Melbourne Airport Power Centre, Tullamarine - Site 3

Pivot Group Pty Ltd
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GTA CONSULTANTS

Document Issue

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Issue	Date	Description	Project Consultant	Project Manager	Director Approval
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Executive Summary

Introduction

A major development plan approval is currently being sought for 'Site 3' of the proposed "Power Centre" development on land located on the eastern corner of the Mercer Drive / Melrose Drive intersection in Tullamarine.

The proposed development incorporates the provision of 32,000sqm of restricted retail floor space, 9,300sqm of office floor space and 6,730sqm of warehouse floor space. These uses are in addition to the recently approved 48,000sqm of predominantly restricted retail (bulky goods) floor space that is proposed on Sites 1 and 2 of the overall "Power Centre".

Advice provided to GTA Consultants indicates that the restricted retail floor space within Site 3 is likely to be occupied by a large format retailer with international standing such as IKEA. To this end, while the assessment presented in this report is based on the occupation of this floor area by IKEA, it is emphasised that this tenant is indicative and has been used only for the purposes of estimating traffic and car parking requirements.

Existing Conditions

The analysis previously undertaken by our office for the Sites 1 and 2 development was inadvertently conservative on the high side as the 'base traffic volumes' used in the assessment included two allowances for traffic generated by the subject site.

This conservatism has been corrected in this report by 'discounting' the traffic generated by the site which is distributed to the surrounding road network by 516 and 734 vehicle movements during the weekday afternoon and weekend lunchtime peak hours respectively.

These discounts are based on information contained within the SKM report titled 'Melbourne Airport Paramics Traffic Model'.

Access Arrangements

Vehicular access to all Site 3 uses except the warehouse use (Building Q) is proposed via the ultimate road network that was recently approved as part of the Sites 1 and 2 development. This network includes the following principal components:

i The construction of a roundabout approximately 180m northeast of the existing Melrose Drive / Mercer Drive intersection which facilitates access from both Tullamarine Freeway and Melrose Drive;

ii The construction of Airport Drive and the accompanying signalisation of the Mercer Drive intersection;

iii The construction of a roundabout at the termination of Melrose Drive immediately southwest of the recently constructed QANTAS Joey Club; and

iv The provision of entry and exit only access points to Airport Drive immediately south of Site 2.

It is further noted that vehicular access to the warehouse use (i.e. Building Q) is proposed via two crossovers to Springbank Street, noting that this part of the development does not enjoy access through the balance of the site.

Traffic Generation

The Site 3 development is expected to generate approximately 730 and 1,050 additional vehicle movements (i.e. above that generated by the Sites 1 and 2 development) during the typical weekday afternoon and weekend lunchtime peak hours respectively.

This additional traffic results in an overall "Power Centre" traffic generation of approximately 2,230 and 3,110 vehicle movements during each respective peak hour.

Traffic Impact Assessment

The road network as shown in Figure 3.1 of this report can be expected to operate satisfactorily under Year 2018 post-development conditions, noting that this road network includes:

- The completion of improvements to the surrounding road network (including the construction of Airport Drive and the signalisation of its intersection with Mercer Drive) which, as discussed in Section 2.2.2 of this report, are currently proposed and are not directly required as a result of the development of the site; and
- The completion of additional works necessitated by the development of the site, including:
    - i The provision of an additional right-turn lane on the Mercer Drive north approach to Airport Drive; and
    - ii The lengthening of the right-turn lane on the Airport Drive west approach to Mercer Drive.

Sufficient evidence is considered to exist to suggest that traffic generated by the overall "Power Centre" can be satisfactorily accommodated by the Tullamarine Freeway for both northbound and southbound carriageways.

Although a marginal impact could be expected, the additional traffic generated by the overall "Power Centre" could not be expected to compromise the safety or function of the road network in the vicinity of the Airport Terminus. It is also expected that any upgrade works at the intersections within this Precinct (which is located approximately 1.5km from the site) would be investigated as part of the Melbourne Airport Ground Transport Plan, noting that this plan would consider traffic generated by the "Power Centre" and other developments in the area.

The internal north-south road running between the Mercer Drive / Site Access roundabout and the roundabout to the immediate south of Building P can also be expected to operate satisfactorily with a single trafficable lane in each direction (and the provision of a central turning lane at key intersections) following the development of the overall "Power Centre" site.

Analysis undertaken by our office with respect to daily traffic volume impacts indicates that the post-development daily volumes on the key roads in the vicinity of the site (including Melrose Drive to the southeast of the site) are acceptable, noting that volumes on Melrose Drive following the development of the site are expected to be less than those which occurred prior to the construction of Mercer Drive.

This analysis also indicates that while an Airport Drive cross-section containing six lanes is required at the Mercer Drive intersection (given that a triple right turn lane is proposed), a four lane cross-section is sufficient to the south of the site.

Car Parking Assessment

The provision of 300 surplus car spaces within Sites 1 and 2 (as documented in Section 5.2 of this report), together with the 1,800 car spaces proposed within Site 3, can be expected to accommodate the peak parking demands likely to be generated by the overall "Power Centre" site under even 'exceptional' circumstances (i.e. in the event that Building P is occupied by an IKEA which generates a parking demand of 1,500 car spaces).

Other Considerations

The proposed loading bays and internal road network have been designed to accommodate vehicles of a size up to and including 19.0m semi-trailers, noting that the design of this network to accommodate larger vehicles (such as B-doubles) is not considered to be warranted.

It is recommended that the existing on-road bicycles lanes on Melrose Drive are extended to the eastern access point following the development of the site.

The proposed development incorporates good pedestrian connections to the surrounding residential and industrial land uses, noting that these connections can be expected to encourage modes of travel to the site other than via private motor vehicle.

The proposed development includes the potential for an internal bus stop and the internal road network has been designed to accommodate a diversion of the nearby existing bus routes if required in the future.

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1 Introduction

1.1 Background

A major development plan approval is currently being sought for 'Site 3' of the proposed "Power Centre" development on land located on the eastern corner of the Mercer Drive / Melrose Drive intersection in Tullamarine.

The proposed development incorporates the provision of 32,000sqm of restricted retail floor space, 9,300sqm of office floor space and 6,730sqm of warehouse floor space. These uses are in addition to the recently approved 48,000sqm of predominantly restricted retail (bulky goods) floor space that is proposed on Sites 1 and 2 of the overall "Power Centre".

Advice provided to GTA Consultants indicates that the restricted retail floor space within Site 3 is likely to be occupied by a large format retailer with international standing such as IKEA. To this end, while the assessment presented in this report is based on the occupation of this floor area by IKEA, it is emphasised that this tenant is indicative and has been used only for the purposes of estimating traffic and car parking requirements.

The proposed development also incorporates the provision of some 1,800 additional on-site car spaces with access to all but approximately 120 of these spaces (which are required for the warehouse use) proposed via the ultimate road network that was approved as part of the Sites 1 and 2 development.

Vehicular access to these latter warehouse parking spaces is proposed via two crossovers to Springbank Street, noting that this part of the development does not enjoy access through the balance of the site.

In October 2005, GTA Consultants was commissioned by Pivot Group Pty Ltd to undertake a traffic and car parking impact assessment of the Sites 1 and 2 development and assist in its planning. This engagement culminated in the preparation of an accompanying traffic and car parking report titled 'Melbourne Airport Power Centre – Mercer Drive, Tullamarine', dated 21 December 2006.

In more recent times (July 2007), GTA Consultants was recommissioned by Pivot Group Pty Ltd to undertake a new traffic and car parking impact assessment of the Site 3 development (utilising the previous assessment as a base) and again assist in the planning of this component of the overall "Power Centre" site.

1.2 Purpose of This Report

This report sets out an assessment of the anticipated car parking and traffic implications of the Site 3 development, including consideration of the following:

i The existing traffic and car parking conditions surrounding the site;
ii The traffic generation characteristics of the proposed development;
iii The proposed access arrangements for the site;
iv The impact of the development proposal on the surrounding and internal road network;
v The parking demand likely to be generated by the proposed development;
vi The suitability of the proposed car parking provision in terms of supply (quantum); and
vii The connectivity of the site to surrounding pedestrian and bicycle pathways / lanes.

1.3 Referenced Documents

In preparing this report, reference has been made to a number of background documents, including:

- Hume Planning Scheme;
- Plans for the proposed development prepared by Leffler Simes Pty Ltd, specifically Drawing No. MP200 / A (dated 18 September 2007);
- *'Melbourne Airport Power Centre – Mercer Drive, Tullamarine: Traffic and Car Parking Report' (21 December 2006),* GTA Consultants;
- *'Melbourne Airport Paramics Traffic Model: Future Traffic Projections – Apac Drive Extension/Melrose Drive' (4 March 2006)*, Sinclair Knight Merz;
- *'Tullamarine Freeway – Traffic Operation Improvement Investigation' (June 2006)*, Traffix Group;
- *'Guide to Traffic Engineering Practice – Part 2: Roadway Capacity'*, Austroads;
- *'Guide to Traffic Generating Developments' (October 2002)*, RTANSW;
- Traffic and car parking surveys undertaken by GTA Consultants as referenced in the context of this report;
- Various technical data as referenced in this report;
- Numerous inspection of the subject site and its surrounds; and
- Other documents as nominated.

2 Existing Conditions

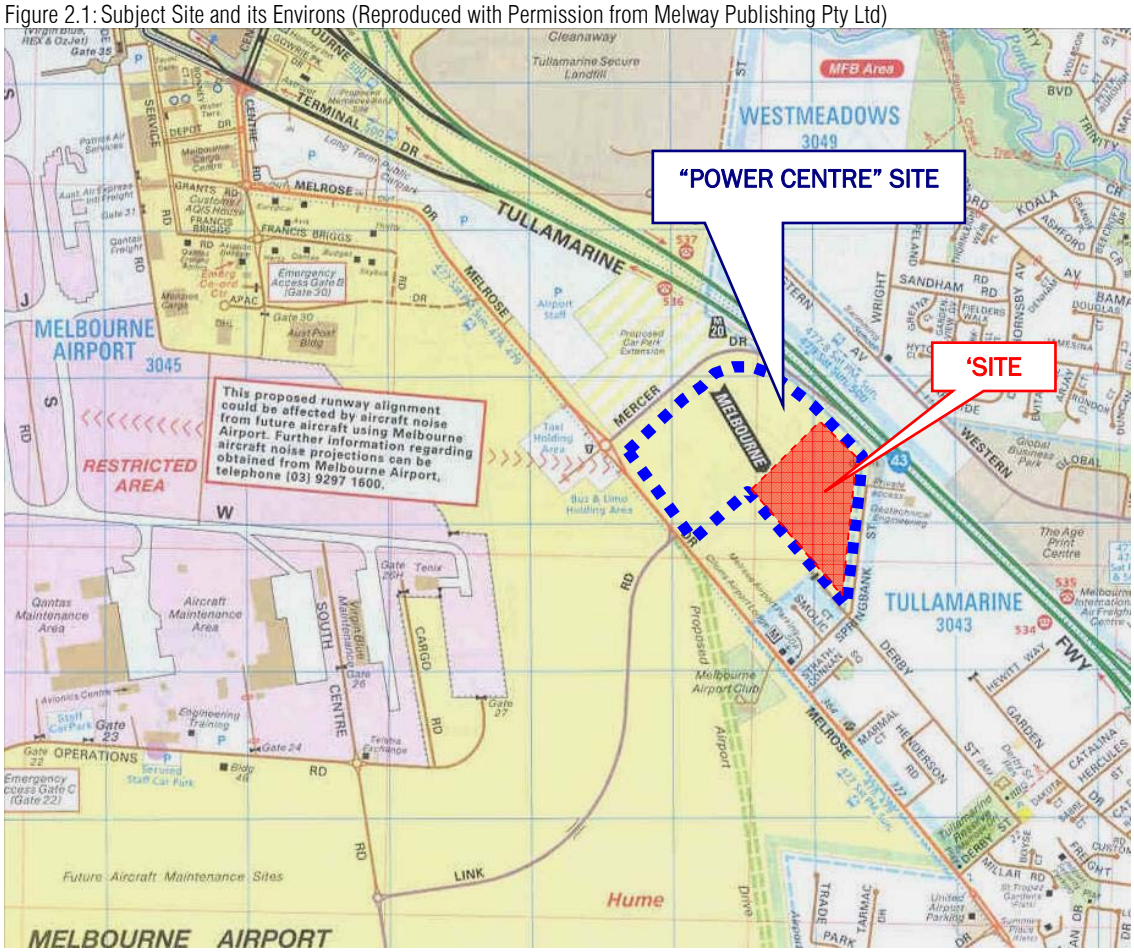
2.1 Subject Site

The overall "Power Centre" site is located on the east corner of the Mercer Drive / Melrose Drive intersection in Tullamarine and is currently unoccupied.

As shown in Figure 2.1, the site is located on Melbourne Airport land and is bound by the Tullamarine Freeway to the north, Melrose Drive to the south and Mercer Drive to the west.

The surrounding land uses include the Melbourne Airport Long Term Car Park to the immediate northwest, a Taxi Holding Area to the southwest, and industrial and residential uses to the east.

Figure 2.1: Subject Site and its Environs (Reproduced with Permission from Melway Publishing Pty Ltd)



2.2 Road Network

2.2.1 Adjoining Roads

A brief summary of the surrounding road network is presented as follows:

- Tullamarine Freeway provides an important role in Melbourne's metropolitan road network linking Melbourne Airport and the CBD (via CityLink). It is configured with a 4-6 lane divided carriageway in the vicinity of the site;
- Melrose Drive functions as a major (collector) road and is configured with a two lane carriageway in the vicinity of the site;
- Mercer Drive functions as a collector road providing a one-way link (north to south) between the Tullamarine Freeway and Melrose Drive. This road is configured with two lanes;
- Link Road runs between Melrose Drive and South Centre Road. It functions as a collector road and is configured with a two lane carriageway; and
- Springbank Street generally runs in the north-south direction and functions as an industrial street configured with a two-lane carriageway.

For reference, the above roads are shown in Figures 2.2 to 2.5.

Figure 2.2: Melrose Drive looking southeast (site on left)

Figure 2.3: Mercer Drive looking northeast (site on right)

Figure 2.4: Link Road looking southwest from Melrose Drive

Figure 2.5: Springbank Street looking north

2.2.2 Currently Proposed Road Projects

The following road projects are currently being completed or are proposed within the immediate vicinity of the subject site:

- The duplication of Melrose Drive to the northwest of its intersection with Mercer Drive – completion due in 2007;
- The construction of a grade separated roadway (above the Melbourne Airport Long Term Car Park) connecting Melrose Drive to the Tullamarine Freeway for one-way (city-bound) traffic only – completion due by 2009-2010; and
- The construction of the Airport Drive Extension connecting the Western Ring Road and Melrose Drive opposite the subject site. Preliminary plans prepared by Hyder Consulting Pty Ltd indicate that this road will ultimately be constructed with a divided carriageway with three trafficable through lanes in each direction, and will incorporate the signalisation of its intersection with Mercer Drive – completion due by approx. 2012-2014, but., if warranted, stages may be completed earlier if full development and occupation of the total Airport Entry Development occurs.

2.2.3 Surrounding Intersections

The following intersections currently exist in the vicinity of the site:

- Melrose Drive / Mercer Drive (roundabout with auxiliary short through lanes on Melrose Drive and two circulating lanes); and
- Melrose Drive / Link Road (unsignalised – priority to Melrose Drive).

2.2.4 Traffic Volumes

2.2.4.1 Surrounding Intersections

Melrose Drive / Mercer Drive intersection

Forecast traffic volumes at the Melrose Drive / Mercer Drive intersection for the weekday afternoon period in the Years 2009 and 2023 are documented in Appendix B of the SKM March 2006 report (as detailed in Section 1.3 of this report).

These volumes were used to extrapolate Year 2008 and Year 2018 volumes for the weekday afternoon and weekend lunchtime and are shown in Appendix A of this report. Further discussion regarding this extrapolation is documented in our previous December 2006 report for Sites 1 and 2.

Notwithstanding these volumes, it is noted that the SKM forecasts incorporate a traffic generation allowance from the subject site; that is, the volumes assume that the site is developed to some level. This allowance was discovered following the completion of our aforementioned December 2006 report and has therefore previously not been documented.

This discovery has significant implications for our previous assessment, however, as the forecast volumes were used as 'base traffic volumes' to which the "Power Centre" development generated traffic volumes were added to produce post-development traffic volume estimates.

These post-development volume estimates accordingly included two allowances for traffic generated by the subject site.

