42.0
5	T	2625	5.0	0.711	9.5	LOS A	20.7	151.5	0.70	0.65	45.1
Approach		2636	5.0	0.711	9.5	LOS A	20.7	151.5	0.70	0.65	45.1
West: KS Dve (w)											
11	T	2929	5.0	0.791	5.2	LOS A	15.6	113.9	0.45	0.43	50.6
12	R	269	5.0	0.805	44.1	LOS D	10.3	75.3	0.99	0.92	27.2
Approach		3199	5.0	0.805	8.4	LOS A	15.6	113.9	0.50	0.47	47.2
All Vehicles		6053	5.0	0.805	10.0	LOS A	20.7	151.5	0.60	0.56	45.3

MOVEMENT SUMMARY

Site: 2031 PM Proposed Gen

14BRT0013 Icon
KS Dve / Harbour Rd
Signals - Actuated Cycle Time = 75 seconds

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Harbour Rd (s)											
1	L	84	5.0	0.132	36.4	LOS D	1.4	10.1	0.87	0.74	30.0
Approach		84	5.0	0.132	36.4	LOS D	1.4	10.1	0.87	0.74	30.0
East: KS Dve (e)											
4	L	11	5.0	0.845	25.3	LOS C	34.0	248.0	0.84	1.02	37.5
5	T	3120	5.0	0.845	16.4	LOS B	34.1	248.9	0.84	0.85	39.2
Approach		3131	5.0	0.845	16.4	LOS B	34.1	248.9	0.84	0.85	39.2
West: KS Dve (w)											
11	T	2366	5.0	0.639	3.6	LOS A	8.4	61.1	0.31	0.29	53.2
12	R	251	5.0	0.748	42.2	LOS D	9.2	67.0	0.98	0.88	27.9
Approach		2617	5.0	0.748	7.3	LOS A	9.2	67.0	0.38	0.34	48.9
All Vehicles		5832	5.0	0.845	12.6	LOS B	34.1	248.9	0.63	0.62	42.8

KINGSFORD SMITH DRIVE / HERCULES STREET

MOVEMENT SUMMARY

Site: 2031 AM Approved Gen

14BRT0013 Icon
KS Dve / Hercules St Link
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hercules St Link (s)											
1	L	1067	5.0	0.580	35.1	LOS D	26.6	194.0	0.75	0.84	30.6
3	R	471	5.0	1.000 ^a	59.0	LOS E	15.6	114.2	1.00	0.83	23.0
Approach		1538	5.0	1.000	42.4	LOS D	26.6	194.0	0.82	0.84	27.8
East: KS Dve (e)											
4	L	11	5.0	0.009	8.2	LOS A	0.0	0.2	0.05	0.61	49.2
5	T	1895	5.0	0.822	38.5	LOS D	38.4	280.1	0.89	0.82	28.0
Approach		1905	5.0	0.822	38.4	LOS D	38.4	280.1	0.89	0.82	28.0
West: KS Dve (w)											
11	T	2282	5.0	0.990	93.7	LOS F	78.7	574.4	1.00	1.24	16.3
12	R	168	5.0	0.671	73.1	LOS E	11.4	83.5	0.96	0.82	20.1
Approach		2451	5.0	0.990	92.3	LOS F	78.7	574.4	1.00	1.21	16.5
All Vehicles		5894	5.0	1.000	61.8	LOS E	78.7	574.4	0.92	0.99	21.7

