Government of **Western Australia**
Development Assessment Panels

# Metro North-West Joint Development Assessment Panel Agenda

**Meeting Date and Time:** 16 October 2019, 1:00 PM
**Meeting Number:** MNWJDAP/270
**Meeting Venue:** Department of Planning, Lands and Heritage
140 William Street, Perth

## Attendance

### DAP Members

Ms Karen Hyde (Presiding Member)
Mr Clayton Higham (A/Deputy Presiding Member)
Mr Fred Zuideveld (Specialist Member)

Item 9.1
Ms Christine Hamilton-Prime (Local Government Member, City of Joondalup)
Ms Philippa Taylor (Local Government Member, City of Joondalup)

Item 9.2
Mr Giovanni Italiano (Local Government Member, City of Stirling)
Mr David Boothman (Local Government Member, City of Stirling)

### Officers in attendance

Item 9.1
Mr Chris Leigh (City of Joondalup)
Mr Ryan Bailey (City of Joondalup)
Mr Stevan Zecevic (City of Joondalup)

Item 9.2
Mr Stevan Rodic (City of Stirling)

### Minute Secretary

Ms Adele McMahon (DAP Secretariat)

### Applicants and Submitters

Item 9.1
Mr Julius Skinner (Thomson Greer)
Mr Darren Levey (Uloth and Associates)

Item 9.2
Mr Scott Nugent (Aurecon)
Mr Antony Johnstone (Aurecon)
Mr Sean Fairfoul (Rowe Group)

**Members of the Public / Media**

Nil

## 1. Declaration of Opening

The Presiding Member declares the meeting open and acknowledges the traditional owners and pay respects to Elders past and present of the land on which the meeting is being held.

## 2. Apologies

Ms Sheryl Chaffer (Deputy Presiding Member)

## 3. Members on Leave of Absence

Nil

## 4. Noting of Minutes

Signed minutes of previous meetings are available on the DAP website.

## 5. Declarations of Due Consideration

Any member who is not familiar with the substance of any report or other information provided for consideration at the DAP meeting must declare that fact before the meeting considers the matter.

## 6. Disclosure of Interests

| Member | Item | Nature of Interest |
|---|---|---|
| Ms Sheryl Chaffer | 9.2 | Indirect Pecuniary Interest -<br>Ms Chaffer's husband is employed by the builder of the project |

## 7. Deputations and Presentations

**7.1** Mr Julius Skinner (Thomson Greer) presenting in support of the application at 9.1. The presentation will address the appropriateness of increasing the practitioner numbers to 18.

**7.2** Mr Darren Levey (Uloth and Associates) presenting in support of the application at 9.1. The presentation will address parking requirements and the restriction on the number of practitioners.

**7.3** Mr Scott Nugent (AMP) presenting in support of the application at 9.2. The presentation will provide background of project, discussion with the PTA, funding and options.

**7.4** Mr Antony Johnstone (Aurecon) presenting in support of the application at 9.2. The presentation will provide background of public transport capacity, PTA's requirements, and the alternative option.

**7.5** Mr Sean Fairfoul (Rowe Group) presenting in support of the application at 9.2. The presentation will address the failure of the existing and proposed condition to pass the nexus test and options.

The City of Stirling and City of Joondalup may be provided with the opportunity to respond to questions of the panel, as invited by the Presiding Member.

## 8. Form 1 – Responsible Authority Reports – DAP Applications

Nil

## 9. Form 2 – Responsible Authority Reports – Amending or cancelling DAP development approval

**9.1**

| | |
|---|---|
| Property Location: | Lots 7 (22), 8 (24) and 9 (26) Monkhouse Way & Lots 5 (4) and 6 (2) Banks Avenue, Hillarys |
| Development Description: | Mixed use commercial development |
| Proposed Amendment: | Form 2.1 - Amendment to Condition 5 |
| Applicant: | Dynamic Planning and Developments |
| Owner: | Perpetual Corporate Trust Limited ACF The Hillarys Investment Trust |
| Responsible Authority: | City of Joondalup |
| DAP File No: | DAP/17/01267 |

**9.2**

| | |
|---|---|
| Property Location: | Lots 166 and 66 Davenport Street and Lot 11 (200) Karrinyup Road, Karrinyup |
| Development Description: | Mixed Use Development Expansion - Karrinyup Shopping Centre |
| Proposed Amendment: | Form 2.7 - Removal of Condition |
| Applicant: | Rowe Group |
| Owner: | AMP Capital Funds Management Ltd Scott Nugent |
| Responsible Authority: | City of Stirling |
| DAP File No: | DAP/15/00741 |

## 10. Appeals to the State Administrative Tribunal

| Current Applications | | |
|---|---|---|
| **LG Name** | **Property Location** | **Application Description** |
| City of Joondalup | Lot 96 & 97 (9 & 11) Davallia Road, Duncraig | 13 Multiple Dwellings |
| City of Joondalup | Lot 104 & 105 (8 & 10) Brechin Court, Duncraig | 3 Levels, 16 Apartments, Multiple Dwellings |
| City of Stirling | Lot 101 (191) Balcatta Road, Balcatta | Extension to the Existing Bunnings Warehouse |
| City of Stirling | Lot 90 (38) Geneff Street & Lot 89 (59) Hertha Road, Innaloo | Multiple Dwelling Development |

## 11. General Business / Meeting Closure

In accordance with Section 7.3 of the DAP Standing Orders 2017 only the Presiding Member may publicly comment on the operations or determinations of a DAP and other DAP members should not be approached to make comment.

Government of **Western Australia**
Development Assessment Panels

# Form 2 – Responsible Authority Report

(Regulation 17)

| | |
|---|---|
| **Property Location:** | Lots 7 (22), 8 (24) and 9 (26) Monkhouse Way and Lots 5 (4) and 6 (2) Banks Avenue, Hillarys |
| **Development Description:** | Mixed use commercial development |
| **Proposed Amendments:** | Amendment to Condition 5 of the previous DAP/17/01267 approval. |
| **DAP Name:** | Metro North-West JDAP |
| **Applicant:** | Dynamic Planning and Developments |
| **Owner:** | Perpetual Corporate Trust Limited |
| **Value of Amendment:** | Not applicable |
| **LG Reference:** | DA19/0620 |
| **Responsible Authority:** | City of Joondalup |
| **Authorising Officer:** | Dale Page, Director Planning and Community Development |
| **DAP File No:** | DAP/17/01267 |
| **Report Date:** | 3 October 2019 |
| **Application Received Date:** | 18 July 2019 |
| **Application Process Days:** | 90 days |
| **Attachment(s):** | 1: Location plan<br>2: Development plans<br>3: Shared Parking Analysis (including update dated 22 August 2019)<br>4: Responsible Authority Report dated 13 December 2018.<br>5: Determination Notice (DAP/17/01267) dated 20 December 2017 |

**Officer Recommendation:**

That the Metro North-West Joint Development Assessment Panel resolves to:

1. **Accept** that the DAP Application reference DAP/17/01267 as detailed on the DAP Form 2 dated 18 July 2019 is appropriate for consideration in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;

2. **Approve** the DAP Application reference DAP/17/01267 as detailed on the DAP Form 2 dated 18 July 2019 and accompanying plans in Attachment 2 in accordance with Clause 77 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015* and the provisions of the City of Joondalup *Local Planning Scheme No. 3*, for the proposed minor amendment to the approved mixed use commercial development at Lots 7 (22), 8 (24) and 9 (26) Monkhouse Way and Lots 5 (4) and 6 (2) Banks Avenue, Hillarys, subject to:

**Amended Condition:**

5. A maximum of sixteen (16) practitioners shall be permitted to operate from tenancies 1, 3, 4, 5, 6 and 7 at any given time under the approved land use of 'Medical Centre' and/or 'Consulting Rooms'.

**New Condition:**

25. A Practitioner Management Plan shall be submitted to and approved by the City prior to occupation of development. The practitioner management plan shall detail the number of practitioners allocated to tenancies 1, 3, 4, 5, 6 and 7 to ensure the maximum number of permitted practitioners is not exceeded onsite. Development shall be undertaken in accordance with the approved Practitioner Management Plan and must not be modified without first obtaining written consent from the City.

**New Advice Note:**

6. Further to the conditions regarding practitioner numbers and the Practitioner Management Plan, should the land use of tenancies 1, 3, 4, 5, 6 and 7 change from 'medical centre' or 'consulting rooms', the maximum number of practitioners permitted shall be reduced by the number of practitioners allocated to that tenancy under the Practitioner Management Plan to ensure the parking demand generated by the development site is not exceeded.

All other conditions and requirements detailed on the previous approval dated 20 December 2017 shall remain unless altered by this application.

**Details: outline of development application**

| | | |
|---|---|---|
| Zoning | MRS: | Urban |
| | LPS3: | Centre |
| Use Class: | | Medical Centre, Consulting Rooms, Restaurant/Café, Office, Recreation – Private and Child Care Premises |
| Strategy Policy: | | None applicable |
| Development Scheme: | | *Local Planning Scheme No. 3* |
| Lot Size: | | 4,254.7m² (combined) |
| Existing Land Use: | | Vacant |

The amendment proposes to modify condition 5 of the current development approval (DAP/17/01267) which was approved by the JDAP on 13 December 2017. Condition 5 of DAP/17/01267 currently states the following:

*"A maximum of two practitioners shall operate from each of tenancies 1, 3, 4, 5, and 6 and a maximum of five practitioners shall operate from tenancy 7 at any given time."* This equates to a maximum of 15 practitioners on the site.

The proposed modified condition requested by the applicant states the following:

*"A maximum of nineteen (19) medical practitioners shall be permitted to operate from the combined tenancies 1, 3, 4, 5, 6 and 7."*

However, following public consultation and the City's review of the Shared Parking Analysis, the applicant modified the proposal to request a maximum of 18 practitioners onsite, reducing the modified proposal by one practitioner.

The proposed modification to condition 5 will therefore result in an additional three practitioners onsite. In addition, the condition will restrict practitioners over the entire development rather than specific to each tenancy.

The development plans and the current development approval (DAP/17/01267) are provided as Attachments 2 and 5 respectively.

**Background:**

Lots 7 (22), 8 (24) and 9 (26) Monkhouse Way and Lots 5 (4) and 6 (2) Banks Avenue, Hillarys (subject site) previously comprised five residential dwellings; however, these have since been demolished. Construction works for the development of a mixed-use commercial development are currently being undertaken onsite. Prior to occupation of the development, the lots will require amalgamation into one singular lot.

The subject site is bound by Banks Avenue to the north, Marmion Avenue to the east, Monkhouse Way to the south and two residential lots (Lot 4 (6) Banks Avenue and Lot 10 (28) Monkhouse Way) to the west (Attachment 1 refers).

The subject site is zoned 'Urban' under the *Metropolitan Region Scheme* (MRS), 'Centre' under the City's *Local Planning Scheme No. 3* (LPS3) and is located within the Banks District of the Whitford Activity Centre Structure Plan (WACSP).

The current development approval (DAP/17/01267) for a mixed-use commercial development was granted by the Joint-Development Assessment Panel (JDAP) on 13 December 2017, subject to a number of conditions (Attachment 5 refers). In addition to this approval, a number of other minor development approvals have been granted by the City. These approved development applications include the following:

- DA18/0535 – Shop (change of use from medical centre to pharmacy) within Tenancy 7.
- DA18/0565 – Child Care Centre (change of use from office to child care centre) within Tenancy 10 and combine with Tenancy 11.
- DA18/0804 – Signage Strategy consistent with condition 11 of DAP/17/01267.
- DA19/0064 – Restaurant/café (additions) change to include alfresco dining within the plaza.

**Legislation and Policy:**

<u>Legislation</u>

- *Planning and Development Act 2005.*
- *Metropolitan Region Scheme* (MRS).
- *Planning and Development (Local Planning Schemes) Regulations 2015* (Regulations).
- *City of Joondalup Local Planning Scheme No.* 3 (LPS3).

<u>State Government Policies</u>

- State Planning Policy 4.2: Activity Centres for Perth and Peel.

<u>Local Policies</u>

- Notification of Approved Commercial Development Policy.

**Consultation:**

<u>Public Consultation</u>

Consultation was undertaken via letters to the 37 adjoining landowners and occupiers and information placed on the City's website for public viewing. Consultation was undertaken for 14 days in accordance with Schedule 2, Part 8, Clause 64 of the Regulations from 1 August 2019 until 15 August 2019.

Three submissions were received, all being objections to the proposed modification.

A summary of the concerns raised is outlined in the below table:

| No. | Issue Raised | Applicant response | City comment |
|---|---|---|---|
| 1 | The parking bay shortfall is not addressed and no additional parking bays are allocated for the extra four medical practitioners and their support staff. | The existing parking shortfall is not getting worse (as the parking is calculated on floor area) and the amount of bays provided is remaining the same. In addition, the revised Shared Parking Analysis illustrates that a total of 18 practitioners can be accommodated without impacting the available parking provision. | The City has reviewed the Shared Parking Analysis (Attachment 4 refers) and has concerns regarding the assumptions and reduction rates proposed by the applicant. The City is concerned that the increase in practitioner numbers will impact the locality in terms of traffic and parking. Refer to the officer comment section for further detail. |
| 2 | This modification will increase traffic and would escalate the anticipated problems. | As noted above and illustrated in the Shared Parking Analysis, the forecast traffic and parking can be accommodated within the parking available on site and the surrounding road network. | As stated above, the Shared Parking Analysis does not demonstrate to the satisfaction of the City that the site can accommodate an increase in the number of practitioners proposed by the applicant on site. |
| 3 | Surrounding landowners/occupants should not be prohibited from commenting on matters that would impact negatively on our living standards, civil liberties, property values, anti-social behaviour and safety. Our common law rights are being denied in this instance. | The surrounding landowners have been given the opportunity to comment through the advertising period. | Those aspects raised by the submitter are not valid planning considerations which can be addressed through the planning approval process. Some of these concerns will be raised and addressed under separate legislation and/or by other public authorities. |
| 4 | The modification will have a direct impact on driveways being denied access due to illegal parking and spill over of cars onto the street. | As noted in the Shared Parking Analysis, the parking demand generated by the development will be catered for within the confines of the proposed development and the available street parking, as | Any illegal parking on crossovers or within the verge can be addressed by the City's Ranger Services on a case-by-case basis should this occur in the future. It is noted that should the |

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|---|---|---|---|
| | | such there will be no vehicles blocking any residential driveways. | provision of parking be compromised through the increase in practitioner numbers, customers and staff may have to park offsite or within the verge due to a lack of parking facilities onsite/on-street. |
| 5 | The waste handling area, waste containment and collection clearly needs to be revised so we don't have to ensure waste trucks servicing these premises on a daily basis, with issues such as noise, air pollution and congestion impacting surrounding landowners/occupants. | The waste handling area, collection and management are not the subject of this application and have been dealt with separately. | Waste handling and the bin enclosure onsite does not form part of this application. It is noted that condition 10 of the current planning approval requires the submission and approval of a refuse management plan prior to occupation of the development. |
| 6 | The additional practitioners are not required due to the number of medical centres and other medical practitioners currently operating in the area. | Commercial competition is not a relevant planning consideration. | This is not a valid planning consideration. |
| 7 | It is unacceptable that proposal is being modified near completion of the works onsite. | The modification relates to the operational side of the development, no structural changes or works are being proposed. Similar modifications are addressed through change of use planning applications relating to existing developments all the time. | As advised by the applicant, no structural modifications to the development form part of this application. However, the proposed modification to practitioner numbers needs to be supported by the approved parking facilities onsite. |
| 8 | The passing traffic on Solander Road and Monkhouse Way is to the detriment of the community as access via Banks Avenue is not possible. | Access from Banks Avenue has been approved and will be the primary entry point for the development. Further to this access and traffic issues have already been resolved through a previous planning application. | The vehicle access point from Banks Avenue does not form part of this application. However, the City is aware that should parking and traffic not be managed appropriately, congestion and parking issues could impact the surrounding community. |
| 9 | Public transportation patronage is on a decline and it would be wrong to rely on public transport to justify and allow parking shortfalls. In addition, | No data on the public transport usage in the area has been provided to support this statement. In addition it is common practice right across Perth | The City accepts justification relating the proximity and frequency of public transport and accessibility to other forms of transport, |

| | | | |
|---|---|---|---|
| | persons are unlikely to use bicycles or public transport to visit the medical centre or child care centre due to the nature of uses. | to rely on public transport and bicycles as an alternative means of transport which in turn reduces the parking demand. | however this needs to be reasonably justified in the context of each application/site. It is noted that public transport and other forms of transport are less likely to be used for certain land uses over others, dependent on the operation of the business and the users of their services/facilities. This has been factored in when considering the acceptability of the increase in practitioner numbers onsite. |
| 10 | At four bays per practitioner, this equates to a parking bay requirement of 76 bays, which is almost the number of bays set aside for the entire centre. Most GP's see between 4-6 patients per hour and therefore the parking provided is insufficient. | The applicable parking requirement for the medical centre is 2.7 bays per 100sqm of NLA area. The proposed modification does not increase the parking requirement and the Shared Parking Analysis demonstrates that the available parking bays are sufficient to accommodate the revised maximum number of practitioners (18). | The City's Whitford Activity Centre Structure Plan (WACSP) includes a standardised parking requirement for non-residential uses within the Banks Avenue precinct. The parking ratio of 2.7 bays per 100sqm NLA has been calculated by the City taking into account the reciprocal nature of uses for an activity centre. Further reduction of parking requires detailed consideration as a concession in the parking requirements has already been applied under the WACSP. The provided Shared Parking Analysis does not address the concerns of the City in respect to parking. |
| 11 | As demonstrated on Health Engine (online GP booking service), GP's see an average of 40 patients per day, which equates to a total number of 160 persons for four practitioners, or 760 patients per day for 19 practitioners which is more than what the centre can handle. | As noted previously, the Shared Parking Analysis demonstrates that the centre is able to accommodate the revised maximum number of practitioners (18). | Please refer to the City's comment to item 10 above. |

Consultation with other Agencies or Consultants

None applicable.

**Planning Assessment:**

In accordance with the WACSP, the Banks Avenue Precinct includes a standard non-residential parking requirement of 2.7 bays per 100m² per net lettable area (NLA). As the overall amount of NLA is not changing under the proposed modification, the technical parking requirement under WACSP is not being altered.

It is noted that the JDAP previously approved a car parking shortfall on-site under DA1P/17/01267 of 13 bays, and therefore this shortfall needs to be reconsidered in the context of the revised proposal.

**Officer Comments:**

Parking shortfall

On 13 December 2017, the JDAP considered a development application (DAP/17/01267) for a mixed-use commercial centre at the subject site. A copy of the City's Responsible Authority Report (RAR) is included at Attachment 4 for reference.

In accordance with general standard A4 of the City's WACSP, car parking in the Banks Precinct is required at a rate of 2.7 bays per 100m² NLA for non-residential land uses. Based on the proposed NLA of 3,703m², a total of 100 bays are required on site.

The approved development includes a total of 87 car parking bays on site, resulting in a shortfall of 13 bays.

The City and JDAP supported the proposed car parking shortfall based on the following:

- A total of eight on-street car parking bays were proposed within the Monkhouse Way verge adjacent to the subject site. These bays will assist in reducing the effective shortfall to five bays.
- The subject site is in close proximity to a high frequency bus route along Marmion Avenue and therefore is easily accessible by public transport.
- It is anticipated that there will be some reciprocal use of car parking onsite, and tenancies/land uses will likely have differing peak-times for parking due to the nature of their operation.

In its report on the original proposal the City highlighted the need to appropriately manage practitioner numbers to ensure an adequate amount of parking is available for the development. In accordance with the City's former *District Planning Scheme No. 2*, and current *Local Planning Scheme No. 3* (LPS3), the land use 'medical centre' requires five parking bays per practitioner. Under the City's WACSP, the car parking requirements for this use (and all non-residential uses) is based on floor area and therefore the number of practitioners is not taken into account as part of the car parking calculation.

There is however a practical parking implication to not managing practitioner numbers as the actual demand for parking will increase when considering support staff and patients associated with each practitioner. As a result, a condition was included on the planning

approval which limited the number of practitioners on site to 15 to assist with supporting the shortfall proposed in the original application.

By increasing the number of practitioners permitted onsite as proposed as part of the amended application, the applicant is increasing the potential parking demand for the development without altering the technical parking shortfall under the City's WACSP. The increase in practitioner numbers does however potentially impact the reciprocal use of car parking on the site which was a reason to support the parking shortfall approved as part of the original application.

Shared Parking Analysis

The applicant has prepared a Shared Parking Analysis to support the additional practitioner numbers proposed (Attachment 3 refers).

To analyse this potential impact of increasing the number of practitioners the Shared Parking Analysis:

- Calculates the initial parking requirements for each individual land use, as would be required for a stand-alone development. As the Banks District includes a single parking ratio for non-residential land uses, the Shared Parking Analysis has instead adopted the individual parking ratios as per the City's *Local Planning Scheme No. 3* (LPS3) and associated policies to better represent the individual parking demand associated with each land use.
- Applies reductions for each land use to account for public transport availability and the provision of additional cycling end-of-trip facilities. The Shared Parking Analysis has adopted a reduction rate of 72% using the City of Vincent's former *Parking and Access Local Planning Policy* as a guide to set the appropriate rate of reduction.
- Analyses the fluctuation of parking for each land use throughout the day and determines the combined 'shared parking' demand for the overall development.
- Applies further reductions to account for linked trips between different land uses.

The City has reviewed the Shared Parking Analysis and the assumptions which underpin its findings and has concerns regarding the adopted reduction rate (72%).

The City of Vincent policy used to guide the reduction rate was revised in April 2018 and the reduction rates have decreased under the new version of this policy. Further, the parking and traffic context within the City of Vincent – being an inner-city local government – is not considered comparable to the context of the subject site.

The City therefore does not support a reduction factor of 72% as suggested by the applicant. Instead, the City has considered a reduction rate based on *AustRoads, Guide to Traffic Management Part 11: Parking* and the City of Stirling's *Parking and Access Policy Manual 6.7* to assist in assessing the potential parking demand created by additional practitioners. Both are considered to be more relevant examples in the context of this site. In reviewing these documents and the information provided by the applicant, the City is of the view that a reduction factor of 85% (or 15% less than the LPS3 parking standard) is more appropriate in this instance.

Increasing the number of practitioners on-site to 18 as proposed results in a further parking shortfall when applying the more appropriate reduction rate of 85%. An increase in the shortfall beyond that already approved is not considered acceptable for the City.

A total number of 16 practitioners (ie. one more than currently approved) would result in no further parking shortfall when using the reduction rate of 85%.

As a result, the City recommends that the total number of practitioners permitted on site at any given time is limited to a maximum of 16 in lieu of the 18 practitioners proposed by the applicant so as not to create any further parking shortfall.

Allocation of practitioners

In addition to the increase in practitioner numbers, the applicant has also proposed that condition 5 is modified to avoid allocating specific practitioner numbers per tenancy.

This modification to the condition will provide greater flexibility for the developer to allocate practitioner numbers between tenancies depending on the specific operations of each tenant/business.

Under the current condition, tenancies 1, 3, 4, 5 and 6 are permitted a maximum of two practitioners each and tenancy 7 is permitted a total of five (equating to a total of 15 practitioners over the entire site). This condition was imposed to control and manage the number of practitioners onsite, and where each practitioner can be allocated in the context of the medical centre tenancies approved.

Should the condition be altered to remove reference to specific tenancies, the management and overall compliance with the total practitioner numbers between multiple tenancies may become difficult to achieve.

It is recommended that should the wording of condition 5 be modified, that an additional condition is included which requires a Practitioner Management Plan be submitted to, and approved, by the City prior to occupation of the development. This management plan will need to detail the allocation of practitioners per tenancy to ensure the total number is not exceeded onsite, whilst providing flexibility in the allocation of practitioners between tenancies. Any reallocation of practitioner numbers will require amendment to the management plan, which is subject to approval by the City. This will avoid the need for an amended development application should a tenant change and the operations in relation to practitioner numbers is altered.

A new advice note is also recommended to clarify that should one of the tenancies apply for a change of use, the equivalent number of allocated practitioners should be removed to avoid exceeding parking demands onsite.

As a result, the City recommends a new condition of approval and advice note to address the allocation of practitioners onsite.

**Options/Alternatives:**

Not applicable.

**Council Recommendation:**

Not applicable.

**Conclusion:**

The proposed Shared Parking Analysis provided by the applicant, specifically the reduction factor proposed, is not supported by the City. Based on the City's review and parking

calculations, a total of 18 practitioners onsite would create a parking shortfall for those bays available (onsite and on-street). Using the analysis methodology, the City recommends that condition 5 is modified so a maximum of 16 practitioners is permitted onsite based on the reduction factor of 85% of the City's LPS3 parking standards. Based on the City's calculations, this would ensure a shortfall in parking is unlikely to be experienced as part of the development.

In addition, the allocation of practitioners needs to be controlled to avoid issues in management between multiple tenancies. It is therefore recommended that a new condition is included which requires a practitioner management plan to provide flexibility in the allocation between tenancies whilst still being documented to assist with compliance.

As a result, the City recommends that the JDAP approve the application subject to conditions of approval.

City of Joondalup

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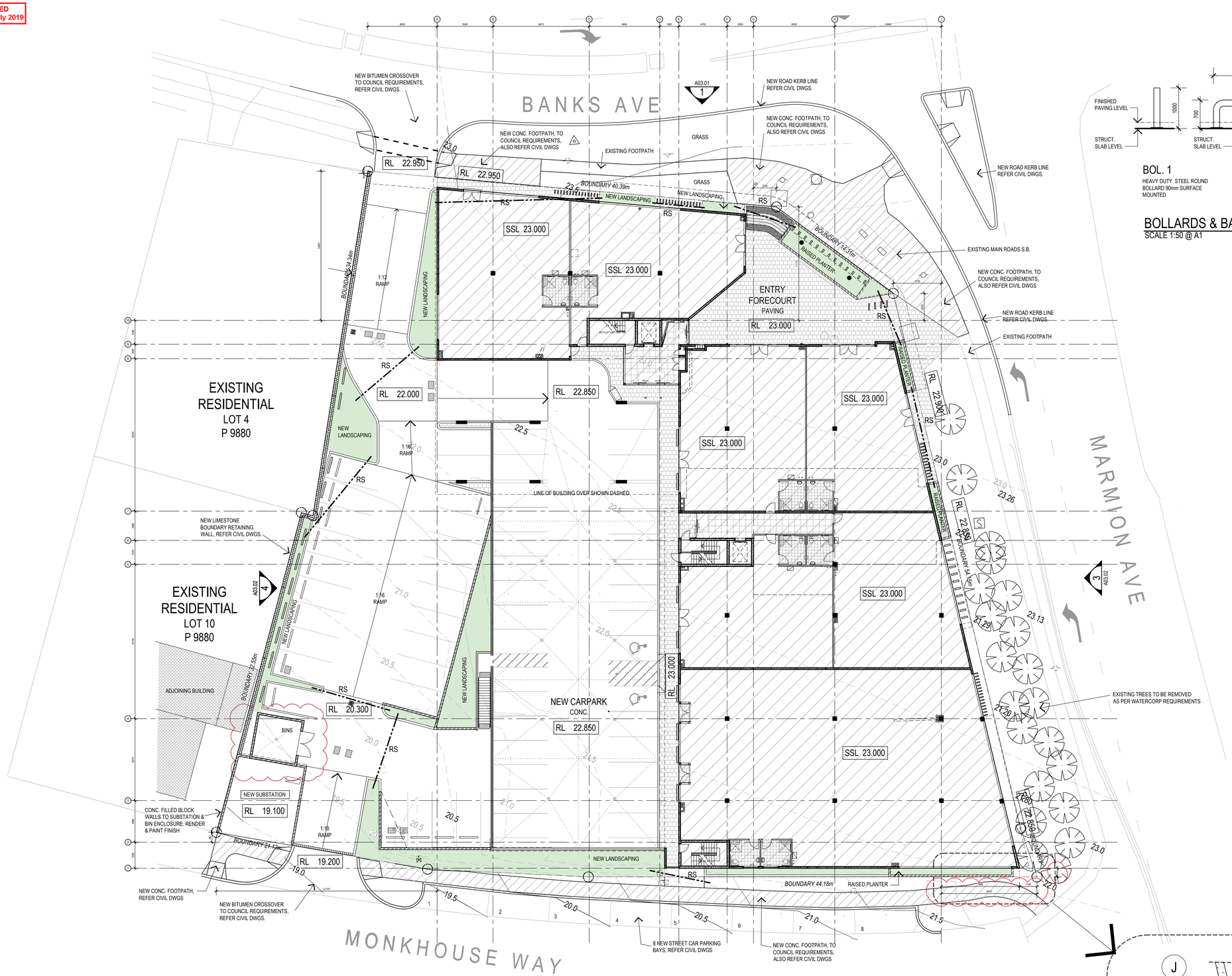
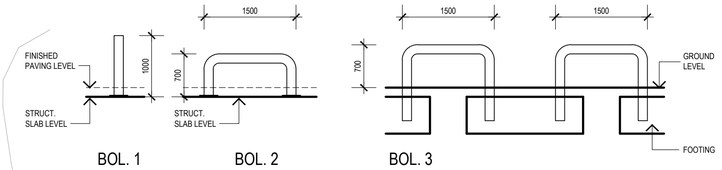
banks_monkhouse-23102017

AMENDED
DATE: 22 July 2019

**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.




## PROPOSED SITE PLAN
SCALE 1:200 @ A1



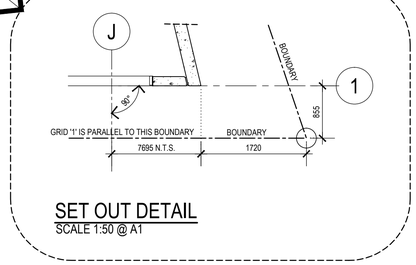

**BOL. 1**
HEAVY DUTY STEEL ROUND BOLLARD 90mm SURFACE MOUNTED

**BOL. 2**
U-BAR HEAVY DUTY 1.5M SURFACE MOUNTED

**BOL. 3**
U-BAR HEAVY DUTY 1.5M BELOW GROUND

## BOLLARDS & BARRIERS
SCALE 1:50 @ A1

'ADVANCED GROUP' OR APPROVED SIMILAR HOT DIP GAL. STEEL BOLLARDS. ALSO REFER CIVIL DWGS.
BOL. 2 & 3 TO BE DESIGNED BY CIVIL/STRUCT. ENGINEER AS VEHICLE BARRIERS FOR THE LOADING REQUIREMENTS OF AS/NZ 1170.1




## SET OUT DETAIL
SCALE 1:50 @ A1

### SITE INFORMATION

PROPOSED CAR BAYS 88

NOTES

1. ON SITE MAKE SAFE ALL EXISTING ELECTRICAL SERVICES / MECHANICAL SERVICES / FIRE SERVICES PRIOR TO COMMENCEMENT OF WORKS.
2. MAINTAIN AND PROTECT ANY EXISTING STRUCTURES AND FINISHES THAT ARE NOT PART OF THE WORK. MAKE GOOD ANY DAMAGES.
3. PROVIDE WARNING SIGNS REQUIRED TO PROTECT TENANTS AND THE PUBLIC FROM ANY CONSTRUCTION RELATED DANGER.
4. PROTECT EXISTING TREES TO BE RETAINED; REFER TO LANDSCAPE PLAN & REPORT FOR FURTHER DETAIL
5. REFER TO EARTHWORKS PLAN FOR DETAILS OF CARPARK WORKS

RS — NOM. 50Ø RETICULATION SLEEVE

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| 3 | 21/11/18 | BINSTORE & GLAZING REVISION | CS | CD |
| 2 | 13/11/18 | SITE SETOUT DIMS ADDED | LJ | CD |
| 1 | 21/09/18 | AGEM & BCA CONS. CHANGES | JD | LJ |
| 0 | 03/08/18 | ISSUED FOR CONSTRUCTION | JD | LG |

**FOR CONSTRUCTION**


dmg ARCHITECTURE
DESIGN MANAGEMENT GROUP level 2 1008 hay street perth 6000
telephone +61 8 9212 8888 | facsimile +61 8 9212 8822
info@dmgaustralia.com.au | www.dmgaustralia.com.au


PROJECT

**HILLARYS PLAZA**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE

PROPOSED SITE PLAN

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:200 @ A1 | JD | LG |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A01.02** | **3** |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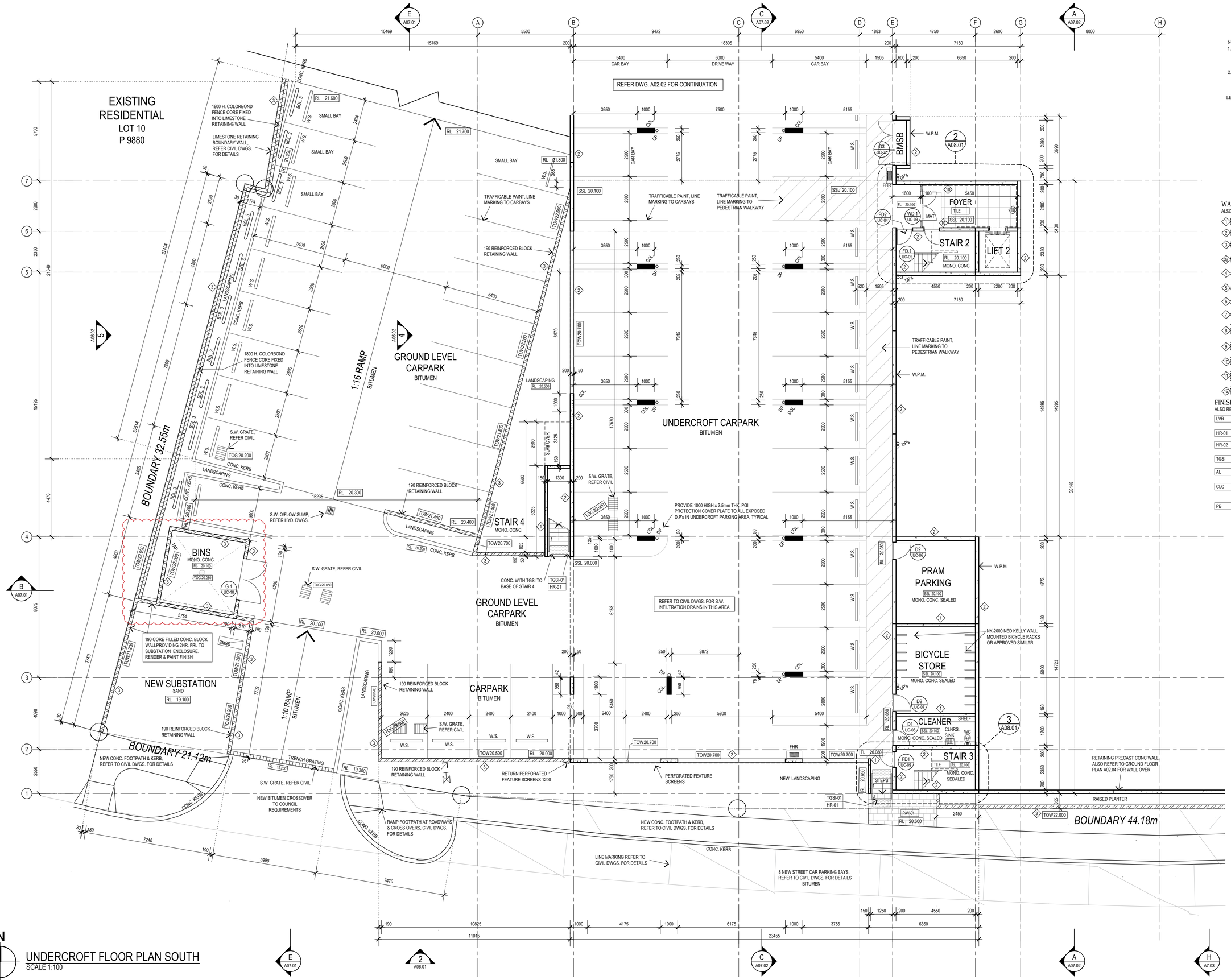


**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.

NOTES:

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2. REFER TO EXTERNAL FINISHES SCHEDULE FOR MATERIAL SELECTIONS IN DETAIL.

LEGEND

| | |
|---|---|
| SSL 26.000 | STRUCTURAL SLAB LEVEL |
| FL 26.000 | FINISHED FLOOR LEVEL |
| TOW 26.000 | TOP OF WALL LEVEL |
| TOG 26.000 | TOP GRATE OF LEVEL |
| | STORM WATER DRAIN |
| BOL. 1 | 150Ø HDG. 1200 H. BOLLARD. |
| BOL. 2 & 3 | 150Ø x1600 L. HDG. VEHICLE BARRIER RAIL. REFER DWG. A1.02 |
| W.S. | 100mm H. PROPRIETARY CONC. WHEEL STOP. |
| W.W. | WATER & WASTE LOCATION, REFER HYD. DWGS. (FOR FUTURE TEA PREP's BY TENNANT) |

D.01 / T1.1 — DOOR TYPE / OPENING REFERENCE

WALLS TYPES :

ALSO REFER WALL LEGEND - DWG. A09.01

| | |
|---|---|
| 1 | 150mm PRECAST CONCRETE-PAINT FINISH EXT. |
| 2 | 200mm PRECAST CONCRETE-PAINT FINISH EXT. |
| 3 | 190mm REINFORCED CONC. BLOCKWORK RENDER FINISHED BOTH SIDES-PAINT FINISH |
| 3a | 190mm REINFORCED CONC. BLOCKWORK, STONE CLAD. |
| 4 | 100mm STUD WALL (13 GYPROCK+75 STUD+13 P/BOARD)-PAINT FINISH |
| 5 | 100mm STUD WALL TO DUCTS (2x13 GYPROCK+75 STUD)-PAINT FINISH |
| 6 | 140mm STUD WALL F.R.L. -/180/180 (2x16 FYRECHECK+75 STUD+2x13 FYRCHECK)-PAINT FINISH |
| 7 | 100mm STUD WALL F.R.L. -/180/180-PAINT FINISH |
| 8 | ' COMTEXT' FLUSH FINISHED FIBRE CEMENT CLADDING FRAMED OFF PRECAST PANEL WALL-ACROTEX FINISH |
| 9 | 'DECOCLAD' CLADDING ON TOP HATS FIXED TO PRECAST PANEL WALL |
| 10 | PRECAST PANEL WALL WITH FLUSHED PLASTERBOARD LINING INTERNALLY-PAINT FINISHED INT. & EXT. |
| 11 | 'DECOCLAD' CLADDING EXTERNALLY+ CONC. PRECAST PANEL + FLUSHED PLASTERBOARD LINING INTERNALLY |
| 12 | STONE CLADDING TO PRECAST CONC. PANEL |

FINISHES :

ALSO REFER FINISHES SCHEDULE

| | | | |
|---|---|---|---|
| LVR | LOUVRE PANEL REFERENCE | FC | FLUSHED FIBRE CEMENT CLADDING (ACRATEX HIGH BUILD FINISH) |
| HR-01 | 50Ø S.S. HAND RAIL | CONC | CONCRETE (PAINT FINISHED) |
| HR-02 | 50Ø H.D.G. HAND RAIL-PAINTED | REN | RENDER (PAINT FINISHED) |
| TGSI | TACTILE GROUND SURFACE INDICATORS . | ST | STONE CLADDING |
| AL | ALUMINIUM COMPOSITE PANEL 'DECOCLAD' OR APPROVED SIMILAR EXTERNAL LINING | PAV | PAVING |
| CLC | | TILE | CERAMIC TILE |
| PB | FLUSHED PLASTERBOARD | BAL-01 | 1800 H. 'Grß' GLAZED / POWDERCOATED FENCING |
| | | BAL-02 | 1000 H. 'Grß' GLAZED / POWDERCOATED BALUSTRADE |
| | | BAL-03 | 50Ø HDG. & PAINTED STEEL BALUSTR WITH BALULSTERS AT 300 MAX. CTRS |

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| 1 | 21/11/18 | BIN STORE REVISION | CS | CD |
| 0 | 03/08/18 | ISSUED FOR CONSTRUCTION | JD | LG |

## FOR CONSTRUCTION

dmg ARCHITECTURE
DESIGN MANAGEMENT GROUP level 2 1008 hay street perth 6000
telephone +61 8 9212 8888 | facsimile +61 8 9212 8822
info@dmgaustralia.com.au | www.dmgaustralia.com.au

PROJECT

**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE

UNDERCROFT FLOOR PLAN SOUTH

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:100 @ A1 | JD | LG |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A02.01** | **1** |

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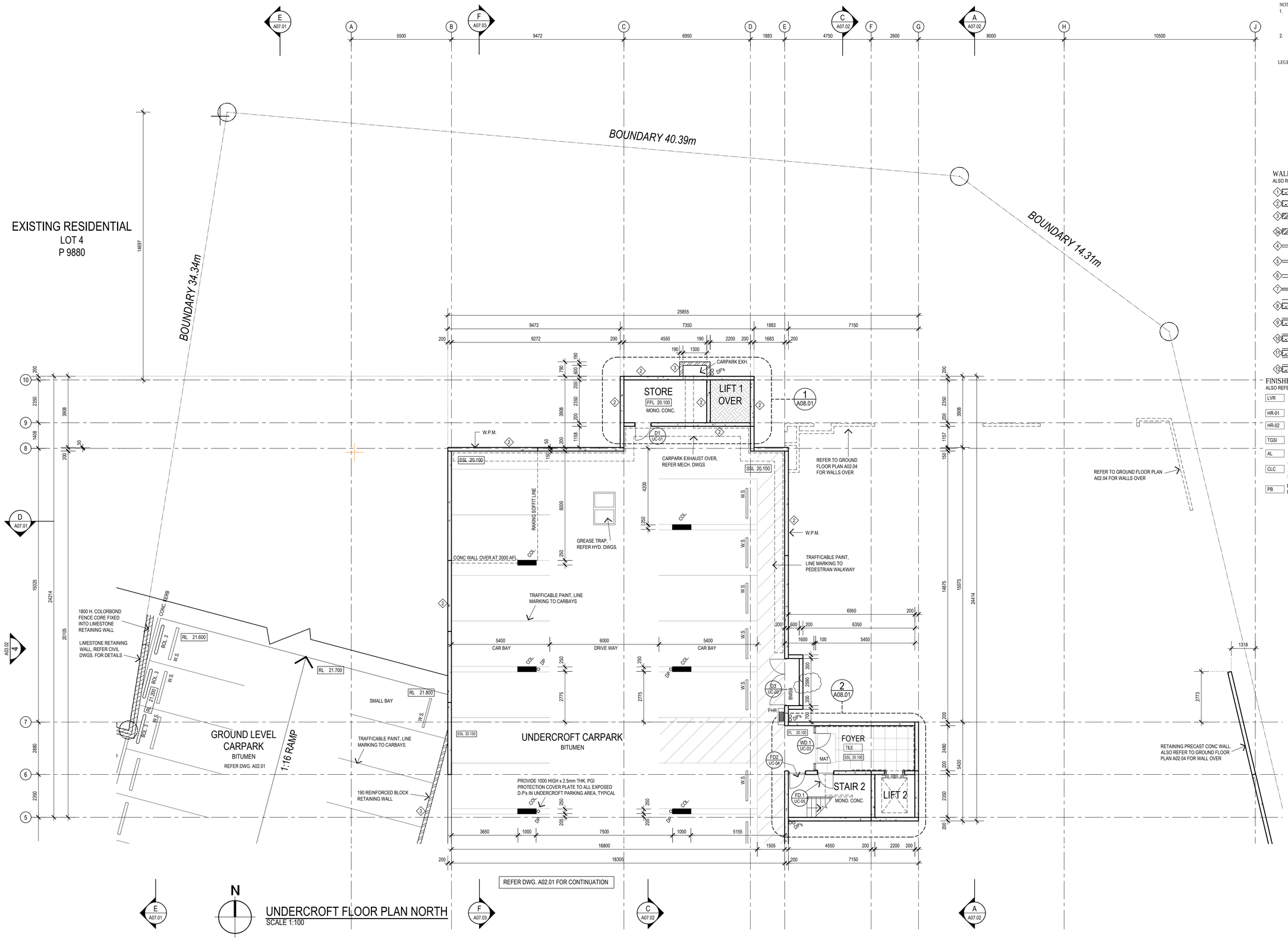
N

UNDERCROFT FLOOR PLAN SOUTH
SCALE 1:100




UNDERCROFT FLOOR PLAN NORTH
SCALE 1:100

**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.

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2. REFER TO EXTERNAL FINISHES SCHEDULE FOR MATERIAL SELECTIONS IN DETAIL.

LEGEND

| | |
|---|---|
| SSL 26.000 | STRUCTURAL SLAB LEVEL |
| FL 26.000 | FINISHED FLOOR LEVEL |
| TOW 26.000 | TOP OF WALL LEVEL |
| TOG 26.000 | TOP GRATE OF LEVEL |
| | STORM WATER DRAIN |
| BOL. 1 | 150Ø HDG. 1200 H. BOLLARD. |
| BOL. 2 & 3 | 150Ø x1600 L. HDG. VEHICLE BARRIER RAIL. REFER DWG. A1.02 |
| W.S. | 100mm H. PROPRIETARY CONC. WHEEL STOP. |
| W.W. | WATER & WASTE LOCATION, REFER HYD. DWGS. (FOR FUTURE TEA PREP's BY TENNANT) |

D.01 / T1.1 — DOOR TYPE / OPENING REFERENCE

WALLS TYPES :
ALSO REFER WALL LEGEND - DWG. A09.01

| | |
|---|---|
| 1 | 150mm PRECAST CONCRETE-PAINT FINISH EXT. |
| 2 | 200mm PRECAST CONCRETE-PAINT FINISH EXT. |
| 3 | 190mm REINFORCED CONC. BLOCKWORK RENDER FINISHED BOTH SIDES-PAINT FINISH |
| 3a | 190mm REINFORCED CONC. BLOCKWORK, STONE CLAD. |
| 4 | 100mm STUD WALL (13 GYPROCK+75 STUD+13 P/BOARD)-PAINT FINISH |
| 5 | 100mm STUD WALL TO DUCTS (2x13 GYPROCK+75 STUD)-PAINT FINISH |
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| 7 | 100mm STUD WALL F.R.L. -/180/180-PAINT FINISH |
| 8 | ' COMTEXT' FLUSH FINISHED FIBRE CEMENT CLADDING FRAMED OFF PRECAST PANEL WALL-ACROTEX FINISH |
| 9 | 'DECOCLAD' CLADDING ON TOP HATS FIXED TO PRECAST PANEL WALL |
| 10 | PRECAST PANEL WALL WITH FLUSHED PLASTERBOARD LINING INTERNALLY-PAINT FINISHED INT. & EXT. |
| 11 | 'DECOCLAD' CLADDING EXTERNALLY+ CONC. PRECAST PANEL + FLUSHED PLASTERBOARD LINING INTERNALLY |
| 12 | STONE CLADDING TO PRECAST CONC. PANEL |

FINISHES :
ALSO REFER FINISHES SCHEDULE

| | |
|---|---|
| LVR | LOUVRE PANEL REFERENCE |
| HR-01 | 50Ø S.S. HAND RAIL |
| HR-02 | 50Ø H.D.G. HAND RAIL-PAINTED |
| TGSI | TACTILE GROUND SURFACE INDICATORS . |
| AL | ALUMINIUM COMPOSITE PANEL |
| CLC | 'DECOCLAD' OR APPROVED SIMILAR EXTERNAL LINING |
| PB | FLUSHED PLASTERBOARD |
| FC | FLUSHED FIBRE CEMENT CLADDING (ACRATEX HIGH BUILD FINISH) |
| CONC | CONCRETE (PAINT FINISHED) |
| REN | RENDER (PAINT FINISHED) |
| ST | STONE CLADDING |
| PAV | PAVING |
| TILE | CERAMIC TILE |
| BAL-01 | 1800 H. 'G/6' GLAZED / POWDERCOATED FENCING |
| BAL-02 | 1000 H. 'G/6' GLAZED / POWDERCOATED BALUSTRADE |
| BAL-03 | 50Ø HDG. & PAINTED STEEL BALUSTRA WITH BALULSTERS AT 300 MAX. CTRS. |

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| 1 | 16/10/18 | DIMENSION CORRECTION | JD | JD |
| 0 | 03/08/18 | ISSUED FOR CONSTRUCTION | JD | LG |

## FOR CONSTRUCTION

dmg ARCHITECTURE
DESIGN MANAGEMENT GROUP level 2 1008 hay street perth 6000
telephone +61 8 9212 8888 | facsimile +61 8 9212 8822
info@dmgaustralia.com.au | www.dmgaustralia.com.au

PROJECT
**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE
UNDERCROFT FLOOR PLAN NORTH

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:100 @ A1 | JD | LG |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A02.02** | **1** |

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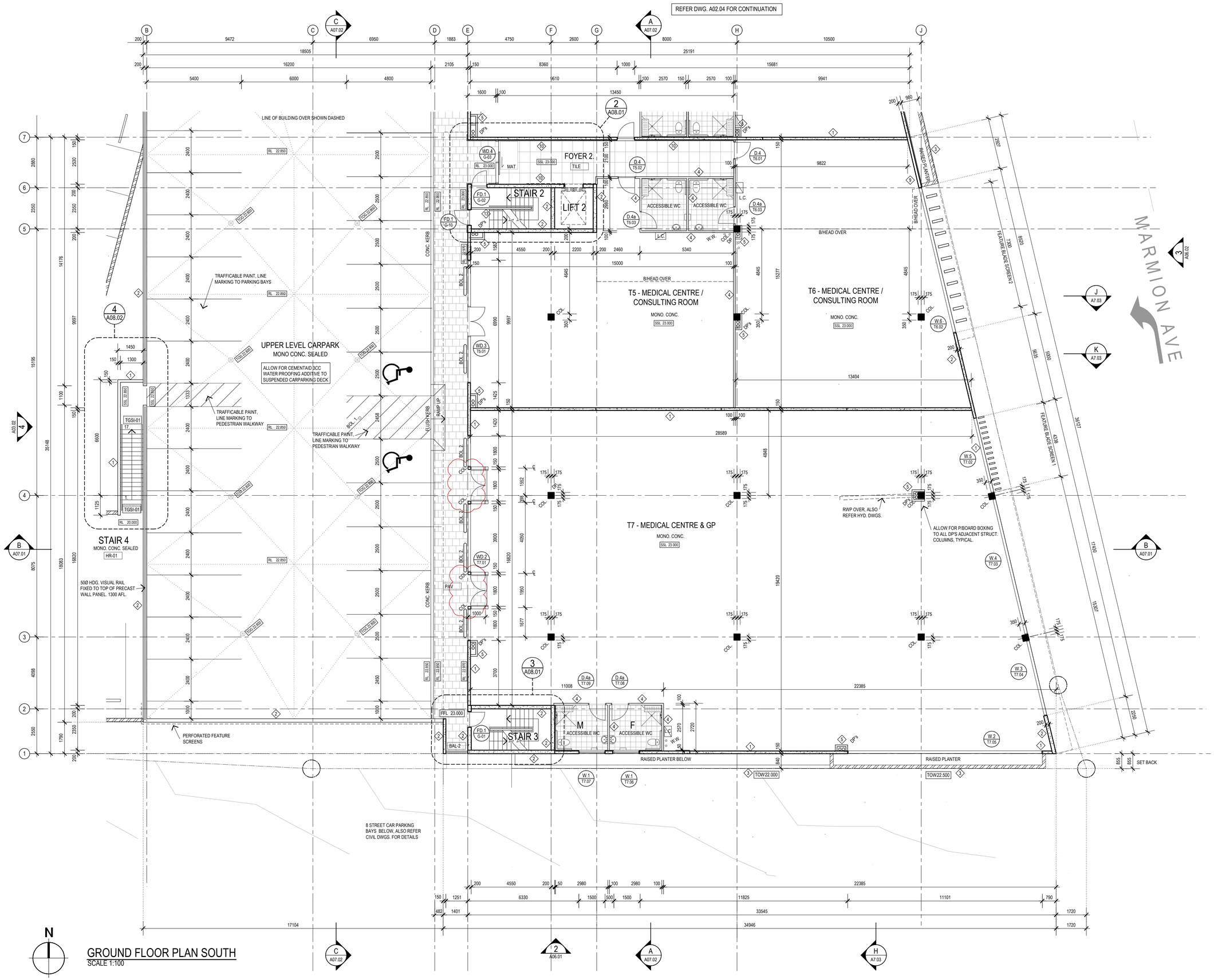


## GROUND FLOOR PLAN SOUTH

SCALE 1:100

**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.

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2. REFER TO EXTERNAL FINISHES SCHEDULE FOR MATERIAL SELECTIONS IN DETAIL.

LEGEND

| | |
|---|---|
| SSL 26.000 | STRUCTURAL SLAB LEVEL |
| FL 26.000 | FINISHED FLOOR LEVEL |
| TOW 26.000 | TOP OF WALL LEVEL |
| TOG 26.000 | TOP GRATE OF LEVEL |
| | STORM WATER DRAIN |
| BOL.1 | 150Ø HDG. 1200 H. BOLLARD. |
| BOL. 2 & 3 | 150Ø x1600 L. HDG. VEHICLE BARRIER RAIL. REFER DWG. A1.02 |
| W.S. | 100mm H. PROPRIETARY CONC. WHEEL STOP. |
| W.W. | WATER & WASTE LOCATION, REFER HYD. DWGS. (FOR FUTURE TEA PREP's BY TENNANT) |
| D.01 / T1.1 | DOOR TYPE / OPENING REFERENCE |

WALLS TYPES :

ALSO REFER WALL LEGEND - DWG. A09.01

| | |
|---|---|
| 1 | 150mm PRECAST CONCRETE-PAINT FINISH EXT. |
| 2 | 200mm PRECAST CONCRETE-PAINT FINISH EXT. |
| 3 | 190mm REINFORCED CONC. BLOCKWORK RENDER FINISHED BOTH SIDES-PAINT FINISH |
| 3a | 190mm REINFORCED CONC. BLOCKWORK, STONE CLAD. |
| 4 | 100mm STUD WALL (13 GYPROCK+75 STUD+13 P/BOARD)-PAINT FINISH |
| 5 | 100mm STUD WALL TO DUCTS (2x13 GYPROCK+75 STUD)-PAINT FINISH |
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| 7 | 100mm STUD WALL F.R.L. -/180/180-PAINT FINISH |
| 8 | ' COMTEXT' FLUSH FINISHED FIBRE CEMENT CLADDING FRAMED OFF PRECAST PANEL WALL-ACROTEX FINISH |
| 9 | 'DECOCLAD' CLADDING ON TOP HATS FIXED TO PRECAST PANEL WALL |
| 10 | PRECAST PANEL WALL WITH FLUSHED PLASTERBOARD LINING INTERNALLY-PAINT FINISHED INT. & EXT. |
| 11 | 'DECOCLAD' CLADDING EXTERNALLY+ CONC. PRECAST PANEL + FLUSHED PLASTERBOARD LINING INTERNALLY |
| 12 | STONE CLADDING TO PRECAST CONC. PANEL |

FINISHES :

ALSO REFER FINISHES SCHEDULE

| | | | |
|---|---|---|---|
| LVR | LOUVRE PANEL REFERENCE | FC | FLUSHED FIBRE CEMENT CLADDING (ACRATEX HIGH BUILD FINISH) |
| HR-01 | 50Ø S.S. HAND RAIL | CONC | CONCRETE (PAINT FINISHED) |
| HR-02 | 50Ø H.D.G. HAND RAIL-PAINTED | REN | RENDER (PAINT FINISHED) |
| TGSI | TACTILE GROUND SURFACE INDICATORS . | ST | STONE CLADDING |
| AL | ALUMINIUM COMPOSITE PANEL | PAV | PAVING |
| CLC | 'DECOCLAD' OR APPROVED SIMILAR EXTERNAL LINING | TILE | CERAMIC TILE |
| PB | FLUSHED PLASTERBOARD | BAL-01 | 1800 H. 'Gr8' GLAZED / POWDERCOATED FENCING |
| | | BAL-02 | 1000 H. 'Gr8' GLAZED / POWDERCOATED BALUSTRADE |
| | | BAL-03 | 50Ø HDG. & PAINTED STEEL BALUSTR WITH BALULSTERS AT 300 MAX. CTRS |

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| 2 | 21/11/18 | STRUCTURAL UPDATE | CS | CD |
| 1 | 21/09/18 | AGEM & BCA CON. CHANGES | JD | LJ |
| 0 | 03/08/18 | ISSUED FOR CONSTRUCTION | JD | LG |

# FOR CONSTRUCTION


dmg ARCHITECTURE

**DESIGN MANAGEMENT GROUP** level 2 1008 hay street perth 6000
**telephone +61 8 9212 8888** | facsimile +61 8 9212 8822
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PROJECT

**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE

GROUND FLOOR PLAN SOUTH

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:100 @ A1 | JD | LG |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A02.03** | **2** |


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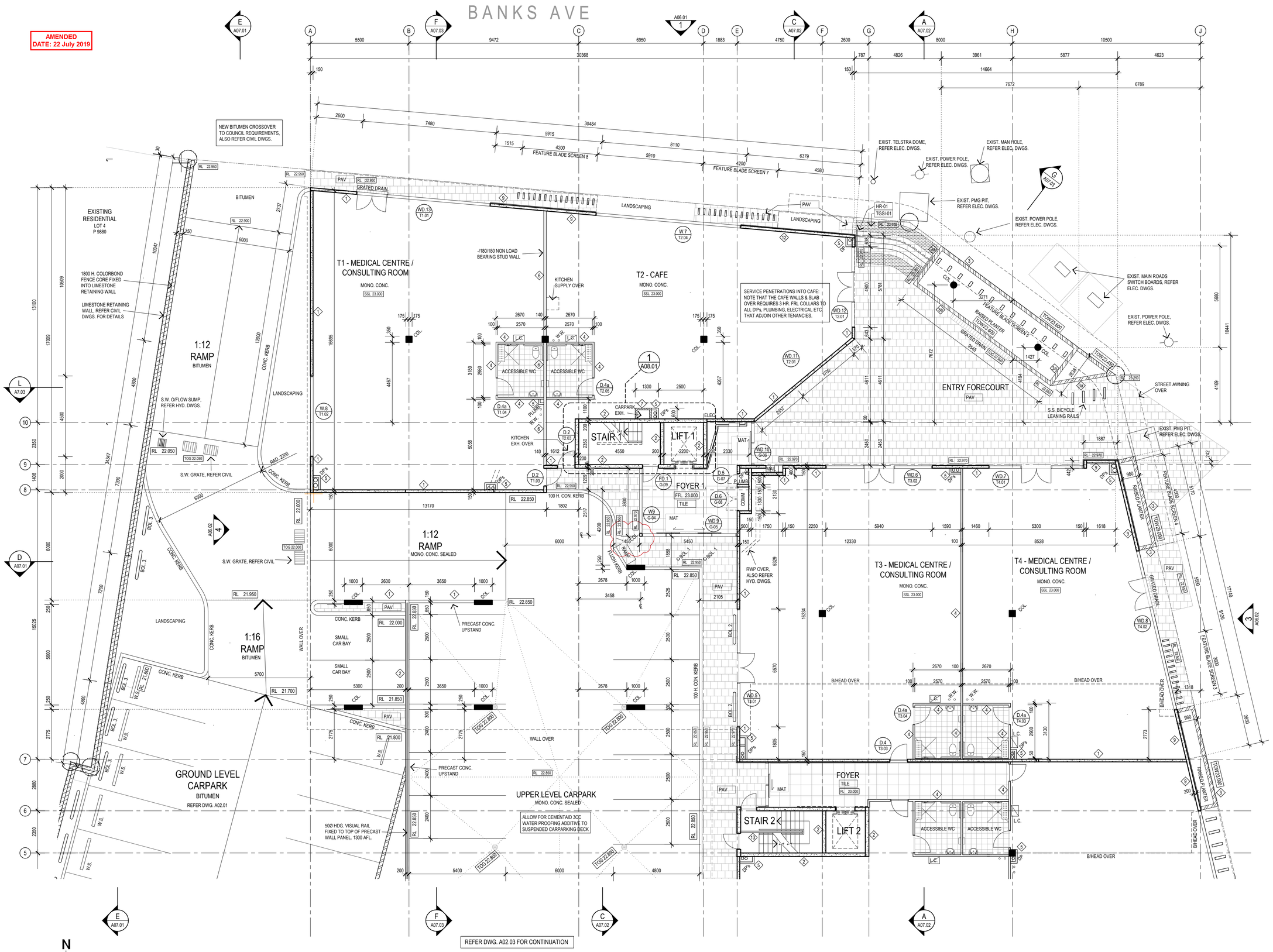
AMENDED
DATE: 22 July 2019




## GROUND FLOOR PLAN NORTH
SCALE 1:100

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LEGEND

| | |
|---|---|
| SSL 26.000 | STRUCTURAL SLAB LEVEL |
| FL 26.000 | FINISHED FLOOR LEVEL |
| TOW 26.000 | TOP OF WALL LEVEL |
| TOG 26.000 | TOP GRATE OF LEVEL |
| | STORM WATER DRAIN |
| BOL 1 | 150Ø HDG. 1200 H. BOLLARD. |
| BOL. 2 & 3 | 150Ø x1500 L. HDG. VEHICLE BARRIER RAIL. REFER DWG. A1.02 |
| W.S. | 100mm H. PROPRIETARY CONC. WHEEL STOP. |
| W.W. | WATER & WASTE LOCATION, REFER HYD. DWGS. (FOR FUTURE TEA PREP's BY TENNANT) |
| D.01 / T1.1 | DOOR TYPE / OPENING REFERENCE |

WALLS TYPES :
ALSO REFER WALL LEGEND - DWG. A09.01

| | |
|---|---|
| 1 | 150mm PRECAST CONCRETE-PAINT FINISH EXT. |
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| 3a | 190mm REINFORCED CONC. BLOCKWORK, STONE CLAD. |
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| 7 | 100mm STUD WALL F.R.L. -/180/180-PAINT FINISH |
| 8 | ' COMTEXT' FLUSH FINISHED FIBRE CEMENT CLADDING FRAMED OFF PRECAST PANEL WALL-ACROTEX FINISH |
| 9 | 'DECOCLAD' CLADDING ON TOP HATS FIXED TO PRECAST PANEL WALL |
| 10 | PRECAST PANEL WALL WITH FLUSHED PLASTERBOARD LINING INTERNALLY-PAINT FINISHED INT. & EXT. |
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| 12 | STONE CLADDING TO PRECAST CONC. PANEL |

FINISHES :
ALSO REFER FINISHES SCHEDULE

| | | | |
|---|---|---|---|
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| HR-02 | 50Ø H.D.G. HAND RAIL-PAINTED | REN | RENDER (PAINT FINISHED) |
| TGSI | TACTILE GROUND SURFACE INDICATORS . | ST | STONE CLADDING |
| AL | ALUMINIUM COMPOSITE PANEL | PAV | PAVING |
| CLC | 'DECOCLAD' OR APPROVED SIMILAR EXTERNAL LINING | TILE | CERAMIC TILE |
| PB | FLUSHED PLASTERBOARD | BAL-01 | 1800 H. 'Gr8' GLAZED / POWDERCOATED FENCING |
| | | BAL-02 | 1000 H. 'Gr8' GLAZED / POWDERCOATED BALUSTRADE |
| | | BAL-03 | 50Ø HDG. & PAINTED STEEL BALUSTR WITH BALULSTERS AT 300 MAX. CTRS |

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| 3 | 21/11/18 | STRUCTURAL UPDATES | CS | CD |
| 2 | 16/10/18 | DRAWING CORRECTION | JD | JD |
| 1 | 21/09/18 | AGEM & BCA CON. CHANGES | JD | LJ |
| 0 | 03/08/18 | ISSUED FOR CONSTRUCTION | JD | LG |

**FOR CONSTRUCTION**


dmg ARCHITECTURE
DESIGN MANAGEMENT GROUP level 2 1008 hay street perth 6000
telephone +61 8 9212 8888 | facsimile +61 8 9212 8822
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PROJECT
**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE
GROUND FLOOR PLAN NORTH

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:100 @ A1 | JD | LG |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | A02.04 | 3 |


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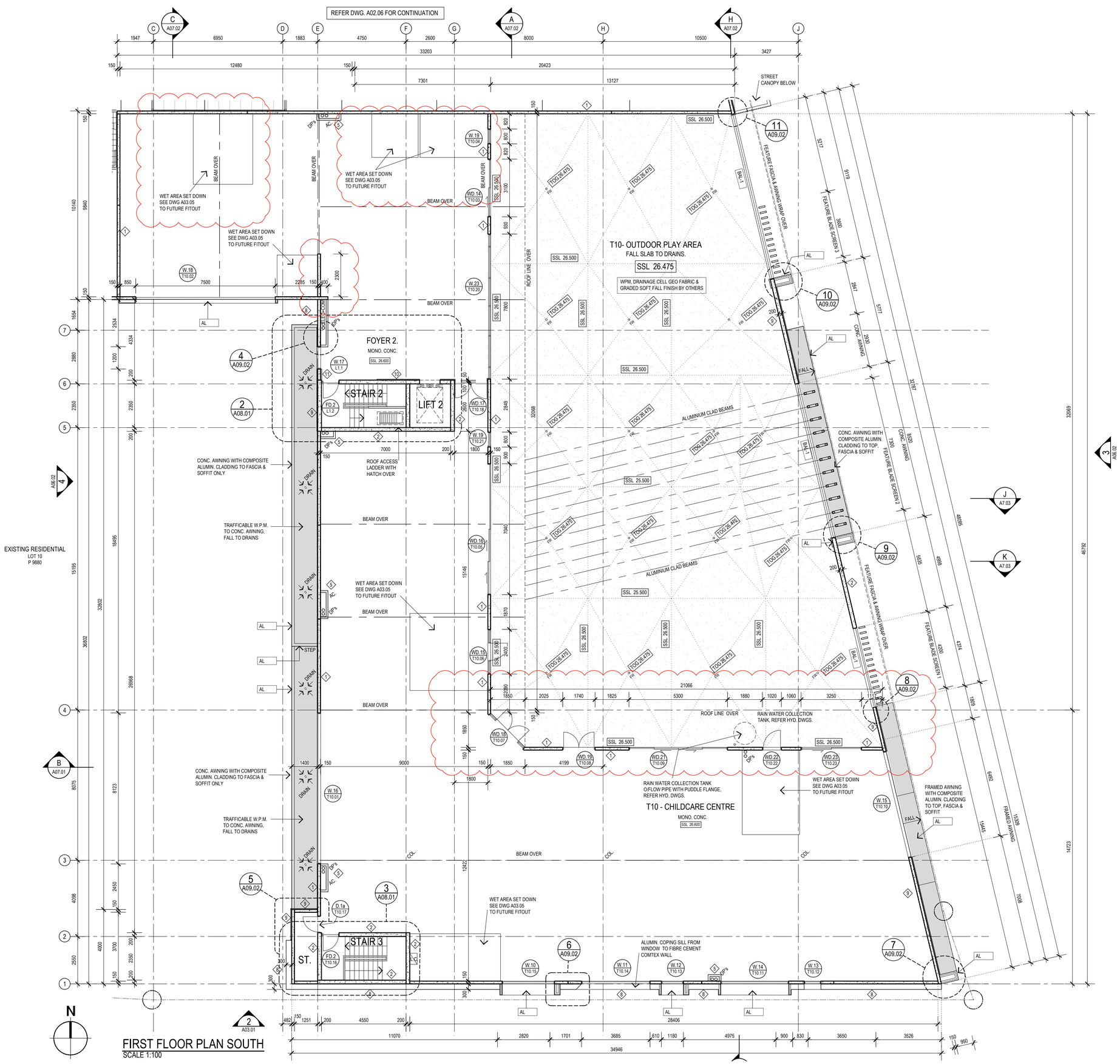


FIRST FLOOR PLAN SOUTH
SCALE 1:100

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LEGEND

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| TOG 26.000 | TOP GRATE OF LEVEL |
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| BOL.1 | 150Ø HDG. 1200 H. BOLLARD. |
| BOL. 2 & 3 | 150Ø x1600 L. HDG. VEHICLE BARRIER RAIL. REFER DWG. A1.02 |
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| W.W. | WATER & WASTE LOCATION, REFER HYD. DWGS. (FOR FUTURE TEA PREP's BY TENNANT) |

D.01 / T1.1 — DOOR TYPE / OPENING REFERENCE

## WALLS TYPES :

ALSO REFER WALL LEGEND - DWG. A09.01

| | |
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| 1 | 150mm PRECAST CONCRETE-PAINT FINISH EXT. |
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| 9 | 'DECOCLAD' CLADDING ON TOP HATS FIXED TO PRECAST PANEL WALL |
| 10 | PRECAST PANEL WALL WITH FLUSHED PLASTERBOARD LINING INTERNALLY-PAINT FINISHED INT. & EXT. |
| 11 | 'DECOCLAD' CLADDING EXTERNALLY+ CONC. PRECAST PANEL + FLUSHED PLASTERBOARD LINING INTERNALLY |
| 12 | STONE CLADDING TO PRECAST CONC. PANEL |

## FINISHES :

ALSO REFER FINISHES SCHEDULE

| | | | |
|---|---|---|---|
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| TGSI | TACTILE GROUND SURFACE INDICATORS . | ST | STONE CLADDING |
| AL | ALUMINIUM COMPOSITE PANEL | PAV | PAVING |
| CLC | 'DECOCLAD' OR APPROVED SIMILAR EXTERNAL LINING | TILE | CERAMIC TILE |
| PB | FLUSHED PLASTERBOARD | BAL-01 | 1800 H. 'G/8' GLAZED / POWDERCOATED FENCING |
| | | BAL-02 | 1000 H. 'G/8' GLAZED / POWDERCOATED BALUSTRADE |
| | | BAL-03 | 50Ø HDG. & PAINTED STEEL BALUSTR WITH BALULSTERS AT 300 MAX. CTRS |

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| 3 | 31/01/19 | T10 AMENDMENTS | CS | LJ |
| 2 | 11/01/19 | TENANCY 10 REVISION | CS | LJ |
| 1 | 21/09/18 | AGEM & BCA CON. CHANGES | JD | LJ |
| 0 | 03/08/18 | ISSUED FOR CONSTRUCTION | JD | LG |

# FOR CONSTRUCTION


dmg ARCHITECTURE

**DESIGN MANAGEMENT GROUP** level 2 1008 hay street perth 6000
**telephone +61 8 9212 8888** | facsimile +61 8 9212 8822
info@dmgaustralia.com.au | **www.dmgaustralia.com.au**


**PROJECT**

**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

**TITLE**

FIRST FLOOR PLAN SOUTH

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:100 @ A1 | JD | LG |

| PROJECT # | DRAWNING # | ISSUE |
|---|---|---|
| 17014 | **A02.05** | **3** |


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**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.

NOTES:
1. ALL STRUCTURAL, HYDRAULIC, ELECTRICAL AND MECHANICAL INFORMATION SHOWN IS INDICATIVE ONLY. REFER TO RELEVANT STRUCTURAL AND SERVICES DRAWINGS FOR FURTHER INFORMATION & SIZING.
2. REFER TO EXTERNAL FINISHES SCHEDULE FOR MATERIAL SELECTIONS IN DETAIL.

LEGEND

| | |
|---|---|
| SSL 26.000 | STRUCTURAL SLAB LEVEL |
| FL 26.000 | FINISHED FLOOR LEVEL |
| TOW 26.000 | TOP OF WALL LEVEL |
| TOG 26.000 | TOP GRATE OF LEVEL |
| SDL.1 | STORM WATER DRAIN |
| BOL. | 150Ø HDG. 1200 H. BOLLARD. |
| BOL. 2 & 3 | 150Ø x1600 L. HDG. VEHICLE BARRIER RAIL. REFER DWG. A1.02 |
| W.S. | 100mm H. PROPRIETARY CONC. WHEEL STOP. |
| W.W. | WATER & WASTE LOCATION, REFER HYD. DWGS. (FOR FUTURE TEA PREP's BY TENNANT) |

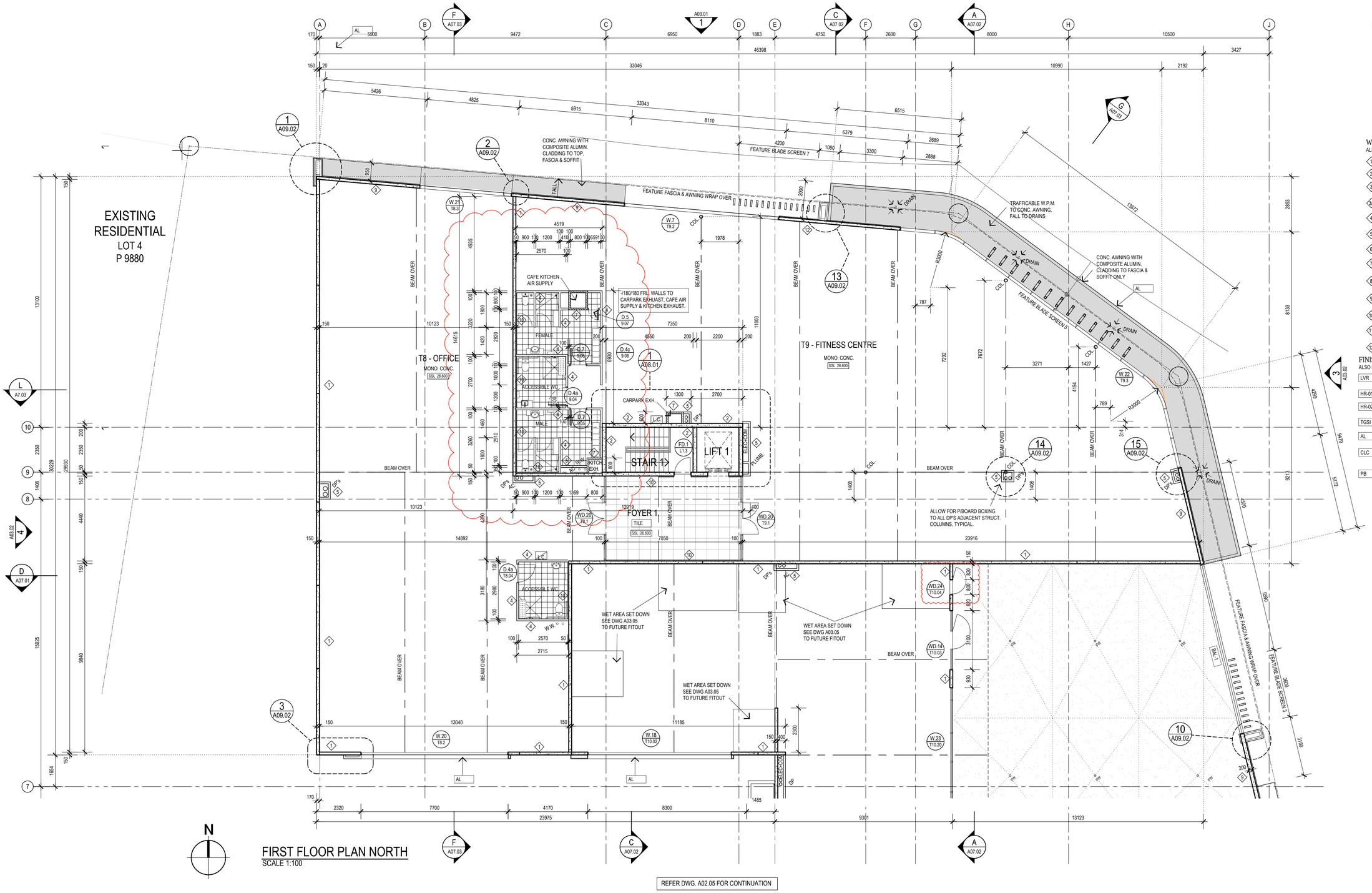
D.01 / T1.1 — DOOR TYPE / OPENING REFERENCE

WALLS TYPES :
ALSO REFER WALL LEGEND - DWG. A09.01

| | |
|---|---|
| 1 | 150mm PRECAST CONCRETE-PAINT FINISH EXT. |
| 2 | 200mm PRECAST CONCRETE-PAINT FINISH EXT. |
| 3 | 190mm REINFORCED CONC. BLOCKWORK RENDER FINISHED BOTH SIDES-PAINT FINISH |
| 3a | 190mm REINFORCED CONC. BLOCKWORK, STONE CLAD. |
| 4 | 100mm STUD WALL (13 GYPROCK+75 STUD+13 P/BOARD)-PAINT FINISH |
| 5 | 100mm STUD WALL TO DUCTS (2x13 GYPROCK+75 STUD)-PAINT FINISH |
| 6 | 140mm STUD WALL F.R.L. -/180/180 (2x16 FYRECHECK+75 STUD+2x13 FYRCHECK)-PAINT FINISH |
| 7 | 100mm STUD WALL F.R.L. -/180/180-PAINT FINISH |
| 8 | ' COMTEXT' FLUSH FINISHED FIBRE CEMENT CLADDING FRAMED OFF PRECAST PANEL WALL-ACROTEX FINISH |
| 9 | 'DECOCLAD' CLADDING ON TOP HATS FIXED TO PRECAST PANEL WALL |
| 10 | PRECAST PANEL WALL WITH FLUSHED PLASTERBOARD LINING INTERNALLY-PAINT FINISHED INT. & EXT. |
| 11 | 'DECOCLAD' CLADDING EXTERNALLY+ CONC. PRECAST PANEL + FLUSHED PLASTERBOARD LINING INTERNALLY |
| 12 | STONE CLADDING TO PRECAST CONC. PANEL |

FINISHES :
ALSO REFER FINISHES SCHEDULE

| | | | |
|---|---|---|---|
| LVR | LOUVRE PANEL REFERENCE | FC | FLUSHED FIBRE CEMENT CLADDING (ACRATEX HIGH BUILD FINISH) |
| HR-01 | 50Ø S.S. HAND RAIL | CONC | CONCRETE (PAINT FINISHED) |
| HR-02 | 50Ø H.D.G. HAND RAIL-PAINTED | REN | RENDER (PAINT FINISHED) |
| TGSI | TACTILE GROUND SURFACE INDICATORS . | ST | STONE CLADDING |
| AL | ALUMINIUM COMPOSITE PANEL | PAV | PAVING |
| CLC | 'DECOCLAD' OR APPROVED SIMILAR EXTERNAL LINING | TILE | CERAMIC TILE |
| PB | FLUSHED PLASTERBOARD | BAL-01 | 1800 H. 'Gr8' GLAZED / POWDERCOATED FENCING |
| | | BAL-02 | 1000 H. 'Gr8' GLAZED / POWDERCOATED BALUSTRADE |
| | | BAL-03 | 50Ø HDG. & PAINTED STEEL BALUSTR WITH BALULSTERS AT 300 MAX. CTRS |




N

FIRST FLOOR PLAN NORTH
SCALE 1:100

REFER DWG. A02.05 FOR CONTINUATION

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| 6 | 12/06/19 | AMENDMENTS CLOUDED | CS | LJ |
| 5 | 13/05/19 | WD24 REVISED TO DOOR | CS | LJ |
| 4 | 26/03/19 | T9 & T10 AMMENDMENTS | CS | LJ |
| 3 | 31/01/19 | T10 AMENDMENTS | CS | LJ |
| 2 | 11/01/19 | TENANCY 10 REVISION | CS | LJ |
| 1 | 21/09/18 | AGEM & BCA CON. CHANGES | JD | LJ |
| 0 | 03/08/18 | ISSUED FOR CONSTRUCTION | JD | LG |

**FOR CONSTRUCTION**


dmg ARCHITECTURE
DESIGN MANAGEMENT GROUP level 2 1008 hay street perth 6000
telephone +61 8 9212 8888 | facsimile +61 8 9212 8822
info@dmgaustralia.com.au | www.dmgaustralia.com.au


PROJECT
**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE
FIRST FLOOR PLAN NORTH

| SCALE | DRAWN | CHECKED |
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| PROJECT # | DRAWNING # | ISSUE |
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CONSULTANTS IN
TRAFFIC ENGINEERING
& TRANSPORT PLANNING

Suite 164, Level 3
580 Hay Street, Perth WA 6000
www.uloth.com.au (08) 9321 4841

22 August 2019

Reegan Cake,
Dynamic Planning
15/29 Collier Road
MORLEY WA 6062

Dear Reegan,

RE: DEVELOPMENT APPLICATION DA19/0620
2 & 4 BANKS AVENUE AND 22, 24 & 26 MONKHOUSE WAY, HILLARYS (REF: 690)

We have now fully reviewed the City's comments. We have also followed up regarding the changes to the City of Vincent's parking policy. Our responses to the City's comments are as documented below, with a revised recommendation for a maximum of 18 practitioners.

## 1. CITY OF VINCENT PARKING POLICY

The City of Vincent's Parking Policy (Planning Policy 7.7.1) was updated in April 2018. However, it seems that the previous version was still available online when we downloaded it in early 2019. The superseded version provided reduction factors in Table 2, including the 80 percent factor for developments within 400 metres of a bus route and the 90 percent factor for on-site End of Trip facilities, as utilised in our initial analysis.

The City of Vincent's updated parking policy still includes reduction factors similar to those in the superseded version. However, instead of a simple Table of factors to be applied sequentially, the new Policy identifies (in Table 1) a series of parking ratios for each land use, depending on its location, thereby effectively applying built-in reduction factors for each scenario. For example, for a Medical Centre, the new policy specifies an initial rate of 4 spaces per consulting room, but then provides reduced rates of 3 spaces per consulting room within Mixed Use areas, 3.5 spaces for Activity Corridors and Transit Corridors, and 2.5 spaces within a Town Centre. This translates to a reduction factor of 75 percent for a Mixed Use area and 62.5 percent for the Town Centre.

It is therefore argued that the currently applied overall reduction of 72 percent for the proposed Hillarys Plaza analysis is more than reasonable, since it is located within the Whitfords Activity Centre and within 400 metres of multiple bus routes. It is also important to note that the City of Vincent policy also still permits a further reduction of overall parking demands due to reciprocal parking (See Section 5), which is also consistent with the approach we have taken for Hillarys Plaza.

## 2. OFFICE PARKING RATIO

It is agreed that the analysis should be based on City of Joondalup's standard Office parking requirement of 1 space per 30 square metres, thus increasing the initial requirements from 7 spaces to 12 spaces.

## 3. END-OF-TRIP FACILITIES FOR CHILD CARE CENTRE

The shared parking analysis assumes that the Child Care Centre will also provide at least 1 unisex shower/toilet and a locker. If this is not already the case, then it is recommended that this requirement should become a condition of the amended approval.

## 4. UPDATED SHARED PARKING ANALYSIS

The updated shared parking analysis for the currently approved Hillarys Plaza development is shown in the attached 'Updated Table A.3', resulting in an overall peak parking requirement of 83 spaces (due to the additional 4 spaces required for 'Office'). The approved parking provision of 95 spaces therefore results in an oversupply of 12 spaces.

The total number of practitioners within the 6 Medical Centre tenancies can therefore be increased to a revised maximum of 18 practitioners, which will result in an overall shared parking requirement of 94 spaces, as shown in the attached 'Updated Table 1'.

## 5. OVERALL CONCLUSIONS AND RECOMMENDATIONS

In spite of the above calculations (which are documented to illustrate that the current restriction on the number of practitioners can be increased from 15 to 18 practitioners), it is important to also reconsider the calculations under the Whitfords Activity Centre Structure Plan (WACSP) parking requirements.