For reference later within this report, Table 2.1 presents a summary of the traffic volume allowance in the SKM 'base volumes'.

Table 2.1: Site Generated Traffic Allowance in SKM 'Base Traffic Volumes'

Use [1]	NFA	Weekday AM Peak Hour	Weekday PM Peak Hour	Weekend Lunchtime
Leisure	31,650sqm	119vph	-	
Service / Retail	44,658sqm	223vph	-	
Service / Retail	34,806sqm	174vph	-	
Total	**111,114sqm**	**516vph**	**516vph [2]**	**734vpd [3]**

[1] Excludes office floor area of 36,130sqm NFA that is also located within the larger subject site area. This area has been excluded based on our understanding that Melbourne Airport seeks to provide predominantly office floor area between Site 3 and the recently constructed QANTAS Joey Club. This is discussed further in Section 4 of this report.

[2] Based on highly conservative assumption (on the low side) that weekday AM and PM traffic volumes are equal.

[3] Based on assumption that weekday PM volumes equate to 70% of weekend lunchtime volumes.

Melrose Drive / Springbank Street intersection

GTA Consultants undertook traffic movement counts at the Melrose Drive / Springbank Road intersection on Wednesday 18 July 2007 between 8:00am and 9:00am, and 5:00pm and 6:00pm.

It is noted that the weekend lunchtime period was not surveyed as vehicular access to the development via Springbank Street will be restricted to the industrial (warehouse) use only, noting that this use is expected to generate little if any traffic during this period.

In this regard, the AM and PM peak hour traffic volumes are shown in Figures 2.6 and 2.7, respectively.

Figure 2.6: Melrose Drive / Springbank Street – Existing AM Peak Hour Traffic Volumes

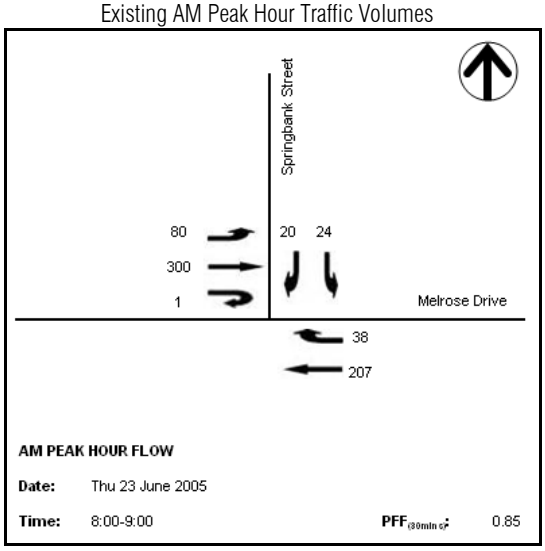
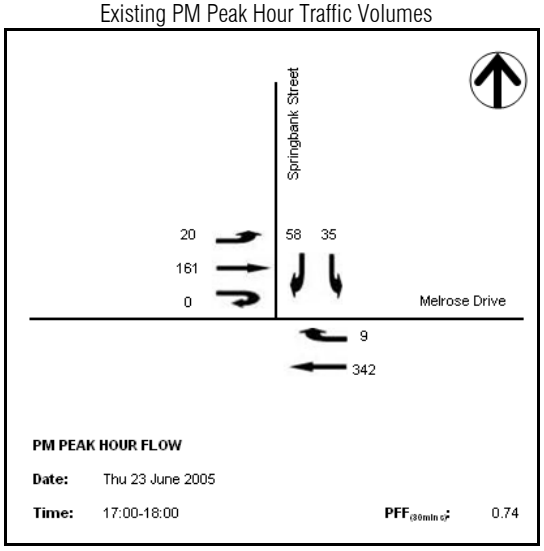


Figure 2.7: Melrose Drive / Springbank Street – Existing PM Peak Hour Traffic Volumes



2.2.4.2 Surrounding Road Network

Tullamarine Freeway

Existing peak hour traffic volumes on the Tullamarine Freeway volumes have been sourced from the "Tullamarine Freeway – Traffic Operation Improvement Investigation" prepared by Traffix Group dated June 2006.

This document identifies the following volumes:

- Weekday afternoon peak hour: 2,996vph northbound & 2,551vph southbound; and
- Weekend lunchtime peak hour: 1,787vph northbound & 2,191vph southbound.

2.2.5 Road Network Operation

2.2.5.1 Surrounding Intersections

Melrose Drive / Mercer Drive intersection

As documented in our aforementioned December 2006 report for Sites 1 and 2 of the development, analysis undertaken using SIDRA indicates that the Melrose Drive / Mercer Drive roundabout can be expected to operate with 'very good' to 'excellent' levels of service during the weekday afternoon and weekend lunchtime periods under 'base case' conditions in the Years 2008 and 2018.

This analysis has been completed using the *Degree of Saturation* to measure the intersection performance. The DOS-value represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. For unsignalised intersections (including roundabouts), a DOS-value of around 0.90 has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately[1].

For comparison later in this report, it is noted that this 'ideal' limit increases to a flow-to-capacity ratio of 0.95 for signalised intersection.

Melrose Drive / Springbank Street intersection

The operation of Melrose Drive / Springbank Street intersection has been assessed using SIDRA INTERSECTION 3.1[2], a computer based modelling package which calculates intersection performance.

Table 2.2 presents a summary of the existing operation of the Melrose Drive / Springbank Street intersection, with full results presented in Appendix B of this report.

Table 2.2: Melrose Drive / Springbank Street Intersection – Existing Operating Conditions

Period	Approach	DOS	95th Percentile Queue (m)	Average Delay (seconds)
Weekday AM Peak Hour	Melrose Drive (e)	0.16	11	4
	Springbank Street (n)	0.10	3	16
	Melrose Drive (w)	0.21 #	0	2
Weekday PM Peak Hour	Melrose Drive (e)	0.20	14	1
	Springbank Street (n)	0.21 #	7	17
	Melrose Drive (w)	0.10	0	1

DOS = Degree of Saturation, # = Intersection DOS

Table 2.2 indicates the Melrose Drive / Springbank Street intersection currently operates well with an 'excellent' level of service, and with minimal queues and delays on all approaches.

[1] SIDRA INTERSECTION 3.1 adopts the following criteria for Level of Service assessment:

Level of Service		Intersection Degree of Saturation (X)	
		Unsignalised Intersection	Signalised Intersection
A	Excellent	<=0.50	<=0.60
B	Very Good	0.50-0.70	0.60-0.75
C	Good	0.70-0.80	0.75-0.90
D	Acceptable	0.80-0.90	0.90-0.95
E	Poor	0.90-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0

[2] Program used under license from Akcelik & Associates Pty Ltd.

2.2.5.2 Surrounding Road Network

Tullamarine Freeway

On the basis of a capacity of 2,000 vehicles per lane per hour for a two-lane freeway at 100km/hr (as specified in the relevant Austroads guide discussed in Section 1.3 of this report), a summary of the existing operation of the Tullamarine Freeway is presented in Table 2.3.

Table 2.3: Existing Operation of Tullamarine Freeway (adjacent subject site) – capacity = 2,000vph/lane

Period	Northbound Carriageway		Southbound Carriageway	
	Volume	DOS	Volume	DOS
Weekday PM Peak Hour	2,996vph	0.75	2,551vph	0.64
Weekend Lunchtime Peak Hour	1,787vph	0.45	2,191vph	0.55

DOS = Degree of Saturation / LOS = Level of Service

Table 2.3 indicates that the Tullamarine Freeway currently operates with acceptable levels of service; that is, with degrees of saturation of up to 0.75, noting that this is less than the 'ideal' maximum of 0.90.

2.2.6 Accident Statistics

A review of the accident history for the roads and intersections in the immediate vicinity of the site has been sourced from VicRoads' 'CrashStats' accident database.

This review has been undertaken for the last available five financial years (1 July 2000 to 30 June 2005) and indicates that four casualty accidents (including one serious and three other accidents) have occurred at the Melrose Drive / Link Road intersection during this time period.

It is noted that no other accidents were recorded during this period along the site's frontage to Melrose Drive or Mercer Drive.

2.3 Car Parking

As shown in Figures 2.2 to 2.5 in Section 2.2.1 of this report, on-street parking is prohibited on Melrose Drive, Mercer Drive and Link Road, while kerbside parallel parking is allowed on both sides of the carriageway on Springbank Street.

On-site observations undertaken at the time of the aforementioned traffic surveys at the Melrose Drive / Springbank Street intersection indicate that parking demands on Springbank Street are relatively low, particularly at its northern end opposite the subject site.

2.4 Public Transport

The following bus routes operate along Melrose Drive directly adjacent to the subject site:

- Route 477 (Moonee Ponds to Broadmeadows) - Saturday PM and Sunday services terminate at Gladstone Park Shopping Centre via Melbourne Airport;
- Route 478 (Moonee Ponds to Tullamarine) - Saturday PM and Sunday services terminate at Gladstone Park Shopping Centre; and
- Route 479 (Moonee Ponds to Sunbury) – Weekend services extend to the City

3 Development Proposal

3.1 Land Uses

The proposed Site 3 development includes restricted retail (IKEA[3]), office and industrial (warehouse) uses, as summarised in Table 3.1.

Table 3.1: Development Schedule

Use	Building (Plan Reference)	Size (GLFA)
Office	N	5,200sqm
	O	4,100sqm
IKEA *– indicative only*	P	32,000sqm
Industrial (Warehouse)	Q	6,730sqm
Total		**48,030sqm**

It should be noted that the uses nominated above are not definitive and are offered for the purposes of this preliminary assessment. To this end and as we understand it, the individual uses and building sizes may be subject to change.

3.2 Vehicle Access

Vehicular access to all uses except the warehouse use (Building Q) is proposed via the ultimate road network that was recently approved as part of the Sites 1 and 2 development. This road network is shown in Figure 3.1 on the following page with the principal components summarised below:

i The construction of a roundabout approximately 160m northeast of the existing Melrose Drive / Mercer Drive intersection which facilitates access from both Tullamarine Freeway and Melrose Drive;

ii The construction of Airport Drive and the accompanying signalisation of the Mercer Drive intersection;

iii The construction of a roundabout at the termination of Melrose Drive immediately south of the recently constructed QANTAS Joey Club; and

iv The provision of entry and exit only access points to Airport Drive immediately south of Site 2.

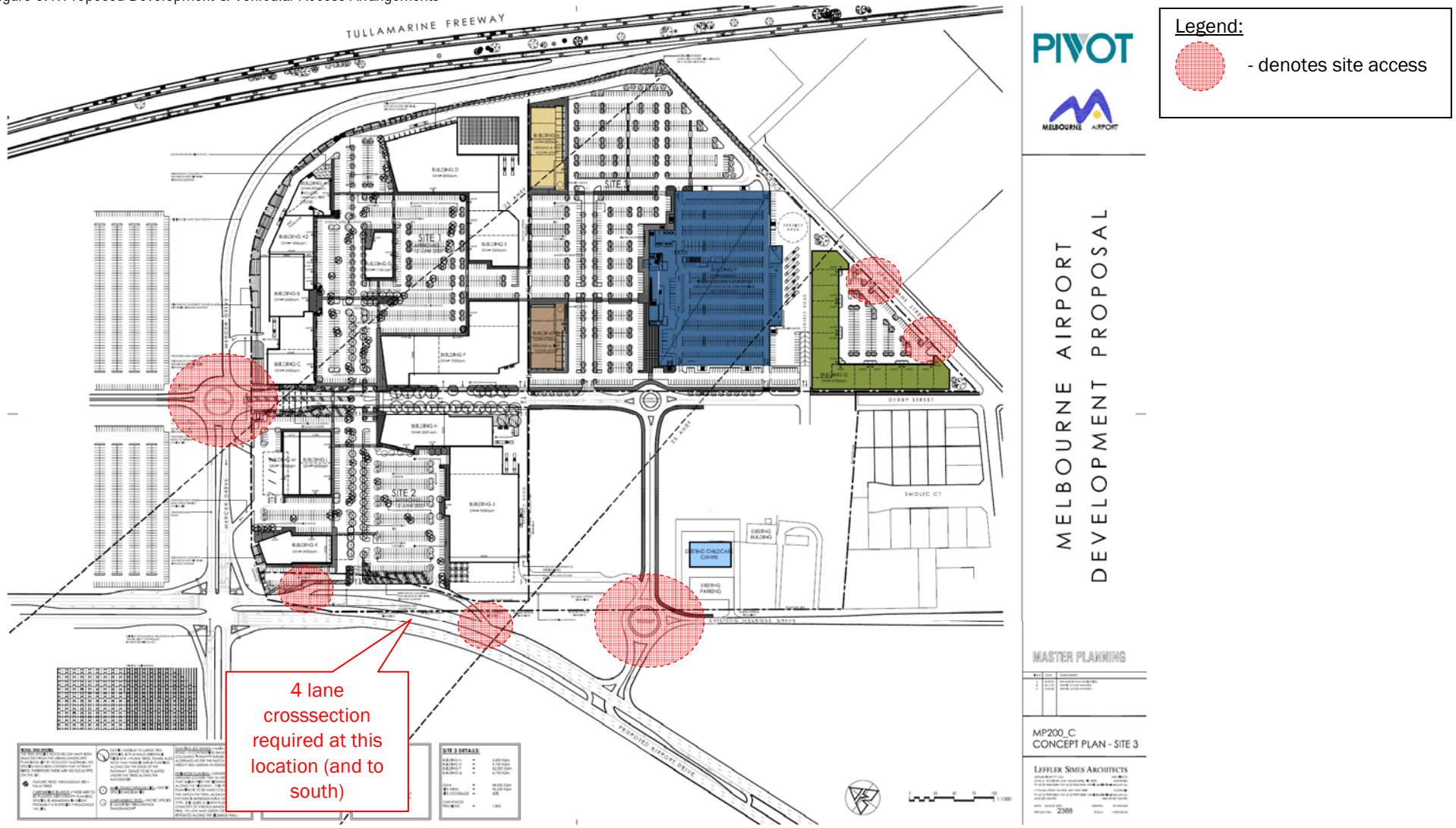
It is further noted that vehicular access to the warehouse use (i.e. Building Q) is proposed via two crossovers to Springbank Street, noting that this part of the development does not enjoy access through the balance of the site.

3.3 Car Parking

A total of some 1,800 car spaces, including approximately 120 spaces for the warehouse use, are proposed for the Site 3 land uses. This provision is proposed in addition to the 1,240 car spaces proposed on Sites 1 and 2.

[3] As detailed in Section 1.1 of this report, the use of an IKEA tenant is indicative only and utilised for the purposes of estimating traffic and parking generation characteristics.

Figure 3.1: Proposed Development & Vehicular Access Arrangements



4 Traffic Impact Assessment

4.1 Traffic Generation

4.1.1 Design Rates

Traffic generation estimates for the proposed Site 3 development have been sourced from a variety of sources, including:

i RTANSW 'Guide to Traffic Generating Developments' (2002); and

ii GTA traffic generation database, including comprehensive surveys undertaken by our office at IKEA Richmond[4].

It is noted that while the IKEA[5] rate for the weekend lunchtime peak hour is approximately 12% greater than the generic bulky goods retail rate previously recommended by our office in our December 2006 report for Sites 1 and 2, the IKEA weekday afternoon rate is actually marginally less than the generic rate.

In this regard and for the purposes of presenting an assessment which is conservative on the high side, the bulky goods retail weekday afternoon rate and the IKEA weekend lunchtime rate have been adopted for the IKEA. That is, the higher of the rates within each respective peak period has been adopted.

On this basis, Table 4.1 presents a summary of the adopted traffic generation rates and resultant traffic generation for the Site 3 uses.

Table 4.1: Traffic Generation Rates

Use	Size (GLFA)	Traffic Generation Rate (vehicle trips / hour / 100sqm)		Traffic Generation (vehicle trips / hour)	
		Weekday	Weekend	Weekday	Weekend
Office	9,300sqm	2.00 [1]	0.00	186	0
IKEA *– indicative only*	32,000sqm	1.98 [2]	4.08 [3]	634	1,306
Industrial (Warehouse)	6,730sqm	0.50 [1]	0.00	34	0
Total				**854vph**	**1,306vpd**

Source:

[1] RTANSW

[2] GTA database – as presented in GTA December 2006 report.

[3] GTA database – IKEA, Richmond.

Table 4.1 indicates that the Site 3 development could be expected to generate up to approximately 854 and 1,306 additional vehicles movements during the typical weekday afternoon and weekend lunchtime peak hours respectively.