MOVEMENT SUMMARY

Site: 2031 PM Approved Gen

14BRT0013 Icon
KS Dve / Hercules St Link
Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hercules St Link (s)											
1	L	821	5.0	0.558	32.7	LOS C	15.3	111.9	0.82	0.84	31.6
3	R	371	5.0	0.861	64.1	LOS E	10.2	74.8	1.00	1.00	21.8
Approach		1192	5.0	0.861	42.5	LOS D	15.3	111.9	0.88	0.89	27.7
East: KS Dve (e)											
4	L	11	5.0	0.009	8.1	LOS A	0.0	0.1	0.05	0.61	49.4
5	T	2265	5.0	0.851	24.8	LOS C	32.3	235.4	0.86	0.84	34.0
Approach		2276	5.0	0.851	24.7	LOS C	32.3	235.4	0.86	0.84	34.0
West: KS Dve (w)											
11	T	1989	5.0	0.747	18.8	LOS B	22.6	165.3	0.76	0.68	37.7
12	R	168	5.0	0.429	43.7	LOS D	6.6	48.3	0.84	0.79	27.5
Approach		2158	5.0	0.747	20.8	LOS C	22.6	165.3	0.76	0.69	36.6
All Vehicles		5625	5.0	0.861	27.0	LOS C	32.3	235.4	0.83	0.79	33.3

MOVEMENT SUMMARY

Site: 2031 AM Proposed Gen

14BRT0013 Icon
KS Dve / Hercules St Link
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hercules St Link (s)											
1	L	1145	5.0	0.630	36.7	LOS D	29.9	217.9	0.78	0.86	29.9
3	R	467	5.0	1.000 ³	59.5	LOS E	15.6	114.2	1.00	0.83	22.9
Approach		1612	5.0	1.000	43.3	LOS D	29.9	217.9	0.84	0.85	27.5
East: KS Dve (e)											
4	L	11	5.0	0.009	8.2	LOS A	0.0	0.2	0.05	0.61	49.2
5	T	1895	5.0	0.809	36.6	LOS D	37.2	271.2	0.87	0.79	28.7
Approach		1905	5.0	0.809	36.4	LOS D	37.2	271.2	0.87	0.79	28.8
West: KS Dve (w)											
11	T	2326	5.0	0.993	95.8	LOS F	81.4	594.1	1.00	1.25	16.1
12	R	168	5.0	0.671	73.1	LOS E	11.4	83.5	0.96	0.82	20.1
Approach		2495	5.0	0.993	94.2	LOS F	81.4	594.1	1.00	1.22	16.3
All Vehicles		6012	5.0	1.000	62.3	LOS E	81.4	594.1	0.92	0.99	21.6

MOVEMENT SUMMARY

Site: 2031 PM Proposed Gen

14BRT0013 Icon
KS Dve / Hercules St Link
Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hercules St Link (s)											
1	L	865	5.0	0.574	32.2	LOS C	16.1	117.7	0.82	0.84	31.9
3	R	400	5.0	0.858	63.2	LOS E	11.0	80.4	1.00	0.99	22.0
Approach		1265	5.0	0.858	42.0	LOS D	16.1	117.7	0.88	0.89	27.9
East: KS Dve (e)											
4	L	11	5.0	0.009	8.1	LOS A	0.0	0.1	0.05	0.61	49.4
5	T	2265	5.0	0.869	27.8	LOS C	34.4	250.9	0.89	0.89	32.4
Approach		2276	5.0	0.869	27.7	LOS C	34.4	250.9	0.89	0.89	32.5
West: KS Dve (w)											
11	T	2034	5.0	0.780	20.8	LOS C	24.9	182.0	0.80	0.73	36.3
12	R	168	5.0	0.429	43.7	LOS D	6.6	48.3	0.84	0.79	27.5
Approach		2202	5.0	0.780	22.6	LOS C	24.9	182.0	0.80	0.74	35.5
All Vehicles		5743	5.0	0.869	28.9	LOS C	34.4	250.9	0.85	0.83	32.4