As noted in our initial (June 2019) report, the applicable parking requirements within the Whitfords Activity Centre Structure Plan specifies a flat rate of 2.7 spaces per 100 square metres NLA, irrespective of use, and without any restrictions on the number of practitioners within any Medical Centre tenancies. It is also important to note that this results in a total of 35 spaces being calculated for the proposed Child Care Centre (if the outdoor play area is included as NLA), compared to just 24 spaces that would be required under the City's Child Care Premises Local Planning Policy (for the proposed 82 children and 13 staff). However, if the outdoor play area is excluded from the calculation, then the overall parking requirement reduces to 88 spaces (based on the reduced floor area of 3,228m$^2$ NLA), resulting in a surplus of 7 spaces.

Alternatively, if the Child Care Centre is excluded altogether from the flat rate calculation, and its parking requirement is determined separately in accordance with the Local Planning Policy, then the overall parking requirement calculates to 93 spaces, which still results in an oversupply of 2 spaces.

- It is therefore recommended that the restriction on the number of Medical Centre practitioners could be removed altogether.

- However, in order to remain conservative regarding potential impacts on the surrounding streets, the number of practitioners should at least be increased from 15 to 18, in which case it is also recommended to allow flexibility for the allocation of the 18 practitioners across all 6 Medical Centre tenancies (in order to allow for variations to occur during lease negotiations).

Please do not hesitate to contact me if you would like to discuss this further.

Yours sincerely,

Darren Levey

TABLE A.3 (UPDATED)
SHARED PARKING ANALYSIS FOR APPROVED HILLARYS PLAZA DEVELOPMENT

| LAND USE | LPS PARKING [1] | ADJUSTED PARKING [2] | SHARED PARKING ANALYSIS [3] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 8am | 9am | 10am | 11am | 12pm | 1pm | 2pm | 3pm | 4pm | 5pm | 6pm |
| • Medical Centres (15 Practitioners) | 75 | 54 | 46 (85%) | 51 (95%) | **54** (100%) | **54** (100%) | 30 (55%) | 51 (95%) | **54** (100%) | **54** (100%) | 49 (90%) | 46 (85%) | 35 (65%) |
| • Pharmacy | 9 | 6 | 1 (20%) | 3 (50%) | 4 (70%) | 5 (85%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) |
| • Café (incl. Alfresco) | 29 | 21 | 14 (65%) | 17 (80%) | 18 (85%) | 19 (90%) | **21** (100%) | 19 (90%) | 12 (55%) | 11 (50%) | 11 (50%) | 17 (80%) | 17 (80%) |
| • Office | 12 | 9 | 7 (80%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | 5 (60%) | 2 (20%) |
| • Gym [4] | 13 | 13 [5] | 5 (40%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 9 (70%) | **13** (100%) | 7 (50%) |
| • Child Care Centre [6] | 24 | 17 | **17** (100%) | 14 (80%) | 10 (60%) | 10 (60%) | 10 (60%) | 10 (60%) | 14 (80%) | 14 (80%) | 14 (80%) | 14 (80%) | 10 (60%) |
| • Total | 162 | 120 | 90 | 98 | 99 | 101 | 80 | 99 | 99 | 98 | 98 | **101** | 77 |
| • Minus Linked Trips [7] | | | 13 | 17 | 18 | 20 | 23 | 21 | 16 | 15 | 15 | 21 | 20 |
| • Grand Total | | | 77 | 81 | 81 | 81 | 57 | 78 | **83** | **83** | **83** | 80 | 57 |

Notes:
1) As calculated in Table A.2.
2) Adjusted to 72 percent of LPS requirements based on City of Vincent methodology, as discussed in Chapter A.3.
3) Hourly fluctuations based on *'Shared Parking'* by the Urban Land Institute, except for Gym and Child Care Centre which are noted separately.
4) Fluctuation for Gym is based on Attendance Data provided by Plus Fitness 24/7.
5) Initial rate of 2.7 spaces per 100m$^2$ (as per Table A.2) is assumed to already account for public transport and cycling. Therefore no further adjustment is applied.
6) Fluctuation for Child Care Centre is based on previous surveys carried out by Uloth and Associated.
7) 80 percent of the Café and the Pharmacy plus 15 percent of the Gym parking requirements are expected to be linked with parking already generated by the remaining land uses.

Bold Figures denote individual and overall parking demands.

Source: Uloth and Associates, 22 August 2019

TABLE 1 (UPDATED)
UPDATED SHARED PARKING ANALYSIS FOR PROPOSED HILLARYS PLAZA DEVELOPMENT
WITH INCREASE TO 18 PRACTITIONERS IN THE MEDICAL CENTRE TENANCIES

| LAND USE | LPS PARKING [1] | ADJUSTED PARKING [2] | SHARED PARKING ANALYSIS [3] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 8am | 9am | 10am | 11am | 12pm | 1pm | 2pm | 3pm | 4pm | 5pm | 6pm |
| • Medical Centres (18 Practitioners) | 90 | 65 | 55 (85%) | 62 (95%) | **65** (100%) | **65** (100%) | 36 (55%) | 62 (95%) | **65** (100%) | **65** (100%) | 59 (90%) | 55 (85%) | 42 (65%) |
| • Pharmacy | 9 | 6 | 1 (20%) | 3 (50%) | 4 (70%) | 5 (85%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) |
| • Café (incl. Alfresco) | 29 | 21 | 14 (65%) | 17 (80%) | 18 (85%) | 19 (90%) | **21** (100%) | 19 (90%) | 12 (55%) | 11 (50%) | 11 (50%) | 17 (80%) | 17 (80%) |
| • Office | 12 | 9 | 7 (80%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | **9** (100%) | 5 (60%) | 2 (20%) |
| • Gym [4] | 13 | 13 [5] | 5 (40%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 9 (70%) | **13** (100%) | 7 (50%) |
| • Childcare Centre [6] (82 Children) | 24 | 17 | **17** (100%) | 14 (80%) | 10 (60%) | 10 (60%) | 10 (60%) | 10 (60%) | 14 (80%) | 14 (80%) | 14 (80%) | 14 (80%) | 10 (60%) |
| • Total | 177 | 131 | 99 | 109 | 110 | **112** | 86 | 110 | 110 | 109 | 108 | **110** | 84 |
| • Minus Linked Trips [7] | | | 13 | 17 | 18 | 20 | 23 | 21 | 16 | 15 | 15 | 21 | 20 |
| • Grand Total | | | 86 | 92 | 92 | 92 | 63 | 89 | **94** | **94** | 93 | 89 | 64 |

Notes:
1) As calculated in Table A.2, but updated for increase to 19 practitioners within the Medical Centres.
2) Adjusted to 72 percent of LPS requirements based on City of Vincent methodology, as discussed in Chapter A.3.
3) Hourly fluctuations based on *'Shared Parking'* by the Urban Land Institute, except for Gym and Child Care Centre which are noted separately.
4) Fluctuation for Gym is based on Attendance Data provided by Plus Fitness 24/7.
5) Initial rate of 2.7 spaces per 100m$^2$ (as per Table A.2) is assumed to already account for public transport and cycling. Therefore no further adjustment is applied.
6) Fluctuation for Child Care Centre is based on previous surveys carried out by Uloth and Associates.
7) 80 percent of the Café and the Pharmacy plus 15 percent of the Gym parking requirements are expected to be linked with parking already generated by the remaining land uses.

Bold Figures denote individual and overall parking demands.

Source: Uloth and Associates, 22 August 2019

# Hillarys Plaza Mixed Use Development

SHARED PARKING ANALYSIS

Prepared for
DYNAMIC PLANNING AND DEVELOPMENTS

On Behalf of
AGEM PROPERTY GROUP

Prepared by
Uloth and Associates
26 June 2019

**TABLE OF CONTENTS**


| | | Page |
|---|---|---|
| 1. | INTRODUCTION | 1 |
| 2. | APPROVED DEVELOPMENT | 1 |
| 3. | INITIAL OVERALL CAR PARKING REQUIREMENTS | 2 |
| 4. | SHARED PARKING ANALYSIS FOR APPROVED DEVELOPMENT | 2 |
| 5. | ADDITIONAL ANALYSIS TO DETERMINE MAXIMUM NUMBER OF PRACTITIONERS | 3 |
| 6. | OVERALL CONCLUSIONS AND RECOMMENDATIONS | 4 |
| | TECHNICAL APPENDIX | A-1 |
| A.1 | APPROVED FLOORSPACE BY TENANCY | A-2 |
| A.2 | PLANNING SCHEME PARKING REQUIREMENTS | A-3 |
| A.3 | REDUCTIONS FOR PUBLIC TRANSPORT AND END OF TRIP FACILITIES. | A-4 |
| A.4 | HOURLY FLUCTUATIONS AND LINKED TRIPS | A-5 |
| A.5 | CONFIRMATION OF BICYCLE PARKING REQUIREMENTS | A-7 |

## LIST OF TABLES


| | | Page |
|---|---|---|
| 1. | Updated Shared Parking Analysis for Proposed Hillarys Plaza Development With Increase to 19 Practitioners in the Medical Centre Tenancies | 5 |

TECHNICAL APPENDIX

| | | |
|---|---|---|
| A.1 | Approved Floorspace Areas<br>Hillarys Plaza - Cnr Marmion Ave and Banks Avenue, Hillarys | A-2 |
| A.2 | (Planning Scheme Parking Requirements)<br>Approved Hillarys Plaza Development | A-3 |
| A.3 | Shared Parking Analysis for Approved Hillarys Plaza Development | A-6 |

## 1. INTRODUCTION

The Hillarys Plaza mixed use development (located on Lots 7, 8 & 9 Monkhouse Way and Lots 5 & 6 Banks Avenue, Hillarys), was initially approved by the North West Metropolitan JDAP on 13 December 2017, with Condition 5 limiting the proposed Medical Centres to a total of 15 practitioners at any given time, including a maximum of 2 practitioners in each of Tenancies 1, 3, 4, 5 and 6, and a maximum of 5 practitioners in Tenancy 7. Subsequent development applications were then also approved by City of Joondalup on 7 June 2018, 13 June 2018 and 15 Feb 2019, including a change of use for Tenancy 7 (Medical Centre) to include a pharmacy, a change of use for an Office to be included as part of the Child Care Centre (in Tenancy 10), a modification of floor area and relocation of bike racks, and the addition of an Alfresco Dining area for the Café in Tenancy 2.

However, with construction of the development now underway, leasing negotiations have highlighted the need for flexibility in the number of practitioners allocated to each Medical Centre tenancy, and a desire to also increase the overall number of practitioners (by at least 3 to 5 practitioners), if possible.

Uloth and Associates has therefore been appointed to further review the overall parking requirement for the approved development, with a view to providing justification for the proposed increase.

## 2. APPROVED DEVELOPMENT

Table A.1 in the Technical Appendix shows the detailed breakdown of the approved development, in accordance with the latest approval on 15 February 2019. It can be seen in Table A.1 that the overall development provides a total floorspace of 3,838 square metres NLA across 10 tenancies, and includes 6 Medical Centre tenancies (T1, 3, 4, 5, 6 and 7), a Café (T2), Office (T8), Gym (T9) and Child Care Centre (T10).

The approved plans also include a total of 95 car parking spaces (87 spaces on-site and 8 spaces on-street), plus 4 bicycle rails (at the entry forecourt off Banks Avenue) and a secure bicycle storage room (with an estimated capacity for 14 bicycles), noting that Condition 17 of the initial approval specified a requirement for a total of 13 bicycle parking spaces. It is also important to note that unisex showers/toilets are provided within each tenancy.

## 3. INITIAL OVERALL CAR PARKING REQUIREMENTS

The Hillarys Plaza development site is located within the Banks District of the Whitfords Activity Centre Structure Plan (WACSP). In accordance with the structure plan, the overall parking requirement was initially calculated on the basis of the specified flat rate of 2.7 spaces per 100 square metres NLA, resulting in a required total of 104 spaces (for the overall 3,838m$^2$ NLA).

However, it is noted that this results in a total of 35 spaces being calculated for the proposed Child Care Centre (1,304m$^2$ at 2.7 spaces/100m$^2$), compared to just 24 spaces that would be required under the City's Child Care Premises Local Planning Policy (for the proposed 82 children and 13 staff). It was therefore suggested that perhaps the outdoor play area of the Child Care Centre should be excluded from the calculation, which would reduce the overall parking requirement to 88 spaces (based on the reduced floor area of 3,228 m$^2$ NLA).

Alternatively, the Child Care Centre could be excluded altogether from the flat rate calculation, and have its parking requirement determined separately in accordance with the Local Planning Policy, which would result in an overall requirement for 93 spaces (that is 24 spaces for the Child Care Centre plus 69 spaces for the remaining 2,534m$^2$ NLA).

It is important to note, however, that while the flat rate of 2.7 spaces per 100m$^2$ NLA takes into account the availability of public transport, walking and cycling opportunities and linked trips within the broader overall Activity Centre, it also assumes a mix of land uses with different peak periods and shared use of parking, as well as linked trips between tenancies. But with the proposed development including a high proportion of Medical Centre tenancies, the opportunity for shared use of the car park is reduced, and it appears that City of Joondalup (and subsequently JDAP) was therefore unsure that the application of the overall flat rate would be sufficient. They therefore applied (via Condition 5) what appears to be an arbitrary restriction on the number of practitioners.

However, while we agree that the high proportion of Medical Centre tenancies will have an impact on the effectiveness of the overall flat rate for parking, we also believe that a more rigorous approach should be applied to determine the resulting restriction on the number of practitioners.

A more detailed shared parking analysis has therefore been carried out, on a first-principles basis, by adopting a step-by-step approach to each of the assumptions built into the specified 'flat-rate' approach in the WACSP, as detailed below in Chapter 4.

## 4. SHARED PARKING ANALYSIS FOR APPROVED DEVELOPMENT

The overall shared parking analysis for the approved development is detailed in this chapter, with additional information provided in Chapters A.2 to A.4 in the Technical Appendix.

The overall methodology is as follows:

i) Calculate the initial parking requirements for each individual land use, as would be required for a stand-alone development (based on typical planning scheme requirements), as presented in Chapter A.2.

ii) Apply reductions for each land use to account for public transport availability and the provision of additional cycling End-of-Trip facilities, as discussed in Chapter A.3.

iii) Analyse the fluctuation of parking for each land use throughout the day, and hence determine the combined 'shared parking' demand for the overall development, as calculated in Chapter A.4.

iv) Apply further reductions to account for linked trips between different land uses, as also documented in Chapter A.4.

Table A.2 in Chapter A.2 in the Technical Appendix shows that the sum of the individual (stand-alone) parking requirements for the approved development results in an initial total of 157 spaces. However, when taking into account the availability of public transport and the provision of additional cycling End-of-Trip facilities, as discussed in Chapter A.3 in the Technical Appendix, this initial calculation is reduced to a total of 116 spaces (as shown in the 2nd column of Table A.3 in Chapter A.4).

By then also taking into account the different fluctuations of parking demands throughout the day, together with the expected additional reductions for the Cafe, Pharmacy and Gym (due to linked trips with parking generated by the remaining land uses, the overall shared parking requirement for the currently approved development reduces further to 79 spaces, as discussed in Chapter A.4 in the Technical Appendix, and as shown in Table A.3.

This translates to an oversupply of 16 spaces based on the approved parking provision of 95 spaces.

## 5. ADDITIONAL ANALYSIS TO DETERMINE MAXIMUM NUMBER OF PRACTITIONERS

With an initial oversupply of 16 parking spaces resulting from the shared parking analysis for the currently approved development (as detailed above in Chapter 4), further analysis has now also been carried out to determine the maximum number of practitioners that could be accommodated within the approved parking provision of 95 spaces.

The additional analysis shows that an increase to 20 practitioners would result in an overall peak parking requirement of 97 spaces. However, by reducing this to 19 practitioners, the peak parking requirement reduces to 93 spaces.

Table 1 in Chapter 6 therefore shows the overall Shared Parking Analysis with the recommended increase to a maximum of 19 practitioners across the 6 Medical Centre tenancies. However, it is also then necessary to confirm that the overall bicycle parking requirements are still satisfied, as detailed in Chapter A.5 in the Technical Appendix.

## 6. OVERALL CONCLUSIONS AND RECOMMENDATIONS

The overall conclusions regarding the required parking provision for the approved development, and the recommendations regarding the proposed increase to the number of practitioners for the Medical Centres are presented in this Chapter.

- The detailed shared parking analysis identifies an overall peak parking requirement of 79 spaces for the currently approved development (with 15 practitioners in the 6 Medical Centre tenancies). However, this means that the approved parking provision of 95 spaces results in an oversupply of 16 spaces.
- Further analysis then shows that the total number of practitioners permitted within the 6 Medical Centre tenancies can be increased to a maximum of 19 practitioners, which will result in an overall shared park parking requirement of 93 spaces, as shown in Table 1.
- It is therefore recommended to modify the restriction under Condition 5 of the initial approval to permit a total of 19 practitioners operating within the 6 Medical Centre tenancies at any given time.
- It is also recommended to allow flexibility for the allocation of the 19 practitioners across the 6 tenancies, in order to allow for variations to occur during leasing negotiations.

TABLE 1
UPDATED SHARED PARKING ANALYSIS FOR PROPOSED HILLARYS PLAZA DEVELOPMENT
WITH INCREASE TO 19 PRACTITIONERS IN THE MEDICAL CENTRE TENANCIES

| LAND USE | LPS PARKING [1] | ADJUSTED PARKING [2] | SHARED PARKING ANALYSIS [3] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 8am | 9am | 10am | 11am | 12pm | 1pm | 2pm | 3pm | 4pm | 5pm | 6pm |
| • Medical Centres (19 Practitioners) | 95 | 68 | 58 (85%) | 65 (95%) | **68** (100%) | **68** (100%) | 37 (55%) | 65 (95%) | **68** (100%) | **68** (100%) | 61 (90%) | 58 (85%) | 44 (65%) |
| • Pharmacy | 9 | 6 | 1 (20%) | 3 (50%) | 4 (70%) | 5 (85%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) |
| • Café (incl. Alfresco) | 29 | 21 | 14 (65%) | 17 (80%) | 18 (85%) | 19 (90%) | **21** (100%) | 19 (90%) | 12 (55%) | 11 (50%) | 11 (50%) | 17 (80%) | 17 (80%) |
| • Office | 7 | 5 | 4 (80%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | 3 (60%) | 1 (20%) |
| • Gym [4] | 13 | 13 [5] | 5 (40%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 9 (70%) | **13** (100%) | 7 (50%) |
| • Childcare Centre [6] (82 Children) | 24 | 17 | **17** (100%) | 14 (80%) | 10 (60%) | 10 (60%) | 10 (60%) | 10 (60%) | 14 (80%) | 14 (80%) | 14 (80%) | 14 (80%) | 10 (60%) |
| • Total | 177 | 130 | 99 | 108 | 109 | **111** | 83 | 109 | 109 | 108 | 106 | **111** | 85 |
| • Minus Linked Trips [5] | | | 13 | 17 | 18 | 20 | 23 | 21 | 16 | 15 | 15 | 21 | 20 |
| • Grand Total | | | 86 | 91 | 91 | 91 | 60 | 88 | **93** | **93** | 91 | 90 | 65 |

Notes:
1) As calculated in Table A.2, but updated for increase to 19 practitioners within the Medical Centres.
2) Adjusted to 72 percent of LPS requirements based on City of Vincent methodology, as discussed in Chapter A.3.
3) Hourly fluctuations based on *'Shared Parking'* by the Urban Land Institute, except for Gym and Child Care Centre which are noted separately.
4) Fluctuation for Gym is based on Attendance Data provided by Plus Fitness 24/7.
5) Initial rate of 2.7 spaces per 100m$^2$ (as per Table A.2) is assumed to already account for public transport and cycling. Therefore no further adjustment is applied.
6) Fluctuation for Child Care Centre is based on previous surveys carried out by Uloth and Associates.
7) 80 percent of the Café and the Pharmacy plus 15 percent of the Gym parking requirements are expected to be linked with parking already generated by the remaining land uses.

Bold Figures denote individual and overall parking demands.

Source: Uloth and Associates

## TECHNICAL APPENDIX

The Technical Appendix documents the approved floorspace, the detailed shared parking analysis for the approved development, and the confirmation of overall bicycle parking requirements for the recommended modifications.

## A.1 APPROVED FLOORSPACE BY TENANCY

Table A.1 shows the breakdown of approved floorspace by Tenancy for the overall Hillarys Plaza development, with a total floorspace of 3,838 square metres NLA across 10 tenancies. It can be seen that the development includes 6 Medical Centre tenancies (T1,3,4,5,6 and 7), a Cafe (T2), Office (T8), Gym (T9) and Child Care Centre (T10).

TABLE A.1
APPROVED FLOORSPACE AREAS
HILLARYS PLAZA - CNR MARMION AVE AND BANKS AVENUE, HILLARYS

| TENANCY AND LAND USE | FLOORSPACE (NLA) |
|---|---|
| T1 - Medical Centre | 204 $m^2$ |
| T2 - Cafe | 249 $m^2$ 1) |
| T3 - Medical Centre | 195 $m^2$ |
| T4 - Medical Centre | 168 $m^2$ |
| T5 - Medical Centre | 162 $m^2$ |
| T6 - Medical Centre | 182 $m^2$ |
| T7 - Medical Centre | 560 $m^2$ |
| T8 - Office | 336 $m^2$ |
| T9 - Gym | 478 $m^2$ 2) |
| T10 - Childcare Centre | 1,304 $m^2$ |
| Total | 3,838 $m^2$ |

Notes: 1) Includes alfresco dining area of 76 square metres.
2) Includes indoor area of 694 $m^2$ plus outdoor play area of 610 $m^2$.

Source: DMG Architecture

## A.2 PLANNING SCHEME PARKING REQUIREMENTS

Table A.2 shows the calculation of the initial stand-alone parking requirements for the approved development based predominantly on the rates specified in City of Joondalup Local Planning Scheme No. 3 resulting in an initial parking requirement of 157 spaces.

However, it should be noted that the parking requirement for the gym was adopted from a previous parking study that was carried out for multiple Plus Fitness 24/7 gyms in New South Wales, which identified an overall peak parking demand of 2.7 spaces per 100 square metres.

TABLE A.2
PLANNING SCHEME PARKING REQUIREMENTS
APPROVED HILLARYS PLAZA DEVELOPMENT

| LAND USE | AMOUNT | PARKING REQUIREMENTS | |
|---|---|---|---|
| | | Rate | No. of Spaces |
| • Medical Centres | 15 practitioners | 5/practitioner | 75 |
| • Pharmacy | 180m$^2$ | 1/20m$^2$ | 9 |
| • Café | 116 patrons [1)] | 1/4 patrons | 29 |
| • Office | 336m$^2$ | 2/100m$^2$ | 7 |
| • Gym | 478m$^2$ | 2.7/100m$^2$ [2)] | 13 |
| • Childcare | 82 children + 13 staff [3)] | 11 for 81-88 children plus 1 per employee | 24 |
| Total | | | 157 |

Notes:
1) Assumes that 40 percent of the indoor floorspace will be seating area, plus 100 percent of the outdoor alfresco area, with 4 patrons per 5m$^2$.
2) As per previous parking study undertaken for Plus Fitness 24/7 in New South Wales.
3) Staff number assumed based on applicable 'educator to child' ratios.

Source: Uloth and Associates

## A.3 REDUCTIONS FOR PUBLIC TRANSPORT AND END OF TRIP FACILITIES.

In order to take into account the availability of public transport and cycling opportunities for the approved development, it is noted that City of Vincent Planning and Building Policy 7.7.1 provides a series of car parking adjustment factors to be applied as a reduction to the initial parking requirement. This includes a factor of 80 percent for developments located within 400 metres of a bus route and a subsequent factor of 90 percent for developments with on-site End of Trip facilities exceeding the minimum requirements.

Since the Hillarys Plaza development is easily accessible by public transport with bus routes operating along both Marmion Avenue and Whitfords Avenue, the adjustment factor in relation to a bus route is considered applicable for this development.

Under General Development Standard A4 of the WACSP, the approved development requires 6 long term and 7 short term bicycle parking spaces, but with no End of Trip facilities (since these are only required where there is more than 6 long term spaces required). It is noted, however, that each tenancy within the approved development provides at least 1 unisex shower/toilet and a locker. The adjustment factor in relation to End of Trip facilities is therefore also considered applicable for this development.

An overall factor of 72 percent is therefore applied to the initial parking requirement, resulting in an adjusted total of 116 spaces as shown in the 2nd column of Table A.3 in Chapter A.4 in the Technical Appendix.

## A.4 HOURLY FLUCTUATIONS AND LINKED TRIPS

Table A.3 shows the expected fluctuation of the adjusted parking requirements for each of the individual land uses throughout the day, resulting in a shared peak parking requirement of 99 spaces at 5pm.

A further reduction is then also applied for the Café, the Gym and the Pharmacy, for linked trips with the remaining land uses, resulting in an overall peak parking requirement of 79 parking spaces at 2pm, 3pm and 4pm.

TABLE A.3
SHARED PARKING ANALYSIS FOR APPROVED HILLARYS PLAZA DEVELOPMENT

| LAND USE | LPS PARKING [1] | ADJUSTED PARKING [2] | SHARED PARKING ANALYSIS [3] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 8am | 9am | 10am | 11am | 12pm | 1pm | 2pm | 3pm | 4pm | 5pm | 6pm |
| • Medical Centres (15 Practitioners) | 75 | 54 | 46 (85%) | 51 (95%) | **54** (100%) | **54** (100%) | 30 (55%) | 51 (95%) | **54** (100%) | **54** (100%) | 49 (90%) | 46 (85%) | 35 (65%) |
| • Pharmacy | 9 | 6 | 1 (20%) | 3 (50%) | 4 (70%) | 5 (85%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) | **6** (100%) |
| • Café (incl. Alfresco) | 29 | 21 | 14 (65%) | 17 (80%) | 18 (85%) | 19 (90%) | **21** (100%) | 19 (90%) | 12 (55%) | 11 (50%) | 11 (50%) | 17 (80%) | 17 (80%) |
| • Office | 7 | 5 | 4 (80%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | **5** (100%) | 3 (60%) | 1 (20%) |
| • Gym [4] | 13 | 13 [5] | 5 (40%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 4 (30%) | 9 (70%) | **13** (100%) | 7 (50%) |
| • Child Care Centre [6] | 24 | 17 | **17** (100%) | 14 (80%) | 10 (60%) | 10 (60%) | 10 (60%) | 10 (60%) | 14 (80%) | 14 (80%) | 14 (80%) | 14 (80%) | 10 (60%) |
| • Total | 157 | 116 | 87 | 94 | 95 | 97 | 76 | 95 | 95 | 94 | 94 | **99** | 76 |
| • Minus Linked Trips [5] | | | 13 | 17 | 18 | 20 | 23 | 21 | 16 | 15 | 15 | 21 | 20 |
| • Grand Total | | | 74 | 77 | 77 | 77 | 53 | 74 | **79** | **79** | **79** | 78 | 56 |

Notes:
1) As calculated in Table A.2.
2) Adjusted to 72 percent of LPS requirements based on City of Vincent methodology, as discussed in Chapter A.3.
3) Hourly fluctuations based on *'Shared Parking'* by the Urban Land Institute, except for Gym and Child Care Centre which are noted separately.
4) Fluctuation for Gym is based on Attendance Data provided by Plus Fitness 24/7.
5) Initial rate of 2.7 spaces per 100m$^2$ (as per Table A.2) is assumed to already account for public transport and cycling. Therefore no further adjustment is applied.
6) Fluctuation for Child Care Centre is based on previous surveys carried out by Uloth and Associated.
7) 80 percent of the Café and the Pharmacy plus 15 percent of the Gym parking requirements are expected to be linked with parking already generated by the remaining land uses.

Bold Figures denote individual and overall parking demands.

Source: Uloth and Associates

## A.5 CONFIRMATION OF BICYCLE PARKING REQUIREMENTS

As a result of the recommended increase in the number of practitioners, the development will now require a slightly increased total of 15 bicycle parking spaces (7 long term and 8 short term). It is therefore recommended to accommodate the 8 short term spaces within the entry forecourt, in addition to the estimated 14 long term spaces within the secure bicycle storage room.

With more than 6 long term bicycle spaces now required, a minimum of 1 unisex shower, 1 change room and 1 locker per bicycle space must also now be provided. However, as noted above in Chapter A.3, each tenancy within the development already provides at least 1 unisex shower/toilet and a locker. It is therefore confirmed that the modified development will still exceed the minimum requirements.

Government of **Western Australia**
Development Assessment Panels

# Form 1 - Responsible Authority Report

(Regulation 12)

| | |
|---|---|
| **Property Location:** | Lots 7 (22), 8 (24) and 9 (26) Monkhouse Way & Lots 5 (4) and 6 (2) Banks Avenue, Hillarys |
| **Development Description:** | Medical Centre, Office, Restaurant, Recreation Centre and Child Care Centre (new mixed use development) |
| **DAP Name:** | Metro North-West |
| **Applicant:** | Dynamic Planning and Developments |
| **Owner:** | HW Properties (WA) Pty Ltd, Romeo Carvalhais Marcos, Filomena Dias Marcos & others |
| **Value of Development:** | $5,000,000.00 |
| **LG Reference:** | DA17/0989 |
| **Responsible Authority:** | City of Joondalup |
| **Authorising Officer:** | Dale Page |
| **DAP File No:** | DAP/17/01267 |
| **Report Due Date:** | 4 December 2017 |
| **Application Received Date:** | 24 August 2017 |
| **Application Process Days:** | 90 Days |
| **Attachment(s):** | 1: Location plan<br>2: Development plans<br>3: Perspective drawings<br>4: Landscaping concept plan<br>5: Traffic Impact Assessment |

**Officer Recommendation:**

That the Metro North-West JDAP resolves to:

1. **Defer** a decision on DAP Application reference DAP/17/01267 and accompanying plans in Attachment 2 for a period of six (6) weeks for the following reasons:

   a) Safe and adequate vehicle access to the development from Banks Avenue is dependent on the modifications to the intersection at Banks Avenue and Marmion Avenue, which is located within a Primary Regional Road reservation. The application and proposed modification to the intersection has been referred to Main Roads Western Australia (MRWA) for comment and recommendation, however MRWA formal position is currently unknown. Deferral will allow for transport related comments and recommendations to be provided by MRWA so that a determination can be made with this necessary information.

   b) The development cannot be supported without vehicle access from Banks Avenue. Providing sole vehicle access from Monkhouse Way would negatively impact the existing road network and the amenity of the residential properties on Monkhouse Way.

**Details: outline of development application**

| | | |
|---|---|---|
| Zoning | MRS: | Urban |
| | TPS: | Centre |
| Use Class: | | Medical Centre, Office, Restaurant, Recreation Centre and Child Care Centre |
| Strategy Policy: | | None applicable |
| Development Scheme: | | District Planning Scheme No. 2 |
| Lot Size: | | 4,254.7m² |
| Existing Land Use: | | Single House |

The proposed development comprises the following:

- The demolition of existing dwellings and amalgamation of existing lots (subject to separate approval).
- Development of 11 commercial tenancies across two storeys with 3,707m² of net lettable area.
- Six medical centres, two offices, a restaurant (café), recreation centre and child care centre.
- An entry forecourt located in the north-eastern corner of the site.
- Vehicle access from Monkhouse Way and Banks Avenue.
- 87 on-site parking bays and eight on-street bays.
- Associated landscaping and site works.

The development plans and building perspectives are provided as Attachments 2 and 3.

**Background:**

Lots 7 (22), 8 (24) and 9 (26) Monkhouse Way and Lots 5 (4) and 6 (2) Banks Avenue, Hillarys (subject site) comprise five residential lots developed with single houses. The lots will require amalgamation into one lot to accommodate the proposed development.

The subject site is bound by Banks Avenue to the north, Marmion Avenue to the east, Monkhouse Way to the south and two residential lots (lot 4 (6) Banks Avenue & lot 10 (28) Monkhouse Way) to the west (Attachment 1 refers).

The subject site is zoned 'Urban' under the *Metropolitan Region Scheme* (MRS), 'Centre' under the City's *District Planning Scheme No. 2* (DPS2) and is located within the Banks District of the Whitford Activity Centre Structure Plan (WACSP).

The proposed land uses 'Restaurant' (café), 'Recreation Centre' and 'Medical Centre' are discretionary ("D") uses, 'Office' is a permitted ("P") use and a 'Child Care Centre' is a discretionary (subject to advertising) ("A") use in accordance with DPS2.

**Legislation & policy:**

<u>Legislation</u>

- *Planning and Development Act 2005.*
- *Metropolitan Region Scheme* (MRS).
- *Planning and Development (Local Planning Schemes) Regulations 2015* (Regulations).

- *City of Joondalup District Planning Scheme No.* 2 (DPS2).

State Government Policies

- *State Planning Policy 4.2: Activity Centres for Perth and Peel.*

Local Policies

- *Child Care Centres Policy (CCCP).*
- *Environmentally Sustainable Design Local Planning Policy.*

**Consultation:**

Public Consultation

The proposal was advertised by way of letters to 37 surrounding landowners/occupiers, an on-site advertising sign, local newspaper advertisements for two consecutive weeks and information placed on the City's website.

Consultation was undertaken for 14 days from 2 November 2017 to 16 November 2017 in accordance with clause 64 of the *Planning and Development (Local Planning Schemes) Regulations 2015*.

Six submissions were received during the advertising period, all being objections to the proposal. The issues raised in the submissions are summarised in the table below:

| **Issue Raised** | **Applicant Response** | **City Comment** |
|---|---|---|
| Increase in traffic, noise and congestion generated by the development. | The existing road network was developed to cater to high volumes of traffic associated with the Whitfords Shopping Centre, therefore the surrounding road network has the capacity to cater for the traffic generated by the proposal.<br><br>Noise levels will be governed by the relevant regulations (Environment Protection (Noise) Regulations 1997), which the proposed development will comply with. | The applicant's traffic impact report prepared by KCTT has demonstrated that the existing road network can accommodate the increase in vehicle trips generated by the development. |
| No need for more medical centres, restaurants and child care centres. | Not a relevant planning consideration. All uses can be contemplated under the WACSP. | Need or market demands are not valid planning considerations. |
| Vehicle Access via Monkhouse Way will impact negatively on the surrounding | The proposed development provides access from Banks Avenue which will be the primary access point. This | Although it is expected that traffic will increase along Monkhouse Way, the volumes can be |

| | | |
|---|---|---|
| neighbourhood. | will relieve the pressure off the Monkhouse Way crossover and the surrounding residential area. | accommodated by the existing road network.<br><br>As the land on the north of Monkhouse Way is zoned 'Mixed use' under the WACSP, it is expected that traffic will increase and the character of the street will change over time. |
| The bin enclosure is poorly located, is too small to accommodate the waste generated by the complex and waste vehicle will block access when collecting waste. | The location of the bin store has considered the proximity to the adjoining residential properties and will also be screened from the Monkhouse Way streetscape. The proposed location will also allow the bin storage area to be serviced easily.<br><br>Due to the nature of the proposed uses being predominantly medical, many of the proposed tenancies will have internal waste storage and their own private waste contractors due to the nature of their waste. Consequently, it is expected that the waste generation will be easily catered for by the proposed bin store.<br><br>Waste collection will occur through a private contractor and after hours. As a result the temporary obstruction of the entry point will not affect the functionality of the proposed development. | The proposed bin enclosure is located for ease of access for a refuse collection vehicle.<br><br>A condition of approval would be recommended to ensure the bin enclosure is screened from view from the street.<br><br>A condition of approval would also be recommended by the City to require a waste management plan to ensure the private collection of refuse is undertaken during off-peak times and minimising any impact on surrounding landowners. |
| Vehicle movement at the Banks Avenue / Marmion Avenue intersection is already dangerous and this development will increase the hazard experienced by the community. | The proposed development includes a minor alteration of the proposed Marmion Avenue/Banks Avenue intersection (making it a give way rather than a left turn merge). This is expected to increase both pedestrian and cyclists safety whilst also reducing the chances of a traffic accident. | The transport impact assessment submitted by the applicant recommends modifications to the intersection at Banks Avenue and Marmion Avenue to address safety issues with the location of the proposed crossover on Banks Avenue. However, this modification is yet to be approved (or supported) |

| | | |
|---|---|---|
| | | by MRWA. |
| Car parking shortfall is not supported as it will result in verge parking. This will further exacerbate once surrounding residential properties (R20/R60) are redeveloped. | In an attempt to reduce the parking shortfall and ensure that there is no parking problem onsite, we have proposed an under croft parking area which will provide an additional 32 parking bays.<br><br>The on-site shortfall is considered appropriate due to the following:<br><br>• We have proposed 8 on-street car bays effectively reducing the on-site shortfall.<br>• Differing peak hours of operation between the tenancies.<br>• Reciprocity between land uses.<br>• Pedestrian infrastructure enabling walkability and connectivity to public transportation.<br>• The parking requirement generated by the proposed childcare outdoor play area is not a contributing factor to patron/child demand generated by this tenancy. | It is considered that the eight proposed on-street parking bays along Monkhouse Way will assist in mitigating the impact of the parking shortfall proposed on-site.<br><br>The total of 95 bays proposed (including on-street bays) is considered sufficient to adequately cater for the demand generated by the development, given the justification provided by the applicant. |
| Anti-social behaviour will occur at the site outside of business hours. | The design of the proposed development incorporates the Crime Prevention Through Environmental Design Principles in an attempt to reduce antisocial behaviour. | Anti-social behaviour is not a valid planning consideration. |

It is noted that three of the submissions received during advertising were copies of the same comments with separate landowner/occupier's signatures.

Consultation with other Agencies or Consultants

The proposal was referred to Main Roads WA (MRWA) on the 6 November 2017, 20 November 2017 and 23 November 2017 (additional information requested) regarding the proposed modification to the signalised intersection at Marmion Avenue and Banks Avenue.

Comments are yet to be received from MRWA stating whether the proposed modifications are supported or not, and therefore it is unknown whether the intersection will be modified to ensure safe vehicle access to and from Banks Avenue.

Joondalup Design Reference Panel

The proposal was presented the City's Joondalup Design Reference Panel (JDRP) at its meeting held on 31 October 2017. The key issues raised by the JDRP, and the summary of applicant's responses and modifications are provided below:

| No. | JDRP comment | Applicant response | City Comment |
|---|---|---|---|
| 1 | The ground floor of the development does not achieve the 4.5m minimum ceiling height requirement. | Current ceiling level has been determined by slope of NGL and minimising visual impact on neighbouring lots.<br>The ceiling level has been increased from 3.2m to 3.6m across the development. This will provide enough roof space to conceal all relevant services.<br><br>3.6m is considered a positive development outcome in lieu of the 4.5m for the following reasons:<br><br>• Preserving existing residential amenity – reducing bulk and scale of building/impact on neighbouring lots and streetscape.<br>• 3.6m is sufficient to conceal the relevant services within the ceiling.<br>• The proposed 3.6m ceiling height will still provide a flexible development outcome should any future change in uses occur. | The City considers that the revised ceiling levels provided by the applicant achieve an acceptable development design outcome.<br><br>Services will be screened from view; the tenancy ceiling level will be high enough to accommodate commercial activities and the bulk and scale of the development is compatible with the site context. |
| 2 | The Panel queried the Marmion Avenue interface as the development plans do not clearly show the glazing underneath the | Tenancy 7 is to be fully glazed to address Marmion Ave. Amended plans have been provided to address this concern. | The location and amount of glazing facing Marmion Avenue is considered acceptable and meets the provisions of the WACSP. |

| | | | |
|---|---|---|---|
| | signage for the ground floor tenancy 7. | | |
| 3 | How will signage be controlled on-site to avoid excessive and ad-hoc signage. Signage panels could be integrated in the development. | Signage panels to be integrated to the built form and it is expected that a requirement for a signage strategy to be submitted and approved by the City will be conditioned as part of DA approval. | The indicative location of signage shown on the development plans and perspective drawings indicates that signage can be accommodated appropriately within the façade of the building. Should the DAP approve the application, a signage strategy is recommended as a condition of approval to ensure signage is positioned and controlled appropriately. |
| 4 | Noted the overhang on the western elevation and raised concerns that there could be services that are clearly visible (hanging) from this awning. | Applicant has increased height of the ground floor level to conceal all services within ceiling space. There will be no exposed services to the western elevation. | Based on the proposed increase in ceiling level from 3.2m to 3.6m for the ground floor level, it is anticipated that all services will be screened from view of the public realm. Should the DAP approve the application, it is recommended that a condition of approval is included which requires all equipment, utilities and service areas to be screened from view of the street. |
| 5 | Will air-conditioning units and other services be screened from view? | Yes. All AC units will be screened. | Refer to item 4 above. |
| 6 | The circulation of the car parking area appears tight, especially for vehicles travelling from Banks Avenue to the upper parking level. | Turning circle template provided demonstrating compliance with the relevant Australian Standards. | The City is generally satisfied that the amended plans ensure that the car parking area on-site will comply with the relevant Australian Standards. However, if approved a condition of approval is recommended to ensure that compliance is achieved. |
| 7 | What consideration has been given to pram parking | Pram parking area provided on-site. | The amended plans provided by the applicant include a pram |

| | | | |
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| | associated with the proposed child care centre? | | storage/parking area on the undercroft level. The location and size of this space is considered acceptable. |
| 8 | Will end of journey facilities be provided on-site? if so, where can these be accommodated? | End of journey facilities provided on-site. | Although end of journey facilities are not required for this development (based on the number of bike bays required), the applicant has included space for male and female end of journey facilities on the undercroft level of the development which is considered acceptable. |

As outlined above, the applicant has adequately addressed the issues/concerns raised by the JDRP and the amended plans/responses provided are considered acceptable by the City.

**Planning assessment:**

Local Planning Scheme

As the subject site is located within the *Whitford Activity Centre Structure Plan* (WACSP), the only applicable provisions under the City's *District Planning Scheme No. 2* (DPS2) relate to land use permissibility.

The proposed land uses are either a permitted ("P"), discretionary ("D") or a discretionary (subject to advertising) ("A") use, and therefore can be considered at the discretion of the determining authority.

Whitford Activity Centre Structure Plan

The City's planning assessment against the relevant provisions of the WACSP are included below:

*Clause 1.11.2 - General Development Standards*

| Item | Requirement | Proposal | Compliance |
|---|---|---|---|
| A1 – Land use and development intensity | Land use permissibility as per DPS2. | Child care centre – 'A'<br>Medical Centre – 'D'<br>Office – 'P'<br>Recreation Centre – 'D'<br>Restaurant – 'D' | Complies. |
| A2 – Height and setbacks<br><br>*building setbacks as | Development to be less than 13.5 metres high. | Maximum building height of 10.5 metres. | Complies. |

| | | | |
|---|---|---|---|
| per respective District Development Standards. | | | |
| | Ground level floor to floor height shall be a minimum of 4.5 metres to provide for changing of uses over time. | Ground floor level height of 3.6 metres. | Does not comply.<br><br>0.9 metre ceiling height variation.<br><br>Refer to the officer comments. |
| A3 – Pedestrian access | Shopping Malls internal pedestrian connection. | N/A | N/A |
| | Prominent Pedestrian Entrances to be provided as identified on Figure 1. | N/A | N/A |
| | Car parks clearly signed and safe pedestrian access routes. | Clear and safe pedestrian paths provided on-site providing direct access to tenancies from the street and from the on-site car parking area. | Complies. |
| A4 – Vehicle parking and access | ACROD parking provided in accordance with Australian Standards. | ACORD bays provided. | Complies. |
| | Traffic Impact Assessment may be required by the City. | Traffic Impact Assessment provided by applicant (Attachment 5 refers) demonstrating that the local road network (subject to modification) and on-site vehicle parking and access can accommodate the traffic generated by the development and that already existing. | Complies, however required modification to the intersection at Banks Avenue and Marmion Avenue subject to comments/recommendation of MRWA (yet to be received).<br><br>Refer to officer comments. |
| | Car parking bays provided at a rate of | The applicant has proposed a total of 87 car bays on-site. | Does not comply.<br><br>Shortfall of 13 car parking |

| | | | |
|---|---|---|---|
| | 2.7 bays per 100 square metres net lettable area within the Banks District.<br><br>Based on the NLA proposed, a total of 100 bays are required on-site. | | bays.<br><br>Refer to officer comments. |
| | Sleeving of parking from the public realm. | Screening has been provided to the decked parking area facing Monkhouse Way, and the remaining at-grade/under croft parking is screened by way of landscaping.<br><br>Parking is screened behind the building as viewed from Banks Avenue and Marmion Avenue . | Complies. |
| | Vehicle access locations as per Structure Plan map. | N/A | N/A |
| | Service vehicle routes and access points should be located away from high pedestrian footfall and consideration made to safety, visual and acoustic amenity for adjoining uses. | No service areas proposed as part of application, however the bin enclosure is located adjacent to Monkhouse Way.<br><br>As a result if approved, a condition of approval is recommended to ensure a refuse management plan is provided prior to occupancy of the development to ensure refuse is managed | N/A |

| | | | |
|---|---|---|---|
| | | appropriately by specifying days/time of collection, noise mitigation, avoidance of traffic impacts etc. | |
| | Services areas shall be appropriately visually screened where visible from the public realm to minimise their impact. | Although a service area has not been proposed as part of the development, the proposed bin enclosure is located adjacent to Monkhouse way.<br><br>The bin enclosure is screened by way of landscaping and a one metres high retaining wall which cuts into the site.<br><br>If approved, a condition of approval is recommended to ensure all equipment, utilities and service areas are adequately screened from view of the street. | N/A |
| | Any application for planning approval proposing a service area shall be accompanied by an acoustic assessment. | The recommended requirement for a refuse management plan will additionally need to demonstrate acceptable noise mitigation and management. | N/A |
| | Car parking entrances shall be clearly visible from the street. | The proposed vehicle access points are clearly visible from Monkhouse Way and Banks Avenue. | Complies. |
| | Bicycle parking bays required: Six long terms bays and seven short term bays. Total of 13 | Five bicycle parking bays provided. | Does not comply.<br><br>Shortfall of 8 bike bays.<br><br>Refer to officer comments. |

| | | | |
|---|---|---|---|
| | required. | | |
| | End of journey facilities required where more than six long term bays are required. | Six long term bicycle bays required. Therefore, end of journey facilities not required.<br><br>It is noted that end of journey facilities have been proposed. | Complies. |
| A5 – Landmark sites. | Landmark sites where depicted on the Structure Plan map. | None shown in Banks District. | N/A |
| A6 – Street and public realm interface. | Street interface as per Figure 2. | Passive frontages to Monkhouse Way and Banks Avenue:<br><br>• Pedestrian shelter provided.<br>• Building entrance towards street.<br>• Screening/fencing along Monkhouse Way is 900m high.<br><br>Attractive frontage to Marmion Avenue:<br>• 1.0m landscaping strip along building fronting Marmion.<br>• Architectural and sculptural features included in building façade. | Complies. |
| | Signage, advertising and public art | Signage not included as part of application, however if approved, a condition of approval is recommended which requires a signage strategy be submitted to the City for approval to ensure signage is managed appropriately.<br><br>No public art proposed. | Complies. |
| A7 – Landscape | Landscaping to suit urban | Landscaping on-site is acceptable, with | Complies. |

| | | | |
|---|---|---|---|
| and private open space. | environment.<br><br>Where frontage to street, landscaping is provided.<br><br>Shade trees provided at a rate of one per four car bays. | shade trees provided at a rate of one per four car bays. | |
| | Balconies and Roof gardens | None shown. | N/A |
| A8 – Roofscape. | Roof mounted plant and equipment screened from view from all sides of the building. | Condition of approval recommended which requires that all equipment, utilities and services are screened from view of the street. | Complies. |
| A9 – Service areas and ancillary buildings. | Service and refuse disposal systems shall be located away from public areas and residential development. | No service areas or refuse disposal systems proposed as part of development. | N/A |
| | Service and refuse areas are to be screened from view. | Screening of the bin enclosure is achieved through retaining walls and landscaping proposed by applicant. | Complies. |
| | Screening and ancillary buildings shall be constructed of materials and be of a design compatible with adjacent buildings. | None shown. | N/A |

*Clause 1.14.3 – Banks District Development Standards*

| Item | Requirement | Proposal | Compliance |
|---|---|---|---|

| | | | |
|---|---|---|---|
| A1 – Building setbacks | Ground floor setback minimum of 1.0 metre to primary street. Upper floor may be provided at nil setback. | Minimum 1.0 metre setback to banks and Marmion Avenue. | Complies. |
| | 1.0 metre minimum setback to secondary street. | Minimum of 1.0 metre setback to Monkhouse Way. | Complies. |
| | A 7.5 metre minimum rear setback applies for those lots south of Banks Avenue, so as to avoid overlooking issues. Car parking can be within 7.5 metre setback area. | No rear lot boundary as part of this development. Due to the proposed amalgamation of those lots fronting Monkhouse Way and the proposed setback of the development from residential lots, the potential for overlooking/privacy issues is minimised. | N/A |
| | Nil minimum side setback subject to BCA. | Building is setback a minimum of 7.0 metres to the western lot boundary.<br><br>Retaining walls located at nil to western lot boundary. | Complies. |
| A2 – Vehicle parking and access. | No vehicle parking within the primary street setback area is permitted. | No car parking within primary street setback area. | Complies. |
| A3 - Landscaping | Landscaping to be in accordance with an approved landscaping plan. A landscaping plan is to be submitted with any development application. | Landscaping concept plan provided (Attachment 4 refers). | Complies, if approved, a condition of approval will address further landscaping detail. |

<u>Child Care Centres Policy</u>

| | | | |
|---|---|---|---|
| Clause 5.1 of CCCP - Location | Located adjacent to non-residential uses. | Located within a mixed-use development. | Complies. |
| | Vehicle access should not be via a district distributor A road and only in | Banks Avenue is a local distributor road, however Monkhouse Way is | Banks Avenue access complies.<br><br>Monkhouse Way |

| | | | |
|---|---|---|---|
| | exceptional circumstances via a district distributer B or access road. | an access road. | access is considered acceptable as it services the entire development not just the proposed child care centre. |
| Clause 5.2 of CCCP – Parking and traffic | Minimise disruption of existing traffic safety measures and traffic flow, and safe access to on-site parking areas. | Crossover and access is appropriate subject to modification of the intersection (as recommended). | Complies. |
| | Car parking circulation as per City's CCCP. | Car parking configuration is appropriate. | Complies. |
| | Car parking bays required as per clause 5.2.3 (as mentioned under clause 4.8) | N/A –WACSP car parking standards apply. | N/A |
| Clause 5.3 of CCCP – Building Design and Outdoor Play Area | Setbacks as per DPS2, may be reduced as discretion of City. | N/A – as per WACSP setbacks | N/A |
| | Noise mitigation measures included to limit impact on adjoining landowners. | It is recommended that an acoustic report is provided prior to commencement of development to ensure noise from child care centre is mitigated. | If approved, it is recommended that an acoustic report is provided as a condition of approval. |
| Clause 5.4 of CCCP – Landscaping | Landscaping as per provisions of DPS2. | N/A –WACSP landscaping requirements apply. | N/A |
| | Verge suitability landscaped. | N/A – WACSP landscaping requirements apply. | N/A |
| Clause 5.5 of CCCP – Operating Hours. | 7am to 6pm weekdays and 8:00am to 1:00pm Saturdays. | It is recommended that operating hours of the child care centre are limited in accordance with policy requirements. | If approved, it is recommended that operating hours are limited through a condition of approval. |

**Officer Comments**

<u>Vehicle Access and Movement</u>

The applicant has proposed two vehicle access points to and from the subject site, one is located on Monkhouse Way and the other from Banks Avenue.

The proposed crossover/access point on Banks Avenue is located at a traffic merge point for vehicles entering Banks Avenue (heading west) from Marmion Avenue. The crossover is also in close proximity to the existing intersection of Banks Avenue and Marmion Avenue.

The proposed crossover from Banks Avenue is not supported by the City as access is considered unsafe without modification to the intersection. As a result, the following is recommended by the City to ensure safe and efficient vehicle movement from Banks Avenue into the subject site can be achieved:

*Intersection modification*

The City agrees with the applicant's traffic engineers (KCTT) that the existing signalised intersection at Banks Avenue and Marmion Avenue requires modification to avoid issues associated with the location of the crossover conflicting with the vehicle merge point. The proposed modification is summarised below:

1. Removal of the merge point on Banks Avenue;
2. Reduce the width of the carriageway lane for vehicles heading west along Banks Avenue;
3. Inclusion of a 'give way' sign at the intersection for those vehicles heading north along Marmion Avenue and turning west onto Banks Avenue; and,
4. Other associated works related to the modification of the verge, kerbing, footpath, pedestrian crossing and incidental site works.

It is noted that no change is required to the slip lane on Marmion Avenue (for queuing of vehicles) or the traffic light sequence to implement these works.

In order to complete the required intersection modifications, the approval of MRWA is required due to the intersection being located within a Primary Regional Road Reservation (Marmion Avenue). At the time of submitting this RAR to the JDAP, MRWA is yet to provide their comments and recommendations regarding the proposal. The City is unable to support the proposal without modifications to the intersection of Banks Avenue and Marmion Avenue as safe access is unable to be facilitated. The alternative of providing access only via Monkhouse Way is unacceptable to both the applicant and the City.

As the intersection modifications are critical to the development, there needs to be some degree of certainty that the intersection modifications will be approved by MRWA.

As a result, the City has recommended that the application is deferred until MRWA provide their in-principle support (or approval) of the modifications to the intersection of Banks Avenue and Marmion Avenue.

*Left-in, left-out*

In addition to the proposed modification to the Banks Avenue and Marmion Avenue intersection, the City also has a concern regarding all-direction vehicle access from Banks Avenue into the subject site.

The design of Banks Avenue does not allow for the banking of vehicles heading east, turning into the subject site. There are also concerns that vehicles turning right into the subject site from Banks Avenue will result in safety issues and congestion at the traffic lights.

The applicant and the City have agreed that vehicle access can only be achieved from Banks Avenue via a 'left-in, left-out' arrangement. This is considered appropriate as the majority of traffic is anticipated to come from Marmion Avenue heading west onto Banks Avenue. There is also an existing roundabout approximately 120 metres from the proposed crossover which provides a convenient and safe avenue for vehicles to turn-around and head east along Banks Avenue.

As a result, if approved the City recommends a condition of approval which requires the applicant to extend the median strip along Banks Avenue to ensure vehicles can only enter/exit the site via this crossover by either turning left into, or left out of the subject site.

Building Height

In accordance with general development standard A2 of the City's WACSP, the ground floor level is required to be a minimum of 4.5 metres from floor to floor in order to accommodate change of uses over time.

The applicant originally proposed a floor to floor height of 3.2 metres for the ground floor, however have amended the proposal to provide an increased height of 3.6 metres. Although the floor to floor height still does not meet this provision of the City's WACSP, the height is considered acceptable for the following reasons:

- The applicant has attempted to minimise the impact of bulk and scale on the surrounding residential properties to the south by reducing the building height as much as possible. The maximum building height proposed is 10.5 metres above natural ground level, which is 3 metres lower than that permitted under the WACSP.
- The intent of the 4.5 metre floor to floor height relates to providing adaptability for future uses to accommodate the ground floor where a residential dwelling may be proposed. In this case, commercial land uses are proposed to occupy the ground level from the outset, and therefore it is clear that adaptability will still be maintained with a floor to floor height of 3.6 metres.
- The applicant has stated that the heights will allow for services/utilities within and outside of the tenancies to be screened from view, and avoid any overhang of from the ceiling or awnings of the building. Therefore, there will be no visual impact as a result of this floor to floor height.

In light of the above, the City considers that the proposed height of the ground floor level meets the intent of the relevant provision under the WACSP and will not result in any significant impact on the streetscape, the use of the building or on surrounding landowners.

Parking

*Car Parking*

In accordance with general development standard A4 of the City's WACSP, car parking within the Banks District is required to be provided at a rate of 2.7 bays per 100 square metres of net lettable area (NLA). The development includes a total of 3,703 square metres of NLA and therefore a total of 100 car parking bays are required on site.

The proposal includes a total of 87 car parking bays on site resulting in a shortfall of 13 bays. This car parking shortfall is considered appropriate for the following reasons:

- A total of eight on-street car parking bays are proposed within the Monkhouse Way verge adjacent to the subject site. These bays will assist in reducing the effective shortfall to five bays.
- The subject site is in close proximity to a high frequency bus route along Marmion Avenue and therefore is easily accessible by public transport.
- It is anticipated that there will be some reciprocal use of car parking on site. For example, the proposed Restaurant (café) is intended to predominantly service employees and other visitors to the subject site.
- The tenancies are likely to have differing peak hours of operation due to the proposed land uses which will ensure peak demand for car parking is not experienced at the same time.

Although the car parking shortfall can be considered based on the above justification, the City has a concern regarding the number of practitioners that could operate from the six proposed medical centres onsite.

In accordance with the City's DPS2 car parking requirements, medical centres require five car parking bays per practitioner. Under the City's WACSP, the car parking requirements for medical centres are based on NLA and therefore the number of practitioners is not considered as part of the car parking calculation.

In light of the above, without appropriate controls on practitioner numbers there is a risk that the medical centres could result in parking demand greater than that provided for. As a result, the City recommends that a condition of any approval is included to restrict the number of practitioners which can operate from the medical centre tenancies at any one time.

With appropriate controls on practitioner numbers, and the construction of the eight proposed on-street bays along Monkhouse Way, the proposed effective parking shortfall of five bays is considered acceptable.

*Bicycle Parking*

In accordance with general development standard A4 of the City's WACSP, six long term and seven short term bicycle parking bays/racks are required for the proposed development. The proposed plans only include five bicycle bays onsite.

Due to the proposed car parking shortfall, proximity to public transport and proposed land uses, the City considers that the required 13 bicycle parking bays should be provided on site in accordance with the WACSP. There is also adequate space onsite to accommodate these additional bicycle bays without any modification to the proposed plans.

As a result, the City recommends that a condition of any approval includes a requirement for the applicant to provide a total of 13 bicycle parking bays onsite.

**Options/Alternatives:**

Not applicable.

**Council Recommendation:**

Not applicable.

**Conclusion:**

The proposed mixed-use development generally complies with the relevant requirements of the City's DPS2 and WACSP. The areas of discretion sought have been adequately justified by the applicant and are not considered to significant impact the amenity of the streetscape or surrounding landowners.

The signalised intersection at Banks Avenue and Marmion Avenue requires modification in order to accommodate the proposed crossover from Banks Avenue to the subject site. Without clear support from MRWA, there is considered to be inadequate information for the City to recommend approval of the application.

Without safe access from Banks Avenue, the development is considered unacceptable as access via Monkhouse Way only would have a significant negative impact on the existing road network and on those residential properties surrounding the subject site.

It is therefore recommended that the application be deferred by the JDAP until comments are provided by MRWA in respect to the proposed intersection modifications at Banks Avenue and Marmion Avenue.

Government of **Western Australia**
Development Assessment Panels

LG Ref: DA17/0989
DAP Ref: DAP/17/01267
Enquiries: (08) 6551 9919

Mr Neil Teo
Dynamic Planning and Developments
PO Box 688
INGLEWOOD WA 6932

Dear Mr Teo

**METRO NORTH-WEST JDAP - CITY OF JOONDALUP - DAP APPLICATION - DA17/0989 – DETERMINATION**

| | |
|---|---|
| Property Location: | Lots 7 (22), 8 (24) and 9 (26) Monkhouse Way & Lots 5 (4) and 6 (2) Banks Avenue, Hillarys |
| Application Details: | Medical Centre, Office, Restaurant, Recreation Centre and Child Care Centre (new mixed use development) |

Thank you for your Form 1 Development Assessment Panel (DAP) application and plans submitted to the City of Joondalup on 24 August 2017 for the above-mentioned development.

This application was considered by the Metro North-West JDAP at its meeting held on 13 December 2017, where in accordance with the provisions of the City of Joondalup District Planning Scheme No.2, it was resolved to **approve** the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, an application may be made to amend or cancel this planning approval in accordance with regulation 17 and 17A of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Mr Ryan Bailey on behalf of the City of Joondalup on 9400 4300.

Yours sincerely,

**DAP Secretariat**

20 December 2017

Encl. DAP Determination Notice
Approved plans

Cc: Mr Ryan Bailey
City of Joondalup

Government of **Western Australia**
Development Assessment Panels

## *Planning and Development Act 2005*

### City of Joondalup District Planning Scheme No.2

### Metro North-West Joint Development Assessment Panel

# Determination on Development Assessment Panel Application for Planning Approval

**Property Location:** Lots 7 (22), 8 (24) and 9 (26) Monkhouse Way & Lots 5 (4) and 6 (2) Banks Avenue, Hillarys
**Application Details:** Medical Centre, Office, Restaurant, Recreation Centre and Child Care Centre (new mixed use development)

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 13 December 2017, subject to the following:

1. **Approve** DAP Application reference DAP/17/01267 and accompanying plans in Attachment 2 in accordance with Clause 68 of the *Planning and Development (Local Planning Schemes) Regulations 2015* and the provisions of the City of Joondalup *District Planning Scheme No. 2*, subject to the following conditions:

**Conditions**

1. Detailed engineering drawings for the proposed modifications to the signalised intersection of Banks Avenue and Marmion Avenue shall be submitted to the City and Main Roads Western Australia (MRWA) and shall be supported/approved by the City/MRWA prior to commencement of development. The required modifications to the intersection shall be undertaken by and at the cost of the applicant/landowner prior to occupation of the development.

2. This approval only relates to the proposed Medical Centre, Office, Restaurant, Recreation Centre and Child Care Centre (and associated works) as indicated on the approved plans. It does not relate to any other development on the lot.

3. The lots included within the application site shall be granted approval for amalgamation prior to commencement of development and amalgamation concluded prior to occupancy certification.

4. The median island along Banks Avenue shall be extended at the cost of the applicant/landowner to the specification and satisfaction of the City. These works shall ensure that vehicles entering or exiting the site via Banks Avenue can only turn left-in or left-out, and shall be completed prior to the occupancy of the development.

5. A maximum of two practitioners shall operate from each of tenancies 1, 3, 4, 5 and 6 and a maximum of five practitioners shall operate from tenancy 7 at any given time.

6. The child care centre shall only operate from 7:00 am to 6:00pm on weekdays and 8:00am to 1:00pm on Saturdays. The child care centre shall not operate on Sundays and public holidays.

7. The eight on-street car parking bays proposed within the Monkhouse Way road reserve, as depicted on the approved plans, shall be designed and constructed at the cost of the applicant/landowner. The design and construction of these on-street bays shall be to the specification and satisfaction of the City, and shall be installed prior to occupancy of the development.

8. A Construction Management Plan shall be submitted to and approved by the City prior to the commencement of development. The management plan shall detail how it is proposed to manage:

   - all forward works for the site;
   - the delivery of materials and equipment to the site;
   - the storage of materials and equipment on the site;
   - the parking arrangements for the contractors and subcontractors;
   - the management of dust during the construction process;
   - access to car parking and the centre for staff and customers;
   - other matters likely to impact on the surrounding properties;

   and works shall be undertaken in accordance with the approved Construction Management Plan.

9. A delivery management plan indicating the timing of deliveries shall be submitted prior to the commencement of development, and approved by the City prior to the development first being occupied. Delivery management shall then be undertaken in accordance with the approved plan.

10. A refuse management plan indicating the management of waste collection, including timing and method, shall be submitted prior to the commencement of development to limit any impact on the street, surrounding landowners and vehicle access to and from the site. The refuse management plan shall be approved by the City prior to the development first being occupied and shall then be undertaken in accordance with the approved plan.

11. A signage strategy shall be submitted to the City for approval prior to commencement of development. The strategy shall include information such as the location, size and allocation of signage panels and other areas of signage to avoid a proliferation of signage onsite. The strategy shall be consistent with the requirements of the City's Signs Local Planning Policy.

12. An acoustic engineering report shall be prepared and submitted to the City prior to the commencement of development to ensure noise generated by the proposed child care centre is managed within acceptable noise levels.

13. A full schedule of colours and materials for all exterior parts of the development (including any retaining walls) shall be submitted to and approved by the City prior to the commencement of development. Development shall be in accordance with the approved schedule and all external materials and finishes shall be maintained to a high standard, including being free of vandalism, to the satisfaction of the City.

14. Any proposed building plant and equipment, including air conditioning units, piping, ducting and water tanks shall be located so as to minimise any visual and noise impact on surrounding landowners, and screened from view from the street, and where practicable from adjoining buildings. Details shall be submitted to and approved by the City prior to the commencement of development. Development shall be in accordance with these approved details.

15. The external surface of the development, including roofing, shall be finished in materials and colours that have low reflective characteristics, to the satisfaction of the City. The external surfaces shall be treated to the satisfaction of the City if it is determined by the City that glare from the completed development has a significant adverse effect on the amenity of adjoining or nearby neighbours.

16. The car parking bays, driveways and access points shown on the approved plans are to be designed, constructed, drained and marked in accordance with the Australian Standard for Off-street Car Parking (AS/NZS2890.1 2004), Off-street Parking for People with Disabilities (AS/NZS2890.6 2009) and Off-street Commercial Vehicle Facilities (AS2890.2:2002), prior to the occupation of the development. These bays are to be thereafter maintained to the satisfaction of the City.

17. A total of 13 bicycle parking bays shall be provided onsite, and shall be designed and constructed in accordance with the Australian Standard for Off-street Carparking – Bicycles (AS2890.3-1993 as amended) prior to the development first being occupied. Details of bicycle parking area(s) shall be provided to the City for approval prior to the commencement of development.

18. Detailed landscaping plans shall be submitted to and approved by the City prior to the commencement of development. These landscaping plans are to indicate the proposed landscaping treatment(s) of the subject site and the adjoining road verge(s), and shall:

    - Be drawn at an appropriate scale of either 1:100, 1:200 or 1:500;
    - Provide all details relating to paving, treatment of verges and tree planting in the car park;
    - Provide a minimum of one shade tree per four car bays within new car parking areas;
    - Show spot levels and/or contours of the site;
    - Be based on water sensitive urban design principles to the satisfaction of the City;
    - Be based on Designing out Crime principles to the satisfaction of the City;
    - Show all irrigation design details;
    - Indicate if any verge trees are proposed to be removed/replaced; and,
    - Ensure any trees that are proposed are appropriate based on their proximity to powerlines.

19. Landscaping and reticulation shall be established in accordance with the approved landscaping plans, Australian Standards and best trade practice prior to the development first being occupied and thereafter maintained to the satisfaction of the City.

20. The applicant shall remove the existing crossovers (as depicted on the approved plans) and make good the verge to the satisfaction of the City, prior to occupation of the additions.

21. All development shall be contained within the property boundaries.

22. All storm water shall be collected on-site and disposed of in a manner acceptable to the City.

23. Retaining walls shall be of a clean finish and made good to the satisfaction of the City.

24. Appropriate signage shall be installed at the Monkhouse Way crossover to direct vehicles towards Solander Road and Banks Ave to the satisfaction of the City.

**Advice Notes**

1. Further to condition 2, the City of Joondalup District Planning Scheme No. 2 defines:

   *"**medical centre**: means premises, other than a hospital, used by one or more health consultant(s) for the investigation or treatment of human injuries or ailments and for general outpatient care (including preventative care, diagnosis, medical and surgical treatment, and counselling)."*

   *"**office**: means any premises used for the administration of clerical, technical, professional or other like business activities but does not include administration facilities which are required in association with a predominant use on site, and does not include consulting rooms or medical centres."*

   *"**restaurant**: means any premises where the predominant use is the preparation of food for sale and consumption within the building or portion thereof. The expression may include the sale of food for consumption off the premises, where local government is of the opinion that it is incidental to the business. The term may include an outdoor eating area which shall be treated as being within the building of the Restaurant. The expression excludes Drive Through Food Outlets."*

   *"**recreation centre**: means any premises used for physical exercise or sports including swimming, ice skating, ten pin bowling, cricket, tennis, squash, soccer, billiards and similar activities."*

   *"**child care centre**: means premises used for the daily or occasional care of children in accordance with the Community Services (Child Care) Regulations 1988."*

2. Any signage shall be the subject of a separate development application.

3. The applicant/owner is advised that verge treatments are required to comply with the City's Street Verge Guidelines. A copy of the Guidelines can be obtained at http://www.joondalup.wa.gov.au/Live/Streetscapes.aspx.

4. This approval does not include the dividing fence(s) shown on the approved plans. You are advised that in accordance with the Dividing Fences Act 1961 you are required to reach agreement with the adjoining owners as to the height, appearance and location of the dividing fence. Further information is available at www.buildingcommission.wa.gov.au.

5. Any existing footpath and kerbing shall be retained and protected during construction of the development and shall not be removed or altered for the purposes of a vehicle crossover. Should the footpath/kerb be damaged during the construction of the development, it shall be reinstated to the satisfaction of the City.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

DEVELOPMENT ASSESSMENT PANEL
APPROVED
13-Dec-2017

**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.

NOTE:CHECK CERTIFICATES OF TITLE FOR EASEMENTS ETC.THIS PLAN IS A SITE CONTOUR ONLY. BOUNDARY POSITIONS & LOCATION OF IMPROVEMENTS IS NOT GUARANTEED.ALL DIMENSIONS SHOULD BE VERIFIED ON SITE PRIOR TO CONSTRUCTION.SEWER INFO IS FROM WA.W.A PLANS.CHECK CLEARANCES AS NO LIABILITY CAN BE ACCEPTED.EARTHWORKS SET OUT DIMENSIONS MAY VARY AT BUILDERS DISCRETION

| | | | | |
|---|---|---|---|---|
| TRIFIELD SURVEYS<br>58 WATERVIEW PDE<br>STH RIVER 6110<br>PH:0416118396 | CLIENT<br>AGEM PROPERTY GROUP | JOB<br>LEVEL & FEATURE SURVEY<br>LOTS 5,6 BANKS AVE,<br>LOTS 7,8,9 MONKHOUSE WAY<br>HILLARYS | DATE: 3/7/2017 | PLAN: 9880 |
| | | | SCALE: 1:250@A2 | |
| | | | DATUM: A.H.D (SEWER LID) | |
| | | | CO-ORD: ASSUMED | |
| | | | CONT-INT: 1.00m | JOB ID: 10373 |

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| E | 13/11/17 | DRP AMENDMENTS | LM | LA |
| D | 25/10/17 | DA REVISION | LM | LA |
| C | 08/09/17 | FOR REVIEW | LM | ER |
| B | 24/08/17 | DA ISSUE | LM | ER |

**DA**


dmg ARCHITECTURE
**DESIGN MANAGEMENT GROUP** level 2 1008 hay street perth 6000
**telephone +61 8 9212 8888** | facsimile +61 8 9212 8822
info@dmgaustralia.com.au | **www.dmgaustralia.com.au**


PROJECT

**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE

SITE SURVEY
SURVEY PREPARED BY TRIFIELD SURVEYS

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:200 @ A1 | LM | LA |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A01.01** | **E** |


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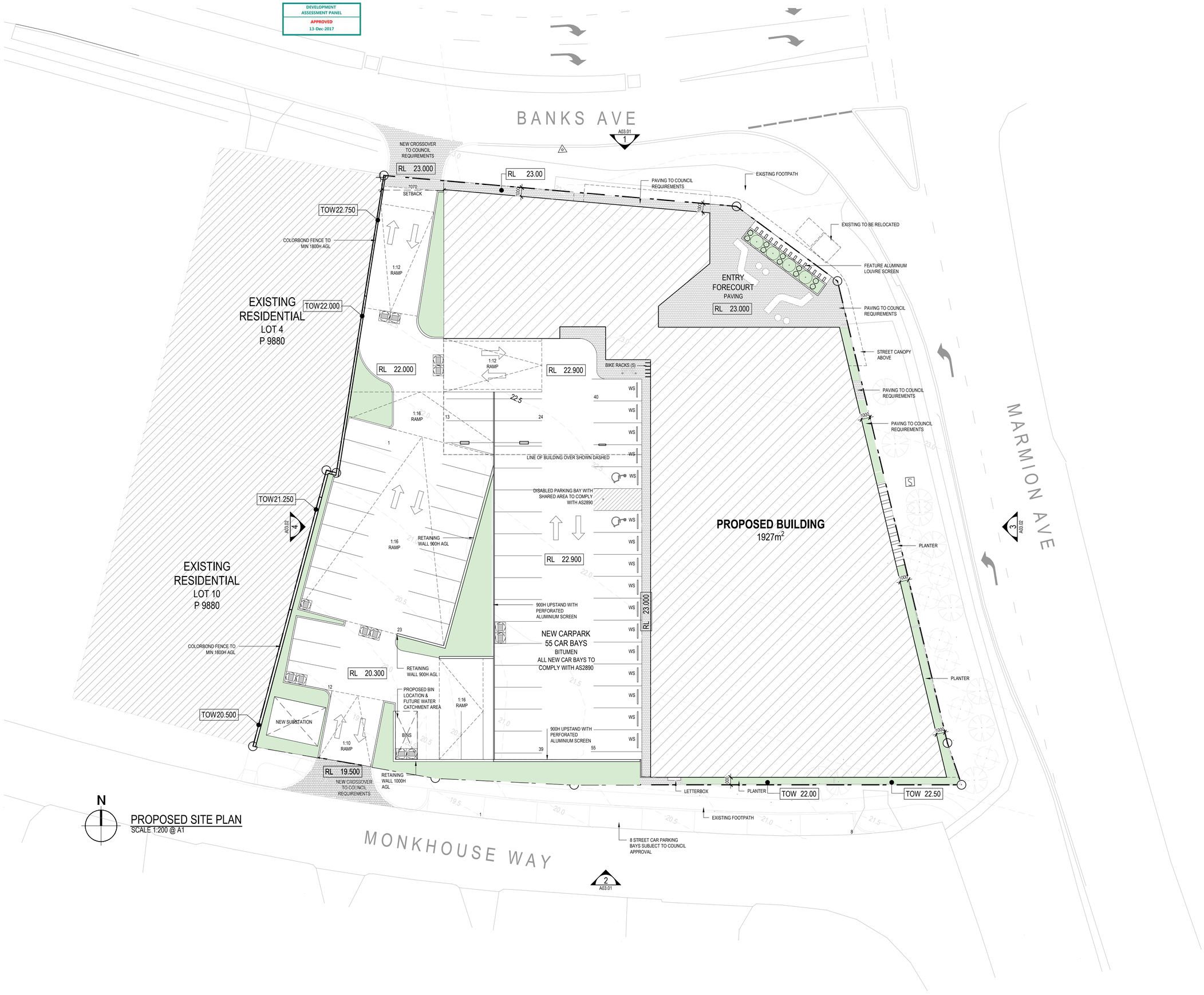
DEVELOPMENT ASSESSMENT PANEL
APPROVED
13-Dec-2017




## PROPOSED SITE PLAN
SCALE 1:200 @ A1

**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.

LEGEND

- NEW BUILDING
- LANDSCAPING; REFER TO LANDSCAPE PLAN ATTACHED BY CAPA LANDSCAPE ARCHITECTS
- NEW PAVING
- EXISTING SITE CONTOURS
- RL 23.00 — INDICATES PROPOSED NEW RELATIVE LEVEL
- FFL 23.00 — INDICATES PROPOSED NEW FINISHED FLOOR LEVEL
- TOW 23.00 — INDICATES TOP OF WALL LEVEL
- WS — WHEEL STOP

NOTES

SOAKWELL LOCATIONS SHOWN INDICATIVELY. REFER TO CIVIL ENGINEERS DRAWINGS FOR LOCATIONS AND SIZES.

ENSURE TREE PROTECTTION ZONES AS PER AS 4970 ARE ADEQUATELY PROTECTED DURING THE WORKS. PLANT SPECIES TO BE CONFIRMED THROUGHOUT DESIGN DEVELOPMENT. FINAL LANDSCAPE PLAN TO BE PRESENTED TO COUNCIL PRIOR TO THE COMMENCEMENT OF WORKS. PLEASE REFER TO A05.01 FOR LANDSCAPE CONCEPT PLAN.

SITE INFORMATION

| | |
|---|---|
| PROPOSED CAR BAYS | 87 |
| PROPOSED BUILDING AREA | 1927m² |
| PROPOSED PLANTING AREA | 310m² |
| PROPOSED HARD LANDSCAPE (ENTRY FORECOURT) | 180m² |

NOTES

1. ON SITE MAKE SAFE ALL EXISTING ELECTRICAL SERVICES / MECHANICAL SERVICES / FIRE SERVICES PRIOR TO COMMENCEMENT OF WORKS.
2. MAINTAIN AND PROTECT ANY EXISTING STRUCTURES AND FINISHES THAT ARE NOT PART OF THE WORK. MAKE GOOD ANY DAMAGES.
3. PROVIDE WARNING SIGNS REQUIRED TO PROTECT TENANTS AND THE PUBLIC FROM ANY CONSTRUCTION RELATED DANGER.
4. PROTECT EXISTING TREES TO BE RETAINED; REFER TO LANDSCAPE PLAN & REPORT FOR FURTHER DETAIL
5. REFER TO EARTHWORKS PLAN FOR DETAILS OF CARPARK WORKS

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| C | 13/11/17 | DRP AMENDMENTS | LM | LA |
| B | 25/10/17 | DA REVISION | LM | LA |
| A | 08/09/17 | FOR REVIEW | LM | ER |

**DA**


dmg ARCHITECTURE

DESIGN MANAGEMENT GROUP level 2 1008 hay street perth 6000
telephone +61 8 9212 8888 | facsimile +61 8 9212 8822
info@dmgaustralia.com.au | www.dmgaustralia.com.au


PROJECT

**HILLARYS PLAZA**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE

PROPOSED SITE PLAN

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:200 @ A1 | LM | LA |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A01.02** | **C** |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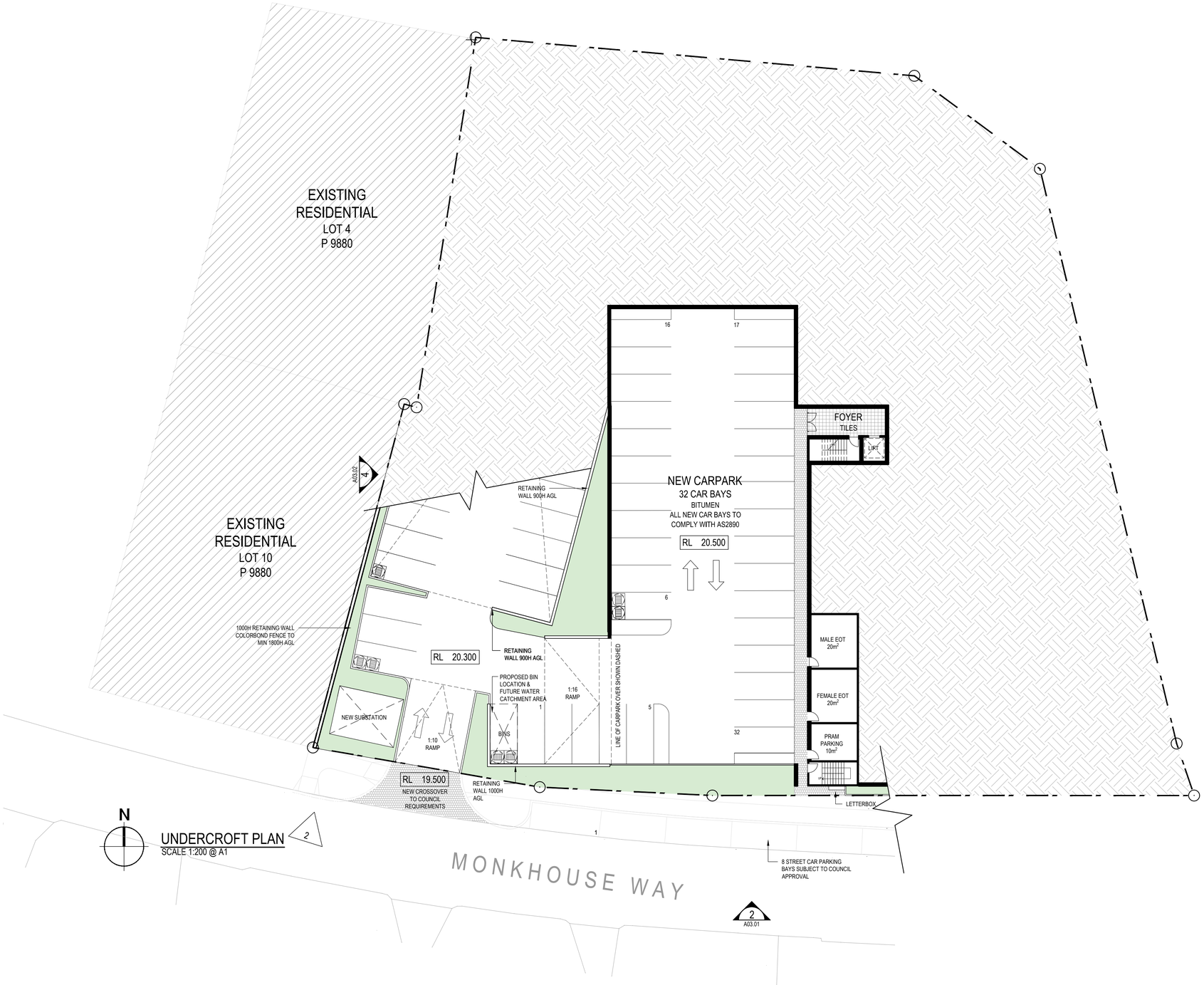
DEVELOPMENT ASSESSMENT PANEL
APPROVED
13-Dec-2017

**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.




UNDERCROFT PLAN
SCALE 1:200 @ A1

LEGEND

NEW BUILDING

LANDSCAPING; REFER TO LANDSCAPE PLAN ATTACHED BY CAPA LANDSCAPE ARCHITECTS

NEW PAVING

EXISTING SITE CONTOURS

RL 23.00 — INDICATES PROPOSED NEW RELATIVE LEVEL

FFL 23.00 — INDICATES PROPOSED NEW FINISHED FLOOR LEVEL

TOW 23.00 — INDICATES TOP OF WALL LEVEL

WS — WHEEL STOP

NOTES

SOAKWELL LOCATIONS SHOWN INDICATIVELY. REFER TO CIVIL ENGINEERS DRAWINGS FOR LOCATIONS AND SIZES.

ENSURE TREE PROTECTTION ZONES AS PER AS 4970 ARE ADEQUATELY PROTECTED DURING THE WORKS. PLANT SPECIES TO BE CONFIRMED THROUGHOUT DESIGN DEVELOPMENT. FINAL LANDSCAPE PLAN TO BE PRESENTED TO COUNCIL PRIOR TO THE COMMENCEMENT OF WORKS. PLEASE REFER TO A05.01 FOR LANDSCAPE CONCEPT PLAN.