[4] The results of the surveys undertaken at Richmond IKEA have been 'normalised' to assume a mode split to car of 100%.

[5] As detailed in Section 1.1 of this report, the use of an IKEA tenant is indicative only and utilised for the purposes of estimating traffic and parking generation characteristics.

4.1.2 Characteristic Trip Types

Notwithstanding the analysis presented in the previous Section, it is noted that the traffic volumes presented in Table 4.1 exclude any allowance for linked or multi-purpose trips that are applicable for the retail land uses on the site.

For reference, the definition of these trip types (as specified in the aforementioned RTANSW document) is reproduced below:

Linked trip: *"A trip taken as a side-track from another trip, for example, a person calling in to the centre on the way home from work."*

Multi-purpose trip: *"A trip where more than one shop or facility is visited."*

The important distinction here is that the occurrence of multi-purpose trips directly decrease the amount of vehicle movement generated by a use, while linked trips are already present on the adjacent road network; that is, while these latter trips need to be considered in the design of access driveways, turning lanes and so on, they do not constitute additional traffic per se.

In this regard, it is further noted that the RTANSW document recommends a multi-purpose trip discount of 20% (with a range between 15% and 25%) and provides guidance that linked trip discounts should depend on the nature of the surrounding road network (e.g. traffic volumes passing the site frontage). On this basis, linked trip discounts of 10% and 5% have been adopted for the weekday and weekend periods respectively while a multi-purpose trip discount of 20% has been assumed[6].

Table 4.2 sets out a summary of the resultant traffic generation during the weekday afternoon and weekend lunchtime peak hours once consideration is given to the relevant traffic discounts.

Table 4.2: Site 3 Traffic Generation Summary

Use	Size (GLFA)	Traffic Generation (vehicle trips/hour) – multi-purpose trip discount of 20% APPLICABLE FOR ACCESS POINT INTERSECTIONS		Traffic Generation (vehicle trips/hour) – linked trip discount of 10% and 5% APPLICABLE FOR SURROUNDING INTERSECTIONS	
		Weekday	Weekend	Weekday	Weekend
Office	9,300sqm	186 [1]	0 [1]	186 [1]	0 [1]
IKEA *– indicative only*	32,000sqm	507	1,045	456	993
Industrial (Warehouse)	6,730sqm	34 [1]	0 [1]	34 [1]	0 [1]
Total		**727vph**	**1,045vph**	**676vph**	**993vph**

[1] No discount applied for this use (i.e. discounts only applicable for retail land uses).

Table 4.2 indicates that the Site 3 development can be expected to generate approximately 730 vehicle movements (including 670 new movements) during the weekday afternoon peak hour and approximately 1,050 vehicle movements (including 990 new movements) during the weekend lunchtime peak hour.

It is noted that Table 4.2 also indicates that the industrial (warehouse) use fronting Springbank Street can be expected to generate approximately 34 vehicle movements during the weekday afternoon peak hour and negligible traffic during the weekend lunchtime period.

[6] As discussed above, it is noted that the linked trip discount is not applicable to the turning movements at the access points but rather only to the existing through traffic on the external road network.

4.1.3 Summary of Traffic Generation

On the basis of the volumes presented in Table 4.2 and those detailed in Section 4.1.1 of our December 2006 report, Table 4.3 presents a summary of the anticipated traffic generation for the overall "Power Centre" (i.e. sites 1, 2 and 3).

Table 4.3: Sites 1, 2 and 3 Traffic Generation Summary

Site	Size (GLFA)	Traffic Generation (vehicle trips/hour) – multi-purpose trip discount of 20% APPLICABLE FOR ACCESS POINT INTERSECTIONS [1]		Traffic Generation (vehicle trips/hour) – linked trip discount of 10% and 5% APPLICABLE FOR SURROUNDING INTERSECTIONS [1]	
		Weekday	Weekend	Weekday	Weekend
1 & 2	48,000sqm	1,505	2,069	1,354	1,965
3	48,000sqm	727	1,045	676	993
Total		**2,232vph**	**3,114vph**	**2,031vph**	**2,958vph**

[1] As detailed in Table 4.2, this discount has only been applied to the retail land uses.

Table 4.3 indicates that the overall "Power Centre" can be expected to generate approximately 2,230 vehicle movements (including 2,030 new movements) during the weekday afternoon peak hour and some 3,110 vehicle movements (including 2,960 new movements) during the weekend lunchtime peak hour.

4.1.4 Adjustment for 'Base Traffic Volume' Conservatism

Notwithstanding the volumes presented in Table 4.3, as discussed in Section 2.2.4 of this report it is noted that the previous assessment undertaken by our office for the Sites 1 and 2 development was based on post-development traffic volumes that incorporated two allowances for traffic generated by the subject site.

This level of conservatism is unwarranted and hence, in order to determine the net traffic volume impact of the Site 3 development, the traffic volume allowances detailed in Table 2.1 should be subtracted from the volumes shown in Table 4.3. This approach allows for the conservatism that was inadvertently adopted by our office for the Sites 1 and 2 development to be avoided in this report for Site 3.

Table 4.4 presents a summary of this 'traffic volume adjustment' and indicates that the overall "Power Centre" can realistically be expected to generate approximately 1,520 and 2,220 additional vehicle movements at the surrounding intersection during the weekday afternoon and weekend lunchtime peak hours respectively.

As shown in the Table, the removal of this conservatism is not expected to reduce the amount of traffic entering or exiting the site but rather simply the amount of traffic on the external road network and at the surrounding intersections.

Table 4.4: Traffic Generation Summary (with allowance for relevant discounts) & Less Base Traffic Volume Conservatism / Background Modelling Allowance

Traffic Volume	Traffic Generation (vehicle trips/hour) – multi-purpose trip discount of 20% APPLICABLE FOR ACCESS POINT INTERSECTIONS [1]		Traffic Generation (vehicle trips/hour) – linked trip discount of 10% and 5% APPLICABLE FOR SURROUNDING INTERSECTIONS [1]	
	Weekday	Weekend	Weekday	Weekend
Power Centre (Sites 1, 2 & 3)	2,232	3,114	2,031	2,958
Base Traffic Volume Conservatism	n/a	n/a	(516)	(734)
TOTAL	**2,232vph**	**3,114vph**	**1,515vph**	**2,224vph**

[1] As detailed in Table 4.2, this discount has only been applied to the retail land uses.

4.2 Traffic Distribution

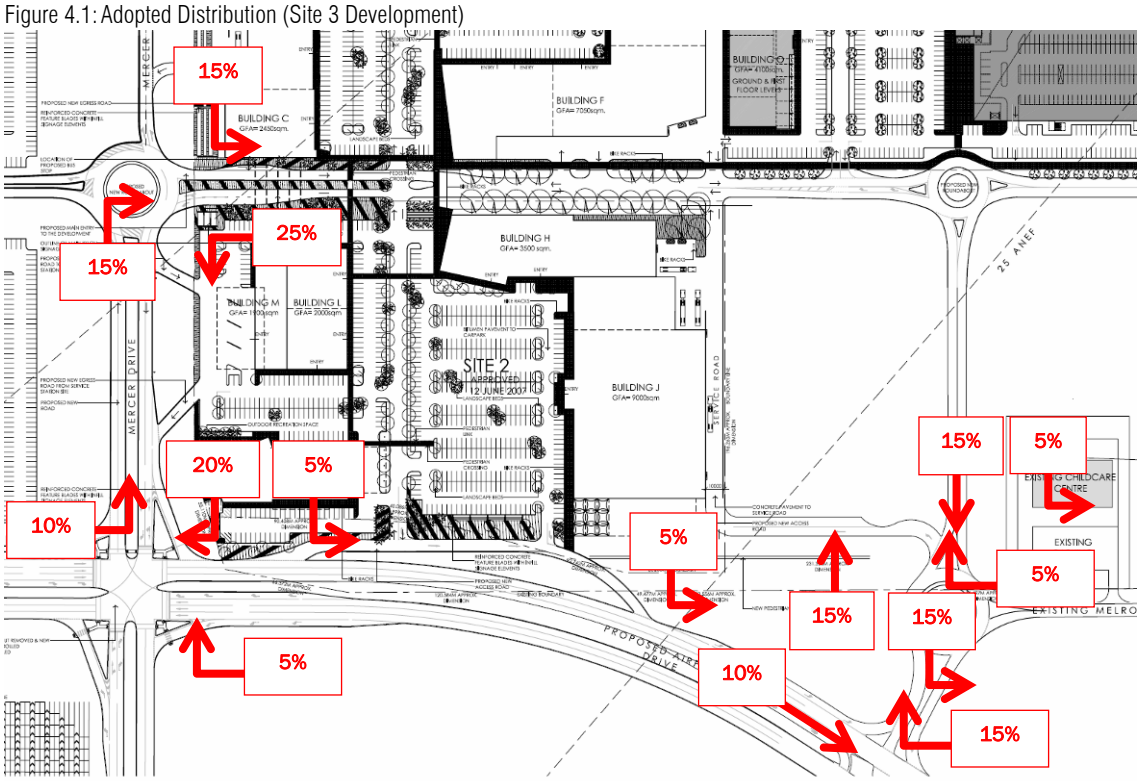
4.2.1 Adopted Distribution

Further to the trade catchment analysis documented in our December 2006 report, the assumed distribution of traffic under ultimate road network conditions is reproduced in Figure 4.1.

This distribution is generally identical to that previously adopted by our office with the exception that a greater proportion of traffic entering and exiting the site via the eastern access has been assumed. This is considered reasonable as the development of Site 3 will result in the eastern access no longer having the appearance of a "rear access" to the development.

Importantly, it is emphasised that this modification does not change the overall distribution of traffic to and from the site (i.e. it only effects which access point is used) which remains identical to that previously adopted.

Figure 4.1: Adopted Distribution (Site 3 Development)



4.2.2 Development Generated Traffic Volumes

On the basis of the above discussions and analysis, the anticipated development generated traffic volumes for the overall "Power Centre" during the weekday afternoon and weekend lunchtime peak hours are presented in Figures 4.2 and 4.3 respectively.

It is noted that this distribution includes the traffic generated by the industrial (warehouse) use fronting Springbank Street; that is, 34 and zero vehicle movements during the weekday afternoon and weekend lunchtime peak hours respectively.

Figure 4.2: Development Generated Traffic Volumes for Sites 1, 2 & 3 – Weekday Afternoon Peak Hour

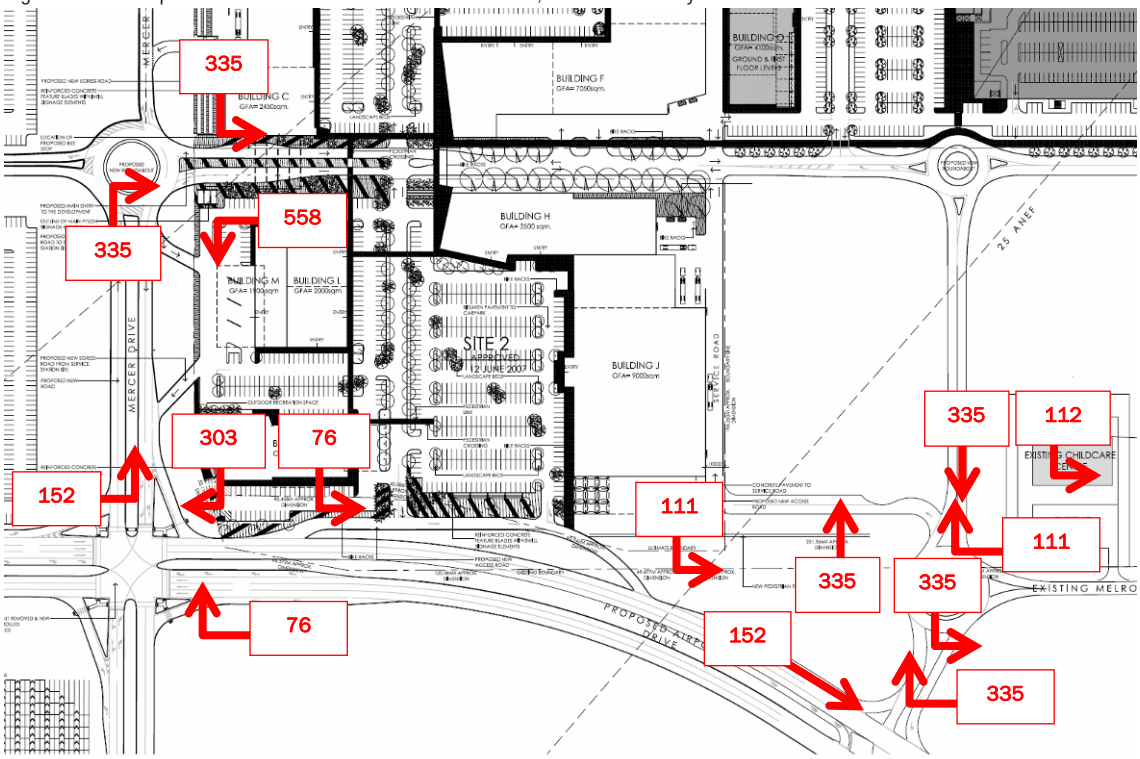
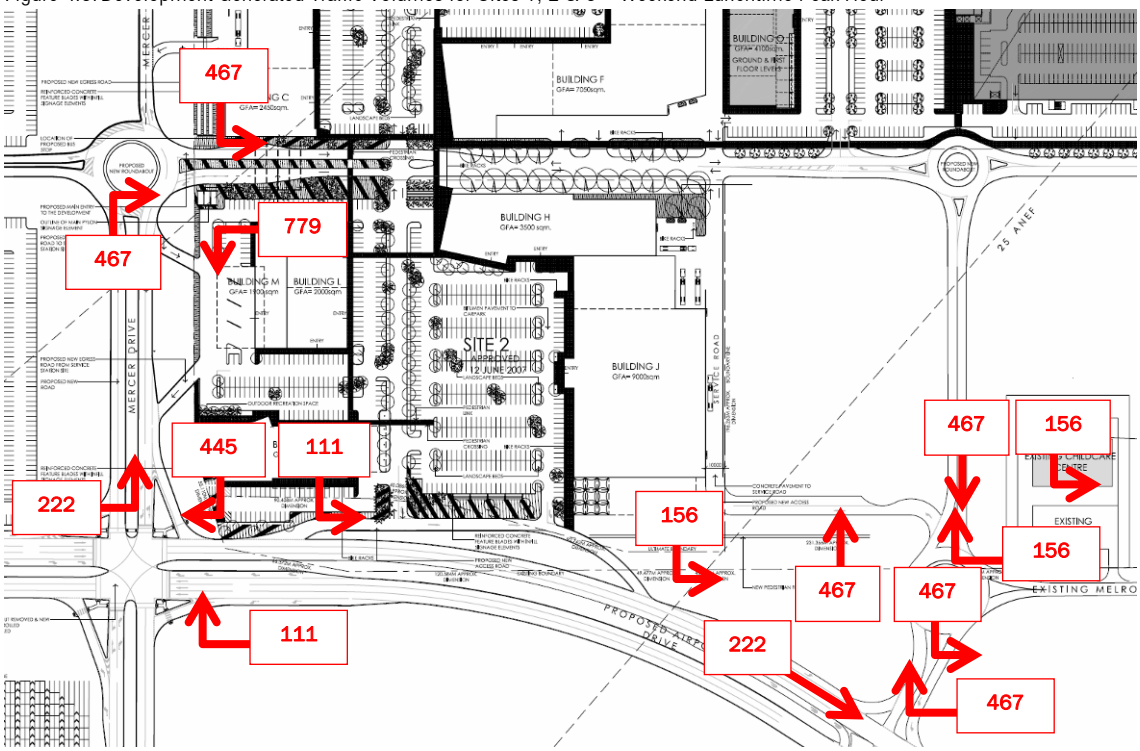


Figure 4.3: Development Generated Traffic Volumes for Sites 1, 2 & 3 – Weekend Lunchtime Peak Hour



4.2.3 Post-Development Traffic Volumes

On the basis of the traffic volumes presented in Figures 4.2 and 4.3, the 'base case' traffic volumes presented in Figures A2 and A4 and the traffic generation estimates for the Melbourne Airport long-term car park (as documented in our December 2006 report), the anticipated Year 2018 post-development traffic volumes for the weekday afternoon and weekend lunchtime peak hours are presented in Figures 4.4 and 4.5 respectively.