KINGSFORD SMITH DRIVE / REMORA ROAD

MOVEMENT SUMMARY

Site: 2031 AM Approved Gen

14BRT0013 Icon
KS Dve / Nudgee Rd
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Remora Rd (s)											
1	L	483	5.0	0.819	22.1	LOS C	15.9	116.4	0.46	0.76	37.6
2	T	141	5.0	0.862	83.0	LOS F	11.3	82.5	1.00	0.97	17.8
3	R	55	5.0	0.406	79.7	LOS E	3.9	28.4	0.98	0.75	18.9
Approach		679	5.0	0.862	39.4	LOS D	15.9	116.4	0.61	0.81	28.7
East: KS Dve (e)											
4	L	16	5.0	0.649	60.2	LOS E	28.4	207.3	0.87	0.95	23.5
5	T	1409	5.0	0.649	44.0	LOS D	28.4	207.3	0.88	0.79	26.1
6	R	271	5.0	0.905	88.6	LOS F	22.4	163.2	1.00	0.99	17.6
Approach		1696	5.0	0.905	51.3	LOS D	28.4	207.3	0.90	0.83	24.2
North: Nudgee Rd (n)											
7	L	124	5.0	0.299	13.6	LOS B	1.7	12.7	0.22	0.65	43.9
8	T	684	5.0	0.906	75.4	LOS E	27.4	199.8	1.00	1.02	18.9
9	R	2	5.0	0.011	58.4	LOS E	0.1	0.8	0.75	0.62	23.2
Approach		811	5.0	0.906	65.9	LOS E	27.4	199.8	0.88	0.97	20.8
West: KS Dve (w)											
10	L	651	5.0	0.606	10.3	LOS B	4.0	28.9	0.19	0.65	47.0
11	T	1926	5.0	0.879	30.6	LOS C	40.5	295.4	0.89	0.84	31.1
12	R	497	5.0	0.831	68.3	LOS E	17.9	130.9	1.00	0.88	21.0
Approach		3074	5.0	0.879	32.4	LOS C	40.5	295.4	0.76	0.81	30.9
All Vehicles		6259	5.0	0.906	42.6	LOS D	40.5	295.4	0.79	0.83	27.0

MOVEMENT SUMMARY

Site: 2031 PM Approved Gen

14BRT0013 Icon
KS Dve / Nudgee Rd
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Remora Rd (s)											
1	L	121	5.0	0.293	24.1	LOS C	4.1	30.1	0.54	0.72	36.3
2	T	124	5.0	0.519	67.1	LOS E	8.7	63.2	0.98	0.79	20.4
3	R	38	5.0	0.265	71.6	LOS E	2.5	18.3	0.93	0.73	20.3
Approach		283	5.0	0.519	49.4	LOS D	8.7	63.2	0.79	0.75	25.1
East: KS Dve (e)											
4	L	40	5.0	0.926	89.0	LOS F	53.2	388.5	1.00	1.14	18.0
5	T	1827	5.0	0.926	73.7	LOS E	53.2	388.5	1.00	1.10	19.2
6	R	201	5.0	0.841	84.4	LOS F	15.7	114.7	1.00	0.93	18.2
Approach		2068	5.0	0.926	75.1	LOS E	53.2	388.5	1.00	1.08	19.1
North: Nudgee Rd (n)											
7	L	32	5.0	0.053	8.7	LOS A	0.1	0.8	0.05	0.61	48.6
8	T	645	5.0	0.928	78.4	LOS E	33.1	241.7	1.00	1.07	18.4
9	R	317	5.0	0.928	78.9	LOS E	32.6	237.7	0.95	0.95	19.3
Approach		994	5.0	0.928	76.3	LOS E	33.1	241.7	0.95	1.01	19.0
West: KS Dve (w)											
10	L	405	5.0	0.346	8.8	LOS A	1.7	12.6	0.08	0.62	48.6
11	T	1493	5.0	0.746	28.9	LOS C	26.4	193.0	0.79	0.70	32.1
12	R	444	5.0	0.929	82.7	LOS F	18.0	131.1	1.00	0.96	18.4
Approach		2342	5.0	0.929	35.6	LOS D	26.4	193.0	0.71	0.74	29.7
All Vehicles		5687	5.0	0.929	57.8	LOS E	53.2	388.5	0.86	0.91	22.7