LANDSCAPING CALCULATIONS

| | |
|---|---|
| REQUIRED LANDSCAPING | 340m¡ |
| DISTRICT PLANNING SCHEME | 8% |
| CLASS: NON RESIDENTIAL | |
| PROPOSED LANDSCAPING | 490m² |
| SOFT LANDSCAPE | 310m² |
| HARD LANDSCAPE | 180m² |

PARKING CALCULATIONS

STRUCTURE PLAN
*2.7 BAYS PER 100m2 NLA / 1 BAY PER 37m² NLA*

| | |
|---|---|
| GROUND FLOOR NLA | 1685m² |
| LEVEL 1 NLA | 1387m² |
| TOTAL NLA | 3072m² |
| REQUIRED CAR BAYS | 83 BAYS |
| - 10 SHORTFALL AS PER COJ ADVICE | 73 BAYS |
| PROPOSED CAR BAYS | 87 BAYS |
| + 8 STREET BAYS | 95 BAYS |

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| H | 13/10/17 | DRP AMENDMENTS | LM | LA |
| G | 25/10/17 | DA REVISION | LM | LA |
| F | 17/10/17 | FOR REVIEW (COJ) | LM | LA |
| E | 07/09/17 | FOR REVIEW | LM | ER |
| D | 05/09/17 | FOR REVIEW (CLIENT) | LM | ER |
| C | 30/08/17 | FOR REVIEW (CLIENT) | LM | ER |
| B | 24/08/17 | DA ISSUE | LM | ER |

**DA**


dmg ARCHITECTURE
DESIGN MANAGEMENT GROUP level 2 1008 hay street perth 6000
telephone +61 8 9212 8888 | facsimile +61 8 9212 8822
info@dmgaustralia.com.au | www.dmgaustralia.com.au


PROJECT

**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE

PROPOSED UNDERCROFT PLAN

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:200 @ A1 | LM | LA |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A02.01** | **H** |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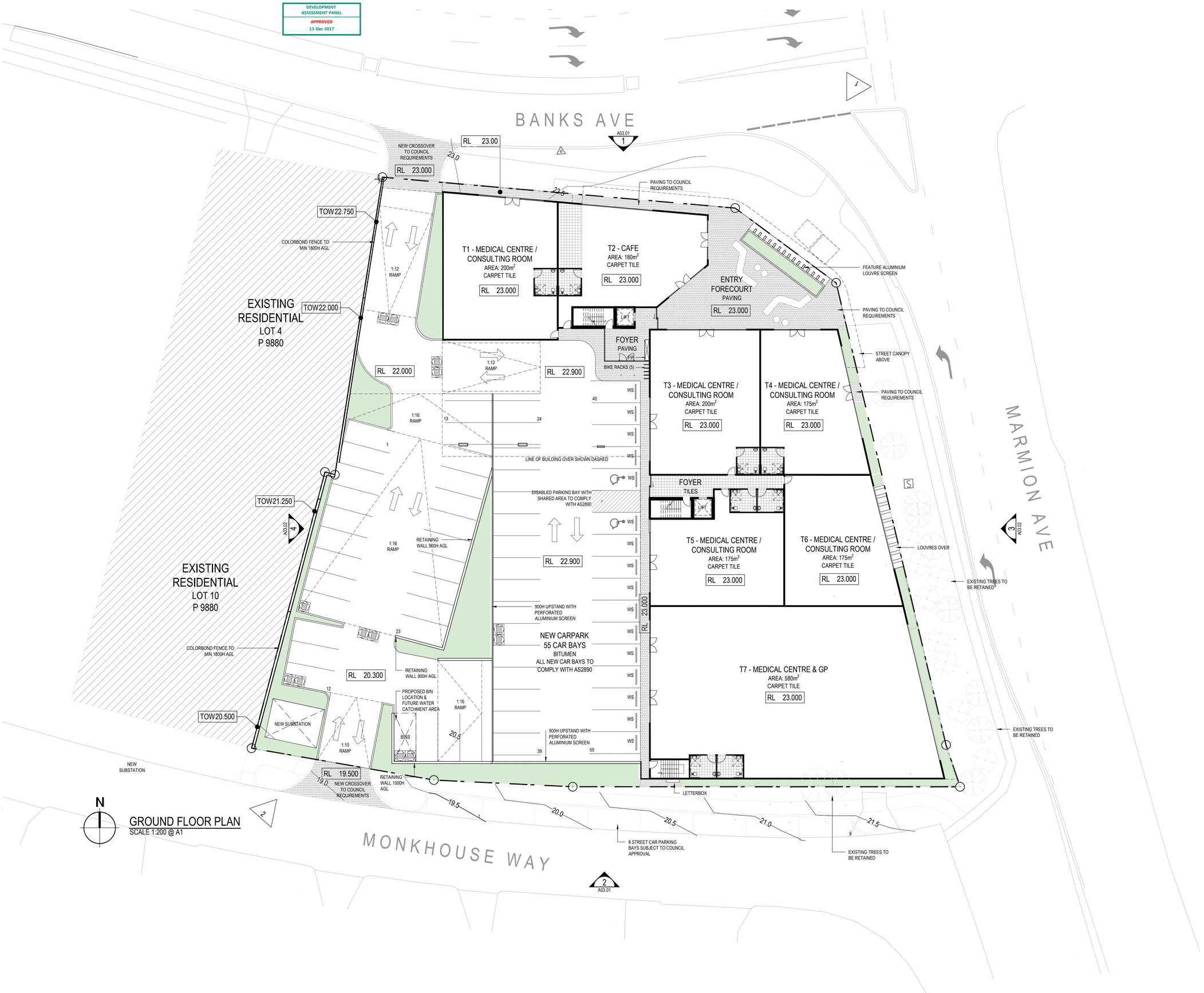
DEVELOPMENT ASSESSMENT PANEL
APPROVED
13-Dec-2017




## GROUND FLOOR PLAN
SCALE 1:200 @ A1

**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.

LEGEND

- NEW BUILDING
- LANDSCAPING; REFER TO LANDSCAPE PLAN ATTACHED BY CAPA LANDSCAPE ARCHITECTS
- NEW PAVING
- EXISTING SITE CONTOURS

| | |
|---|---|
| RL 23.00 | INDICATES PROPOSED NEW RELATIVE LEVEL |
| FFL 23.00 | INDICATES PROPOSED NEW FINISHED FLOOR LEVEL |
| TOW 23.00 | INDICATES TOP OF WALL LEVEL |
| WS | WHEEL STOP |

NOTES

SOAKWELL LOCATIONS SHOWN INDICATIVELY. REFER TO CIVIL ENGINEERS DRAWINGS FOR LOCATIONS AND SIZES.

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LANDSCAPING CALCULATIONS

| | |
|---|---|
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| DISTRICT PLANNING SCHEME | 8% |
| CLASS: NON RESIDENTIAL | |
| PROPOSED LANDSCAPING | 490m² |
| SOFT LANDSCAPE | 310m² |
| HARD LANDSCAPE | 180m² |

PARKING CALCULATIONS

STRUCTURE PLAN
*2.7 BAYS PER 100m2 NLA / 1 BAY PER 37m² NLA*

| | |
|---|---|
| GROUND FLOOR NLA | 1685m² |
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| D | 05/09/17 | FOR REVIEW (CLIENT) | LM | ER |
| C | 30/08/17 | FOR REVIEW (CLIENT) | LM | ER |
| B | 24/08/17 | DA ISSUE | LM | ER |

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dmg ARCHITECTURE
DESIGN MANAGEMENT GROUP level 2 1008 hay street perth 6000
telephone +61 8 9212 8888 | facsimile +61 8 9212 8822
info@dmgaustralia.com.au | www.dmgaustralia.com.au

PROJECT

**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE

PROPOSED GROUND FLOOR PLAN

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:200 @ A1 | LM | LA |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A02.02** | **H** |

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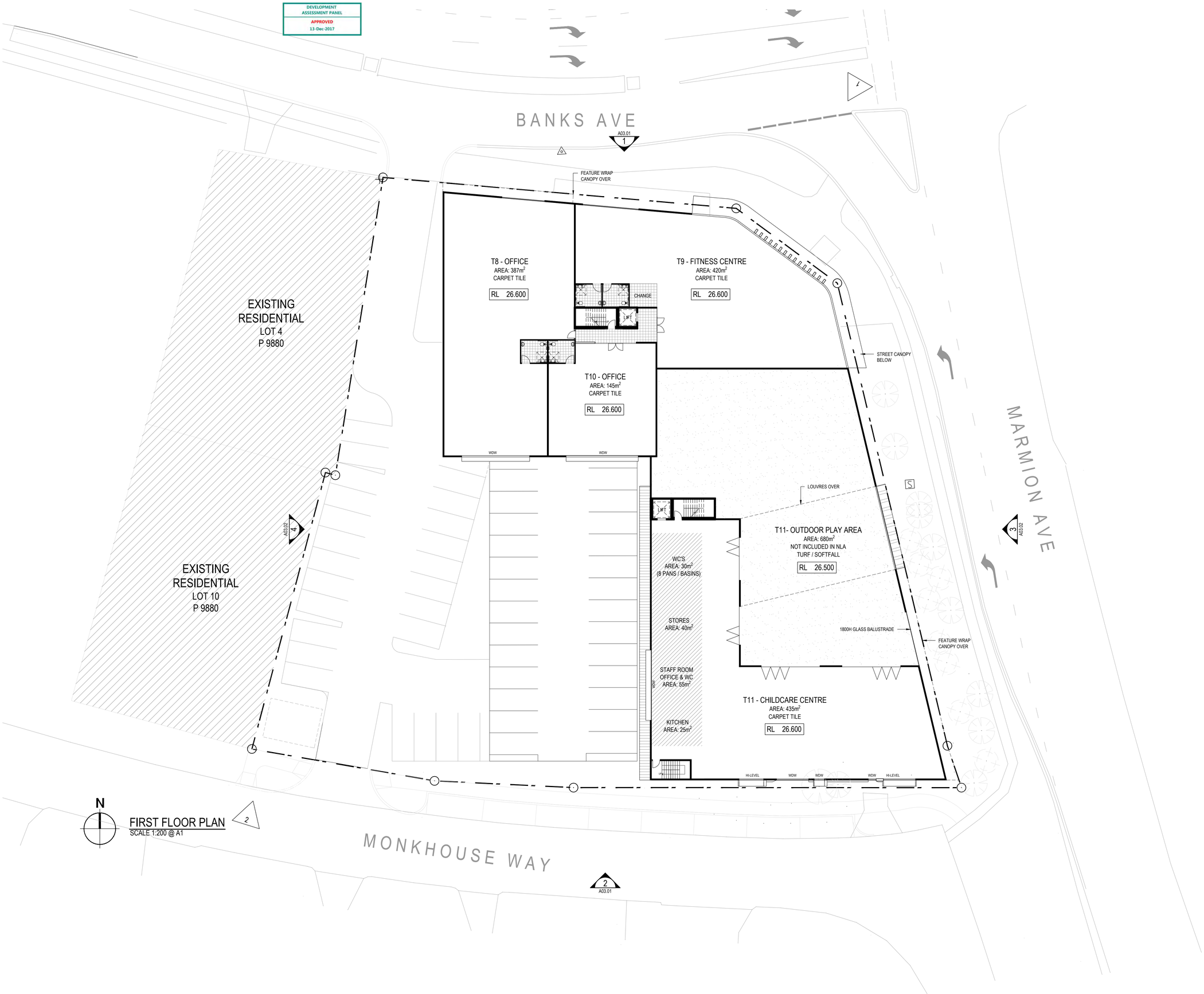
APPROVED
13-Dec-2017




FIRST FLOOR PLAN
SCALE 1:200 @ A1

**NOTE.** Contractor to check and verify all dimensions, levels, and angles on site before commencing. All construction work to be in accordance with the building code of Australia, approved documents and relevant Australian Standards.

LEGEND

NEW BUILDING

LANDSCAPING; REFER TO LANDSCAPE PLAN ATTACHED BY CAPA LANDSCAPE ARCHITECTS

NEW PAVING

EXISTING SITE CONTOURS

| | |
|---|---|
| RL 23.00 | INDICATES PROPOSED NEW RELATIVE LEVEL |
| FFL 23.00 | INDICATES PROPOSED NEW FINISHED FLOOR LEVEL |
| TOW 23.00 | INDICATES TOP OF WALL LEVEL |
| WS | WHEEL STOP |

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| HARD LANDSCAPE | 180m² |

PARKING CALCULATIONS

STRUCTURE PLAN
*2.7 BAYS PER 100m2 NLA / 1 BAY PER 37m² NLA*

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telephone +61 8 9212 8888 | facsimile +61 8 9212 8822
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PROJECT

**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE

PROPOSED FIRST FLOOR PLAN

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:200 @ A1 | LM | LA |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A02.03** | **H** |


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DEVELOPMENT ASSESSMENT PANEL
APPROVED
13-Dec-2017

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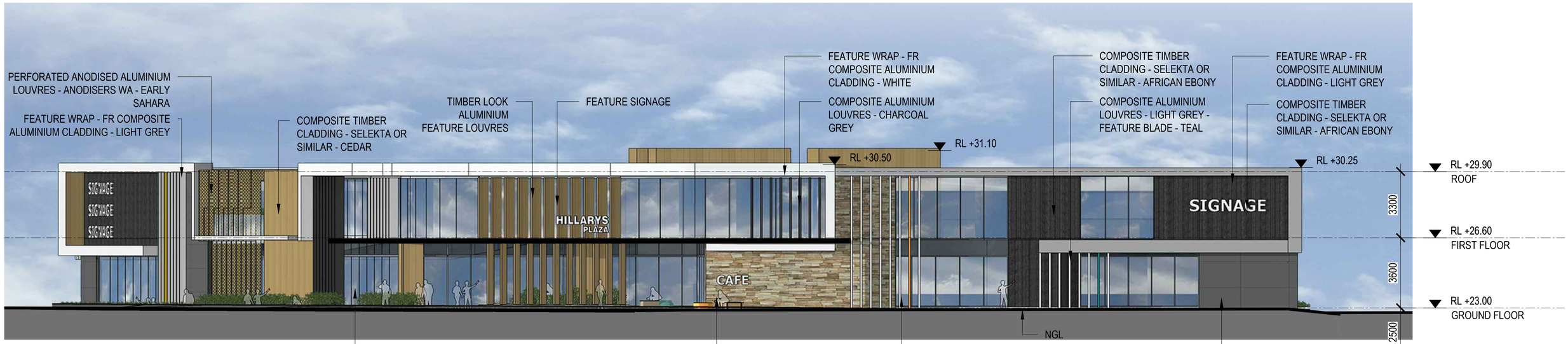


## NORTH ELEVATION
SCALE 1:100

## SOUTH ELEVATION
SCALE 1:100

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| F | 13/11/17 | DRP AMENDMENTS | LM | LA |
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| B | 24/08/17 | DA ISSUE | LM | ER |

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PROJECT
**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE
ELEVATIONS 1

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:100 @ A1 | LM | LA |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A03.01** | **F** |


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DEVELOPMENT ASSESSMENT PANEL
APPROVED
13-Dec-2017

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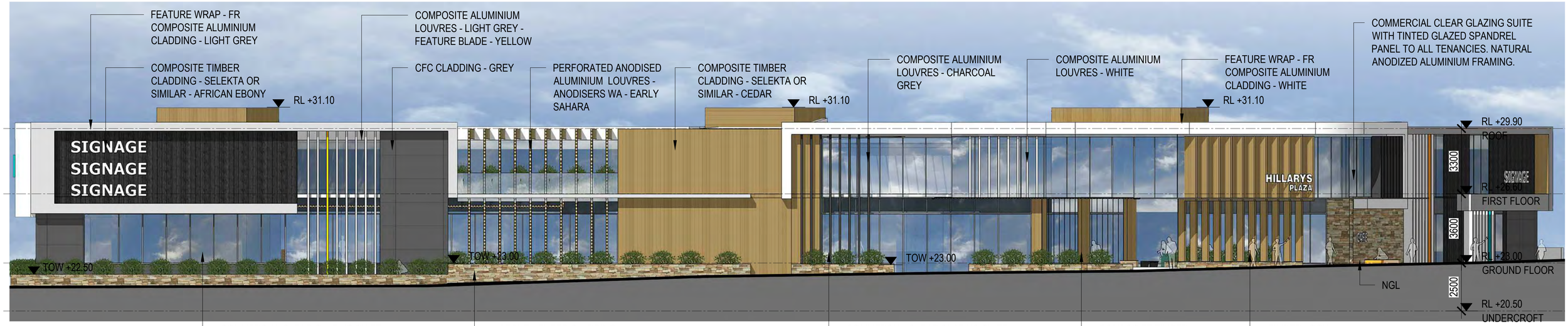
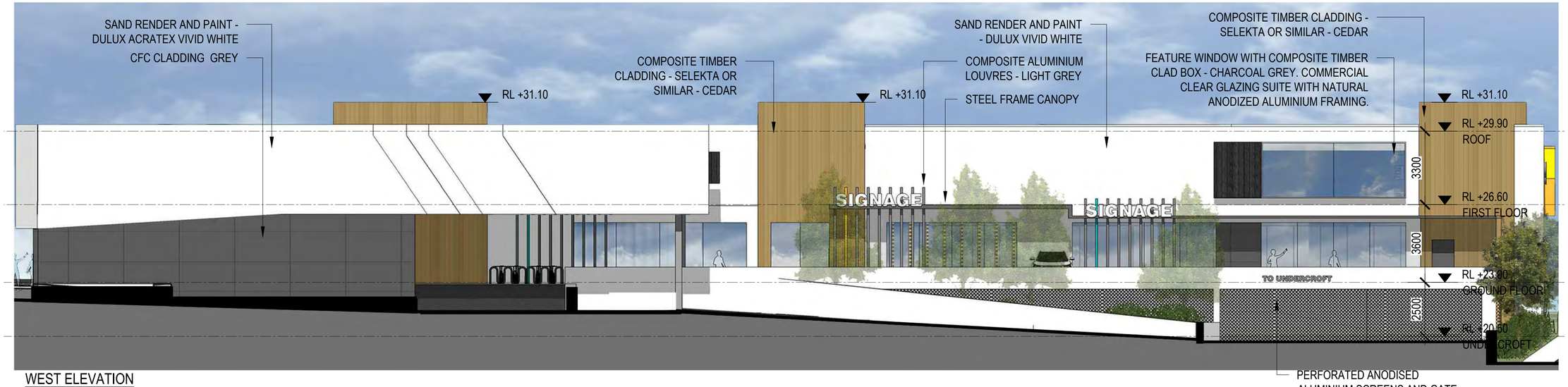
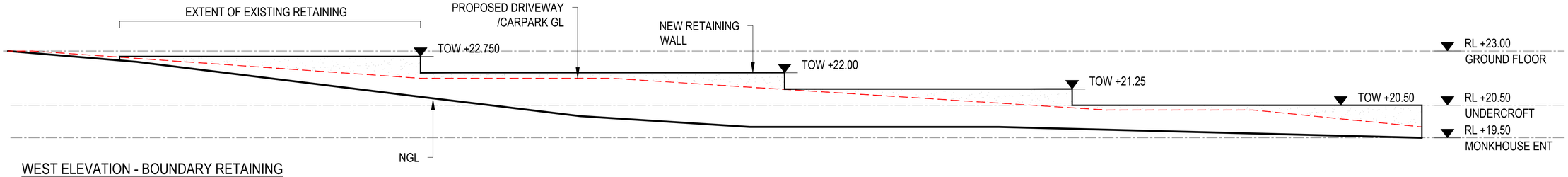



## EAST ELEVATION
SCALE 1:100




## WEST ELEVATION
SCALE 1:100




## WEST ELEVATION - BOUNDARY RETAINING
SCALE 1:100

| ISSUE | DATE | DESCRIPTION | DRN. | APP. |
|---|---|---|---|---|
| F | 13/11/17 | DRP AMENDMENTS | LM | LA |
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PROJECT
**HILLARYS COMMERCIAL**
CNR BANKS AVE AND MONKHOUSE WAY
HILLARYS, WA 6025

TITLE
ELEVATIONS 2

| SCALE | DRAWN | CHECKED |
|---|---|---|
| 1:100 @ A1 | LM | LA |

| PROJECT # | DRAWING # | ISSUE |
|---|---|---|
| 17014 | **A03.02** | **F** |


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Government of **Western Australia**
Development Assessment Panels

# Form 2 – Responsible Authority Report

(Regulation 17)

| | |
|---|---|
| **Property Location:** | Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup |
| **Development Description:** | Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) |
| **Proposed Amendments:** | Amendment to Condition 2 |
| **DAP Name:** | Metro North-West JDAP |
| **Applicant:** | Rowe Group |
| **Owner:** | AMP Capital Funds Management Ltd |
| **Value of Amendment:** | $530 million (Total Value of Development) |
| **LG Reference:** | DA19/0909 |
| **Responsible Authority:** | City of Stirling |
| **Authorising Officer:** | Ross Povey, Director Planning and Development |
| **DAP File No:** | DAP/15/00741 |
| **Report Date:** | 4 October 2019 |
| **Application Received Date:** | 14 June 2019 |
| **Application Process Days:** | 113 days |
| **Attachments** | **Attachment 1**<br>Development Application Plans (all date stamped 12 July 2019):<br>a. Cover Sheet;<br>b. Location Plan (DRG No. DA2 Rev A);<br>c. Site Plan (DRG No. DA3 Rev A);<br>d. Existing Survey and Ground Plan (DRG No. DA4 Rev A);<br>e. Level 00 Plan (DRG No. DA5 Rev L);<br>f. Level 01 Plan (DRG No. DA6 Rev L);<br>g. Level 01 Mezanine Plan (DRG No. DA6.1 Rev F);<br>h. Level 02 Plan (DRG No. DA7 Rev J);<br>i. Basement 01 Plan (DRG No. DA8 Rev K);<br>j. Basement 02 Plan (DRG No. DA9 Rev H);<br>k. Detail Plan (Main Piazza) (DRG No. DA10 Rev D);<br>l. Detail Plan (East Gate) (DRG No. DA11 Rev F);<br>m. Detail Plan (South Gate) (DRG No. DA12 Rev D);<br>n. Typical Apartment Plans (DRG No. DA13 Rev A);<br>o. Elevations (DRG No. DA14 Rev G);<br>p. Elevations (DRG No. DA15 Rev I);<br>q. Elevations (DRG No. DA16 Rev D);<br>r. Elevations (DRG No. DA17 Rev G);<br>s. Material Palette (DRG No. DA18 Rev D);<br>t. Material Palette (DRG No. DA19 Rev E);<br>u. Material Palette (DRG No. DA20 Rev D);<br>v. Material Palette (DRG No. DA21 Rev E);<br>w. Material Palette (DRG No. DA22 Rev C);<br>x. Material Palette (DRG No. DA23 Rev C);<br>y. Forms, Materials, Textures + Colours (DRG No. DA24 Rev C);<br>z. Forms, Materials, Textures + Colours (DRG No. DA25 Rev C);<br>aa. Forms, Materials, Textures + Colours (DRG No. |

| | |
|---|---|
| | DA26 Rev C);<br>bb. Natural Forms and Fabrics (DRG No. DA27 Rev C);<br>cc. Urban, Suburban Landscape (DRG No. DA28 Rev C);<br>dd. Forms, Materials, Textures_Facades (DRG NO. DA29 Rev C);<br>ee. Forms, Materials_Western Precinct (DRG No. DA30 Rev C);<br>ff. Forms, Materials_East Gate (DRG No. DA31 Rev C);<br>gg. Perspective 01 – Main Piazza (DRG No. DA32 Rev C);<br>hh. Perspective 02 – East Gate (DRG No. DA33 Rev D);<br>ii. Perspective 03 – Karrinyup Rd/Main Street (DRG No. DA34 Rev C);<br>jj. Perspective 03 – Karrinyup Rd/Main Street (DRG No. DA35 Rev C);<br>kk. Site Plan – Existing + Proposed Verge Overlay (DRG No. A01 Rev B); and<br>ll. Overshadowing Diagrams (DRG NO. A02 Rev D).<br><br>**Attachment 2**<br>Aerial Location Plan<br><br>**Attachment 3**<br>Metropolitan Region Scheme (MRS) Zoning Map<br><br>**Attachment 4**<br>City of Stirling Local Planning Scheme No. 3 (LPS 3) Zoning Map<br><br>**Attachment 5**<br>Previous Metro North-West JDAP Determinations:<br>a. Metro North-West JDAP Determination dated 14 August 2015 (DA15/0460)<br>b. Metro North-West JDAP Determination dated 21 January 2016 (DA15/2234)<br>c. Metro North-West JDAP Determination dated 7 September 2016 (DA16/1046)<br>d. Metro North-West JDAP Determination dated 15 August 2016 (DA16/1233)<br>e. Metro North-West JDAP Determination dated 13 April 2017 (DA16/2419)<br>f. Metro North-West JDAP Determination dated 6 July 2017 (DA16/2761)<br>g. Metro North-West JDAP Determination dated 19 December 2017 (DA17/1652)<br>h. Metro North-West JDAP Determination dated 19 December 2017 (DA17/1653)<br>i. Metro North-West JDAP Determination dated 19 |

| | |
|---|---|
| | October 2018 (DA18/0791)<br><br>**Attachment 6**<br>Applicant's Justification<br>a. Applicant's Cover Letter dated 29 April 2019<br>b. Aurecon Transport Plan for Development Application dated 10 July 2019<br>c. Aurecon Travel Behaviour Change and Parking Management Plan dated 10 July 2019<br>d. Aurecon Technical Note dated 27 February 2019<br><br>**Attachment 7**<br>Transport Portfolio Response dated 20 September 2019<br><br>**Attachment 8**<br>Karrinyup Shopping Centre – Summary of DAP Applications |

**Officer Recommendation:**

That the Metro North-West JDAP resolves to:

1. **Accept** that the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 14 June 2019 is appropriate for consideration in accordance with regulation 17 of the Planning and Development (Development Assessment Panels) Regulations 2011;

2. **Approve** the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 14 June 2019 and accompanying plans in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015* and the provisions of the City of Stirling Local Planning Scheme No. 3, for the proposed modified condition of the approved Major Expansion of Karrinyup Shopping Centre at Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup, subject to:

**<u>Amended Condition</u>**

2. Prior to opening of the retail centre, the applicant is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The agreement is to provide for the applicant to fund the PTA's estimated cost of delivering additional Transperth bus service kilometres for a minimum period of five years from the opening of the retail centre, to the satisfaction of the City of Stirling and upon the advice of Main Roads WA and PTA.

**<u>New Advice Note</u>**

1. The mixed use development in the north-east corner of the site does not form part of this approval.

All other conditions and requirements detailed on the original approval DAP/15/00741 dated 14 August 2015, including any amendments to conditions and requirements on succeeding amendments to the approval, shall remain unless altered by this application.

Where an approval has so lapsed, no development shall be carried out without further approval first being sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under Regulation 17(1)(a) of the *Planning and Development (Development Assessment Panel) Regulations 2011*.

**Background**

| | |
|---|---|
| Zoning MRS: | Urban |
| TPS: | Regional Centre |
| Use Class: | Amusement Parlour, Betting Agency, Car Park, Child Care Premises, Cinema / Theatre, Community Purposes, Consulting Rooms, Convenience Store, Drive Through Fast Food Outlet, Fast Food Outlet, Medical Centre, Motor Vehicle Wash, Multiple Dwelling, Office, Personal Care Services, Personal Services, Recreation – Private, Restaurant, Service Station, Shop, and Tavern |
| Strategy Policy: | Not Applicable |
| Development Scheme: | Not Applicable |
| Lot Size: | 137,835m² |
| Land Use: | Consulting Rooms, Drive Through Fast Food Outlet, Fast Food Outlet, Medical Centre, Motor Vehicle Wash, Personal Care Services, Office, Restaurant, and Shop |

The subject site is zoned 'Urban' under the Metropolitan Region Scheme (MRS) (refer Attachment 3) and 'Regional Centre' under the City of Stirling Local Planning Scheme No. 3 (LPS 3) (refer Attachment 4).

The subject site predominately abuts residential properties along Davenport Street, Francis Avenue and Burroughs Road, with a small number of commercial tenancies located along the periphery of the Centre. The subject site abuts Karrinyup Road to the south.
There have been a number of DAP applications for this site, since the Original Form 1 application was approved by the Metro North-West JDAP on 14 August 2015 for the major expansion of Karrinyup Shopping Centre. The proposal has been considered in context with previous applications for the subject site which are briefly described in Attachment 8. All previous Metro North-West JDAP determinations are contained within Attachment 5.

Construction of the approved development commenced in November 2018 with stage 8 of 9 stages of the overall development currently under construction.

**Details: Outline of Development Application**

This Form 2 application relates solely to the amendment of Condition 2 of the development approval (DAP/15/00741 refers), which is as follows:

> *Prior to opening of the retail centre, the applicant is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The agreement is to provide for the applicant to fund the PTA's estimated cost of delivering additional Transperth bus service kilometres for a minimum period of five years from the opening of the retail centre, to the satisfaction of the City of Stirling and the Department of Transport upon the advice of the PTA.*

The applicant's planning justification (Attachment 6) states that the landowner has discussed potential arrangements regarding bus movements and funding with the PTA, however a solution has not been agreed between parties. Consequently, the applicant has undertaken a review of the approved Transport Plan with the following modifications proposed to the agreed arrangement:

- Additional footpath construction funding beyond 400m of the centre;
- Street tree planting contribution;
- Reduction to the bus lane along Karrinyup Road (east of Huntriss Road – approximately 460m);
- Targeted increased bus frequencies, funding between the Karrinyup and Stirling bus stations;
    - Weekday AM / PM Peak – 10 minute frequencies – combination of 423 & 425 routes.
    - Weekends (10am – 6pm) – 15 minute frequencies – 425 route.
- Extended increased bus frequencies funding period (increased from 5 to 7 years);
- Public Transport use promotion during construction (approximate 3 years), including additional early morning bus funding; and
- Way finding / route guidance signage (provision or funding) at both the Karrinyup and Stirling Bus Stations.

With respect to the above, the applicant proposes the following amended Condition 2 of the development approval:

> *The applicant is to amend the Transport Plan to include the commitments as summarised in the "Revised Proposal" column of the attached table dated 26 February 2019. Prior to the opening of the completed retail centre and thereafter the Transport Plan is to be implemented to the satisfaction of the City.*

**Legislation and Policy:**

<u>Legislation</u>

- Planning and Development Act 2005
- Metropolitan Region Scheme (MRS)
- Planning and Development (Local Planning Schemes) Regulations 2005
- Local Planning Scheme No. 3 (LPS 3)

State Government Policies

- State Planning Policy 4.2 – Activity Centres for Perth and Peel
- State Planning Policy 7.3 – Residential Design Codes Volume 2 – Apartments

Local Policies

- Local Planning Policy 4.2 – Mixed Use and Commercial Centre Design Guidelines
- Local Planning Policy 5.7 – Karrinyup Regional Centre Design Guidelines
- Local Planning Policy 6.2 – Bicycle Parking
- Local Planning Policy 6.3 – Bin Storage Areas
- Local Planning Policy 6.6 – Landscaping
- Local Planning Policy 6.7 – Parking and Access
- Local Planning Policy 6.11 – Trees and Development.

Clause 4.2.11 of Local Planning Scheme No. 3 – Regional Centre

The subject site is zoned 'Regional Centre' in accordance with the City of Stirling Local Planning Scheme No. 3 (LPS 3). LPS 3 provides the following objectives for the Regional Centre zone:-

a) *To provide for the full range of shopping, office, administrative, social, recreation, entertainment and community services, consistent with the region-serving role of the centre.*
b) *To facilitate the creation of employment within the centre so as to reduce the demand for travel, and enhance the level of self-sufficiency within the sub-region.*
c) *To promote a high degree of accessibility to and within the centre, for users of all modes of transport (bus, rail, private car, cycle and pedestrian) and to avoid fragmentation of commercial development.*
d) *To enhance pedestrian connectivity within the centre, so as to facilitate movement between sites and from public and private transport nodes.*

Clause 5.3.2 of Local Planning Scheme No. 3 – Special Application of Residential Design Codes

The subject site is zoned 'Regional Centre', hence Clause 5.3.2 of LPS 3 is applicable which states:-

> *Except as otherwise required in the Scheme or a Local Planning Policy, residential development not in the Residential Zone is to comply with the requirements of multiple dwellings under the R80 R-Code.*

On the basis of the above, residential development on the subject site is to be in accordance with the R80 standards of Part 6 of the Residential Design Codes (R-Codes), unless otherwise varied by a Local Planning Policy.

Clauses 5.5.1 and 5.5.2 of Local Planning Scheme No. 3 – Variations to Site and Development Standards and Requirements

The development application proposes variations to the requirements of LPS 3, hence Clauses 5.5.1 and 5.5.2 of LPS 3 are relevant:-

*Except for development in respect of which the Residential Design Codes apply, if a development is the subject of an application for planning approval and does not comply with a standard or requirement prescribed under the Scheme, the Council may, despite the non-compliance, approve the application unconditionally or subject to such conditions as the Council thinks fit.*

*In considering an application for planning approval under Clause 5.5.1, where, in the opinion of the Council, the variation is likely to affect any owners or occupiers in the general locality or adjoining the site which is the subject of consideration for the variation, the Council is to –*

*a) consult the affected parties by following one or more of the provisions for advertising uses under Clause 9.4; and*
*b) have regard to any expressed views prior to making its determination to grant the variation.*

<u>Planning and Development (Local Planning Schemes) Regulations 2015 Schedule 2, Part 9, Clause 67 (Matters to be considered by local government)</u>

Clause 67 of the *Planning and Development (Local Planning Schemes) Regulations 2015* Deemed Provisions stipulates other matters to which Council is to give due regard to. The following provisions are applicable to the development proposal:-

*a) The aims and provisions of this Scheme and any other local planning scheme operating within the Scheme area.*
*b) the requirements of orderly and proper planning including any proposed local planning scheme or amendment to this Scheme that has been advertised under the Planning and Development (Local Planning Schemes) Regulations 2015 or any other proposed planning instrument that the local government is seriously considering adopting or approving.*
*c) any approved State planning policy.*
*g) any local planning policy for the Scheme area.*
*m) the compatibility of the development with its setting including the relationship of the development to development on adjoining land or on other land in the locality including, but not limited to, the likely effect of the height, bulk, scale, orientation and appearance of the development;*
*t) the amount of traffic likely to be generated by the development, particularly in relation to the capacity of the road system in the locality and the probable effect on traffic flow and safety.*
*u) the availability and adequacy for the development of the following:*
    *i. public transport services;*
    *ii. public utility services;*
    *iii. storage, management and collection of waste;*
    *iv. access for pedestrians and cyclists (including end of trip storage, toilet and shower facilities;*
    *v. access by older people and people with disability.*
*za) the comments or submissions received from any authority consulted under clause 66.*

**Consultation:**

Public Consultation

As part of consideration of the Amendment to Condition 2, public consultation was not required to be undertaken in accordance with the City's Planning Consultation Procedure.

Consultation with other Agencies or Consultants

Internal and external referrals were undertaken as part of the City's assessment, with all received responses forming part of the City's consideration of this application.

**Transport Portfolio**

On 19 August 2019, the application was referred to the Transport Portfolio, which comprises the Department of Transport (DoT), Main Roads WA (MRWA) and the Public Transport Authority of WA (PTA). On 20 September 2019, the City received a response from the DoT, on behalf of the Transport Portfolio with comments contained in Attachment 7 and provided as follows:

> *Bus Service Proposals*
>
> *The Portfolio position remains that Route 425 alone (rather than the combined 425 and 423 service frequencies) is to be reinforced to provide a single, legible, high frequency and direct alignment, especially once the bus lanes are constructed.*
>
> *Leaving the weekday bus service provision at the status quo will not be sufficient to drive public transport mode shift outcomes required as committed to and approved as part of the development. The focus of public transport provisions is to be concentrated on Route 425 (planned 10-minute frequency at peak periods and 15 minutes off peak). This will establish a strong legible primary link between the shopping centre and Stirling Station. The service is the most direct route and with the construction of bus lanes on Karrinyup Road, the service will have reliable trip times despite congestion on the network increasing over time.*
>
> *Investigation into providing bus priority on Huntriss Road for Route 423, deemed that option unviable therefore there would be a diverging level of service reliability between Routes 423 and 425 as congestion increases.*
>
> *Reduction in the length of the bus lanes included in the application is not justified or supported.*
>
> *Public Transport Service Contribution*
>
> *The Portfolio does not support the applicant's proposal to co-fund a modified public transport service for seven years as the proposed contributions represent less than half of the cost of the planned services. The service kilometre requirement to be paid by the applicant is 105,500 km per annum together with the cost to grow the fleet by 2 buses in the peak period ($120,000 per annum).*

*The Applicant proposes to drop its contribution to an estimated 32,000 – 38,000kmper annum and to grow the fleet by 1 bus in the peak period ($60,000 per annum).*

*It should be noted that in the JDAP Metro NW 144 meeting (15 August 2016), the bus service contribution period was reduced to 5 years from the originally approved condition that required contributions in perpetuity.*

*Without a contribution from the applicant, the PTA is not resourced to increase bus services to Karrinyup from its own budget. There are numerous demands in the network that would be prioritised if and when funding is available. Long term funding requirements have been applied in other circumstances including at Midland Gate Shopping Centre and at most universities.*

*Construction Staff Travel Arrangements*

*The proposal to include the construction period costs of transporting construction workers as part of the development contribution in the Transport Plan is not acceptable.*

*The funding of additional bus services during the construction period has been paid directly to the bus operator by the construction company, as a separate arrangement. Transport of construction staff is the responsibility of the contractor and it was the decision of the contractor to stage their workforce from Stirling Station because land was available for parking adjacent to the station. This was driven by the fact that their staff were unable to park on site and therefore the choice to transport construction staff in early mornings via addition Transperth buses (which were of negligible benefit to the wider community operating so early in the non-peak direction) and subsequent cost is not for consideration in the context of the DA conditions. This also applies to the subsidisation Smart riders and directional signage at Stirling Station and Karrinyup Bus Station – essentially these costs relate to mitigation disruption during construction.*

*Amendment to Condition 2*

*It is noted that the submitted Transport Plan proposes modifications to the road network. Such works require an approval from Main Roads to modify the network. This approval is a separate and distinct approval from a development approval issued under the Planning and Development Act 2005.*

The City acknowledges the comments provided by the Transport Portfolio. The City's assessment will address the comments later in this report.

**Planning Assessment:**

The assessment is separated into the following sections:

1. DA15/0460 – Approved Original Form 1 Application – Major Expansion of Karrinyup Shopping Centre
2. DA15/2334 – Approved Form 2 Application – Modification to Conditions
3. DA19/0909 - Current Form 2 Application – Modification to Condition 2
4. Internal Referrals

5. Amended Condition and Advice Note
6. State Planning Policy 7.3 Residential Design Codes Volume 2 – Apartments
7. Planning and Development (Local Planning Schemes) Regulations 2015

**1. DA15/0460 – Approved Original Form 1 Application – Major Expansion of Karrinyup Shopping Centre**

The City received the Original Form 1 application for the Major Expansion of Karrinyup Shopping Centre on 5 March 2015. As part of the City's assessment and Responsible Authority Report (RAR), significant concerns were raised by the City in relation to the submitted Transport Plan, particularly in the absence of an Activity Centre Structure Plan, with the City engaging Jacobs Engineering Group to undertake a peer review of the Transport Plan on behalf of the City. The peer review by Jacobs Engineering Group concluded that there were substantive issues, from a transport perspective, that prevented the application from being supported. These are summarised briefly below:

- The proposed redevelopment of Karrinyup Shopping Centre would result in a limited reduction in car dependence with the potential for a significant increase in congestion and a negative car parking impact around the centre.
- The public transport mode share of 2% was well below the 8% public transport mode share that existed at other regional centres in response to the low frequency of buses to and from Karrinyup which were insufficient to attract patronage from staff or visitors to the centre. The developer had also not provided unconditional commitment to the funding of the necessary increases in bus services as identified by the Public Transport Authority of WA.
- The development application only targeted a 4% mode share by public transport which represented approximately half that of similar centres in Perth.
- The centre was serviced by only five bus routes with very low levels of frequency which resulted in the centre being very poorly serviced by public transport. The Transport Plan proposed the following measures to improve public transport patronage:
    - Better integration of the bus station with the entrance to the shopping centre whilst including improved personal security (CCTV, lighting, weather cover);
    - Real time bus timetable information at the bus station and throughout the shopping centre;
    - Improved bus priority infrastructure including dedicated bus lanes at various locations along Karrinyup Road; and
    - Travel behaviour change initiatives to promote mode shift.

  Despite the measures proposed within the Transport Plan, it was concluded the following measures would need to be implemented to achieve the required mode shift:
    - Route 425 – This service was required to be upgraded to a 15 minute service each day in each direction between 7am and 9pm on weekdays with a service frequency of 10 minutes during peak periods. The 425 would run on a 15 minute frequency both ways on Saturdays and Sundays between 7am and 7pm; and
    - Provision of a new service north/south on a similar frequency to route 425 above, to link Scarborough / Wembley Downs to Karrinyup.

The Transport Portfolio conditioned their support of the application based on a similar upgrading of bus frequencies and advised if this service was not to be provided, their support of the application would be withdrawn.

Notwithstanding the City's concerns regarding the approval of the development in relation to transport related matters, the application was approved by the JDAP on 14 August 2015. However, in response to the transport related issues, particularly the public transport mode shift, the following Condition and Advice Note was imposed by the JDAP on the development approval issued under Local Planning Scheme No.3:

*Condition 2* — *Prior to the opening of any component of the development, the applicant is to have entered into a legally funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access no later than upon its opening. The applicant must agree to fund the PTA's estimated costs of delivering 105,500 Transperth branded bus service kilometres per year, inclusive of bus ownership costs for two buses, and direct administration costs in perpetuity to the satisfaction of the Western Australian Planning Commission upon the advice of the PTA.*

*Advice Note 3* — *In relation to Condition 2, AMP to fund the full cost ($530,000/annum 2015/16) of operating the Route 425 at a 20 minute peak and 30 minute off peak period frequency on weekdays from 7am to 9pm; and a 30 minute frequency on weekends from 7am and 7pm. This level of service should correspond with trading hours and train services at Stirling Station. Also note that the funding from PTA is to be the same as AMP during these hours. Should services outside of these times will be fully funded by the PTA.*

*The transport portfolio encourages the owner to change the opening hours for the majority of the tenants to 10AM. Should this be done the funding agreement can be renegotiated to reflect the new service demands and any savings on bus ownership costs.*

The above Condition and Advice Note demonstrates recognition by the JDAP of the importance of prioritising public transport services to encourage a mode shift, which was further substantiated by the approved Transport Plan and Travel Behaviour Change and Parking Management Plan submitted by the applicant. Additionally, the Condition and Advice Note reinforces the importance of providing a single, legible, direct and high frequency bus route to and from Karrinyup Shopping Centre (i.e. Route 425).

**2. DA15/2334 – Approved Form 2 Application – Modification to Conditions**

On 11 November 2015, the City received a Form 2 Application relating to the modification of a number of conditions to the original development approval, including Condition 2 of the original development approval.

Upon advice from DoT, the applicant proposed the deletion of Condition 2 and Advice Note 3 from the LPS 3 development approval, with the following amended condition and advice note to be placed on the MRS development approval:

*Condition 2* *Prior to the opening of the retail centre, the landowner is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The landowner must agree to fund the PTA's estimated cost of delivering additional Transperth bus services from the opening of the retail centre, to the satisfaction of the Western Australian Planning Commission upon the advice of the PTA.*

*Advice Note 3* *In relation to Condition 2, the landowner to fund the cost of operating higher frequency bus services on weekdays from 7am to 9pm and on weekends from 7am and 7pm, to achieve the modelled 6% mode share for public transport. This level of service should correspond with trading hours and train services at Stirling Station.*

On 18 November 2015, the application was referred to the Transport Portfolio for comment noting the discrepancy between the proposed condition and the original condition on the determination notice. On 7 January 2016, the City received comment from DoT, on behalf of the Transport Portfolio, advising that Condition 2 and Advice Note 3 should be retained on the determination notice under LPS 3. Minor modifications to the Condition were recommended by the Department of Transport, with these detailed within the City's RAR and included on the JDAP's approval of the application on 21 January 2016. The current Condition 2 and Advice Note 3 are provided as follows:

*Condition 2* *Prior to opening of the retail centre, the applicant is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The agreement is to provide for the applicant to fund the PTA's estimated cost of delivering additional Transperth bus service kilometres for a minimum period of five years from the opening of the retail centre, to the satisfaction of the City of Stirling and the Department of Transport upon the advice of the PTA.*

*Advice Note 3.* *In relation to Condition 2, the landowner to fund the cost of operating higher frequency bus services on weekdays from 7am to 9pm and on weekends from 7am and 7pm, to achieve the modelled 6% mode share for public transport. This level of service should correspond with trading hours and train services at Stirling Station.*

With respect to the above, Condition 2 of the Form 2 development approval (DA15/2334 refers) significantly reduced the funding of public transport services, with the funding decreased from perpetuity to a period of five years from the opening of the retail centre. Notwithstanding this, the requirement for dedicated bus infrastructure and service funding was retained in order to encourage the public transport mode shift as per the approved Transport Plan and Travel Behaviour Change and Parking Management Plan.

## 3. DA19/0909 – Current Form 2 Application – Modification to Condition 2

As outlined earlier in this report, the applicant has submitted a revised Transport Plan and Travel Behaviour Change and Parking Management Plan citing issues with the implementation of the current approved scheme. Specifically, the applicant has cited issues relating to high costs and the long term viability of high frequency bus routes following the expiry of the funding period by the landowner. The revised Transport Plan proposed by the applicant focusses on the following elements:

- Reduction of the length of the bus lane on Karrinyup Road;
- Increased bus frequencies;
- Extended funding for increased bus frequencies;
- Public transport use promotion during construction;
- Additional footpath construction and street tree planting; and
- Way finding and route guidance signage.

This section of the report addresses the abovementioned elements:

<u>Reduction to the Bus Lane on Karrinyup Road</u>

The revised Transport Plan proposes reducing the length of the bus lane along Karrinyup Road by 460m with the section east of Huntriss Road to be removed entirely. The revised Transport Plan and justification provided by the applicant identifies the length of the current bus lane was based on the Saturday midday peak period queuing that was estimated to occur in 2031 westbound from the Huntriss Road intersection. The applicant contests as this level of congestion does not occur during the weekday peaks, it is estimated the current bus lane length would be required for two hours on a Saturday, equating to 8 buses on a Saturday due to the improved bus frequencies.

As per the Transport Portfolio response, there is a requirement to provide a single, legible, high frequent and direct public transport route to and from the Centre, with the entirety of the approved bus lane critical to minimising congestion on the road network and improving the public transport experience to users on weekdays and weekends. The provision of dedicated bus lanes along Karrinyup Road, as per the approved Transport Plan, promotes reliable trip times despite any congestion of the road network. Furthermore, the applicant has not provided sufficient justification or modelling of the road network which supports the proposed removal of the approved bus lane.

On the basis of the above, the removal of the bus lane east of Huntriss Road and reduction in length is not supported by the City as it will compromise the targeted mode shift required to support the expansion of Karrinyup Shopping Centre. Additionally, it is noted the submitted Transport Plan proposes modifications to the road network. This approval is separate and distinct from development approval issued under the *Planning and Development Act 2005.*

<u>Increased Bus Frequencies</u>
The applicant's revised Transport Plan includes targeted increased bus frequencies during the following periods:

- AM/PM weekdays peaks with 10 minute frequencies using a combination of the 423 and 425 routes; and
- Weekends with 15 minute frequencies using the 425 Route.

With respect to the above, the City does not support the proposed combination of services along Routes 423 and 425 to facilitate the public transport mode shift. The City supports the position of the Transport Portfolio in that the focus for public transport provision should be concentrated along Route 425 which provides a direct and high frequency service supported by dedicated bus lanes along Karrinyup Road. Previous reviews into providing bus priority along Huntriss Road for Route 423, deemed the option unviable with a contrasting level of service reliability between Routes 423 and 425 during congestion.

Additionally, the modifications proposed to the approved Transport Plan result in a reduction in Public Transport Trips by 2% in 2031, with this reduced from 6% to 4% as per the below Figure from Aurecon's Technical Note dated 27 February 2019 (Attachment 6):

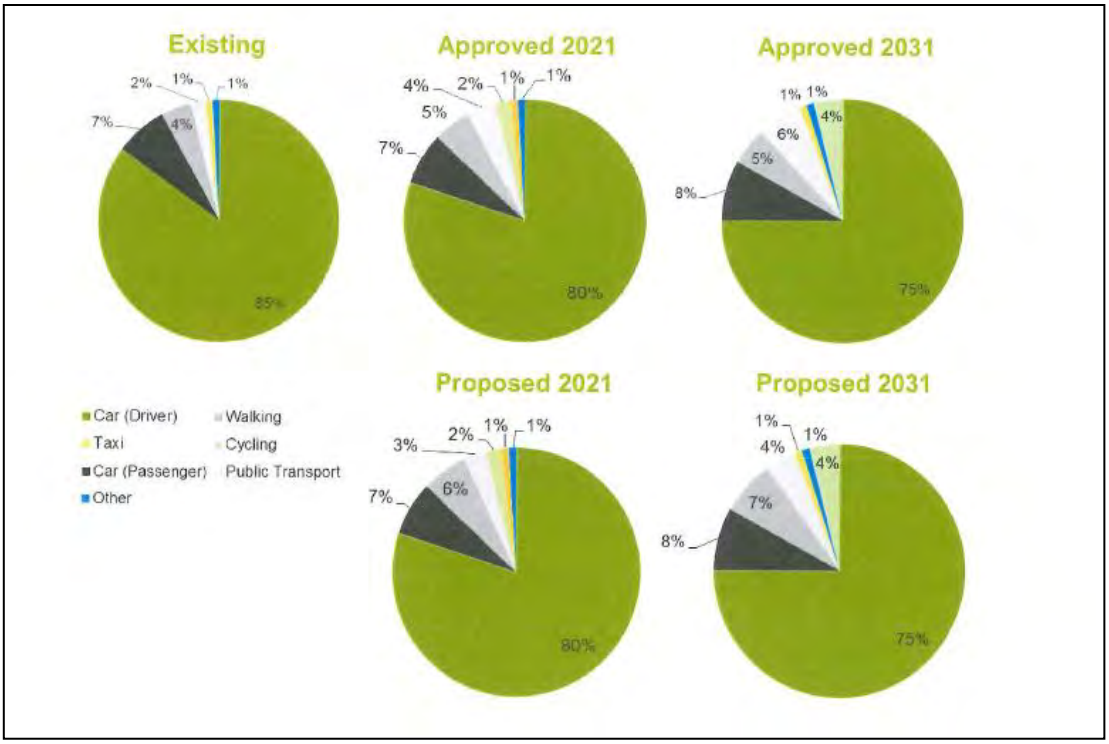


*Figure 1: Comparison of Modal Trips between Approved Transport Plan and Proposed Transport Plan.*

With respect to the above, the public transport mode share was raised as a significant issue in the City's RAR as part of the original development application (DA15/0460 refers). Specifically, the City identified the development application only targeted a 4% mode share by public transport which represented approximately half that of similar centres in Perth. The approved Transport Plan identifies a mode share of 6% by public transport, with elements within the proposed Transport Plan including reduction of the bus lane along Karrinyup Road and targeted frequencies along Routes 423 and 425, reducing the public transport mode share back to 4% as per the original proposal. This reduction is considered inconsistent with the intent to prioritise public transport services and undermines the approved expansion of the Centre.
On the basis of the above, the City does not support the proposed revision to the Transport Plan to provide for a combination of increased frequencies between Routes 423 and 425. The City supports the retention of the Route 425 service to provide the legible, direct and high frequent service to the Centre.

Extended Funding for Increased Bus Frequencies

The revised Transport Plan proposes to extend the funding period for increased bus frequencies along Routes 423 and 425 from five years to seven years.

As previously outlined, the targeted increased bus frequencies along Route 423 and 425 are not supported. The focus of increased public transport provision should be concentrated along Route 425 with 10 minute frequencies at peak periods and 15 minutes during off peak periods in order to establish a direct and legible route between the Centre and Stirling Station.

As per the Transport Portfolio's response, the applicant's proposal to co-fund a modified public transport service (i.e. Routes 423 and 425) represents less than half the cost of the planned services as per the approved Transport Plan. Currently, the service kilometre requirement to be paid by the applicant is 105,500km per annum together with the cost to grow the fleet by 2 buses in the peak period ($120,000 per annum). Based on the Transport Portfolio's response, it is estimated the revised Transport Plan seeks to reduce this contribution to 32,000 – 38,000km per annum and to grow the fleet by 1 bus in the peak period ($60,000 per annum). Given the original development approval required the landowner to fund the services in perpetuity, which was then reduced to five years as per the Form 2 (DA15/2334 refers), this proposal represents a significant reduction towards the investment in public transport. Given a key objective of SPP 4.2, and justification for the original development approval, relates to the maximisation of access to activity centres by walking, cycling and public transport while reducing private car trips, the proposed amendment to Condition 2 is contrary to the objectives of SPP 4.2 and the original development approval.

Additionally, the Transport Portfolio has indicated that the PTA is not resourced to provide increased bus services from its current budget. Accordingly, without the funding of the approved services, the Centre will not achieve the required modal shift which was a key component in supporting the expansion; thereby undermining the original development approval.

On the basis of the above, the City does not support the extended funding period for increased bus frequencies along Routes 423 and 425. The City recommends the current and approved funding arrangement be retained with increased services along Route 425 remaining the priority to achieve the required public transport mode shift.

Public Transport Use Promotion During Construction

Separately, the landowner has provided additional funding for services between Stirling Station and the Centre for a period of three years during the construction phase of the development.

The funding of additional bus services was paid directly to the bus operator by the construction company, as a separate arrangement, in order to transport contractors associated with the redevelopment of the Centre to and from Stirling Station. This arrangement was required as there was insufficient area available to accommodate contractors on-site or in close proximity to the Centre during the construction phase. The additional services provided by the landowner provide minimal benefit to the wider community with services commencing in the early morning, in the non-peak period in order to accommodate contractors.

Given the landowner decided to provide contractor parking in a private temporary car park abutting Stirling Station, the landowner is responsible for the costs associated with transporting contractors to and from the Centre. Accordingly, this arrangement should not form part of the Transport Plan or modified Condition 2 as there is no nexus to include the services associated with construction workers as part of the provision of services associated with the future users of the expanded retail centre, which is the intent of Condition 2.

Additional Footpath Construction and Street Tree Planting

The revised Transport Plan proposes funding contributions, up to $400,000, for footpaths beyond 400m of the centre. At present, the applicant is required to contribute 50% of the costs associated with the installation of footpaths within 400m of the Centre on one side of every street that does not have a footpath.

Additionally, the applicant has proposed additional street tree planting contributions of $50,000. As per the proposed Transport Plan, the proposed contributions may increase the attractiveness of the Centre to pedestrians on a local level which is supported, however this should not be at the expense of the public transport services through the reallocation of funding.

Way Finding and Route Guidance Signage

The revised Transport Plan proposes funding or provisions for way finding and route guidance signage at Stirling Station.

Based on the previous advice from the PTA, the City advises that Transperth installs signage at train stations in accordance with its standards. Signage promoting a particular shopping centre is unlikely to be supported due to the precedent it sets on the endorsement of a specific commercial entity. Additionally, these contributions should not be at the expense of providing public transport services or infrastructure. On this basis the City does not support the inclusion way finding and route guidance signage at Stirling Train Station or Karrinyup Bus Station.

As outlined above, the City does not support the proposed modifications to the Transport Plan, and does not support the amended Condition 2. The City supports and reinforces the position of the Transport Portfolio for the approved Transport Plan and current approved Condition 2 to be retained.

## 4. Internal Referrals

City Planning Business Unit Comments

The City's City Planning Business Unit provided the following comments in relation to the proposal.

> *City Planning supports PTA's position in that the conditions should remain as they are currently.*
> *The main reason for this is that the trips generated by the development could not be handled by the road network alone and that a mode shift to walking, cycling and public transport was required to make the development work from a transport point of view.*

*The conditions of the development application require upgrades to walking cycling and public transport infrastructure to support this agreed mode shift as well as increase public transport services. The increase in walking, cycling and public transport has been included in the modelling assumptions that underpinned the approval and the agreed road upgrades.*

*If the services / infrastructure for walking cycling and public transport are reduced then basis for the modelling and extent of road upgrades will be inadequate.*

The comments provided by the City's City Planning Business Unit further reinforce that the Transport Plan should remain as approved to encourage the mode shift towards walking, cycling and public transport which forms the basis of the original justification for the expansion of the Centre. Should the proposed revisions to the Transport Plan be supported, the basis for the modelling and extent of road upgrades which supported the expansion of the Centre may be inadequate.

<u>Engineering Design Business Unit Comments</u>

The City's Engineering Design Business Unit provided the following comments in relation to the proposal:

*The changes proposed relate to the removal of most of the bus lanes along Karrinyup Road and additional bus services.*

*Karrinyup Road is under the care and control of Main Roads WA and bus services and bus lanes are managed by PTA.*

*Any change to what was previously approved by these authorities will need to be considered by the relevant authorities, especially on a Main Roads WA road.*

*Engineering Design supports the increased footpath construction funding beyond 400m of the centre (additional $200,000). These would be subject to a separate approval with the City. The street planting contribution ($50,000) is also supported.*

As the proposed modifications predominately relate to transport matters under the authority of external authorities, the application was referred to the Transport Portfolio for comment. The response by the Transport Portfolio unequivocally did not support the proposed modifications to the Transport Plan with the modifications considered to undermine the mode shift towards public transport which substantiated the expansion of the Centre. As per the City's assessment, the City reinforces the position of the Transport Portfolio.

Notwithstanding the above, the City in principle supports the increased footpath construction and street tree planting, however this should not be at the expense of public transport provision.

## 5. Amended Condition and Advice Note

Amended Condition

Based on the comments provided by the Transport Portfolio, the City recommends Condition 2 of development approval be modified as follows (modification in bold):

> 2. *Prior to opening of the retail centre, the applicant is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The agreement is to provide for the applicant to fund the PTA's estimated cost of delivering additional Transperth bus service kilometres for a minimum period of five years from the opening of the retail centre, to the satisfaction of the City of Stirling and the upon the advice of* ***Main Roads WA*** *and the PTA.*

The inclusion of Main Roads WA within the condition reflects Main Roads role as the road authority and is consistent with the Transport Portfolio response dated 20 September 2019 (Attachment 7).

Additional Advice Note

> *The mixed use development in the north-east corner of the site does not form part of this approval.*

The inclusion of the above Advice Note is recommended as there is a concurrent development approval for a Seven Storey Mixed Use Development in the north-east corner of the site (DA18/0791 refers). The submitted plans do not reflect the approved configuration and would require assessment against State Planning Policy 7.3 Residential Design Codes Volume 2 – Apartments (SPP 7.3). Should the applicant wish to pursue the design shown on the submitted plans as part of this application, a full suite of documents addressing SPP 7.3 will be required for the City's assessment.

## 6. State Planning Policy 7.3 Residential Design Codes Volume 2 – Apartments

The submitted plans include multiple dwellings along Burroughs Road which were originally approved under Part 6 of State Planning Policy 3.1 – Residential Design Codes (SPP 3.1)(DA15/0460 refers). With Part 6 of SPP 3.1 rescinded and SPP 7.3 gazetted on 24 May 2019, development applications for multiple dwellings are to be assessed against SPP 7.3 in accordance with Schedule 2, Part 9, Clause 67(c) of the *Planning and Development (Local Planning Scheme) Regulations 2015*.

Notwithstanding, Clause 67 of the *Planning and Development (Local Planning Scheme) Regulations 2015* requires local government in considering an application for development approval to have due regard to the matters to the extent that, in the opinion of local government, those matters are relevant to the development the subject of the application. In this regard, there is a valid approval until 17 May 2021 for the multiple dwellings along Burroughs Road, with no alterations proposed as part of this application or extension of time to the development approval period (DA16/1233 refers). Additionally, as this application is for an amendment to Condition 2 of development approval only, no assessment against SPP 7.3 of the approved multiple dwellings is required for this application. Accordingly, the City has not assessed the previously approved multiple dwellings against SPP 7.3 as part of this application.

## 7. Planning and Development (Local Planning Schemes) Regulations 2015

An assessment against Schedule 2, Part 9, Clause 67 of the *Planning and Development (Local Planning Schemes) Regulations 2015* is set out below. Clause 67 outlines the matters that Council is to consider when determining a development application. This requires Council to take close consideration of the following matters:

| Provision | Officer Comment |
|---|---|
| a) The aims and provisions of this Scheme and any other local planning scheme operating within the Scheme area. | The proposed modifications to the Transport Plan are inconsistent with Clause 1.6(b) of LPS 3 which seeks to:<br><br>*Provide for convenient attractive and viable commercial centres, which service the needs of the community and are accessible to pedestrians, cyclists and public transport users as well as motorists.*<br><br>As detailed in the City's assessment, the proposed modifications to the Transport Plan will reduce the frequency of public transport services to the Centre, with a reduction of 6% to 4% in public transport trips to 2031. Additionally, the reduction of the bus lane along Karrinyup Road compromises the ability to provide direct and convenient public transport to the Centre. The proposal is inconsistent with LPS 3 and is not supported. |
| b) The requirements of orderly and proper planning including any proposed local planning scheme or amendment to this Scheme that has been advertised under the Planning and Development (Local Planning Schemes) Regulations 2015 or any other proposed planning instrument that the local government is seriously considering adopting or approving. | The proposed modifications to the Transport Plan compromise the mode shift required to substantiate the expansion of the Centre and therefore the proposal is inconsistent with orderly and proper planning. The proposal is therefore not supported. |
| c) Any approved State planning policy. | As per the City's assessment, the original development application (DA15/0460) was considered inconsistent with the requirements of State Planning Policy 4.2 – Activity Centres for Perth and Peel (SPP 4.2) with public transport provision or lack thereof raised a significant concern. Specifically, the mode share of public transport at 4% was identified as an issue as it represented approximately half of the share of similar sized centres. This was recognised in the Transport Plan with the provision increased to 6% |

| | |
|---|---|
| | to 2031. The measures proposed within the Transport Plan reduce the mode share back to 4% to 2031 as per the original application which is not supported.<br><br>This application seeks to reduce the investment in public transport which undermines the intent to balance transport modes and encourage high frequency public transport to centres.<br><br>The application is considered to be inconsistent with SPP 4.2. |
| g) Any local planning policy for the Scheme area. | The City's local planning policies are not relevant to this application. |
| m) the compatibility of the development with its setting including the relationship of the development to development on adjoining land or on other land in the locality including, but not limited to, the likely effect of the height, bulk, scale, orientation and appearance of the development. | The application does not propose any amendments to the approved built form. |
| t) the amount of traffic likely to be generated by the development, particularly in relation to the capacity of the road system in the locality and the probable effect on traffic flow and safety. | The City raised significant concerns regarding public transport as part of the original application (DA15/0460 refers), particularly in relation to the low mode share of public transport. The application was ultimately approved subject to the Transport Plan and conditions requiring investment by the land owner in infrastructure and services towards public Transport.<br><br>As previously outlined, the proposed modifications to the Transport Plan represent a significant decrease in expenditure towards public transport and reduction in public transport use. Given the original application was modelled on the approved measures of the Transport Plan, if this investment is reduced then the basis for the modelling and road upgrades may be inadequate, compromising the expansion of the Centre. The applicant has not provided adequate justification to substantiate the proposed modifications to the Transport Plan will not have a detrimental impact on the road network. |
| u) the availability and adequacy for the development of the following: | The modifications to the Transport Plan include a reduction to the bus lane along |

| | |
|---|---|
| i) public transport services;<br>ii. public utility services;<br>iii. storage, management and collection of waste;<br>iv. access for pedestrians and cyclists (including end of trip storage, toilet and shower facilities;<br>v. access by older people and people with disability. | Karrinyup Road and increased bus frequencies between Routes 423 and 425.<br><br>As per the City's assessment and comment from the Transport Portfolio, the proposed modifications negatively impact the frequency, legibility and reliability of bus services associated with the Centre. The proposed modifications result in a significant decrease in the forecast public transport usage which is considered to undermine the expansion of the Centre.<br><br>Suitable justification to modify the Transport Plan has not been provided by the applicant and therefore the City supports the position of the Transport Portfolio for the existing Transport Plan to be retained with specific focus on the retention of the entire length of the bus lane and services along Route 425. Accordingly, the City does not support the proposal. |
| za) the comments or submissions received from any authority consulted under clause 66. | The application was referred to the Transport Portfolio for comment which comprises Main Roads WA, the Department of Transport and Public Transport Authority of WA.<br><br>Comments were provided from the Transport Portfolio, with the Transport Portfolio not supportive of the proposed modification to the Transport Plan. These comments were included in the Report and form part of the City's recommendation. |

**Conclusion:**

The modifications proposed as part of the revised Transport Plan are inconsistent with the original development approval (DA15/0460 refers) and subsequent development approvals which have sought to increase the legibility, frequency and reliability of public transport services to and from the Centre to achieve the required mode shift towards public transport. This increase in public transport forms part of the approved Transport Plan and traffic modelling which has been used to justify the expansion of the Centre as per SPP 4.2 which seeks to maximise access to activity centres by walking, cycling and public transport while reducing private car trips. Suitable justification has not been provided by the applicant to substantiate the modifications will not adversely impact the functionality of the Centre from a transport perspective.

The original development approval included a condition for the landowner to provide contributions towards increased bus services in perpetuity. This requirement was reduced to a period of five years, following the opening of the retail centre, in accordance with a subsequent approval (DA15/2334 refers), and with the City is not supportive of reducing this requirement further for the reasons outlined earlier in this report. The City does not support the proposed modifications to the Transport Plan and therefore does not support the proposed modified Condition 2.

| | |
|---|---|
| **Property Location:** | Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup |
| **Application Details:** | Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) – Amendment to Condition 2 |
| **DAP Name:** | Metro North-West JDAP |
| **Applicant:** | Rowe Group |
| **Owner:** | AMP Capital Funds Management Ltd |
| **DAP Reference:** | DAP/15/00741 |
| **LG Reference:** | DA19/0909 |
| **Responsible Authority:** | City of Stirling |

**Nature of Additional Information:**

*Minor modification to the City's recommended Amended Condition 2*

On review of the City's Responsible Authority Report (RAR), the City has identified an error regarding the wording of Amended Condition 2 in the City's recommendation, which impacts the timeframe for the clearance of the condition. The incorrect condition timing is also referenced in the Applicant's cover letter dated 29 April 2019 (refer Attachment 6a).

The recommended Amended Condition 2 timeframe in the City's RAR is inconsistent with the Amended Condition 2 timeframe approved by the JDAP on 21 December 2017 (DA17/1653 refers).

Within the City's RAR, Amended Condition 2 is as follows:

> Prior to opening of the retail centre, the applicant is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The agreement is to provide for the applicant to fund the PTA's estimated cost of delivering additional Transperth bus service kilometres for a minimum period of five years from the opening of the retail centre, to the satisfaction of the City of Stirling and upon the advice of Main Roads WA and PTA.

The City recommends Amended Condition 2 be modified to reflect the timing as per JDAP previous determination on 21 December 2017 (DA17/1653 refers), note the modification underlined below for ease of reference only:

> Prior to <u>the occupation of any additional retail floorspace</u>, the applicant is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The agreement is to provide for the applicant to fund the PTA's estimated cost of delivering additional Transperth bus service kilometres for a minimum period of five years from the occupation of any additional retail floorspace, to the satisfaction of the City of Stirling and upon the advice of Main Roads WA and PTA.

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Attachment 1

# KARRINYUP

## DEVELOPMENT APPLICATION

AMENDMENT 05 REV B 23 05 2019

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## Location Plan

KARRINYUP SHOPPING CENTRE

development application - amendment 04

NORTH

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Site Plan
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NORTH

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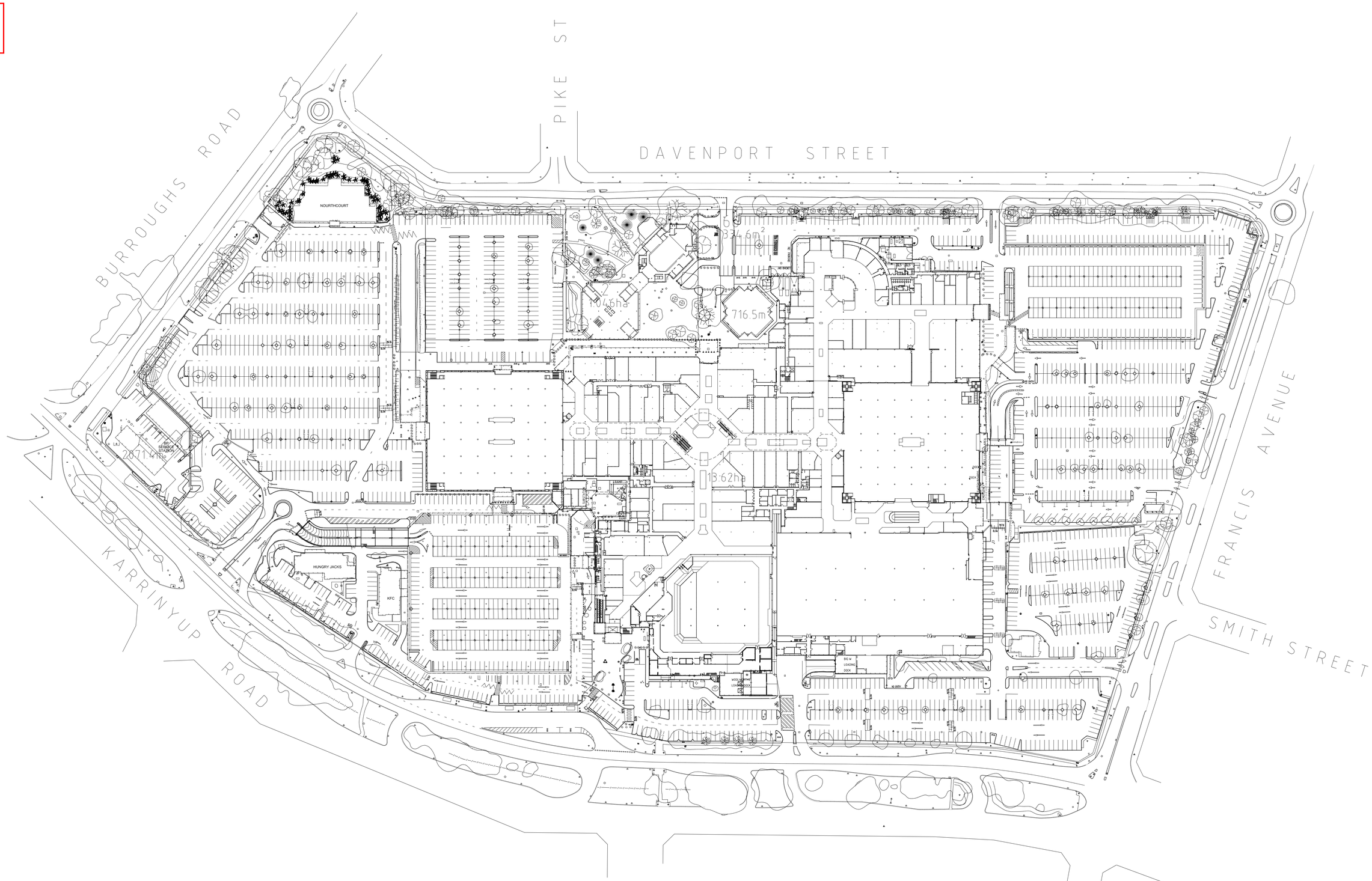


NOTES

This plan has been prepared for the client and should not be used for any other purpose unless authorised by Whelans (WA) Pty Ltd.

The location of cadastral boundaries shown has been extracted from Landgate's database on 31/7/09 and are subject to survey.

Prior to the commencement of any work, relevant authorities should be contacted for the location of underground services.

Levels are based on AHD and derived from SSM

This note is an integral part of this plan.