Figure 4.4: Year 2018 Post-Development Traffic Volumes for Sites 1, 2 & 3 – Weekday Afternoon Peak Hour

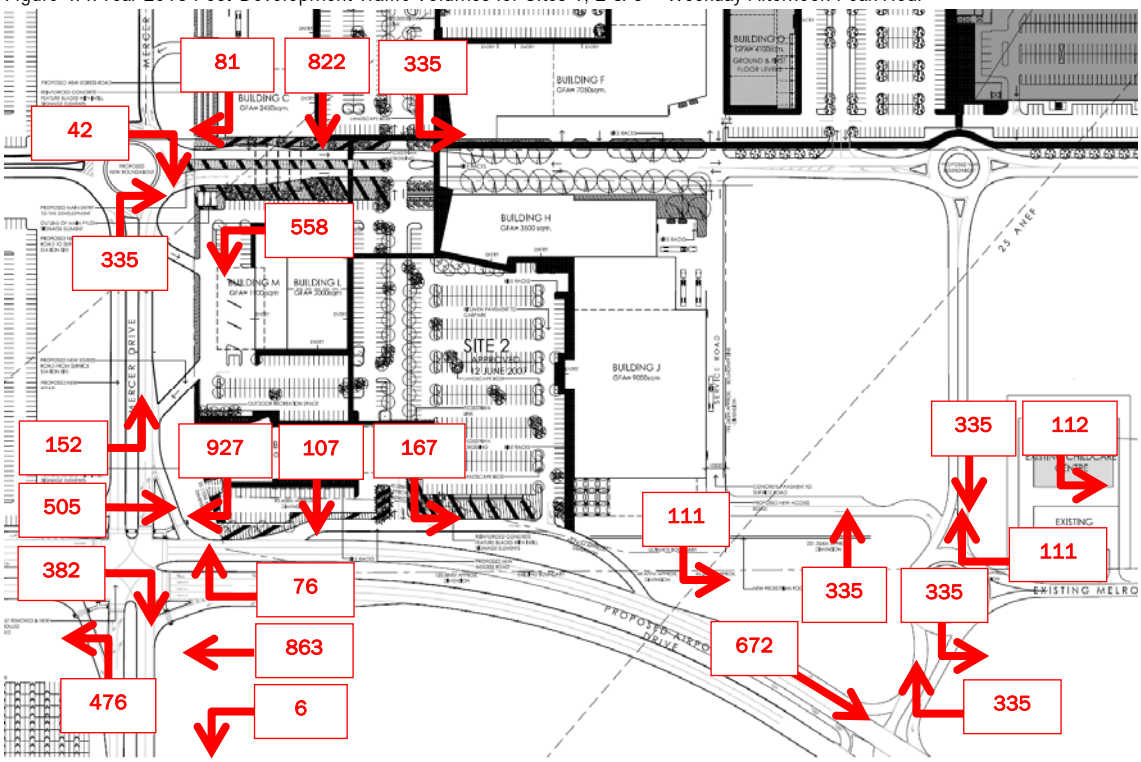
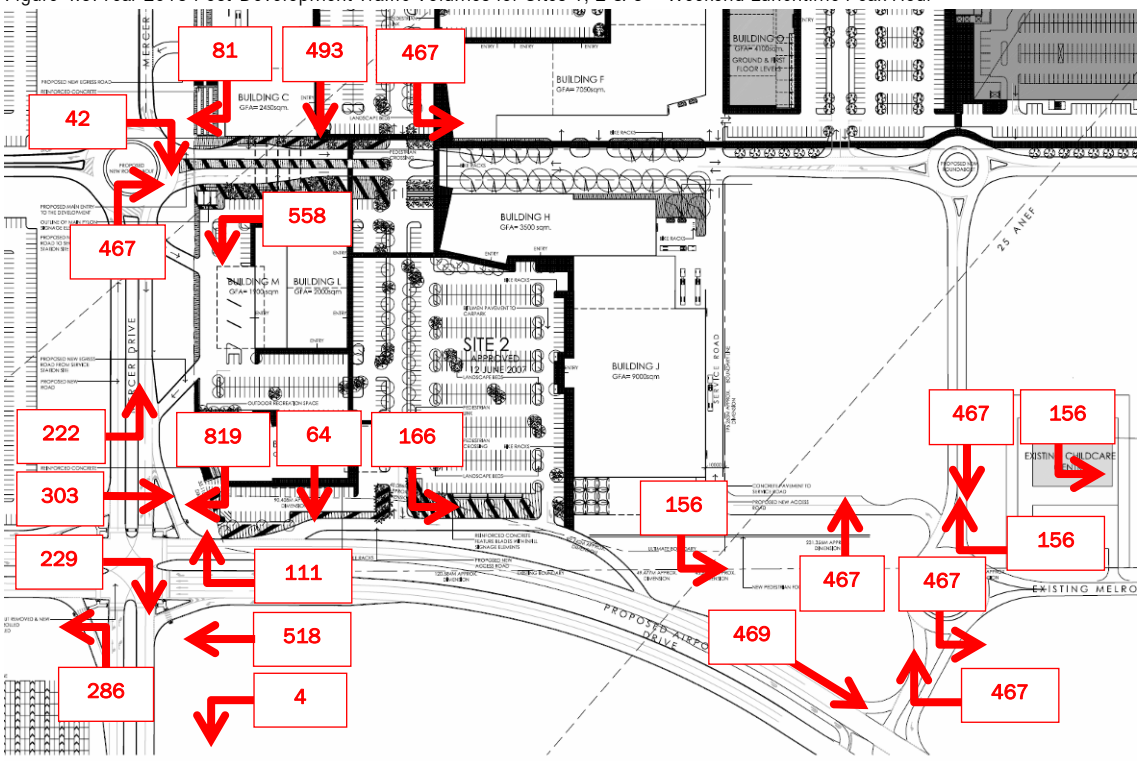


Figure 4.5: Year 2018 Post-Development Traffic Volumes for Sites 1, 2 & 3 – Weekend Lunchtime Peak Hour



4.3 Traffic Impact

4.3.1 Preamble

The following analysis has been prepared on the basis of the traffic volume estimates summarised in the previous sections; noting that these estimates include traffic generated by the recently approved development on Sites 1 and 2, and that anticipated from Site 3.

In this regard, it is noted that while this analysis assesses the extent of works that will be required as a result of the overall development of the overall site, these works may not necessarily be required if Site 3 is developed prior to Sites 1 and/or 2.

For instance, given that Site 3 is expected to generate significantly less traffic than Sites 1 and 2 (as documented in Table 4.3 of this report), the mitigating road works detailed in our previous report can be expected to be sufficient for Site 3 should this development occur prior to Sites 1 and 2.

4.3.2 Peak Hour Operating Conditions

On the basis of the traffic volumes presented in Figures 4.4 and 4.5, the operation of the "Power Centre" access points and surrounding intersections under Year 2018 post-development conditions has been assessed using SIDRA INTERSECTION 3.1.

In addition, the operation of surrounding road network under these conditions has also been assessed using a first-principles approach which utilises traffic capacities as specified in the relevant Austroads guideline.

This analysis is summarised in the following sections.

4.3.2.1 "Power Centre" Access Points

Mercer Drive / Western Site Access (Roundabout)

The post-development operation of the Mercer Drive / Western Site Access intersection, adopting the geometry shown in Figure 3.1 (i.e. a roundabout with up to two circulating lanes), is summarised in Table 4.5 with full results presented in Appendix C.

On the basis of the performance criteria detailed in Section 2.2.5.1 of this report, Table 4.5 indicates that the Mercer Drive / Western Site Access can be expected to operate with a 'very good' level of service during the weekday afternoon and weekend lunchtime peak hours under Year 2018 post-development conditions.

Importantly, the analysis also indicates that 95th percentile queue lengths of up to 42m (approximately 6 vehicles) are expected on the northern approach to the roundabout. These queue lengths are not expected to compromise the deceleration of vehicles exiting Tullamarine Freeway.

This analysis accordingly indicates that further mitigating road works – above that previously recommended by our office for Sites 1 and 2 of the development (as shown in Figure 3.1) – are not required at this intersection as a result of the development of Site 3.

Table 4.5: Mercer Drive / Western Site Access Intersection – Year 2018 Post-Development Operating Conditions

Period	Approach	Lane	DOS	95th Percentile Queue (m)	Average Delay (seconds)
Weekday PM Peak Hour	Mercer Drive (s)	L R	0.01 0.24	<1 12	8 14
	Site Access (e)	L (50m) LT	0.38 0.38	20 19	11 12
	Mercer Drive (n)	LT TR	0.59 # 0.59 #	42 42	10 11
	Long-term Car Park (w)	TR	0.04	2	15
Weekend Lunchtime Peak Hour	Mercer Drive (s)	L R	0.01 0.33	<1 18	8 14
	Site Access (e)	L (50m) LT	0.32 0.32	16 16	10 11
	Mercer Drive (n)	LT TR	0.55 0.55	38 38	11 13
	Long-term Car Park (w)	TR	0.05	2	15

DOS = Degree of Saturation, # = Intersection DOS

Melrose Drive / Eastern Site Access (Roundabout)

The post-development operation of the Melrose Drive / Eastern Site Access intersection, adopting the geometry shown in Figure 3.1 (i.e. a roundabout with a single circulating lane), is summarised in Table 4.6 with full results presented in Appendix C.

Table 4.6: Melrose Drive / Eastern Site Access Intersection – Year 2018 Post-Development Operating Conditions

Period	Approach	Lane	DOS	95th Percentile Queue (m)	Average Delay (seconds)
Weekday PM Peak Hour	Airport Drv Connection (s)	TR	0.31	15	6
	Melrose Drive (e)	LR	0.11	5	12
	Site Access (n)	LT	0.32	16	4
Weekend Lunchtime Peak Hour	Airport Drv Connection (s)	TR	0.44	26	6
	Melrose Drive (e)	LR	0.16	9	13
	Site Access (n)	LT	0.45 #	27	4

DOS = Degree of Saturation, # = Intersection DOS

Table 4.6 indicates that the Melrose Drive / Eastern Site Access intersection can be expected to operate with an 'excellent' level of service during the weekday afternoon and weekend lunchtime peak hours under Year 2018 post-development conditions.

Importantly, the analysis also indicates that 95th percentile queue lengths of up to 26m (approximately 4 vehicles) are expected on the southern approach to the roundabout. These queue lengths are not expected to extend back to the Airport Drive extension.

This analysis similarly indicates that further mitigating road works – above that previously recommended by our office for Sites 1 and 2 of the development (as shown in Figure 3.1) – are not required at this intersection as a result of the development of Site 3.

4.3.2.2 Surrounding Intersections

Airport Drive Extension / Mercer Drive (Signalised)

The post-development operation of the Airport Drive extension / Mercer Drive intersection, adopting the geometry shown in Figure 3.1 (i.e. a signalised intersection with three through lanes on the east and west approaches, a double right-turn lane on the north approach and single right-turn lanes on all other approaches), is summarised in Table 4.7 with full results presented in Appendix C.

Table 4.7: Airport Drive Extension / Mercer Drive Intersection – Year 2018 Post-Development Operating Conditions

Period	Approach	Lane	DOS	95th Percentile Queue (m)	Average Delay (seconds)
Weekday PM Peak Hour *(110 second cycle time)*	Taxi Rank (s)	L T (40m) R	0.60 0.01 0.01	134 1 1	28 54 62
	Airport Drive (e)	L (100m) T R (100m)	0.01 0.95 # 0.19	1 160 34	14 72 44
	Mercer Drive (n)	L (60m) TR R	0.20 0.95 # 0.95 #	16 272 271	9 72 73
	Airport Drive (w)	L (80m) T R (100m)	0.13 0.55 0.92	8 79 166*	8 46 60
Weekend Lunchtime Peak Hour *(90 second cycle time)*	Taxi Rank (s)	L T (40m) R	0.33 0.01 0.01	55 1 1	16 43 51
	Airport Drive (e)	L (100m) T R (100m)	< 0.01 0.74 0.36	< 1 75 44	10 44 44
	Mercer Drive (n)	L (60m) TR R	0.17 0.72 0.72	11 139 138	9 35 36
	Airport Drive (w)	L (80m) T R (100m)	0.20 0.43 0.73	15 45 86	9 40 49

DOS = Degree of Saturation, # = Intersection DOS, * = queue extends beyond storage capacity

From an intersection capacity viewpoint, Table 4.7 indicates that the Airport Drive / Mercer Drive intersection can be expected to operate with an 'acceptable' level of service during the weekday afternoon and weekend lunchtime peak hours under Year 2018 post-development conditions (i.e. as a DOS of no greater than 0.95 is anticipated).

Notwithstanding this important performance criteria, the analysis also indicates that 95th percentile queue lengths of 166m can be expected in the right-turn lane on the west approach, while a 95th percentile queue length of 272m can be expected on the north approach.

This former queue length indicates that the storage length of the right-turn lane on the west approach would need to be extended to contain the anticipated queue while the latter queue length indicates that vehicles can be expected to queue into the Mercer Drive / Site Access roundabout during peak periods.

This analysis accordingly indicates that further mitigating road works are required at this intersection to accommodate the additional traffic generated by the Site 3 development.

Airport Drive Extension / Mercer Drive (Signalised) – Additional Mitigating Road Works

Further analysis undertaken at the Airport Drive Extension / Mercer Drive intersection indicates that the following mitigating road works would provide sufficient capacity to accommodate the additional traffic generated by the Site 3 development:

- The provision of an additional right-turn lane on the Mercer Drive north approach as shown in Appendix D; and
- The lengthening of the right-turn lane on the Airport Drive west approach as shown in Appendix D.

For reference, the post-development operation of this intersection following the completion of these works is presented in Table 4.8 with full results presented in Appendix D.

Table 4.8: Airport Drive Extension / Mercer Drive Intersection – Year 2018 Post-Development Operating Conditions with Additional Mitigating Road Works

Period	Approach	Lane	DOS	95th Percentile Queue (m)	Average Delay (seconds)
Weekday PM Peak Hour *(90 second cycle time)*	Taxi Rank (s)	L T (40m) R	0.53 0.01 0.01	98 1 1	19 43 51
	Airport Drive (e)	L (100m) T R (100m)	0.01 0.87 0.18	1 122 28	13 48 37
	Mercer Drive (n)	L (60m) TR R ***R (160m)***	0.20 0.86 0.86 0.86	14 137 136 136	9 50 53 53
	Airport Drive (w)	L (80m) T ***R (150m)***	0.13 0.51 0.89 #	8 66 148	8 36 55
Weekend Lunchtime Peak Hour *(90 second cycle time)*	Taxi Rank (s)	L T (40m) R	0.30 0.01 0.01	45 1 1	13 43 51
	Airport Drive (e)	L (100m) T R (100m)	< 0.01 0.59 0.30	< 1 70 42	10 39 41
	Mercer Drive (n)	L (60m) TR R ***R (160m)***	0.17 0.59 0.59 0.59	11 97 97 97	9 36 38 38
	Airport Drive (w)	L (80m) T ***R (150m)***	0.20 0.35 0.62	14 43 80	9 37 43

DOS = Degree of Saturation, # = Intersection DOS, * = queue extends beyond storage capacity

Table 4.8 indicates that the intersection can be expected to operate with a 'good' level of service and with manageable 95th percentile queue lengths under Year 2018 post-development conditions following the completion of the aforementioned additional mitigating road works.

Indeed, the analysis indicates that 'surplus' intersection capacity is expected following the completion of these works. This additional capacity would accommodate considerable future traffic growth on (for example) Airport Drive Extension without compromising the overall operation of the intersection. Moreover, it is noted that even further intersection capacity could be created via the provision of a double right-turn lane on the west approach (i.e. into the taxi rank).

Melrose Drive / Springbank Street (unsignalised)

The post-development operation of the Melrose Drive / Springbank Street intersection during the weekday afternoon peak hour, adopting the current intersection geometry, is summarised in Table 4.9 with full results presented in Appendix C.

This analysis has been completed using the anticipated industrial (warehouse) use traffic generation of 34 vehicle movements per hour (as documented in Table 4.1), and assuming an entry/exit split of 20%/80% during the weekday afternoon peak hour and a distribution to the north and south of 80% and 20% respectively.

It is noted that the weekend lunchtime peak hour has not been assessed at this intersection given that the industrial (warehouse) use within the Site 3 development – which is accessed via Springbank Street – is not expected to generate traffic during this period.