MOVEMENT SUMMARY

Site: 2031 AM Proposed Gen

14BRT0013 Icon
KS Dve / Nudgee Rd
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Remora Rd (s)											
1	L	483	5.0	0.830	24.4	LOS C	17.0	124.2	0.47	0.77	36.2
2	T	141	5.0	0.862	83.0	LOS F	11.3	82.5	1.00	0.97	17.8
3	R	55	5.0	0.406	79.7	LOS E	3.9	28.4	0.98	0.75	18.9
Approach		679	5.0	0.862	41.0	LOS D	17.0	124.2	0.62	0.81	28.1
East: KS Dve (e)											
4	L	31	5.0	0.665	58.5	LOS E	28.3	206.9	0.88	0.96	23.9
5	T	1409	5.0	0.665	44.1	LOS D	28.6	208.9	0.89	0.81	26.1
6	R	271	5.0	0.905	88.6	LOS F	22.4	163.2	1.00	0.99	17.6
Approach		1711	5.0	0.905	51.4	LOS D	28.6	208.9	0.91	0.84	24.2
North: Nudgee Rd (n)											
7	L	124	5.0	0.295	14.4	LOS B	1.9	13.8	0.24	0.65	43.2
8	T	699	5.0	0.895	72.9	LOS E	27.4	200.3	1.00	1.01	19.3
9	R	2	5.0	0.011	57.5	LOS E	0.1	0.8	0.74	0.62	23.5
Approach		825	5.0	0.895	64.1	LOS E	27.4	200.3	0.88	0.95	21.1
West: KS Dve (w)											
10	L	665	5.0	0.618	10.4	LOS B	4.1	30.2	0.20	0.66	46.9
11	T	1941	5.0	0.902	34.3	LOS C	43.6	318.2	0.92	0.89	29.5
12	R	541	5.0	0.905	74.3	LOS E	21.0	153.2	1.00	0.93	19.8
Approach		3147	5.0	0.905	36.1	LOS D	43.6	318.2	0.78	0.85	29.4
All Vehicles		6362	5.0	0.905	44.4	LOS D	43.6	318.2	0.81	0.86	26.4