NOTES: Data surveyed in PCG94 and converted to local Karrinyup system:

- Origin (0,0) at SSM Scarborough 97
- Rotated 180° about Y-Axis
- Rotated 0°07'12" about Z-Axis
- Scaled to millimetres

| | | | |
|---|---|---|---|
| SCALE: | 1:1000mm | DATE DRAWN: | 17/12/09 |
| V.DATUM: | AHD | DRAWN BY: | N.G.A. |
| H.DATUM: | LOCAL | CHECKED BY: | I.K.G. |
| SURVEY DATE: | NOV-DEC 09 | DATA FILE: | 091216 karrinyup_pcg94 master file.acs |
| SURVEYOR: | L.V. | MAPPING DATA (NOV 09): | detail_13659_karrinyup_pcg94.acs |
| JOB NO: | 13659 | FIELD SURVEY (DEC 09) : | 091215_combined_detail_lv.acs |
| FILE: | S:\Projects\13\13659\survey\detail\13659_survey_mapping_karrinyup_(kcs).dwg | | |

whelans
133 Scarborough Beach Road, Mount Hawthorn WA 6016
PO Box 99, MOUNT HAWTHORN WA 6915
T: 08 9443 1511 F: 08 9444 3901
E: whelans@whelans.com.au W: www.whelans.com.au

FEATURE SURVEY
KARRINYUP SHOPPING CENTRE
KARRINYUP

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CLIENT: TAYLOR ROBINSON

ORIGINAL SHEET SIZE: A1 SHEET 1 OF 1

REV 0
PLAN 13659-001

ISO 9001:2008 FS 521302

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Existing survey and Ground Plan
KARRINYUP SHOPPING CENTRE
development application - amendment 04

NORTH

SCALE: SCALE AS NOTED

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# Level 00 Plan

## KARRINYUP SHOPPING CENTRE

development application - amendment 04

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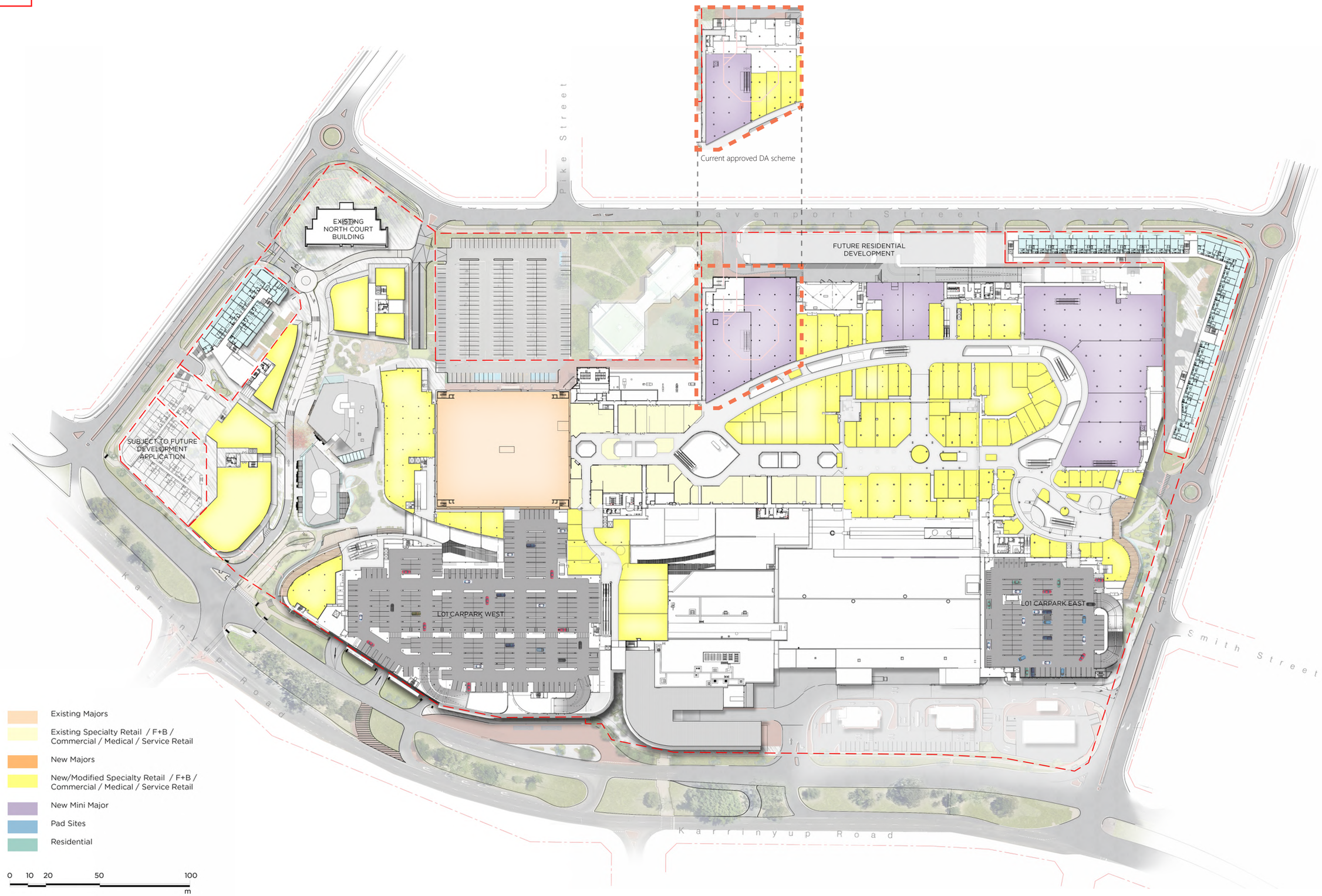


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# Level 01 Plan

KARRINYUP SHOPPING CENTRE
development application - amendment 04

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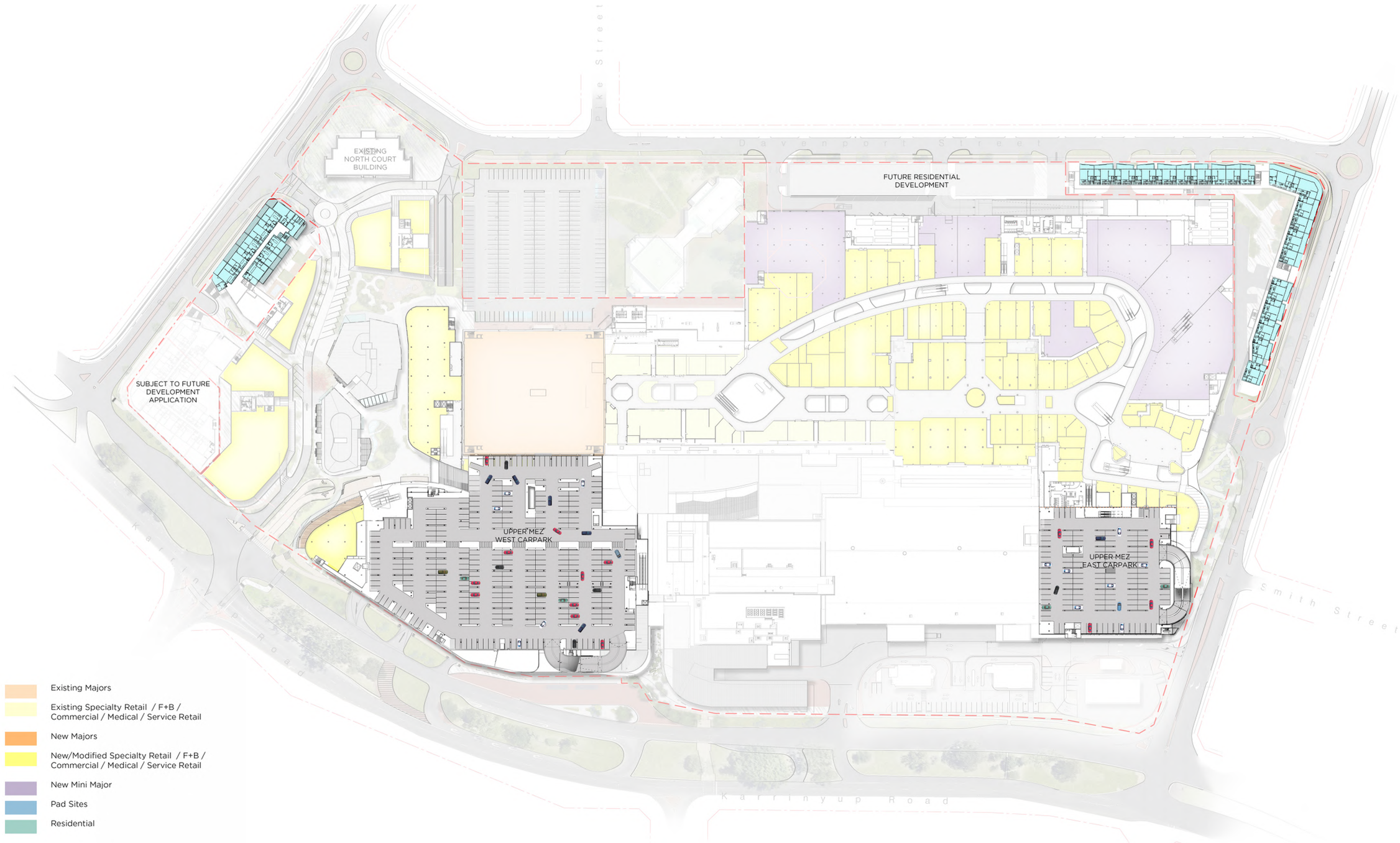


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# Level 01 Mezanine Plan

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development application - amendment 04

NORTH

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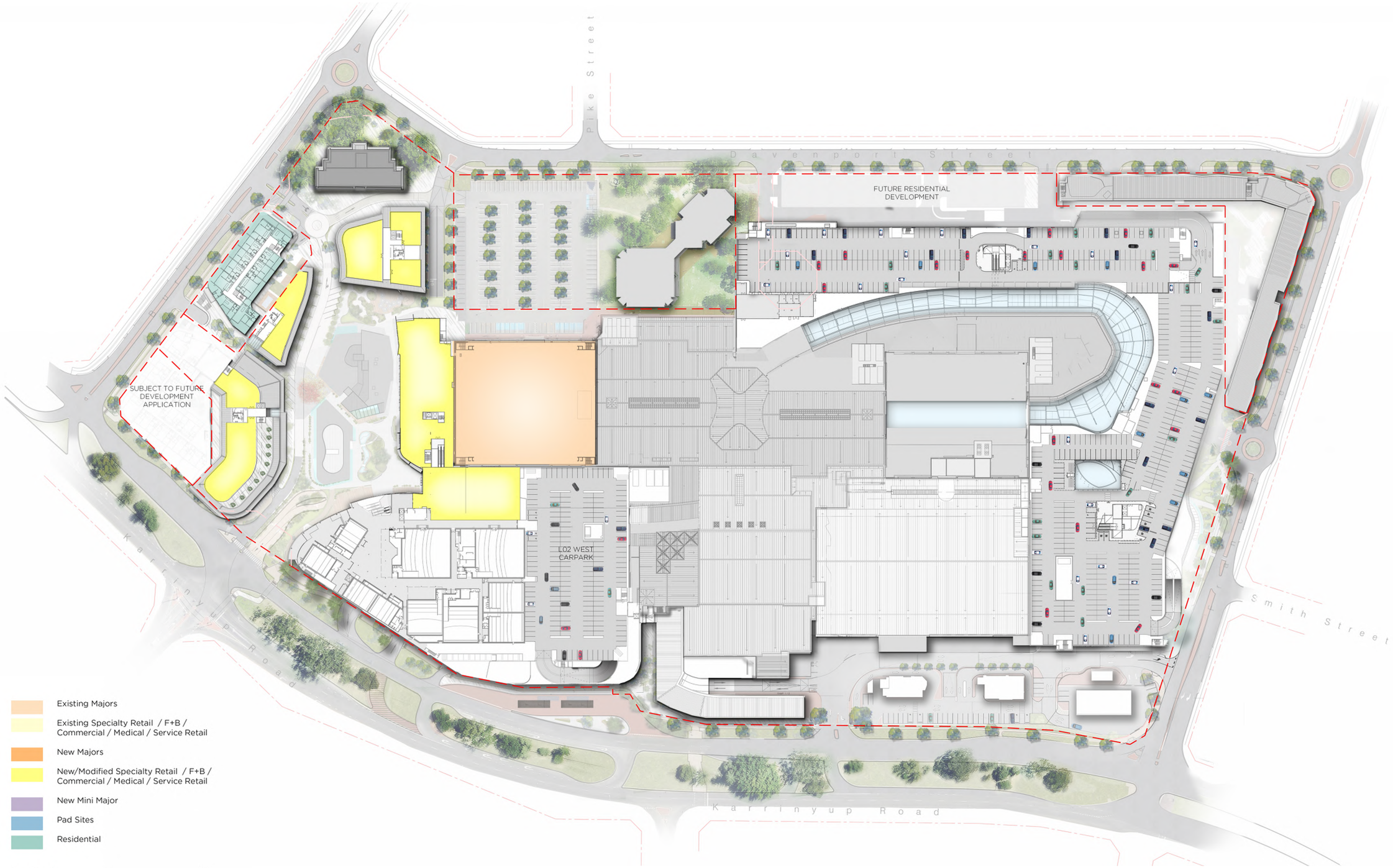


Existing Majors
Existing Specialty Retail / F+B / Commercial / Medical / Service Retail
New Majors
New/Modified Specialty Retail / F+B / Commercial / Medical / Service Retail
New Mini Major
Pad Sites
Residential

0 10 20 50 100
m

AMP CAPITAL
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# Level 02 Plan

KARRINYUP SHOPPING CENTRE
development application - amendment 04

NORTH

SCALE: 1:2000@A3/1:1000@A1

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# Basement 01 Plan

## KARRINYUP SHOPPING CENTRE

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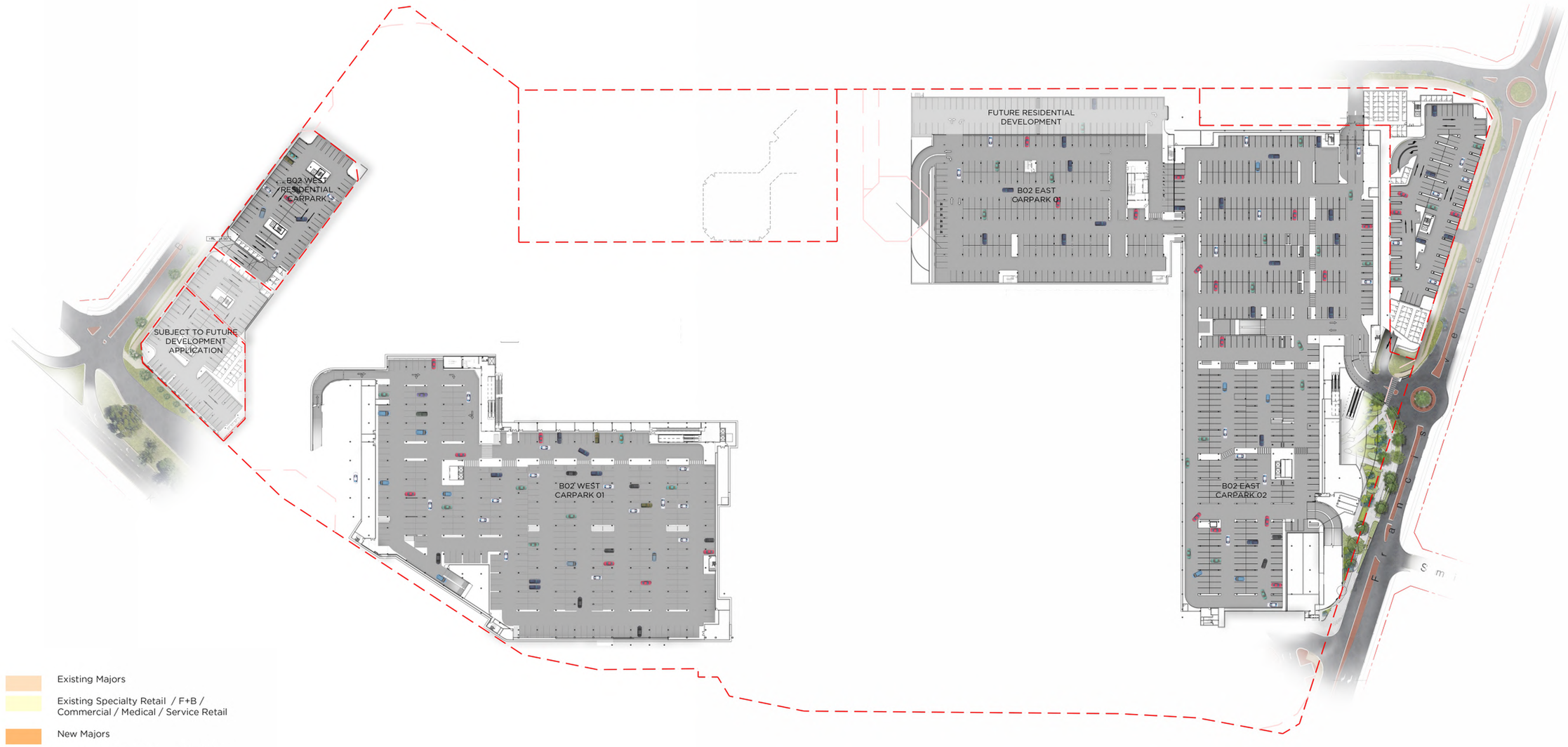


Existing Majors

Existing Specialty Retail / F+B / Commercial / Medical / Service Retail

New Majors

New/Modified Specialty Retail / F+B / Commercial / Medical / Service Retail

New Mini Major

Pad Sites

Residential

0 10 20 50 100
m

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# Basement 02 Plan

KARRINYUP SHOPPING CENTRE

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# Detail Plan (Main Piazza)

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- Existing Majors
- Existing Specialty Retail / F+B / Commercial / Medical / Service Retail
- New Majors
- New/Modified Specialty Retail / F+B / Commercial / Medical / Service Retail
- New Mini Major
- Pad Sites
- Residential

0 1 2 5 10 20
m

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# Detail Plan (East Gate)

KARRINYUP SHOPPING CENTRE
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NORTH

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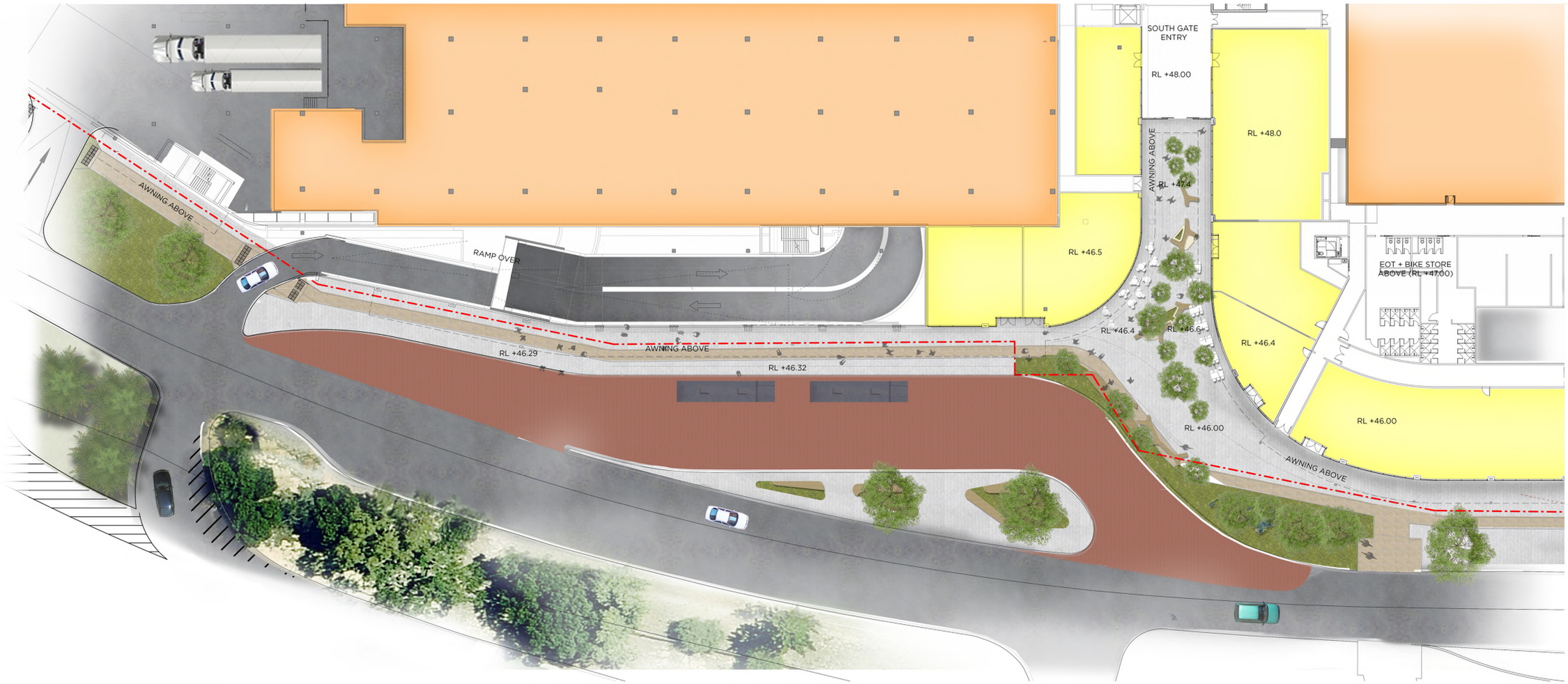


Existing Majors

Existing Specialty Retail / F+B / Commercial / Medical / Service Retail

New Majors

New/Modified Specialty Retail / F+B / Commercial / Medical / Service Retail

New Mini Major

Pad Sites

Residential

0 1 2 5 10 20
m

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# Detail Plan (South Gate)

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Typical 1 Bed Apartment

Typical 2 Bed Apartment

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Typical apartment plans
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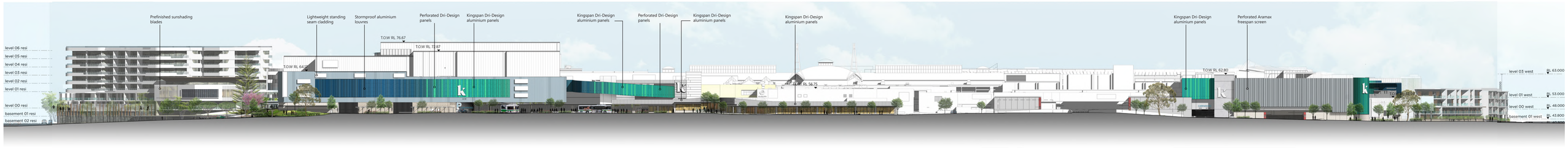
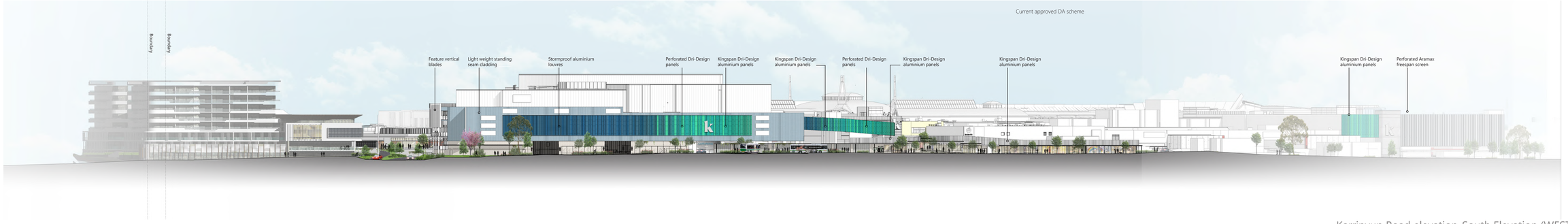



Karrinyup Road elevation-South Elevation (EAST)




Karrinyup Road elevation-South Elevation (WEST)

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Elevations
KARRINYUP SHOPPING CENTRE
development application - amendment 02

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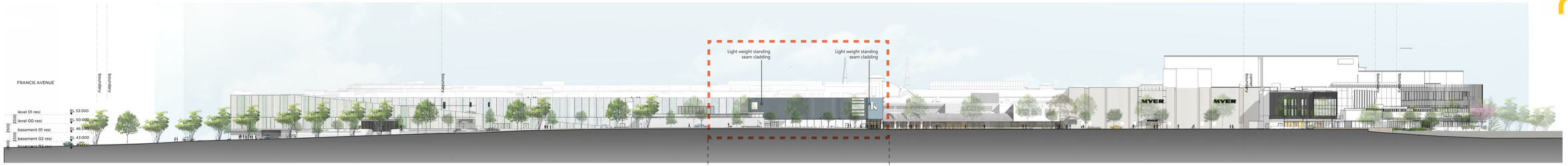
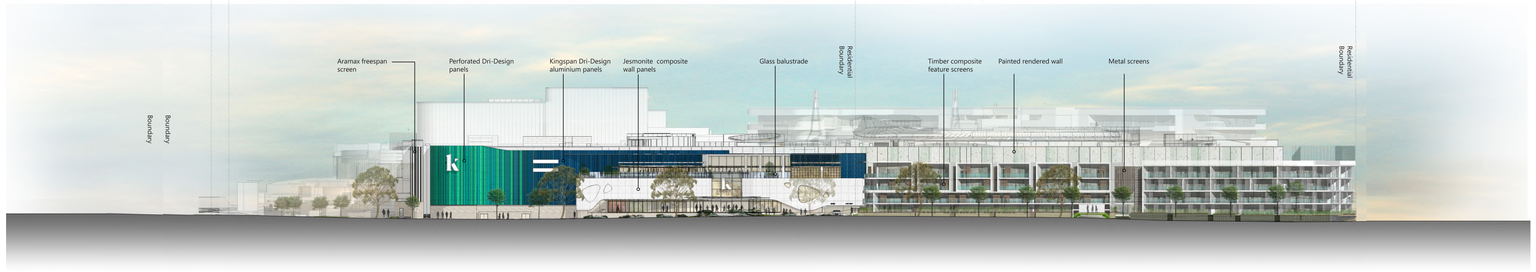
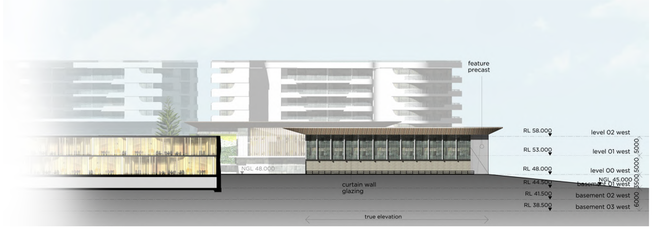



Davenport Street - North Elevation

Current approved DA scheme




Francis Avenue elevation - East Elevation




East Elevation

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Elevations
KARRINYUP SHOPPING CENTRE
development application - amendment 02

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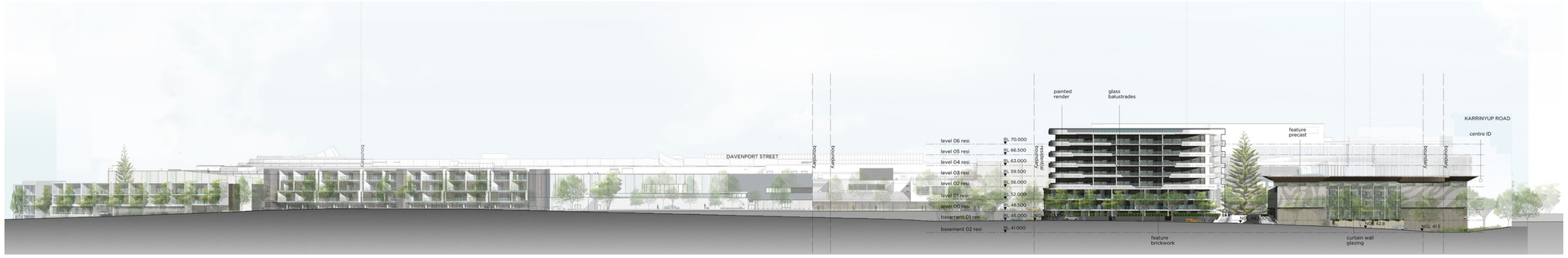
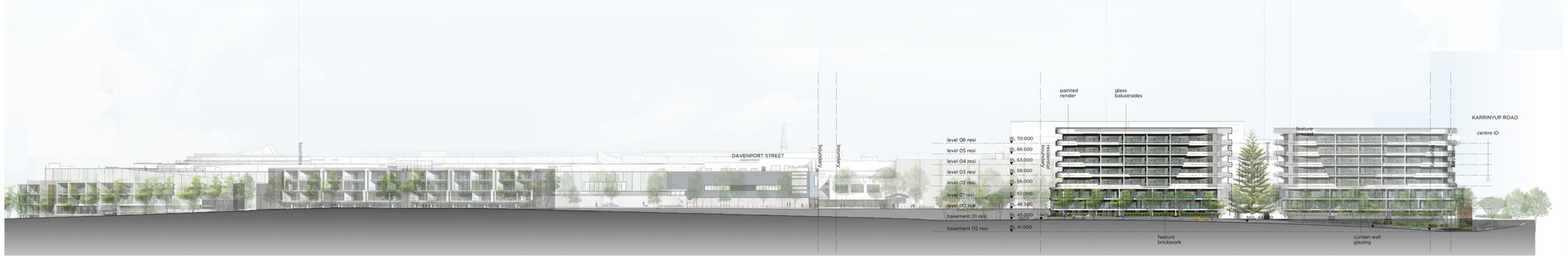



Burroughs Road Elevation - East Elevation

South elevation




Burroughs Road Elevation - East Elevation

"Corso" North elevation

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Elevations
KARRINYUP SHOPPING CENTRE
development application - amendment 02

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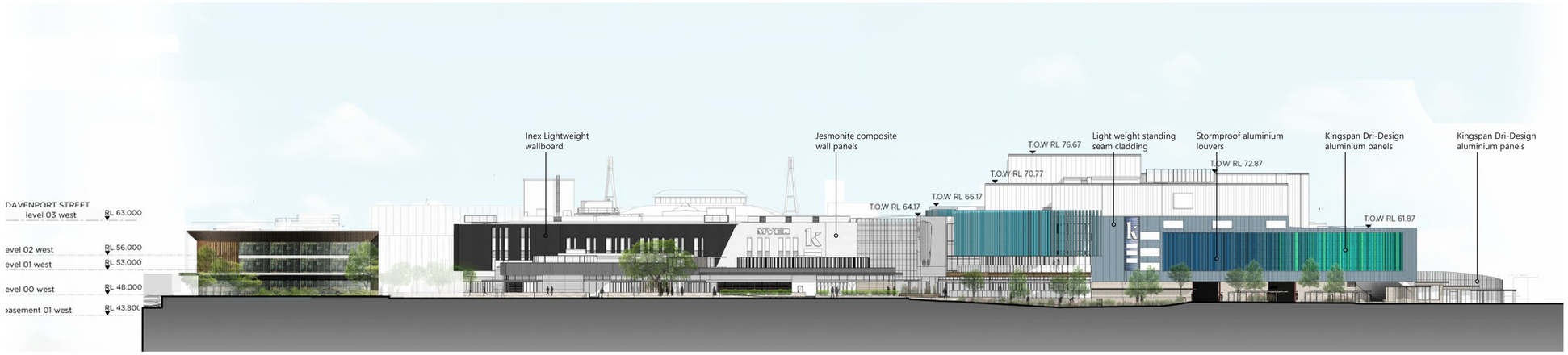


"Main Street" - West Elevation

"Main Street" - East Elevation

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Elevations
KARRINYUP SHOPPING CENTRE
development application - amendment 02

SCALE:

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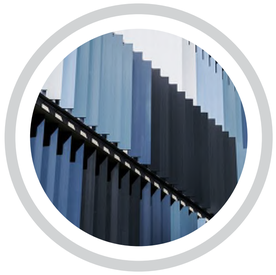

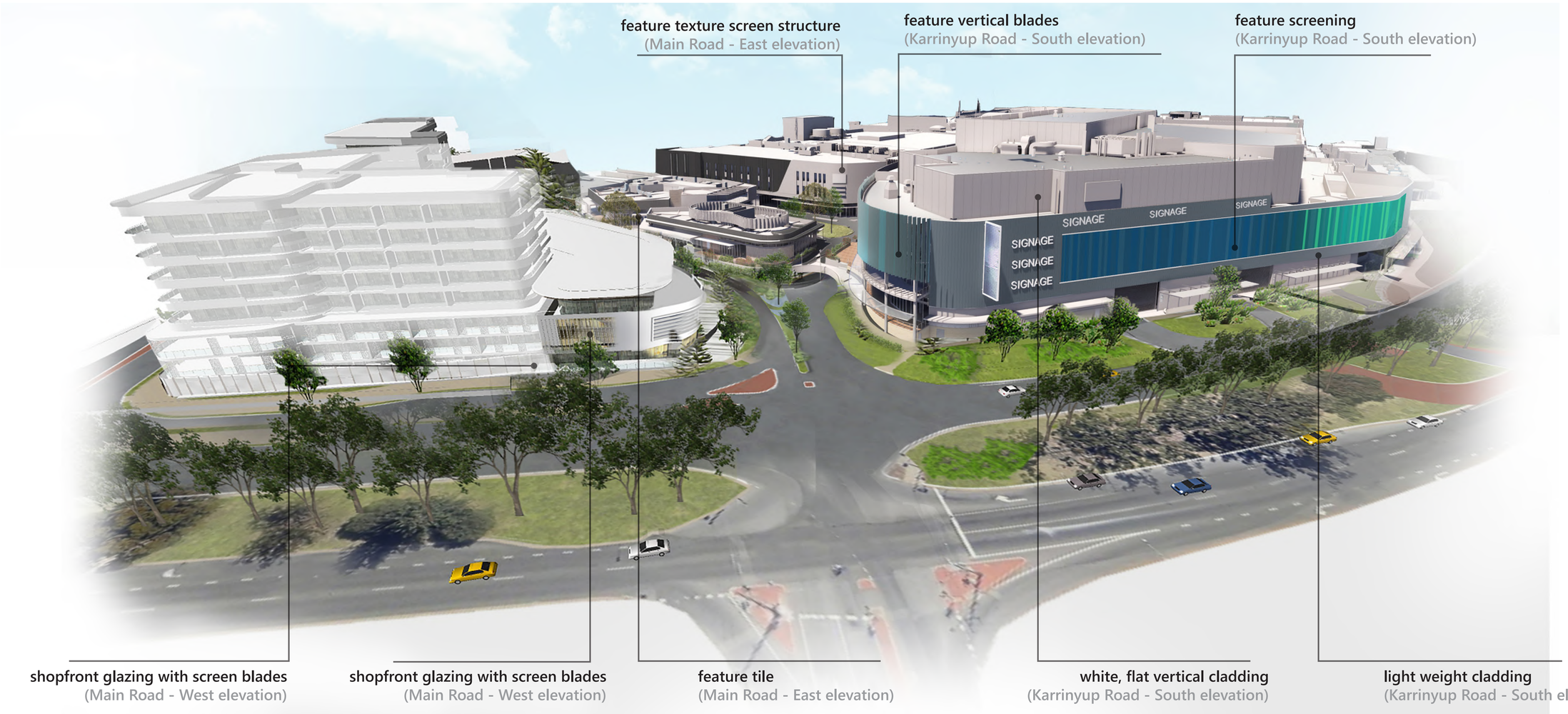

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material palette
KARRINYUP SHOPPING CENTRE
development application - amendment 02

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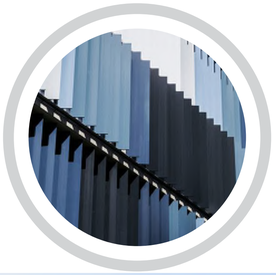

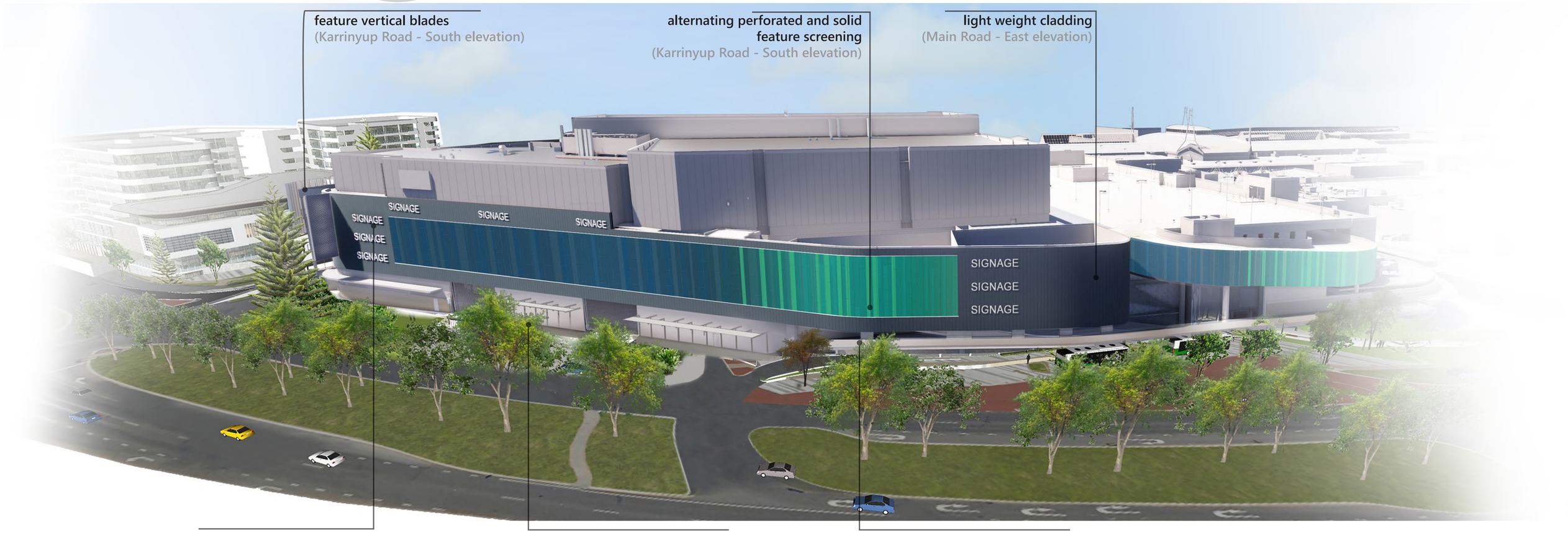

AMP CAPITAL
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# material palette

## KARRINYUP SHOPPING CENTRE

development application - amendment 02

SCALE: NOT TO SCALE

DATE: 14/03/19
DRAWN: TRHS

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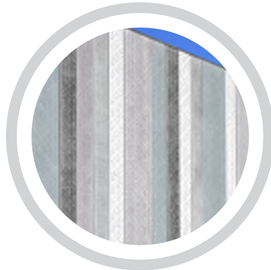
light weight cladding
(Karrinyup Road - South elevation)

alternating perforated and solid feature screening
(Karrinyup Road - South elevation)



precast concrete panels
(Karrinyup Road - South elevation)

painted precast
(Karrinyup Road - South elevation)

aramax freespan screen
(Karrinyup Road - South elevation)

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material palette
KARRINYUP SHOPPING CENTRE
development application - amendment 02

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jesmonite composite panels
(Francis Avenue - East elevation)

pergola structure
(Francis Avenue - East elevation)

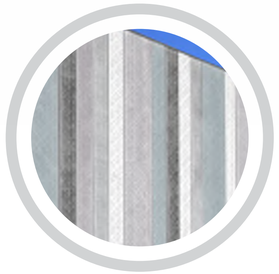
light weight cladding
(Karrinyup Road - South elevation)

blockwork wall
(Francis Avenue - East elevation)

shopfront glazing
(Francis Avenue - East elevation)

laminated patterned glass
(Francis Avenue - East elevation)

precast concrete panels
(Francis Avenue - East elevation)



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# material palette

KARRINYUP SHOPPING CENTRE
development application - amendment 02

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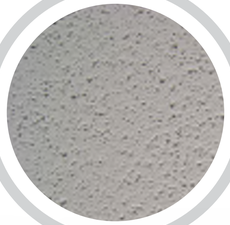
**glass balustrade**
(Francis Avenue - East elevation)



**painted rendered wall**
(Francis Avenue - East elevation)

**fascia**
(Francis Avenue - East elevation)

**timber composite feature screens**
(Francis Avenue - East elevation)

**feature brick work**
(Francis Avenue - East elevation)

**metal screens**
(Francis Avenue - East elevation)

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KARRINYUP SHOPPING CENTRE
development application - amendment 02

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glass balustrade
(Burroughs Road-West elevation)

painted rendered wall
(Burroughs Road-West elevation)

metal screens
(Burroughs Road-West elevation)

feature brick work
(Burroughs Road-West elevation)

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material palette
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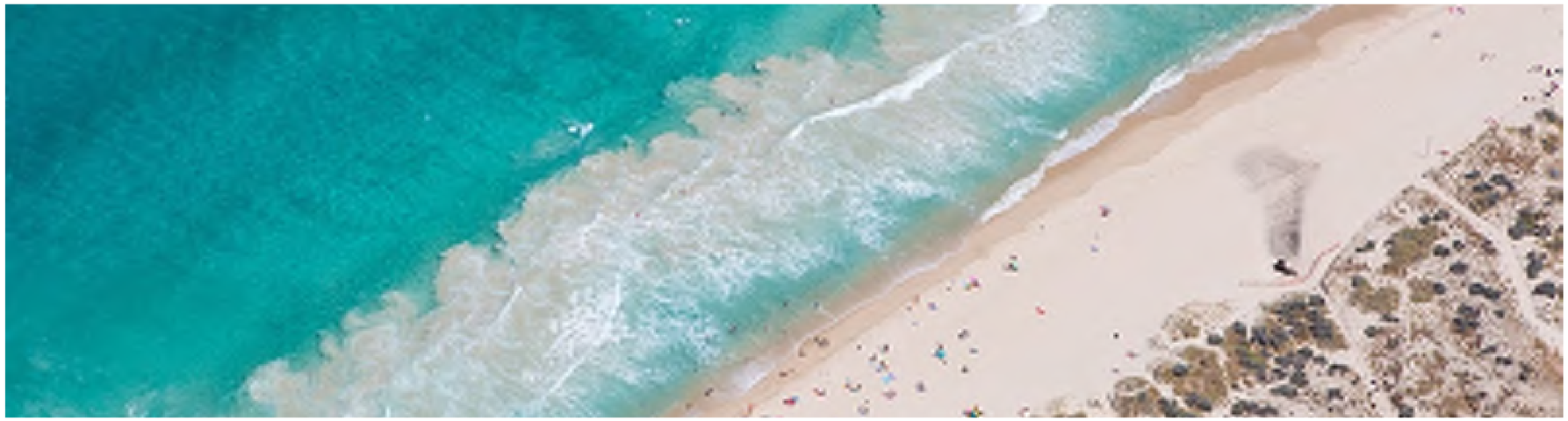

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Forms, Materials, Textures + Colours
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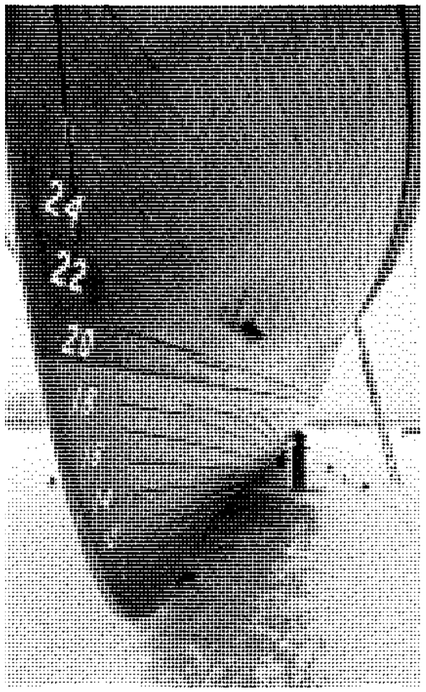

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Forms, Materials, Textures + Colours

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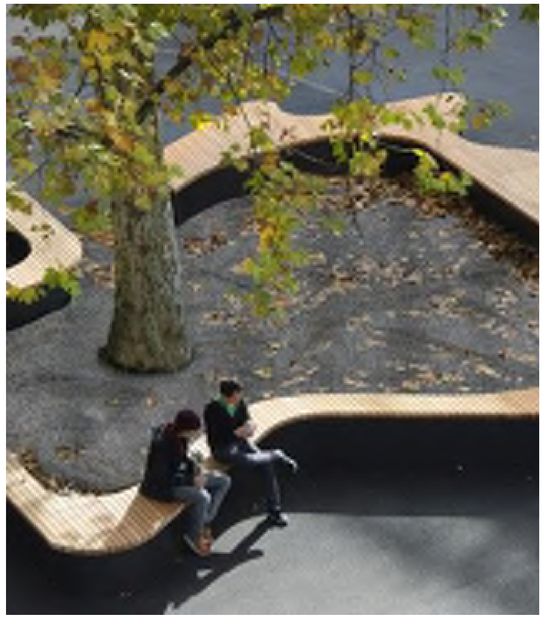
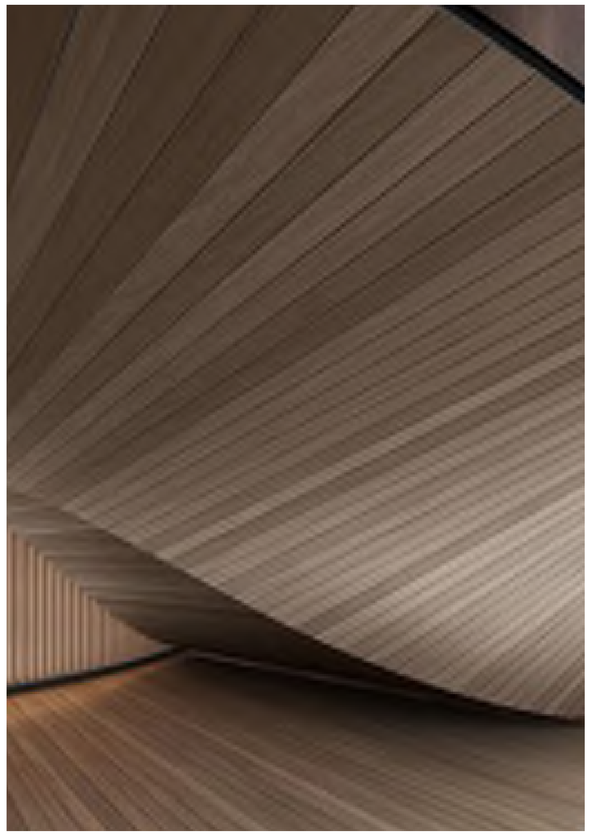
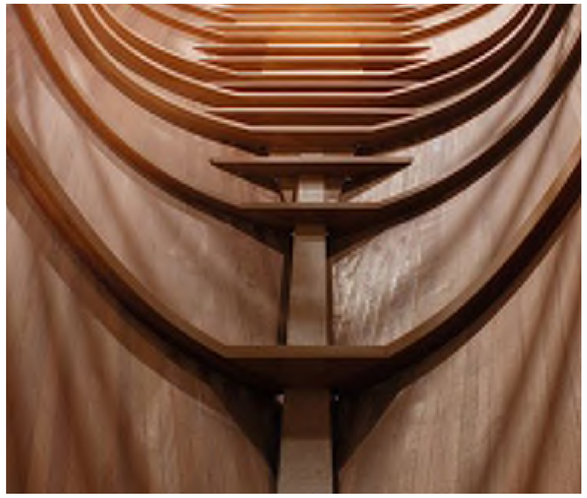
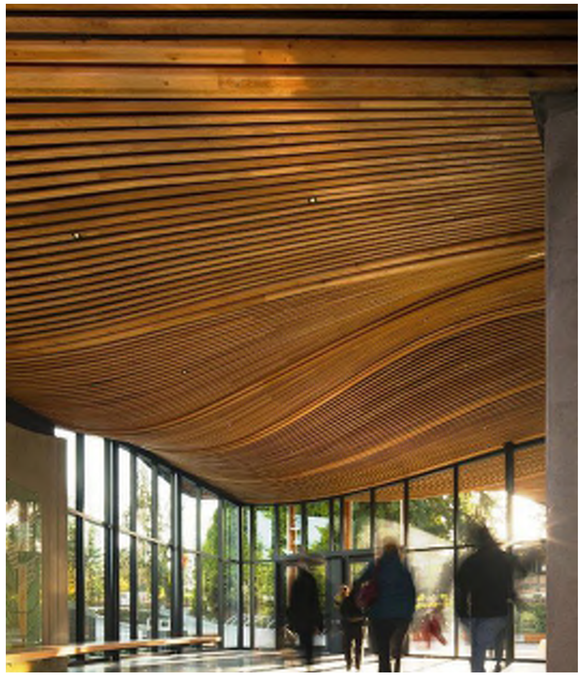
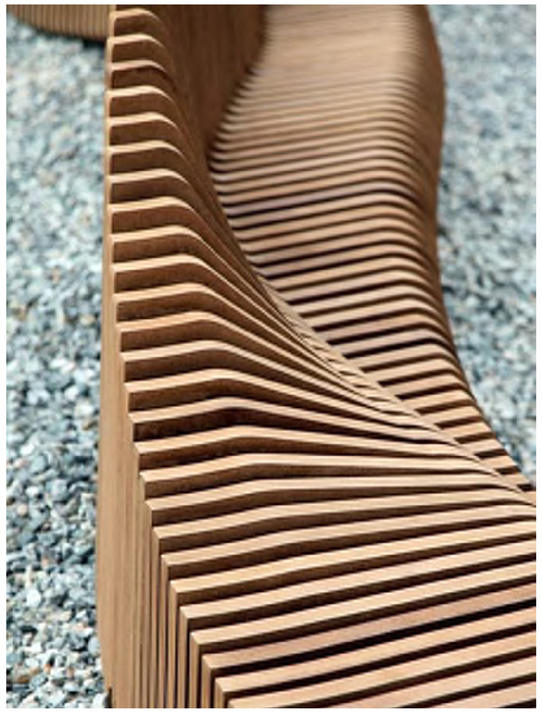
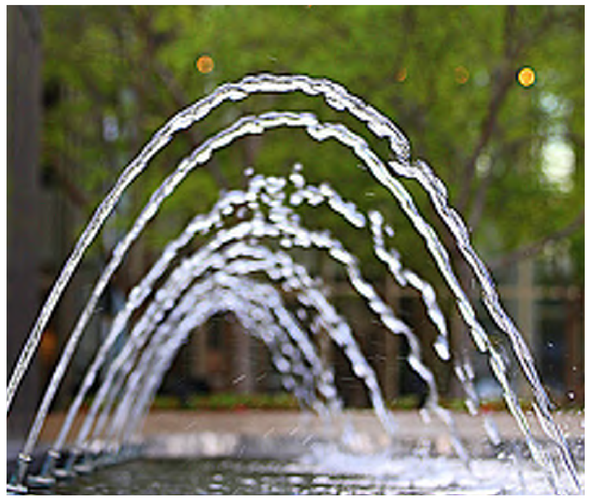

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Natural Forms and Fabrics
KARRINYUP SHOPPING CENTRE
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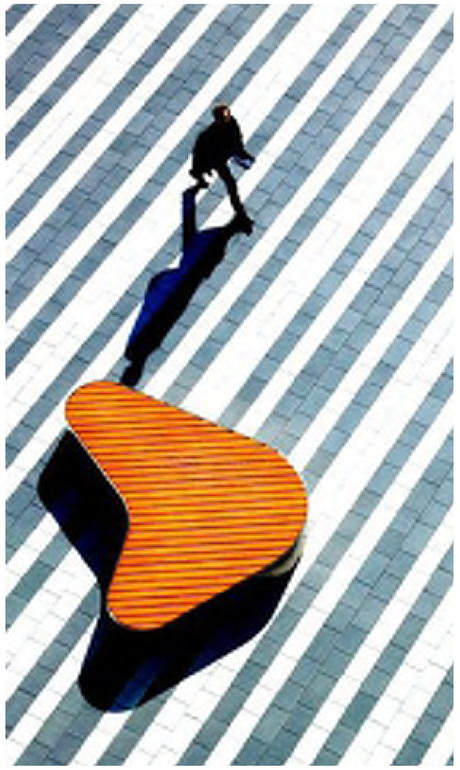

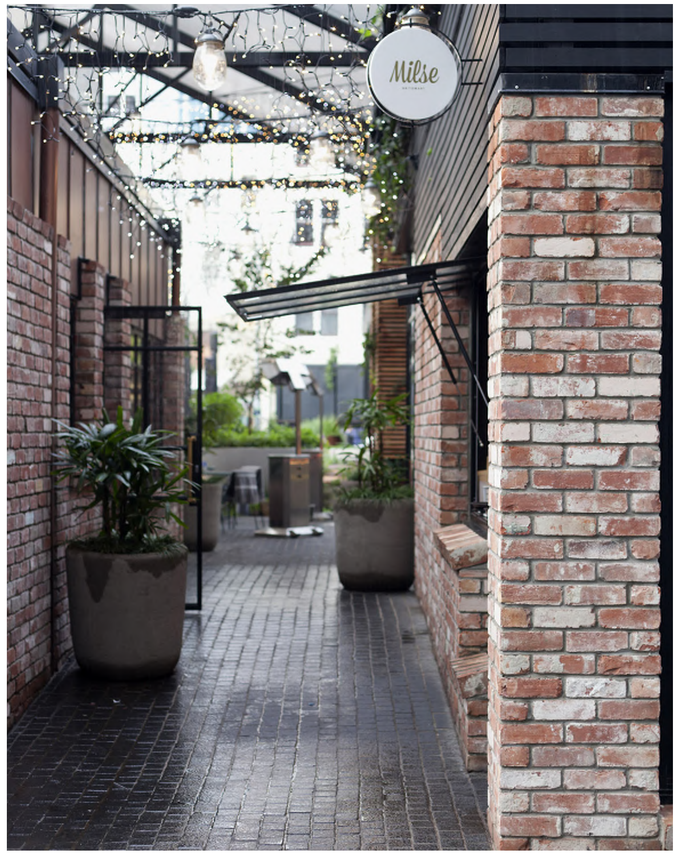

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Urban , Suburban Landscape
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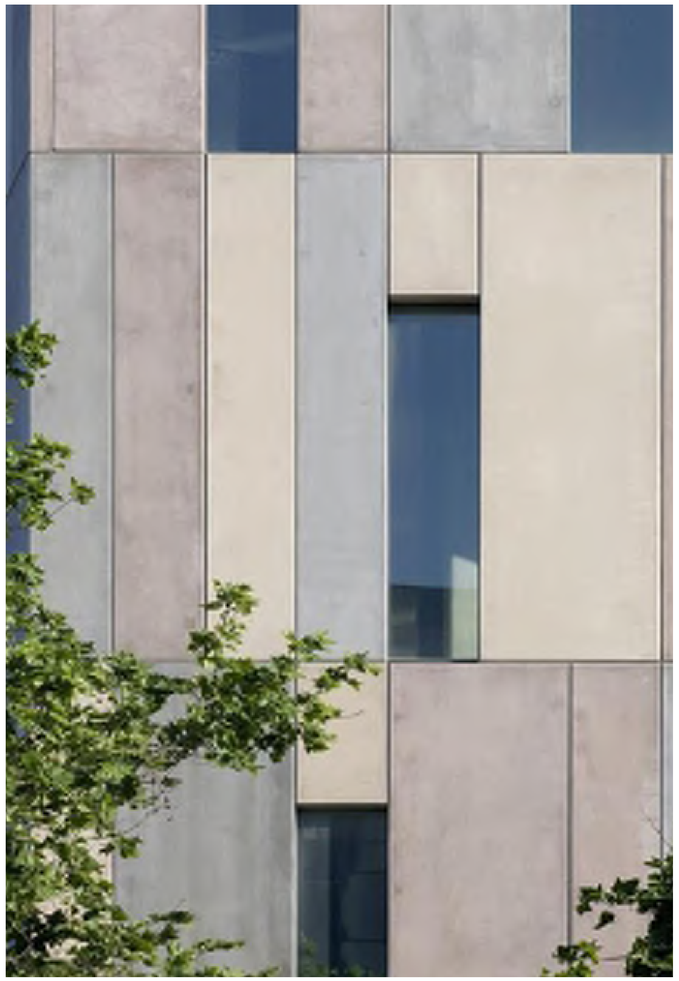

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Forms, Materials, Textures_ Facades
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Forms, Materials_Western Precinct
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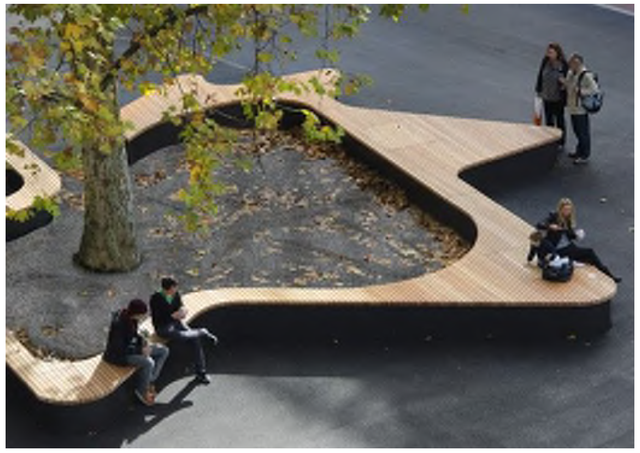

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Forms, Materials _East Gate
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development application - amendment 02

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Perspective 01 - Main Piazza
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Perspective 02 - East Gate
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Perspective 03 - Karrinyup Rd/Main Street

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development application - amendment 02

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## Perspective 03 - Karrinyup Rd/Main Street

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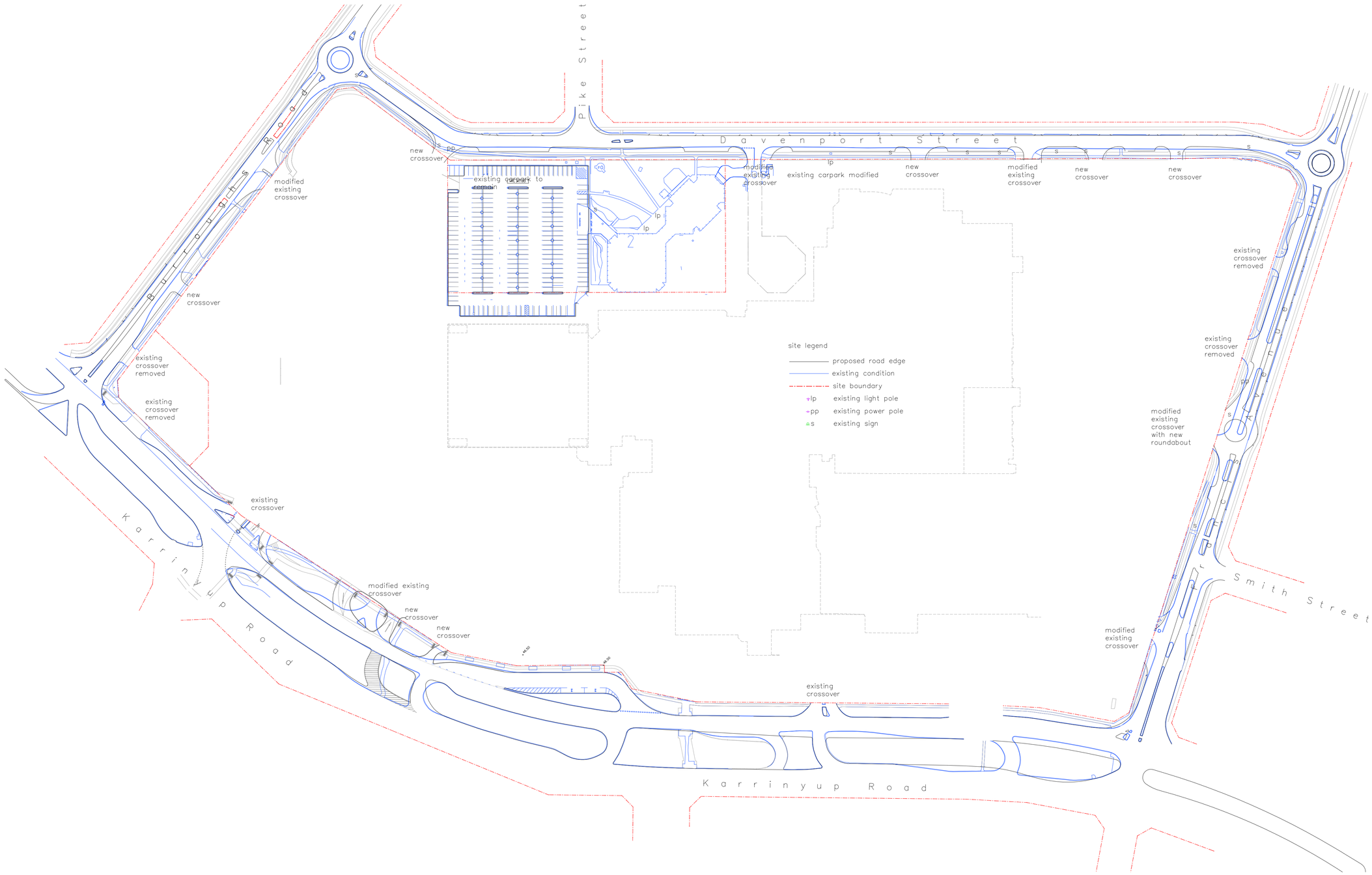


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# Site Plan - Exiting + Proposed Verge Overlay

KARRINYUP SHOPPING CENTRE

development application - amendment 02

NORTH

SCALE: 1:2000@A3/1:1000@A1 DATE: 27/11/2017
REVISION : DRAWN: TRHS

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Overshadowing diagram at 9:00 am

Overshadowing diagram at 12:00 pm

Overshadowing diagram at 3:00 pm

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Overshadowing Diagrams
KARRINYUP SHOPPING CENTRE
development application - amendment 02

NORTH

SCALE: NOT TO SCALE
REVISION :

DATE: 27/11/2017
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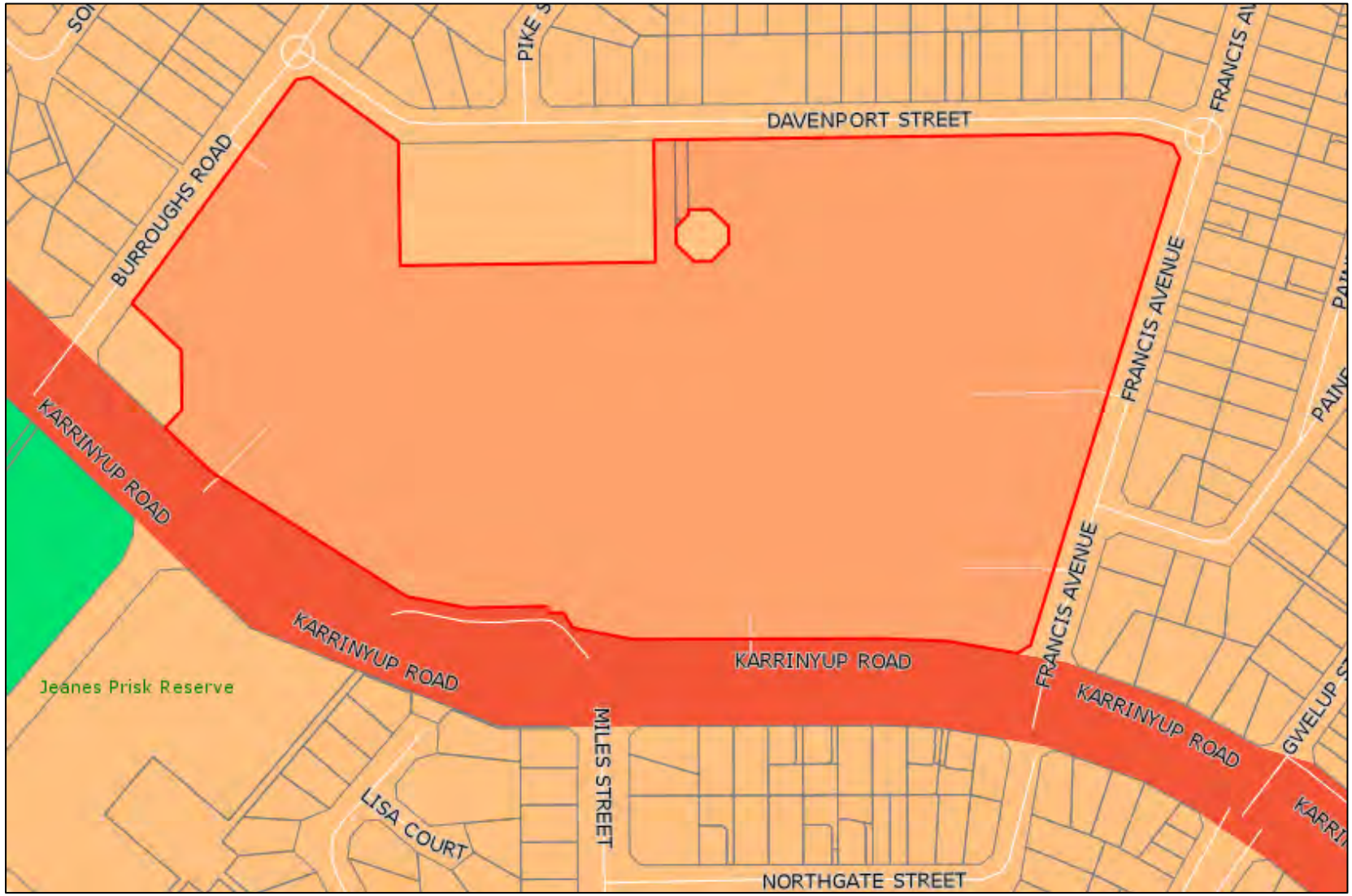
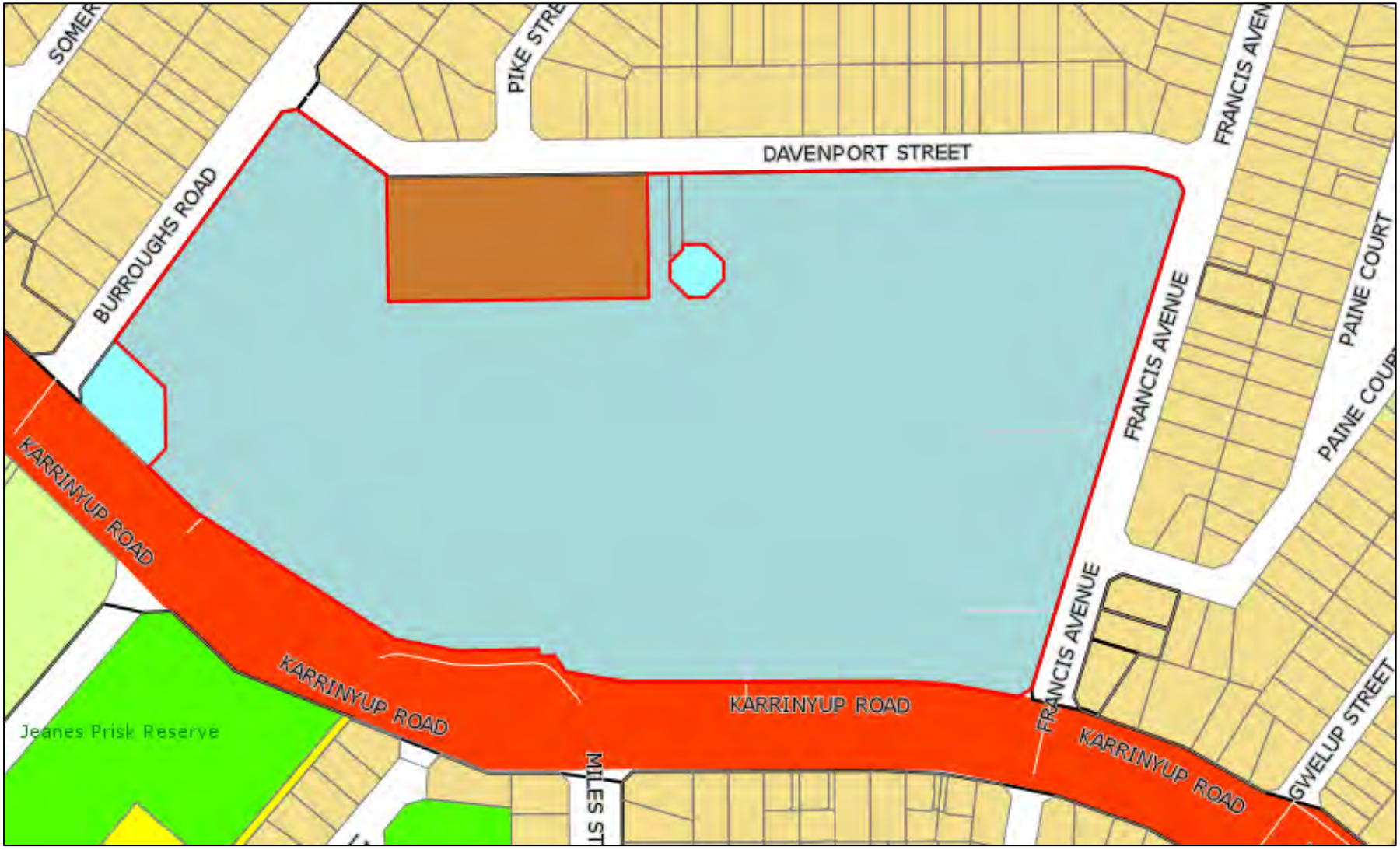
A 02 D

**Attachment 2 – Aerial Location Plan**

**Attachment 3 – Metropolitan Region Scheme (MRS) Zoning Map**



**Attachment 4 – City of Stirling Local Planning Scheme No. 3 (LPS 3) Zoning Map**



Attachment 5a

Government of **Western Australia**
Development Assessment Panels

LG Ref: DA15/0460
DoP Ref: DAP/15/00741
Enquiries: Development Assessment Panels
Telephone: (08) 6551 9919

Mr Sean Fairfoul
Rowe Group
3/369 Newcastle Street
NORTHBRIDGE WA 6003

Dear Mr Fairfoul

**Metro North-West JDAP – City of Stirling – DAP Application DA15/0460**
**Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup**
**Major Expansion of Karrinyup Shopping Centre**

Thank you for your application and plans submitted to the City of Stirling on 5 March 2015 for the above development at the abovementioned site.

This application was considered by the Metro North-West Joint Development Assessment Panel at its meeting held on 14 August 2015, where in accordance with the provisions of the City of Stirling Local Planning Scheme No.3 and the Metropolitan Region Scheme, it was resolved to approve the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, a DAP Form 2 application may be made to amend or cancel this planning approval in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Ms Kimberley Masuku at the City of Stirling on (08) 9205 8742.

Yours sincerely,

*Jess Leitão*

**DAP Secretariat**
**24/08/2015**

Encl. DAP Determination Notice
Approved plans

Cc: Ms Kimberley Masuku
City of Stirling

Mr Gary McGowan
Department of Planning

Ms Rosa Rigali
Department of Planning

Government of **Western Australia**
Development Assessment Panels

***Planning and Development Act 2005***

**City of Stirling Local Planning Scheme No.3**
**Metropolitan Region Scheme**

**Metro North-West Joint Development Assessment Panel**

# Determination on Development Assessment Panel Application for Planning Approval

**Location:** Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup
**Description of proposed Development**: Major Expansion of Karrinyup Shopping Centre

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 14 August 2015, subject to the following:

**PART A - LOCAL PLANNING SCHEME NO.3**

**Approve** DAP Application reference DAP/15/00741 and accompanying plans (Attachment 1), and the letter from the Rowe Group dated 26 June 2015, and plans DA8A and DA9A of 13 May 2015, in accordance with Clause 10.3.1 of the City of Stirling Local Planning Scheme No.3, subject to the following conditions:-

**Transport Portfolio**

1. Prior to the commencement of site works, agreements with MRWA and the City of Stirling are to be in place for the staging and construction of infrastructure as generally shown in Appendix A (Drawing Plan Number 2 - 13) of the revised Transport Plan dated 15th June 2015. Signed copies are to be submitted to and approved by the Western Australian Planning Commission upon advice from the City of Stirling, Department of Transport, Public Transport Authority and Main Roads WA. The landowner's responsibilities contained within the plan, as approved, shall be fully implemented and completed to the satisfaction of the Western Australian Planning Commission, at the cost of the applicant, unless otherwise agreed.

2. Prior to the opening of the retail centre, the applicant is to have entered into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access no later than upon its opening. The applicant must agree to fund the PTA's estimated cost of delivering 105, 500 Transperth branded bus service kilometres per year, inclusive of; bus ownership costs for two buses, and direct administration costs in perpetuity to the satisfaction of the Western Australian Planning Commission upon the advice of the PTA.

3. Prior to the commencement of site works for the centre, a Parking Management Plan shall be submitted to and approved in writing by the City of Stirling, upon advice from the Department of Transport. The approved parking management plan shall be implemented with the commencement of use of the expanded retail centre.

4. Prior to the occupation of the development, a Travel Behaviour Change Plan particularly targeting centre employees but also customers, is to be approved, implemented and reviewed as required to the satisfaction of the City of Stirling on the advice of the Department of Transport.

5. End of Trip bicycle facility(s) to include a total of 200 secure and covered bike racks and lockers for staff is to be designed and supplied to the satisfaction of the City of Stirling. A total of 160 customer bike racks are to be distributed in key locations around the site including the provision for at least 30 bikes being provided at each major ground floor entrance and at least an additional 20 being provided on the main street.

6. All delivery vehicles must be manoeuvred entirely on the site for the loading and unloading of goods associated with the use of the site, and are to enter and leave the site and or internal "public" roads in a forward gear, to the satisfaction of the City of Stirling and Main Roads. Prior to the issue of a building licence, plans are to show how this will be achieved

**Drainage Infrastructure**

7. All stormwater from the site shall be contained on site.

8. Prior to the issue of a building permit an urban water management plan is to be provided in accordance with the requirements of State Planning Policy 4.2 to the City for its approval. The Plan shall propose measures to ensure that no stormwater from the site is discharged into the City's drainage system and once approved by the City the plan must be implemented.

9. An as-constructed survey showing all drainage infrastructure affected by the development, prepared in compliance with DSPEC drawing requirements, shall be provided to the City of Stirling prior to occupation of any part of the development.

10. Prior to the commencement of any part of the development, a detailed stormwater drainage plan designed by a suitably qualified engineer is to be submitted to the City of Stirling for its approval. The drainage system in accordance with the plan approved by the City is to be installed prior to the occupation of the development and be thereafter maintained to the satisfaction of the City of Stirling.

**Road Design and Construction**

11. Detailed design of Francis Street and Burroughs Road is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall generally be in accordance with plans 239230-9 and 11 of the transport Plan prepared by Aurecon dated 15 June 2015, including the changes marked in red (attached) and shall include the following:-

    a. 3.0m lane widths, 2.2m wide parking bays on both sides of the street, 2.0m cycling separator, 3.0m dual way cycling lane and 4.3m wide footpaths on both sides of the street;
    b. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;

c. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
d. The surface finish of the traffic lanes, to the satisfaction of the City;
e. 40km/h design speed;
f. Accommodation of a 12.5m long Single Unit Truck only;
g. Two priority pedestrian crossings aligning with entrances to the shopping centre;
h. Platanus acerfolia (London Plain Tree) shall be planted a minimum 11m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;
i. Pyrus calleryana cultivars (ornamental pear tree) shall be planted at 5.0m spacing on footpaths;
j. All street tree plantings must be located to ensure adequate sightlines are maintained;
k. All landscaped areas are to be reticulated;
l. Street lighting is to be upgraded to suit the new Francis Street and Burroughs Road in compliance with Australian Lighting Standards and to the satisfaction of the City;
m. New or modified roads shall be drained in accordance with water sensitive urban design principles and/or the major / minor drainage philosophy;
n. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
o. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.

The works for Francis Street and Burroughs Road shall be undertaken in accordance with the design approved by the City.

12. Detailed design of Davenport Road is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall generally be with plan 239230-10 (attached) including the changes marked in red and is to include the following:-

a. 3.0m lane widths, 2.2m wide parking bays on both sides of the street, 1.0m cycling separator, 3.0m dual way cycling lane and 2.8m wide footpaths on both sides of the street;
b. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;
c. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
d. The surface finish of the traffic lanes, to the satisfaction of the City;
e. 40km/h design speed;
f. Accommodation of a 12.5m long Single Unit Truck only;
g. Two priority pedestrian crossings aligning with entrances to the shopping centre;
h. Platanus acerfolia (London Plain Tree) shall be planted a minimum 11m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;
i. Pyrus calleryana cultivars (ornamental pear tree) shall be planted at 5.0m spacing on footpaths;
j. All street tree plantings must be located to ensure adequate sightlines are maintained;

k. All landscaped areas are to be reticulated;
l. Street lighting is to be upgraded to suit the new Davenport Road in compliance with Australian Lighting Standards and to the satisfaction of the City;
m. Water sensitive urban design (WSUD) principles to be incorporated into street drainage and streetscapes shall include but not be limited to tree pits and/or rain gardens to reduce stormwater runoff and increase at source infiltration;
n. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
o. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.

The works for Davenport Road shall be undertaken in accordance with the design approved by the City.

13. Detailed design of Karrinyup Road is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall generally be in accordance with plans 239230-2, 3, 4, 5, 6, 7 and 8 (attached), including the changes marked in red and is to include the following:-

a. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;
b. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
c. Corymbia maculata shall be planted every 5m where the median is being altered and mulched;
d. Platanus acerfolia (London Plain Tree) shall be planted a minimum 5m apart adjacent to the site;
e. The median shall be reticulated adjacent to the site;
f. All street tree plantings must be located to ensure adequate sightlines are maintained;

g. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
h. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent abutting the site.

The works for Karrinyup Road shall be undertaken in accordance with the design approved by the City.

14. Prior to the occupation of any portion of the development, the landowner shall cede to the Crown free of cost without compensation for the purpose of a public road, any road widening shown on designs approved by the City under Conditions 11 - 13.

15. Construction of works as required by Conditions 11 - 13 shall be completed by the landowner in accordance with the approved detailed designs prior to the occupation of any part of the development, to the satisfaction of the City of Stirling.

16. Prior to commencement of development, the landowner shall commission a Stage 3 road safety audit for all road and access modifications as required by this approval, to be conducted in accordance with the Austroads Guide to Road Safety, Road Safety Audit, 2009, by an independent Accredited Senior Road Safety Auditor and submit to the City the road safety audit report and the completed Corrective Actions Report inclusive of landowner/designer's responses to the audit findings. The approved works shall be constructed at the expense of the landowner to the City of Stirling's satisfaction prior to the occupation of the development.

17. Prior to the occupation of any portion of development, the landowner is to enter into a legal agreement with the City of Stirling to specify the landowner's responsibilities for maintenance of the private paved areas abutting the development, which should include:-

    a. For which the landowner is responsible;
    b. Maintenance requirements;
    c. Damage repair/replacements;
    d. Frequency of cleaning;
    e. Maintenance vehicles access requirements to all paved areas;
    f. Access times that meet the City's and the landowners operational requirements;
    g. Co-ordinated cyclic pavement sealing to reduce the incidents of staining and gum removal;
    h. Installation, repair and maintenance of street furniture; and
    i. Installation, repair and maintenance of landscaping.

    The responsibility for maintenance of public areas abutting the development shall be shared in agreement between the land owner and the City of Stirling.

18. Prior to the erection of any street furniture in the Francis Avenue, Davenport Street and Burroughs Road road reserves, details of the street furniture are to be provided to the City of Stirling for its approval. The street furniture as approved by the City of Stirling shall be installed prior to the occupation of the development and thereafter maintained to the satisfaction of the City.

19. The owner shall prepare and submit to the City for its approval detailed design drawings, which shall be in accordance with the City's Landscaping Policy, for all landscaping to be provided on the subject site and within any road reserve. All landscaping of the subject site and the abutting road reserves is to be completed in accordance with the drawings approved by the City prior to the occupation of the development and thereafter maintained to the satisfaction of the City.

20. Prior to the occupation of any portion of the development forming part of this approval, the landowner shall construct the proposed cycle path on Jeanes Road between Karrinyup Road and Deanmore Road, generally in accordance with Plan 239230-DRG-CC-0013-GA-C (refer Attachment 18), or an alternative route as agreed by the City in accordance with the City's Integrated Cycling Strategy, to the satisfaction of the City of Stirling.

21. Service vehicle access and egress plan be prepared to the satisfaction of the City, and that the applicant modify any access arrangements proposed as a result of that plan.

22. Headlight glare from parking vehicles onto Karrinyup Road from the South West parking area of the development (levels 44.00 and 44.50) shall be prevented by the provision of screening at the landowner's expense to the City's satisfaction.

23. The applicant shall:-

    a. Produce an updated Transport Plan to the satisfaction of the City that will clearly show the impact of the proposal on the adjacent residential road network; and
    b. All necessary measures as identified by the updated Transport Plan shall be implemented and constructed by the landowner at their expense and to the satisfaction of the City, prior to the occupation of the development.

24. Footpaths shall be provided on at least one side of all streets within 800 metres of the lot boundary to the satisfaction of the City. The location, width, and construction specifications of these footpaths shall be to the satisfaction of the City.

25. Cut-throughs shall be provided on the Jeanes Road / Karrinyup Road traffic islands and the proposed entrance/exit to the east of Miles Street shall provide for a median island extended to the kerb line on Karrinyup Road with these modifications to the satisfaction of the City.

26. The proposed raised medians on Burroughs Road and Francis Avenue shall be provided with breaks to allow unimpeded access to existing crossovers from both directions, to the satisfaction of the City.

27. All existing and proposed driveway median island are to provide pedestrian crossings, to align with footpaths, to the satisfaction of the City.

**Main Street and Piazza**

28. A detailed design of the Main Street is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall be generally in accordance with the road typologies contained with Part 5.2 of the Transport Plan (Attachment 18), and shall include:-

    a. 3.0m lane widths, 2.4m wide parking bays and a pedestrian footpath;
    b. The finish of the footpaths and/or paved areas to be seamless between public and private areas;

    c. The surface finish of the traffic lanes, to the satisfaction of the City of Stirling;
    d. 30km/h design speed, 20km/h posted speed, with a reduced a 10km/h shared zone for the piazza;
    e. Accommodation of a 12.5m long Single Unit Truck;
    f. Landscaping, paving and street furniture in accordance with the Landscaping Plan;
    g. Street lighting is to be upgraded as needed in compliance with Australian Lighting Standards and to the satisfaction of the City of Stirling;

29. Construction of the Main Street shall be completed by the landowner in accordance with the approved detailed design and in accordance with the Site Management Plan referred to in Condition 56. The Main Street shall be completed to the satisfaction of the City of Stirling and maintained in good condition thereafter to the satisfaction of the City of Stirling.

30. All tenancies fronting the Main Street and Piazza shall provide an operable pedestrian access opening to the square.

31. Prior to occupation of any part of the development, a Place Management and Activation Strategy setting out the arrangements for the ongoing management of Main Street and Piazza shall be submitted to and approved by the City of Stirling.

32. Prior to the occupation of any part of the development the subject of this application that fronts the Main Street, the owner of Lot 11 Karrinyup Road, Karrinyup (**land**) shall grant to the City an easement in gross pursuant to sections 195 and 196 of the *Land Administration Act 1997* for the benefit of the City of Stirling and the public at large over that portion of the land designated for vehicular and pedestrian traffic along the Main Street for the purposes of providing unrestricted public pedestrian and vehicular access to the Main Street in accordance with the Place Management and Activation Strategy.

**Land Use**

33. Ground floor development fronting Karrinyup Road, Davenport Street, Francis Avenue and Burroughs Road, and the proposed Piazza shall comprise active non - residential uses in accordance with Local Planning Policy 5.7.

34. The proposed Tavern shall be located within the Piazza. If a Tavern is proposed in any other location, further approval from the City of Stirling pursuant to clause 10.8 of Local Planning Scheme No.3 shall be required.

35. Prior to the commencement of development, a land use tenancy plan for all permitted land uses (as specified under Local Planning Scheme No.3), including all proposed kiosk locations, is to be provided to the satisfaction of the City of Stirling. The plan shall specify the land use for each tenancy using the land uses defined under Local Planning Scheme No.3. Any land uses that have not been specified within the development application will require the further planning approval of the City of Stirling.

**Residential Development**

36. Prior to the occupation of any part of the retail floor space which is approved by this development approval, there must be substantial commencement of a minimum of 50 residential multiple dwellings.

37. Prior to the occupation of the whole of the proposed retail floor space which is approved by this development approval, there must be substantial commencement of the remaining approved multiple dwellings.

38. All multiple dwellings are to be provided with a store room in accordance with the deemed-to-comply provisions of clause 6.4.6 of the Residential Design Codes. Modified drawings demonstrating compliance with this will be required as part of the building permit.

**General**

39. Further to Condition 5, the end of trip facilities for the non-residential development shall include a minimum of 20 showers and changing facilities. Detailed drawings identifying the location of all bicycle parking bays, lockers and showers shall be submitted to the City for its approval and be provided prior to the commencement of development in accordance with the approved detailed drawings to the City's satisfaction.

40. Prior to the commencement of development, a Site Management Plan to be submitted to the City of Stirling for its approval. The Site Management Plan shall address dust, noise, waste management, parking, storage of materials, traffic and site safety/security. The Site Management Plan as approved by the City shall be complied with for the duration of the construction of the development.

41. Prior to occupation of the development, a Shopping Trolley Management Plan is to be prepared to the satisfaction of the City of Stirling.

42. Prior to the commencement of development, a report outlining the intended environmentally sustainable design approach with respect to part 6.0 of the Model Centre Framework of State Planning Policy 4.2 have been addressed in the detailed design.

43. Awnings shall be provided in accordance with the requirements of Local Planning Policy 5.7, specifically:-

    a. Shall be provided over all footpaths that abut buildings adjacent to an existing road reserve or the proposed main street (including the bus station);
    b. Awnings shall be provided above all entrances and exits of a building;
    c. Have a minimum clearance from the footpath of 2.7m;
    d. have a maximum clearance from the footpath of 3.2m;
    e. Awnings constructed using materials that are opaque, translucent and non-reflective; and
    f. Have a minimum depth of 2m.

44. Pedestrian entrances to all buildings shall be at finished pavement level of the adjacent public road or the main street to allow for Universal Access to the satisfaction of the City.

45. A maximum of 4,880 car parking bays shall be provided and reserved as public parking bays, to the satisfaction of the City of Stirling.

46. A minimum 50 motorbike parking bays shall be provided on site prior to occupation of the development, to the satisfaction of the City of Stirling.

47. A taxi rank shall be provided at a suitable location (for at least two vehicles) prior to occupation of the development, to the satisfaction of the City of Stirling.

48. All crossovers shall be at the same level as the footpath and shall be designed and constructed using the same materials and finishes of the adjoining footpath, to the satisfaction of the City.

49. All redundant vehicle crossovers shall be removed and the verge, landscaping, footpaths and kerbing reinstated.

50. The car parking bays, driveways and access points shown on the approved plans shall be designed, constructed, drained and marked in accordance with the Australian Standard for Off-street Car Parking (AS/NZS2890.1), Offstreet Parking for People with Disabilities (AS/NZS2890.6) and Off-street Commercial Vehicle Facilities (AS2890.2), prior to occupation of the development. A detailed design addressing this condition is to be submitted to the City of Stirling for approval prior to commencement of development or alternatively the applicant may provide certification from a suitably qualified engineer that compliance with this condition has been achieved. These bays are to be thereafter maintained to the satisfaction of the City of Stirling.

51. Where the satisfaction of any condition requires the preparation of a legal agreement, such agreement shall be prepared by the City of Stirling's solicitors.

52. Unless otherwise specified all costs of and incidental to the satisfaction of these conditions must be paid by the owner including, without limitation, the City of Stirling's legal costs and all registration fees and stamp duty (if any).

53. The delivery noise control strategies outlined in the submitted acoustic report is to be incorporated into a Noise Management Plan to be prepared to the satisfaction of the City of Stirling prior to the commencement of the development. The Noise Management Plan shall be complied with for the duration of the development.

54. A further acoustic report shall be submitted prior to the occupation of the development demonstrating that the new mechanical plant and equipment complies with the applicable standards for environmental noise (Environmental Protections (Noise) Regulations) 1997. Any identified elements of non-compliance shall be rectified prior to o the occupation of the development.

55. All recommendations of the current acoustic report, as it relates to the proposed multiple dwellings, are to be implemented into the drawings submitted with the application for a building permit and demonstrated to be in compliance with the requirements of the acoustic report prior to the issue of a building permit for any of the multiple dwellings.

56. A CCTV system providing surveillance of all entrances into the development, parking and loading areas shall be installed prior to practical completion of each stage of the development in accordance with the relevant Australian Standards, Guidelines and City of Stirling Policies. A CCTV design plan for the development is to be submitted for the City's approval prior to the commencement of the development and implemented, as approved, to the satisfaction of the City of Stirling.

57. A modified Waste Management Plan is to be provided to the satisfaction of the City prior to the commencement of development. The Plan is to specifically include provisions demonstrating how waste removal for the residential buildings will be wholly facilitated on the subject site.

58. Landscaping shall be provided generally in accordance with the submitted Landscaping Plans prepared by Emerge Associates, dated 9 June 2015. In addition, a Detailed Landscaping Plan the shall be submitted for the further approval of the City and shall include the following information:-

    a. Site boundaries;
    b. Location of buildings, car parks, retaining walls, fencing and paving;

    c. Sufficient construction details to clearly define method of construction and materials used;
    d. Species key showing species and number or symbol showing the location of the species;
    e. Planting beds clearly identified and species noted;
    f. Identification of hard landscape materials (e.g. specify if paving is to be brick or concrete slabs etc.);
    g. Existing vegetation (species and location) including those proposed to be removed;
    h. Street frontages and road names;
    i. Depth and extent of mulching to be used; and
    j. Model number and manufacturers details for all landscape furniture.

59. All landscaping provided in accordance with the Landscaping Plan approved by the City is to be installed in accordance with the Site Management Plan and maintained in good condition thereafter.

60. All external fixtures, including air conditioning units, plant and roof equipment, shall be screened and/or located in accordance with the deemed-to-comply standards of clause 6.4.5 of the R-Codes and the "Screening" provisions of LPP5.7.

61. All multiple dwelling balcony balustrading shall be constructed and maintained with material that is a minimum 50% visually permeable.

62. No goods or materials being stored, either temporarily or permanently, in the parking or landscape areas or within access driveways. All goods and materials are to be stored within the buildings or storage yards, where provided.

63. Vehicular parking manoeuvring and circulation areas (including all internal roads and driveways) indicated on the approved plan shall be sealed and drained, the parking spaces marked out and maintained in good repair.

64. Any outside lighting to comply with Australian Standards AS 4282-1997 for the control of obstructive effects of outdoor lighting and not spill into any adjacent residential premises.

65. Lighting to be provided in accordance with the requirements of Local Planning Policy 5.7 and shall include lighting to all public spaces including under awnings, parking areas, service areas, footpaths and entry and exit points.

66. All ground floor external walls are to be treated with an anti-graffiti coating appropriate to the finished surface to reduce the likelihood of and improve ease of graffiti removal.

67. A minimum of six visitors bicycle parking bays are to be provided for the eastern multiple dwelling building, and a minimum of three visitors bicycle parking bays for the western multiple dwelling building, in locations to the satisfaction of the City prior to the occupation of the development.

68. All public access easements required by these conditions shall be granted by the owner to the City of Stirling as an easement in gross pursuant to sections 195 and 196 of the *Land Administration Act 1997* for the benefit of the City of Stirling and the public at large.

69. Delivery and service vehicles are not permitted to enter the site outside of the hours 7.00am to 7.00pm Monday to Saturday and 9.00am to 5.00pm Sundays and public holidays.

70. The applicant is to submit information detailing the actual noise emissions from the extension once in operation. This information is to be provided to the City of Stirling within a two month period from the commencement of operation. Should noise emissions exceed assigned levels then further noise reduction measures are to be installed and implemented.

**Advice Notes**

**Transport Portfolio**

1. In relation to Condition 1, the Karrinyup Road works include the proposed road improvements, drainage, pedestrian and bike path improvements, bus queue jump lanes, all vehicle access points to the Centre, the proposed intersection upgrades at Marmion Avenue / West Coast Highway, Burroughs Road, Jeanes Road, Francis Street, Huntriss Road intersections, and the extension of the eastbound right turn lane onto the Mitchell Freeway, generally as outlined in Appendix A (Plan Number 1 - 13) of the revised Transport Plan dated 15 June 2015. The staging plan and agreements is to ensure that the main upgrade works to Karrinyup Road are to be completed prior to the commencement of operation of any additional retail uses.

2. The attached letter (Attachment 2) from MRWA provides more specific comments on issues that can be resolved and refined in subsequent works approval stages.

3. In relation to Condition 2, AMP to fund the full cost ($530,000/annum 2015/16) of operating the Route 425 at a 20 minute peak and 30 minute off peak period frequency on weekdays from 7am to 9pm; and a 30 minute frequency on weekends from 7am and 7pm. This level of service should correspond with trading hours and train services at Stirling Station. Also note that the funding from PTA is to be the same as AMP during these hours. Shoulder services outside of these times will be fully funded by the PTA.

   The transport portfolio encourages the owner to change the opening hours for the majority of the tenants to 10AM. Should this be done the funding agreement can be renegotiated to reflect the new service demands and any savings on bus ownership costs.

4. In relation to Condition 3, the Parking Management Plan is to detail the staging of the provision of bays (at a rate of 4.3 bays per 100m²), appropriate way finding, the provision of suitable parking management technology to indicate available bays, all of the intended locations of directional signs to be placed within the surrounding road reserves and the site, indicative employee parking locations, paid parking for all employees of shop-retail uses at the commencement of the additional shop-retail uses, and paid parking for all other employees by 5 years from completion of the development.

5. In relation to Condition 4, the Travel Behaviour Change Plan should contain a range of actions that encourage employees and customers to access the site by alternatives to solo car commuting. The plan could also be incorporated into the Centre's marketing strategy to attract more customers via public transport, walking, cycling and car-pooling. It may also include TravelSmart like programmes aimed at assisting staff with their travel choices. The DoT is preparing guidance for the preparation of travel behavior change plans and would be interested in providing follow-up assistance in the preparation and implementation of such a plan.

6. In relation to Condition 5, it is noted that additional lockers and staff facilities are provided within the major tenancies. The specific location and design of the bike end of trip facilities and racks are to be agreed with the City prior to installation.

7. In the absence of an approved structure plan, the proposed 4,900 bays will be considered the maximum parking cap for development on the site subject of the DA.

8. The Karrinyup Road and Huntriss Road intersection be upgraded to ensure that the maximum degree of saturation at this intersection is not greater than 90% at any time. Prior to commencement of any part of the development, plans for the design of the intersection shall be submitted to the City of Stirling for its approval and the works for the intersections shall be undertaken in accordance with the plans as approved by the City of Stirling.