Table 4.9: Melrose Drive / Springbank Street Intersection – Year 2018 Post-Development Operating Conditions

Period	Approach	DOS	95th Percentile Queue (m)	Average Delay (seconds)
Weekday PM Peak Hour	Melrose Drive (e)	0.27	22	2
	Springbank Street (n)	0.43 #	18	26
	Melrose Drive (w)	0.17	0	1

DOS = Degree of Saturation, # = Intersection DOS

Table 4.9 indicates that the Melrose Drive / Springbank Street intersection can be expected to continue to operate with an 'excellent' level of service and with negligible queues and delays under Year 2018 post-development conditions.

Airport Drive / Melrose Drive (unsignalised – 'left-in / left-out / right-in' layout)

The post development operation of the Airport Drive / Melrose Drive intersection during the weekday afternoon peak hour and weekend lunchtime peak hour is summarised in Table 4.10 with full results presented in Appendix C.

The intersection was assessed based on a left-in/left-out/right-in layout which we understand was previously proposed given the safety concerns associated with an unsignalised right-turn movement across four to six lanes of traffic.

This intersection configuration allows for traffic to enter the site via Melrose Drive from Airport Drive in both directions (i.e. south and north), although only allows traffic to exit the site to the south. It is noted, however, that traffic wishing to travel to the north along Airport Drive can do so via the u-turn lane proposed to the south of this intersection.

In this regard, traffic wishing to travel to the north from Melrose Drive is unlikely to prefer to "rat-run" through the site as a longer travel time would be experienced.

Finally, it is noted that this intersection has also been modelled with only two through lanes in each direction as the provision of a six lane cross-section is not required at this location. Further discussion in this regard is presented in Section 4.3.3.2 of this report.

Table 4.10: Airport Drive / Melrose Drive Intersection – Year 2018 Post-Development Operating Conditions

Period	Approach	Lane	DOS	95th Percentile Queue (m)	Average Delay (seconds)
Weekday PM Peak Hour	Airport Drive (e)	T R	0.27 0.55	0 33	0 16
	Eastern Access (n)	L	0.68 #	45	23
	Airport Drive (w)	L T R	0.06 0.18 0.05	2 0 2	9 0 17
Weekend Lunchtime Peak Hour	Airport Drive (e)	T R	0.18 0.59	0 44	0 14
	Eastern Access (n)	L	0.72 #	62	20
	Airport Drive (w)	L T R	0.05 0.13 0.03	2 0 1	10 0 14

DOS = Degree of Saturation, # = Intersection DOS

Table 4.10 indicates that the Airport Drive / Melrose Drive intersection can be expected to operate with a 'good' to 'very good' level of service during the weekday afternoon and weekend lunchtime peak hours under the Year 2018 post-development conditions.

Importantly, the analysis also indicates that a 95th percentile queue length of up to 62m is expected on the eastern access approach to Airport Drive, noting that this queue is not expected to encroach into the roundabout at Mercer Drive which is located approximately 70m from Airport Drive.

4.3.2.3 Surrounding Road Network

Tullamarine Freeway

Northbound Traffic

On the basis of the traffic volumes presented in Figures 4.2 and 4.3 (less the nominated allowance for passer-by trips[7]), Table 4.11 has been prepared to show the anticipated impact of development generated traffic on the operation of the Tullamarine Freeway northbound carriageway under ultimate access arrangements[8].

As can be seen, Table 4.11 indicates that the degree of saturation for the Tullamarine Freeway northbound carriageway can be expected to increase following the development of the overall "Power Centre" site from 0.75 to 0.82 during the weekday afternoon peak hour and from 0.45 to 0.56 during the weekend lunchtime peak hour.

The Table also indicates that relatively minor increases in the degree of saturation can be expected between the initial development of Site 1 and 2 and the ultimate development of Site 3; that is, increases of 0.02 and 0.04 during each respective peak hour.

On the basis of an 'ideal' degree of saturation limit of 0.9, this analysis indicates that the Tullamarine Freeway northbound carriageway can be expected to operate with satisfactory degrees of saturation following the development of the overall "Power Centre" site and hence mitigating road works are not required on this carriageway.

[7] That is, 10% and 5% during the weekday afternoon and Weekend lunchtime peak periods respectively.
[8] That is, assuming the road network as described in Figure 3.1 – together with the road works detailed in Section 2.2.2 of this report – have been completed.

Table 4.11: Anticipated Impact of Site Generated Traffic on Tullamarine Freeway (Northbound)

Period	Access Arrangements	Anticipated Additional Site Generated Traffic (vph)	Northbound Freeway Volume (vph)	Degree of Saturation (DOS)
Weekday Afternoon	*Existing*	*n/a*	*2,996*	*0.75*
	Sites 1 & 2	203 [1]	3,199	0.80 *(+0.05)*
	Sites 1, 2 & 3	302 [2]	3,298	0.82 *(+0.07)*
Weekend Lunchtime	*Existing*	*n/a*	*1,787*	*0.45*
	Sites 1 & 2	295 [1]	2,082	0.52 *(+0.07)*
	Sites 1, 2 & 3	444 [2]	2,231	0.56 *(+0.11)*

DOS = Degree of Saturation

[1] As documented in the GTA letter to Melbourne Airport dated 11 December 2006 responding to DOTARS request for further information for Sites 1 and 2.

[2] As per the right turn entry volumes from Mercer Drive into site presented in Figures 4.2 to 4.3 less passer-by trip discount (i.e. 10% and 5% during the weekday afternoon and \weekend lunchtime peak hours respectively).

Southbound Traffic

As detailed in Section 2.2.2 of this report, the construction of the southbound onramp (i.e. the proposed fly-overbridge above the long-term car park) from Melrose Drive will allow traffic (including that generated by the proposed Power Centre) to directly join southbound traffic on the freeway.

It is our understanding that the completion of this onramp is expected to coincide with the completion of the proposed development (i.e. approximately 2008-2010).

On this basis, Table 4.12 has been prepared to show the anticipated impact of the development generated traffic (less passer-by trips) upon the southbound carriageway of the Tullamarine Freeway. To this end, it is noted this assessment does not specifically account for non-development generated traffic utilising the southbound onramp / flyover bridge (i.e. other non-development generated traffic that is attracted to this route) but rather simply documents the impact of the subject development on this road.

This assessment has been completed using the methodology presented above, southbound traffic volumes as documented in Section 2.2.4.2 of this report and the following assumptions regarding the distribution of traffic exiting the site and heading north on Melrose Drive:

- Southeast (towards City): 50%;
- Northwest (towards Airport): 25%; and
- Northwest (towards Sunbury): 25%.

Table 4.12: Anticipated Impact of Site Generated Traffic on Tullamarine Freeway (Southbound)

Period	Access Arrangements	Anticipated Additional Site Generated Traffic (vph)	Southbound Freeway Volume (vph)	Degree of Saturation (DOS)
Weekday Afternoon	*Existing*	-	*2,551*	*0.64*
	Sites 1 & 2	135	2,686	0.67 *(+0.03)*
	Sites 1, 2 & 3	203	2,754	0.69 *(+0.05)*
Weekend Lunchtime	*Existing*	-	*2,191*	*0.55*
	Sites 1 & 2	197	2,388	0.60 *(+0.05)*
	Sites 1, 2 & 3	296	2,487	0.62 *(+0.07)*

[1] Based on the traffic volumes presented in Table 4.3 (discounted for passer-by trips) and the distribution shown in Figure 4.1.

Table 4.12 indicates that the degree of saturation for the Tullamarine Freeway southbound carriageway can be expected to increase following the development of the overall "Power Centre" site from 0.64 to 0.69 during the weekday afternoon peak hour and from 0.55 to 0.62 during the weekend lunchtime peak hour.

The Table also indicates that relatively minor increases in the degree of saturation can be expected between the initial development of Site 1 and 2 and the ultimate development of Site 3; that is, increases of 0.02 during both peak hours.

On the basis of an 'ideal' degree of saturation limit of 0.9, this analysis indicates that the Tullamarine Freeway southbound carriageway can also be expected to operate with satisfactory degrees of saturation following the development of the overall "Power Centre" site and hence mitigating road works are similarly not required on this carriageway.

Airport Terminus Precinct

In order to undertake an analysis of the post-development operation of the roads in the vicinity of the Airport Terminus (e.g. Centre Road), reference has been sought to the volumes presented in Table 4.4 of this report.

This Table indicates that the overall "Power Centre" (i.e. sites 1, 2 & 3) can be expected to generate approximately 1,515 and 2,224 additional vehicle movements onto the surrounding road network during the weekday afternoon and weekend lunchtime peak hours respectively.

As shown in Figure 4.1 of this report, it is noted that only 30% of this traffic can be expected to head towards the Airport Terminus Precinct, with approximately 33% of this traffic utilising the proposed grade separated roadway (above Melbourne Airport Long Term Car Park) connecting Melrose Drive to the Tullamarine Freeway (completion due by 2009-2010).

In this regard and assuming an equal split of entering and exiting traffic, a summary of the additional traffic likely to be generated by the overall "Power Centre" (i.e. including sites 1, 2 and 3) towards the Airport Terminus Precinct is presented in Table 4.13 on the following page.

Table 4.13: Development Generated Traffic towards Airport Terminus Precinct

	Weekday PM Peak Hour	Weekend Lunchtime Peak Hour
Total Additional Traffic Generation	1,515vph	2,224vph
Total Additional Traffic Generation towards Airport Terminus	30% x 1515 = 455vph	30% X 2224 = 667vph
Total Additional Traffic Generation towards Airport Terminus (less traffic utilising freeway on-ramp)	67% X 455 = 305vph	67% X 667 = 447vph
Total Additional Traffic Generation towards Airport Terminus (less traffic utilising freeway on-ramp) – entry & exit movements	50% X 305 = 153vph (entry) + 152vph (exit)	50% X 447 = 224vph (entry) + 223vph (exit)

Table 4.13 indicates that the overall "Power Centre" can be expected to generate approximately 153 additional entry and 152 additional exit movements through the Airport Terminus Precinct during the critical weekday afternoon peak hour. In addition, this Table indicates that the overall Centre can be expected to generate 224 additional entry and 223 additional exit movements during the weekend lunchtime peak hour (at which time volumes on the road network are lower).

On this basis and against existing traffic volumes in the vicinity of Airport Terminus, it is envisaged that although a marginal impact could be expected, the additional traffic generated by the overall "Power Centre" could not be expected to compromise the safety or function of the road network in the vicinity of the Airport Terminus.

Indeed, it is also expected that any upgrade works at the intersections within this Precinct (which is located approximately 1.5km from the site) would be investigated as part of the Melbourne Airport Ground Transport Plan, noting that this plan would consider traffic generated by the "Power Centre" and other developments in the area.

4.3.2.4 Internal Road Network

General

The sufficiency of the internal north-south road running between the Mercer Drive roundabout and the internal roundabout directly opposite Building P (which features a carriageway width of 10m and recommended parking prohibitions along its entire length) has been assessed.

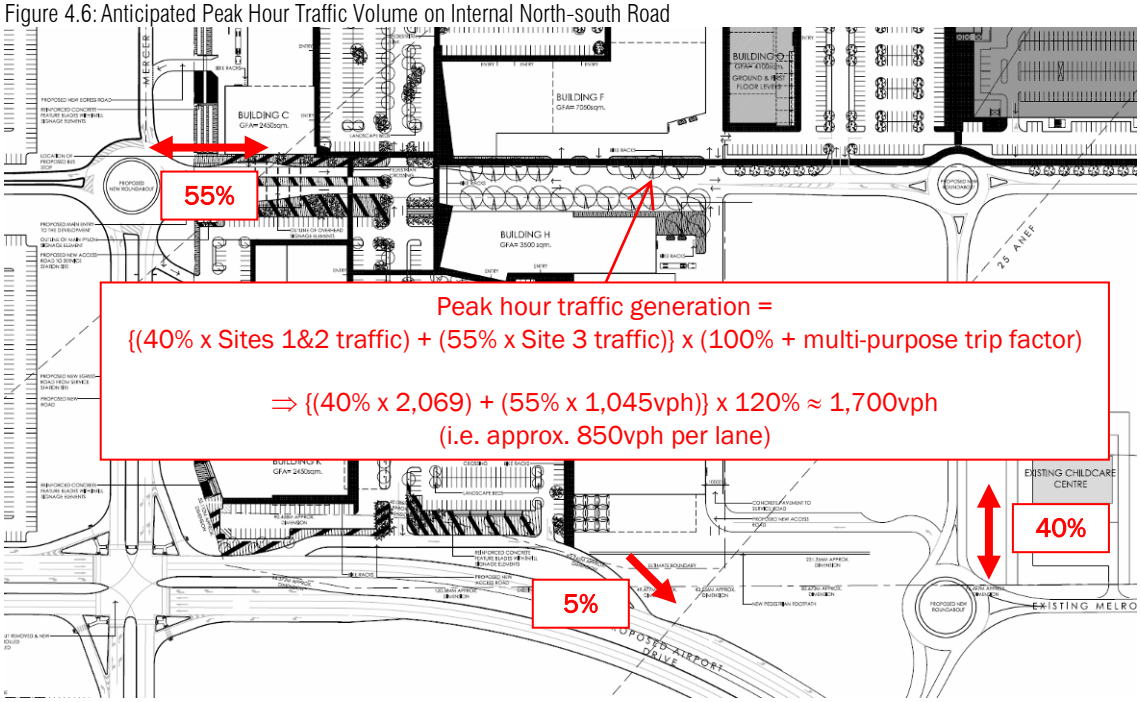
This assessment has been completed using the weekend lunchtime peak hour traffic volumes shown in Table 4.3 (the busiest peak hour) and the traffic distribution shown in Figure 4.1, with the resultant anticipated two-way traffic volume on the internal road between Sites 1&2 and 3 shown in Figure 4.6 on the following page.

As can be seen, Figure 4.6 indicates that the internal north-south road can be expected to carry approximately 1,700vph during the busiest peak hour period; that is, approximately 850vph in each lane / direction.

This volume compares to a theoretical capacity for a single lane of approximately 1,500 vehicles per hour per lane[9] and accordingly suggests that the internal north-south road can be expected to operate satisfactorily following the development of the overall "Power Centre" site.

[9] Calculated using the formula presented in Section 2 of the relevant Austroads guide discussed in Section 1.3 of this report and assuming a heavy vehicle proportion of 5%.

Figure 4.6: Anticipated Peak Hour Traffic Volume on Internal North-south Road



Ikea Access

The main access point to Ikea (which is located to the immediate north of the roundabout located on the internal north-south road) has been assessed using SIDRA assuming that one-third of traffic to/from the north and one-half of traffic to/from the south utilise this access[10].

This analysis has also been completed adopting an intersection configuration with one through lane in each direction, an auxiliary right-turn lane (with a 20m storage capacity) into the car park, and separate left and right turn lanes out of the car park (including a left-turn lane with a 12m storage capacity).

The post-development operation of this intersection during the weekend lunchtime peak hour (the most conservative period) is summarised in Table 4.14 with full results presented in Appendix C.

[10] This distribution is considered appropriate as a number of access points service the overall IKEA car park and motorists are likely to adopt the route which minimises their travel times.

Table 4.14: Ikea Access – Year 2018 Post-Development Operating Conditions

Period	Approach	Lane (Storage)	DOS	95th Percentile Queue (m)	Average Delay (seconds)
Weekend Lunchtime Peak Hour	North-south Rd (e)	T R (20m)	0.29 0.17	0 6	0 12
	Ikea car park access (n)	L (12m) R	0.22 0.56 #	6 24	14 36
	North-south Rd (w)	L T	0.37 0.37	0 0	0 0

DOS = Degree of Saturation, # = Intersection DOS

Table 4.14 indicates that the Ikea access point can be expected to operate with a 'very good' level of service during the weekend lunchtime peak hours under the Year 2018 post-development conditions.

Importantly, the analysis also indicates that the 95th percentile queue lengths of up to 6m are expected on the North-south Road. This queue length is not expected to exceed the storage provided for the right turn into the site and hence vehicle queuing into the nearby roundabout is not expected.

4.3.3 Daily Traffic Volume Impact

4.3.3.1 Daily Traffic Volumes

In order to estimate post-development daily traffic volumes, guidance on peak hour to daily traffic volume ratios for a typical weekday and weekend has been sought from the aforementioned RTANSW document.

Although this document does not specifically nominate any recommended ratios, extrapolation of the recommended peak hour and daily rates indicates the following ratios could be applied to a predominantly retail premises with a floor area in excess of 30,000sqm:

- Weekday: 9.2%; and
- Weekend: 15.3%.