MOVEMENT SUMMARY

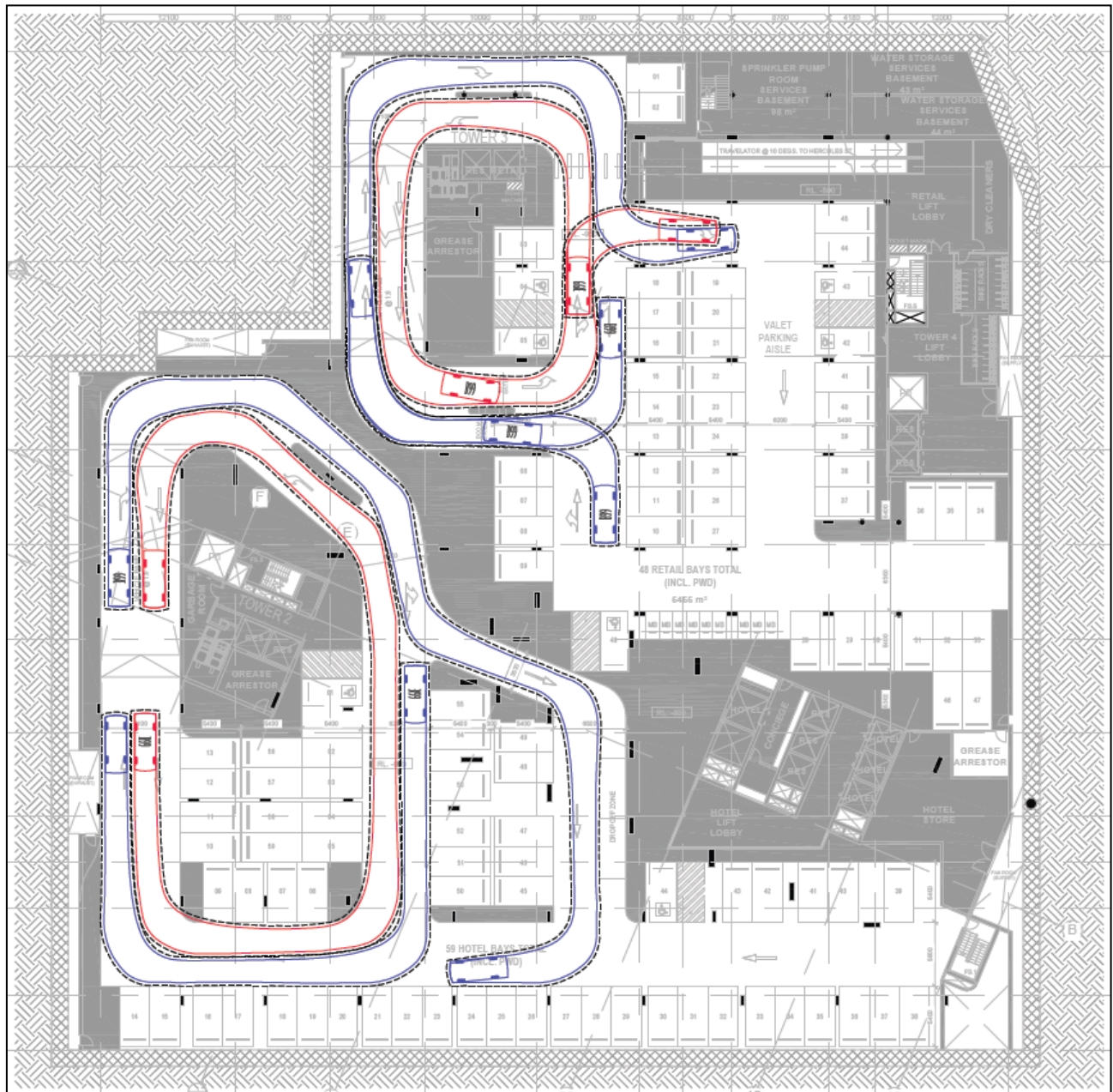
Site: 2031 PM Proposed Gen

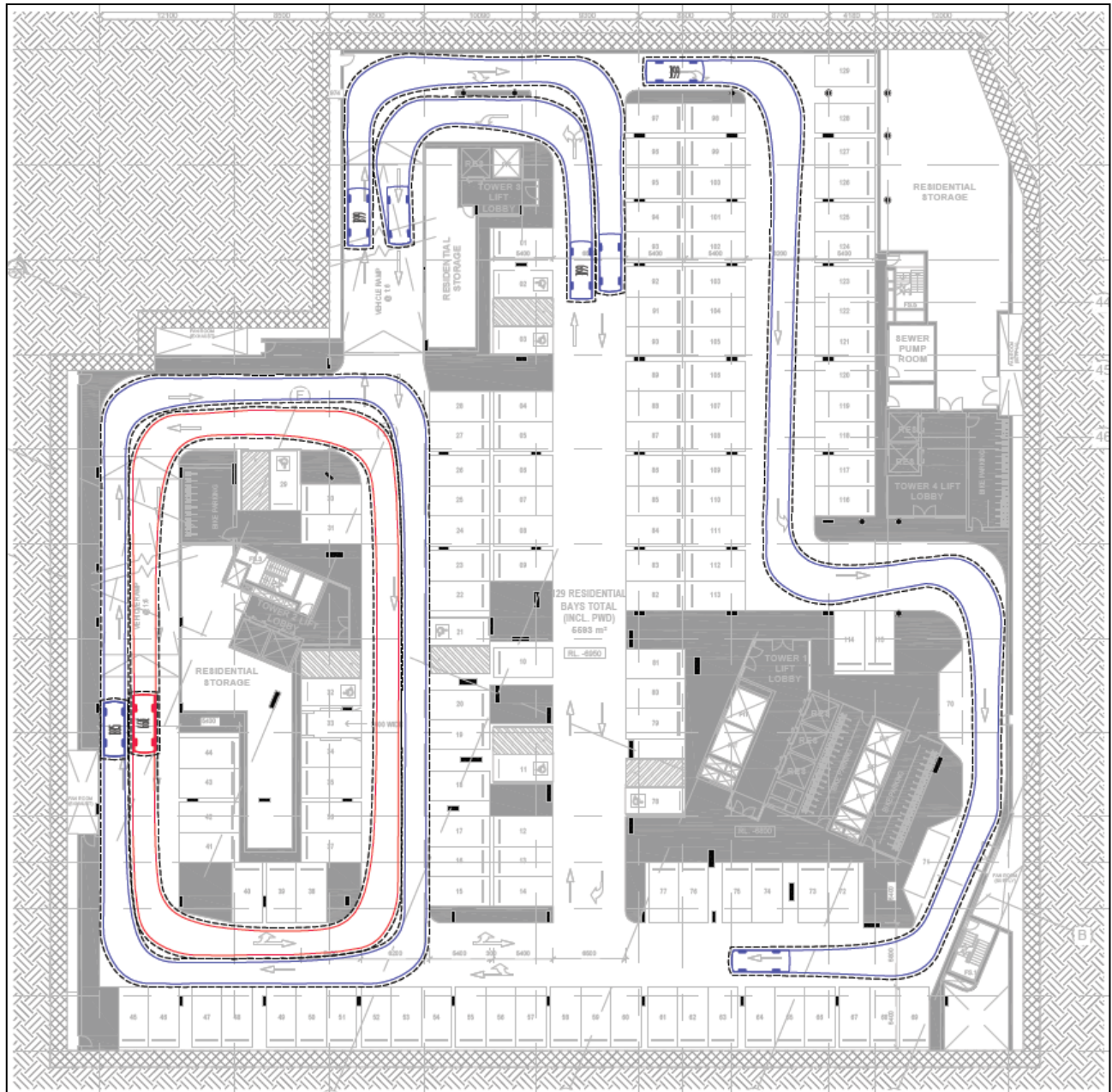
14BRT0013 Icon
KS Dve / Nudgee Rd
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Remora Rd (s)											
1	L	121	5.0	0.293	23.7	LOS C	4.1	29.7	0.54	0.72	36.6
2	T	124	5.0	0.822	80.8	LOS F	9.7	71.1	1.00	0.92	18.1
3	R	38	5.0	0.264	80.1	LOS F	2.7	19.6	0.98	0.74	18.9
Approach		283	5.0	0.822	56.3	LOS E	9.7	71.1	0.80	0.81	23.3
East: KS Dve (e)											
4	L	55	5.0	0.898	75.8	LOS E	49.2	358.8	1.00	1.08	20.2
5	T	1827	5.0	0.898	62.5	LOS E	49.2	358.8	1.00	1.03	21.3
6	R	201	5.0	0.731	75.7	LOS E	14.5	106.2	1.00	0.86	19.6
Approach		2083	5.0	0.898	64.1	LOS E	49.2	358.8	1.00	1.02	21.1
North: Nudgee Rd (n)											
7	L	32	5.0	0.072	8.7	LOS A	0.1	0.8	0.05	0.61	48.7
8	T	660	5.0	0.895	69.7	LOS E	31.5	229.9	1.00	1.00	19.8
9	R	317	5.0	0.895	75.2	LOS E	31.0	226.1	0.93	0.93	19.9
Approach		1008	5.0	0.895	69.5	LOS E	31.5	229.9	0.95	0.97	20.2
West: KS Dve (w)											
10	L	420	5.0	0.357	8.8	LOS A	1.8	13.2	0.09	0.63	48.6
11	T	1507	5.0	0.726	26.8	LOS C	25.4	185.6	0.75	0.67	33.2
12	R	488	5.0	0.888	74.3	LOS E	18.7	136.2	1.00	0.91	19.8
Approach		2416	5.0	0.888	33.3	LOS C	25.4	185.6	0.69	0.71	30.7
All Vehicles		5791	5.0	0.898	51.8	LOS D	49.2	358.8	0.85	0.87	24.2