9. The Karrinyup Road and Marmion Avenue intersection be upgraded to ensure that the maximum degree of saturation at this intersection is not greater than 90% at any time. Prior to commencement of any part of the development, plans for the design of the intersection shall be submitted to the City of Stirling for its approval and the works for the intersections shall be undertaken in accordance with the plans as approved by the City of Stirling.

10. New dedicated bus lanes in both directions are to be provided along Karrinyup Road from west of Burroughs Road to the Mitchell Freeway, at the expense of the landowner. Prior to the commencement of any part of the development, design plans for the bus lanes shall be submitted to the City for its approval and the bus lanes shall be provided in accordance with the plans approved by the City.

11. New bus lanes are to be provided along Karrinyup Road for a distance of 200m either side of the Marmion Avenue intersection, at the expense of the landowner. Prior to the commencement of any part of the development, design plans for the bus lanes shall be submitted to the City for its approval and the bus lanes shall be provided in accordance with the plans approved by the City.

12. New northern bus lane is to be provided along Huntriss Road for a distance of 200m south of the Karrinyup Road intersection, at the expense of the landowner. The design shall be to the satisfaction of the City.

13. All brick paving installed within the public and private realm to provide a nonslip finish, to the satisfaction of the City of Stirling.

14. All public and private paved areas abutting the development are to be sealed on completion of these works, to reduce the incidents of staining and improve the ease of gum removal, to the satisfaction of the City of Stirling.

15. Proposed verge trees are to be located to comply with minimum road setback requirements and sight lines to the satisfaction of the City of Stirling.

16. A physical means of preventing vehicles attempting to turn right into the Eastern parking area (Basement 02) from Francis Avenue, such as an extended median island and associate signage, shall be installed at the landowner's expense to the City's satisfaction.

17. The potential conflict area at the entrance into the basement car park on the main street shall be addressed by providing adequate signage and pavement marking or by repositioning the location of this entrance to the satisfaction of the City.

18. The submitted plans (Attachment 1) shall be amended to ensure that from the position of a driver exiting the loading dock 5 there is adequate visibility to the right along Karrinyup Road to the satisfaction of the City.

19. Details shall be provided to the City for its approval for the traffic management and definition of movement priorities between trucks exiting the loading Yard 5, vehicle movements onto the parking ramp and bus movements into the station, so there is definition of priority or separation of in and out movements.

20. The exit from Yard 1 onto Davenport Street shall be designed so there are no conflicts between entering and exiting vehicles, including delivery trucks, to the satisfaction of the City.

21. The entrance into Yard 7 shall be designed so there are no conflicts between entering and exiting vehicles, including delivery trucks, to the satisfaction of the City.

22. The applicant shall demonstrate to the satisfaction of the City of Stirling and prior to the commencement of development that the fuel delivery articulated trucks are able to enter the proposed service station without driving over median islands.

23. Visual truncations to be provided to all loading docks and parking ramps for vehicle and pedestrians, to the satisfaction of the City.

**General**

24. If services are required to be relocated as part of this development the landowner is required to liaise with the relevant service authorities.

25. All road signing and lining requirements are subject to Main Roads Western Australia (MRWA) standards and approvals;

26. Payment to the City of an inspection fee equivalent to 1.5% of the tendered cost of all construction works, relating to the modification of existing and the creation of new City infrastructure, prior to the occupation of the development.

27. Payment to the City of a 12 months defects liability period retention bond of 2.5% of the tendered cost of all construction works, relating to the modification of existing and the creation of new City infrastructure, prior to the occupation of the development.

28. PTA approval for the proposed joint access to loading docks and parking ramp off Karrinyup Road adjoining the PTA Bus Station as well as for the shared use of the median break on Karrinyup Road is required

29. If, in satisfying conditions that require modification to the development as identified in the submitted plans, further changes occur, the applicant is advised that a Form 2 application will be required.

**Health**

30. Compliance with the *Food Act 2008* and FSANZ Food Safety Standards.

31. Acceptable plans indicating the position and type of all proposed fittings and fixtures and details of floor, wall and ceiling finishes and floor drainage to be submitted for all food premises prior to internal fit out.

32. Compliance with Health (Public Building) Regulations 1992 and related standards.

33. Compliance with the Environmental Protection (Noise) Regulations 1997.

## PART B – METROPOLITAN REGION SCHEME

**Approve** DAP Application reference DP/15/00741 and accompanying plans and documents which are stamped dated 15 June and 2015 and 01 July 2015, in accordance with (Clause 30) of the Metropolitan Region Scheme, subject to the following conditions:-

1. Prior to the commencement of site works, agreements with MRWA and the City of Stirling are to be in place for the staging and construction of infrastructure improvements as generally shown with the Transport Plan dated 15 June 2015, or as revised in an updated transport plan. These works are to be constructed to the satisfaction of the Western Australian Planning Commission in liaison City of Stirling, at the expense of the applicant, prior to the occupation of the development.

2. Satisfactory arrangements being made for the implementation of the proposed upgrades in Conditions 1 to the specification of Department of Transport, the Public Transport Authority, MRWA, and the City of Stirling, to the satisfaction of the Western Australian Planning Commission.

3. Prior to the occupation of the development, a Travel Behaviour Change Plan is to be approved, implemented and reviewed as required to the specification of the City of Stirling on the advice of the Department of Transport to the satisfaction of the Western Australian Planning Commission.

4. Prior to the issue of a building licence, plans are to show how all delivery vehicles manoeuvre entirely on the site for the loading and unloading of goods associated with the use of the site, and demonstrate that all vehicles are capable of entering and leaving the site and/or internal "public" roads in a forward gear, to the specification of the City of Stirling and MRWA to the satisfaction of the Western Australian Planning Commission.

**Advice Notes**

1. In relation to Condition 1, the Karrinyup Road works include the proposed road improvements, drainage, pedestrian and bike path improvements, bus queue jump lanes, all vehicular access points to the Centre, the proposed intersection upgrades at Marmion Avenue / West Coast Highway, Burroughs Road, Jeanes Road, Francis Street, Huntriss Road intersections, and the extension of the eastbound right turn lane onto the Mitchell Freeway, generally as outlined in Appendix A (Plan Number 1 – 13) of the revised Transport Plan dated 15 June 2015. The staging plan and agreements is to ensure that the main upgrade works to Karrinyup Road are to be completed prior to the commencement of operation of any additional retail uses.

2. In regard to Condition 3, the applicant is advised that the Travel Behaviour Plan shall primarily target centre employees but also customers.

3. The applicants is advised that in the absence of an approved Activity Centre Structure Plan, the proposed car parking numbers are considered to be the maximum parking cap for development.

4. The applicant is required to liaise closely with MRWA about the implementation of the proposed infrastructure upgrades.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Attachment 5b

Government of **Western Australia**
Development Assessment Panels

LG Ref: DA15/2234
DoP Ref: DAP/15/00741
Enquiries: Development Assessment Panels
Telephone: (08) 6551 9919

Mr Sean Fairfoul
Rowe Group
3/369 Newcastle Street
Northbridge WA 6003

Dear Mr Fairfoul

**Metro North-West JDAP – City of Stirling – DAP Application DA15/2234**
**Lot 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup**
**Mixed Use Development Expansion Karrinyup Shopping Centre**

Thank you for your application and plans submitted to the City of Stirling on 11 November 2015 for the above development at the abovementioned site.

This application was considered by the Metro North-West Joint Development Assessment Panel at its meeting held on 21 January 2016, where in accordance with the provisions of the City of Stirling Local Planning Scheme No. 3, it was resolved to approve the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, a DAP Form 2 application may be made to amend or cancel this planning approval in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Ms Giovanna Lumbaca at the City of Stirling on (08) 9205 8773.

Yours sincerely,

*Natalie Garland*

**DAP Secretariat**

**1/02/2016**

Encl. DAP Determination Notice
Approved plans

Cc: Ms Giovanna Lumbaca
City of Stirling

Mr Gary McGowan
WAPC

Government of **Western Australia**
Development Assessment Panels

***Planning and Development Act 2005***

**City of Stirling Local Planning Scheme No. 3**

**Metro North-West Joint Development Assessment Panel**

# Determination on Development Assessment Panel Application for Planning Approval

**Location:** Lot 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup
**Description of proposed Development**: Mixed Use Development Expansion Karrinyup Shopping Centre

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 21 January 2016, subject to the following:

**PART A: CITY OF STIRLING LOCAL PLANNING SCHEME NO. 3**

That the Metro North-West JDAP resolves to:

1. **Accept** that the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 15 September 2015 is appropriate for consideration in accordance with regulation 17 of the Planning and Development (Development Assessment Panels) Regulations 2011;

2. **Approve** the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 15 September 2015 and accompanying plans in accordance with the provisions of the Local Planning Scheme No.3, for the proposed minor modifications to the conditions of the approved Major Expansion of Karrinyup Shopping Centre at Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup, subject to:

**<u>Amended Conditions</u>**

**Transport Portfolio**

1. Prior to the commencement of site works, agreements with the City of Stirling are to be in place for the staging and construction of infrastructure as generally shown in Appendix A (Plans Numbered 0002 - 0015) of the revised Transport Plan dated 15 October 2015, and in accordance with the Site Management Plan. The landowner's responsibilities contained within the plans, as approved, shall be fully implemented and completed to the satisfaction of the City of Stirling, at the cost of the applicant, unless otherwise agreed.

2. Prior to the opening of the retail centre, the applicant is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The agreement is to provide for the applicant to fund the PTA's estimated cost of delivering additional Transperth bus service kilometres for a minimum period of five years from

the opening of the retail centre, to the satisfaction of the City of Stirling and the Department of Transport upon the advice of the PTA.

3. Prior to the commencement of site works for the centre, a Parking Management Plan shall be submitted to and approved in writing by the City of Stirling, upon advice from the Department of Transport. The approved parking management plan shall be implemented with the commencement of use of the expanded retail centre.

4. Prior to the occupation of the development, a Travel Behaviour Change Plan particularly targeting centre employees but also customers, is to be approved, implemented and reviewed as required to the satisfaction of the City of Stirling on the advice of the Department of Transport.

5. End of Trip bicycle facility(s) to include a total of 200 secure and covered bike racks and lockers for staff is to be designed and supplied to the satisfaction of the City of Stirling. A total of 160 customer bike racks are to be distributed in key locations around the site including the provision for at least 30 bikes being provided at each major ground floor entrance and at least an additional 20 being provided on the main street.

6. All delivery vehicles must be manoeuvred entirely on the site for the loading and unloading of goods associated with the use of the site, and are to enter and leave the site and or internal "public" roads in a forward gear, to the satisfaction of the City of Stirling and Main Roads. Prior to the issue of a building licence, plans are to show how this will be achieved.

**Drainage Infrastructure**

7. Unless otherwise agreed, all stormwater from the site shall be contained on site.

8. Prior to the commencement of construction of any part of the development, an Overall Stormwater Management Plan designed by a suitably qualified engineer is to be submitted to the City of Stirling for its approval. Unless otherwise agreed the Detailed Stormwater Drainage Designs are to be in accordance with the Overall Stormwater Management Plan.

9. An as-constructed survey(s) showing all of the City's drainage infrastructure affected by the development and/or road upgrades, prepared in compliance with DSPEC drawing requirements, shall be provided to the City of Stirling upon completion of the relevant road and/or drainage works.

10. Prior to the commencement of each stage of the development, a detailed stormwater drainage plan for that portion of the development, designed by a suitably qualified engineer is to be submitted to the City of Stirling for its approval. The drainage system in accordance with the plan approved by the City is to be installed prior to occupancy of that staged portion of the development and be thereafter maintained to the satisfaction of the City of Stirling.

**Road Design and Construction**

11. Detailed design of Francis Street and Burroughs Road is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall generally be in accordance with plans 239230-9 and 11 of the transport Plan prepared by Aurecon dated 15 June 2015, including the changes marked in red (attached) and shall generally include the following:-
    a. 3.0m lane widths, 2.2m wide parking bays only on the shopping centre side of the road, 2.0m cycling separator, 3.0m dual way cycling lane and 4.3m wide footpaths only on the shopping centre side of the road;
    b. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;
    c. The finish of the footpaths and/ or paved areas to be seamless between public and private areas;
    d. The surface finish of the traffic lanes, to the satisfaction of the City;
    e. 40km/h design speed;
    f. Two priority pedestrian crossings aligning with entrances to the shopping centre;
    g. Platanus acerifolia (London Plain Tree) shall be planted a minimum 11m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;
    h. Pyrus calleryana cultivars (ornamental pear tree) shall be planted at 5.0m spacing on footpaths;
    i. All street tree plantings must be located to ensure adequate sightlines are maintained;
    j. All landscaped areas are to be reticulated;
    k. Street lighting is to be upgraded to suit the new Francis Street and Burroughs Road in compliance with Australian Lighting Standards and to the satisfaction of the City;
    l. New or modified roads shall be drained in accordance with water sensitive urban design principles and/or the major / minor drainage philosophy;
    m. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
    n. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5 mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.

    The works for Francis Street and Burroughs Road shall be undertaken in accordance with the design approved by the City.

12. Detailed design of Davenport Road is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall generally be in accordance with plan 239230-10 (attached) including the changes marked in red and is to generally include the following:-
    a. 3.0m lane widths, 2.2m wide parking bays only on the shopping centre side of the road, 2.0m cycling separator, 3.0m dual way cycling lane and 4.3m wide footpaths only on the shopping centre side of the road;
    b. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;
    c. The finish of the footpaths and/ or paved areas to be seamless between public and private areas;
    d. The surface finish of the traffic lanes, to the satisfaction of the City;

e. 40km/h design speed;
f. Two priority pedestrian crossings aligning with entrances to the shopping centre;
g. Platanus acerifolia (London Plain Tree) shall be planted a minimum 11m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;
h. Pyrus calleryana cultivars (ornamental pear tree) shall be planted at 5.0m spacing on footpaths;
i. All street tree plantings must be located to ensure adequate sightlines are maintained;
j. All landscaped areas are to be reticulated;
k. Street lighting is to be upgraded to suit the new Davenport Road in compliance with Australian Lighting Standards and to the satisfaction of the City;
l. Water sensitive urban design (WSUD) principles to be incorporated into street drainage and streetscapes shall include but not be limited to tree pits and/ or rain gardens to reduce stormwater runoff and increase at source infiltration;
m. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
n. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5 mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.

The works for Davenport Road shall be undertaken in accordance with the design approved by the City.

13. Detailed design of Karrinyup Road is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall generally be in accordance with plans 239 230-2, 3, 4, 5, 6 , 7 and 8 (attached), and generally include the changes marked in red and is to include the following:-
    a. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;
    b. The finish of the footpaths and/ or paved areas to be seamless between public and private areas;
    c. Corymbia maculata shall be planted every 5m where the median is being altered and mulched;
    d. Platanus acerifolia (London Plain Tree) shall be planted a minimum 5m apart adjacent to the site;
    e. The median shall be reticulated adjacent to the site;
    f. All street tree plantings must be located to ensure adequate sightlines are maintained;
    g. All signing and lining requirements are subject to Main Roads WA standards and approvals; and

    h. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5 mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent abutting the site.

The works for Karrinyup Road shall be undertaken in accordance with the design approved by the City.

14. Prior to commencement of any roadworks that require road widenings, the landowner shall cede to the Crown free of cost without compensation for the purpose of a public road, any road widening shown on designs approved by the City under Conditions 11-13, in accordance with the Site Management Plan.

15. Construction of works as required by Conditions 11-13 shall be completed by the landowner in accordance with the approved detailed designs and the Site Management Plan, to the satisfaction of the City of Stirling.

16. Prior to commencement of development, the landowner shall commission a Stage 3 road safety audit for all road and access modifications as required by this approval, to be conducted in accordance with the Austroads Guide to Road Safety, Road Safety Audit, 2009, by an independent Accredited Senior Road Safety Auditor and submit to the City the road safety audit report and the completed Corrective Actions Report inclusive of landowner/designer's responses to the audit findings. The approved works shall be constructed at the expense of the landowner to the City of Stirling's satisfaction prior to the occupation of the development.

17. The landowner is responsible for the maintenance of all public areas on the subject land.

18. Prior to the erection of any street furniture in the Francis Avenue, Davenport Street and Burroughs Road road reserves, details of the street furniture are to be provided to the City of Stirling for its approval. The street furniture as approved by the City of Stirling shall be installed prior to the occupation of the development and thereafter maintained to the satisfaction of the City.

19. The owner shall prepare and submit to the City for its approval detailed design drawings, which shall be in accordance with the City's Landscaping Policy, for all landscaping to be provided on the subject site and within any road reserve. All landscaping of the subject site and the abutting road reserves is to be completed in accordance with the drawings approved by the City prior to the occupation of the development and thereafter maintained to the satisfaction of the City.

20. Prior to the occupation of any portion of the development forming part of this approval, the landowner shall construct the proposed cycle path on Jeanes Road between Karrinyup Road and Deanmore Road, generally in accordance with Appendix A (Plans 0011-0012) of the revised Transport Plan, or an alternative route as agreed with the City in accordance with the City's Integrated Cycling Strategy, to the satisfaction of the City of Stirling.

21. Service vehicle access and egress plan be prepared to the satisfaction of the City, and that the applicant modify any access arrangements proposed as a result of that plan.

22. Headlight glare from parking vehicles onto Karrinyup Road from the South West parking area of the development (levels 44.00 and 44.50) shall be prevented by the provision of screening at the landowner's expense to the City's satisfaction.

23. The applicant shall:-
    a. Produce an updated Transport Plan to the satisfaction of the City that will clearly show the impact of the proposal on the adjacent residential road network; and
    b. All necessary measures as identified by the updated Transport Plan shall be implemented and constructed by the landowner at their expense and to the satisfaction of the City, prior to the occupation of the development.

24. A contribution of 50% of the cost shall be paid to the City to provide a footpath on one side of every street that does not have a footpath within 400m of the boundary of the subject site in accordance with the City's Footpaths Policy.

25. Cut-throughs shall be provided on the Jeanes Road / Karrinyup Road traffic islands and the proposed entrance/exit to the east of Miles Street shall provide for a median island extended to the kerb line on Karrinyup Road with these modifications to the satisfaction of the City.

26. All existing and proposed driveway median island are to provide pedestrian crossings, to align with footpaths, to the satisfaction of the City.

**Main Street and Piazza**

27. A detailed design of the Main Street is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall be generally in accordance with the road typologies contained with Part 5.2 of the Transport Plan (Attachment 18), and shall include:-
    a. 3.0m lane widths, 2.4m wide parking bays and a pedestrian footpath;
    b. The finish of the footpaths and/ or paved areas to be seamless between public and private areas;
    c. The surface finish of the traffic lanes, to the satisfaction of the City of Stirling;
    d. 30km/h design speed, 20km/h posted speed, with a reduced a 10km/h shared zone for the piazza;
    e. Accommodation of a 12.5m long Single Unit Truck;
    f. Landscaping, paving and street furniture in accordance with the Landscaping Plan;
    g. Street lighting is to be upgraded as needed in compliance with Australian Lighting Standards and to the satisfaction of the City of Stirling;

28. Construction of the Main Street shall be completed by the landowner in accordance with the approved detailed design as referred to in Condition 27 and in accordance with the Site Management Plan referred to in Condition 39. The Main Street shall be completed to the satisfaction of the City of Stirling and maintained in good condition thereafter to the satisfaction of the City of Stirling.

29. All tenancies fronting the Main Street and Piazza shall provide an operable pedestrian access opening to the square.

30. Prior to occupation of any part of the development, a Place Management and Activation Strategy setting out the arrangements for the on going management of Main Street and Piazza shall be submitted to and approved by the City of Stirling.

31. Prior to the occupation of any part of the development the subject of this application that fronts the Main Street, the owner of Lot 11 Karrinyup Road, Karrinyup (land) shall grant to the City an easement in gross pursuant to sections 195 and 196 of the *Land Administration Act 1997* for the benefit of the City of Stirling and the public at large over that portion of the land designated for vehicular and pedestrian traffic along the Main Street for the purposes of providing unrestricted public pedestrian and vehicular access to the Main Street in accordance with the Place Management and Activation Strategy.

**Land Use**

32. Ground floor development fronting Karrinyup Road, Davenport Street, Francis Avenue and Burroughs Road, and the proposed Piazza shall comprise active non - residential uses in accordance with Local Planning Policy 5.7.

33. The proposed Tavern shall be located within the Piazza. If a Tavern is proposed in any other location, further approval from the City of Stirling pursuant to clause 10.8 of Local Planning Scheme No.3 shall be required.

34. Prior to the commencement of development, a land use tenancy plan for all permitted land uses (as specified under Local Planning Scheme No.3), including all proposed kiosk locations, is to be provided to the satisfaction of the City of Stirling. The plan shall specify the land use for each tenancy using the land uses defined under Local Planning Scheme No.3. Any land uses that have not been specified within the development application will require the further planning approval of the City of Stirling.

**Residential Development**

35. Prior to the occupation of any part of the additional retail floor space which is approved by this development approval, there must be substantial commencement of a minimum of 50 residential multiple dwellings.

36. Prior to the occupation of the whole of the proposed retail floor space which is approved by this development approval, there must be substantial commencement of the remaining approved multiple dwellings.

37. All multiple dwellings are to be provided with a store room in accordance with the deemed-to-comply provisions of clause 6.4.6 of the Residential Design Codes. Modified drawings demonstrating compliance with this will be required as part of the building permit.

**General**

38. Further to Condition 5, the end of trip facilities for the non-residential development shall include a minimum of 20 showers and changing facilities. Detailed drawings identifying the location of all bicycle parking bays, lockers and showers shall be submitted to the City for its approval and be provided prior to the commencement of development in accordance with the approved detailed drawings to the City's satisfaction.

39. Prior to the commencement of development, a Site Management Plan to be submitted to the City of Stirling for its approval. The Site Management Plan shall address dust, noise, waste management, parking, storage of materials, traffic, site safety/security, staging of the development and any other relevant matters to the satisfaction of the City. The Site Management Plan as approved by the City shall be complied with for the duration of the construction of the development.

40. Prior to occupation of the development, a Shopping Trolley Management Plan is to be prepared to the satisfaction of the City of Stirling.

41. Prior to the commencement of development, a report outlining the intended environmentally sustainable design approach with respect to part 6.0 of the Model Centre Framework of State Planning Policy 4.2 have been addressed in the detailed design.

42. Awnings shall be provided in accordance with the requirements of Local Planning Policy 5.7, specifically:-
    a. Shall be provided over all footpaths that abut buildings adjacent to an existing road reserve or the proposed main street (including the bus station);
    b. Awnings shall be provided above all entrances and exits of a building;
    c. Have a minimum clearance from the footpath of 2.7m;
    d. have a maximum clearance from the footpath of 3.2m;
    e. Awnings constructed using materials that are opaque, translucent and non-reflective; and
    f. Have a minimum depth of 2m.

43. Pedestrian entrances to all buildings shall be at finished pavement level of the adjacent public road or the main street to allow for Universal Access to the satisfaction of the City.

44. A maximum of 4,880 car parking bays shall be provided and reserved as public parking bays, to the satisfaction of the City of Stirling.

45. A minimum 50 motorbike parking bays shall be provided on site prior to occupation of the development, to the satisfaction of the City of Stirling.

46. A taxi rank shall be provided at a suitable location (for at least two vehicles) prior to occupation of the development, to the satisfaction of the City of Stirling.

47. All crossovers shall be at the same level as the footpath and shall be designed and constructed using the same materials and finishes of the adjoining footpath, to the satisfaction of the City.

48. All redundant vehicle crossovers shall be removed and the verge, landscaping, footpaths and kerbing reinstated.

49. The car parking bays, driveways and access points shown on the approved plans shall be designed, constructed, drained and marked in accordance with the Australian Standard for Off-street Car Parking (AS/NZS2890.1), Off-street Parking for People with Disabilities (AS/NZS2890.6) and Off-street Commercial Vehicle Facilities (AS2890.2), prior to occupation of the development. A detailed design addressing this condition is to be submitted to the City of Stirling for approval prior to commencement of development or alternatively the applicant may provide certification from a suitably qualified engineer that compliance with this condition has been achieved. These bays are to be thereafter maintained to the satisfaction of the City of Stirling.

50. Where the satisfaction of any condition requires the preparation of a legal agreement, such agreement shall be prepared by the City of Stirling's solicitors.

51. Unless otherwise specified all costs of and incidental to the satisfaction of these conditions must be paid by the owner including, without limitation, the City of Stirling's legal costs and all registration fees and stamp duty (if any).

52. The delivery noise control strategies outlined in the submitted acoustic report is to be incorporated into a Noise Management Plan to be prepared to the satisfaction of the City of Stirling prior to the commencement of the development. The Noise Management Plan shall be complied with for the duration of the development.

53. A further acoustic report shall be submitted prior to the occupation of the development demonstrating that the new mechanical plant and equipment complies with the applicable standards for environmental noise (Environmental Protections (Noise) Regulations 1997). Any identified elements of non-compliance shall be rectified prior to the occupation of the development.

54. All recommendations of the current acoustic report, as it relates to the proposed multiple dwellings, are to be implemented into the drawings submitted with the application for a building permit and demonstrated to be in compliance with the requirements of the acoustic report prior to the issue of a building permit for any of the multiple dwellings.

55. A CCTV system providing surveillance of all entrances into the development, parking and loading areas shall be installed prior to practical completion of each stage of the development in accordance with the relevant Australian Standards, Guidelines and City of Stirling Policies. A CCTV design plan for the development is to be submitted for the City's approval prior to the commencement of the development and implemented, as approved, to the satisfaction of the City of Stirling.

56. A modified Waste Management Plan is to be provided to the satisfaction of the City prior to the commencement of development. The Plan is to specifically include provisions demonstrating how waste removal for the residential buildings will be wholly facilitated on the subject site.

57. Landscaping shall be provided generally in accordance with the submitted Landscaping Plans prepared by Emerge Associates, dated 9 June 2015. In addition, a Detailed Landscaping Plan the shall be submitted for the further approval of the City and shall include the following information:-
    a. Site boundaries;
    b. Location of buildings, car parks, retaining walls, fencing and paving;
    c. Sufficient construction details to clearly define method of construction and materials used;
    d. Species key showing species and number or symbol showing the location of the species;
    e. Planting beds clearly identified and species noted;
    f. Identification of hard landscape materials (e.g. specify if paving is to be brick or concrete slabs etc.);
    g. Existing vegetation (species and location) including those proposed to be removed;
    h. Street frontages and road names;
    i. Depth and extent of mulching to be used; and
    j. Model number and manufacturers details for all landscape furniture.

58. All landscaping provided in accordance with the Landscaping Plan approved by the City is to be installed in accordance with the Site Management Plan and maintained in good condition thereafter.

59. All external fixtures, including air conditioning units, plant and roof equipment, shall be screened and /or located in accordance with the deemed-to-comply standards of clause 6. 4.5 of the R -Codes and the "Screening" provisions of LPP5.7.

60. All multiple dwelling balcony balustrading shall be constructed and maintained with material that is a minimum 50% visually permeable.

61. No goods or materials being stored, either temporarily or permanently, in the parking or landscape areas or within access driveways. All goods and materials are to be stored within the buildings or storage yards, where provided.

62. Vehicular parking manoeuvring and circulation areas (including all internal roads and driveways) indicated on the approved plan shall be sealed and drained, the parking spaces marked out and maintained in good repair.

63. Any outside lighting to comply with Australian Standards AS 4282-1997 for the control of obstructive effects of outdoor lighting and not spill into any adjacent residential premises.

64. Lighting to be provided in accordance with the requirements of Local Planning Policy 5.7 and shall include lighting to all public spaces including under awnings, parking areas, service areas, footpaths and entry and exit points.

65. All ground floor external walls are to be treated with an anti-graffiti coating appropriate to the finished surface to reduce the likelihood of and improve ease of graffiti removal.

66. A minimum of six visitors bicycle parking bays are to be provided for the eastern multiple dwelling building, and a minimum of three visitors bicycle parking bays for the western multiple dwelling building, in locations to the satisfaction of the City prior to the occupation of the development.

67. All public access easements required by these conditions shall be granted by the owner to the City of Stirling as an easement in gross pursuant to sections 195 and 196 of the *Land Administration Act 1997* for the benefit of the City of Stirling and the public at large.

68. Unless otherwise included as part of the Servicing and Waste Management Plan and an associated Acoustic Consultants Report the delivery and service vehicles are not permitted to enter the site outside of the hours 7.00am to 7.00pm Monday to Saturday and 9.00am to 5.00pm Sundays and public holidays.

69. The applicant is to submit information detailing the actual noise emissions from the extension once in operation. This information is to be provided to the City of Stirling within a two month period from the commencement of operation. Should noise emissions exceed assigned levels then further noise reduction measures are to be installed and implemented.

**<u>Amended Advice Notes</u>**

**Transport Portfolio**

1. In relation to Condition 1, the Karrinyup Road works include the proposed road improvements, drainage, pedestrian and bike path improvements, bus queue jump lanes, all vehicle access points to the Centre, the proposed intersection upgrades at Marmion Avenue / West Coast Highway, Burroughs Road, Jeanes Road, Francis Street, Huntriss Road intersections, and the extension of the eastbound right lane onto the Mitchell Freeway, generally as outlined in Appendix A (Plan Number 1 - 13) of the revised Transport Plan dated 15 June 2015. The staging plan and agreement is to ensure that the main upgrade works to Karrinyup Road are to be completed prior to the commencement of operation of any additional retail uses.

2. The attached letter (Attachment 2) from MRWA provides more specifically comments on issues that can be resolved and refined in subsequent works approval stages.

3. In relation to Condition 2, the landowner to fund the cost of operating higher frequency bus services on weekdays from 7.00am to 9.00pm and on weekends from 7.00am and 7.00pm, to achieve the modelled 6% mode share for public transport. This level of service should correspond with trading hours and train services at Stirling Station.

4. In relation to Condition 3, the Parking Management Plan is to detail the staging of the provision of bays (at a rate of 4.3 bays per 100m $^2$), appropriate way finding, the provision of suitable parking management technology to indicate available bays, all of the intended locations of directional signs to be placed within the surrounding road reserves and the site, indicative employee parking locations, paid parking for all employees of shop-retails uses at the commencement of the additional shop-retail uses,

and paid parking for all employees by five years from completion of the development.

5. In relation to Condition 4, the Travel Behaviour Change Plan should contain a range of actions that encourage employees and customers to access the site by alternatives to solo car commuting, the plan could also be incorporated into the Centre's marketing strategy to attract more customers via public transport, walking, cycling and car-pooling. It may also include TravelSmart like programmes aimed at assisting staff with their travel choices. The Department of Transport is preparing guidance for the preparation of travel behaviour change plans and would be interested in providing follow-up assistance in the preparation and implementation of such a plan.

6. In relation to Condition 5, it is noted that additional lockers and staff facilities are provided within the major tenancies. The specific location and design of the bike end of trip facilities and racks are to be agreed with the City prior to installation.

7. In the absence of an approved structure plan, the proposed 4,900 bays will be considered the maximum parking cap for development on the site subject of the DA.

8. The Karrinyup Road and Huntriss Road intersection be upgraded to ensure that the maximum degree of saturation at this intersection is not greater than 90% at any time. Prior to commencement of any part of the development, plans for the design of the intersection shall be submitted to the City of Stirling for its approval and the works for the intersections shall be undertaken in accordance with the plans as approved by the City of Stirling.

9. The Karrinyup Road and Marmion Avenue intersection be upgraded to ensure that the maximum degree of saturation at this intersection is not greater than 90% at any time. Prior to commencement of any part of the development, plans for the design of the intersection shall be submitted to the City of Stirling for its approval and the works for the intersections shall be undertaken in accordance with the plans as approved by the City of Stirling.

10. New dedicated bus lanes in both directions are to be provided along Karrinyup Road from west of Burroughs Road to the Mitchell Freeway, at the expense of the landowner. Prior to the commencement of any part of the development, design plans for the bus lanes shall be submitted to the City for its approval and the bus lanes shall be provided in accordance with the plans approved by the City.

11. New bus lanes are to be provided along Karrinyup Road for a distance of 200m either side of the Marmion Avenue intersection, at the expense of the landowner. Prior to the commencement of any part of the development, design plans for the bus lanes shall be submitted to the City for its approval and the bus lanes shall be provided in accordance with the plans approved by the City.

12. New northern bus lane is to be provided along Huntriss Road for a distance of 200m south of the Karrinyup Road intersection, at the expense of the landowner. The design shall be to the satisfaction of the City.

13. All brick paving installed within the public and private realm to provide a nonslip finish, to the satisfaction of the City of Stirling.

14. All public and private paved areas abutting the development are to be sealed on completion of these works, to reduce the incidents of staining and improve the ease of gum removal, to the satisfaction of the City of Stirling.

15. Proposed verge trees are to be located to comply with minimum road setback requirements and sight lines to the satisfaction of the City of Stirling.

16. A physical means of preventing vehicles attempting to turn right into the Eastern parking area (Basement 02) from Francis Avenue, such as an extended median island and associate signage, shall be installed at the landowner's expense to the City's satisfaction.

17. The potential conflict area at the entrance into the basement car park on the main street shall be addressed by providing adequate signage and pavement marking or by repositioning the location of this entrance to the satisfaction of the City.

18. The submitted plans (Attachment 1) shall be amended to ensure that from the position of a driver exiting the loading dock 5 there is adequate visibility to the right along Karrinyup Road to the satisfaction of the City.

19. Details shall be provided to the City for its approval for the traffic management and definition of movement priorities between trucks exiting the loading Yard 5, vehicle movements onto the parking ramp and bus movements into the station, so there is definition of priority or separation of in and out movements.

20. The exit from Yard 1 onto Davenport Street shall be designed so there are no conflicts between entering and exiting vehicles, including delivery trucks, to the satisfaction of the City.

21. The entrance into Yard 7 shall be designed so there are no conflicts between entering and exiting vehicles, including delivery trucks, to the satisfaction of the City.

22. The applicant shall demonstrate to the satisfaction of the City of Stirling and prior to the commencement of development that the fuel delivery articulated trucks are able to enter the proposed service station without driving over median islands.

23. Visual truncations to be provided to all loading docks and parking ramps for vehicle and pedestrians, to the satisfaction of the City.

**General**

24. If services are required to be relocated as part of this development the landowner is required to liaise with the relevant service authorities.

25. All road signing and lining requirements are subject to Main Roads Western Australia (MRWA) standards and approvals.

26. Payment to the City of an inspection fee equivalent to 1.5% of the tendered cost of all construction works, relating to the modification of existing and the creation of new City infrastructure, prior to the occupation of the development.

27. Payment to the City of a 12 months defects liability period retention bond of 2.5% of the tendered cost of all construction works, relating to the modification of existing and the creation of new City infrastructure, prior to the occupation of the development.

28. PTA approval for the proposed joint access to loading docks and parking ramp off Karrinyup Road adjoining the PTA Bus Station as well as for the shared use of the median break on Karrinyup Road is required.

29. If, in satisfying conditions that require modification to the development as identified in the submitted plans, further changes occur, the applicant is advised that a Form 2 application will be required.

**Health**

30. Compliance with the *Food Act 2008* and FSANZ Food Safety Standards.

31. Acceptable plans indicating the position and type of all proposed fittings and fixtures and details of floor, wall and ceiling finishes and floor drainage to be submitted for all food premises prior to internal fit out.

32. Compliance with Health (Public Building) Regulations 1992 and related standards.

33. Compliance with the Environmental Protection (Noise) Regulations 1997.

34. In relation to Condition 7, rainfall events exceeding 1 in 100 year may overflow into the road reserves. The City will also consider portions of the main street that intersect with a public road being drained into the City's Infrastructure. The landowner will be responsible for the cost of upgrading all infrastructure required to accommodate this.

## PART B: METROPOLITAN REGION SCHEME

That the Metro North-West JDAP resolves to:

1. **Accept** that the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 15 September 2015 is appropriate for consideration in accordance with regulation 17 of the Planning and Development (Development Assessment Panels) Regulations 2011;

2. **Approve** the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 19 November 2015 and accompanying plans in accordance with the provisions of the Metropolitan Region Scheme, for the proposed minor modifications to the conditions of the approved Major Expansion of Karrinyup Shopping Centre at Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup, subject to:

**Amended Condition**

1. Prior to commencement of site works, agreements with Main Roads Western Australia (MRWA) are to be in place for the staging and construction of infrastructure improvements as generally shown within the Transport Plan dated October 2015, or as revised in an updated transport plan. These works are to be constructed to the satisfaction of the Western Australian Planning Commission in liaison with MRWA the Public Transport Authority and the City of Stirling, at the expense of the applicant, prior to occupation of the development.

**Amended Advice Note**

1. In relation to Condition 1, the Karrinyup Road works include the proposed road improvements, drainage, pedestrian and bike path improvements, bus queue jump lanes, all vehicular access points to the Centre, the proposed intersection upgrades at Marmion Avenue / West Coast Highway, Burroughs Road, Jeanes Road, Francis Street, Huntriss Road intersections, and the extension of the eastbound right turn lane onto the Mitchell Freeway, generally as outlined in Appendix A (Plan Number 002 – 0010) of the revised Transport Plan dated October 2015. The staging plan and agreements is to ensure that the main upgrade works to Karrinyup Road are to be completed prior to the commencement of operation of any additional retail uses.

All other conditions, footnotes and advice notes remain as per the DAPs' original decision dated 24 August 2015.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Attachment 5c

Government of **Western Australia**
Development Assessment Panels

LG Ref: DA16/1046
DoP Ref: DAP/15/00741
Enquiries: Development Assessment Panels
Telephone: (08) 6551 9919

Mr Sean Fairfoul
Rowe Group
3/369 Newcastle Street
Northbridge WA 6003

Dear Mr Fairfoul

**Metro North West JDAP – City of Stirling – DAP Application DA16/1046**
**Lots 166, 66 & 11 (200) Karrinyup Road, Karrinyup**
**Mixed Use Development Expansion**

Thank you for your application and plans submitted to the City of Stirling on 20 May 2016 for the above development at the abovementioned site.

This application was considered by the Metro North West Joint Development Assessment Panel at its meeting held on 7 September 2016, where in accordance with the provisions of the City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme, it was resolved to approve the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, a DAP Form 2 application may be made to amend or cancel this planning approval in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Mr Alex Campbell at the City of Stirling on (08) 9205 8577.

Yours sincerely,

R Osborne

**DAP Secretariat**

**9/09/2016**

Encl. DAP Determination Notice
Approved plans

Cc: Mr Alex Campbell
City of Stirling

Mr Gary McGowan & Ms Rosa Rigali
WAPC

Government of **Western Australia**
Development Assessment Panels

***Planning and Development Act 2005***

**City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme**

**Metro North West Joint Development Assessment Panel**

# Determination on Development Assessment Panel Application for Planning Approval

**Location:** Lots 166, 66 & 11 (200) Karrinyup Road, Karrinyup
**Description of proposed Development**: Mixed Use Development Expansion

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 7 September 2016, subject to the following:

**PART A – Local Planning Scheme No. 3**

1. **Accept** that the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 20 May 2016 is appropriate for consideration in accordance with Regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;

2. **Approve** the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 20 May 2016 and accompanying plans (Attachment 1) in accordance with the provisions of Schedule 2, Clause 68(2) of the *Planning and Development (Local Planning Scheme) Regulations 2015*, for the proposed amendments to the approved Major Expansion of Karrinyup Shopping Centre at Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup, subject to:-

**<u>Removal of Condition</u>**

Condition 19 is to be removed.

**<u>Amended Condition</u>**

58. All landscaping provided in accordance with the Detailed Landscaping Plan approved by the City is to be installed in accordance with the Site Management Plan, prior to the occupation of each stage of the development and thereafter maintained in good condition.

**<u>Advice Notes</u>**

1. The occupier of the premises is required under Regulation 8 of the Health (Aquatic Facilities) Regulations 2007 to apply for an approval from the Executive Director of Public Health to construct an aquatic facility (proposed water play space).

2. Any premises conducting skin penetration procedures or any hairdressing establishment are required to be registered with the City of Stirling and to

comply with Health (Skin Penetration) Regulation 1998 and the Hairdressing Establishment.

3. All other conditions and requirements detailed on the previous approval dated 15 August 2016 shall remain unless altered by this application.

**PART B – Metropolitan Region Scheme**

1. Accept that the DAP Application reference DP/15/00741 as detailed on the DAP Form 2.2, dated 20 May 2016, is appropriate for consideration in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*; and

2. Approve the DAP Application reference DP/15/00741 as detailed on the DAP Form 2.2, dated 20 May 2016 and accompanying plans dated 05 August 2016 and 15 August 2016 in accordance with the provisions of the Metropolitan Region Scheme, subject to the following conditions:

**Conditions**

1. Prior to commencement of site works, agreements with Main Roads Western Australia (MRWA) are to be in place for the staging and construction of infrastructure improvements as generally shown within the Transport Plan dated 18 May 2016, or as revised in an updated transport plan. These works are to be constructed to the satisfaction of the Western Australian Planning Commission in liaison with MRWA the Public Transport Authority and the City of Stirling, at the expense of the applicant, prior to occupation of the development.

2. Satisfactory arrangements being made for the implementation of the proposed upgrades in Condition 1 to the specification of Department of Transport, the Public Transport Authority, MRWA, and the City of Stirling, to the satisfaction of the Western Australian Planning Commission.

3. Prior to the occupation of the development, a Travel Behaviour Change Plan is to be approved, implemented and reviewed as required to the specification of the City of Stirling on the advice of the Department of Transport to the satisfaction of the Western Australian Planning Commission.

4. Prior to the issue of a building license, plans are to show how all delivery vehicles manoeuvre entirely on the site for the loading and unloading of goods associated with the use of the site, and demonstrate that all vehicles are capable of entering and leaving the site and or internal "public" roads in a forward gear, to the specification of the City of Stirling and MRWA to the satisfaction of the Western Australian Planning Commission.

**Advice Notes**

1. In relation to Condition 1, the Karrinyup Road works include the proposed road improvements, drainage, pedestrian and bike path improvements, bus queue jump lanes, all vehicular access points to the Centre, the proposed intersection upgrades at Marmion Avenue / West Coast Highway, Burroughs Road, Jeanes Road, Francis Street, Huntriss Road intersections, and the extension of the

eastbound right turn lane onto the Mitchell Freeway, generally as outlined in Appendix A (Plan Number 002 – 0013) of the revised Transport Plan dated 18 May 2016. The staging plan and agreements is to ensure that the main upgrade works to Karrinyup Road are to be completed prior to the commencement of operation of any additional retail uses.

2. In regard to Condition 3, the applicant is advised that the Travel Behavior Plan shall primarily target center employees but also customers.

3. The applicants is advised that in the absence of an approved Activity Centre Structure Plan, the proposed car parking numbers are considered to be the maximum parking cap for development.

4. The applicant is required to liaise closely with MRWA about the implementation of the proposed infrastructure upgrades.

All other conditions, footnotes and advice notes remain as per the DAPs' original decision dated 24 August 2016.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Government of **Western Australia**
Development Assessment Panels

Attachment 5d

LG Ref: DA16/1233
DoP Ref: DAP/15/00741
Enquiries: Development Assessment Panels
Telephone: (08) 6551 9919

Mr Sean Fairfoul
Rowe Group
3/369 Newcastle Street
Northbridge WA 6003

Dear Mr Sean Fairfoul

**Metro North West JDAP – City of Stirling – DAP Application DA16/1233**
**Lots 166 and 66 Davenport Street and Lot 11 (200) Karrinyup Road, Karrinyup (KARRINYUP SHOPPING CENTRE)**
**Mixed Use Development Expansion**

Thank you for your application and plans submitted to the City of Stirling on 15 June 2016 for the above development at the abovementioned site.

This application was considered by the Metro North West Joint Development Assessment Panel at its meeting held on 15 August 2016, where in accordance with the provisions of the City of Stirling Local Planning Scheme No. 3, it was resolved to approve the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, a DAP Form 2 application may be made to amend or cancel this planning approval in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Alex Campbell at the City of Stirling on (08) 9205 8428.

Yours sincerely,

R Osborne

**DAP Secretariat**

**15/08/2016**

Encl. DAP Determination Notice
Approved plans

Cc: Alex Campbell
City of Stirling

Gary McGowan & Rosa Rigali

Government of **Western Australia**
Development Assessment Panels

***Planning and Development Act 2005***

**City of Stirling Local Planning Scheme No. 3**

**Metro North West Joint Development Assessment Panel**

# Determination on Development Assessment Panel Application for Planning Approval

**Location:** Lots 166 and 66 Davenport Street and Lot 11 (200) Karrinyup Road, Karrinyup (KARRINYUP SHOPPING CENTRE)
**Description of proposed Development**: Mixed Use Development Expansion

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 15 August 2016, subject to the following:

1. **Accept** that the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 14 June 2016 is appropriate for consideration in accordance with Regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;

2. **Approve** the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 14 June 2016 in accordance the provisions of Regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, for the proposed extension of time to the approved Major Expansion of Karrinyup Shopping Centre at Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup, for a further two years, subject to:

**Amended Conditions**

1. Nil.

**Amended Advice Notes**

1. All other conditions and requirements detailed on the previous approval dated 21 January 2016 shall remain unless altered by this application.

2. If the development has not substantially commenced by 14 August 2019 this approval shall no longer be valid. Notwithstanding, if a further application is made under regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the responsible authority will assess any new application under the operative planning framework at that point in time.

Attachment 5e

Government of **Western Australia**
Development Assessment Panels

LG Ref: DA16/2419
DoP Ref: DAP/16/01140
Enquiries: Development Assessment Panels
Telephone: (08) 6551 9919

Mr Sean Fairfoul
Rowe Group
Level 3, 369 Newcastle Street
Northbridge WA 6003

Dear Mr Fairfoul

**Metro North-West JDAP – City of Stirling – DAP Application DA16/2419**
**Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup**
**Major Expansion of Karrinyup Shopping Centre**

Thank you for your application and plans submitted to the City of Stirling on 10 November 2016 for the above development at the abovementioned site.

This application was considered by the Metro North-West Joint Development Assessment Panel at its meeting held on 13 April 2017, where in accordance with the provisions of the City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme, it was resolved to approve the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, a DAP Form 2 application may be made to amend or cancel this planning approval in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Ms Giovanna Lumbaca at the City of Stirling on (08) 9205 8773.

Yours sincerely,

*Natalie Garland*

**DAP Secretariat**

**21/04/2017**

Encl. DAP Determination Notice
Approved plans

Cc: Ms Giovanna Lumbaca
City of Stirling

Government of **Western Australia**
Development Assessment Panels

***Planning and Development Act 2005***

**City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme**

**Metro North-West Joint Development Assessment Panel**

# Determination on Development Assessment Panel Application for Planning Approval

**Location:** Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup
**Description of proposed Development**: Major Expansion of Karrinyup Shopping Centre

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 13 April 2017, subject to the following:

**PART A: CITY OF STIRLING LOCAL PLANNING SCHEME NO.3**

**Approve** DAP Application reference DAP/16/01140 as detailed on the DAP Form 1 dated 10 November 2016 and accompanying plans (Attachment 1) for Additions to the Major Expansion of Karrinyup Shopping Centre (Cinema Tenancy and Bankwest Site) at Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup in accordance with *Schedule 2, Clause 68 (2) of the Planning and Development (Local Planning Scheme) Regulations 2015*, subject to the following conditions:

1. Prior to the commencement of site works for the development, an updated Parking Management Plan which includes this development shall be submitted to and approved in writing by the City of Stirling, upon advice from the Department of Transport. The approved parking management plan shall be implemented with the commencement of use of the expanded retail centre.

2. All delivery and service vehicles must be manoeuvred entirely on the site for the loading and unloading of goods associated with the use of the site, and are to enter and leave the site and or internal "public" roads in a forward gear, to the satisfaction of the City of Stirling and Main Roads.

3. Unless otherwise agreed, all stormwater from the site shall be contained on site.

4. An as-constructed survey(s) showing all of the City's drainage infrastructure affected by the development and/or road upgrades, prepared in compliance with DSPEC drawing requirements, shall be provided to the City of Stirling upon completion of the relevant road and/or drainage works.

5. Prior to the commencement of each stage of the development, a detailed stormwater drainage plan for that portion of the development, designed by a suitably qualified engineer is to be submitted to the City of Stirling for its approval. The drainage system in accordance with the plan approved by the City is to be installed prior to occupancy of that staged portion of the

development and be thereafter maintained to the satisfaction of the City of Stirling.

6. Headlight glare from parking vehicles onto Karrinyup Road from the South West parking area of the development (levels 44.00 and 44.50) shall be prevented by the provision of screening at the landowner's expense to the City's satisfaction.

7. The applicant shall:
   a. Produce an updated Transport Plan to the satisfaction of the City that will clearly show the impact of the proposal on the adjacent residential road network; and
   b. All necessary measures as identified by the updated Transport Plan shall be implemented and constructed by the landowner at their expense and to the satisfaction of the City, prior to the occupation of the development.

8. All existing and proposed driveway median island are to provide pedestrian crossings, to align with footpaths, to the satisfaction of the City.

9. Ground floor development on the former BankWest site shall comprise active non - residential uses in accordance with Local Planning Policy 5.7, including windows and/ or door openings to the Western elevation. Window signs shall cover no more than 25% of the glazed area.

10. Prior to the commencement of development, a land use tenancy plan for all permitted land uses (as specified under Local Planning Scheme No.3), including all proposed kiosk locations, is to be provided to the satisfaction of the City of Stirling. The plan shall specify the land use for each tenancy using the land uses defined under Local Planning Scheme No.3. The land use tenancy plan for the overall centre is to be updated to include any tenancy proposed by this development. Any land uses that have not been specified within the development application will require the further planning approval of the City of Stirling.

11. Prior to the commencement of development, the Site Management Plan for the overall centre is to be updated to include the proposed development to the satisfaction of the City. The Site Management Plan is to be submitted to the City of Stirling for its approval. The Site Management Plan shall address dust, noise, waste management, parking, storage of materials, traffic, site safety/security, staging of the development and any other relevant matters to the satisfaction of the City. The Site Management Plan as approved by the City shall be complied with for the duration of the construction of the development.

12. Prior to occupation of the development, an updated Shopping Trolley Management Plan including the overall centre is to be prepared to the satisfaction of the City of Stirling.

13. Prior to the commencement of development, a report outlining the intended environmentally sustainable design approach with respect to part 6.0 of the Model Centre Framework of State Planning Policy 4.2 have been addressed in the detailed design.

14. Awnings shall be provided in accordance with the requirements of Local Planning Policy 5.7, specifically:-
    a. Shall be provided over all footpaths that abut buildings;
    b. Awnings shall be provided above all entrances and exits of a building;
    c. Have a minimum clearance from the footpath of 2.7m;
    d. have a maximum clearance from the footpath of 3.2m;
    e. Awnings constructed using materials that are opaque, translucent and non-reflective; and
    f. Have a minimum depth of 2m.

15. Pedestrian entrances to all buildings shall be at finished pavement level of the adjacent public road or the main street to allow for Universal Access to the satisfaction of the City.

16. A maximum of 4, 880 car parking bays shall be provided and reserved as public parking bays, to the satisfaction of the City of Stirling.

17. All crossovers shall be at the same level as the footpath and shall be designed and constructed using the same materials and finishes of the adjoining footpath, to the satisfaction of the City.

18. All redundant vehicle crossovers shall be removed and the verge, landscaping, footpaths and kerbing reinstated.

19. The car parking bays, driveways and access points shown on the approved plans shall be designed, constructed, drained and marked in accordance with the Australian Standard for Off-street Car Parking (AS/NZS2890.1), Off-street Parking for People with Disabilities (AS/NZS2890.6) and Off-street Commercial Vehicle Facilities (AS2890.2), prior to occupation of the development. A detailed design addressing this condition is to be submitted to the City of Stirling for approval prior to commencement of development or alternatively the applicant may provide certification from a suitably qualified engineer that compliance with this condition has been achieved. These bays are to be thereafter maintained to the satisfaction of the City of Stirling.

20. A further acoustic report shall be submitted prior to the occupation of the development demonstrating that the new mechanical plant and equipment complies with the applicable standards for environmental noise (Environmental Protections (Noise) Regulations 1997). Any identified elements of non-compliance shall be rectified prior to the occupation of the development.

21. A CCTV system providing surveillance of all entrances into the development, parking and loading areas shall be installed prior to practical completion of each stage of the development in accordance with the relevant Australian Standards, Guidelines and City of Stirling Policies. A CCTV design plan for the development is to be submitted for the City's approval prior to the commencement of the development and implemented, as approved, to the satisfaction of the City of Stirling.

22. Unless otherwise agreed, waste management, loading and servicing of the site is to generally be in accordance with the overall Site Servicing and Waste

Management Plan prepared, to the satisfaction of the City prior to the commencement of development, for the site.

23. Landscaping shall be provided generally in accordance with the submitted Landscaping Plans prepared by Emerge Associates (Attachment 6b). In addition, a Detailed Landscaping Plan shall be submitted for the further approval of the City and shall include the following information:-
    a. Site boundaries;
    b. Location of buildings, car parks, retaining walls, fencing and paving;
    c. Sufficient construction details to clearly define method of construction and materials used;
    d. Species key showing species and number or symbol showing the location of the species;
    e. Planting beds clearly identified and species noted;
    f. Identification of hard landscape materials (e.g. specify if paving is to be brick or concrete slabs etc.);
    g. Existing vegetation (species and location) including those proposed to be removed;
    h. Street frontages and road names;
    i. Depth and extent of mulching to be used; and
    j. Model number and manufacturers details for all landscape furniture.

24. All landscaping provided in accordance with the Detailed Landscaping Plan approved by the City is to be installed in accordance with the Site Management Plan, prior to the occupation of each stage of the development and thereafter maintained in good condition.

25. Unless otherwise agreed all external fixtures, including air conditioning units, plant and roof equipment, shall be screened and/or located in accordance with the "Screening" provisions of LPP5.7.

26. No goods or materials being stored, either temporarily or permanently, in the parking or landscape areas or within access driveways. All goods and materials are to be stored within the buildings or storage yards, where provided.

27. Any outside lighting to comply with Australian Standards AS 4282-1997 for the control of obstructive effects of outdoor lighting and not spill into any adjacent residential premises.

28. Lighting to be provided in accordance with the requirements of Local Planning Policy 5. 7 and shall include lighting to all public spaces including under awnings, parking areas, service areas, footpaths and entry and exit points.

29. All ground floor external walls are to be treated with an anti-graffiti coating appropriate to the finished surface to reduce the likelihood of and improve ease of graffiti removal.

30. Unless otherwise included as part of the overall Site Servicing and Waste Management Plan and an associated Acoustic Consultants Report the delivery and service vehicles are not permitted to enter the site outside of the hours 7.00am to 7.00pm Monday to Saturday and 9.00am to 5.00pm Sundays and public holidays.

31. The applicant is to submit information detailing the actual noise emissions from the extension once in operation. This information is to be provided to the City of Stirling within a two month period from the commencement of operation. Should noise emissions exceed assigned levels then further noise reduction measures are to be installed and implemented.

32. Prior to the installation of any external signage on site, a Signage Strategy shall be provided to the satisfaction of the City. The Signage Strategy will, once approved, inform the provision of all signage proposed to the external façade of the development. Where any proposed signage is not consistent with the approved Signage Strategy it will require separate development approval of the City.

33. Shade trees are to be provided in the verge of Davenport Street, in accordance with the City's Local Planning Policy 6.6 - Landscaping to the satisfaction of the City.

**Advice Notes**

1. In relation to Condition 1, the Parking Management Plan is to detail the staging of the provision of bays (at an indicative rate of 4.3 bays per 100m2), appropriate way finding, the provision of suitable parking management technology to indicate available bays, all of the intended locations of directional signs to be placed within the surrounding road reserves and the site, indicative employee parking locations, paid parking for all employees of shop-retail uses at the commencement of the additional shop-retail uses, and paid parking for all employees by five years from completion of the development.

2. In the absence of an approved structure plan, the proposed 4,880 bays will be considered the maximum parking cap for development on the site subject of the DA.

3. All brick paving installed within the public and private realm to provide a nonslip finish, to the satisfaction of the City of Stirling.

4. All public and private paved areas abutting the development are to be sealed on completion of these works, to reduce the incidents of staining and improve the ease of gum removal, to the satisfaction of the City of Stirling.

5. If services are required to be relocated as part of this development the landowner is required to liaise with the relevant service authorities.

6. If, in satisfying conditions that require modification to the development as identified in the submitted plans, further changes occur, the applicant is advised that a Form 2 application will be required.

7. Compliance with the Food Act 2008 and FSANZ Food Safety Standards.

8. Acceptable plans indicating the position and type of all proposed fittings and fixtures and details of floor, wall and ceiling finishes and floor drainage to be submitted for all food premises prior to internal fit out.

9. Compliance with Health (Public Building) Regulations 1992 and related standards.

10. Compliance with the Environmental Protection (Noise) Regulations 1997.

11. In relation to Condition 3, rainfall events exceeding 1 in 100 year may overflow into the road reserves. The City will also consider portions of the main street that intersect with a public road being drained into the City's Infrastructure. The landowner will be responsible for the cost of upgrading all infrastructure required to accommodate this.

12. Any premises conducting skin penetration procedures or any hairdressing establishment are required to be registered with the City of Stirling and to comply with Health (Skin Penetration) Regulation 1998 and the Hairdressing Establishment.

13. All other conditions and requirements detailed on the previous approvals dated 14 August 2015, 21 January 2016, 15 August 2016 and 7 September 2016 shall remain unless altered by this application.

**PART B: METROPOLITAN REGION SCHEME**

**Approve** DAP Application reference DAP/16/01140 and accompanying plans dated stamped 29 March 2017 by the Department of Planning on behalf of the Western Australian Planning Commission, in accordance with Clause 30 of the Metropolitan Region Scheme, subject to the following conditions:

**Conditions**

1. This decision constitutes development approval only and is valid for a period of four (4) years from the date of approval. If the subject development is not substantially commenced within the four (4) year period, the approval shall lapse and be of no further effect.

2. A maximum of 4,880 car parking bays shall be provided and reserved as public parking bays, to the satisfaction of the Western Australian Planning Commission.

3. This decision relates only to the following works as referenced in Section 2.1.1 of the *Mixed Use Development Additions* planning report (Version 1 dated 3 November 2016):

   Basement Levels

   (a) Provision of parking and access under the floorspace facing the development site fronting Davenport Street.

   Level 00 - 01

   (b) Demolition of the Bankwest Building;
   (c) Construction of a net increase of 2,685m² floorspace; and
   (d) Updates to the facade treatment fronting Karrinyup Road.

   Level 02

(e) Minor structural pillars and elevator/stair wells to accommodate entry into the proposed Cinema addition; and

(f) Provision of roof top parking on top of floorspace facing the development site fronting Davenport Street.

Level 03

(g) Construction of a tenancy to house the Cinema use, comprising approximately 6,200m², located to the south west of the subject site above the car parking area at level 2.

**Advice Notes**

1. In regard to the condition relating to car parking bays, the maximum number of car bays is not in addition to any other development approved for the subject site. Any private car parking bay for residential purposes is not to be included in the maximum number of car bays permitted under this approval.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Attachment 5f

Government of **Western Australia**
Development Assessment Panels

LG Ref: DA16/2761
DoP Ref: DAP/15/00741
WAPC Ref: 20-50085-3
Enquiries: (08) 6551 9919

Mr Nathan Stewart
Rowe Group
Level 3, 369 Newcastle Street,
Northbridge WA 6003

Dear Mr Stewart

**METRO NORTH-WEST JDAP - CITY OF STIRLING AND WESTERN AUSTRALIAN PLANNING COMMISSION - DAP APPLICATION - DA16/2761 - DETERMINATION**

| | |
|---|---|
| Property Location: | Lots 166 and 66 Davenport Street and Lot 11 (200) Karrinyup Road, Karrinyup |
| Application Details: | Mixed Use Development Expansion - Karrinyup Shopping Centre |
| Amendment Details | Form 2.4 - To refine the facade treatments, updates to Eastgate and Westgate, improvements to the main street and surrounding built form and amend Conditions 11-13 |

Thank you for your Form 2.4 Development Assessment Panel (DAP) application and plans submitted to the City of Stirling on 23 December 2016 for the above-mentioned development.

The application was considered by the Metro North-West JDAP at its meeting held on 6 July 2017, where in accordance with the provisions of the City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme, it was resolved to **approve** the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, an application may be made to amend or cancel this planning approval in accordance with regulation 17 and 17A of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Ms Giovanna Lumbaca on behalf of the City of Stirling on 9205 8773 or Mr Martin Erlacher on behalf of the WAPC on 6551 9201.

Yours sincerely,

**DAP Secretariat**

10 July 2017

Encl. DAP Determination Notice
Approved plans

Cc: Mr Martin Erlacher and PSO Admin
Western Australian Planning Commission (WAPC)

Ms Giovanna Lumbaca
City of Stirling

Government of **Western Australia**
Development Assessment Panels

***Planning and Development Act 2005***

**City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme**

**Metro North-West Joint Development Assessment Panel**

# Determination on Development Assessment Panel Application for Planning Approval

**Property Location:** Lots 166 and 66 Davenport Street and Lot 11 (200) Karrinyup Road, Karrinyup
**Application Details**: Mixed Use Development Expansion - Karrinyup Shopping Centre
**Amendment Details:** Form 2.4 - To refine the facade treatments, updates to Eastgate and Westgate, improvements to the main street and surrounding built form and amend Conditions 11-13

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 6 July 2017, subject to the following:

**PART A – CITY OF STIRLING LOCAL PLANNING SCHEME NO. 3**

1. **Accept** that the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 23 December 2016 is appropriate for consideration in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;

2. **Approve** the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 date 23 December 2016 and accompanying plans (Attachment 1) for the proposed minor amendment to the plans and conditions of the approved Major Expansion of Karrinyup Shopping Centre at Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup, in accordance with *Schedule 2, Clause 68 (2) of the Planning and Development (Local Planning Scheme) Regulations 2015* and the provisions of Clause 10.3 of the City of Stirling Local Planning Scheme No. 3, subject to the following new and amended conditions:

**Amended Conditions**

11. Detailed design of Francis Street and Burroughs Road is to be submitted to the City of Stirling for approval in accordance with the Site Management Plan. The design shall generally be in accordance with plans 239230-9 and 11 of the transport Plan prepared by Aurecon dated 15 June 2015, including the changes marked in red (attached) and shall generally include the following:

    a. 3.0m lane widths, 2.2m wide parking bays only on the shopping centre side of the road, 2.0m cycling separator, 3.0m dual way cycling lane and 4.3m wide footpaths only on the shopping centre side of the road;
    b. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;
    c. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
    d. The surface finish of the traffic lanes, to the satisfaction of the City;
    e. 40km/h design speed;
    f. Two priority pedestrian crossings aligning with entrances to the shopping centre;
    g. Platanus acerifolia (London Plain Tree) shall be planted a minimum 11m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;

h. Pyrus calleryana cultivars (ornamental pear tree) shall be planted at 5.0m spacing on footpaths;
i. All street tree plantings must be located to ensure adequate sightlines are maintained;
j. All landscaped areas are to be reticulated;
k. Street lighting is to be upgraded to suit the new Francis Street and Burroughs Road in compliance with Australian Lighting Standards and to the satisfaction of the City;
l. New or modified roads shall be drained in accordance with water sensitive urban design principles and/or the major / minor drainage philosophy;
m. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
n. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.

The works for Francis Street and Burroughs Road shall be undertaken in accordance with the design approved by the City.

12. Detailed design of Davenport Road is to be submitted to the City of Stirling for approval in accordance with the Site Management Plan. The design shall generally be in accordance with plan 239230-10 (attached) including the changes marked in red and is to generally include the following:

a. 3.0m lane widths, 2.2m wide parking bays only on the shopping centre side of the road, 2.0m cycling separator, 3.0m dual way cycling lane and 4.3m wide footpaths only on the shopping centre side of the road;
b. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;
c. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
d. The surface finish of the traffic lanes, to the satisfaction of the City;
e. 40km/h design speed;
f. Two priority pedestrian crossings aligning with entrances to the shopping centre;
g. Platanus acerifolia (London Plain Tree) shall be planted a minimum 11m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;
h. Pyrus calleryana cultivars (ornamental pear tree) shall be planted at 5.0m spacing on footpaths;
i. All street tree plantings must be located to ensure adequate sightlines are maintained;
j. All landscaped areas are to be reticulated;
k. Street lighting is to be upgraded to suit the new Davenport Road in compliance with Australian Lighting Standards and to the satisfaction of the City;
l. Water sensitive urban design (WSUD) principles to be incorporated into street drainage and streetscapes shall include but not be limited to tree pits and/or rain gardens to reduce stormwater runoff and increase at source infiltration;
m. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
n. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.

The works for Davenport Road shall be undertaken in accordance with the design approved by the City.

13. Detailed design of Karrinyup Road is to be submitted to the City of Stirling for approval in accordance with the Site Management Plan. The design shall generally be in

accordance with plans 239230-2, 3, 4, 5, 6, 7 and 8 (attached), and generally include the changes marked in red and is to include the following:

a. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;
b. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
c. Corymbia maculata shall be planted every 5m where the median is being altered and mulched;
d. Platanus acerifolia (London Plain Tree) shall be planted a minimum 5m apart adjacent to the site;
e. The median shall be reticulated adjacent to the site;
f. All street tree plantings must be located to ensure adequate sightlines are maintained;
g. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
h. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent abutting the site.

The works for Karrinyup Road shall be undertaken in accordance with the design approved by the City.

22. The applicant shall:

a. Produce an updated Transport Plan to the satisfaction of the City that will clearly show the impact of the proposal on the adjacent residential road network;
b. The updated Transport Plan is to remove reference to Route 381 which has ceased and is to list the improved bus frequencies in the Executive Summary to the satisfaction of the City; and
c. All necessary measures as identified by the updated Transport Plan shall be implemented and constructed by the landowner at their expense and to the satisfaction of the City, prior to the occupation of the development.

27. A detailed design of the Main Street including the roundabout to the northern end is to be submitted to the City of Stirling for approval in accordance with the Site Management Plan. The design shall be generally in accordance with the road typologies contained with Part 5.2 of the Transport Plan (Attachment 18), and shall generally include:

a. 3.0m lane widths, 2.4m wide parking bays and a pedestrian footpath;
b. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
c. The surface finish of the traffic lanes, to the satisfaction of the City of Stirling;
d. 30km/h design speed, 20km/h posted speed, with a reduced a 10km/h shared zone for the piazza;
e. Accommodation of a 12.5m long Single Unit Truck;
f. Landscaping, paving and street furniture in accordance with the Landscaping Plan;
g. Street lighting is to be upgraded as needed in compliance with Australian Lighting Standards and to the satisfaction of the City of Stirling;

43. Unless otherwise agreed or shown on the approved plans awnings shall be provided in accordance with the requirements of Local Planning Policy 5.7, generally:

a. Shall be provided over all footpaths that abut buildings adjacent to an existing road reserve or the proposed main street (including) the bus station;
b. awnings shall be provided above all entrances and exits of a building;
c. Have a minimum clearance from the footpath of 2.7m;
d. Have a maximum clearance from the footpath of 3.2m;

e. Awnings constructed using materials that are opaque, translucent and non-reflective; and
f. Have a minimum depth of 2m.

**New Condition**

69. Prior to the installation of any external signage on site, a Signage Strategy, shall be provided to the satisfaction of the City. The Signage Strategy will, once approved, inform the provision of all signage proposed to the external façade of the development. Where any proposed signage is not consistent with the approved Signage Strategy it will require separate development approval of the City.

**Additional Advice Notes**

- All other conditions and requirements detailed on the previous approvals dated 14 August 2015, 21 January 2016, 15 August 2016, 7 September 2016 and 13 April 2017 shall remain unless altered by this application.

**PART B – METROPOLITAN REGION SCHEME**

1. **Accept** that the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 4 November 2016 is appropriate for consideration in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;

2. **Approve** the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 4 November 2016 and accompanying plans date stamped 22 June 2017 by the Department of Planning on behalf of the Western Australian Planning Commission in accordance with Clause 30 of the Metropolitan Region Scheme, for the proposed minor amendment to the approved Mixed Use Development Expansion Karrinyup Shopping Centre at Lot 166, Lot 66 and Lot 9, Davenport Street and Lot 11 Karrinyup Road, Karrinyup, subject to:

**Additional Conditions**

1. Prior to the commencement of works, traffic modelling is to be prepared to validate that the proposed configuration of the Karrinyup Road/ Jeanes Road/ Main Street intersection will operate at an acceptable level of service. A schematic road upgrade drawing/s of the intersection is also required to be prepared. The schematic drawing/s and traffic modelling are to be prepared to the specification of Main Roads Western Australia and the satisfaction of the Western Australian Planning Commission.

**Advice Notes**

1. In regard to the condition for traffic modelling and schematic drawings to be undertaken, the traffic modelling and schematic road upgrade drawing/s are to be included in Appendix A of the Aurecon Transport Plan.

All other conditions and requirements detailed on the previous approval dated 24 August 2015, including any amendments to conditions and requirements on succeeding amendments to the approval, shall remain unless altered by this application.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Attachment 5g

Government of **Western Australia**
Development Assessment Panels

LG Ref: DA17/1652
DAP Ref: DAP/16/01140
WAPC Ref: 20-50085-4
Enquiries: (08) 6551 9919

Mr Sean Fairfoul
Rowe Group
Level 3, 369 Newcastle Street
Northbridge WA 6003

Dear Mr Fairfoul

**METRO NORTH-WEST JDAP - CITY OF STIRLING AND WESTERN AUSTRALIAN PLANNING COMMISSION - DAP APPLICATION - DA17/1652 - DETERMINATION**

| | |
|---|---|
| Property Location: | Lot 166, Lot 66 and Lot 9 Davenport Street and Lot 11 Karrinyup Road, Karrinyup |
| Application Details: | Mixed Use Development Expansion (Karrinyup Shopping Centre) |
| Amendment Details | Form 2.2 - Plan Updates and Modification to Conditions |

Thank you for your Form 2.2 Development Assessment Panel (DAP) application and plans submitted to the City of Stirling on 30 August 2017 for the above-mentioned development.

The application was considered by the Metro North-West JDAP at its meeting held on 19 December 2017, where in accordance with the provisions of the City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme, it was resolved to **approve** the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, an application may be made to amend or cancel this planning approval in accordance with regulation 17 and 17A of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Ms Giovanna Lumbaca on behalf of the City of Stirling on 9205 8773 or Mr Martin Erlacher on behalf of the WAPC on 6551 9201.

Yours sincerely,

**DAP Secretariat**

21 December 2017

Encl. DAP Determination Notice
Approved plans

Cc: Mr Martin Erlacher and PSO Admin
Western Australian Planning Commission (WAPC)

Ms Giovanna Lumbaca
City of Stirling

Government of **Western Australia**
Development Assessment Panels

## *Planning and Development Act 2005*

**City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme**

**Metro North-West Joint Development Assessment Panel**

# Determination on Development Assessment Panel Application for Planning Approval

**Property Location:** Lot 166, Lot 66 and Lot 9 Davenport Street and Lot 11 Karrinyup Road, Karrinyup
**Application Details:** Mixed Use Development Expansion (Karrinyup Shopping Centre)
**Amendment Details:** Form 2.2 - Plan Updates and Modification to Conditions

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 19 December 2017, subject to the following:

**PART A – CITY OF STIRLING LOCAL PLANNING SCHEME NO.3**

1. **Accept** that the DAP Application reference DAP/16/01140 as detailed on the DAP Form 2 dated 30 August 2017 is appropriate for consideration in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;

2. **Approve** DAP Application reference DAP/16/01140 as detailed on the DAP Form 2 dated 30 August 2017 and accompanying plans (Attachment 1) for the proposed amendments and modified conditions of the approved Major Expansion of Karrinyup Shopping Centre at Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup in accordance with *Schedule 2, Clause 68 (2) of the Planning and Development (Local Planning Scheme) Regulations 2015*, subject to the following conditions:

**<u>Amended Conditions</u>**

1. Upon occupation of any additional retail floorspace, the management of parking is to be in accordance with the approved Travel Behaviour Change and Parking Management Plan to the satisfaction of the City of Stirling.

2. All delivery and service vehicles must be manoeuvred entirely on the site for the loading and unloading of goods associated with the use of the site, and are to enter and leave the site and or internal "public" roads in a forward gear, generally in accordance with the Approved Service Vehicle Access and Egress Plan, to the satisfaction of the City of Stirling in consultation with Main Roads WA.

5. Prior to the commencement of construction of each stage of the development, a detailed stormwater drainage plan for that portion of the development, designed by a suitably qualified engineer is to be submitted to the City of Stirling for its approval. The drainage system in accordance with the plan approved by the City is to be installed prior to occupancy of that staged portion of the development and be thereafter maintained to the satisfaction of the City of Stirling.

7. All necessary measures as identified by the approved Transport Plans shall be implemented and constructed by the landowner at their expense and to the satisfaction of the City, in accordance with the Site Management Plan.

10. Prior to the **occupation of any additional retail floorspace**, a land use tenancy plan for all permitted land uses (as specified under Local Planning Scheme No.3), including all proposed kiosk locations, is to be provided to the satisfaction of the City of Stirling. The plan shall specify the land use for each tenancy using the land uses defined under Local Planning Scheme No.3. The land use tenancy plan for the overall centre is to be updated to include any tenancy proposed by this development. Any land uses that have not been specified within the development application will require the further planning approval of the City of Stirling.

11. Unless otherwise agreed, construction is to be in accordance with the approved Site Management Plan to the satisfaction of the City of Stirling. The Site Management Plan shall address dust, noise, waste management, parking, storage of materials, traffic, site safety/security, staging of the development and any other relevant matters to the satisfaction of the City. The Site Management Plan as approved by the City shall be complied with for the duration of the construction of the development.

14. Unless otherwise agreed or shown on the approved plans awnings shall be provided in accordance with the requirements of Local Planning Policy 5.7, specifically:-

    a. Shall be provided over all footpaths that abut buildings;
    b. Awnings shall be provided above all entrances and exits of a building;
    c. Have a minimum clearance from the footpath of 2.7m;
    d. have a maximum clearance from the footpath of 3.2m;
    e. Awnings constructed using materials that are opaque, translucent and non-reflective; and
    f. Have a minimum depth of 2m.

23 Landscaping shall be provided generally in accordance with the submitted Landscaping Concept Plans prepared by UDLA and TCL dated August 2017 for the overall development of the site. In addition, a Detailed Landscaping Plan shall be submitted for the further approval of the City and shall include the following information:-

    a. Site boundaries;
    b. Location of buildings, car parks, retaining walls, fencing and paving;
    c. Sufficient construction details to clearly define method of construction and materials used;
    d. Species key showing species and number or symbol showing the location of the species;
    e. Planting beds clearly identified and species noted;
    f. Identification of hard landscape materials (e.g. specify if paving is to be brick or concrete slabs etc.);
    g. Existing vegetation (species and location) including those proposed to be removed;
    h. Street frontages and road names;
    i. Depth and extent of mulching to be used; and
    j. Model number and manufacturers details for all landscape furniture.

33. Unless otherwise agreed, shade trees are to be provided in the verge of Davenport Street, in accordance with the City's Local Planning Policy 6.6 - Landscaping to the satisfaction of the City.

All other conditions and requirements detailed on the previous approval dated 13 April 2016 shall remain unless altered by this application.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

## PART B – METROPOLITAN REGION SCHEME

1. **Accept** that the DAP Application reference DAP/16/01140 as detailed on the DAP Form 2 dated 24 August 2017 is appropriate for consideration in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;

2. **Approve** the DAP Application reference DAP/16/01140 as detailed on the DAP Form 2 dated 24 August 2017 and accompanying plans date stamped 30 November 2017 in accordance with Clause 30 of the Metropolitan Region Scheme, for the proposed minor amendment to the approved Mixed Use Development Expansion at Lot 166, Lot 66 and Lot 9, Davenport Street and Lot 11 Karrinyup Road, Karrinyup subject to:

**Deleted Conditions:**

3. This decision relates only to the following works as referenced in Section 2.1.1 of the *Mixed Use Development Additions* planning report (Version 1 dated 3 November 2016):

   Basement Levels

   (a) Provision of parking and access under the floorspace facing the development site fronting Davenport Street.

   Level 00 - 01

   (b) Demolition of the Bankwest Building;
   (c) Construction of a net increase of 2,685m² floorspace; and
   (d) Updates to the facade treatment fronting Karrinyup Road.

   Level 02

   (e) Minor structural pillars and elevator/stair wells to accommodate entry into the proposed Cinema addition; and
   (f) Provision of roof top parking on top of floorspace facing the development site fronting Davenport Street.

   Level 03

   (g) Construction of a tenancy to house the Cinema use, comprising approximately 6,200m², located to the south west of the subject site above the car parking area at level 2.

**Advice Notes**

All other conditions and requirements detailed on the previous approval dated 21 April 2017 shall remain unless altered by this application.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Attachment 5h

Government of **Western Australia**
Development Assessment Panels

LG Ref: DA17/1653
DAP Ref: DAP/15/00741
WAPC Ref: 20-50085-3
Enquiries: (08) 6551 9919

Mr Sean Fairfoul
Rowe Group
Level 3, 369 Newcastle Street
Northbridge WA 6003

Dear Mr Fairfoul

**METRO NORTH-WEST JDAP - CITY OF STIRLING AND WESTERN AUSTRALIAN PLANNING COMMISSION - DAP APPLICATION - DA17/1653 - DETERMINATION**

| | |
|---|---|
| Property Location: | Lots 166 and 66 Davenport Street and Lot 11 (200) Karrinyup Road, Karrinyup |
| Application Details: | Mixed Use Development Expansion - Karrinyup Shopping Centre |
| Amendment Details | Form 2.6 - Plan Updates and Modification to Conditions |

Thank you for your Form 2.6 Development Assessment Panel (DAP) application and plans submitted to the City of Stirling on 30 August 2017 for the above-mentioned development.

The application was considered by the Metro North-West JDAP at its meeting held on 19 December 2017, where in accordance with the provisions of the City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme, it was resolved to **approve** the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, an application may be made to amend or cancel this planning approval in accordance with regulation 17 and 17A of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Ms Giovanna Lumbaca on behalf of the City of Stirling on 9205 8773 or Mr Martin Erlacher on behalf of the WAPC on 6551 9201.

Yours sincerely,

**DAP Secretariat**

21 December 2017

Encl. DAP Determination Notice
Approved plans

Cc: Mr Martin Erlacher and PSO Admin
Western Australian Planning Commission (WAPC)

Ms Giovanna Lumbaca
City of Stirling

Government of **Western Australia**
Development Assessment Panels

## *Planning and Development Act 2005*

**City of Stirling Local Planning Scheme No. 3 and the Metropolitan Region Scheme**

**Metro North-West Joint Development Assessment Panel**

# Determination on Development Assessment Panel Application for Planning Approval

**Property Location:** Lots 166 and 66 Davenport Street and Lot 11 (200) Karrinyup Road, Karrinyup
**Application Details:** Mixed Use Development Expansion - Karrinyup Shopping Centre
**Amendment Details:** Form 2.6 - Plan Updates and Modification to Conditions

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 19 December 2017, subject to the following:

**PART A – CITY OF STIRLING PLANNING SCHEME NO. 3**

1. **Accept** that the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 30 August 2017 is appropriate for consideration in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;

2. **Approve** DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 30 August 2017 and accompanying plans (Attachment 1) for the proposed amendments and modified conditions of the approved Major Expansion of **Karrinyup** Shopping Centre at Lots 166 and 66 Davenport Street and Lot 11, House Number 200, Karrinyup Road, Karrinyup in accordance with *Schedule 2, Clause 68 (2) of the Planning and Development (Local Planning Scheme) Regulations 2015*, subject to the following conditions:

**<u>Amended Conditions</u>**

1. Unless otherwise agreed, the staging and construction of infrastructure as generally shown in Appendix A (Plans Numbered 0002 - 0015) of the approved Transport Plan and the approved Site Management Plan, shall be fully implemented and completed at the cost of the landowner to the satisfaction of the City of Stirling.

2. Prior to the occupation of any additional retail floorspace, the applicant is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The agreement is to provide for the applicant to fund the PTA's estimated cost of delivering additional Transperth bus service kilometres for a minimum period of five years from the occupation of any additional retail floorspace, to the satisfaction of the City of Stirling and the Department of Transport upon the advice of the PTA.

3. Upon occupation of any additional retail floorspace, the management of parking is to be in accordance with the Approved Travel Behaviour Change and Parking Management Plan to the satisfaction of the City of Stirling.

4. Upon occupation of any additional retail floorspace, the approved Travel Behaviour Change and Parking Management Plan is to be implemented to the satisfaction of the City of Stirling.

5. Prior to the occupation of the whole of the additional retail floorspace, End of Trip bicycle facility(s) shall be provided and shall include:

   a. a total of 200 secure and covered bike racks and lockers for staff; and
   b. a minimum of 20 showers and changing facilities.

   In addition, a total of 160 customer bike racks are to be distributed in key locations around the site including the provision for at least 30 bikes being provided at each major ground floor entrance and at least an additional 20 being provided on the main street.

   Detailed drawings identifying the location of all bicycle parking bays, lockers and showers shall be submitted to the City prior to the commencement of construction of each relevant stage of the development. The End of Trip facility(s) and bicycle racks are to then be provided in accordance with the Staging Management Plan to the satisfaction of the City of Stirling.

6. All delivery vehicles must be manoeuvred entirely on the site for the loading and unloading of goods associated with the use of the site, and are to enter and leave the site and or internal "public" roads in a forward gear, generally in accordance with the approved Service Vehicle Access and Egress Plan to the satisfaction of the City of Stirling.

8. Unless otherwise agreed the Detailed Stormwater Drainage Designs are to be in accordance with the Approved Overall Stormwater Management Plan to the satisfaction of the City of Stirling.

11. Detailed design of Francis Street and Burroughs Road is to be submitted to the City of Stirling for approval in accordance with the Site Management Plan. The design shall generally be in accordance with plans 239230-13B and 15 of the approved Transport Plan prepared by Aurecon, and is to generally include the following:-

    a. 3.0m lane widths, 2.2m wide parking bays only on the shopping centre side of the road, a cycling separator not less than 1.0m, 3.0m dual way cycling lane and footpaths not less than 3.0m only on the shopping centre side of the road and contained within the existing road reserves;
    b. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
    c. The surface finish of the traffic lanes, to the satisfaction of the City;
    d. 40km/h design speed;
    e. Two priority pedestrian crossings aligning with entrances to the shopping centre;
    f. Platanus acerifolia (London Plain Tree) or approved alternate shall be planted a minimum 11m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;
    g. Pyrus calleryana cultivars (ornamental pear tree) or approved alternate shall be planted at 5.0m spacing on footpaths;
    h. All street tree plantings must be located to ensure adequate sightlines are maintained;
    i. All landscaped areas are to be reticulated;
    j. Street lighting is to be upgraded to suit the new Francis Street and Burroughs Road in compliance with Australian Lighting Standards and to the satisfaction of the City;
    k. New or modified roads shall be drained in accordance with the Overall Stormwater Management Plan;
    l. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
    m. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.

The works for Francis Street and Burroughs Road shall be undertaken in accordance with the design approved by the City.