Application of these ratios to the development generated traffic volumes detailed in Table 4.3 of this report indicates that the overall "Power Centre" could be expected to generate the following approximate daily traffic volumes:

- Weekday: 22,100 vehicle movements per day; and
- Weekend: 19,300 vehicle movements per day.

These volumes indicate that while weekend peak hour volumes exceed those during a typical weekday afternoon peak hour, the weekday daily volumes are expected to exceed those on a Weekend. While this may appear counterintuitive, higher volumes are generated on the weekday as a result of longer trading hours that occur (which generally includes night trading) as opposed to a weekend (which generally only trades during the day).

4.3.3.2 Surrounding Road Network Impact

On the basis of the daily traffic volumes detailed above and the traffic distribution detailed in Figure 4.1, Table 4.15 presents a summary of the anticipated daily traffic volume increases on the surrounding road network.

Table 4.15: Development Generated Daily Traffic Volumes on Surrounding Road Network

Road	Section	Proportion of Traffic	Development Generated Traffic Volumes - approx.	
			Weekday	Weekend (vpd)
Mercer Drive	Northeast of roundabout access	15%	3,315vpd	2,895vpd
Melrose Drive	Southeast of subject site	10%	2,210vpd	1,930vpd
Airport Drive Extension	Northwest of Mercer Drive	30%	6,630vpd	5,790vpd
	Southeast of subject site	45%	9,945vpd	8,685vpd
Total		**100%**	**22,100vpd**	**19,300vpd**

Amongst other information, Table 4.15 indicates that the overall "Power Centre" site can be expected to generate up to approximately 2,200 additional daily traffic movements on Melrose Drive to the southeast of the subject site.

This road currently carries approximately 7,100 vehicles per day at this location (based on the volumes presented in Figures 2.6 and 2.7 of this report and a peak-to-daily ratio of 8.4%) and hence indicates that this road section can be expected to carry approximately 9,300 vehicles per day under post-development conditions.

It is noted that while this post-development volume is above the indicative maximum daily traffic volume specified in Clause 56 of the Hume Planning Scheme for a 'connector street' (i.e. 7,000vpd), this indicative volume is technically applicable for streets within residential subdivisions rather than roads providing access for the through movement of traffic outside of such subdivisions.

To this end, given that Melrose Drive provides secondary access to Tullamarine Freeway (i.e. in addition to Tullamarine Freeway) rather than access to purely residential dwellings, the application of the connector road daily traffic volume maximum is considered inappropriate for this road.

Indeed, considering that the Planning Scheme indicates that volumes in excess of 7,000 vehicles per day is acceptable for 'arterial roads', the occurrence of a daily traffic volume of approximately 9,300 vehicles per day on Melrose Drive is considered acceptable.

Moreover, it is noted that traffic volumes provided by Melbourne Airport show that in October 2005 Melrose Drive carried approximately 10,300 vehicles per day. After construction and opening of Mercer Drive in November 2005, however, this volume fell to approximately 8,000 vehicles per day in February 2006. This volume appears to have further decreased to approximately 7,100 vehicles per day in 2007.

This analysis indicates that post-development volumes on Melrose Drive can be expected to be less than those volumes carried by this road prior to the opening of Mercer Drive.

Finally, it is also noted that on the basis of the volumes presented in Figures 4.4 and 4.5, Airport Drive can be expected to carry a daily traffic of approximately 25,000 vehicles per day to the south of the site. This volume indicates that a four-lane cross-section (rather than a six-lane cross-section) can be expected to be sufficient in 2018, although it is noted that a six-lane cross-section is required at the Airport Drive / Mercer Drive signalised intersection – where a triple right turn lane is proposed.

4.3.3.3 Internal Road Network Impact

On the basis of the assessment methodology presented in Section 4.3.1.4 of this report and the daily traffic volumes presented above, it is envisaged that the internal north-south road will carry up to approximately 12,000 vehicles per day.

This volume is considered acceptable noting that arterial roads with similar (if not narrower) cross-sections typically carry daily traffic volumes in excess of 15,000 vehicles per day before the provision of two traffic lanes in each direction is warranted.

Moreover, it is noted that this road has been designed with a width of 10m which is sufficient to allow a central turning lane to be provided at key access points, such as the aforementioned IKEA access.

5 Car Parking

5.1 Anticipated Parking Requirement

In the absence of any statutorily applicable parking rates for the proposed development (given that the site is located on Federal land), guidance on the parking requirements for the site has been sought from the following sources:

i Hume Planning Scheme; and

ii Advice provided by Leffler Simes Architects which indicates an IKEA[11] parking requirement of 1,500 car spaces for a 32,000sqm store (i.e. a parking rate of 4.7 spaces / 100sqm).

For reference, it is noted that this latter rate compares to an IKEA Richmond surveyed rate of approximately 2.8 spaces / 100sqm (adjusted to reflect a mode split to car of 100%). This survey suggests that the requirement of 1,500 car spaces for the IKEA is conservative on the high side, noting that the application of the surveyed rate would indicate a peak parking requirement of approximately 900 car spaces.

Notwithstanding this, Table 5.1 presents a summary of the adopted parking rates and resultant parking requirement for the Site 3 uses.

Table 5.1: Anticipated Parking Requirement

Use	Size (GLFA)	Adopted Parking Rate	Anticipated Parking Demand
Office	9,300sqm	3.5 spaces / 100sqm [1]	326 spaces
IKEA *– indicative only*	32,000sqm	-	1,500 spaces [2]
Industrial (Warehouse)	6,730sqm	1.5 spaces / 100sqm [1]	109 spaces
Total			**1,935 spaces**

Source:

[1] Hume Planning Scheme

[2] Advice provided by IKEA via Leffler Simes.

Table 5.1 indicates that the Site 3 development can be expected to generate a peak parking demand of approximately 1,935 car spaces, including some 110 spaces for the industrial (warehouse) use, should Building P be occupied by an IKEA which generates a peak parking demand of 1,500 spaces.

[11] As detailed in Section 1.1 of this report, the use of an IKEA tenant is indicative only and utilised for the purposes of estimating traffic and parking generation characteristics.

5.2 Adequacy of Parking Supply

Based upon the above discussions and analysis, it is clear that the proposed car parking provision of some 1,800 car spaces could be expected to generate a Site 3 parking shortfall of approximately 150 car spaces should Building P be occupied by an IKEA[12] which generates a peak parking demand of 1,500 car spaces.

As discussed above, this parking requirement is considered to be conservative on the high side and it is envisaged that an IKEA parking demand of approximately 1,000 car spaces is potentially more realistic for this use and consistent with other large format retailers.

Notwithstanding this, in the event that this peak parking demand was generated, it is noted that approximately 300 surplus car spaces are likely to be available within Sites 1 and 2 (as documented in Table 5.1 of our December 2006 report for Sites 1 and 2).

As documented in this December 2006 report, this surplus is expected within Sites 1 and 2 predominantly as a result of the fact that the peak parking demand associated with each individual use will not occur at the same time (i.e. parking will be "shared" amongst uses). Parking surveys undertaken by our office indicate, for instance, that the peak weekend parking demand associated with a supermarket will typically occur at 11:00am, a gymnasium typically at 9:00am and restricted retail (bulky goods) tenancies typically at 2:00pm.

In this regard, it is evident that as a result of the difference in the timing of these peaks, the overall combined parking demand of the uses within Sites 1 and 2 (and indeed within Site 3) will be significantly less than the sum of the individual peak parking demands of each use.

The provision of these surplus parking spaces within Sites 1 and 2, together with the aforementioned 1,800 car spaces, provides a total 'effective' parking provision for Site 3 of approximately 2,100 car spaces. This effective supply indicates that even under exceptional circumstances (i.e. where an IKEA is provided on site and generates a demand for 1,500 car spaces), the overall provision of parking within the "Power Centre" site can be expected to accommodate the peak parking demands.

Finally, it is also noted that given that car parking within Sites 1, 2 and Site 3, will be connected by vehicular and pedestrian accessways, it is envisaged that customers will be willing (and indeed are likely to prefer) to park in one location and walk around the site (rather than constantly move their car around the site). To this end, a reduction in the overall parking requirement as a result of multi-purpose trips to the Centre (as documented in our December 2006 report) is accordingly also considered to be valid.

[12] As detailed in Section 1.1 of this report, the use of an IKEA tenant is indicative only and utilised for the purposes of estimating traffic and parking generation characteristics.

6 Other Considerations

6.1 Loading Facilities

The internal road network and the proposed access points to the external road network have been designed to facilitate ingress and egress for vehicles of a size up to and including 19.0m semi-trailers.

With respect to the actual loading areas, it is recommended that these areas are designed in accordance with the Australian Standard for Off-street Commercial Vehicle Facilities (AS2890.2-2002) which (amongst other matters) specifies minimum bay dimensions for semi-trailers as follows:

- Bay width: 3.5m;
- Length: 19m; and
- Vertical height clearance: 4.5m.

It is noted that lesser bay dimensions (e.g. lengths of 12.5m) could be used where loading by vehicles of a size equal to or less than 12.5m length is anticipated.

Finally, although vehicles larger than semi-trailers (e.g. B-doubles) may need to circulate the external road network, the design of the internal road network or the access points to the Centre for such vehicles is not considered to be warranted given that retail uses in metropolitan areas rarely (if ever) have delivery requirements by such vehicles.

6.2 Bicycle Facilities

6.2.1 On-site Bicycle Parking

The plans prepared by Leffler Simes Architects indicate that bicycle parking spaces (racks) have been provided throughout the development.

Although it is difficult to determine the exact supply of such parking spaces shown on these plans, it is recommended that bicycle parking is generally provided in accordance with the rates specified in Table 10-1 of the Austroads' 'Guide to Traffic Engineering Practice, Part 14: Bicycles'. By way example, it is recommended that the bicycle parking for the IKEA[13] is provided in accordance with the rate nominated for 'retail show rooms'.

For reference, these rates are reproduced as follows:

- Employee Bicycle Parking: 1 bicycle space per 750sqm sales floor area; and
- Shopper Bicycle Parking: 1 bicycle space per 1,000sqm sales floor area.

[13] As detailed in Section 1.1 of this report, the use of an IKEA tenant is indicative only and utilised for the purposes of estimating traffic and parking generation characteristics.

It is further noted that the staff bicycle parking would need to be provided in secure areas (such as back-of-house staffing areas or lockable compounds) while shopper parking could be provided at bicycle rails located throughout the development.

It is envisaged that the provision of bicycle parking for the development could be considered as part of the detailed design phase of this project.

6.2.2 Surrounding Bicycle Pathways / Lanes

GTA Consultants undertook a review of the existing bicycle facilities along Melrose Drive and within the immediate vicinity of the subject site during July 2006. This review indicated that on-street bicycle lanes exist along Melrose Drive from approximately 140m south of the existing intersection with Link Road to the Mickleham Road intersection (and beyond).

This review further indicates that these lanes were provided with a carriageway width of approximately 10-12m, including a 1.5m to 1.9m bicycle lane in the northbound direction and a 2.0m combined parking / bicycle lane in the southbound direction.

For reference, Figures 6.1 and 6.2 show the Melrose Drive bicycle lanes in the vicinity of the site.

Figure 6.1: Melrose Drive
(looking north towards Springbank Street)

Figure 6.2: Melrose Drive
(looking north towards Link Road)

In order to improve bicycle connectivity to the subject site, it is recommended that these on-road lanes are extended to the Melrose Drive access point following the development of the site.

As previously detailed in our letter to Urbis Pty Ltd dated 1 August 2006, it is our view that a contribution from the developer towards providing these facilities would be fair and not inappropriate. The value of any contribution, however, warrants further discussion between Melbourne Airport and the applicant.

6.3 Pedestrian Facilities

In addition to the discussion presented in the previous Section, it is noted that the plans prepared by Leffler Simes Architects include the provision of internal pedestrian pathways and connections to surrounding pedestrian pathways.

These connections include a pedestrian only link to the existing pathways on Derby Street and Springbank Street (via a pathway to the immediate south of Building Q) and indicative pathways along both sides of the eastern access road connecting to Melrose Drive.

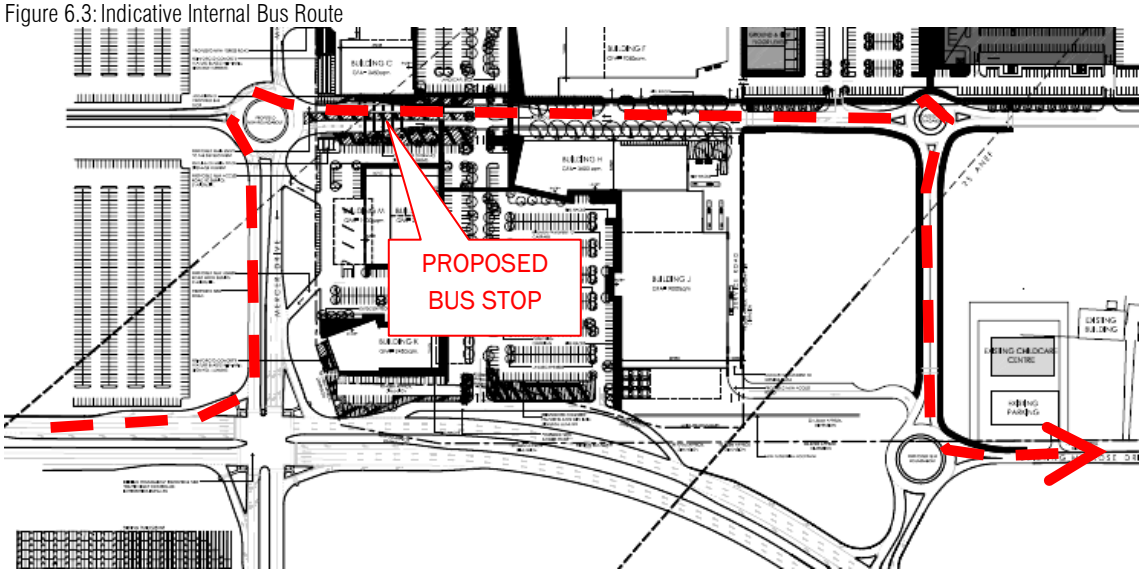
These connections are expected to provide good pedestrian connectivity to the surrounding residential and industrial land uses and hence encourage modes of travel to the site other than via private motor vehicle.

6.4 Public Transport

The development proposal incorporates the provision of a bus stop located immediately east of the Mercer Drive entry. It is proposed that this stop will be incorporated into the surrounding public bus services (e.g. routes 477, 478 and 479) with buses entering via Mercer Drive before exiting via the Eastern Site Access.

For reference, a plan showing the indicative bus route is presented in Figure 6.3, noting that any such route would require discussions with both the Department of Infrastructure and the local bus operators.

Figure 6.3: Indicative Internal Bus Route



7 Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

i The analysis previously undertaken by our office for the Sites 1 and 2 development was inadvertently conservative on the high side as the 'base traffic volumes' used in the assessment included two allowances for traffic generated by the subject site. This conservatism has been corrected in this report;

ii The Site 3 development is expected to generate approximately 730 and 1,050 additional vehicle movements (i.e. above that generated by Site 1 and 2) during the typical weekday afternoon and weekend lunchtime peak hours respectively;

iii The overall "Power Centre" site is expected to generate approximately 2,230 and 3,110 vehicle movements during the typical weekday afternoon and weekend lunchtime peak hours respectively;

iv The ultimate road network as detailed in Section 3.2 of this report (and shown in Figure 3.1) can be expected to operate satisfactorily under Year 2018 post-development conditions, noting that this road network includes the following works which are considered to be necessitated by the subject development:

- The provision of an additional right-turn lane on the Mercer Drive north approach to Airport Drive, and
- The lengthening of the right-turn lane on the Airport Drive west approach to Mercer Drive;

v Sufficient evidence is considered to exist to suggest that traffic generated by the overall "Power Centre" can be satisfactorily accommodated by the Tullamarine Freeway for both northbound and southbound carriageways;

vi Against existing traffic volumes in the vicinity of Airport Terminus, it is envisaged that although a marginal impact could be expected, the additional traffic generated by the overall "Power Centre" could not be expected to compromise the safety or function of the road network in the vicinity of the Airport Terminus.

vii The post-development daily traffic volumes on the roads in the vicinity of the site (including Melrose Drive to the southeast of the site) are considered to be acceptable, noting that volumes on Melrose Drive following the development of the site are expected to be less than those which occurred prior to the construction of Mercer Drive;

viii The internal road network, including the internal north-south road comprising one trafficable lane in each direction and a central turning lane at key intersections (such as the IKEA access), can be expected to accommodate the post-development traffic volumes;

ix The proposed car parking provision of some 1,800 car spaces will be more than capable of accommodating the peak parking demands likely to be generated by the development;

x The proposed loading bays (and internal road network) have been designed to accommodate vehicles of a size up to and including 19.0m semi-trailers;

xi It is recommended that suitable and sufficient bicycle parking spaces are provided as part of the development (although this can be considered as part of the detailed design phase of this project);

xii It is recommended that the existing on-road bicycles lanes on Melrose Drive are extended to the eastern access point following the development of the site;

xiii The proposed development incorporates good pedestrian connections to the surrounding residential and industrial land uses, noting that these connections can be expected to encourage modes of travel to the site other than via private motor vehicle; and

xiv The proposed development includes the potential for an internal bus stop and the internal road network has been designed to accommodate a diversion of the nearby existing bus routes if required in the future.