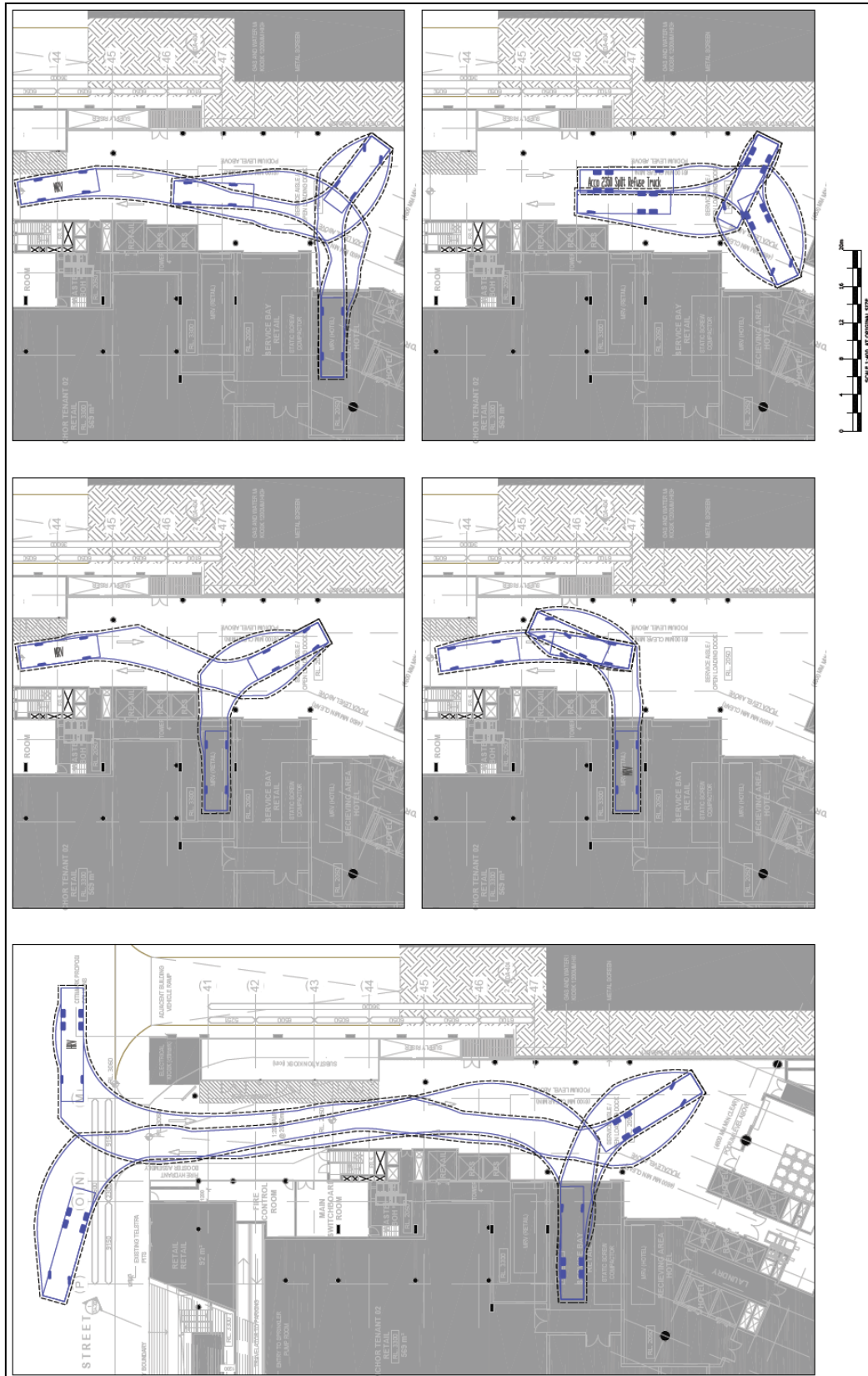
Appendix C Swept Paths

CARPARK





SERVICE / LOADING AREA



PORTE COCHERE