12. Detailed design of Davenport Road is to be submitted to the City of Stirling for approval in accordance with the Site Management Plan. The design shall generally be in accordance with plan 239230-14 (attached) of the approved Transport Plan, and is to generally include the following:

    a. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
    b. The surface finish of the traffic lanes, to the satisfaction of the City;
    c. 40km/h design speed;
    d. Two priority pedestrian crossings aligning with entrances to the shopping centre;
    e. Platanus acerifolia (London Plain Tree) or approved alternate shall be planted a minimum 11 m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;
    f. Pyrus calleryana cultivars (ornamental pear tree) or approved alternate shall be planted at 5.0m spacing on footpaths;
    g. All street tree plantings must be located to ensure adequate sightlines are maintained;
    h. All landscaped areas are to be reticulated;
    i. Street lighting is to be upgraded to suit the new Davenport Road in compliance with Australian Lighting Standards and to the satisfaction of the City;
    j. New or modified roads shall be drained in accordance with the Overall Stormwater Management Plan;
    k. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
    l. Footpaths shall be paved with rectangular pavers (600mm x 300 mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.

    The works for Davenport Road shall be undertaken in accordance with the design approved by the City.

13. Detailed design of Karrinyup Road is to be submitted to the City of Stirling for approval in accordance with the Site Management Plan. The design shall generally be in accordance with plans 239230-2, 3, 4, 5F, 6, 7, 8, 9 and 10 of the approved Transport Plan, and is to include the following:

    a. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
    b. Corymbia maculata or approved alternate shall be planted every 5m where the median is being altered and mulched;
    c. Platanus acerifolia (London Plain Tree) or approved alternate shall be planted a minimum 5m apart adjacent to the site;
    d. The median shall be reticulated adjacent to the site;
    e. All street tree plantings must be located to ensure adequate sightlines are maintained;
    f. All signing and lining requirements are subject to Main Roads WA standards and approvals; and
    g. Footpaths shall be paved with rectangular pavers (600mm x 300 mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent abutting the site.

    The works for Karrinyup Road shall be undertaken in accordance with the design approved by the City.

14. Prior to the occupation of any portion of the development practical completion of any road works that require road widenings, the landowner shall cede to the Crown free of cost without compensation for the purpose of a public road, any road widening shown on designs approved by the City under Conditions 11 - 13, in accordance with the Site Management Plan.

16. Prior to commencement of the relevant road works, the landowner shall commission a Stage 3 road safety audit for all road and access modifications as required by this approval, to be conducted in accordance with the Austroads Guide to Road Safety, Road Safety Audit, 2009, by an independent Accredited Senior Road Safety Auditor and submit to the City the road safety audit report and the completed Corrective Actions Report inclusive of landowner/designer's responses to the audit findings. The approved works shall be constructed at the expense of the landowner to the City of Stirling's satisfaction in accordance with the Site Management Plan.

18. Prior to the erection of any street furniture in the Francis Avenue, Davenport Street and Burroughs Road reserves, details of the street furniture are to be provided to the City of Stirling for its approval. The street furniture as approved by the City of Stirling shall be installed prior to the practical completion of the relevant road works and thereafter maintained to the satisfaction of the City.

20. In accordance with the Site Management Plan, the landowner shall construct the proposed cycle path on Jeanes Road between Karrinyup Road and Deanmore Road, generally in accordance with Appendix A (Plans 0011-0012) of the revised Transport Plan prepared by Aurecon dated 26 May 2017, or as revised in an updated Transport Plan, or an alternative route as agreed with the City in accordance with the City's Integrated Cycling Strategy, to the satisfaction of the City of Stirling.

23. All necessary measures as identified by the approved Transport Plan, shall be implemented and constructed by the landowner at their expense and to the satisfaction of the City, in accordance with the Site Management Plan.

24. Prior to the occupation of any additional retail floorspace, a contribution of 50% of the cost shall be paid to the City to provide a footpath on one side of every street that does not have a footpath within 400m of the boundary of the subject site in accordance with the City's Footpaths Policy.

27. Prior to the commencement of the relevant road works, a detailed design of the Main Street including the roundabout to the northern end is to be submitted to the City of Stirling for approval in accordance with the Site Management Plan. The design shall be generally in accordance with the road typologies contained with Part 5.2 of the approved Transport Plan, and shall include:

    a. 3.0m lane widths, 2.4m wide parking bays and a pedestrian footpath;
    b. The finish of the footpaths and/or paved areas to be seamless between public and private areas;
    c. The surface finish of the traffic lanes, to the satisfaction of the City of Stirling;
    d. 30km/h design speed, 20km/h posted speed, with a reduced a 10km/h shared zone for the piazza;
    e. Accommodation of a 12.5m long Single Unit Truck;
    f. Landscaping, paving and street furniture in accordance with the Landscaping Plan; and
    g. Street lighting is to be upgraded as needed in compliance with Australian Lighting Standards and to the satisfaction of the City of Stirling.

30. Prior to occupation of any part of the development that fronts the Main Street or Piazza, a Place Management and Activation Strategy setting out the arrangements for the ongoing management of Main Street and Piazza shall be submitted to and approved by the City of Stirling.

32. Unless otherwise approved, tenancies located on the ground floor fronting Karrinyup Road, Davenport Street, Francis Avenue and Burroughs Road, and the proposed Piazza shall comprise active non - residential uses in accordance with Local Planning Policy 5.7.

34. Prior to the occupation of any additional retail floorspace, a land use tenancy plan for all approved land uses (as specified under Local Planning Scheme No.3), including all proposed kiosk locations, is to be provided to the satisfaction of the City of Stirling. The plan shall specify the land use for each tenancy using the land uses defined under Local Planning Scheme No.3. Any land uses that have not been specified within the development application will require the further planning approval of the City of Stirling.

39. Unless otherwise agreed, construction is to be in accordance with the approved Site Management Plan to the satisfaction of the City of Stirling. The Site Management Plan shall address dust, noise, waste management, parking, storage of materials, traffic, site safety/security, staging of the development and any other relevant matters to the satisfaction of the City. The Site Management Plan as approved by the City shall be complied with for the duration of the construction of the development.

45. A minimum 50 motorbike parking bays shall be provided on site prior to occupation of the whole of the development, to the satisfaction of the City of Stirling.

46. A taxi rank shall be provided at a suitable location (for at least two vehicles) prior to occupation of the whole of the development, to the satisfaction of the City of Stirling.

49. The car parking bays, driveways and access points shown on the approved plans shall be designed, constructed, drained and marked in accordance with the Australian Standard for Off-street Car Parking (AS/NZS2890.1), Offstreet Parking for People with Disabilities (AS/NZS2890.6) and Off-street Commercial Vehicle Facilities (AS2890.2), prior to occupation of the respective stage of development. A detailed design addressing this condition is to be submitted to the City of Stirling for approval prior to commencement of each stage of the development or alternatively the applicant may provide certification from a suitably qualified engineer that compliance with this condition has been achieved. These bays are to be thereafter maintained to the satisfaction of the City of Stirling.

50. Where the satisfaction of any condition requires the preparation of a legal agreement, these agreements are to be prepared by the City of Stirling's solicitors and, all costs incidental to the satisfaction of these conditions, including the City of Stirling's legal costs and registration fees and stamp duty (if any), must be paid by the owner.

52. The development is to comply with the approved Noise Management Plan to the satisfaction of the City of Stirling. The Noise Management Plan shall be complied with for the duration of the development.

53. A further acoustic report shall be submitted prior to the occupation of each stage of the development demonstrating that the new mechanical plant and equipment complies with the applicable standards for environmental noise (Environmental Protections (Noise) Regulations) 1997. Any identified elements of noncompliance shall be rectified prior to the occupation of the development.

55. A CCTV system providing surveillance of all entrances into the development, parking and loading areas shall be installed prior to practical completion of each stage of the development in accordance with the relevant Australian Standards, Guidelines and City of Stirling Policies. A CCTV design plan for the development is to be submitted for the City's approval prior to the commencement of each stage of the development and implemented, as approved, to the satisfaction of the City of Stirling.

56. All waste management is to be in accordance with the approved Waste Management Plan to the satisfaction of the City of Stirling.

57. Unless otherwise agreed, landscaping shall be provided generally in accordance with the submitted Landscaping Plans prepared by UDLA and TCL dated August 2017. In addition, a Detailed Landscaping Plan the shall be submitted for the further approval of the City and shall include the following information:

    a. Site boundaries;
    b. Location of buildings, car parks, retaining walls, fencing and paving;
    c. Sufficient construction details to clearly define method of construction and materials used;
    d. Species key showing species and number or symbol showing the location of the species;
    e. Planting beds clearly identified and species noted;
    f. Identification of hard landscape materials (e.g. specify if paving is to be brick or concrete slabs etc.);
    g. Existing vegetation (species and location) including those proposed to be removed;
    h. Street frontages and road names;
    i. Depth and extent of mulching to be used; and
    j. Model number and manufacturers details for all landscape furniture.

65. All ground floor external walls are to be treated with an anti-graffiti coating, paint, texture or material appropriate to the finished surface to reduce the likelihood of and/or improve the ease of removal of any graffiti. Thereafter landowner is to ensure that any graffiti is removed as soon as practicable.

68. Unless otherwise included as part of the Waste Management Plan and an associated Acoustic Consultants Report the delivery and service vehicles are not permitted to enter the site outside of the hours 7.00am to 7.00pm Monday to Saturday and 9.00am to 5.00pm Sundays and public holidays.

**Removal of Conditions**

Conditions 21, 38 and 51 are to be removed.

All other conditions and requirements detailed on the previous approval dated 24 August 2015, including any amendments to conditions and requirements on succeeding amendments to the approval, shall remain unless altered by this application.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

## PART B – METROPOLITAN REGION SCHEME

1. **Accept** that the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 24 August 2017 is appropriate for consideration in accordance with regulation 17 of the *Planning and Development (Development Assessment Panels) Regulations 2011*;

2. **Approve** the DAP Application reference DAP/15/00741 as detailed on the DAP Form 2 dated 24 August 2017 and accompanying plans date stamped 28 November 2017 in accordance with Clause 30 of the Metropolitan Region Scheme, for the proposed minor amendment to the approved Mixed Use Development Expansion at Lot 166, Lot 66 and Lot 9, Davenport Street and Lot 11 Karrinyup Road, Karrinyup subject to:

**Amended Conditions**

1. Unless otherwise agreed, the staging and construction of infrastructure as generally shown in Appendix A (Plans Numbered 0002 - 0015) of the approved Transport Plan and the Site Management Plan, and shall be fully implemented and completed at the cost of the landowner to the satisfaction of th e Western Australian Planning Commission in liaison with Main Roads WA, the Public Transport A uthority and the City of Stirling.

3. Prior to the occupation of **any additional retail floorspace**, **the approved** Travel Behaviour Change **and Parking Management** Plan is to be implemented the satisfaction of the Western Australian Planning Commission.

4. All delivery vehicles must be manoeuvred entirely on the site for the loading and unloading of goods associated with the use of the site, and are to enter and leave the site and or internal "public" roads in a forward gear, generally in accordance with the approved Service Vehicle Access and Egress Plan to the satisfaction of the Western Australian Planning Commission in liaison with Main Roads WA.

**Removal of Conditions**

Conditions 2 and 5 are to be removed.

**Additional Advice Notes**

All ot her c onditions and r equirements det ailed o n t he pr evious a pproval d ated 24 August 2015, including any amendments to conditions and requirements on succeeding amendments to the approval, remain unaltered by this application.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of t he *Planning a nd D evelopment ( Development A ssessment P anels) R egulations 2011*.

Attachment 5i

Government of **Western Australia**
Development Assessment Panels

LG Ref: DA18-0791
DAP Ref: DAP/18/01418
WAPC Ref: 20-50085-5
Enquiries: (08) 6551 9919

Mr Sean Fairfoul
Rowe Group
Level 3k, 369 Newcastle Street,
NORTHBRIDGE WA 6003

Dear Mr Fairfoul

**METRO NORTH-WEST JDAP - CITY OF STIRLING AND WESTERN AUSTRALIAN PLANNING COMMISSION (WAPC) - DAP APPLICATION - DA18-0791 - DETERMINATION**

| | |
|---|---|
| Property Location: | Lot 11 (No.200) Karrinyup Road, Karrinyup WA 6018 |
| Application Details: | Residential Development |

Thank you for your Form 1 Development Assessment Panel (DAP) application and plans submitted to the City of Stirling on 15 May 2018 for the above-mentioned development.

This application was considered by the Metro North-West JDAP at its meeting held on 19 October 2018, where in accordance with the provisions of the City of Stirling Local Planning Scheme No.3 and the Metropolitan Region Scheme, it was resolved to **approve** the application as per the attached notice of determination.

Should the applicant not be satisfied by this decision, an application may be made to amend or cancel this planning approval in accordance with regulation 17 and 17A of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Please also be advised that there is a right of review by the State Administrative Tribunal in accordance with Part 14 of the *Planning and Development Act 2005*. Such an application must be made within 28 days of the determination, in accordance with the *State Administrative Tribunal Act 2004*.

Should you have any queries with respect to the conditions of approval, please contact Mr Dean Williams on behalf of the City of Stirling on 9205 8555 or Mr Martin Erlacher on behalf of the WAPC on 6551 9201.

Yours sincerely,

**DAP Secretariat**

25 October 2018

Encl. DAP Determination Notice
Approved Plans

Cc: Mr Martin Erlacher and PSO Admin
Western Australian Planning Commission (WAPC)

Mr Dean Williams
City of Stirling

Postal address: Locked Bag 2506 Perth WA Street address: 140 William Street Perth WA 6000
Tel: (08) 6551 9919 Fax: (08) 6551 9961 TTY: 6551 9007 Infoline: 1800 626 477
daps@dplh.wa.gov.au www.dplh.wa.gov.au
ABN 68 565 723 484

Government of **Western Australia**
Development Assessment Panels

***Planning and Development Act 2005***

**City of Stirling Local Planning Scheme No.3 and the Metropolitan Region Scheme**

**Metro North-West Joint Development Assessment Panel**

# Determination on Development Assessment Panel Application for Planning Approval

**Property Location:** Lot 11 (No.200) Karrinyup Road, Karrinyup WA 6018
**Application Details:** Residential Development

In accordance with regulation 8 of the *Planning and Development (Development Assessment Panels) Regulations 2011*, the above application for planning approval was **granted** on 19 October 2018, subject to the following:

## PART A - CITY OF STIRLING LOCAL PLANNING SCHEME NO.3

**Approve** DAP Application reference DAP/18/01418 and accompanying plans (Attachment 1) in accordance with Clause 68 of the *Planning and Development (Local Planning Schemes) Regulations 2015* and the provisions of Local Planning Scheme No.3, subject to the following conditions:

1. The proposed development complying with all details and amendments marked in red as shown on the approved plan specifically:

   a) Tandem car parking bays are to either be modified or line marked to ensure compliance with Australian Standards AS2890.1, or have the tandem designation removed where compliance is not achievable.

   Amended plans addressing the above are to be submitted to and approved by the City prior to the commencement of the development.

2. The development is to comply in all respects with the attached approved plans, as dated, marked and stamped, together with any requirements and annotations detailed thereon by the City. The plans approved as part of this application form part of the planning approval issued.

3. A Detailed Landscaping Plan shall be submitted to and approved by the City, prior to the commencement of the development. In addition, the Detailed Landscaping Plan shall demonstrate as to how the Detailed Landscaping Plan coordinates with the submitted Landscaping Plans prepared by UDLA and TCL dated August 2017. The Detailed Landscaping Plan shall include the following information:
   a. Site boundaries;
   b. Location of buildings, car parks, retaining walls, fencing and paving;
   c. Sufficient construction details to clearly define the method of construction and materials used;
   d. Species key showing species and number or symbol showing the location of species;
   e. Planting bed clearly identified and species noted;
   f. Identification of hard landscape materials (e.g. specify if paving is to be brick or concrete slabs etc.);

g. Existing vegetation (species and location) including those proposed to be removed;
h. Street frontages and road names;
i. Depth and extent of mulching to be used;
j. Model number and manufacturers details for all landscape furniture; and
k. Sufficient details of landscaping on the roof and/or balconies.

4. The built form of the development is not to encroach into the road widening area, in order to provide a minimum 3.5m wide shared path.

5. A revised Waste Management Plan shall be submitted to and approved by the City prior to the commencement of the development.

6. The Fire Appliance Layover Area proposed along Davenport Street frontage must be designed to accommodate the hardstand requirements of the Department of Fire and Emergency Services requirements and the sightline requirements from each crossover without encroaching on the 3.5m wide shared path. Amended plans addressing the above shall be provided to and approved by the City prior to the commencement of the development.

7. A total of 24 visitor parking bays shall be permanently marked, maintained and legally accessible at all times for use exclusively by visitors to the property with the remainder available to be designated for resident parking.

8. Vehicular parking manoeuvring and circulation areas indicated on the approved plan shall be sealed and drained, the parking spaces marked out and maintained in good repair.

9. No goods or materials being stored, either temporarily or permanently, in the parking or landscape areas or within access driveways. All goods and materials are to be stored within the buildings or storage yards, where provided.

10. Crossovers shall be designed and constructed in accordance with the City's Local Planning Policy 6.7 - Parking and Access. Crossovers are to be installed prior to occupancy or use of the development.

11. Prior to occupancy of the development, all off-street parking associated with the commercial land uses is to be available onsite during business hours for all customers and staff.

12. A minimum of four bicycle parking bays shall be provided on-site prior to the occupation of development. The design and construction of the bike bays shall be in accordance with Australian Standards AS 2890.3:2015 Parking Facilities Part 3: Bicycle Parking.

13. Unless otherwise approved, all stormwater from all roofed and paved areas shall be disposed in accordance with the approved Overall Stormwater Management Plan to the satisfaction of the City.

14. All land indicated as landscaped area on the approved landscaping plan shall be developed on practical completion of the building and be reticulated thereafter, to the satisfaction of the City.

15. Prior to the occupation of the development, 12 Advanced Trees must be planted on site in the areas indicated on the approved landscaping plans and be thereafter maintained. Each tree must be provided with a minimum nine square metres of soil space with a minimum dimension of two metres at ground

level free of intrusions.

16. Boundary walls shall not exceed the heights shown on the approved plans. Prior to occupation, the external finish of the boundary walls shall be finished externally to the same standard as the rest of the development, to the satisfaction of the City.

17. External lighting is to be provided to all public spaces including under awnings, parking areas, service areas, footpaths and entry and exit points.

18. A Site Management Plan shall be submitted to and approved by the City of Stirling prior to the commencement of works. The Site Management Plan shall address dust, noise, site safety and security and potential sediment runoff during the construction phase.

19. No walls, letterboxes, fences or other structures above 0.75 metres in height to be constructed within the 1.5 metres of where:
    a. vehicular access points adjoin the site, or
    b. driveway meets a public street, or
    c. two streets intersect,
    d. or driveway meets a right of way

    unless further approval of Council is obtained.

20. This decision constitutes development approval only and is valid for a period of four (4) years from the date of approval. If the subject development is not substantially commenced within the four (4) year period, the approval shall lapse and be of no further effect.

**Advice Notes**

1. Construction noise is not permitted outside of the hours of 7.00am to 7.00pm Monday to Saturday inclusive. Any construction works are to comply with the Environmental Protection (Noise) Regulations 1997. Noisy construction works to comply with times specified under the Noise Regulations unless a Noise Management Plan for the construction site has been issued.

2. The level of noise emanating from all fixed plant and equipment installed at the premises not to exceed that prescribed in the Environmental Protection Act 1986 and Environmental Protection (Noise) Regulations 1997.

3. The proposed crossover configuration is subject to the approval of the City's Engineering Operations Business Unit. A 'Crossover Installation Application' is required to be submitted and approved prior to the commencement of the crossover installation.

4. All street trees adjoining the subject land as shown on the submitted plans are to be retained and protected. It is the responsibility of the applicant to ensure that the site survey plan is correct as any inaccuracy of the plans will not be considered justification for removal of the trees in the event that their positions are incorrectly shown. The removal of street trees without the written approval of the City is an offence.

5. An Advanced Tree is defined in Local Planning Policy 6.11 as: *means a tree which requires planting in at least a 90 litre container or greater size and which is at least two metres in height and at least two years of age*.

6. Compliance with the Food Act 2008 and FSANZ Food Safety Standards.

7. Acceptable plans indicating the position and type of all proposed fittings and fixtures and details of floor, wall and ceiling finishes and floor drainage to be submitted prior to internal fit out.

8. The applicant is to submit information detailing the actual noise emissions from the development once construction is completed. In particular this refers to noise from the carpark ventilation system and air conditioner condenser units. This information is to be provided to the City within a two month period from the completion of construction. Should noise emissions exceed assigned levels then further noise reduction measures are to be installed and implemented.

9. Noise evaluation of proposed commercial tenancies will be required as part of their individual planning submissions.

10. Ventilation of underground car park to comply with Australian Standard 1668.2-2002.

11. In reference to Condition 5, the revised Waste Management Plan shall include the following information:
    a. A red bitumen truck embayment will need to be provided with a minimum width of 2.5m and the length is to be compliant with the sightline requirements from each crossover.
    b. The number of bins per pickup.
    c. The number of bins and weekly pickups.
    d. Commercial wastes pickup is to be from within the Karrinyup Shopping Centre loading dock areas.

12. If an applicant is aggrieved by this determination there is a right of appeal under Part 14 of the Planning and Development Act 2005. An appeal must be lodged within 28 days of the determination with the State Administrative Tribunal.

13. Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

14. This approval is not an authority to ignore any constraint to development on the land, which may exist through statute, regulation, contract or on title, such as an easement or restrictive covenant. It is the responsibility of the applicant and not the City to investigate any such constraints before commencing development. This approval will not necessarily have regard to any such constraint to development, regardless of whether or not it has been drawn to the City's attention.

15. This is a Development Approval of the responsible authority under the City of Stirling Local Planning Scheme No. 3 and related policies. It is not a building permit or an approval to commence or carry out development under any other law. It is the responsibility of the applicant to obtain any other necessary approvals, consents and licenses required under any other law, and to commence and carry out development in accordance with all relevant laws.

## PART B - METROPOLITAN REGION SCHEME

**Approve** DAP Application reference DAP/18/01418 and accompanying plans date stamped 4 September 2018 by the Department of Planning, Lands and Heritage on behalf of the Western Australian Planning Commission, in accordance with Clause 30(1) of the Metropolitan Region Scheme, subject to the following conditions:

### Conditions

1. This decision constitutes development approval only and is valid for a period of four (4) years from the date of approval. If the subject development is not substantially commenced within the four (4) year period, the approval shall lapse and be of no further effect.

2. Prior to the occupation of the development, the intersection of Karrinyup Road and Francis Avenue is to be upgraded by the landowner generally in accordance with Main Roads Western Australia drawing number 201748-4978 (Revision D), to the specification of Main Roads Western Australia and the satisfaction of the Western Australian Planning Commission.

Where an approval has so lapsed, no development shall be carried out without further approval having first been sought and obtained, unless the applicant has applied and obtained Development Assessment Panel approval to extend the approval term under regulation 17(1)(a) of the *Planning and Development (Development Assessment Panels) Regulations 2011*.

Attachment 6a

ROWE GROUP

Level 3
369 Newcastle Street
Northbridge 6003
Western Australia

p: 08 9221 1991
f: 08 9221 1919
info@rowegroup.com.au
rowegroup.com.au

Job Ref: 4103
29 April 2019

Chief Executive Officer
City of Stirling
25 Cedric Street
STIRLING WA 6021

**Attention: Ms Giovanna Lumbaca – Planning Coordinator**

Dear Madam

**Amendment of Development Approval – Amended Condition 2 (DoP Ref: DAP/16/01140 and LG Ref: DA16/2419)**
**Lots 166, 9 and 66 Davenport Street Karrinyup Road, Karrinyup**

Rowe Group acts on behalf of the landowner of Lots 166, 9 and 66 Davenport Street and Lot 11 (No. 200) Karrinyup Road, Karrinyup ('the subject site'). We have been instructed to seek planning approval for a modification to Condition 2 of the overall development approval for the subject site.

To progress this Application we have enclosed the following:

- Completed City of Stirling Application for Planning Approval, MRS Form 1 and the JDAP Form 2;
- Advice Note from Aurecon; and
- The following justification for the proposal.

## Subject Site

The subject site is legally identified as:

- Lot 11 on Plan 23000 Certificate of Title Volume 2140 Folio 34;
- Lot 9 on Diagram 67515 on Certificate of Title Volume 1701 Folio 328;
- Lot 166 on Diagram 67516 Certificate of Title Volume 1701 Folio 331; and
- Lot 66 on Plan 10178 Certificate of Title Volume 1715 Folio 110.

Refer Attachment One – Certificates of Title.

The subject site is occupied by the Karrinyup Shopping Centre (currently being redeveloped), the North Court building, KFC, and Hungry Jacks. Construction of the approved development has commenced.

The subject site is located immediately adjacent to the City of Stirling Library and Community Building, and BP Service Station.

## Background

Development Approval for a cinema complex at the subject site was issued by JDAP on 21 April 2017, with a modification approved 19 December 2017.

A separate Development Approval for the mixed use development expansion of Karrinyup Shopping Centre was issued by JDAP on 24 August 2015. Subsequent amendments to this Development Approval were issued by JDAP on 1 February 2016, 16 August 2016, 9 September 2016, 10 July 2017 and 19 December 2017.

## Condition 2

Condition 2 currently requires the following:

2. *Prior to the opening of the retail centre, the applicant is to enter into a legally binding funding agreement with the Public Transport Authority (PTA) to fund the cost of improving public transport access. The agreement is to provide for the applicant to fund the PTA's estimated cost of delivering additional Transperth bus service kilometres for a minimum period of five years from the opening of the retail centre, to the satisfaction of the City of Stirling and the Department of Transport upon the advice of the PTA.*

## PTA Discussions

The landowner commenced discussions with the Public Transport Authority (PTA) in 2017 to determine the proposed arrangements associated with bus movements and funding. To date the discussions with the PTA have failed to reach a solution that in the opinion of the landowner is both financially viable and responsible. There is no confidence that the PTA will be in a position to afford to continue to fund the additional bus services that they are seeking beyond the 5 year period.

PTA have advised that they are requiring the funding of additional services on the 425 route only, to enable 10 minute frequencies within the AM and PM weekday peak periods and 15 minute frequencies for off peak and for Saturdays and Sundays. The 423 services will run in addition to these increased frequencies.

The PTA are of the view that this provides the following advantages:

- It provides a dedicated bus route, which is expected to make the bus more attractive to customers;
- It provides high frequencies at all times; and
- There is maximised benefit of portion of bus lane located east of Huntriss Road.

The PTA have not been willing to accept any alternative outcome to that which is detailed above.

The landowner is of the view that the above outcome is not the best solution for both increasing bus movements, but also for reducing private vehicle movements. The PTA preferred scheme is very expensive and is not sustainable for both the landowner but also the PTA after the funding period expires. If the PTA proposal was to be implemented there would be a community expectation of a level of the service which is unlikely to be maintained.

It is also important to note that the proposal does not benefit those residents who live adjacent to the 423 route, as there will not be any increased frequency along this route.

## Alternative Proposal

The landowner requested that the consultant team review the Transport Plan with a view to determine the best approach to minimise private vehicle usage. The review determined that there should be a prioritisation of pedestrian movements, a focus on staff usage of buses and an increase to the bus contribution period. The review also recommended that staff and customer movements should be prioritised differently.

In summary it is proposed to:

- Additional footpath construction funding beyond 400m of the centre (an additional $200,000);
- Street Tree planting contribution ($50,000);
- Reduction to the bus lane (east of Huntriss – 460m);
- Targeted Increased Bus Frequencies Funding between the Karrinyup and Stirling bus stations:
    - Weekday AM / PM Peak – 10 min frequencies – combination of 423 & 425 routes
    - Weekends (10am – 6pm) – 15 min frequencies – 425 route;
- Extended increased bus frequencies funding period (increased from 5 to 7 years);
- Public Transport use promotion during construction (approx. 3 years), including additional early morning bus funding; and
- Way finding / route guidance signage (provision or funding) at both the Karrinyup and Stirling Bus Stations.

As noted in the attached note from Aurecon, while this proposal does not provide additional bus services during the midweek off-peak periods and does spread the benefit of additional buses across both routes, and targets staff and customers. This proposal is expected to result in the following benefits:

- Increased amenity for the surrounding area due to additional street trees and paths;
- Pedestrian movements will be safer, easier and more attractive;
- Doesn't waste money on unnecessary/under-utilised section of the westbound bus lane;
- Significant reduction to the extent of vegetation removed within the Karrinyup Road median;
- Prioritises staff movements, which will reduce peak hour traffic;
- Provides additional bus movements for an extended period; and
- Seeks to change travel behaviours of staff during the construction period.

The landowner is of the view that this amended proposal will not only increase bus patronage, but will result in a more sustainable and viable outcome. During the week the increased bus frequencies are focused on staff movements, whereas customers are the focus for weekend movements. The landowner is of the view that staff will

be more inclined to use either bus service (423 & 425), but recognises that a higher frequency single service on the week may be more beneficial to customers. The landowner is also of the view encouraging staff to use public transport during construction is more likely to result in the establishment of long term patterns of public transport use.

The landowner is currently already contributing (50%) to the installation of footpaths on streets within 400m of the site without an existing footpath. The City is funding the other 50% of this cost. It is proposed to increase the contribution to allow for paths within 800m of the site to also be installed. This proposal is expected to further encourage increased pedestrian traffic to and from the centre, along with providing improvements to the streetscape due to the increased number of street trees.

The proposal will result in a reduction to the total length of the bus lane. It is important to note that the proposed bus lane will still benefit the weekday PM peak movements, however the Saturday midday peak movements will experience slightly longer trip times. This will only impact on 8 bus movements. Given the significant cost of providing the bus lane, which only benefits 8 bus movements per week, it is considered the provision of an additional 2 years of increased bus frequency funding is a better outcome. As noted previously the rationalisation of the bus lane will also reduce the tree loss within the median.

## Amended Condition 2

Given the above we request that Condition 2 of the approval be modified as follows:

2. *The applicant is to amend the Transport Plan to include the commitments as summarised in the "Revised Proposal" column of the attached table dated 26 February 2019. Prior to the opening of the completed retail centre and thereafter the Transport Plan is to be implemented to the satisfaction of the City of Stirling.*

Should you require any further information or clarification in relation to this matter, please contact the undersigned on 9221 1991.

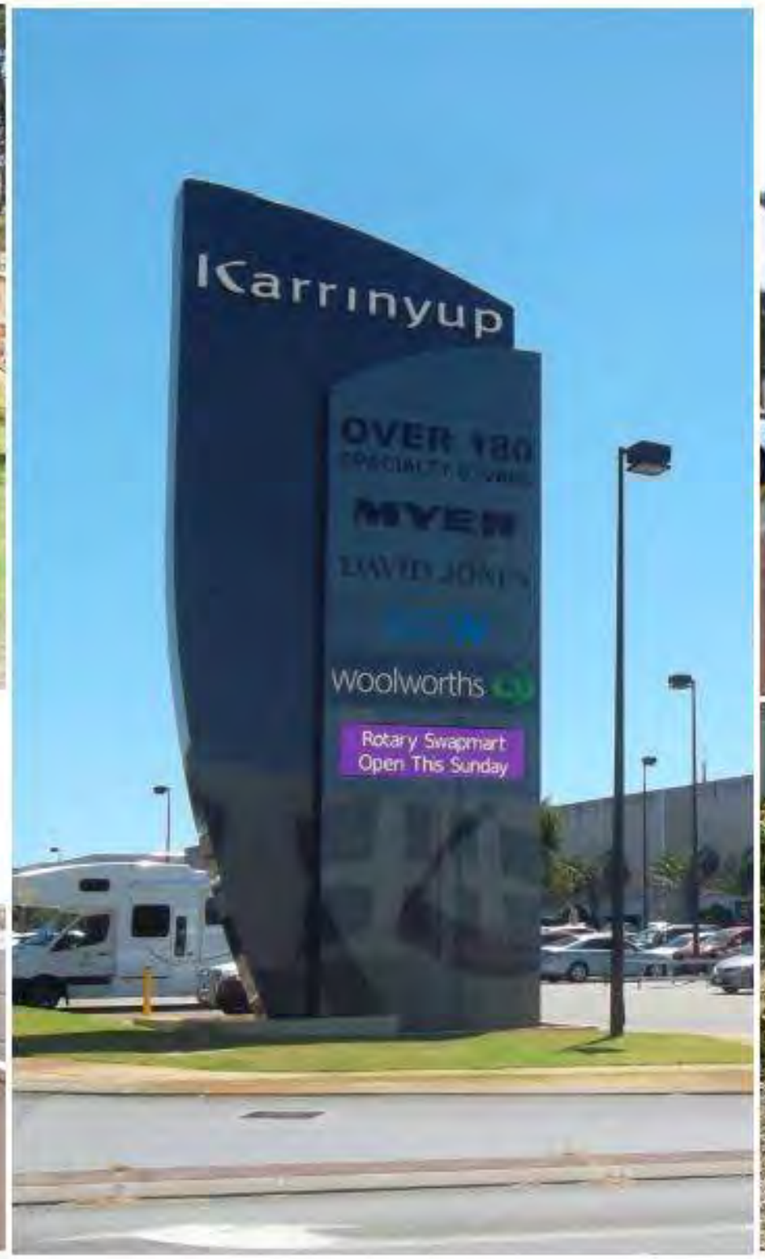
Yours faithfully,

**Sean Fairfoul**
Rowe Group

| Condition / Proposed | | PTA | Revised Proposal |
|---|---|---|---|
| Bus | Additional Bus Funding between Karrinyup and Stirling bus stations – 5 years | 5 years funding | **7 years** funding |
| | | Weekday (AM/PM Peak) – 10 min – 425 only | Weekday (AM/PM Peak) – 10 min – **423 & 425** |
| | | Weekday (Off-Peak) – 15 min – 425 only | Weekday (Off-Peak) – **No funding - Existing frequencies** (20 – 30 min – 423 & 425) |
| | | Weekends (SAT – 8am – 6pm) – 15 min – 425 only | Weekends (SAT – 8am – 6pm) – 15 min – 425 |
| | | Weekends (Sun – 10am – 6pm) – 15 min – 425 only | Weekends (Sun – 10am – 6pm) – 15 min - 425 |
| | | Bus Hire - AM Peak (x2) – to cover additional frequencies | Bus Hire AM Peak (**x1**) – to cover additional frequencies |
| | | - | **Funding of additional early morning Bus Services for contractors during construction** |
| | | - | **Subsidised Smartriders for staff during construction** |
| | | - | **Directional Signage at Stirling & Karrinyup Bus Stations** |
| | Karrinyup Bus Station Awning Upgrades | - | Karrinyup Bus Station Awning Upgrades |
| | | | |
| Roads | Bus Lanes – KSC to Francis Street (eastbound) | | Bus Lanes – KSC to Francis Street (eastbound) |
| | Bus Lanes – North Lake to Huntriss (westbound) – extent of Saturday midday peak | | Bus Lanes – North Lake to Huntriss (westbound) – **extent of weekday PM peak (reduction by 460m from original proposal)** |
| | Francis Ave | | Francis Ave |

| Condition / Proposed | | PTA | Revised Proposal |
|---|---|---|---|
| | Davenport St | | Davenport St |
| | Burroughs Rd | | Burroughs Rd |
| | Karrinyup Rd | | Karrinyup Rd |
| | | | |
| Footpaths | New footpaths on streets within 400m - 50% funding | | New footpaths on streets within 400m - 50% funding **+ additional $200,000 for new footpaths beyond 400m** |
| | - | | **Street Tree (footpath shade trees) funding - $50,000** |
| | Jeanes Road Dual Use Path | | Jeanes Road Dual Use Path |
| | Francis Ave (fronting centre) | | Francis Ave (fronting centre) |
| | Davenport St (fronting centre) | | Davenport St (fronting centre) |
| | Burroughs Rd (fronting centre) | | Burroughs Rd (fronting centre) |
| | Karrinyup Rd (fronting centre) | | Karrinyup Rd (fronting centre) |
| | | | |

Attachment 6b



# Mixed Use Expansion at Karrinyup

## Transport Plan for Development Application

**Prepared for**
AMP Capital Funds Management Ltd
Level 21, AMP Tower,
140 St. Georges Terrace, Perth WA 6000

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aurecon AMPCAPITAL

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**Document Control Record**

Document prepared by:

Aurecon Australasia Pty Ltd

ABN 54 005 139 873

Level 5, 863 Hay Street
Perth WA 6000
Australia

**T** +61 8 6145 9300
**F** +61 8 6145 5020
**E** perth@aurecongroup.com
**W** aurecongroup.com

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| 10 | 10 July 2019 | Re-issue – Amended Target Mode Share Split | S.L.Chang | M. La Galia/ A. Johnstone | A.Reynolds | A. Johnstone |
| **Current Revision** | | **10** | | | | |

# Executive Summary

Aurecon was commissioned by AMP Capital Funds Management Ltd to undertake a Transport Plan (TP) for the Development Application for the Mixed-Use Expansion at Karrinyup ('the Development'). The Development is proposed to increase in retail floor space from approximately 54,000 $m^2$ to 93,355 $m^2$ upon completion. There are also proposed increases in office, eating/entertainment and community/health floor space, and provision for residential dwellings within the Development. The design incorporates a 'main street' as an extension of Jeanes Road, allowing for an open streetscape with pedestrian walkways, landscaping, high quality-built form and features, and mixed use development to create an area of high activity during and beyond normal trading hours. The design also includes the addition of a Cinema and the development of the existing Bankwest site.

The main aim of this TP is to address access requirements to the Development by all modes of transport. A transport model was developed for this study in order to analyse the performance of the road network with and without the redevelopment. Strategies to increase sustainable transport to the Development are included in this TP, including public transport, pedestrian and cycling access. Parking management and servicing strategies are also included in this plan.

A Traffic and Transport Assessment was previously undertaken as part of the Draft Karrinyup Secondary Centre Activity Centre Structure Plan. This TP aims to ensure that the development proposal is consistent with the overall structure planning of the area and to provide a greater level of technical detail of the Development and its immediate surrounds.

### Public Transport Network

A number of measures are proposed to encourage visitors to use public transport as an option to access the Mixed-Use Expansion at Karrinyup, including:

- Better integration of the bus station with the entrance to the Development whilst including improved personal security i.e. CCTV, lighting, weather cover
- Real time bus timetable information at the bus station and throughout the Development
- Improved bus priority infrastructure including dedicated bus lanes at various locations along Karrinyup Road
- Travel behaviour change initiatives to promote mode shift

A funding contribution is proposed to increase the frequency of bus services between the Centre and Stirling Station for a period of 7 years. This will involve services relating to either or both the 423 and 425 routes with a goal of achieving 10-minute headways in the morning and evening Centre weekday peaks. During the weekends, movements will be on one route (Route 425), which will be more easily identifiable for Centre customers, with 15-minute headways on the shoulders of and during the weekend Centre open hours. The final details of the provision of additional bus kilometres will be agreed with the Transport Portfolio.

### Pedestrian Network

Walking access to the Development is currently limited by the lack of dedicated pedestrian links and poor quality of crossings into and within the Development. Of high importance is perceived pedestrian safety during the crossing of main roads and parking lots. In order to improve the walkability of the existing environment and increase walking trips to the Development, the following is proposed:

- Providing a contribution to expand the extent of the local path network to provide a footpath on one side of local streets that do not currently have a footpath. This contribution will be to an amount of $400,000.
- It is also proposed to make a contribution of $50,000 to the City to provide additional street trees to help shade those paths that are devoid of any street trees
- Pedestrian entrances to the Development that link directly to the surrounding pedestrian network
- Widening of existing footpaths around the perimeter of the Development to 2.0m or a 2-way 3.5m shared path
- Providing suitable pedestrian crossings within and surrounding the Development compliant with DDA standards
- Providing way-finding signage at strategic locations to provide legibility and awareness of pedestrian links to the Development
- Improved pedestrian amenities including street furniture, lighting and weather cover

### Cycling Network

There are some existing cycling facilities within the vicinity of the Development. However, in order to encourage mode shift, there is a strong need for substantial cycle infrastructure improvements to improve usability and safety for cyclists, particularly within the immediate vicinity of the Development.

Given that the Development will cater for both commuters and recreational cyclists (including staff, retail shoppers and parents with children), there is a need for infrastructure suitable for inexperienced cyclists to encourage a mode shift. Taking into consideration the type of cyclist and the available road corridor width, there are a number of opportunities to increase the effectiveness of the surrounding cycle network, particularly from the west and south, to promote bicycle access to the Development. It is proposed that a combination of shared and segregated cycle paths is installed around the perimeter of the Development, and along sections of Karrinyup Road and Jeanes Road, to promote cyclist access the Development.

A number of other measures are proposed, including:

- Ensuring that intersections surrounding and within the Development will accommodate cyclists appropriately
- Providing improved way-finding signage to direct cyclists towards the Development
- Providing improved the bicycle access, parking and end of trip facilities within the Development

Bicycle parking and end-of-trip facilities are proposed at strategic locations within the Development, as follows:

- 160 public bicycle parking spaces in the form of bicycle racks dispersed amongst the four major entrances to the Development and along the main street
- A secure, enclosed end-of-trip facility for staff located at the southern major entrance to the development, near the Karrinyup Bus Station, capable of accommodating 200 bicycle racks and lockers. This also includes separate female and male change rooms incorporating 5 showers and 1 toilet in each.

### Road Network

As part of the TP, transport modelling was undertaken for a wider area to investigate the impacts of the Development on the surrounding road network. To ensure the road network surrounding the Development will operate at an acceptable level in the future, a number of upgrades have been recommended to bring connectivity and usability to the area. These are included in the transport model and include lane extensions and additional turning pockets at locations where required.

At most locations, intersection capacities are reached both now and, in the future, with or without the Mixed Use Expansion at Karrinyup.

The proposed intersection upgrades also include provisions for pedestrians and cyclists and will include some cycle traffic lanterns in the subsequent design stages. Further potential upgrades have also been raised and are to be further discussed, in line with local and state authority's plans.

### Parking

It is proposed to apply a reduced rate of parking for the Mixed Use Expansion at Karrinyup. The proposed Development incorporates a total of up to 4,880 car parking bays, at a rate of up to 4.2 bays per 100$m^2$ of total floor space. This includes provision for parking for people with disabilities, as well as provision for motorcycle bays. In addition, localised parking is provided for the proposed residential dwellings.

A number of parking management strategies are proposed, including:

- Parking way-finding signage, including available parking numbers
- Fully managed parking detection system
- Mix of short and long term parking for visitors and staff
- Publicity for improved public transport and cycle provision

### Development Approval Conditions

The following development approval conditions have been addressed in this TP:

- The schematic road upgrade drawing for Karrinyup Road/ Jeanes Road/ Main Street is included in Appendix G. The traffic modelling presented in this plan includes this design.
- Supplementary information has been provided regarding the impact of the Development on the adjacent residential road network. This information shows that while there is an increase in traffic on some of the surrounding roads, the volume of traffic is expected to still be within the designated values for the corresponding road hierarchy levels for each road

It should be noted that other conditions of the development approval have not been considered for this Amended Development Application and will be included in future works as part of the detailed design stage.

## TABLE OF CONTENTS


**1. Introduction and Background** 1

1.1. Introduction and Objectives 1

1.2. Context 1

1.3. Prior Transport Assessment 1

1.4. Report Structure 1

**2. Development Proposal** 2

**3. Existing Situation** 4

3.1. Development Uses and Surrounding Land Use 4

3.2. Mode Accessibility 4

3.3. Road Network 5

3.4. Parking 9

3.5. Public Transport Access 10

3.6. Pedestrian Access 12

3.7. Cycling Access 14

3.8. Freight and Servicing Access 15

3.9. Road Safety 17

**4. Traffic Analysis – Background** 20

4.1. Transport Model 20

4.2. Establishment of Timeframes 20

4.3. Future Planned Network Improvements 21

4.4. Mode Share Target 21

4.5. Estimation of Traffic Growth 22

4.6. Trip Distribution 26

4.7. Option Models 28

**5. Traffic Analysis – Results and Discussion** 29

5.1. Proposed road upgrades 29

5.2. Road Typologies 33

5.3. External Road Network Performance 35

5.4. Development Access Performance Summary 36

5.5. Impact on Local Road Network 40

5.6. Impact on Local Road Network – Supplementary Information 40

5.7. Public Transport Performance 42

5.8. Unreleased Vehicles 42

**6. Parking** 43

6.1. Parking Provision 43

6.2. Bicycle Parking 53

6.3. Parking Management Objectives 53

**7. Public Transport Access** 55

7.1. Prioritisation of Public Transport 55

7.2. Taxi Services 56

**8. Pedestrian Access** 57

8.1. Pedestrian Priority 57

8.2. Safety 57

**9. Cycling Access** 59

9.1. Proposed Infrastructure 59

9.2. Bicycle Parking and End of Trip Facilities 60

9.3. Promotion of Cycling 60

9.4. Safety 60

**10. Servicing Access** 61

10.1. Type of Service Vehicle 61

10.2. Vehicle Swept Path Analysis 61

11.Conclusions 71

## TABLE OF FIGURES

Figure 1-1 Locality map....1
Figure 1-2 Mixed Use Expansion at Karrinyup – the Development....1
Figure 2-1 Mixed Use Expansion at Karrinyup (ground floor)....3
Figure 3-1 Surrounding land use....4
Figure 3-2 Existing travel mode share....4
Figure 3-3 Main Roads WA road hierarchy in surrounding network....5
Figure 3-4 Road hierarchy within the Development....5
Figure 3-5 Access to the Development....6
Figure 3-6 Existing peak hour traffic volumes (two-way)....6
Figure 3-7 Existing Karrinyup Road / Jeanes Road intersection....8
Figure 3-8 Existing Karrinyup Road / Francis Avenue intersection....8
Figure 3-9 Distribution of Parking....9
Figure 3-10 Parking utilisation....9
Figure 3-11 Public Transport Plan 2031, sourced from Department of Transport....10
Figure 3-12 Bus routes to/from the Development....10
Figure 3-13 Taxi feeder rank facility....12
Figure 3-14 Signalised pedestrian crossing on Karrinyup Road....12
Figure 3-15 Example of poor pedestrian access from car parking....12
Figure 3-16 Walkable catchment....13
Figure 3-17 Existing Pedestrian entrances into Karrinyup Shopping Centre from all levels....13
Figure 3-18 Bicycle network surrounding the Development (Department of Transport, 2014)....14
Figure 3-19 Primary freight roads and rail routes (WA Planning Commission, 2005)....15
Figure 3-20 Existing freight access to the Development....16
Figure 3-21 Examples of poor sight distance within the car park....17
Figure 3-22 Number of crashes in the Development between 2009 and 2013....18
Figure 3-23 Total crashes per year in the Development....18
Figure 3-24 Severity of crashes recorded at the road network surrounding the development....18
Figure 3-25 Nature of crashes recorded at the road network surrounding the edevelopment (as defined by Main Roads WA, refer to http://apps.mainroads.wa.gov.au/icr/definitions.asp)....18
Figure 4-1 TP model area....20
Figure 4-2 Analysed mode share targets for the Development....21
Figure 5-1 Overview of proposed road/intersection upgrades....29
Figure 5-2 Existing West Coast Highway/ Karrinyup Road layout....29
Figure 5-3 Proposed West Coast Highway/ Karrinyup Road layout....29
Figure 5-4 Existing Karrinyup Road / Burroughs Road intersection....30
Figure 5-5 Proposed modifications to the Karrinyup Road / Burroughs Road intersection....30
Figure 5-6 Existing road network surrounding the Development....30
Figure 5-7 Proposed additional or modified intersections surrounding the Development....30
Figure 5-8 Proposed intersection at Burroughs Road/Main Street as a T-intersection....31
Figure 5-9 Existing Karrinyup Road/ Francis Avenue intersection layout....31
Figure 5-10 Proposed modifications to the Karrinyup Road/Francis Avenue intersection....31
Figure 5-11 Existing Karrinyup Road/ Huntriss Road intersection layout....32
Figure 5-12 Proposed additional right turn lane at the Karrinyup Road/ Huntriss Road intersection....32
Figure 5-13 Existing Karrinyup Road/ Mitchell Freeway Interchange (east approach) intersection layout....32
Figure 5-14 Proposed lane extension at the Karrinyup Road/ Mitchell Freeway Interchange....32
Figure 5-15 Proposed typical cross section for Karrinyup Road (west of Burroughs Street)....33
Figure 5-16 Proposed typical cross section for Karrinyup Road (between Burroughs Street and Huntriss Road)....33
Figure 5-17 Proposed typical cross section for Karrinyup Road (east of Huntriss Road)....33
Figure 5-18 Proposed typical cross section for Burroughs Street....33
Figure 5-19 Proposed typical cross section for Francis Avenue....33
Figure 5-20 Proposed typical cross section for Davenport Street....34
Figure 5-21 Proposed typical cross section for the main street....34
Figure 5-22 Access 4 – South-east access of the Development on Francis Avenue....36
Figure 5-23 Access 5 – Eastern access to the Development on Francis Avenue....37
Figure 5-24 Access 6 and 7 – North-eastern accesses to the Development on Davenport Street....37
Figure 5-25 Access 8 – North access of the Development on Davenport Street (amended)....37
Figure 5-26 Access 9 – North-western access of the Development on Davenport Street....37
Figure 5-27 Access 10 – Western access of the Development on Burroughs Road....38
Figure 5-28 Access 1 – South-western access of the Development on Karrinyup Road....38
Figure 5-29 Access 2 – South access 1 of the Development on Karrinyup Road....39
Figure 5-30 Access 3 – South access 2 of the Development on Karrinyup Road....39
Figure 5-31 Base Model Local Road Hierarchies and Volumes....40
Figure 5-32 2021 Option Model Local Road Hierarchies and Volumes....41
Figure 5-33 2031 Option Model Local Road Hierarchies and Volumes....41

Figure 6-1 Car Park Access Points ....43
Figure 6-2 Example where parking aisles within proposed car park exceeds 100m in length (Basement 02 level) ....44
Figure 6-3 Example of a 5 km/hr speed limit sign within a shopping centre car park ....44
Figure 6-4 Potential external VMS locations ....51
Figure 6-5 Examples of external VMS ....51
Figure 6-6 Example of internal VMS ....52
Figure 6-7 Example of internal VMS ....52
Figure 6-8 Internal VMS examples ....52
Figure 6-9 Proposed location of bicycle end of trip facilities ....53
Figure 7-1 Proposed bus priority infrastructure ....56
Figure 8-1 Proposed pedestrian infrastructure surrounding the Development ....58
Figure 9-1 Proposed cycle infrastructure surrounding the Development ....60
Figure 10-1 Proposed service delivery yards within the Mixed Use Expansion at Karrinyup ....61
Figure 10-2 Circulation of service vehicles external to the Development ....61
Figure 10-3 Vehicle swept path legend ....62
Figure 10-4 Yard 1 – Access from Davenport Street to Yard 1 ....62
Figure 10-5 Yard 1 – Vehicle swept path for bays 1 to 5 (common loading) ....62
Figure 10-6 Yard 1 – Vehicle swept path for bays 6 to 8 (Myer loading) ....63
Figure 10-7 Yard 2 – Vehicle swept path movements for heavy rigid vehicles (12.5m) ....63
Figure 10-8 Yard 2 – Vehicle swept path movements for waste vehicles ....64
Figure 10-9 Yard 3 – Vehicle swept paths for 12.5m heavy rigid vehicle ....64
Figure 10-10 Yard 3 – Vehicle swept paths for waste vehicles ....64
Figure 10-11 Yard 4 – Vehicle swept path for 8.8m medium rigid vehicle ....65
Figure 10-12 Yard 5 – Vehicle swept path movements for bays 1, 2, 3 and 7 ....65
Figure 10-13 Yard 5 – Vehicle swept path movements for bays 4, 5 and 6 ....66
Figure 10-14 Access into the Development for cars, buses and articulated vehicles ....66
Figure 10-15 Yard 6 – Vehicle swept path movements ....67
Figure 10-16 Yard 7 – Vehicle swept path movements for western bays ....67
Figure 10-17 Yard 7 – Vehicle swept path movements for eastern bays ....67
Figure 10-18 Yard 8 – Vehicle swept path movement ....68
Figure 10-19 Yard 8 – Access to delivery yard via internal road ....68
Figure 10-20 Yard 8 – Vehicle exit via Davenport Street ....68
Figure 10-21 Yard 9 – Vehicle swept path movements for waste vehicles ....69
Figure 10-22 Vehicle swept path for service station access from Karrinyup Road (19.0m articulated truck) ....69
Figure 10-23 Vehicle swept path for service station access (19.0m articulated truck) ....69
Figure 10-24 Vehicle swept paths for fast food delivery – left tenancy (12.5m rigid truck) ....70
Figure 10-25 Vehicle swept paths for fast food delivery – right tenancy (8.8m rigid truck) ....70

## LIST OF TABLES

Table 2-1 Proposed land use for the Karrinyup Development ....2
Table 3-1 Existing land use for the Karrinyup Development ....4
Table 3-2 Peak hour volumes for primary routes by directions ....7
Table 3-3 Public transport patronage at Karrinyup Bus Station ....11
Table 3-4 Crash summary within the Development ....17
Table 4-1 Planned road upgrades in the area surrounding the Development ....21
Table 4-2 Background network traffic growth for each time period ....22
Table 4-3 Peak hour trips for 2015 ....22
Table 4-4 ITE trip breakdown for 2015 (existing) ....22
Table 4-5 ITE trip breakdown calculations ....22
Table 4-6 Existing trip generation difference ....22
Table 4-7 ITE trip breakdown for Mixed Use Expansion ....23
Table 4-8 Application of the overtrading calibration trips ....23
Table 4-9 Peak hour trip breakdowns for 2021 ....23
Table 4-10 Peak hour trip breakdowns for 2031 ....23
Table 4-11 Trip Volume Growth ....24
Table 4-12 Trip generation with mode split adjustment ....24
Table 4-13 Private vehicle trip generation rates ....24
Table 4-14 Stress test results ....24
Table 4-15 Number of trips during weekdays AM and PM peak hours and Saturday peak hour – Existing situation ....24
Table 4-16 Number of trips during weekdays AM and PM peak hours and Saturday peak hour – 2021 ....25
Table 4-17 Number of trips during weekdays AM and PM peak hours and Saturday peak hour – 2031 ....25
Table 5-1 Level of Service (LOS) legend ....35
Table 5-2 Level of Service for the Morning weekday peak period scenarios ....35
Table 5-3 Level of Service for the Afternoon weekday peak period scenarios ....35

Table 5-4 Level of Service for the Saturday midday peak period scenarios .....36
Table 5-5 Modelled volumes for key residential links .....40
Table 5-6 Base Simulated Distribution Values for Development Trips .....41
Table 5-7 2021 Option Simulated Distribution Values for Development Trips .....41
Table 5-8 2031 Option Simulated Distribution Values for Development Trips .....41
Table 6-1 Parking management objectives and outcomes .....54
Table 7-1 PTA Planned 2031 bus route frequencies (sourced from Transperth) .....55

## APPENDICES

**Appendix A Schematic Road Upgrade Drawings**

**Appendix B Transport Model Details**

**Appendix C Modelling Performance – 2021 and 2031**

**Appendix D SIDRA Analysis Outputs**

**Appendix E Flow Density Plots**

**Appendix F Development Access SIDRA Analysis Outputs**

**Appendix G Karrinyup Road/ Jeanes Road/ Main Street Schematic Road Upgrade Drawing**

# 1. Introduction and Background

## 1.1. Introduction and Objectives

Aurecon was commissioned by AMP Capital Funds Management Ltd to undertake a Transport Plan (TP) for the Development Application for the Mixed Use Expansion at Karrinyup ('the Development'). The Development is proposed to undergo significant redevelopment and be transformed into a 'community hub' with mixed use development within and surrounding the Development. This includes the establishment of a main street which will be active during the day and also after hours.

The main aim of the TP is to address access requirements to the Development by all modes of transport in order to sustain the land use intensification in line with the overarching vision of the Development. The transport issues specific to the Development are outlined in this report.

## 1.2. Context

The Development forms the major activity centre within the Karrinyup-Gwelup locality in the City of Stirling, located approximately 12 km north west of the Perth CBD, as shown in Figure 1-1, and locally in Figure 1-2. The Development is identified as a secondary activity centre in the WAPC State Planning Policy 4.2.

The Development focuses on the primary access route, Karrinyup Road, and also on the connecting local distributor and access routes which also provide direct access, including Francis Avenue, Burroughs Road, and Davenport Street.

As part of the TP, transport modelling was undertaken for a wider area bounded by Reid Highway to the north, Mitchell Freeway to the east, West Coast Highway and West Coast Highway/ Marmion Avenue to the west and Pearl Parade, Sackville Terrace and Cedric Ave to the south.

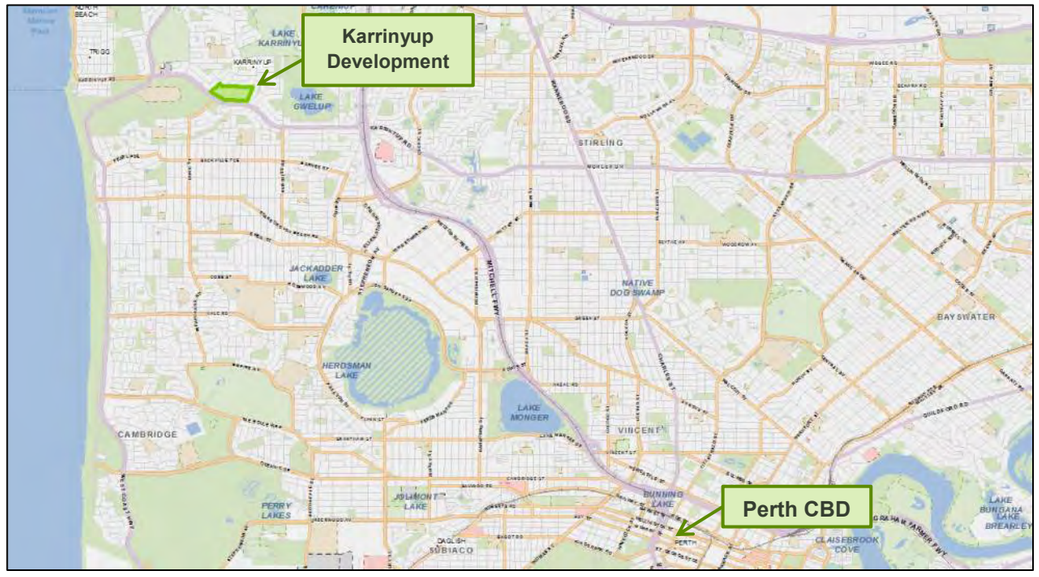



Figure 1-1 Locality map

Figure 1-2 Mixed Use Expansion at Karrinyup – the Development

## 1.3. Prior Transport Assessment

A Traffic and Transport Assessment was previously undertaken as part of the Draft Karrinyup Secondary Centre Activity Centre Structure Plan. This TP aims to ensure that the Development proposal is consistent with the overall structure planning of the area and to provide a greater level of technical detail of the Development and its immediate surrounds.

## 1.4. Report Structure

This TP outlines strategies to increase sustainable transport to the Development, including public transport, pedestrian and cycling access. Having undertaken transport modelling, the TP identifies improvements to the surrounding road network to support the Development, with schematic road upgrade drawings attached in Appendix A. Parking management and servicing strategies are also included in this TP. This report is structured as per the following:

- **Section 2 –** Development Proposal
- **Section 3 –** Existing Situation
- **Section 4 –** Traffic Analysis – Background
- **Section 5 –** Traffic Analysis – Results and Discussion
- **Section 6 –** Parking
- **Section 7 –** Public Transport Access
- **Section 8 –** Pedestrian Access
- **Section 9 –** Cycling Access
- **Section 10 –** Servicing Access
- **Section 11 –** Reduced Parking Number Scenario

# 2. Development Proposal

The proposed Development includes the Mixed Use Expansion of the Karrinyup Shopping Centre (refer to Figure 2-1). The retail floor space of the Development is proposed to increase from approximately 54,000 $m^2$ in retail to 93,355 $m^2$ on completion of this Development. There are also proposed increases in office/business, entertainment/community and health floor space, and provision for residential dwellings within the Development (refer to Table 2-1).

**Table 2-1 Proposed land use for the Karrinyup Development**

| Land Use Type | Proposed Floor Space ($m^2$ NLA) |
|---|---|
| Retail | 93,355 |
| Office / Business | 10,394 |
| Entertainment / Community | 3,916 |
| Cinema | 6,200 |
| Health | 2,654 |
| Utility | 300 |
| **Total:** | **116,819** |
| **Residential Dwellings** | **134** |

The Development proposed consists of the following:

- Four (4) consolidated gateways to the retail core of the Karrinyup Development; North Gate, South Gate, East Gate and West Gate.
- Establishment of a single lane one-way pedestrian friendly 'main street' as an extension of Jeanes Road.
- Multi-level car parking with a total of up to 4,880 bays (including general vehicles and parking for the mobility impaired), split between the eastern and western sides of the Development.
- Reconfigured service delivery yards, catering for the increased retail syndicate.
- Revised road accesses into and throughout the Development, ensuring the road network performs adequately.
- Upgrades to numerous intersections in the wider road network surrounding the Development to improve access.
- A combination of new and upgraded pedestrian and cycling paths to support mode shift to the Development.
- The delivery of bus priority infrastructure along Karrinyup Road and travel behaviour change initiatives to support mode shift to the Development. The bus station is proposed to be retained without any layout modifications, as stipulated by the Public Transport Authority (PTA).
- The addition of a cinema and development of the existing Bankwest site on the northern side to include retail floor space.

The establishment of the main street will form a high street style shared area allowing for outdoor dining with buildings fronting both sides, and a piazza located in front of the West Gate entrance to the Development. There are opportunities for the main street to be, on occasion, cordoned off to prevent vehicle access. This will allow for community events and street festivals to take place throughout the year.

The Draft Karrinyup Secondary Centre Activity Centre Structure Plan includes additional mixed use development adjacent to this Development which may occur in the future. As such, these have not been included in this TP. It can be noted that there is capacity for increased non-retail floor space within the proposed Development.

It is expected that the expansion at Karrinyup will occur in multiple stages, as the demand for such development arises and as construction dictates. Schematic road upgrade drawings for the Development are shown in Appendix A, with concept architectural plans for the Development in the main submission report. Prior to the commencement of site works for the retail centre, a detailed Road Upgrade, Construction and Staging Plan for the Karrinyup Road works is to be prepared in consultation with the City of Stirling, Department of Planning, Department of Transport, Public Transport Authority and Main Roads WA for the proposed upgrades.

Additionally, a Travel Behaviour Change and Parking Management Plan is to be developed, after consultation with Department of Transport. Supplementary information regarding the impacts of the Development on the adjacent residential road network is shown in Section 5.6.

**Figure 2-1 Mixed Use Expansion at Karrinyup (ground floor)**

# 3. Existing Situation

## 3.1. Development Uses and Surrounding Land Use

The Development is currently mixed-use consisting of commercial and civic facilities, including the Karrinyup Shopping Centre, adjacent Library and Community Centre as well as a small number of offices and professional services on land facing the centre and fronting the streets surrounding the centre. A Transperth bus station is located alongside the Development adjacent to Karrinyup Road. Table 3-1 shows the existing land use types.

**Table 3-1 Existing land use for the Karrinyup Development**

| Land Use Type | Floor Space, $m^2$ (2011) |
|---|---|
| Retail | 53,544 |
| Office/Business | 4,184 |
| Eating/Entertainment/Culture | 2,382 |
| Community/Health/Welfare | 706 |
| Other Incidental Floor Space | 195 |
| **Total** | **61,011** |

The land use currently surrounding the Development is predominantly single-unit residential dwellings (design code R20/R30) with various public reserves, including Lake Gwelup to the east. A number of primary schools are located within close proximity to the Development including Karrinyup Primary School, Our Lady of Good Counsel Primary School, St. Mary's Anglican Girls School and Newborough Primary School (refer to Figure 3-1).

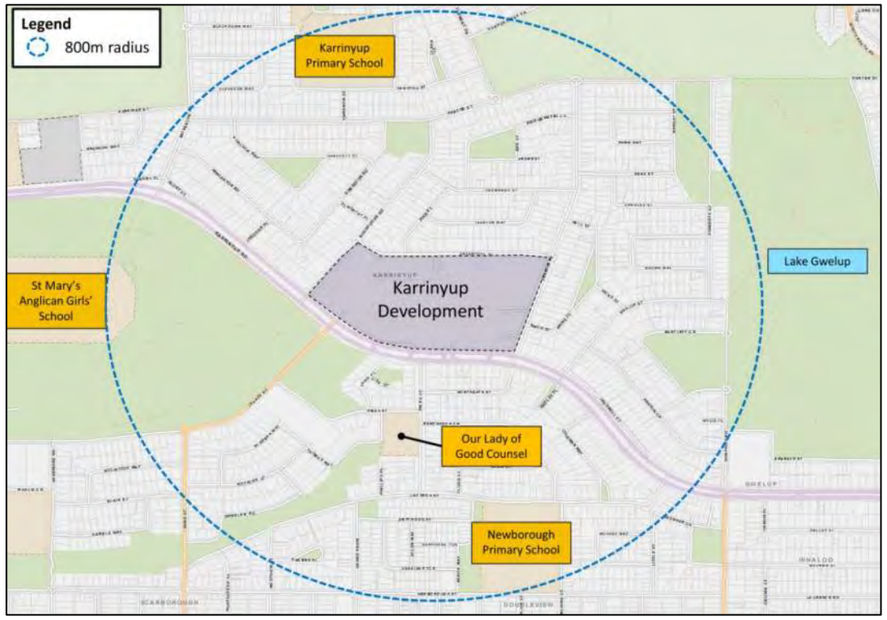



**Figure 3-1 Surrounding land use**

## 3.2. Mode Accessibility

A Customer Exit Survey was conducted by Directional Insights in 2011 which indicated travel modes to the Development were 92% by car and 8% by other modes, as shown in Figure 3-2. This high rate of car use is 10% above the 82% benchmark for regional centres, indicating a significant reliance on car use. At similar regional centres, it is typical to see 6% of customers walking and 8% customers travelling by bus. The Development is slightly below the benchmark for customers walking and well below the benchmark for customers travelling by bus. This may be due to limited walking access and public transport services, especially during peak retail times.

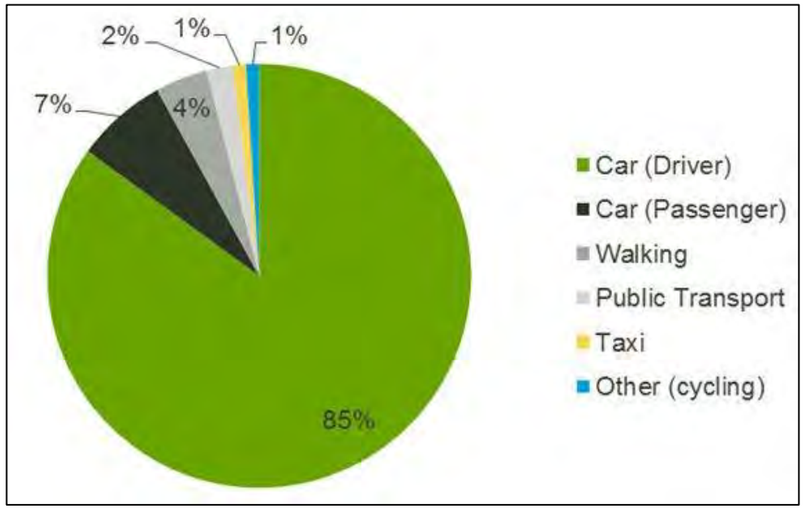



**Figure 3-2 Existing travel mode share**

## 3.3. Road Network

### 3.3.1. Access

Access to the Development is facilitated by a well-connected road network of various classes. The road hierarchy, as assigned by Main Roads Western Australia (MRWA), is provided in Figure 3-3. The primary distributor routes leading to the Development, either directly or indirectly, include Karrinyup Road, West Coast Highway, Marmion Avenue and Mitchell Freeway.

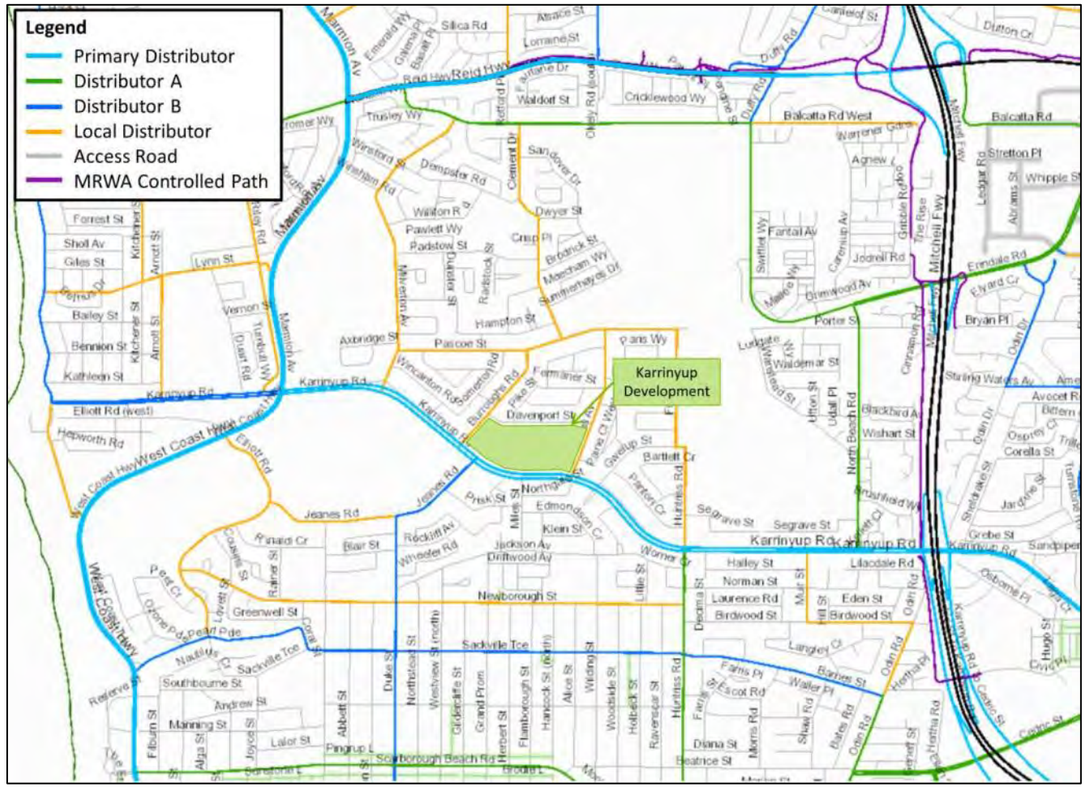



**Figure 3-3 Main Roads WA road hierarchy in surrounding network**

There are five key roads connecting directly to the Development, as shown in Figure 3-4, including the following:

- **Karrinyup Road**
  - A major east-west Primary Distributor road, under Main Roads WA jurisdiction, connecting from West Coast Highway to Morley Drive (east of the Mitchell Freeway)
  - Karrinyup Road is a dual carriageway road with a wide median and has a posted speed of 60km/h in the vicinity of the Development (between Burroughs Road and Gwelup Street), and 70km/h elsewhere
- **Jeanes Road**
  - A Distributor B road connecting a primarily residential catchment south west of the Development with a posted speed of 50km/h
  - Jeanes Road is a single carriageway road providing direct access to the Development via a signalised four-way intersection with Karrinyup Road
- **Francis Avenue**
  - A local distributor road connecting a primarily residential catchment north of the Development
  - Francis Avenue is a single carriageway road providing access to the Development via a signalised T-intersection with Karrinyup Road
  - Francis Avenue has a posted speed of 50km/h
- **Burroughs Road**
  - A local distributor road connecting a primarily residential catchment north of the Development with a posted speed of 50km/h
  - Burroughs Road is a single carriageway road providing access to the Development via an un-signalised T-intersection with Karrinyup Road.
- **Davenport Street**
  - A local access road running along the northern side of the Development between Burroughs Road and Francis Avenue with a posted speed of 50km/h
  - Davenport Street is a single carriageway road providing access to the Development via roundabout controls at both the Burroughs Road and Francis Avenue intersections

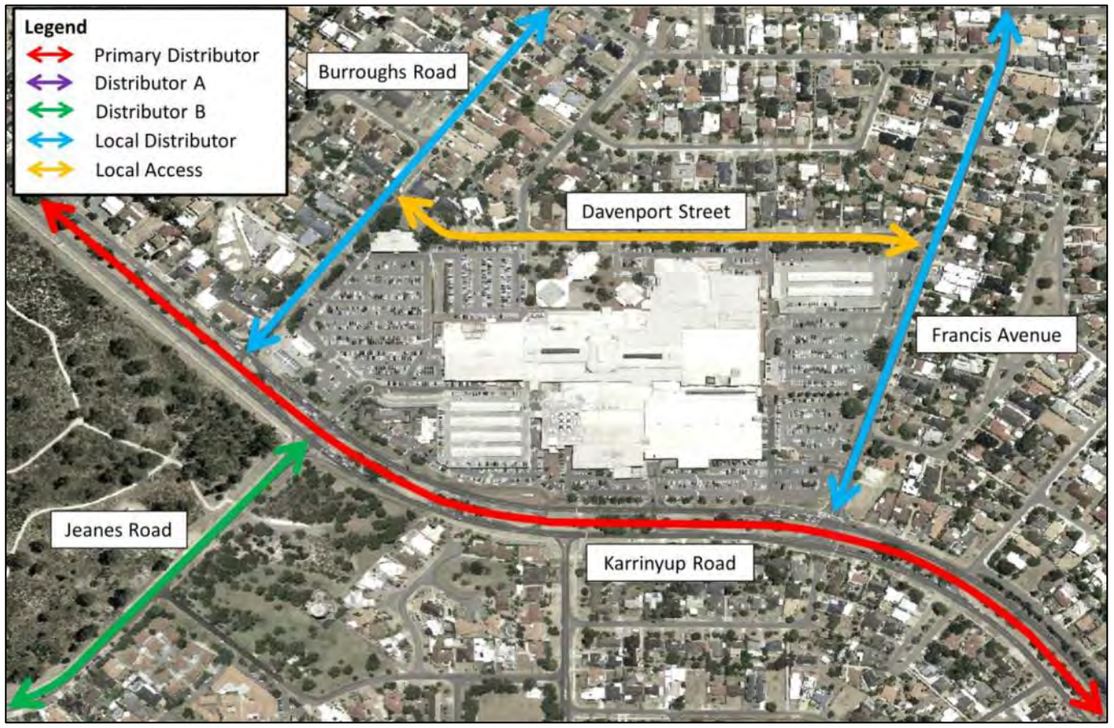



**Figure 3-4 Road hierarchy within the Development**

Predominant access to the Development is via Karrinyup Road, with indirect access provided via the Karrinyup Road / Burroughs Road intersection (an unsignalised T-intersection) and Karrinyup Road / Francis Avenue (signalised T-intersection). Access to the Development itself is currently provided via ten intersections, plus an entry and exit point for bus only access to the Karrinyup bus station, as shown in Figure 3-5.

**Figure 3-5 Access to the Development**

Access directly into the Development from Karrinyup Road is via one signalised and two unsignalised intersections as described below:

- Access 1 provides signalised access to the Development as part of the Karrinyup Road/ Jeanes Road intersection. Northbound and westbound traffic entering the Development is supported by signalised movements, while eastbound traffic enters via the priority controlled left turn slip lane.
- Access 2 provides left in, left out only access from Karrinyup Road, primarily to service existing fast food outlets.
- Access 3 provides access into the Development for both eastbound and westbound vehicles, however is left out only.

All the remaining accesses into the Development via Francis Avenue, Davenport Street and Burroughs Road provide a priority controlled T-intersections where all movements are permitted.

An existing petrol station is located on the corner of Karrinyup Road and Burroughs Road with access off both roads.

There are three U-turn facilities available along Karrinyup Road in both the eastbound and westbound directions. Access to the bus station is accommodated by the existing U-turn facilities.

### 3.3.2. Traffic flows

Traffic volumes were collected for existing and major intersections surrounding the Development from Austraffic surveys and SCATS detector data, with further signal files and data obtained from Main Roads WA. Austraffic volume data was collected on Saturday 6 July 2013, Thursday 21 November 2013, Saturday 23 November 2013, and Wednesday 11 June 2014. Data collected across the different days was compared to determine the peak hour traffic volumes for the Development.

The following peak hours were determined for the Development:

- **AM Peak:** 8:00 AM – 9:00 AM
- **PM Peak:** 5:00 PM – 6:00 PM
- **Saturday Peak:** 12:00 PM – 1:00 PM

Existing traffic volumes (two-way) along the roads immediately surrounding the Development for each peak period are shown in Figure 3-6.

**Figure 3-6 Existing peak hour traffic volumes (two-way)**

The main primary distributor routes used to access the Development, either directly or indirectly, include Karrinyup Road, West Coast Highway, Marmion Avenue and Mitchell Freeway. The peak hour volumes of these primary access roads are indicated in Table 3-2. For the intersections immediately adjacent to the Development, the Saturday midday peak period was found to carry the most traffic.

Table 3-2 Peak hour volumes for primary routes by directions

| Approach | Number of lanes | Volume | | |
|---|---|---|---|---|
| | | AM weekday peak hour 08:00 – 09:00 | PM weekday peak hour 17:00 – 18:00 | Saturday midday peak hour 12:00 – 13:00 |
| Karrinyup Road Eastbound, west of Burroughs Road | 2 | 1,610 | 628 | 993 |
| Karrinyup Road Westbound, west of Burroughs Road | 2 | 536 | 1,503 | 978 |
| Karrinyup Road Eastbound, east of Francis Avenue | 2 | 1,468 | 1,067 | 1,612 |
| Karrinyup Road Westbound, east of Francis Avenue | 2 | 920 | 1,263 | 1,596 |
| Marmion Avenue Northbound, north of Karrinyup Road | 2 | 852 | 2,171 | 1,010 |
| Marmion Avenue Southbound, north of Karrinyup Road | 2 | 1,993 | 818 | 1,025 |
| Mitchell Freeway Northbound, at Karrinyup Road | 4 | 2,991 | 5,618 | 4,745 |
| Mitchell Freeway Southbound, at Karrinyup Road | 4 | 5,070 | 3,980 | 4,566 |

### 3.3.3. Intersection Performance

#### Site Observations

A number of existing network issues were identified through site observation during peak periods, as summarised below:

- Intersection of Karrinyup Road / West Coast Highway – in the PM weekday peak period the east approach right turn queue from Karrinyup Road was observed to spill back into the through lane traffic during most cycles
- Intersection of Karrinyup Road / Francis Avenue – during the Saturday midday peak period the east approach right turn queue on Karrinyup Road into Francis Avenue fills the turn bay and spills back to block one of the through lanes
- Intersection of Karrinyup Road / Huntriss Road - during the Saturday midday peak period, and sometimes during the PM weekday peak period, the east approach through movement exhibits queues lengths of approximately 500m and it generally takes 2-3 signal cycles for traffic to pass through
- Intersection of Karrinyup Road / Mitchell Freeway – in most peak periods the west approach right turn from Karrinyup Road into the Mitchell Freeway on-ramp queues back to block a through lane. During the Saturday midday peak period the north approach right turn queue from the Mitchell Freeway off-ramp into Karrinyup Road was observed to be constrained.
- Further afield, the Mitchell Freeway and West Coast Highway have slow travel times southbound during the AM period and northbound during the PM period

#### Aimsun Hybrid Modelling

An Aimsun Hybrid model with integrated SCATS signal control, containing both a microscopic and mesoscopic model area, was developed for this study in order to analyse the performance of the Development. A Hybrid model was chosen for this study as it allows for individual vehicles, including buses, to be modelled in the detailed micro-simulation cordon environment of Karrinyup Road with the broader model network operating as a mesoscopic model with a simplified model engine.

The mesoscopic buffer area around the micro-simulation area gave greater confidence in the dynamic routing calculation to evaluate how people access the Development in the micro-simulation area, and the impact this has on other main corridors and intersections in the surrounding network. Aimsun also has the added advantage of the integration of adaptive SCATS signal control in the micro-simulation cordon environment. This is achieved by incorporating the actual signal files that are used on-street by MRWA. This method allowed the key modelled signals to adjust to changes in traffic volumes as they would on-street.

A detailed operational base model of the current road network was first built with the 2013 and 2014 traffic volumes. The model was calibrated to count data and observed driver behaviour and validated to travel times and observed queuing patterns. Information regarding the build and calibration/ validation of the model is in Appendix B. This was used as the base case from which the future year models were developed.

The initial background distribution for the Development was taken from the Main Roads Regional Operations Model (ROM) which estimated that trips were relatively well distributed in all directions heading to and from the Development. However through the trip assignment and calibration process with the collected traffic count data, it was evident that the majority of the Development traffic approached and exited to and from Karrinyup Road, east of the Development.

#### Adjacent Key Intersections

The two intersections primarily controlling access to the Development are Karrinyup Road / Jeanes Road, a 4 arm signalised intersection, and Karrinyup Road / Francis Avenue, a 3 arm signalised intersection. The Karrinyup Road / Jeanes Road intersection operates with single diamond phasing which allows the Karrinyup Road right turn movements to run, followed by the through movements, and then the Jeanes Road and Development movements with filtered right turns.

Karrinyup Road/ Jeanes Road currently performs at an acceptable level of service with the highest delay period being the weekday evening period when the average delay is 20 seconds per vehicle .The layout for this intersection is shown in Figure 3-7.

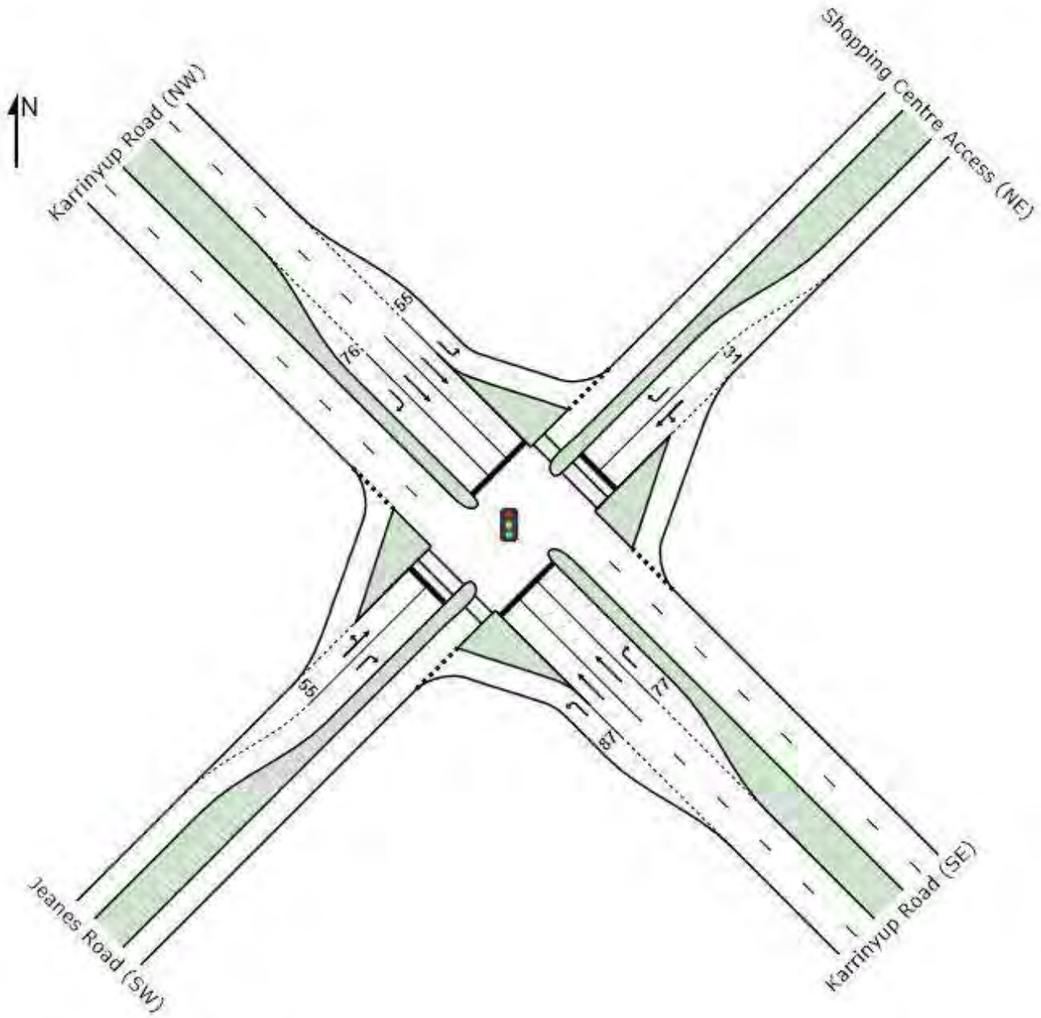



**Figure 3-7 Existing Karrinyup Road / Jeanes Road intersection**

The Karrinyup Road / Francis Avenue intersection is in a T-arrangement where the Karrinyup Road east approach movements run first, followed by the Karrinyup Road through movements, and lastly the right turn from Francis Avenue. This intersection currently has an average delay of 30 seconds per vehicle in the Saturday peak period however the right turn from Karrinyup Road into Francis Avenue often exhibits queues that extend past the dedicated right turn bay with an average delay of 67 seconds per vehicle. The layout for this intersection is shown in Figure 3-8.