Appendix A

Base Case Traffic Volumes (Years 2008 & 2018)

Figure A1: Year 2008 PM Peak Hour Traffic Volumes

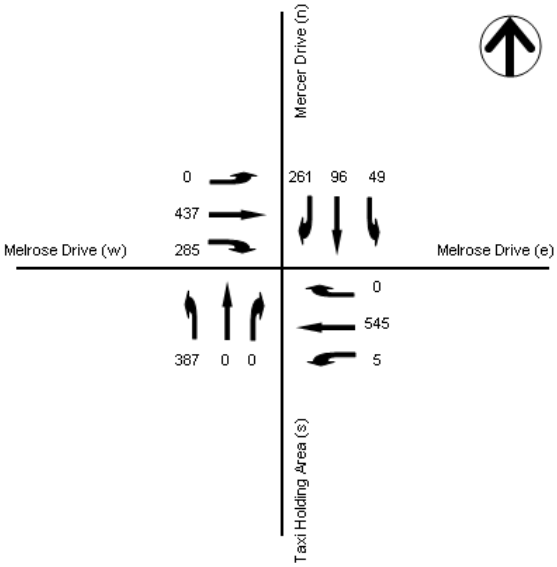


Figure A2: Year 2018 PM Peak Hour Traffic Volumes

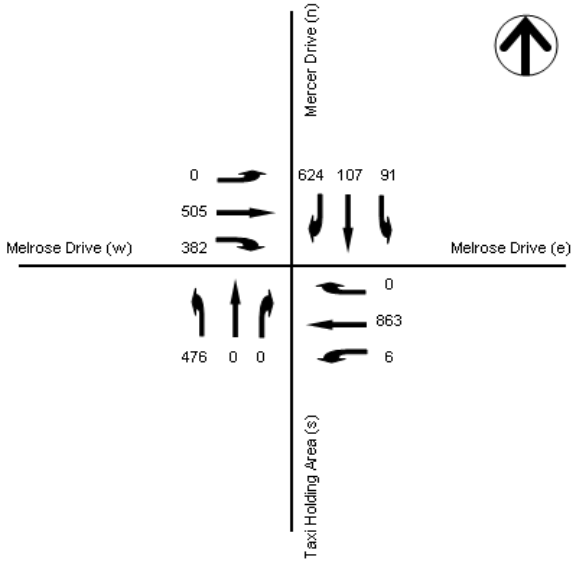


Figure A3: Year 2008 Weekend Lunchtime Traffic Volumes

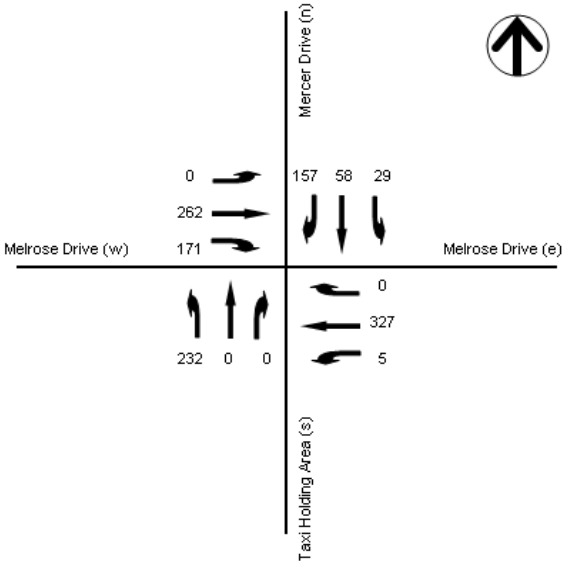
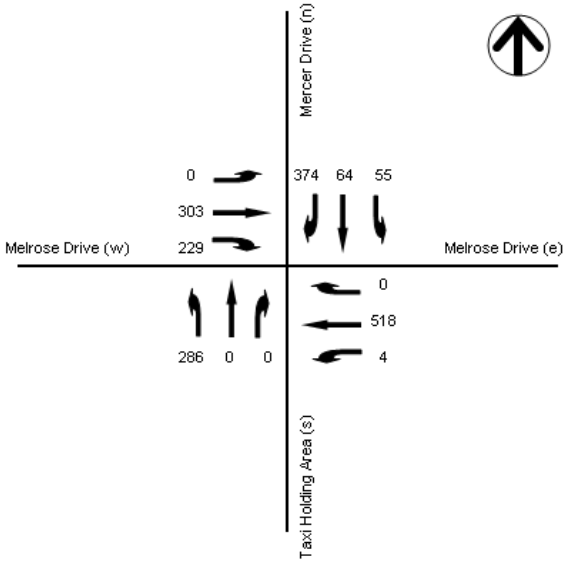


Figure A4: Year 2018 Weekend Lunchtime Traffic Volumes



Appendix B

Existing Conditions SIDRA Results – Melrose Drive / Springbank Street

Melrose Drive / Springbank Street (Unsignalised 'T-intersection')

Weekday Morning Peak Hour

AM Peak Hour - Existing

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Melrose Drv (e)										
5	T	218	5.0	0.158	2.3	LOS A	11	0.52	0.00	53.4
6	R	40	5.0	0.158	10.9	LOS B	11	0.52	0.77	46.2
Approach		**258**	**5.0**	**0.158**	**3.6**	**LOS A**	**11**	**0.52**	**0.12**	**52.2**
Springnbank St (n)										
7	L	25	4.0	0.097	16.5	LOS C	3	0.55	0.89	42.4
9	R	21	4.8	0.097	16.3	LOS C	3	0.55	1.00	42.4
Approach		**46**	**4.3**	**0.097**	**16.4**	**LOS C**	**3**	**0.55**	**0.94**	**42.4**
Melrose Drv (w)										
10	L	84	4.8	0.214	8.4	LOS A	0	0.00	0.67	49.0
11	T	316	5.1	0.214	0.0	LOS A	0	0.00	0.00	60.0
Approach		**400**	**5.0**	**0.214**	**1.8**	**LOS A**		**0.00**	**0.14**	**57.3**
All Vehicles		**704**	**5.0**	**0.214**	**3.4**	**Not Applicable**	**11**	**0.23**	**0.18**	**54.1**

Weekday Afternoon Peak Hour

PM Peak Hour - Existing

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Melrose Drv (e)										
5	T	360	5.0	0.199	1.0	LOS A	14	0.39	0.00	54.9
6	R	9	10.0	0.200	9.7	LOS A	14	0.39	0.68	47.1
Approach		**370**	**5.1**	**0.199**	**1.3**	**LOS A**	**14**	**0.39**	**0.02**	**54.7**
Springnbank St (n)										
7	L	37	5.4	0.206	16.7	LOS C	7	0.50	0.83	42.2
9	R	61	4.9	0.205	16.5	LOS C	7	0.50	1.00	42.2
Approach		**98**	**5.1**	**0.206**	**16.6**	**LOS C**	**7**	**0.50**	**0.94**	**42.2**
Melrose Drv (w)										
10	L	21	4.8	0.101	8.4	LOS A	0	0.00	0.67	49.0
11	T	169	4.7	0.101	0.0	LOS A	0	0.00	0.00	60.0
Approach		**190**	**4.7**	**0.101**	**0.9**	**LOS A**		**0.00**	**0.07**	**58.5**
All Vehicles		**658**	**5.0**	**0.206**	**3.5**	**Not Applicable**	**14**	**0.30**	**0.17**	**53.3**

Appendix C

Post-Development SIDRA Results

Mercer Drive / Long-term Car Park Access / Site Access (Roundabout)

Weekday Afternoon Peak Hour

Post Development (Year 2018) - Stages 1 2

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mercer Drv (s)										
1	L	9	0.0	0.010	8.3	LOS A	0	0.23	0.53	58.4
3	R	353	2.0	0.236	13.7	LOS B	12	0.24	0.66	51.7
Approach		**362**	**1.9**	**0.236**	**13.6**	**LOS B**	**12**	**0.24**	**0.66**	**51.9**
Site Access (e)										
4	L	587	2.0	0.383	11.5	LOS B	20	0.75	0.84	54.0
5	T	1	0.0	0.333	10.8	LOS B	19	0.75	0.82	54.8
Approach		**589**	**2.0**	**0.383**	**11.5**	**LOS B**	**20**	**0.75**	**0.84**	**54.0**
Mercer Drv (n)										
7	L	353	2.0	0.587	10.7	LOS B	42	0.65	0.75	54.8
8	T	865	8.0	0.587	10.1	LOS B	42	0.66	0.75	55.6
9	R	85	0.0	0.586	16.8	LOS B	42	0.67	0.84	49.3
Approach		**1303**	**5.8**	**0.587**	**10.7**	**LOS B**	**42**	**0.66**	**0.76**	**54.9**
LT Car Park Access (w)										
11	T	1	50.0	0.041	8.2	LOS A	2	0.46	0.59	57.5
12	R	44	0.0	0.041	14.8	LOS B	2	0.46	0.67	50.5
Approach		**46**	**2.2**	**0.041**	**14.5**	**LOS B**	**2**	**0.46**	**0.67**	**50.8**
All Vehicles		**2300**	**4.2**	**0.587**	**11.4**	**LOS B**	**42**	**0.61**	**0.76**	**54.0**

Weekend Lunchtime Peak Hour

Post Development (Year 2018) - Stages 1 2

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Mercer Drv (s)										
1	L	9	0.0	0.010	8.3	LOS A	0	0.23	0.53	58.4
3	R	492	2.0	0.325	13.7	LOS B	18	0.26	0.66	51.6
Approach		**501**	**2.0**	**0.325**	**13.7**	**LOS B**	**18**	**0.26**	**0.66**	**51.7**
Site Access (e)										
4	L	587	2.0	0.319	10.3	LOS B	16	0.66	0.75	54.8
5	T	1	0.0	0.333	9.4	LOS A	15	0.66	0.70	55.6
Approach		**589**	**2.0**	**0.318**	**10.3**	**LOS B**	**16**	**0.66**	**0.75**	**54.8**
Mercer Drv (n)										
7	L	492	2.0	0.548	11.6	LOS B	38	0.71	0.82	54.3
8	T	519	8.1	0.547	11.3	LOS B	38	0.72	0.83	55.0
9	R	85	0.0	0.548	17.9	LOS B	38	0.72	0.90	48.2
Approach		**1096**	**4.7**	**0.548**	**11.9**	**LOS B**	**38**	**0.72**	**0.83**	**54.1**
LT Car Park Access (w)										
11	T	1	50.0	0.045	8.9	LOS A	2	0.55	0.65	56.7
12	R	44	0.0	0.045	15.5	LOS B	2	0.55	0.70	50.0
Approach		**46**	**2.2**	**0.045**	**15.2**	**LOS B**	**2**	**0.55**	**0.69**	**50.3**
All Vehicles		**2232**	**3.4**	**0.548**	**12.0**	**LOS B**	**38**	**0.60**	**0.77**	**53.6**

Melrose Drive / Site Access (Roundabout)

Weekday Afternoon Peak Hour

Year 2018 Weekday PM - Post Development

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Airport Extension Rd (s)										
2	T	353	2.0	0.306	4.9	LOS A	15	0.30	0.44	51.2
3	R	36	2.8	0.305	11.8	LOS B	15	0.30	0.65	45.4
Approach		**389**	**2.1**	**0.306**	**5.6**	**LOS A**	**15**	**0.30**	**0.46**	**50.6**
Melrose Drv (e)										
4	L	12	8.3	0.104	5.6	LOS A	5	0.46	0.51	50.1
6	R	117	1.7	0.105	12.6	LOS B	5	0.46	0.67	44.9
Approach		**129**	**2.3**	**0.105**	**12.0**	**LOS B**	**5**	**0.46**	**0.66**	**45.3**
Eastern Access (n)										
7	L	118	1.7	0.319	5.5	LOS A	16	0.15	0.45	51.3
8	T	353	2.0	0.319	3.4	LOS A	16	0.15	0.32	53.7
Approach		**471**	**1.9**	**0.319**	**4.0**	**LOS A**	**16**	**0.15**	**0.35**	**53.1**
All Vehicles		**989**	**2.0**	**0.319**	**5.6**	**LOS A**	**16**	**0.25**	**0.43**	**50.9**

Weekend Lunchtime Peak Hour

Year 2018 Saturday Lunchtime - Post Development

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Airport Extension Rd (s)										
2	T	492	2.0	0.444	5.3	LOS A	26	0.42	0.48	50.2
3	R	49	2.0	0.445	12.2	LOS B	26	0.42	0.67	44.9
Approach		**541**	**2.0**	**0.444**	**5.9**	**LOS A**	**26**	**0.42**	**0.50**	**49.7**
Melrose Drv (e)										
4	L	17	5.6	0.162	6.4	LOS A	9	0.57	0.58	49.3
6	R	164	1.8	0.163	13.4	LOS B	9	0.57	0.72	44.4
Approach		**182**	**2.2**	**0.163**	**12.7**	**LOS B**	**9**	**0.57**	**0.71**	**44.8**
Eastern Access (n)										
7	L	164	1.8	0.449	5.6	LOS A	27	0.21	0.45	50.8
8	T	492	2.0	0.449	3.5	LOS A	27	0.21	0.33	53.1
Approach		**656**	**2.0**	**0.449**	**4.1**	**LOS A**	**27**	**0.21**	**0.36**	**52.5**
All Vehicles		**1379**	**2.0**	**0.449**	**5.9**	**LOS A**	**27**	**0.34**	**0.46**	**50.2**

Mercer Drive / Airport Drive Extension / Taxi Rank (Signalised) – NO ADDITIONAL ROAD WORKS

Weekday Afternoon Peak Hour

Post Development (Year 2018) - Stages 1 2

Signalised - Fixed time **Cycle Time = 110 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Taxi Holding Rank (s)										
1	L	501	0.0	0.603	28.0	LOS C	134	0.81	0.83	34.0
2	T	1	0.0	0.009	54.3	LOS D	1	0.96	0.56	24.1
3	R	1	0.0	0.010	62.2	LOS E	1	0.96	0.59	22.3
Approach		**503**	**0.0**	**0.602**	**28.1**	**LOS C**	**134**	**0.81**	**0.83**	**34.0**
Melrose Drive (e)										
4	L	6	0.0	0.008	13.6	LOS B	1	0.39	0.63	43.7
5	T	908	8.0	0.947	72.3	LOS E	160	1.00	1.16	20.1
6	R	80	2.5	0.185	44.2	LOS D	34	0.84	0.76	27.2
Approach		**995**	**7.5**	**0.947**	**69.7**	**LOS E**	**160**	**0.98**	**1.12**	**20.6**
Mercer Drive (n)										
7	L	176	5.1	0.202	9.1	LOS A	16	0.23	0.65	48.1
8	T	113	0.0	0.947	65.2	LOS E	272	1.00	1.18	21.5
9	R	976	5.0	0.946	73.3	LOS E	272	1.00	1.19	20.0
Approach		**1265**	**4.6**	**0.947**	**63.7**	**LOS E**	**272**	**0.89**	**1.11**	**22.0**
Melrose Drive (w)										
10	L	160	1.9	0.130	8.3	LOS A	8	0.16	0.64	48.9
11	T	532	8.1	0.554	45.8	LOS D	79	0.97	0.79	26.6
12	R	402	0.0	0.916	59.7	LOS E	166	1.00	0.97	22.8
Approach		**1094**	**4.2**	**0.916**	**45.4**	**LOS D**	**166**	**0.86**	**0.83**	**26.7**
All Vehicles		**3857**	**4.6**	**0.947**	**55.4**	**LOS E**	**272**	**0.90**	**1.00**	**23.9**

Weekend Lunchtime Peak Hour

Post Development (Year 2018) - Stages 1 2

Signalised - Fixed time **Cycle Time = 90 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Taxi Holding Rank (s)										
1	L	301	0.0	0.334	16.4	LOS B	55	0.58	0.75	41.4
2	T	1	0.0	0.008	43.3	LOS D	0	0.95	0.56	27.4
3	R	1	0.0	0.008	51.2	LOS D	0	0.95	0.59	25.1
Approach		**303**	**0.0**	**0.334**	**16.6**	**LOS B**	**55**	**0.58**	**0.75**	**41.3**
Melrose Drive (e)										
4	L	4	0.0	0.004	9.9	LOS A	0	0.29	0.62	47.2
5	T	545	8.1	0.737	44.1	LOS D	75	1.00	0.89	27.1
6	R	117	1.7	0.359	43.9	LOS D	44	0.92	0.78	27.3
Approach		**667**	**6.9**	**0.737**	**43.9**	**LOS D**	**75**	**0.98**	**0.87**	**27.2**
Mercer Drive (n)										
7	L	175	5.1	0.167	8.6	LOS A	11	0.21	0.65	48.6
8	T	67	0.0	0.725	28.0	LOS C	139	0.93	0.83	33.9
9	R	862	5.0	0.724	35.9	LOS D	139	0.93	0.87	30.4
Approach		**1104**	**4.7**	**0.724**	**31.1**	**LOS C**	**139**	**0.82**	**0.84**	**32.5**
Melrose Drive (w)										
10	L	234	2.1	0.199	8.7	LOS A	15	0.23	0.66	48.4
11	T	319	8.2	0.431	40.2	LOS D	45	0.96	0.76	28.5
12	R	241	0.0	0.730	48.5	LOS D	86	1.00	0.89	25.8
Approach		**794**	**3.9**	**0.730**	**33.4**	**LOS C**	**86**	**0.76**	**0.77**	**31.3**
All Vehicles		**2868**	**4.5**	**0.737**	**33.2**	**LOS C**	**139**	**0.81**	**0.81**	**31.5**

Melrose Drive / Springbank Street (Unsignalised 'T-intersection')

Weekday Afternoon Peak Hour

PM Peak Hour - Post-Dev

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Melrose Drv (e)										
5	T	477	5.0	0.265	2.0	LOS A	22	0.55	0.00	53.1
6	R	12	8.3	0.267	10.7	LOS B	22	0.55	0.76	46.5
Approach		**489**	**5.1**	**0.265**	**2.2**	**LOS A**	**22**	**0.55**	**0.02**	**53.0**
Springnbank St (n)										
7	L	42	4.8	0.429	26.5	LOS D	18	0.72	1.03	35.7
9	R	84	4.8	0.426	26.3	LOS D	18	0.72	1.08	35.6
Approach		**126**	**4.8**	**0.427**	**26.4**	**LOS D**	**18**	**0.72**	**1.07**	**35.6**
Melrose Drv (w)										
10	L	26	3.8	0.166	8.4	LOS A	0	0.00	0.67	49.0
11	T	286	4.9	0.166	0.0	LOS A	0	0.00	0.00	60.0
Approach		**312**	**4.8**	**0.166**	**0.7**	**LOS A**		**0.00**	**0.06**	**58.9**
All Vehicles		**927**	**5.0**	**0.429**	**5.0**	**Not Applicable**	**22**	**0.39**	**0.17**	**51.3**

Airport Drive / Melrose Drive (unsignalised) – TWO THROUGH LANES ON AIRPORT DRIVE

Weekday Afternoon Peak Hour

Post Development (Year 2018) - Stages 1 2 - two lanes

Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Airport Drive (e)										
5	T	995	8.0	0.268	0.0	LOS A	0	0.00	0.00	60.0
6	R	353	5.1	0.547	16.1	LOS C	33	0.73	1.06	41.7
Approach		**1348**	**7.3**	**0.548**	**4.2**	**LOS A**	**33**	**0.19**	**0.28**	**53.8**
Eastern Access (n)										
7	L	353	5.1	0.679	22.7	LOS C	45	0.80	1.25	38.2
Approach		**353**	**5.1**	**0.679**	**22.7**	**LOS C**	**45**	**0.80**	**1.25**	**38.2**
Airport Drive (w)										
10	L	63	0.0	0.063	9.2	LOS A	2	0.42	0.65	47.5
11	T	707	0.0	0.181	0.0	LOS A	0	0.00	0.00	60.0
12	R	21	0.0	0.049	17.4	LOS C	2	0.71	0.92	40.8
Approach		**791**	**0.0**	**0.181**	**1.2**	**LOS A**	**2**	**0.05**	**0.08**	**58.0**
All Vehicles		**2492**	**4.7**	**0.679**	**5.9**	**Not Applicable**	**45**	**0.23**	**0.35**	**52.0**

Weekend Lunchtime Peak Hour

Post Development (Year 2018) - Stages 1 2 - two lanes

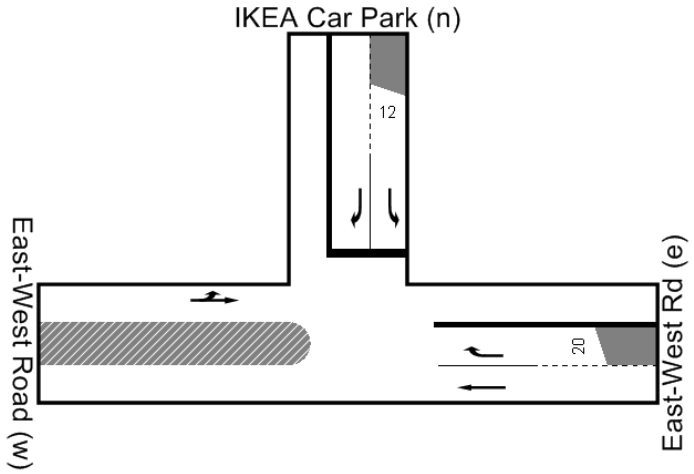
Two-way stop

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Airport Drive (e)										
5	T	666	8.0	0.180	0.0	LOS A	0	0.00	0.00	60.0
6	R	492	5.1	0.590	14.1	LOS B	44	0.69	1.06	43.4
Approach		**1158**	**6.7**	**0.590**	**6.0**	**LOS A**	**44**	**0.29**	**0.45**	**51.6**
Eastern Access (n)										
7	L	492	5.1	0.720	20.2	LOS C	62	0.76	1.29	39.9
Approach		**492**	**5.1**	**0.721**	**20.2**	**LOS C**	**62**	**0.76**	**1.29**	**39.9**
Airport Drive (w)										
10	L	49	0.0	0.059	10.1	LOS B	2	0.50	0.71	47.1
11	T	494	0.0	0.127	0.0	LOS A	0	0.00	0.00	60.0
12	R	21	0.0	0.031	13.6	LOS B	1	0.55	0.78	43.8
Approach		**564**	**0.0**	**0.127**	**1.4**	**LOS A**	**2**	**0.06**	**0.09**	**57.8**
All Vehicles		**2214**	**4.7**	**0.720**	**8.0**	**Not Applicable**	**62**	**0.34**	**0.54**	**49.7**

Internal IKEA Access (unsignalised)

Layout



Weekend Lunchtime Peak Hour

Saturday Midday Peak Hour

Two-way stop

Vehicle Movements

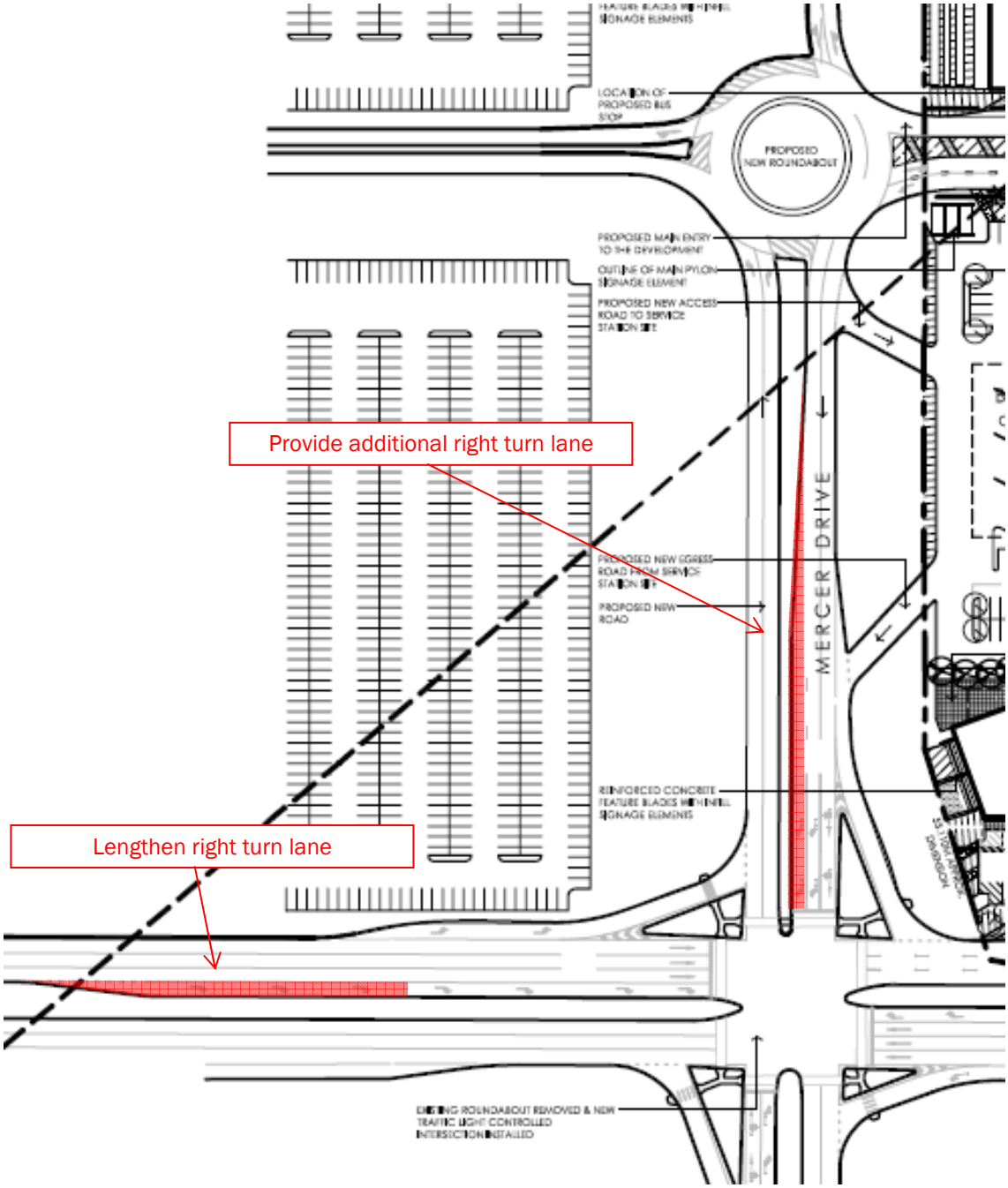
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
East-West Rd (e)										
5	T	572	0.0	0.293	0.0	LOS A	0	0.00	0.00	60.0
6	R	138	0.0	0.170	12.0	LOS B	6	0.62	0.87	45.1
Approach		**710**	**0.0**	**0.293**	**2.3**	**LOS A**	**6**	**0.12**	**0.17**	**56.4**
IKEA Car Park (n)										
7	L	138	0.0	0.215	13.7	LOS B	6	0.59	0.96	44.6
9	R	136	0.0	0.555	35.7	LOS E	24	0.92	1.13	30.8
Approach		**274**	**0.0**	**0.555**	**24.7**	**LOS C**	**24**	**0.75**	**1.04**	**36.5**
East-West Road (w)										
10	L	136	0.0	0.367	8.2	LOS A	0	0.00	0.67	49.0
11	T	572	0.0	0.367	0.0	LOS A	0	0.00	0.00	60.0
Approach		**708**	**0.0**	**0.367**	**1.6**	**LOS A**		**0.00**	**0.13**	**57.5**
All Vehicles		**1692**	**0.0**	**0.555**	**5.6**	**Not Applicable**	**24**	**0.17**	**0.29**	**52.2**

Appendix D

Post-Development SIDRA Results – with additional mitigating road works (Mercer Drive / Airport Drive intersection)

Mercer Drive / Airport Drive Extension / Taxi Rank (Signalised) – ADDITIONAL ROAD WORKS

Additional Road Works



Weekday Afternoon Peak Hour

Post Development (Year 2018) - Stages 1 2

Signalised - Fixed time **Cycle Time = 90 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Taxi Holding Rank (s)										
1	L	501	0.0	0.528	19.2	LOS B	97	0.71	0.80	39.3
2	T	1	0.0	0.008	43.3	LOS D	0	0.95	0.56	27.4
3	R	1	0.0	0.008	51.2	LOS D	0	0.95	0.59	25.1
Approach		**503**	**0.0**	**0.528**	**19.3**	**LOS B**	**97**	**0.71**	**0.80**	**39.3**
Melrose Drive (e)										
4	L	6	0.0	0.007	12.7	LOS B	1	0.40	0.63	44.5
5	T	908	8.0	0.866	47.5	LOS D	122	1.00	1.03	26.0
6	R	80	2.5	0.179	37.1	LOS D	28	0.83	0.76	29.9
Approach		**995**	**7.5**	**0.866**	**46.5**	**LOS D**	**122**	**0.98**	**1.00**	**26.4**
Mercer Drive (n)										
7	L	176	5.1	0.190	9.1	LOS A	14	0.25	0.66	48.1
8	T	113	0.0	0.860	44.6	LOS D	137	1.00	1.02	27.0
9	R	976	5.0	0.860	52.6	LOS D	137	1.00	1.03	24.7
Approach		**1265**	**4.6**	**0.860**	**45.9**	**LOS D**	**137**	**0.90**	**0.97**	**26.7**
Melrose Drive (w)										
10	L	160	1.9	0.130	8.4	LOS A	8	0.19	0.65	48.7
11	T	532	8.1	0.507	36.2	LOS D	66	0.95	0.77	30.1
12	R	402	0.0	0.886	54.9	LOS D	148	1.00	1.06	24.0
Approach		**1094**	**4.2**	**0.886**	**39.0**	**LOS D**	**148**	**0.86**	**0.86**	**29.0**
All Vehicles		**3857**	**4.6**	**0.886**	**40.6**	**LOS D**	**148**	**0.88**	**0.93**	**28.4**

Weekend Lunchtime Peak Hour

Post Development (Year 2018) - Stages 1 2

Signalised - Fixed time **Cycle Time = 90 seconds**

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Taxi Holding Rank (s)										
1	L	301	0.0	0.299	13.2	LOS B	45	0.48	0.73	44.0
2	T	1	0.0	0.008	43.3	LOS D	0	0.95	0.56	27.4
3	R	1	0.0	0.008	51.2	LOS D	0	0.95	0.59	25.1
Approach		**303**	**0.0**	**0.299**	**13.5**	**LOS B**	**45**	**0.48**	**0.73**	**43.8**
Melrose Drive (e)										
4	L	4	0.0	0.004	9.9	LOS A	0	0.29	0.62	47.2
5	T	545	8.1	0.589	38.6	LOS D	70	0.97	0.79	29.1
6	R	117	1.7	0.302	40.7	LOS D	42	0.89	0.78	28.5
Approach		**667**	**6.9**	**0.589**	**38.8**	**LOS D**	**70**	**0.95**	**0.79**	**29.1**
Mercer Drive (n)										
7	L	175	5.1	0.168	8.6	LOS A	11	0.21	0.65	48.6
8	T	67	0.0	0.595	30.0	LOS C	97	0.91	0.78	32.9
9	R	862	5.0	0.594	37.9	LOS D	97	0.91	0.83	29.6
Approach		**1104**	**4.7**	**0.594**	**32.8**	**LOS C**	**97**	**0.80**	**0.80**	**31.7**
Melrose Drive (w)										
10	L	234	2.1	0.196	8.6	LOS A	14	0.22	0.65	48.6
11	T	319	8.2	0.344	36.7	LOS D	43	0.93	0.73	29.9
12	R	241	0.0	0.615	43.4	LOS D	80	0.96	0.83	27.4
Approach		**794**	**3.9**	**0.615**	**30.5**	**LOS C**	**80**	**0.73**	**0.74**	**32.7**
All Vehicles		**2868**	**4.5**	**0.615**	**31.5**	**LOS C**	**97**	**0.78**	**0.77**	**32.3**