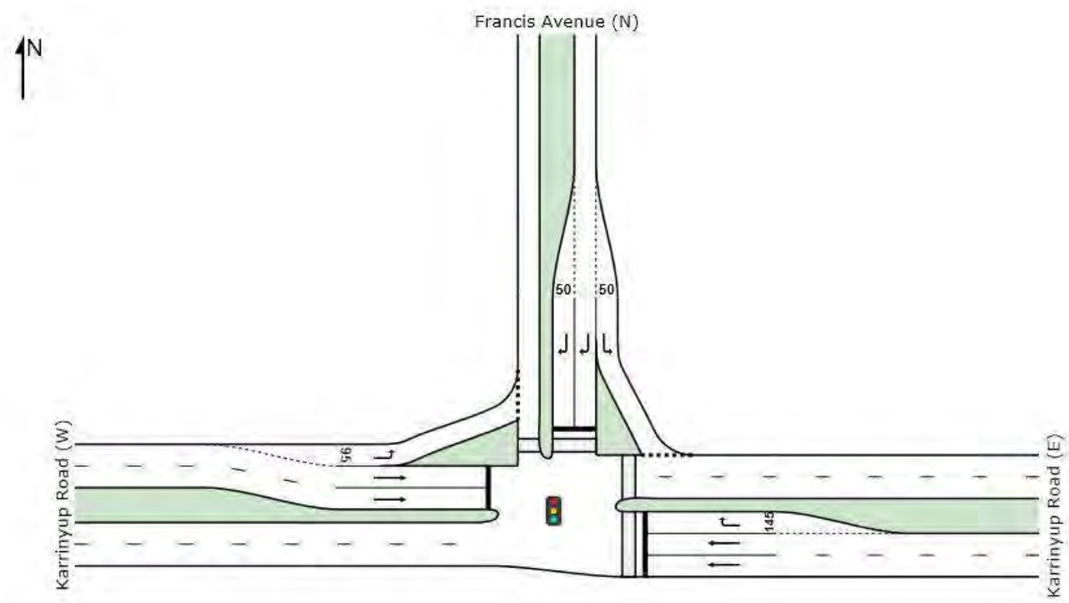



**Figure 3-8 Existing Karrinyup Road / Francis Avenue intersection**

A third, more minor intersection, is that of Karrinyup Road / Burroughs Road. This is a tee give way controlled intersection with space available in the Karrinyup Road median for vehicles to queue in. The delay at this intersection is currently 30 seconds per vehicle in the Saturday peak period with the highest movement delay, 57 seconds per vehicle, occurring for the Burroughs Road right turn into Karrinyup Road.

## 3.4. Parking

There are currently 3,166 parking spaces within the Development, including undercover parking and roof parking in several locations. A parking survey was conducted on Saturday 23 November 2013, Tuesday 26 November 2013 and Thursday 28 November 2013 which entailed an hourly audit of usage. The parking bays are distributed within the Development as shown in Figure 3-9 with the majority being visible and accessible from Francis Avenue and Burroughs Road. Parking utilisation is illustrated in Figure 3-10.

**Figure 3-9 Distribution of Parking**

From the parking audit analysis, the maximum parking utilisation for the Tuesday was 78% of all parking bays available, between 12:00 and 13:00. Utilisation of 72% or more occurred between 11:00 and 15:00.

On the Thursday, it was found that the maximum parking utilisation was 88% between 13:00 and 14:00 and that an 80% or above utilisation occurred between 11:00 and 16:00. The maximum evening utilisation was found to be 73% between 19:00 and 20:00.

The maximum parking utilisation for the Saturday was 95% between 12:00 and 13:00 and again between 14:00 and 15:00. Utilisation of 89% or more occurred between 11:00 and 16:00.

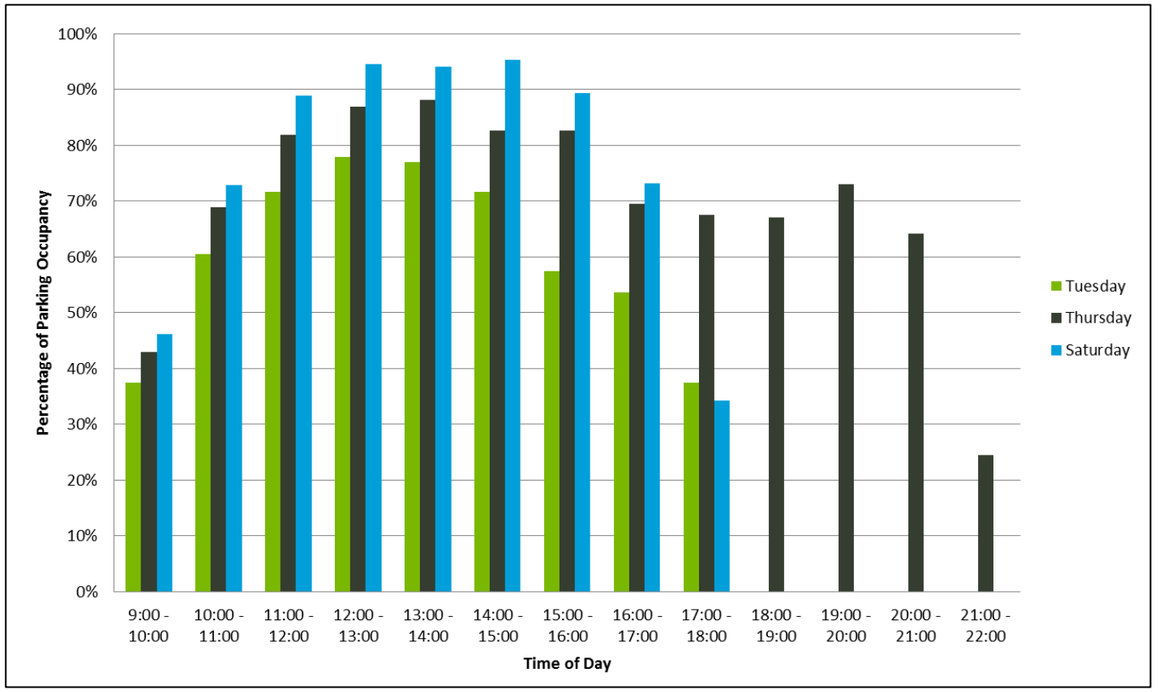



**Figure 3-10 Parking utilisation**

The busiest day (of those surveyed) in terms of parking utilisation was Saturday, both in terms of the average number of bays utilised and the most number of bays utilised. The high percentage of utilisation that occurs indicates that the demand is there due to the availability of parking spaces and relatively poor access by other modes of transport, particularly public transport and cycling. Considering that there are no Variable Message Signs (VMS) indicating where bays are available, the process of finding available bays under near capacity conditions can be time consuming and frustrating for drivers.

The 3,166 parking bays for 60,816m$^2$ of total floor space equates to a provision of approximately 5.2 parking bays per 100m$^2$ of land use.

### 3.4.1. Motorcycle Parking

Motorcycle access to the Development is very low, forming less than 1% of the existing mode share. Six motorcycle parking bays are available throughout the Development, equating to approximately 0.2% of the total number of parking bays.

Motorcycles often park in the car parking bays or in other hard-landscaped areas around the Development.

## 3.5. Public Transport Access

### Mass Transit

According to the Public Transport 2031 Plan, rapid transit infrastructure (likely bus rapid transit) is proposed to connect Karrinyup between Scarborough and Hillarys beyond 2031 (refer to Figure 3-11).

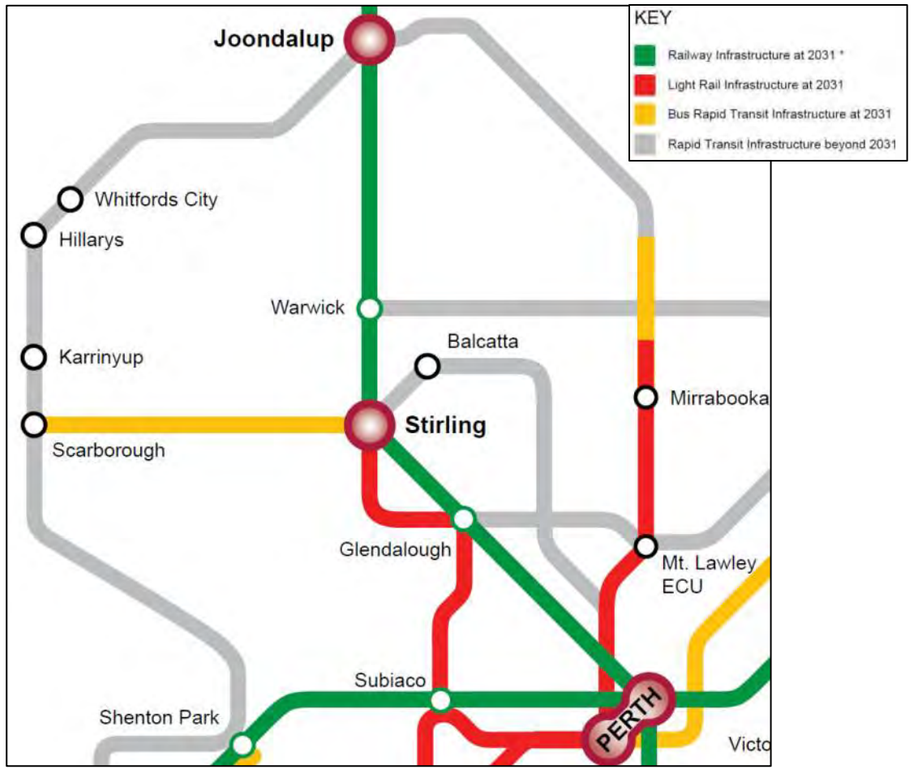



**Figure 3-11 Public Transport Plan 2031, sourced from Department of Transport**

Bus services are available direct to the Karrinyup Bus Station, primarily accessed via Karrinyup Road. The Karrinyup Bus Station is currently used by five bus services, with the general catchment of the services to the surrounding area shown in Figure 3-12.

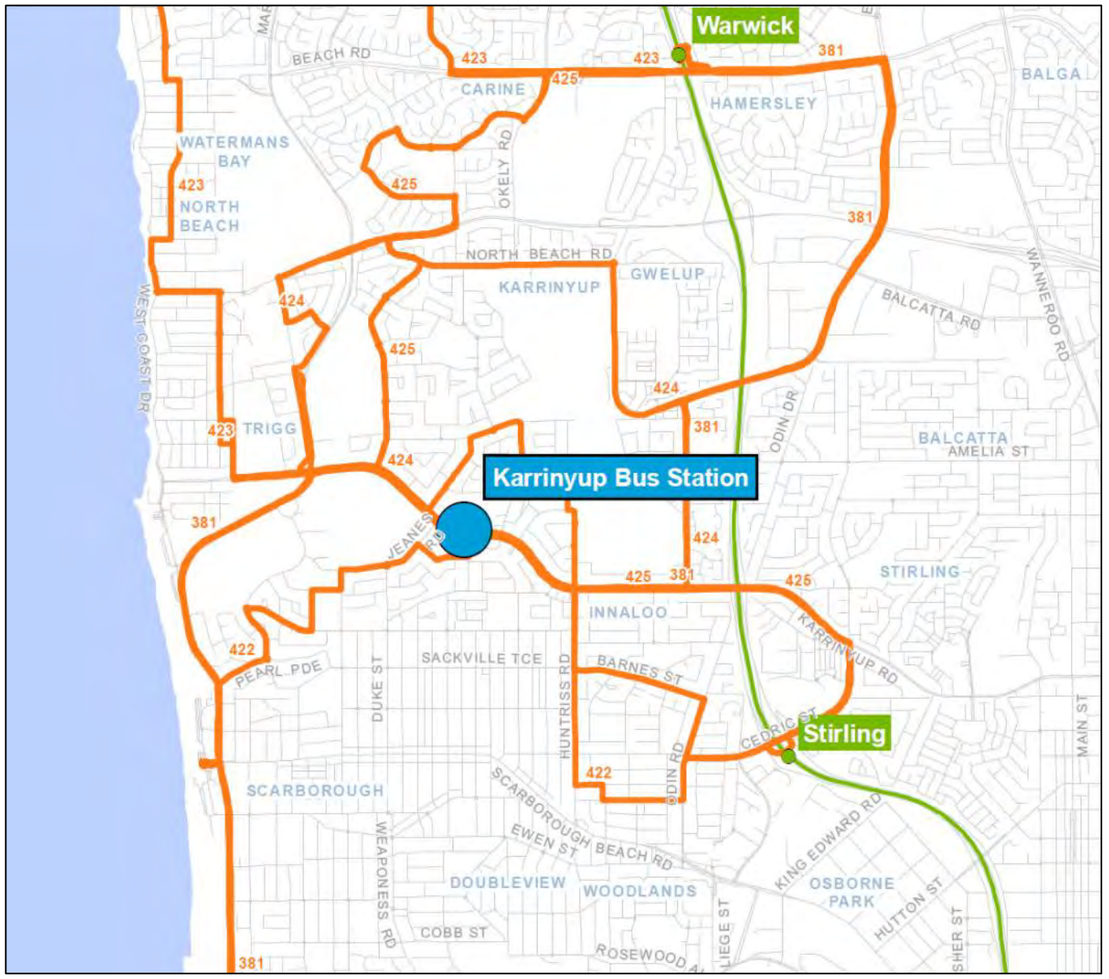



**Figure 3-12 Bus routes to/from the Development**

Direct bus access from Karrinyup Bus Station is available to Scarborough Beach as well as a number of train stations including Stirling, Warwick and Fremantle. Weekday peak headways for these bus services range from 15 minutes to 2 hours, however the peak services align with the commuter peak in the early morning and late afternoon which in general does not coincide with peak shopping hours for the Development.

Most off-peak weekday schedule services run hourly or twice per hour. However, the busiest times for the Development are during weekends and in general weekend bus service frequencies are very poor, typically hourly or even none for some services. A summary of bus services is listed below:

- **Route 423** is the most frequent route and operates between Stirling Station and Warwick Station via the Karrinyup Bus Station. During the weekday peak periods, the service runs at headways of approximately 10 to 20 minutes, and 30 minutes during off-peak and Saturdays. During Sundays and Public Holidays, the 423 service runs hourly.

- **Route 425** operates between Stirling Station and Warwick Station via Karrinyup Bus Station at approximately 15-20 minute intervals during the weekday peak periods and 30 minutes during the off-peak. On Saturdays, Sundays and Public Holidays, the 425 operates at hourly intervals.
- **Route 422** operates between Stirling Station and Scarborough Beach via Karrinyup Bus Station every 20 to 30 minutes during the weekday morning peak period and hourly during the weekday off-peak, afternoon peak and Saturdays. The service does not run on Sunday or Public Holidays.
- **Route 424** operates between Stirling Station and Karrinyup Bus Station every 20 minutes during the weekday morning peak period and every 30 minutes during the afternoon peak period. During the weekday off-peak and Saturday, the 424 operates at hourly headways. The service does not operate on Sundays and Public Holidays.

In general public transport services with frequencies more than 8 to 10 minutes require users to plan their journeys to limit inconvenience caused by waiting. There is significant evidence showing a clear correlation between bus service frequencies, span of hours, and bus patronage, in that people are much more likely to use a bus if they know the service is reliable and frequent.

Passenger numbers for Karrinyup Bus Station were obtained from SmartRider data for Thursday 19th March 2015 and Saturday 21st March 2015, and have been adjusted to include cash tickets. The existing patronage is shown in Table 3-3 and is shown to be relatively quite low.

**Table 3-3 Public transport patronage at Karrinyup Bus Station**

| AM Peak Hour: 08:00 – 09:00 | | | | |
|---|---|---|---|---|
| **TO KARRINYUP** | | | | |
| **Route** | **No. of Services** | **Boardings at Karrinyup** | **Alightings at Karrinyup** | **TOTAL** |
| **422** | **2** | 21 | 0 | 21 |
| **423** | **2** | 2 | 23 | 25 |
| **424** | **1** | 0 | 0 | 0 |
| **425** | **2** | 3 | 11 | 14 |
| **TOTAL** | | **26** | **34** | **60** |
| **FROM KARRINYUP** | | | | |
| Route | **No. of Services** | **Boardings at Karrinyup** | **Alightings at Karrinyup** | **TOTAL** |
| **422** | **2** | 0 | 2 | 2 |
| **423** | **3** | 19 | 1 | 20 |
| **424** | **1** | 0 | 0 | 0 |
| **425** | **3** | 11 | 9 | 20 |
| **TOTAL** | | **30** | **12** | **42** |

Note the above lists the patronage from the Thursday 19th March 2015, sourced from Transperth

| PM Peak Hour: 17:00 – 18:00 | | | | |
|---|---|---|---|---|
| **STIRLING TO KARRINYUP** | | | | |
| **Route** | **No. of Services** | **Boardings at Karrinyup** | **Alightings at Karrinyup** | **TOTAL** |
| **422** | **3** | 0 | 0 | 0 |
| **423** | **4** | 4 | 6 | 10 |
| **424** | **3** | 0 | 1 | 1 |
| **425** | **4** | 4 | 10 | 14 |
| **TOTAL** | | **8** | **18** | **26** |
| **KARRINYUP TO STIRLING** | | | | |
| Route | **No. of Services** | **Boardings at Karrinyup** | **Alightings at Karrinyup** | **TOTAL** |
| **422** | **0** | n/a | n/a | 0 |
| **423** | **2** | 2 | 0 | 2 |
| **424** | **2** | 2 | 0 | 2 |
| **425** | **3** | 8 | 0 | 8 |
| **TOTAL** | | **12** | **0** | **12** |

Note the above lists the patronage from the Thursday 19th March 2015, sourced from Transperth

| Saturday Peak Hour: 12:00 – 13:00 | | | | |
|---|---|---|---|---|
| **STIRLING TO KARRINYUP** | | | | |
| **Route** | **No. of Services** | **Boardings at Karrinyup** | **Alightings at Karrinyup** | **TOTAL** |
| **422** | **1** | 0 | 0 | 0 |
| **423** | **2** | 5 | 12 | 17 |
| **424** | **1** | 0 | 3 | 3 |
| **425** | **1** | 0 | 3 | 3 |
| **TOTAL** | | **5** | **18** | **23** |
| **KARRINYUP TO STIRLING** | | | | |
| Route | **No. of Services** | **Boardings at Karrinyup** | **Alightings at Karrinyup** | **TOTAL** |
| **422** | **0** | n/a | n/a | 0 |
| **423** | **2** | 3 | 5 | 8 |
| **424** | **1** | 3 | 0 | 3 |
| **425** | **1** | 6 | 2 | 8 |
| **TOTAL** | | **12** | **7** | **19** |

Note the above lists the patronage from the Saturday 21st March 2015, sourced from Transperth

The peak period for bus patronage on Saturday is similar to the weekday AM and PM peak periods. This indicates that it is mainly shop employees that are using public transport to commute to and from work, and there is currently limited use of public transport by shoppers. Spikes in patronage can be attributed to school children, for example the 422 route, which services primary schools north of Karrinyup Shopping Centre.

Overall, the current bus services seem to be aimed at commuters travelling to and from the Perth CBD via Warwick and Stirling train stations or school children, with access to the Development not being a key focus of the services. It is apparent that there is currently minimal public transport infrastructure to support higher frequency services to Karrinyup and encourage increased patronage.

Given the overall expected vehicle numbers associated with the Development, a significant increase in patronage is not required to ensure the road network is not unduly affected by the Development. However, improvements to bus patronage would offer other benefits.

### Taxi Service

Taxis are available near the main entrance to the Development (refer to Figure 3-13). A feeder rank with storage for four (4) taxis is located adjacent to the lounge, allowing taxis to progress to the main rank as space becomes available (refer to Figure 3-13).

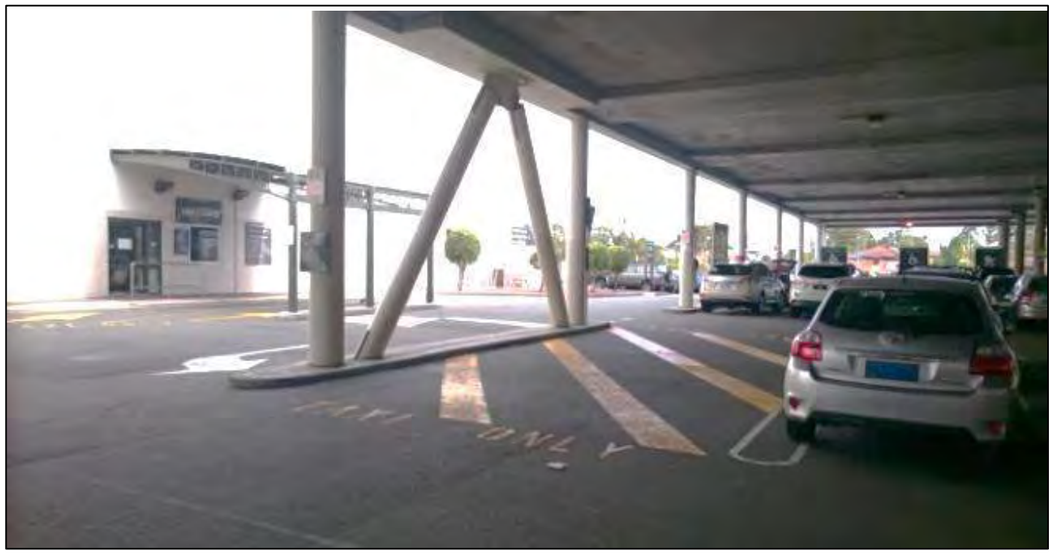


**Figure 3-13 Taxi feeder rank facility**

## 3.6. Pedestrian Access

The Development is situated within a large residential area, with many residents within walking distance. Walking access to the Development is predominantly accommodated on footpaths and shared paths along the adjacent and surrounding road network. The surrounding road network has footpaths alongside the majority of directly accessible routes. The roads without footpaths tend to be lower order residential access routes, and generally do not present a safety concern for pedestrians due to low traffic volumes and generally low operating speeds. Infrastructure upgrades in these areas are therefore not proposed. The walkable catchment (800m) is shown in Figure 3-16.

The main concerns for access on foot are the crossing of major roads, in this case Karrinyup Road, in terms of safety and time delays. There are currently three signalised crossings on Karrinyup Road giving safe and direct access to the Development, namely at Jeanes Avenue, Francis Avenue, and the dedicated pedestrian crossing just east of Miles Street (see Figure 3-14). A continuous footpath also extends around the perimeter of the Development, although most crossings are not Disability Discrimination Act (DDA) compliant.

Access to the pedestrian entrances to the Development is also very important, with the main entrances shown in Figure 3-17. These include direct entrances into the Development and also direct entrances into the shops themselves i.e. Myer and David Jones. Direct walking access to the entrances are provided from Karrinyup Road (via the Karrinyup Bus Station and signalised pedestrian crossing), and Francis Avenue (direct access to David Jones). Elsewhere, the customers are mostly expected to walk through car parks, whether they are walking from their cars or from the street, this increases the number of conflict points between cars and pedestrians (refer to Figure 3-15).

**Figure 3-14 Signalised pedestrian crossing on Karrinyup Road**

**Figure 3-15 Example of poor pedestrian access from car parking**

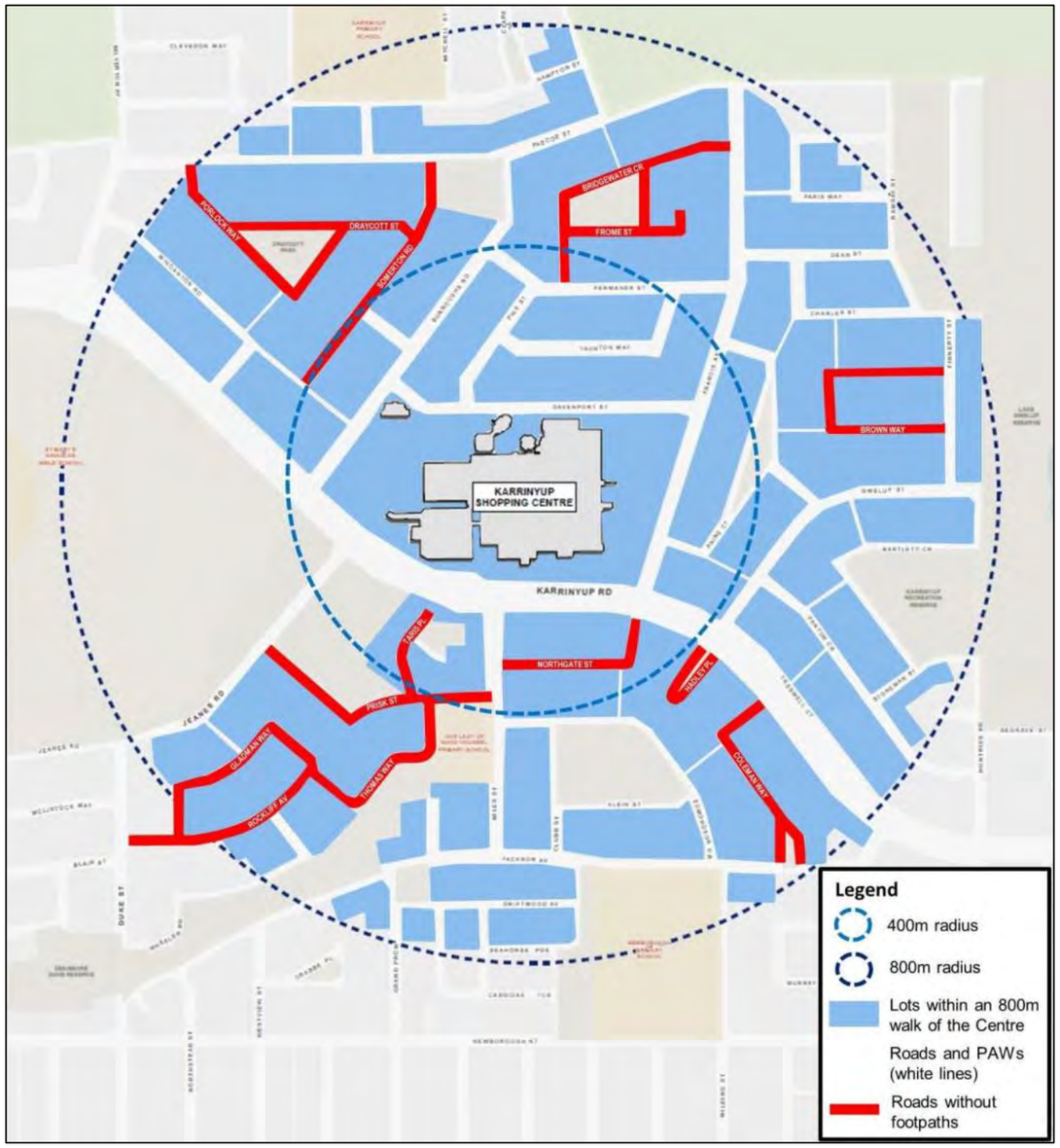



Figure 3-16 Walkable catchment

Figure 3-17 Existing Pedestrian entrances into Karrinyup Shopping Centre from all levels

An analysis of crash data for the area from 2009-2013 (discussed in Section 3.9.2), indicates that only one crash involved a pedestrian which suggests a safe walking environment for pedestrians. The crash was a result of a car losing control on the Karrinyup Road carriageway and striking a pedestrian who was within a pedestrian refuge.

## 3.7. Cycling Access

The facilities and opportunities for direct bicycle access to the Development are poor. Cyclist amenity is generally provided for in the form of on-road cycle lanes (sealed road shoulders), off-road paths (segregated or shared pedestrian / cyclist paths), or otherwise within general traffic lanes (given posted speeds of between 30 and 50km/h). The City of Stirling's preferred option in future cycle planning is the provision of segregated off-road paths in each direction as these present reduced conflicts with other modes. As identified in the Karrinyup and Gwelup Local Area Plan, the current poor street-connectivity within the Karrinyup area has also resulted in the creation of a generally disjointed cyclist network.

The existing Perth Bicycle Network (PBN) is a network of cycling routes comprising of on-road, path and end-of-trip infrastructure, which form part of a strategic and integrated transport network for Perth. The PBN network is currently being re-strategised, which creates opportunities to improve strategic cycling connections to the Development.

Referring to Figure 3-18, a number of existing PBN routes are located in close proximity to the Development with connecting 'local bicycle friendly streets' (good road riding environment) including:

**East-West Routes**

- PBN Route NW7 to the north of the Development providing an east-west connection between Marmion Avenue and the Mitchell Freeway Principal Shared Path (PSP), encompassing College Court, Axbridge Street, Pascoe Street and Porter Street
- PBN Route NW8 to the south of the Development providing an east-west connection between West Coast Highway and the Mitchell Freeway PSP, encompassing Sackville Terrace and Barnes Street

**North-South Routes**

- PBN Route NW2 to the west of the Development providing a north-south route parallel to the coastline and connecting to Marmion Avenue
- PBN Route NW1 to the east of the Development providing a north-south route between Pascoe Street and Barnes Street, encompassing Finnerty Street, Huntriss Road, Norman Street, Decima Street, Birdwood Street, Satin Way, Langley Crescent and Crocker Road
- Mitchell Freeway PSP located approximately 1.7 kilometres to the east of the Development

**Local Bicycle Friendly Streets**

- Jeanes Road between Deanmore Road and Karrinyup Road
- Newborough Street between Elliott Road and Grand Promenade
- Burroughs Road between Karrinyup Road and Pascoe Street

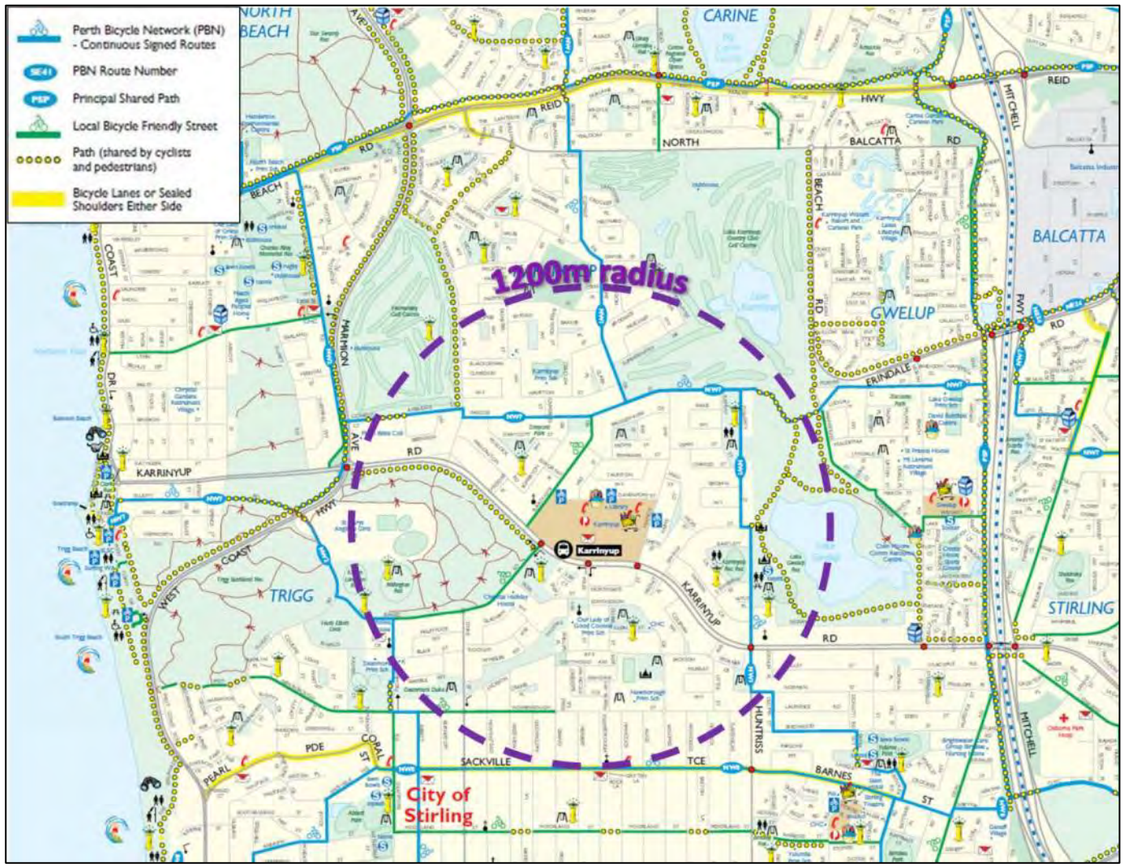



**Figure 3-18 Bicycle network surrounding the Development (Department of Transport, 2014)**

In terms of the above mentioned strategic cycling routes, many are within one kilometre of the Development and have the potential to provide good connectivity, however currently there isn't any dedicated cycling infrastructure (i.e. cycle lanes or paths) along many of these routes to support connections.

Referring to the Department of Transport TravelSmart Map (see Figure 3-18), the road network surrounding the Development has dedicated bicycle infrastructure in the following locations:

- Shared path along West Coast Highway and Marmion Avenue
- Shared path along Karrinyup Road between West Coast Highway and Jeanes Road
- Bicycle Lane / Sealed shoulder along Pearl Parade, Coral Street, Sackville Terrace and Barnes Street (between West Coast Highway and Odin Road)
- Shared path around Lake Gwelup connecting to the principal shared path along Mitchell Freeway via North Bead Road and Karrinyup Road

From the above list, the only dedicated bicycle infrastructure providing direct access to the Development is via the shared path along Karrinyup Road to the west of the Development, although the width of the path is narrower than Austroads Guidelines and is not signed. From both the north and south, there is potential for the key cycling routes along West Coast Highway / Marmion Avenue and the Mitchell Freeway PSP to provide connectivity to the

Karrinyup area. Direct access to the Development from these major strategic routes is limited, and is primarily via non-dedicated cycling routes through residential areas.

Some existing bicycle parking is available at several entrances to the Development, but accessing these facilities is somewhat problematic as cyclists are expected to ride through parking areas. It was observed that the bicycle parking at the main entrance was one of the few that was well utilised, indicating there is potential to increase cycling as a viable travel mode option to the Development. A significant opportunity exists to increase legibility and accessibility to and within the Development for cyclists, as well as providing improved bicycle parking and end of trip facilities.

## 3.8. Freight and Servicing Access

The metropolitan freight road network is identified in the Draft Statement of Planning Policy: Metropolitan Freight Network (WA Planning Commission, 2005) and shown in Figure 3-19.

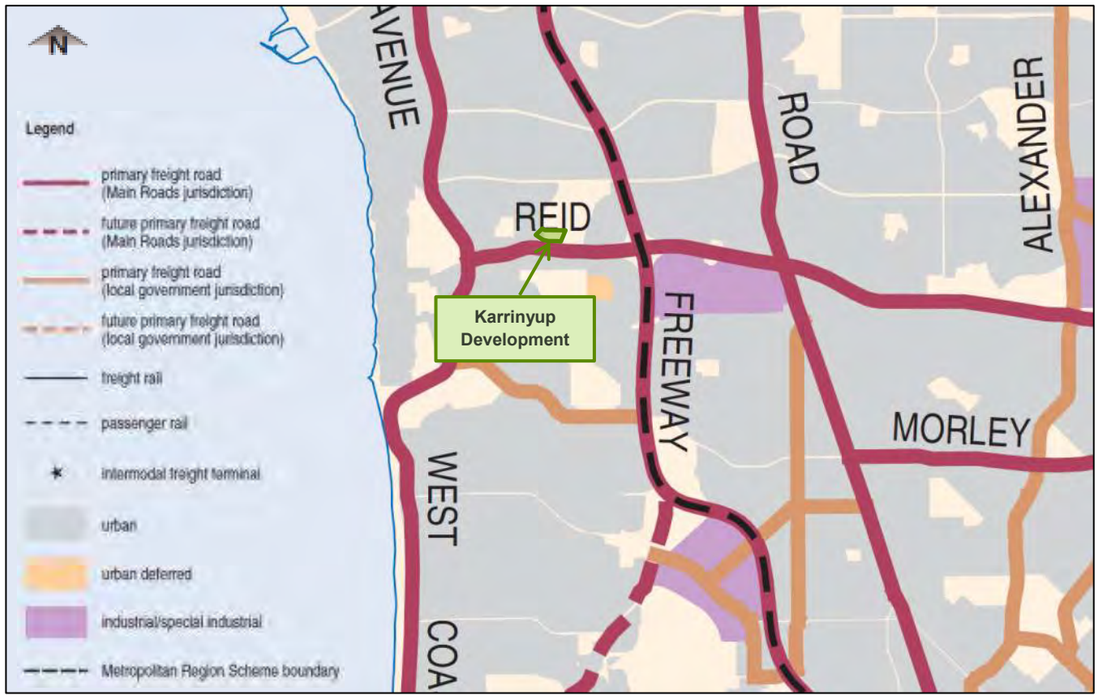



**Figure 3-19 Primary freight roads and rail routes (WA Planning Commission, 2005)**

Karrinyup Road is considered a primary freight road under local government jurisdiction. Heavy commercial vehicles, such as single unit trucks and semi-trailers, service the Development via Karrinyup Road. There are a number of service delivery yards (both common loading and store specific) within the Development as shown in Figure 3-20. Turnaround facilities are provided within the Development to allow for these vehicles to exit in a forward direction.

**Figure 3-20 Existing freight access to the Development**

The existing service delivery yards themselves are generally well separated from the general public, except for yard 6 which services the food court area. Potential conflicts exist however, at yards 1, 3 and 5 where large vehicles (either heavy rigid or articulated vehicles) are required to reverse from within car park circulation areas.

## 3.9. Road Safety

### 3.9.1. General

From observations, the various intersections within the Development did not exhibit significant safety concerns, however the following conflict points were observed:

- Poor sight distance, and potential conflict point when maximum queues were present within the westbound right turn pocket on Karrinyup Road (at the Francis Avenue intersection) and there is movement of cars wishing to enter/exit Gwelup Street and Hadley Place
- Various intersections within the Development car parks have poor sight distance and limited aisle widths (refer to Figure 3-21). Various accesses also provide conflict points for vehicles exiting.

**Figure 3-21 Examples of poor sight distance within the car park**

### 3.9.2. Crash Data

The recorded crash data from January 2009 to December 2013, sourced from Main Roads WA, was analysed to determine any significant trends within the road network surrounding the Development. The quantity, severity and nature of the crashes provide a starting point in identifying areas of concern. A summary of the 173 total crashes within the Development, broken up by crash nature and severity, is presented in Table 3-4 and shown in Figure 3-22.

**Table 3-4 Crash summary within the Development**

| M or I[1] | Location | Total Crashes | Crash Nature | Severity |
|---|---|---|---|---|
| M | Karrinyup Road (between Burroughs Road and Francis Avenue) | 21 | 8 x Rear End<br>7 x Right Turn Through<br>3 x Sideswipe Same Direction<br>3 x Other<br>1 x Hit Pedestrian | 1 x Hospitalisation<br>2 x Medical Treatment<br>11 x Major Property Damage Only (PDO)<br>7 x Minor PDO |
| I | Karrinyup Road and Burroughs Road | 43 | 25 x Right Angle<br>10 x Rear End<br>8 x Right Turn Through | 5 x Medical Treatment<br>25 x Major PDO<br>13 x Minor PDO |
| M | Burroughs Road (between Karrinyup Road and Davenport Street) | 12 | 7 x Right Angle<br>3 x Rear End<br>1 x Right Turn Through<br>1 x Sideswipe Same Direction | 4 x Medical Treatment<br>5 x Major PDO<br>3 x Minor PDO |
| I | Karrinyup Road and Francis Avenue | 29 | 19 x Rear End<br>5 x Right Turn Through<br>3 x Right Angle<br>1 x Reversing in Traffic<br>1 x Sideswipe Same Direction | 4 x Medical Treatment<br>13 x Major PDO<br>12 x Minor PDO |
| M | Francis Avenue (between Karrinyup Road and Davenport Street) | 16 | 14 x Right Angle<br>1 x Rear End<br>1 x Other | 2 x Medical Treatment<br>9 x Major PDO<br>5 x Minor PDO |
| I | Francis Avenue and Davenport Street | 1 | 1 x Hit Object | 1 x Minor PDO |
| M | Davenport Street (between Burroughs Road and Francis Street) | 5 | 2 x Leaving Driveway<br>1 x Parking Vehicle<br>1 x Hit Object<br>1 x Other | 1 x Medical Treatment<br>2 x Major PDO<br>2 x Minor PDO |
| I | Jeanes Road and Karrinyup Road | 46 | 29 x Rear End<br>6 x Right Turn Through<br>5 x Right Angle<br>3 x Sideswipe Same Direction<br>1 x Hit Object<br>1 x Reversing in Traffic<br>1 x Same Direction - Other | 1 x Hospitalisation<br>7 x Medical Treatment<br>19 x Major PDO<br>19 x Minor PDO |

[1] Indicates crashes occurring midblock (M) or at an intersection (I)

**Figure 3-22 Number of crashes in the Development between 2009 and 2013**

Since 2009, the total number of crashes has reduced every year, with a 27% drop between 2009 and 2010. Since 2010 the number of crashes per year has been fairly consistent.

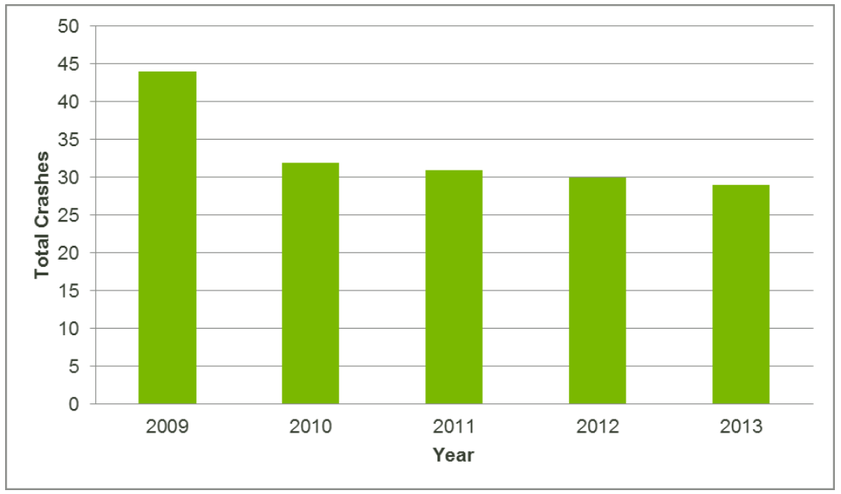



**Figure 3-23 Total crashes per year in the Development**

Summaries of the crash severity and nature of crashes recorded at the road network surrounding the development are presented in Figure 3-24 and Figure 3-25 respectively.

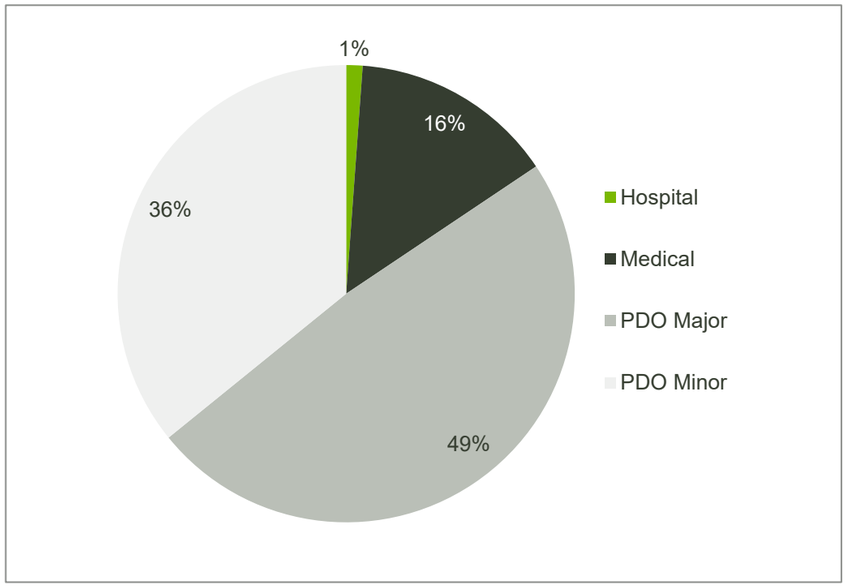



**Figure 3-24 Severity of crashes recorded at the road network surrounding the development**

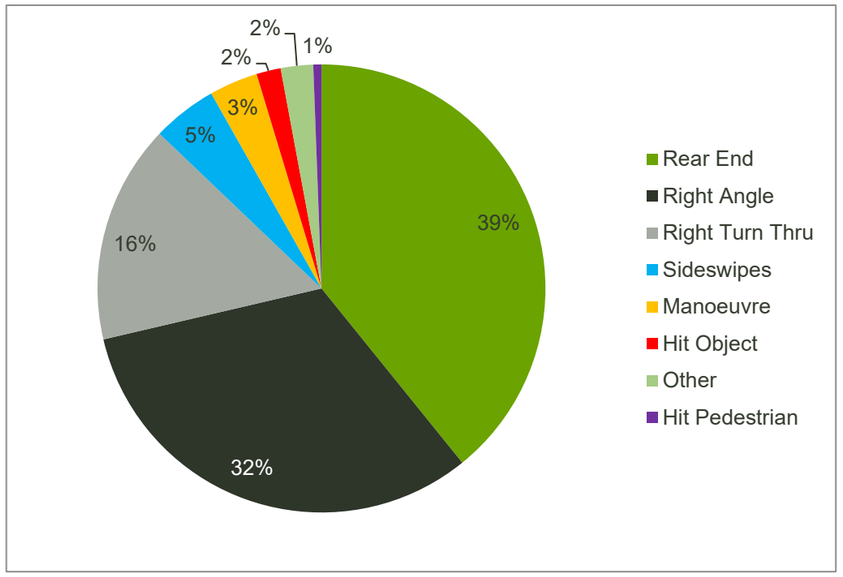



**Figure 3-25 Nature of crashes recorded at the road network surrounding the edevelopment (as defined by Main Roads WA, refer to http://apps.mainroads.wa.gov.au/icr/definitions.asp)**

It can be seen that there were no fatal crashes within the Development between 2009 and 2013. Of the total 173 crashes, only one involved a pedestrian being hit, (0.6% of total), and three crashes involved buses (2% of total crashes), all occurring along Karrinyup Road. There was no cyclist or heavy vehicle crashes recorded at the road network surrounding the development over the five year period.

The following key points can be summarised from the recorded crash data:

- The majority of midblock crashes along Burroughs Street and Francis Avenue occurred at the Development accesses. Of the 16 total midblock crashes that occurred along Francis Avenue, the Development access on Francis Avenue closest to the Karrinyup Road intersection was noted to have experienced a larger proportion of midblock crashes than the other two Development accesses along Francis Avenue, a total of 6 crashes (38%).
- At the Burroughs Road and Karrinyup Road intersection the majority of crashes were right angle vehicle crashes, with vehicles performing the right turn movement out of Burroughs Road on to Karrinyup Road. It was noted that one crash at this intersection involved a collision with a bus travelling along Karrinyup Road and a vehicle attempting the right turn manoeuvre out of Burroughs Road.
- A high number of rear end crashes occurred at the Frances Ave and Karrinyup Road intersection at the priority controlled left turn slip lane from Francis Ave (N) towards Karrinyup Road (E).
- The prevailing crash movement at the Jeanes and Karrinyup Road intersection was rear end crashes, including a rear end crash involving a bus. A large number of the crashes may be attributed to the vehicle queuing spillback onto Karrinyup Road further downstream at the Burroughs Road and Karrinyup Road intersection.
- Notable midblock crashes along Karrinyup Road:
  - As mentioned previously, a pedestrian was hit by an out of control car near the Jeanes Road/Karrinyup Road intersection and required hospitalisation
  - A rear end crash between two vehicles occurred at the signalised pedestrian crossing
  - A sideswipe crash between a bus and another vehicle occurred as the other vehicle attempted to change lanes near the Francis Avenue and Karrinyup Road intersection

Whilst the recorded crashes within the Development did not result in fatalities, and hospitalisations were rare, safe design should be taken into consideration for any upgrades to the road network surrounding the Development.

# 4. Traffic Analysis – Background

## 4.1. Transport Model

An Aimsun Hybrid transport model with integrated SCATS signal control was developed for this study in order to analyse the performance of the road network in the vicinity of the Development. The model provides a base to which the impact of tested options could be quantitatively compared.

The first stage of the model build involved the development of a calibrated and validated base Aimsun model, which reflected existing traffic conditions at key intersections within the model area. This base model has undergone an external peer review facilitated by DoT.

Option models were then built from this base model to test the impact of the proposed Development on the surrounding road network. Within the Centre, the option models and analysis were based on the latest architectural carpark plans issued for construction.

The model area for this study is shown in Figure 4-1.

**Figure 4-1 TP model area**

## 4.2. Establishment of Timeframes

The projected traffic generation years for the road network assessment were agreed in consultation with Main Roads WA and the City of Stirling:

- **Base Case, 2013 / 2014 / 2015 –** existing conditions
- **Future year, 2021 –**approximately 2 years after the opening of the Mixed Use Expansion of Karrinyup and in line with the ROM forecasting year
- **Ultimate Year, 2031** – approximately 12 years after the approximate opening of the Mixed Use Expansion of Karrinyup and in line with the ROM forecasting year

The above mentioned years were adopted for the transport modelling component of this TP and are considered to be a **conservative approach** as 2019 and 2029 could have been used.

## 4.3. Future Planned Network Improvements

Table 4-1 lists the known currently planned significant network improvements within the area surrounding the Development.

**Table 4-1 Planned road upgrades in the area surrounding the Development**

| Location | Authority | Description | Relevant Model Year |
|---|---|---|---|
| Reid Highway | MRWA | Planned upgrades to Reid Highway including an additional lane in both the east and westbound directions | 2021 and 2031 |
| Reid Highway / Mitchell Freeway Interchange | MRWA | Planned upgrades to Reid Highway / Mitchell Freeway Interchange including grade separation of most movements | 2021 and 2031 |
| Mitchell Freeway | MRWA | Additional northbound lane between the Cedric Street Off-Ramp and the Karrinyup Road Off-Ramp | 2021 and 2031 |
| Reid Highway / Duffy Road South | MRWA | Signalisation of the Reid Highway / Duffy Road South T-junction | 2021 and 2031 |
| Karrinyup Road / Mitchell Freeway southbound off-ramp | MRWA | Upgrades to the Karrinyup Road / Mitchell Freeway southbound off-ramp consisting of an additional right turn lane at the off-ramp signals | 2031 |

## 4.4. Mode Share Target

The mode share targets percentages that was used for the purpose of the transport modelling is shown in Figure 4-2. Whilst other modes are encouraged to proportionally increase as part of the proposed transport upgrades, due to the location of the Development in the Perth Metropolitan area, there will always be a high demand and proportion of car use, unless dramatic improvements to the public transport infrastructure network across Perth is increased. The same issues are met with many other shopping centre developments in suburban Perth. Active transport use is also limited to the local catchment area and can be particularly difficult for Karrinyup with the undulations of the surrounding terrain.

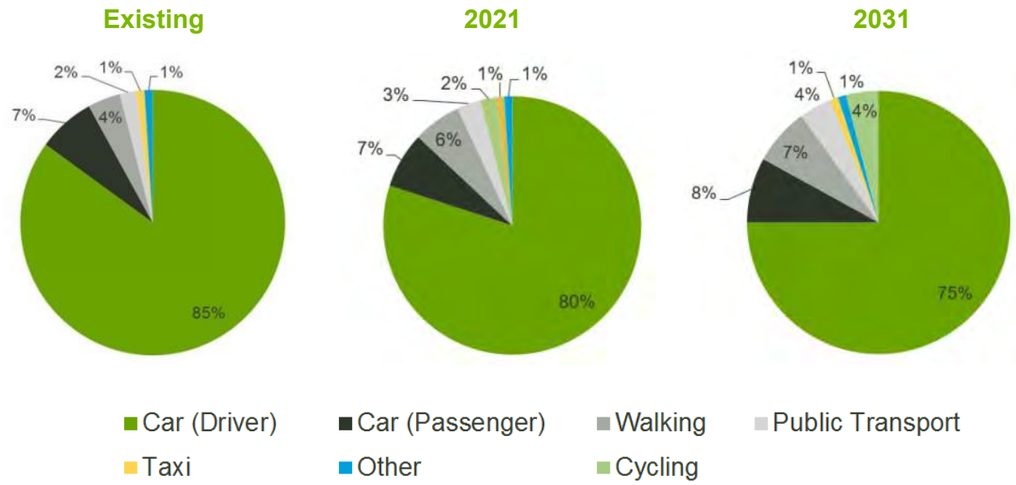



**Figure 4-2 Analysed mode share targets for the Development**

The Draft Karrinyup Secondary Centre Activity Centre Structure Plan identified a mode share goal for the Development. The travel mode share goal was based on an estimate that, by 2021, 5% of people will shift from private motor vehicle to other modes of transport and by 2031, 11% will shift to other modes. This was based off City of Stirling targets. In its entirety, trips associated with all modes will increase as a result of the Development.

## 4.5. Estimation of Traffic Growth

### Background Traffic Growth

In the establishment of the 2021 and 2031 future model years, forecasting data was obtained from the Main Roads WA Regional Operations Model (ROM). This established various levels of background network traffic growth across the different time periods and future years, as indicated in Table 4-2. This background network traffic undertakes trips that are not associated with the Mixed Use Expansion of Karrinyup.

**Table 4-2 Background network traffic growth for each time period**

| Future Year | AM growth from 2013 | PM growth from 2013 | Saturday growth from 2013 |
|---|---|---|---|
| 2021 | 5.21% | 5.30% | 5.92% |
| 2031 | 22.25% | 22.21% | 23.98% |

The ROM24 model is maintained by MRWA. Standard version 3.3 was used with Department of Planning (DoP) land use, including population and employment. For the Karrinyup Development zones, the calculated trip generation values were used to get a more accurate number than what ROM24 would estimate. For the Saturday peak period, the daily ROM matrix was scaled and used. For the AM and PM periods, the hourly matrices were used over the 06:00-10:00 and 15:00-19:00 periods, respectively.

### Trip Generation

There is no fixed approach to trip generation in WA, however the following steps cover what is considered a logical and conservative approach to estimating the number of trips that are likely to be generated by the proposed development.

**Existing Surveyed Trip Generation**

Traffic data was collected at all centre entrances, including the petrol station, on Thursday 14 May 2015 for the AM and PM peak periods and on Saturday 23 May 2015. The total traffic generated during the peak hour of the road network was as follows.

**Table 4-3 Peak hour trips for 2015**

| Peak Period | AM Peak | PM Peak | Sat Peak |
|---|---|---|---|
| Trip Generation Inbound | 1,052 | 1,323 | 1,839 |
| Trip Generation Outbound | 295 | 1,443 | 1,731 |
| **Total Trip Generation** | **1,347** | **2,766** | **3,570** |

**Existing Estimated Trip Generation**

For the estimation of the Development trips resulting from the proposed Development, Institute of Transportation Engineers (ITE) trip rates was predominantly used. The ITE trip rates are not only suited for larger developments such as Karrinyup but are also more private vehicle focussed and are therefore in line with Perth travel characteristics.

By applying the ITE trip rates to the existing land use, the following trip generation was calculated.

**Table 4-4 ITE trip breakdown for 2015 (existing)**

| Land Use | 2015 sqm | AM Peak 08:00 - 09:00 | PM Peak 17:00 - 18:00 | Sat Peak 12:00 - 13:00 |
|---|---|---|---|---|
| Retail | 53,544 | 454 | 1,937 | 2,729 |
| Office / Business | 4,184 | 101 | 84 | 12 |
| Eating / Entertainment / Culture | 2,382 | 60 | 119 | 119 |
| Community / Health / Welfare | 706 | 10 | 13 | 9 |
| Other Incidental Floor Space | 195 | 15 | 45 | 71 |
| **Total Traffic Volumes** | | **640** | **2,198** | **2,940** |

Table 4-5 further details how the trip breakdown was calculated. All square foot values were converted to square metres.

**Table 4-5 ITE trip breakdown calculations**

| Land Use | Trips Formula | Reference |
|---|---|---|
| Retail | $e^{0.65\ln\left(area\left(\frac{ft^2}{1000}\right)\right)+3.78}$ | ITE - Shopping Centre, Peak hour of adjacent street traffic, AM & PM, and Sat Peak Hour Generator |
| Office / Business | $0.1(2.03 \times area\left(\frac{ft^2}{1000}\right) + 31.75)$ | ITE - General office building, AM, PM. Saturday day used, 10% used for peak hour |
| Eating / Entertainment / Culture | $5 \times \left(\frac{area(m^2)}{100}\right)$ | RMS for restaurants (PM only was provided) |
| Community / Health / Welfare | $1.25 \times area\left(\frac{ft^2}{1000}\right)$ | ITE – Recreational Community Centre |
| Other Incidental Floor Space | $e^{0.65\ln\left(area\left(\frac{ft^2}{1000}\right)\right)+3.78}$ | ITE - Shopping Centre, Peak hour of adjacent street traffic, AM & PM, and Sat Peak Hour Generator |
| Dwelling (Inside DA) | $0.5 \times area(m^2)$ | RMS Old Version - Medium density residential |

**Existing Centre Overtrading**

Published information from the Shopping Centre News indicates that the majority of major shopping centres with Western Australia are more productive than the Australian average (of the floor space measured – which was the most productive). Based on the published figures Karrinyup is trading approximately 20% above the Australian average. By comparing the ITE estimated trip generation to the actual trip generation the following difference is calculated.

**Table 4-6 Existing trip generation difference**

| Peak Period | AM Peak | PM Peak | Sat Peak |
|---|---|---|---|
| Trip Generation Difference | 707 | 568 | 630 |

With the exception of the lower volume AM period, the comparison between the existing ITE trip generation and existing survey data shows that this 20% overtrading value is broadly in line with the increase in traffic for the Development estimated from ITE trip rates. This provides confidence in the ITE trip rate for determining the trip generation for a centre that is trading at an average rate.

Once the Development has been completed, AMP expect that the productivity of the floor space will reduce compared to existing levels. It is expected that the productivity levels will be closer to the national average.

### ITE Trip Generation for the Mixed Use Expansion

Using the ITE trip rates, the trip generation was calculated for the proposed expansion of the centre, as shown in Table 4-7, which includes the draft Structure Plan area floor space.

The Cinema trip rate of 4.09 trips per 100 sqm was obtained from the ITE Trip Generation Manual for a Movie Theatre with Matinee during the Friday PM road network peak which is considered applicable for the weekday PM peak period. In the absence of other data, this same value was then applied to the Saturday midday period and 20% of its value applied to the weekday AM peak period.

**Table 4-7 ITE trip breakdown for Mixed Use Expansion**

| Land Use | Completed Centre Floor Space sqm | AM Peak 08:00 - 09:00 | PM Peak 17:00 - 18:00 | Sat Peak 12:00 - 13:00 |
|---|---|---|---|---|
| Retail | 93,355 | 637 | 2,811 | 3,917 |
| Office / Business | 10,394 | 240 | 208 | 29 |
| Entertainment / Community | 3,916 | 98 | 196 | 196 |
| Cinema | 6,200 | 51 | 254 | 254 |
| Health | 2,654 | 38 | 50 | 36 |
| Utility | 300 | 19 | 60 | 94 |
| Dwellings | 134 | 67 | 67 | 67 |
| | | | | |
| **Total Traffic Volumes** | | **1,150** | **3,646** | **4,593** |
| % Split In | | 64% | 43% | 49% |

### Overtrading Calibration

The previously calculated absolute difference between the existing surveyed and existing ITE trip generation can be used as a calibration factor as a **conservative approach** in the unlikely event that the current productivity levels continue.

By adding the difference, the following trip generation is calculated

**Table 4-8 Application of the overtrading calibration trips**

| Peak Period | AM Peak | PM Peak | Sat Peak |
|---|---|---|---|
| ITE Trip Generation | 1,150 | 3,646 | 4,592 |
| Calibration Trips | 707 | 568 | 630 |
| **Total Traffic Volumes** | **1,856** | **4,214** | **5,222** |

### Structure Plan Trip Generation

The Draft Karrinyup Secondary Centre Activity Centre Structure Plan considered additional land uses. The updated trip breakdown for the Structure Plan Trip Generation is as follows for 2021 and 2031.

**Table 4-9 Peak hour trip breakdowns for 2021**

| Land Use | 2021 sqm | AM Peak 08:00 - 09:00 | PM Peak 17:00 - 18:00 | Sat Peak 12:00 - 13:00 |
|---|---|---|---|---|
| Retail | 93,355 | 637 | 2,811 | 3,917 |
| Office / Business | 14,716 | 318 | 294 | 39 |
| Entertainment / Community | 6,086 | 152 | 304 | 304 |
| Cinema | 6,200 | 51 | 254 | 254 |
| Health | 3,237 | 46 | 61 | 44 |
| Utility | 300 | 19 | 60 | 94 |
| Dwellings | 245 | 123 | 123 | 123 |
| | | | | |
| **Total Traffic Volumes** | | **1,345** | **3,907** | **4,774** |
| % Split In | | 64% | 47% | 53% |

The estimated 2031 breakdown is shown below.

**Table 4-10 Peak hour trip breakdowns for 2031**

| Land Use | 2031 sqm | AM Peak 08:00 - 09:00 | PM Peak 17:00 - 18:00 | Sat Peak 12:00 - 13:00 |
|---|---|---|---|---|
| Retail | 99,000 | 660 | 2,924 | 4,070 |
| Office / Business | 18,000 | 372 | 360 | 46 |
| Entertainment / Community | 7,300 | 183 | 365 | 365 |
| Cinema | 6,200 | 51 | 254 | 254 |

| Land Use | 2031 sqm | AM Peak 08:00 - 09:00 | PM Peak 17:00 - 18:00 | Sat Peak 12:00 - 13:00 |
|---|---|---|---|---|
| Health | 5,000 | 71 | 94 | 67 |
| Utility | 500 | 26 | 85 | 131 |
| Dwellings | 750 | 375 | 375 | 375 |
| | | | | |
| **Total Traffic Volumes** | | **1,738** | **4,457** | **5,307** |
| % Split In | | 57% | 48% | 52% |

With the estimated 2031 Structure Plan volumes being higher than the Mixed Use Expansion volumes in the PM and Saturday peak periods, it was considered a **conservative approach** to use the Structure Plan volumes for the Mixed Use Expansion assessment.

This gives the following growth in trips for the DA from the existing surveyed trip volumes.

**Table 4-11 Trip Volume Growth**

| Trip Volume Growth | AM Peak | PM Peak | Sat Peak |
|---|---|---|---|
| 2015 to 2031 DA | 29.8% | 57.1% | 46.7% |

### Mode Split Adjustment

As discussed in Section 0, a 5% reduction in private vehicle drivers is targeted in 2021 and a 10% reduction in 2031. This will be achieved by the implementation of multiple instruments that promote the use of other modes of transport, as discussed in this TP. By taking into consideration these reductions in private vehicle travel, the trip volumes are adjusted to the following.

**Table 4-12 Trip generation with mode split adjustment**

| Model Year | AM Peak | PM Peak | Sat Peak |
|---|---|---|---|
| 2021 Trip Generation | 1,533 | 3,448 | 4,212 |
| 2031 Trip Generation | 1,533 | 3,932 | 4,683 |

As the 2021 AM peak period volume is lower than the existing survey value, the 2031 AM value has been used for 2021 AM period.

### Final Trip Rates

After the mode split adjustment, the final trip rates for the Mixed Use Expansion DA are shown in Table 4-13 if we apply the Structure plan volumes for the DA. The NSW RMS Guide for Traffic Generating Developments is often referred to in Australia for trip generation of shopping centres and this has been compared to below.

**Table 4-13 Private vehicle trip generation rates**

| Trip Rate Method | AM Peak | Thursday PM Peak | Sat Peak |
|---|---|---|---|
| Final trips for 116,819 sqm | 1.3 | 3.4 | 4.0 |
| NSW RTA for centres above 70,000 sqm | - | 3.1 | 3.6 |

Note that all trip generation guides show a decrease in the trip rate as the size of the centre increases.

### Stress Test

A stress test was undertaken on the 2031 network to ascertain the maximum number of trips that the centre can generate before the performance of the road network and accessibility to the centre is no longer satisfactory. This was done by determining when congestion from one intersection was significantly impacting on the performance of an adjacent intersection, primarily on Karrinyup Road between Huntriss Road and North Beach Road. The results of the stress test are shown in Table 4-14.

**Table 4-14 Stress test results**

| Stress test | AM Peak | PM Peak | Sat Peak |
|---|---|---|---|
| Centre Trips | 4,500 | 5,000 | 5,000 |

The stress tests showed that 237 trips need to change modes for the Saturday peak period only, which is equivalent to 4% of private vehicle drivers changing modes. This is expected to be achieved by the proposed internal residential land use within the Development expansion and improvements to cycling infrastructure alone.

### Trip numbers for all modes

From the total vehicle trips, the number of trips for each mode was calculated using the current and target mode splits. These trip numbers are shown in the tables below for each model period.

**Table 4-15 Number of trips during weekdays AM and PM peak hours and Saturday peak hour – Existing situation**

| Existing | Target | AM | PM | Saturday |
|---|---|---|---|---|
| **Car Driver** | 85% | 1,347 | 2,766 | 3,570 |
| **Car Passenger** | 7% | 111 | 228 | 294 |
| **Public Transport** | 2% | 32 | 65 | 84 |
| **Cycling** | 1% | 16 | 33 | 42 |
| **Walking** | 4% | 63 | 130 | 168 |
| **Taxi** | 1% | 16 | 33 | 42 |
| **Other** | 0% | 0 | 0 | 0 |
| **Total Trip Gen** | | **1585** | **3254** | **4200** |

**Table 4-16 Number of trips during weekdays AM and PM peak hours and Saturday peak hour – 2021**

| 2021 (Tested) | Target | AM | PM | Saturday |
|---|---|---|---|---|
| **Car Driver** | 80% | 1,533 | 3,448 | 4,212 |
| **Car Passenger** | 7% | 134 | 302 | 369 |
| **Public Transport** | 3% | 58 | 129 | 158 |
| **Cycling** | 2% | 38 | 86 | 105 |
| **Walking** | 6% | 115 | 259 | 316 |
| **Taxi** | 1% | 19 | 43 | 53 |
| **Other** | 1% | 19 | 43 | 53 |
| **Total Trip Gen** | | **1,917** | **4,309** | **5,265** |

**Table 4-17 Number of trips during weekdays AM and PM peak hours and Saturday peak hour – 2031**

| 2031 (Tested) | Target | AM | PM | Saturday |
|---|---|---|---|---|
| **Car Driver** | 75% | 1,533 | 3,932 | 4,683 |
| **Car Passenger** | 8% | 164 | 419 | 500 |
| **Public Transport** | 4% | 82 | 210 | 250 |
| **Cycling** | 4% | 82 | 210 | 250 |
| **Walking** | 7% | 143 | 367 | 437 |
| **Taxi** | 1% | 20 | 52 | 62 |
| **Other** | 1% | 20 | 52 | 62 |
| **Total Trip Gen** | | **2,044** | **5,243** | **6,244** |

**Other Assumptions**

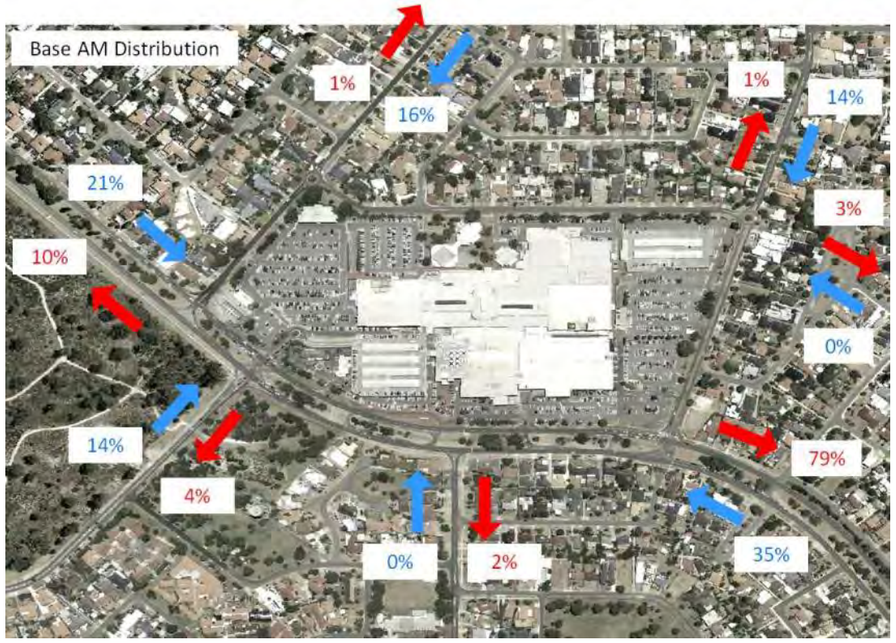
The following assumptions were also made regarding these trip rates:

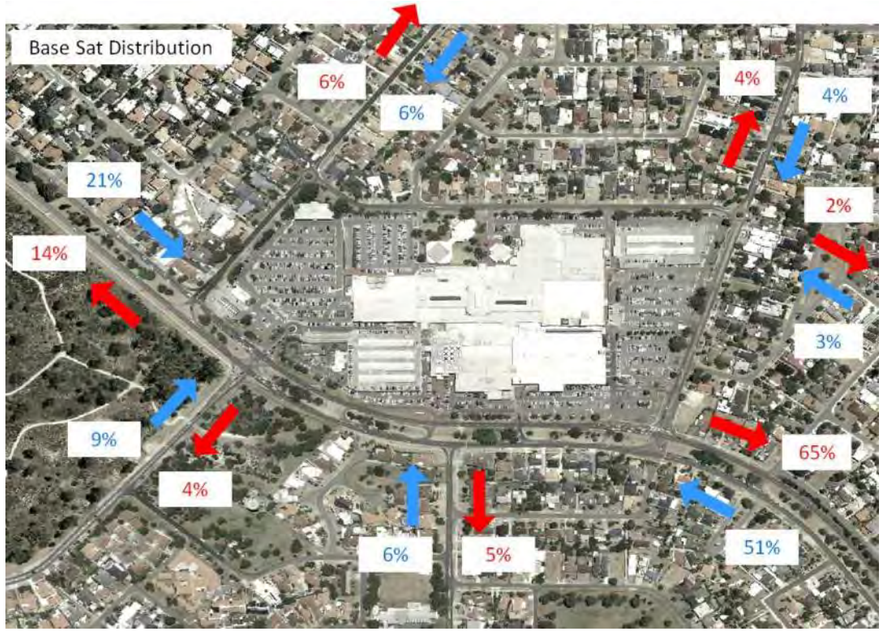
- 85% of trips will be primary trips (directly to the Development), 10% bypass trips (a detour to the Development from a passing adjacent road), and 5% diverted trips (a detour to the Development from a passing road further afield).
- Trips within the existing site and trips external to the site (but within the Structure Plan area), were calculated independently to each other. This generally results in slightly higher estimated volumes as well as potentially enabling more vehicles to be released on to the network.
- Public transport frequencies were increased according to Transperth estimates. Without further information, as a worst case scenario these were fully implemented in 2021, but this would have little impact on the network.

## 4.6. Trip Distribution

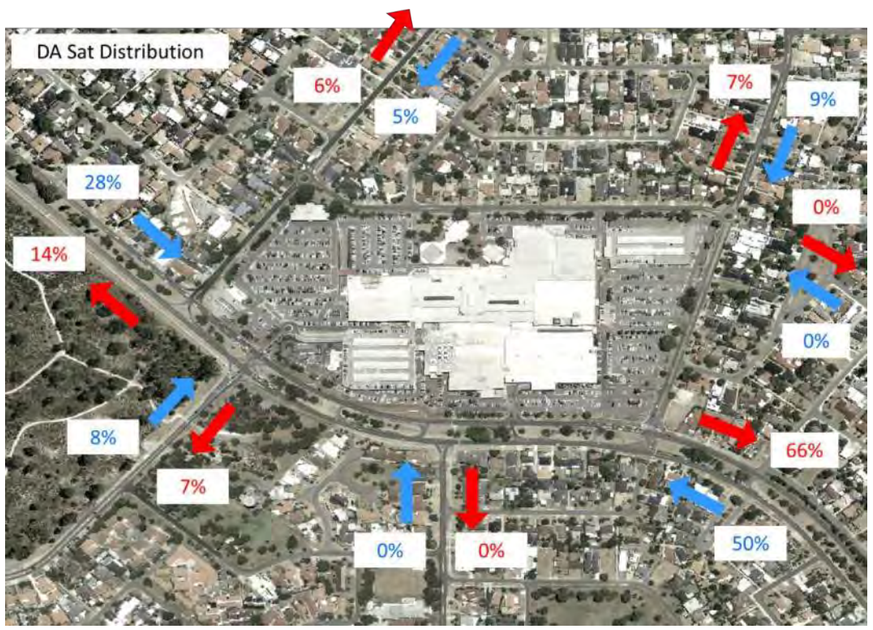
From trade information available to Aurecon, there is a high proportion of people originating from east of the Development. This is in line with indications from the traffic count data. Those originating from north or south of the Development are also likely to use Mitchell Freeway, therefore also arriving to the Development from the east.

The following diagrams illustrate the trip distribution for the base year and DA scenarios.





DA AM Distribution
1%
13%
2%
8%
23%
0%
20%
0%
11%
67%
10%
0%
0%
45%


DA Sat Distribution
6%
5%
7%
9%
28%
0%
14%
0%
8%
66%
7%
0%
0%
50%

DA PM Distribution
8%
7%
10%
10%
25%
0%
26%
0%
5%
52%
4%
0%
0%
53%

## 4.7. Option Models

Option models were built for the assessment years to test the impact of the proposed Development on the surrounding road network. The estimated trip generation values from the Development were added to the background growth to form the option models.

The option model networks were developed from the do-minimum models by incrementally including a number of intersection improvements and modifications to accommodate the projected future year traffic increases. The final model scenarios were as follows:

- **2021 Do-Minimum Model (without the Mixed Use Expansion at Karrinyup)**
  - Existing road network
  - Increased background traffic demands
  - Main Roads WA upgrades to Reid Highway. Look ahead/ distance zones changed on the Reid Highway approach to Marmion Avenue accordingly.
  - Main Roads WA upgrades to the Reid Highway/ Mitchell Freeway Interchange
  - Additional northbound lane on Mitchell Freeway between the Cedric Street Off-Ramp and the Karrinyup Road Off-Ramp
  - Main Roads WA signalisation of Reid Highway / Duffy Road South

- **2021 Option Model (with the Mixed Use Expansion at Karrinyup)**
  - Proposed upgrades at several locations on the road network (refer to Section 5.1)
  - Increased background traffic demands
  - Mixed Use Expansion at Karrinyup included with revised trip numbers
  - Main Roads WA upgrades to Reid Highway. Look ahead/ distance zones changed on the Reid Highway approach to Marmion Avenue accordingly.
  - Main Roads WA upgrades to the Reid Highway/ Mitchell Freeway Interchange
  - Additional northbound lane on Mitchell Freeway between the Cedric Street Off-Ramp and the Karrinyup Road Off-Ramp
  - Main Roads WA signalisation of Reid Highway / Duffy Road South

- **2031 Do-Minimum Model (without the Mixed Use Expansion at Karrinyup)**
  - Main Roads WA upgrades to Reid Highway. Look ahead/ distance zones changed on the Reid Highway approach to Marmion Avenue accordingly.
  - Main Roads WA upgrades to the Reid Highway/ Mitchell Freeway Interchange
  - Additional northbound lane on Mitchell Freeway between the Cedric Street Off-Ramp and the Karrinyup Road Off-Ramp
  - Main Roads WA signalisation of Reid Highway / Duffy Road South
  - Main Roads WA upgrades to the Karrinyup Road / Mitchell Freeway southbound off-ramp
  - Increased background traffic demands

- **2031 Option Model (with the Mixed Use Expansion at Karrinyup)**
  - Main Roads WA upgrades to Reid Highway. Look ahead/ distance zones changed on the Reid Highway approach to Marmion Avenue accordingly.
  - Main Roads WA upgrades to the Reid Highway/ Mitchell Freeway Interchange
  - Additional northbound lane on Mitchell Freeway between the Cedric Street Off-Ramp and the Karrinyup Road Off-Ramp
  - Main Roads WA signalisation of Reid Highway / Duffy Road South
  - Main Roads WA upgrades to the Karrinyup Road / Mitchell Freeway southbound off-ramp
  - Increased background traffic demands
  - Upgrades at several locations on the road network as per Section 5.1
  - Mixed Use Expansion at Karrinyup included with revised trip numbers

Cycle times are assumed to remain as they are today as this is dictated by the MRWA Traffic Operations Centre, although a reduction in cycle times would be supported. The signalised pedestrian crossing by the Karrinyup Bus Station was increased in frequency of calls in the model.

# 5. Traffic Analysis – Results and Discussion

## 5.1. Proposed road upgrades

To ensure the road network surrounding the Development will operate at an acceptable level in the future with the Development in place, it is recommended that the following roads and intersections are upgraded, as shown in Figure 5-1. These road upgrades are reflected in the 2021 and 2031 transport models.

1. Karrinyup Road / West Coast Highway
2. Karrinyup Road / Burroughs Road
3. Roads immediately surrounding the Development
4. Karrinyup Road / Francis Avenue
5. Karrinyup Road / Huntriss Road
6. Karrinyup Road / Mitchell Freeway Interchange West Approach

Schematic road upgrade drawings showing these proposed changes are attached in Appendix A. Note that these designs are being refined as part of the detailed design process. In most instances where additional lanes are proposed, road widening is provided for within the median, rather than the verge. In locations where the road width is wider, it is believed that an additional road lane of road width at a signalised crossing will not deter pedestrians from walking to or from the Development. If the width of a signalised crossing is marginally increased, the allowed crossing time will also be marginally increased.

Figure 5-1 Overview of proposed road/intersection upgrades

### 5.1.1. West Coast Highway / Karrinyup Road

The upgrade of the West Coast Highway and Karrinyup Road intersection comprises of the extension of the right turn bay from Karrinyup Road east approach. The inside lane is proposed to be extended by approximately 90m and the middle lane by approximately 30m. The intent of such modifications is to improve the PM peak traffic movement that is currently operating at its capacity limit on-street, resulting in queuing back that blocks the through movements. This modification will be undertaken by extending into the median.

Figure 5-2 Existing West Coast Highway/ Karrinyup Road layout

Figure 5-3 Proposed West Coast Highway/ Karrinyup Road layout

### 5.1.2. Karrinyup Road / Burroughs Road

Proposed modifications to the Karrinyup Road/Burroughs Road intersection, as per Figure 5-5, include:

- Extension of the Burroughs Road left turn bay by approximately 30m
- Implementation of a westbound acceleration lane, of approximately 150m length, within the Karrinyup Road median

The right turn acceleration lane will allow for an easier right turn movement from Burroughs Road and the left turn slip lane allows left turners to bypass the right turn queue. The acceleration lane ends before the curve in Karrinyup Road and before the next intersection.

An alternative option for this intersection is to convert the northern half to a signalised seagull arrangement, although Main Roads WA does not currently support this. This would provide a safer right turn movement for turning vehicles and eliminate poor gap decision making. MRWA are investigating this intersection as it is an existing safety issue. The intersection can perform at an acceptable level both with and without signalisation. In the modelled options, this intersection is coded as an unsignalised intersection.

**Figure 5-4 Existing Karrinyup Road / Burroughs Road intersection**

**Figure 5-5 Proposed modifications to the Karrinyup Road / Burroughs Road intersection**

### 5.1.3. Roads immediately surrounding the Development

There are a number of additional minor intersections or minor modifications to the road network surrounding the Development. A total of eleven (11) additional or modified intersections will be affected, with the removal of three other intersections within the surrounding area.

The Karrinyup Road turn bay, situated in the median to the east of Jeanes Road, is proposed to be moved to the west by approximately 30m, and will also serve bus movements into the station. The u-turn bay to the west of Francis Avenue will be removed to allow for a longer turn bay for the adjacent right turn into the Development.

**Figure 5-6 Existing road network surrounding the Development**

**Figure 5-7 Proposed additional or modified intersections surrounding the Development**

The development includes the Burroughs Road/Main Street intersection as a T-intersection (refer to Figure 5-8).

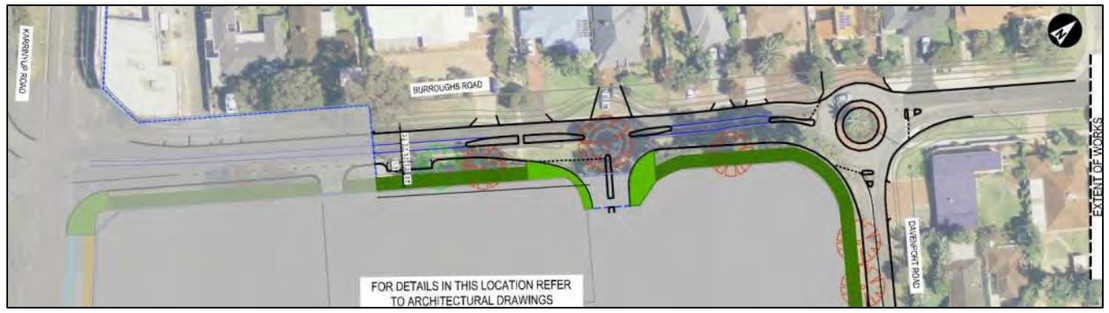



**Figure 5-8 Proposed intersection at Burroughs Road/Main Street as a T-intersection**

### 5.1.4. Karrinyup Road/ Francis Avenue

Proposed modifications to the Karrinyup Road/Francis Avenue intersection include:

- Implementation of a 245m kerbside bus queue jump lane directly from the Karrinyup bus station on the Karrinyup Road west approach plus a 115m exit lane after the intersection.
- An additional right turn lane on the Karrinyup Road east approach. There are some grade differences within this area which will need to be addressed in detailed design.
- Extension of the left turn lane from the Francis Avenue approach by 40m
- An additional northbound lane on Francis Avenue for approximately 70m to support the double right turn

The right turn into Francis Avenue is currently beyond the capacity of its turn bay and blocks traffic in the through lane. The City of Stirling perceives that increasing the number of lanes dictates, to some extent, the difficulties for pedestrians crossing here, however the road widening is proposed to occur within the median which is already of a substantial width.

A bus queue jump lane is proposed for the west approach through movement only as this is the Karrinyup Road through movement that will receive the least amount of green time, and hence most delay, due to the signal phasing arrangement.

**Figure 5-9 Existing Karrinyup Road/ Francis Avenue intersection layout**

**Figure 5-10 Proposed modifications to the Karrinyup Road/Francis Avenue intersection**

### 5.1.5. Karrinyup Road / Huntriss Road

The following changes are considered for the Karrinyup Road/ Huntriss Road intersection:

- Addition of approximately 380 metre kerbside bus lane on Karrinyup Road westbound from west of the intersection of Karrinyup Road/Muir Street (total length to the signals stopline is 460m, plus tapers). This will allow buses to jump past the estimated 2031 morning and evening peak queues from the Huntriss Road intersection. This additional bus lane will be achieved by narrowing of the median.
- Addition of a second right turn lane from the Karrinyup Road west approach, 100m on the approach, 60m on the exit. Also, the conversion the underutilised left turn lane to a shared left/through lane on the west approach with 80m on the exit.

A long bus lane is proposed here as this will support high frequency bus services and benefit public transport users in accessing the Centre. Additionally, it is perceived that the bus lane will encourage private vehicle drivers to shift modes in order to avoid congestion on the general traffic lanes during peak periods. The bus lane will continue through the Huntriss Road intersection utilising the existing left turn lane, before merging with general traffic.

A large proportion of buses also turn right from Karrinyup Road into Huntriss Road south. However, in this instance, it was believed that providing an additional general traffic lane would provide similar benefits for buses as a dedicated bus lane.

**Figure 5-11 Existing Karrinyup Road/ Huntriss Road intersection layout**

**Figure 5-12 Proposed additional right turn lane at the Karrinyup Road/ Huntriss Road intersection**

### 5.1.6. Karrinyup Road / Mitchell Freeway Interchange West Approach

The proposed measure at this intersection is the extension of the right turn bay by 80m on the Karrinyup Road west approach. Currently the west approach right turn bay on the interchange bridge queues back to block the approach through lanes. By increasing the length of the turn bay, improved performance at this intersection is expected.

**Figure 5-13 Existing Karrinyup Road/ Mitchell Freeway Interchange (east approach) intersection layout**

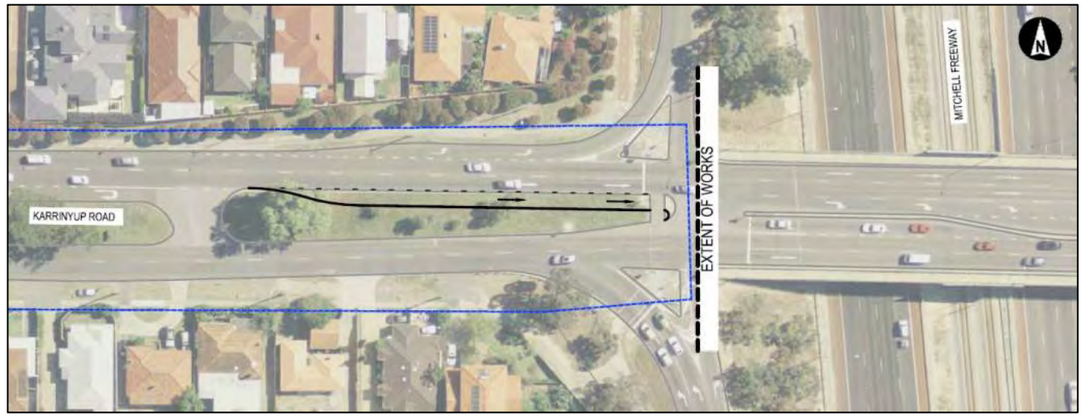



**Figure 5-14 Proposed lane extension at the Karrinyup Road/ Mitchell Freeway Interchange**

## 5.2. Road Typologies

The following sections outline the typical cross sections proposed for the roads surrounding the Development, with schematic road upgrade drawings attached in Appendix A. It is noted that a number of the conditions of approval include specifications in relation to the road typologies. These have not been updated in this report and will be addressed in the detailed design process.

### 5.2.1. Karrinyup Road

Karrinyup Road is classified as a Primary Distributor Road and will continue to carry large traffic volumes to the Development, as well as providing for major east-west traffic movements in the region. Karrinyup Road will also accommodate increased bus movements and service delivery vehicles who will primarily use this road to access the Development.

The existing cross section of Karrinyup Road within the Development is approximately 46m wide, consisting of two lanes in each direction and a wide median of approximately 21m. Dedicated bicycle infrastructure, in the form of either segregated 2-way paths or segregated 1-way paths on each side of the road are proposed along Karrinyup Road (between West Coast Highway and Huntriss Road), while bus queue jump lanes are also proposed at some intersections. Proposed typical cross sections along Karrinyup Road are shown in Figure 5-15, Figure 5-16 and Figure 5-17.

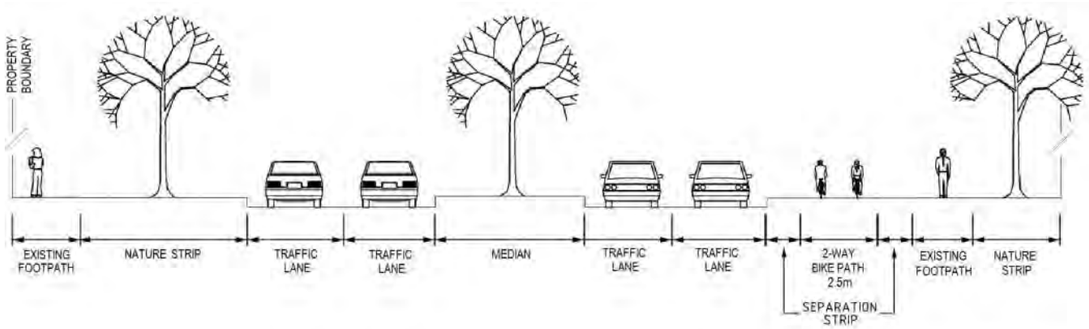



**Figure 5-15 Proposed typical cross section for Karrinyup Road (west of Burroughs Street)**

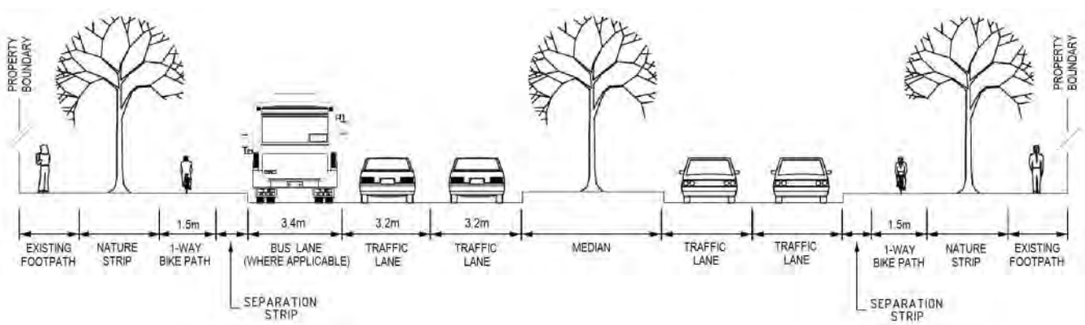



**Figure 5-16 Proposed typical cross section for Karrinyup Road (between Burroughs Street and Huntriss Road)**

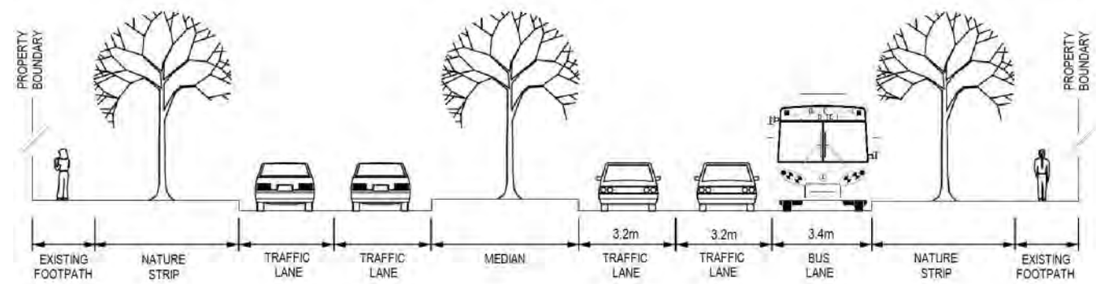



**Figure 5-17 Proposed typical cross section for Karrinyup Road (east of Huntriss Road)**

### 5.2.2. Burroughs Road and Francis Avenue

Both Burroughs Road and Francis Avenue are classified as Local Distributors. These roads are designed to discourage through traffic, and will be used to service the Development and surrounding residential catchment. Within the Development, both Burroughs Road and Francis Avenue will be required to accommodate delivery vehicles, while bus movements will only occur along Burroughs Road as per the existing situation.

Along Burroughs Road, reduced lane widths are proposed while a median is proposed to be maintained along Francis Avenue. On both Burroughs Road and Francis Avenue, two-way shared paths of 3.5m width are proposed, providing safe access for cyclists to the Development.

On the side of the street opposite the Development, on-street parking and footpath modifications may be incorporated by future developers.

The existing cross sections of both Burroughs Road and Francis Avenue are approximately 24m wide, with the proposed typical cross section for each road shown in Figure 5-18 and Figure 5-19 respectively.

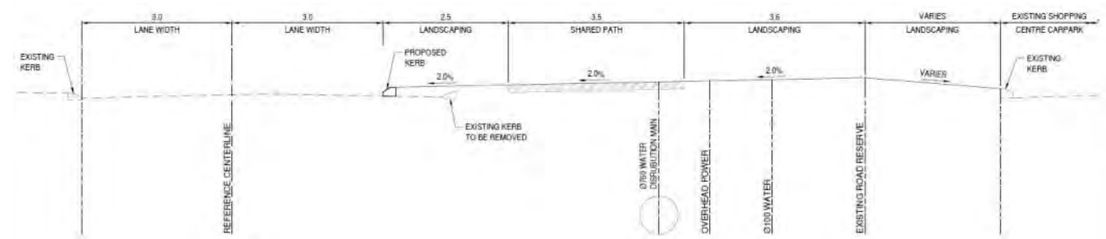



**Figure 5-18 Proposed typical cross section for Burroughs Street**

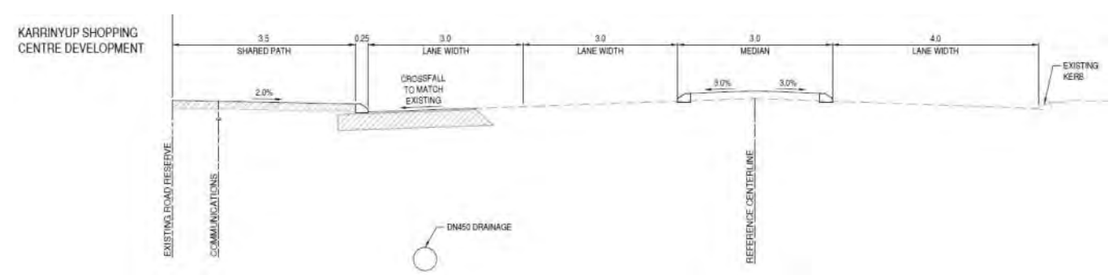



**Figure 5-19 Proposed typical cross section for Francis Avenue**

### 5.2.3. Davenport Street

Davenport Street is classified as a Local Access Road. The function of these roads is to provide access to abutting properties with safety aspects having priority over the vehicle movement function. Since Davenport Street is in an urban area, the main intent is for the road to be bicycle and pedestrian friendly, although some vehicle access to the Development will still be available. The existing cross section of Davenport Street is approximately 20m, with the proposed typical cross section shown in Figure 5-20.

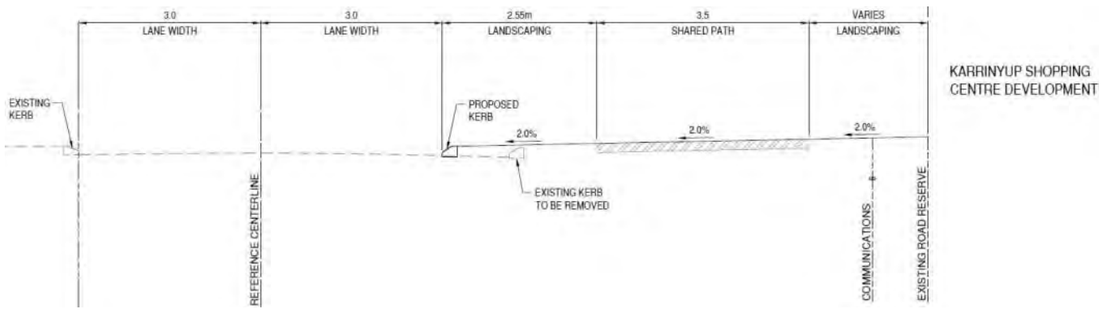



**Figure 5-20 Proposed typical cross section for Davenport Street**

### 5.2.4. Main Street

The proposed main street is aimed to form a high street style shared area allowing for outdoor dining. It should encourage reduced vehicle speed, narrow traffic lanes and wide footpaths, with the typical cross section shown in Figure 5-21.

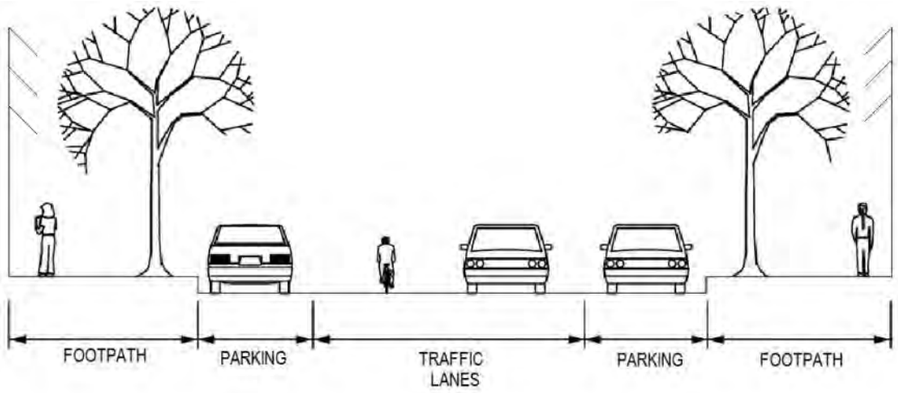



**Figure 5-21 Proposed typical cross section for the main street**

## 5.3. External Road Network Performance

The following tables show the levels of service (LOS) predicted by the Aimsun transport modelling for the scenarios described in Section 4.7. Table 5-1 illustrates the LOS legend for the average vehicle delay at signalised intersections. LOS categorises delay from A, being low levels of delay, to F, being high levels of delay greater than 80 seconds per vehicle for a signalised intersection.

**Table 5-1 Level of Service (LOS) legend**

| Level of Service | Average Delay (seconds) |
|---|---|
| A | <10 |
| B | 10 to 20 |
| C | 20 to 35 |
| D | 35 to 55 |
| E | 55 to 80 |
| F | >80 |

The network in its entirety performs at what can be deemed as an acceptable level. Further detailed outputs can be found in Appendix C with SIDRA outputs in Appendix D that also cover queue lengths. It should be noted that it is common for discrepancies between Aimsun and SIDRA LOS results, due to the difference in model type (Aimsun is an operational model that simulates the movement of each vehicle every time step, while SIDRA is a one-off analytical computation of demand versus capacity of an intersection). Both Aimsun and SIDRA results have been provided for completeness. Counter-intuitive decreases in volumes are due to delay on the wider network, such as on Reid Highway, making some routes and intersections unattractive and/or due to changes in the wider network travel patterns.

In addition, flow density plots can be found in Appendix E. It should be noted that due to the large volumes of traffic using Reid Highway in the 2031 scenario, and the subsequent delay in this area, traffic is less encouraged to rat-run through the residential area to the north of the Development.

The “Base” model is the 2014 road network with the existing Karrinyup Development trips and wider traffic volumes. The ‘Do-minimum’ models consist of the existing Karrinyup Development trips with the background traffic growth on the wider network as per the Main Roads WA traffic forecasts. The “Option” models consist of the same background traffic growth but with also the Mixed Use Expansion at Karrinyup.

In the detailed stages, individual intersection models will be built and SCATS signal settings tested. This is likely to improve the performance of the intersections for all modes of transport.

The summary table of the morning peak hour period intersection results is shown below. All of the intersections perform at a level of service of E or better in all modelled scenarios.

**Table 5-2 Level of Service for the Morning weekday peak period scenarios**

| Morning Peak Intersection Results | | | | | |
|---|---|---|---|---|---|
| Intersection Name | Base | 2021 Domin | 2021 Option | 2031 Domin | 2031 Option |
| Karrinyup Road & Marmion Avenue & West Coast Highway | D | D | D | E | D |
| Karrinyup Road & Burroughs Road | B | B | A | B | B |
| Karrinyup Road & Jeanes Road | B | B | B | B | B |
| Karrinyup Road & Francis Ave | B | B | B | B | B |
| Karrinyup Road & Huntriss Road | C | C | C | C | D |
| Karrinyup Road & North Beach Road | C | C | C | D | D |
| Karrinyup Road & Mitchell Freeway NB | D | D | C | E | D |
| Karrinyup Road & Mitchell Freeway SB | C | D | C | D | C |

The afternoon peak hour period intersection results show that most intersections perform at a satisfactory level in all modelled future year scenarios.

**Table 5-3 Level of Service for the Afternoon weekday peak period scenarios**

| Afternoon Peak Intersection Results | | | | | |
|---|---|---|---|---|---|
| Intersection Name | Base | 2021 Domin | 2021 Option | 2031 Domin | 2031 Option |
| Karrinyup Road & Marmion Avenue & West Coast Highway | D | D | D | D | D |
| Karrinyup Road & Burroughs Road | B | A | A | A | A |
| Karrinyup Road & Jeanes Road | B | B | B | B | C |
| Karrinyup Road & Francis Ave | C | C | B | C | B |
| Karrinyup Road & Huntriss Road | D | D | C | C | C |
| Karrinyup Road & North Beach Road | C | B | B | C | C |
| Karrinyup Road & Mitchell Freeway NB | C | C | C | C | C |
| Karrinyup Road & Mitchell Freeway SB | F | E | E | D | E |

For the Saturday peak hour period intersection results most intersections perform at an acceptable level. Karrinyup Road/ Huntriss Road does exhibit extensive queuing westbound in all modelled scenarios, including the existing base model, but this is hoped to encourage a mode shift to public transport due to the dedicated bus lane in this location.

**Table 5-4 Level of Service for the Saturday midday peak period scenarios**

| Saturday Midday Peak Intersection Results | | | | | |
|---|---|---|---|---|---|
| **Intersection Name** | **Base** | **2021 Domin** | **2021 Option** | **2031 Domin** | **2031 Option** |
| Karrinyup Road & Marmion Avenue & West Coast Highway | C | C | C | C | C |
| Karrinyup Road & Burroughs Road | C | A | A | A | D |
| Karrinyup Road & Jeanes Road | C | B | C | C | E |
| Karrinyup Road & Francis Ave | D | D | B | C | C |
| Karrinyup Road & Huntriss Road | E | E | D | E | E |
| Karrinyup Road & North Beach Road | C | C | C | D | D |
| Karrinyup Road & Mitchell Freeway NB | C | D | D | C | D |
| Karrinyup Road & Mitchell Freeway SB | E | D | E | D | E |

## 5.4. Development Access Performance Summary

The performance of the vehicular accesses to the Development is vital to both the external road network and the Development operating acceptably. If vehicles cannot enter the Development in a safe and efficient manner, congestion can develop from turn bays leading to delays for other vehicles that are not associated with the Development. Likewise, if vehicles cannot exit the Development then congestion will build up within the Development car park areas and internal links. This could then spill out to the external road network, causing wider network congestion.

To mitigate any such issues, Aurecon undertook an extensive iterative process with the project team to establish a set of Development Access points to satisfactorily connect the internal Development design with the external road network. Traffic engineering inputs, however, have also been undertaken so that it was not solely the modelling that was guiding the design.

A dedicated parking management system is proposed for the Development (further detail provided in Section 6. This parking management system will consist of variable message signs both external and internal to the Development. It is thought that on-street this will guide the movements and can even be adjusted to promote less utilised entrances. Furthermore, on any approach to the Development there are multiple entry points so that drivers can make a decision on their entry point depending on those that look more utilised within their field of sight at the time.

Also due to the skewed distribution of traffic distributed to the east of the Development, the access points have been set up to be focussed more towards movements to and from the east.

The performance of the development access points are described below, with SIDRA outputs shown in Appendix F.

### 5.4.1. Francis Avenue

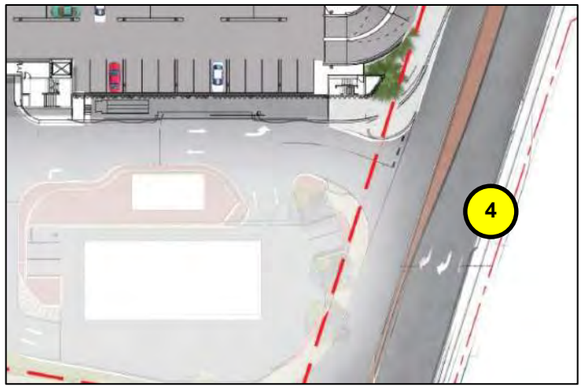



**Figure 5-22 Access 4 – South-east access of the Development on Francis Avenue**

The south-east access is a left in/ left out access providing connection into the east car park areas. Drivers can access this entrance from the left lane. Drivers in either the right or left lane can also access the Development at the next entrance. This is considered a secondary access point.

Due to this entrance being downstream from the Karrinyup Road/ Francis Avenue signalised intersection, vehicles tend to arrive at the intersection in platoons. They can suitably access the Development as they would only have to give way to pedestrians and can exit using gaps created due to the platooning nature of the conflicting through movement traffic.

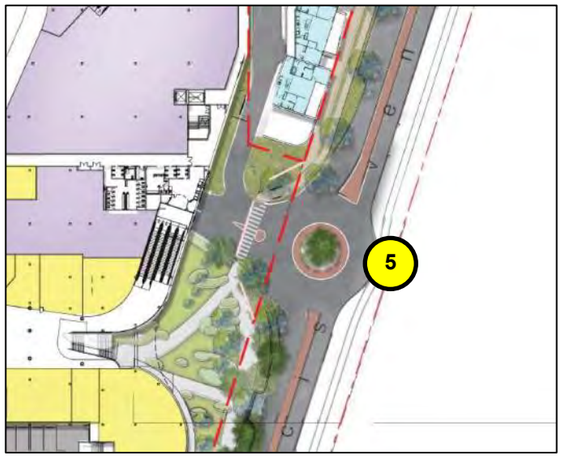



**Figure 5-23 Access 5 – Eastern access to the Development on Francis Avenue**

The primary eastern access consists of a roundabout leading to Basement Level 2 which has good access to the other levels. West of the entrance is a connection to a small set of residential dwellings and therefore enough width has been provided so that a queueing right turning vehicle does not block the primary Development access. There are no performance issues at this roundabout even with some vehicles using the roundabout to perform a u-turn manoeuvre. In some rare cases, a queue for the left turn movement onto Karrinyup Road may extend towards this roundabout but this queue dissipates quickly due to the signal phasing allowing the left turn to receive ample time to clear.

### 5.4.2. Davenport Street

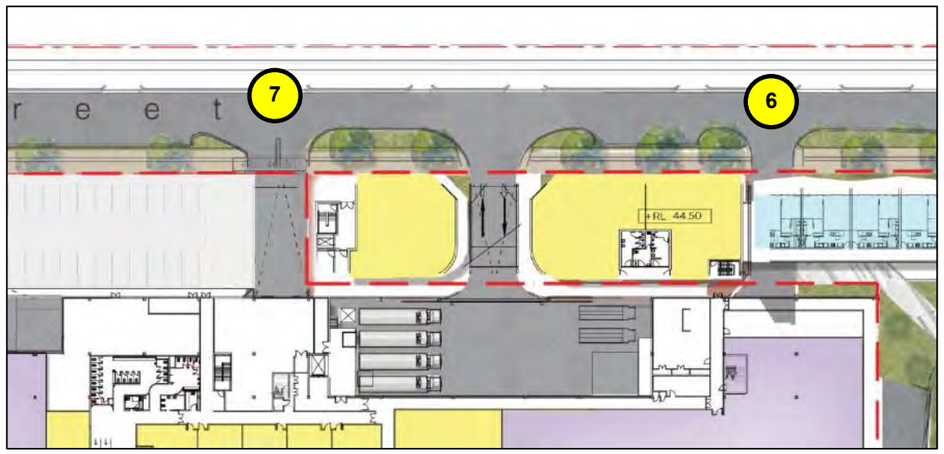



**Figure 5-24 Access 6 and 7 – North-eastern accesses to the Development on Davenport Street**

As per Figure 5-24, the north-eastern access to the Development on Davenport Street (Access 7) leads directly to the Basement 01 car parking level without any intersecting movements. Access 6 leads directly to the Basement 02 car parking level.

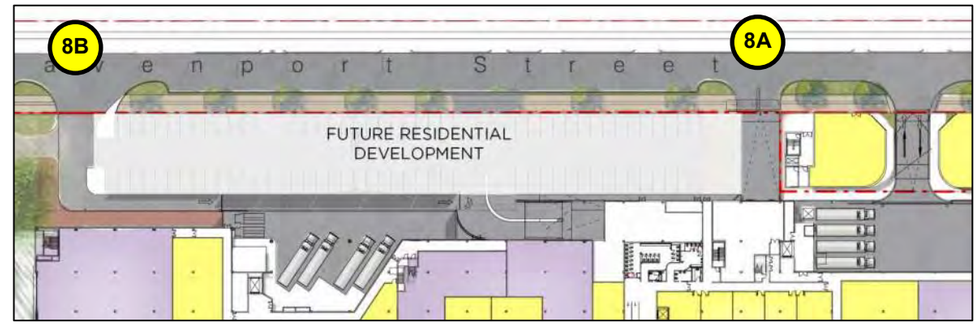



**Figure 5-25 Access 8 – North access of the Development on Davenport Street (amended)**

Referring to Figure 5-25, Access 8 is split into two access points, Access 8A and 8B as follows:

- Access 8A is proposed as a two-way access point that is accessible by general vehicles which allows access to the roof car park (L02). Access 8A is located approximately 90m east of Access 8B.
- Access 8B is proposed to be a one-way entry, providing access to car parking (whilst allowing for future residential development). A one-way service entry is also provided to access Service Delivery Yard 3.

The proposed separation of the service vehicle entry access removes a point of conflict between the general public and service vehicles.

There are no performance issues at these access points.

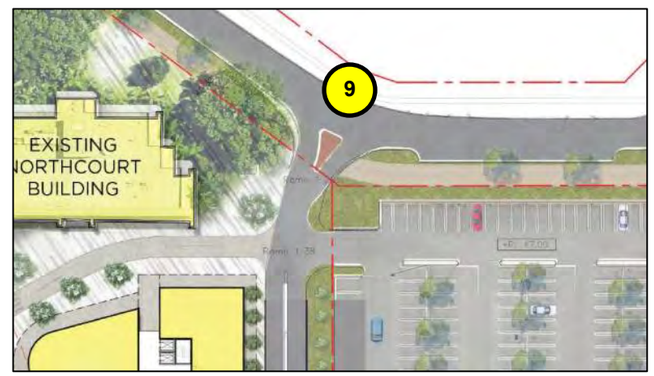



**Figure 5-26 Access 9 – North-western access of the Development on Davenport Street**

The secondary access on the north-western corner of the Development (Access 9) leads to three areas:

- The Ground Level car park
- Basement Level 1
- One-way southbound connection from the Main Street. The connection to Main Street will be a slow speed, paved and narrow 3.2m one way link. It is anticipated to have a negligible impact on pedestrian safety.

As with the other Davenport Street accesses there is generally a low volume of traffic attracted to Davenport Street. However for this access there are vehicles that may turn left out of the access from the Main Street northbound link.

### 5.4.3. Burroughs Road

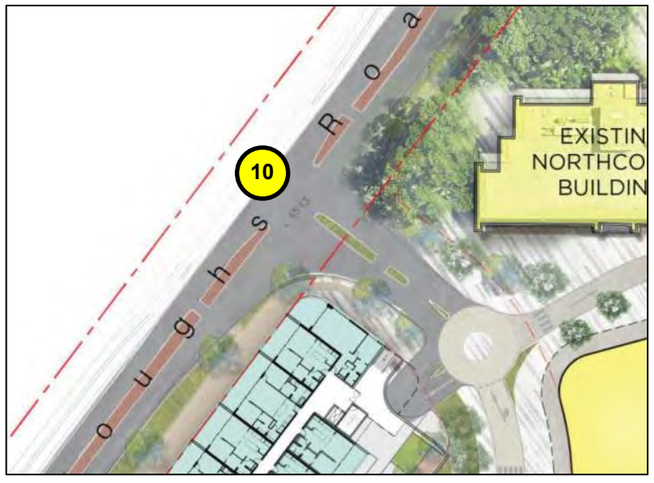



**Figure 5-27 Access 10 – Western access of the Development on Burroughs Road**

The western primary access on Burroughs Road is a T-intersection. With Main Street as a single lane northbound one-way road, there is reduced demand at the intersection and the intersection performs well.

### 5.4.4. Karrinyup Road

**Figure 5-28 Access 1 – South-western access of the Development on Karrinyup Road**

Referring to Figure 5-28, Access 1 leads to Main Street which is initially two way and then one way for the majority of its length. Main Street has a clearly legible drop-off and pick-up area for the Centre, while the one lane provides a short road cross section for pedestrians and cyclists to cross. Upon entering Main Street from Karrinyup Road there is an initial decision point for vehicles to enter the Basement 2 car park, however there is a second option for carpark access with the addition of a roundabout on the northern section of Main Street. This roundabout allows access to the western Basement 1 car park entry off Davenport Street via a one way link road. Access to the residential car park is provided via an additional leg of the roundabout to enable improved access.

Due to the one-way operation, the southern portion of Main Street allows vehicles to exit directly from the internal Basement levels on the western side of the Centre via the signalised Jeanes Road intersection without impacting Main Street. This allows vehicles to exit directly on to Karrinyup Road using the signalised intersection and reduces loading of vehicles on to the surrounding local roads, particularly Burroughs Road. Partial signalisation was originally proposed at the Karrinyup Road/ Burroughs Road intersection to assist vehicles entering and exiting Burroughs Road but any signals at this location was not supported by Main Roads WA.

With the large volumes heading west during the weekday evening period there is some queuing on the eastern approach but this clears within one cycle. During the Saturday peak period the Main Street approach does exhibit some queuing in the order of 110m but this is intermittent. The right turn into the Development is generally contained within the existing turn bay pocket. It should be noted that vehicles have three prior opportunities to enter the Development from the east before reaching this intersection.

The schematic road upgrade drawing for the Karrinyup Road/ Jeanes Road/ Main Street intersection is shown in Appendix G. Note that all traffic analysis and modelling includes this design.

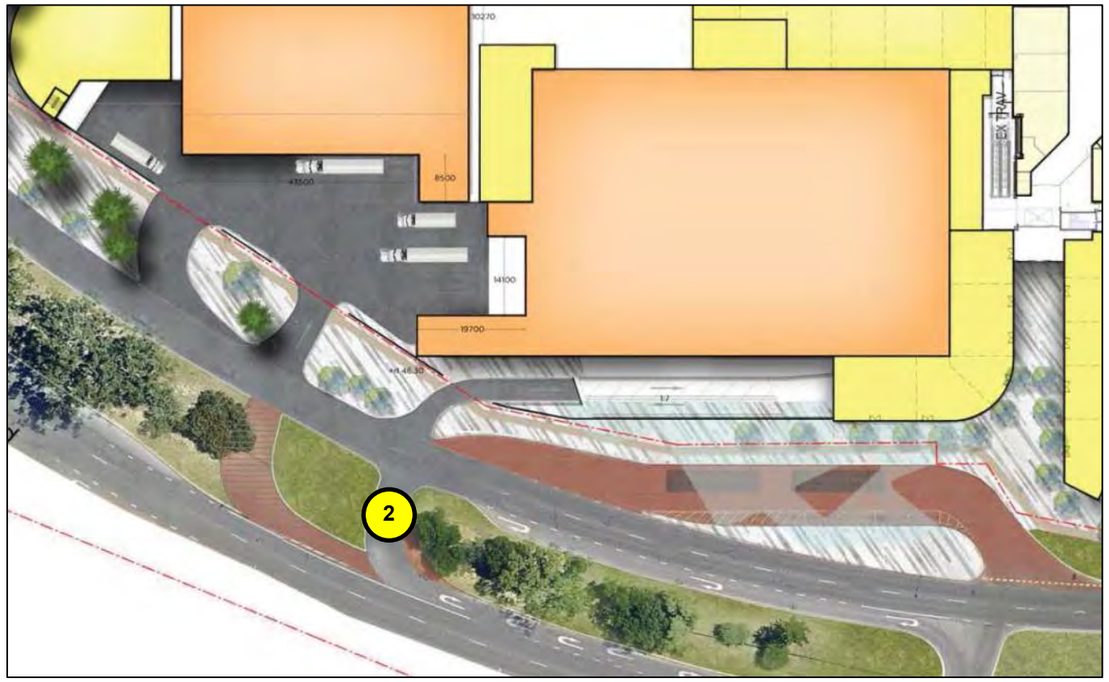



Figure 5-29 Access 2 – South access 1 of the Development on Karrinyup Road

Access point 2 leads to the Basement 1 car park area, the Karrinyup Bus Station, and the freight loading dock. The crossover for the freight loading dock has been split into separate entry and exit only crossovers. There are no performance or intersection issues at this intersection and delay turning into the access is minimal. No high landscaping is planned in this area to ensure that high visibility is maintained for service vehicles. Discussions with the Public Transport Authority indicated that a shared vehicular and bus entry was not a concern.

A suitable treatment for delineation into the loading/basement car park/bus station areas is required at this intersection. It will be important to provide a strong visual guide to assist in the decision making progress for visitors to the centre, and that vehicles are set in the right position when making the turn. Appropriate delineation will be further investigated during the detailed design stage.

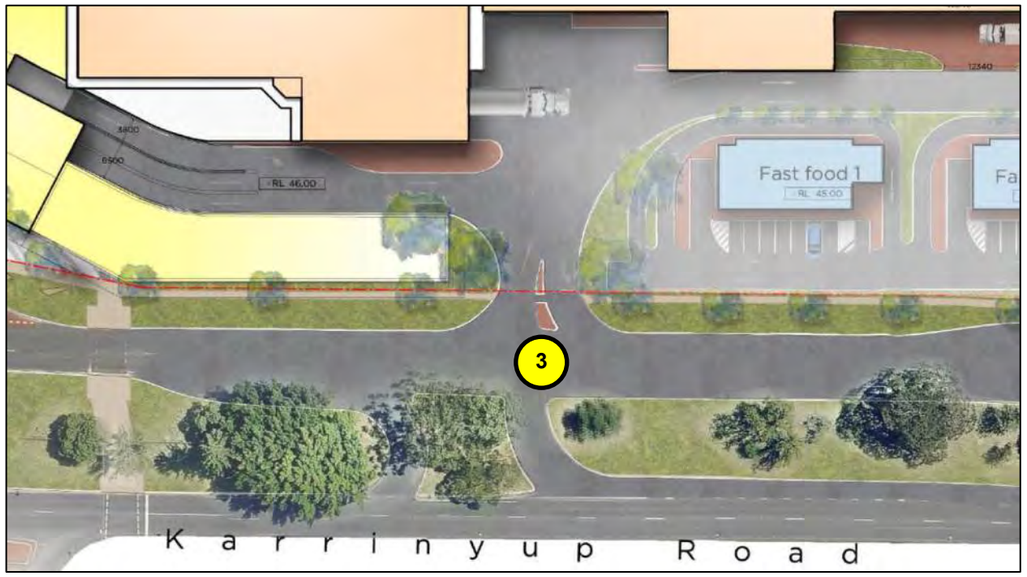



Figure 5-30 Access 3 – South access 2 of the Development on Karrinyup Road

The second access on the southern side of the Development is a primary access that is give way controlled. Vehicles can turn left and right into the Development or left out towards the east. This entrance provides access to various car park areas of the Development. It is an existing entrance to the Development, which in 2014 was underutilised by vehicles to access the Development. It is anticipated that the proposed parking management system will encourage the use of this access.

Within the model vehicles do see this access has an attractive entry and queues do fill the right turn bay at times with additional vehicles rerouting to the next access to the west. Therefore the turn bay has been extended to hold more vehicles.

## 5.5. Impact on Local Road Network

Model outputs for the surrounding residential streets are shown by the flow density plots in Appendix E. These outputs for the surrounding local road network indicate minimal additional impact as a result of the Development. This is mostly due to the complex routes that are required through these areas to access the Development. These residential streets lead to other arterial roads that, due to congestion on these arterial roads in the future years, result in there being more advantage in using Karrinyup Road to enter and exit the Development.

It is also believed that any upgrades within residential area would improve the operation of these streets, which would only result in a marginal performance improvement, but might induce greater traffic onto these streets. Given the comments contained within a number of the submissions, it would be desirable to not encourage significant increases in vehicle movements within these local roads. Traffic management is already in place in many of the surrounding residential streets of concern and further management would only impact negatively on residents. Given the above there is either no need or it is not considered desirable to upgrade any of the local roads.

The modelled volumes for key residential links (as identified by the City of the Stirling) for each scenario and modelled peak hour are shown in Table 5-5. These generally show the links carry relatively low volumes of traffic and with the development any increase in traffic is also relatively small.

**Table 5-5 Modelled volumes for key residential links**

| | | AM vph | | PM vph | | Saturday vph | |
|---|---|---|---|---|---|---|---|
| **Location** | **Period** | Northbound | Southbound | Northbound | Southbound | Northbound | Southbound |
| Milverton Ave, North of Padstow Street | Base | 64 | 230 | 205 | 88 | 94 | 119 |
| | 2021 Do Min | 100 | 258 | 215 | 113 | 147 | 190 |
| | 2021 Option | 93 | 257 | 265 | 138 | 142 | 240 |
| | 2031 Do Min | 183 | 278 | 210 | 117 | 191 | 204 |
| | 2031 Option | 136 | 244 | 170 | 77 | 180 | 330 |
| Clement Drive, North of Padstow Street | Base | 172 | 393 | 210 | 152 | 220 | 268 |
| | 2021 Do Min | 134 | 348 | 202 | 176 | 182 | 310 |
| | 2021 Option | 167 | 299 | 254 | 173 | 208 | 303 |
| | 2031 Do Min | 222 | 403 | 195 | 184 | 266 | 303 |
| | 2031 Option | 284 | 403 | 304 | 336 | 296 | 421 |
| Duke Street, south of Jeanes Road | Base | 235 | 362 | 433 | 220 | 252 | 233 |
| | 2021 Do Min | 260 | 372 | 420 | 272 | 264 | 198 |
| | 2021 Option | 166 | 419 | 483 | 214 | 189 | 143 |
| | 2031 Do Min | 235 | 432 | 350 | 253 | 138 | 200 |
| | 2031 Option | 229 | 401 | 388 | 254 | 272 | 263 |

## 5.6. Impact on Local Road Network – Supplementary Information

The transport model presented in Section 4 covers many of the local roads surrounding the Development. From the model we are able to gain a further understanding of the impacts of the expanded centre on these surrounding roads. While an increase in traffic on the road network as a whole is likely, due to an estimated natural increase in metropolitan population and employment, this report provides further information on the changes in traffic volumes on the key local roads that carry through movement traffic to the Development.

The local road volumes have been compared to the current road network hierarchy from the MRWA Road Mapping Information System. The Metropolitan Functional Road Hierarchy - Road Types and Criteria table identifies a recommended volume of traffic per day for each hierarchy type. If the estimated volumes exceed the daily volumes for that hierarchy type then either treatments are required to reduce the volumes on those roads or the road requires an upgrade to that higher hierarchy level that meet the hierarchy requirements.

The following diagrams present the modelled daily volumes on the road network hierarchy map as well as the highest volume peak hour for each of the road links. These links have been selected as they are seen as through movement residential links for traffic heading to or away from the Development. Other links either provide no route choice advantages or are at a distance from the Development where traffic relating to the Development would be too dispersed in the network to have a notable impact.

Overall the diagrams show that the expected through movements do not exceed the hierarchy traffic volume levels for any of the road links.

**Figure 5-31 Base Model Local Road Hierarchies and Volumes**

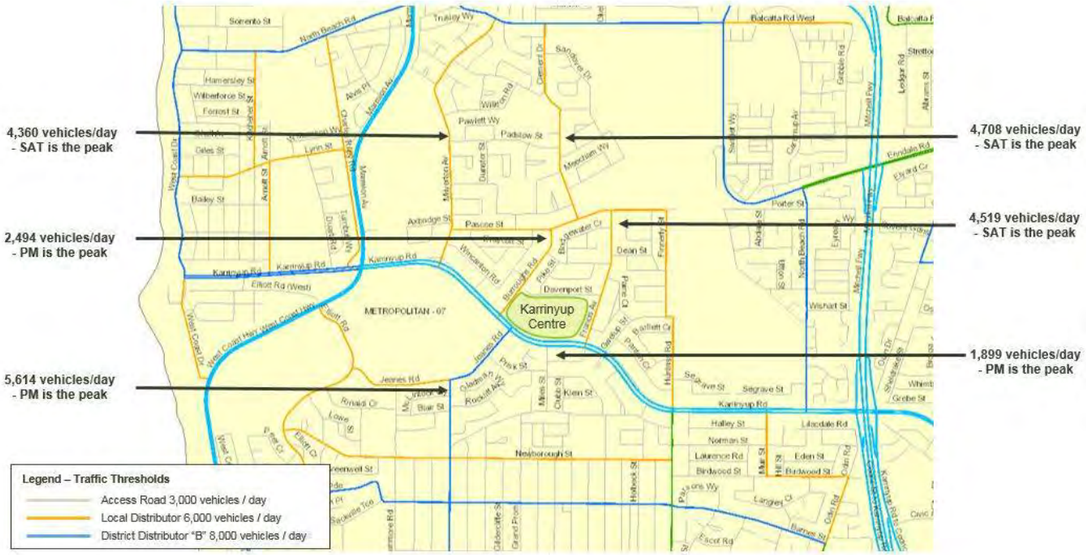



**Figure 5-32 2021 Option Model Local Road Hierarchies and Volumes**

**Figure 5-33 2031 Option Model Local Road Hierarchies and Volumes**

The diagrams also show that as the Development parking distribution and road/access design has changed compared to the existing scenario, the movement of traffic through the surrounding road network has also changed. For example with more car bays on the eastern side of the site, it is anticipated that the distribution of trips would shift from Burroughs Road to Francis Avenue. Similarly the design of Karrinyup Road is anticipated to make Miles Street less attractive. These values are based on the maximum number of bays being provided and the current car park layout described in Section 3.4. Should the number of bays decrease, which would reduce the attractiveness of driving to the Development, or the layout of the car park changes, the traffic volumes on the local roads may reduce.

The roads to the north of the Development, primarily Milverton Avenue and Clement Drive, have been the focus of previous local road discussions. This is because in the morning peak period, congestion on Marmion Avenue could force southbound vehicles to rat run via these local roads. However the volumes relating to the Development in the morning peak period of the wider road network are relatively low. Also the most recent State Government plans include upgrading Mitchell Freeway between Cedric Street and Vincent Street, which will make the Freeway a more viable southbound route option. If, in the future, the trading hours of the Development are moved to a later opening time, it is anticipated that any morning (and evening) peak period impact would be reduced even further. Upgrades to the right turn bay from Karrinyup Road into Marmion Avenue northbound are anticipated to assist the movements in the PM and Saturday movements.

The following tables summarise the percentage distribution for Development trips. These are different to the diagrams presented in Section 0 as the values below are from the model simulation runs, rather than the broader initial model static assignments. These confirm the use of Francis Avenue over Burroughs Road for Development trips and the reduction in distribution of Development trips on other roads such as Miles Street and Jeanes Road.

**Table 5-6 Base Simulated Distribution Values for Development Trips**

| | AM | | PM | | Saturday | |
|---|---|---|---|---|---|---|
| | Inbound | Outbound | Inbound | Outbound | Inbound | Outbound |
| Karrinyup Road West | 22% | 11% | 11% | 32% | 22% | 16% |
| Burroughs Road | 14% | 1% | 2% | 6% | 2% | 5% |
| Francis Street | 12% | 3% | 4% | 3% | 7% | 5% |
| Hicks Street | 0% | 4% | 0% | 1% | 3% | 3% |
| Karrinyup Road East | 36% | 72% | 79% | 45% | 51% | 63% |
| Miles Street | 0% | 5% | 1% | 6% | 5% | 5% |
| Jeanes Road | 16% | 4% | 3% | 7% | 10% | 3% |

**Table 5-7 2021 Option Simulated Distribution Values for Development Trips**

| | AM | | PM | | SAT | |
|---|---|---|---|---|---|---|
| | Inbound | Outbound | Inbound | Outbound | Inbound | Outbound |
| Karrinyup Road (West) | 34% | 17% | 26% | 24% | 22% | 14% |
| Burroughs Road | 3% | 2% | 2% | 5% | 2% | 2% |
| Francis Street | 5% | 3% | 13% | 9% | 7% | 10% |
| Hicks Street | 0% | 1% | 0% | 1% | 0% | 3% |
| Karrinyup Road (East) | 55% | 69% | 49% | 58% | 64% | 69% |
| Miles Street | 0% | 1% | 1% | 1% | 1% | 1% |
| Jeanes Road | 3% | 8% | 9% | 3% | 4% | 2% |

**Table 5-8 2031 Option Simulated Distribution Values for Development Trips**

| | AM | | PM | | SAT | |
|---|---|---|---|---|---|---|
| | Inbound | Outbound | Inbound | Outbound | Inbound | Outbound |
| Karrinyup Road (West) | 24% | 8% | 10% | 26% | 18% | 14% |
| Burroughs Road | 8% | 4% | 4% | 9% | 4% | 8% |
| Francis Street | 9% | 6% | 7% | 5% | 14% | 7% |
| Hicks Street | 1% | 5% | 1% | 2% | 4% | 4% |
| Karrinyup Road (East) | 42% | 64% | 72% | 49% | 41% | 59% |
| Miles Street | 2% | 3% | 2% | 1% | 7% | 1% |
| Jeanes Road | 13% | 9% | 5% | 8% | 11% | 6% |

## 5.7. Public Transport Performance

The on-road infrastructure improvements dedicated for buses consist of the Karrinyup Road westbound bus lane (from west of North Beach Road to west of Huntriss Road) and the Karrinyup Road eastbound bus lane (from the Karrinyup Bus Station to east of Francis Avenue) as discussed in Section 5.1.

The westbound bus lane provides approximately 30 seconds of travel time savings in 2031 for buses in the PM peak period and approximately 1 minute of travel time savings in the Saturday peak period. There is negligible travel time savings in the AM period.

The eastbound bus lane provides approximately 20 seconds of travel time saving in 2031 for buses during the AM and Saturday periods and 10 seconds during the PM period.

The shared bus station entrance with the access to the centre results in a negligible change in delay for buses accessing the station across all periods.

## 5.8. Unreleased Vehicles

The percentage of vehicles unreleased across the peak hours for all models is displayed below and are relatively low values for all periods.

| Model Case | AM | PM | SAT |
|---|---|---|---|
| **Base** | 0.3% | 0.6% | 0.3% |
| **2021 Do-Minimum** | 0.4% | 0.7% | 0.3% |
| **2021 Option** | 0.7% | 1.4% | 1.0% |
| **2031 Do-Minimum** | 0.3% | 0.4% | 0.2% |
| **2031 Option** | 0.6% | 0.8% | 0.5% |

# 6. Parking

## 6.1. Parking Provision

In high activity areas, such as the Development, a level of car parking is essential. However, constraining car parking can encourage the use of more sustainable modes such as public transport, cycling or walking, particularly if these are supported by good quality infrastructure. A balance between parking provision and proper access by other modes of transport including public transport, cycling and walking will provide a true integrated transport network.

Results from the Development parking survey and subsequent analysis indicated that although maximum parking utilisation is high and near capacity, the average parking utilisation is lower than capacity. There is significant opportunity to promote peak use spreading to increase the efficiency of parking utilisation and ease the congestion burden on the transport network and the stores within the Development.

It is proposed to apply a reduced rate of parking for the Mixed Use Expansion at Karrinyup and the additional non-retail floor space. The proposed Development incorporates a total of up to 4,880 car parking bays which equates to a rate of up to 4.2 bays per 100m$^2$ for the proposed total floor space within the development. Included in this total is 60 parking spaces for people with disability (in accordance with the requirements of the Building Code of Australia for a Class 6 facility).

If demand supports the construction of additional car parks, there is capacity within the Development design to add further car parks. In addition, localised parking is provided for the proposed residential dwellings. The architectural drawings and further information regarding parking provision is within the primary submission report. The car parking has been provided in accordance with Australian Standards AS2890.1 and AS2890.6, including aisle widths, parking space widths and ramps. Shopping trolley bays have been included on all car parking levels at strategic locations.

### 6.1.1. Parking Access

The proposed car park is separated into two key regions, the western car park and the eastern car park.

The western car park arrangement has a total of six car park levels including ground level (i.e. L00), three levels above ground (i.e. L01, mezzanine L01a and L02), and two levels below ground (i.e. B01 and B02). Note that the existing ground level car park owned by the City of Stirling remains. The L02 car parking level remains adjacent to the proposed Cinema. Two way ramps provide circulation between all levels of the western car park.

The eastern car park has a total of six car park levels including ground level (i.e. L00), three levels above ground (i.e. L01, mezzanine L01a and L02), and two levels below ground (i.e. B01 and B02). Two way ramps provide circulation between all levels of the eastern car park.

The western car park can be accessed and egressed from Karrinyup Road, Burroughs Road, and Davenport Road. The eastern car park can be accessed and egressed from Karrinyup Road, Francis Avenue, and Davenport Road. The two car park sections are connected internally to the Development on the southern side. The majority of the internal road network will be new to the Development.

A description of the car parking access points and circulation is described below, with reference to Figure 6-1.

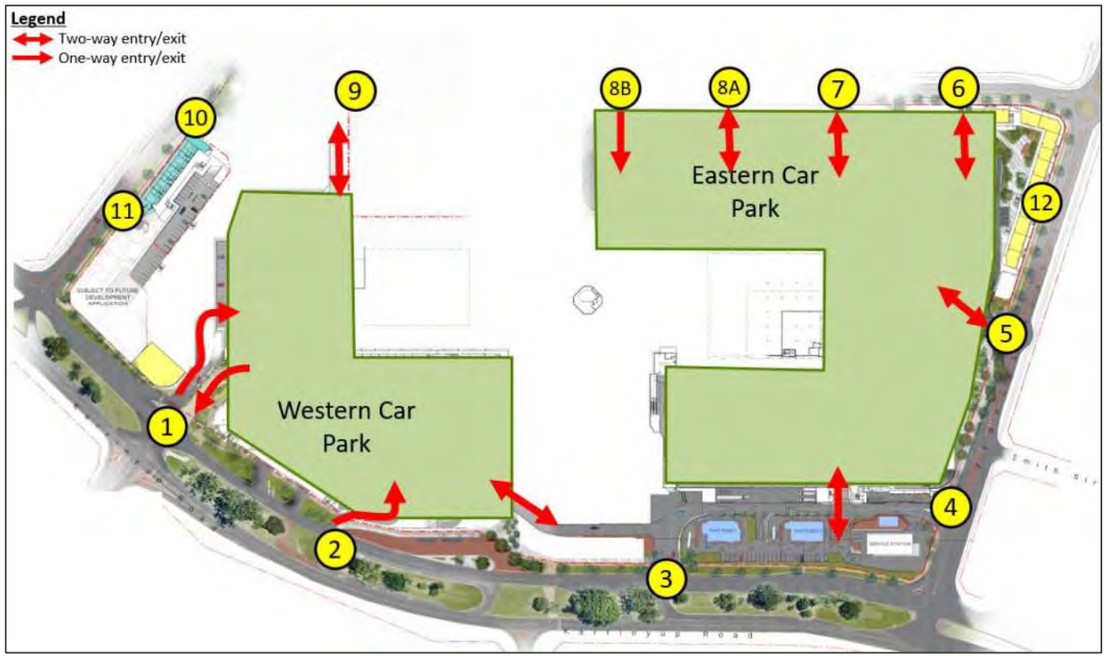



**Figure 6-1 Car Park Access Points**

In order to improve safety within the car parking, a number of design options are proposed to be incorporated within the proposed car parks:

- Speed humps where the parking aisle lengths exceed 100 m in length (as shown in Figure 6-2) and in the concept architectural plans.
- Stop signs at appropriate intersections throughout the car parking area.
- Pedestrian zebra crossings through each car park. This allows priority for pedestrians while also slowing down vehicles. The pedestrian crossings allow direct access for pedestrians into the Development and are indicated within the architectural drawings. Way-finding will also be incorporated in the car parks to direct pedestrians to/from the car parks.
- A 5 km/hr speed limit within the car parking area (example shown in Figure 6-3). Speed limit signs will be located throughout the car park on columns.

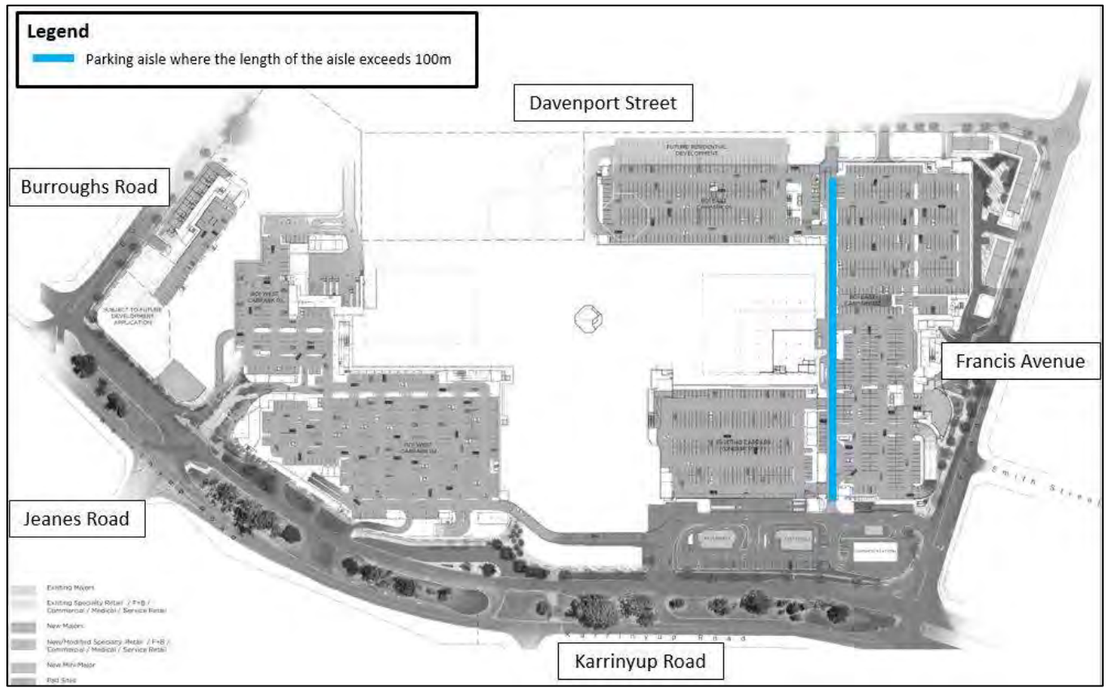



**Figure 6-2 Example where parking aisles within proposed car park exceeds 100m in length (Basement 02 level)**

**Figure 6-3 Example of a 5 km/hr speed limit sign within a shopping centre car park**

The western car park can be accessed and egressed via the following access points:

- Access 1 from Karrinyup Road (traffic signal control) via the Main Street provides direct access to B02 via a ramp to the west, plus an alternative access to B01 via a one-way road at the northern end of Main Street.
- Access 2 from Karrinyup Road (priority T-intersection, entry only) provides direct access to B01
- Access 3 from Karrinyup Road (priority T-intersection) provides direct access to B01
- Access 9 from Davenport Road (priority T-intersection) provides direct access to the existing ground level car park and B01
- Access 10 from Burroughs Road (priority T-intersection) provides direct access to B01

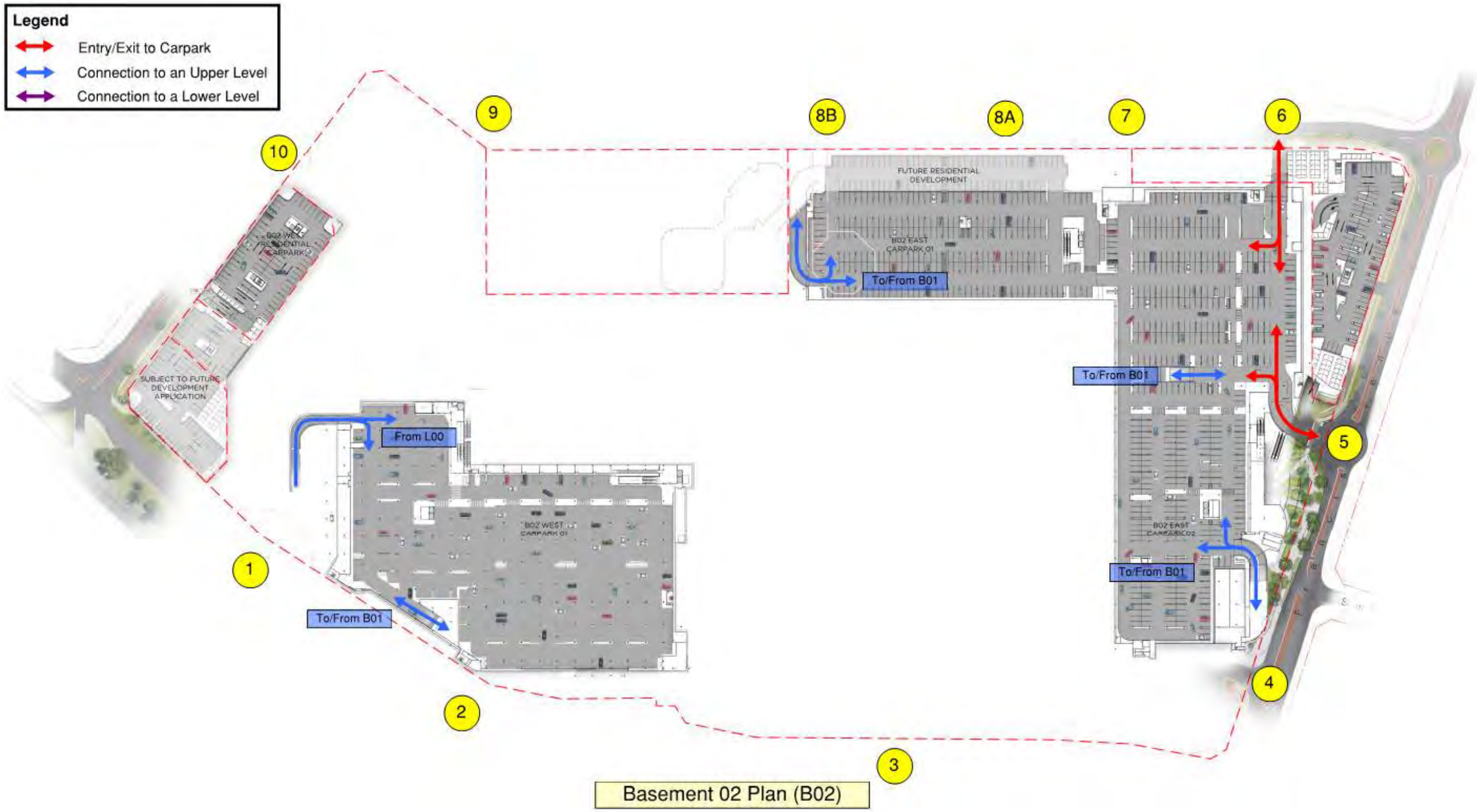
The eastern car park can be accessed and egressed via the following access points:

- Access 3 from Karrinyup Road (priority T-intersection) provides direct access to B01
- Access 4 from Francis Avenue (left in, left out priority) provides direct access to B01
- Access 5 from Francis Avenue (roundabout) provides direct access to B02
- Access 6 from Davenport Street (priority T-intersection) provides direct access to B02
- Access 7 from Davenport Street (priority T-intersection) provides direct access to B01
- Access 8A from Davenport Street (priority T-intersection) provides direct access to L02
- Access 8B from Davenport Street (priority T-intersection) provides one-way access into the existing car park and direct entry only access for service vehicles to Service Delivery Yard 3

Access 11 and 12 provide access to residential car parking only

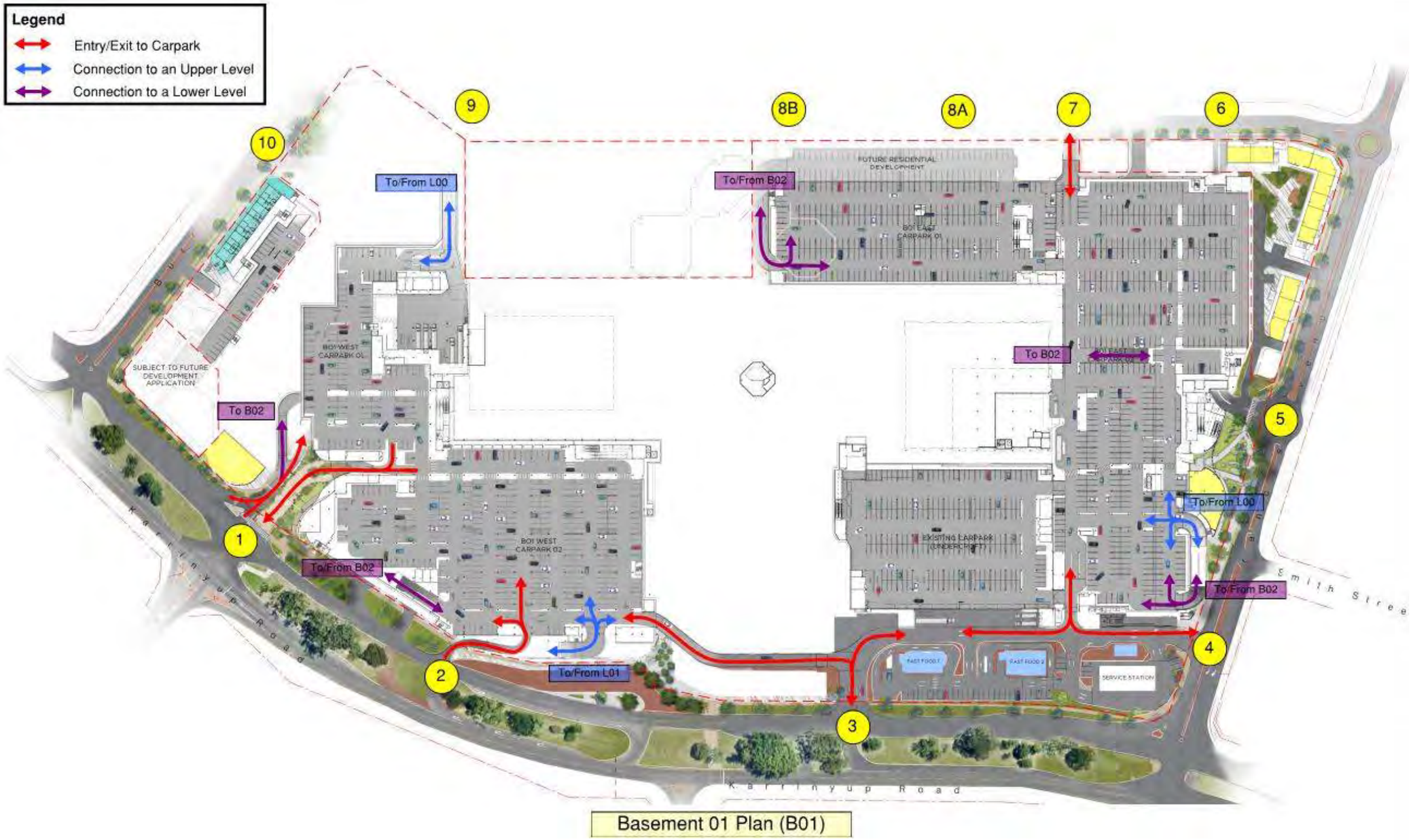
Due to the proposed increase in total floor space but consistent overall parking number, the parking rate for the Development is up to 4.2 bays per 100m$^2$. This is considered to be acceptable as a lower parking rate provides increased incentive for alternative transport modes.

The circulation within each level of the car park is further described in the following figures.



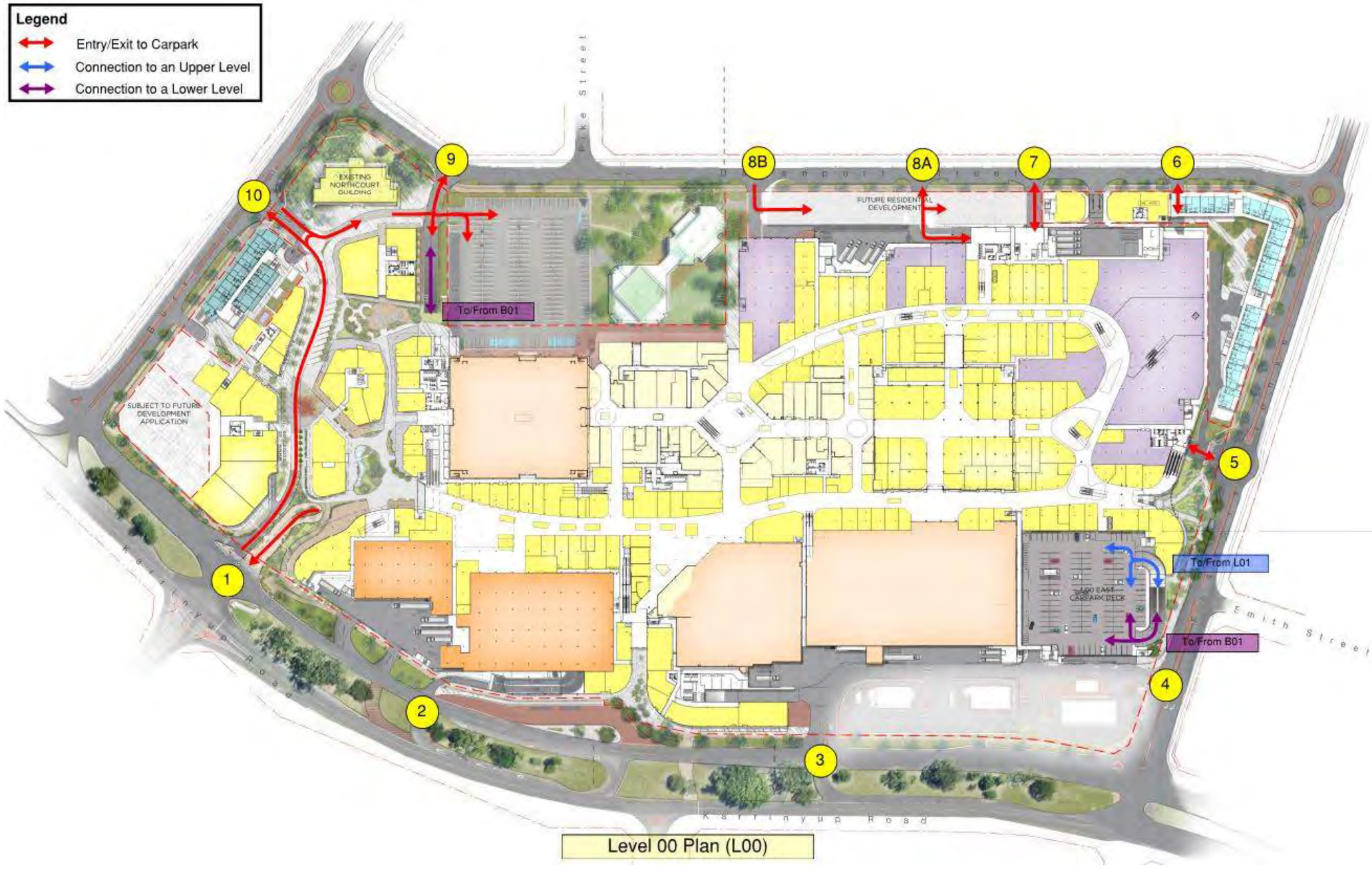

Basement 02 Plan (B02)

- The Basement 02 (B02) western car park can be accessed directly from the Main Street (Access 1), and also via an internal ramp from B01
- The B02 eastern car park can be accessed from both Francis Avenue and Davenport Street (Accesses 5 and 6 respectively), and via three internal ramps from B01

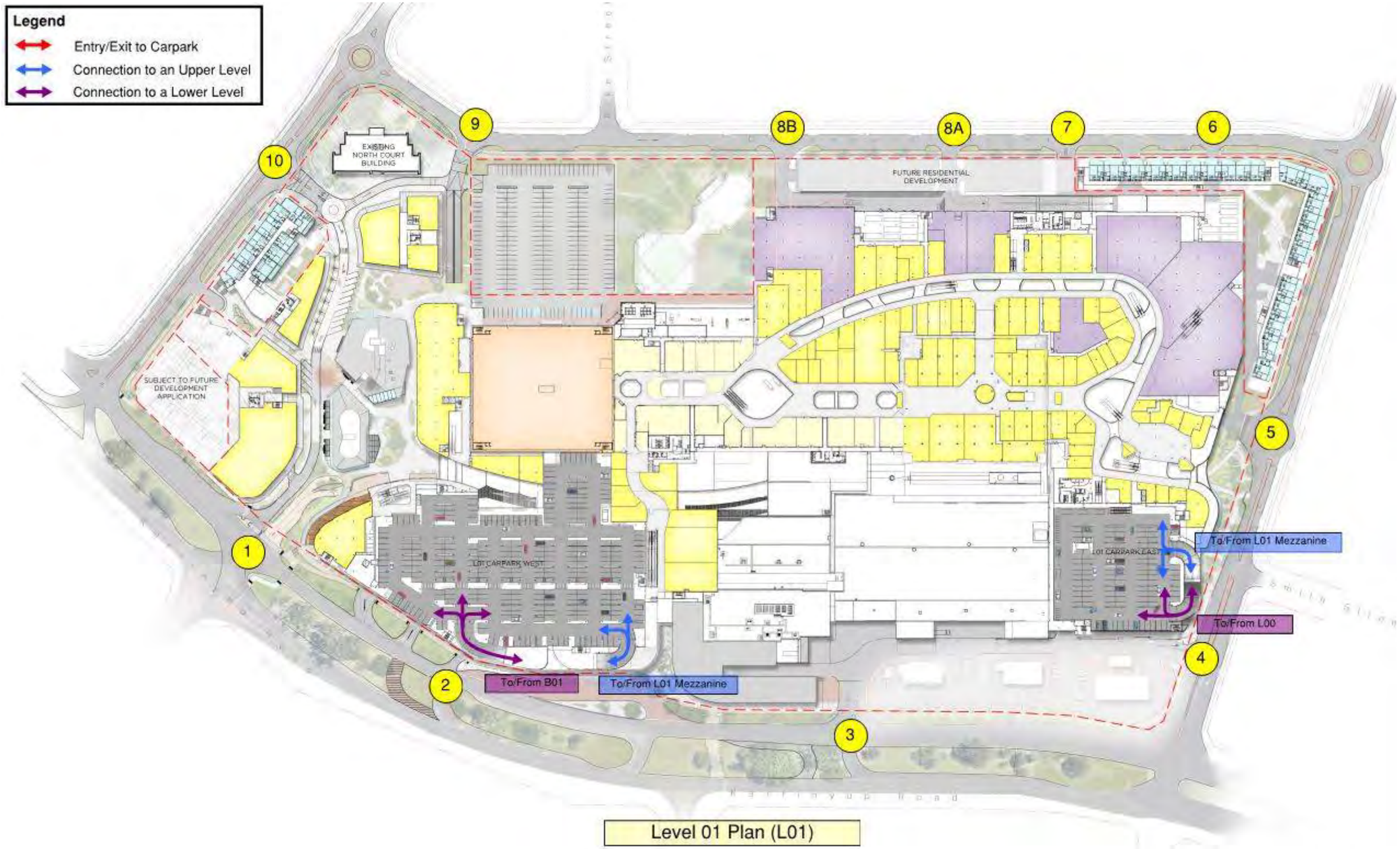



Basement 01 Plan (B01)

- The Basement 01 (B01) western car park can be accessed directly from Davenport Street (Access 9) and Karrinyup Road (Accesses 2 and 3). Within the western car park there is one ramp leading down to B02 and one ramp leading up to Level 01 (L01). Vehicles can exit directly onto Karrinyup Road from B01 via the Main Street signalised intersection (Access 1) or via Access 3.
- The B01 eastern car park can be accessed directly from Karrinyup Road (Access 3), Francis Avenue (Access 4) and Davenport Street (Access 7). Within the eastern car park there are three ramps leading down to B02 and one ramp leading up to Level 00 (L00).

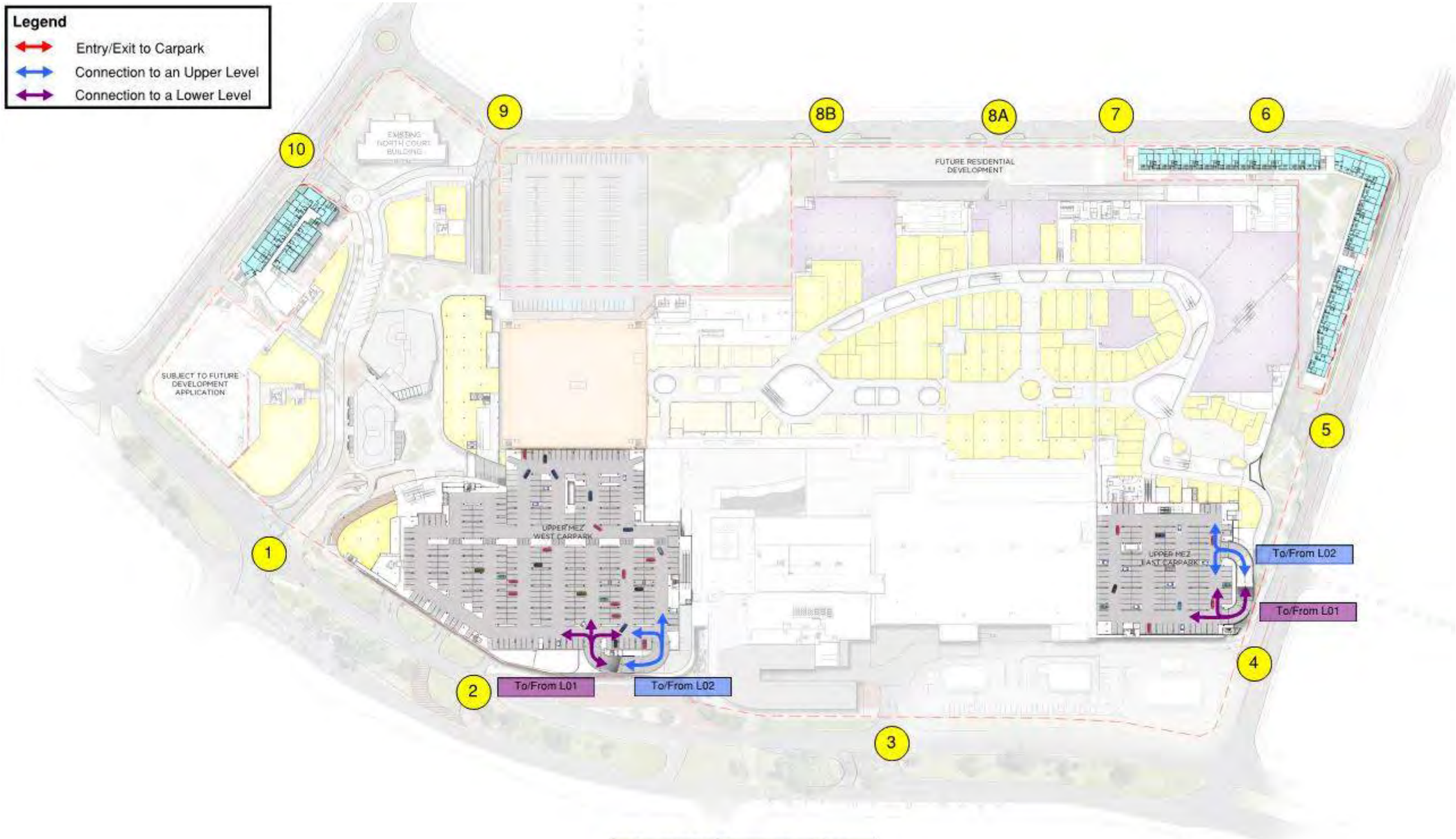



- The Level 00 eastern car park is accessed only via internal ramps, with one ramp leading down to B01 and one ramp leading up to Level 01.
- The existing ground level car park owned by the City of Stirling can be accessed via accesses 9 and 10.



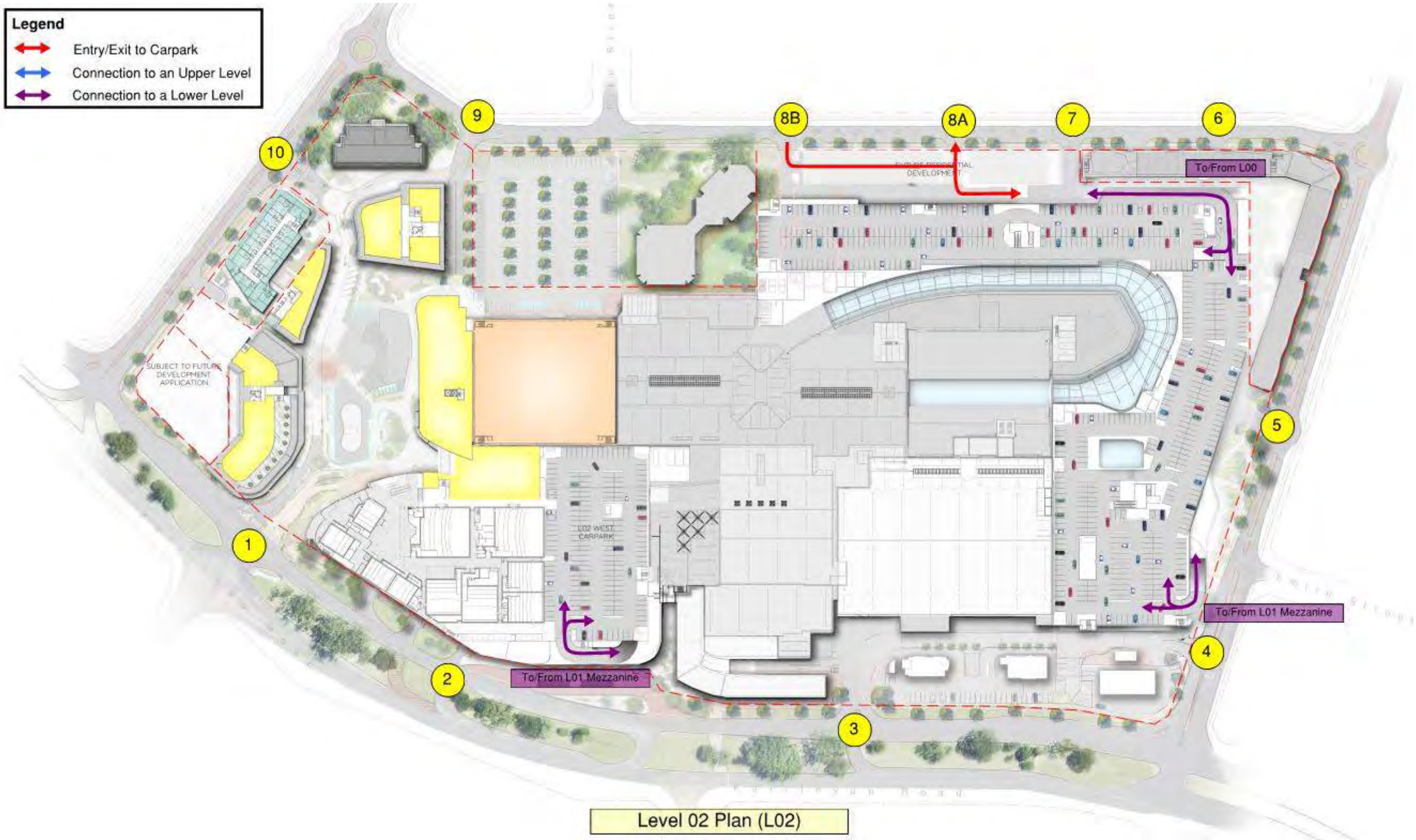

Level 01 Plan (L01)

- The Level 01 (L01) western car park can be accessed only via internal ramps, one leading down to the B01 level and one leading up to the L01 mezzanine level.
- The L01 eastern car park can be accessed only via internal ramps, one leading down to the L00 level and one leading up to the L01 mezzanine level.




Level 01 Mezzanine Plan

- The Level 01 mezzanine western car park can be accessed only via internal ramps, one leading down to L01 and one leading up to the Level 02 (L02).
- The L01 mezzanine eastern car park can be accessed only via internal ramps, one leading down to L01 and one leading up to L02.




- The Level 02 western car park can be accessed only via an internal ramp, leading down to L01 mezzanine.
- The Level 02 eastern car park can be accessed directly via Davenport Street (Accesses 8A and 8B), and internally via a ramp leading down to L01 mezzanine.

### 6.1.2. Parking Management Strategies

Numerous technologies have been developed to improve parking management. Within the Development, a key parking management priority is allowing visitors to identify parking availability and being efficiently directed to unused parking areas.

#### Parking Way-finding

Way-finding signage is proposed within the Development, and is critical, not only to guide drivers to nearest available bay, but in improving the efficiency of the parking system. Efficient way-finding will:

- Improve traffic flow as drivers are provided with real time information of the locations of available parking bays
- Direct vehicles to under-utilised areas
- Reduce aisle / roadway congestion and vehicle emissions as drivers are less likely to circulate in the search for an available bay
- Provide increased safety for both pedestrians and other drivers due to less vehicle circulation
- Decreases the time customers spend searching for car bays
- Alleviate driver frustration as drivers are provided with real time information of the locations of the available car parking bays

#### Parking Detection System

It is proposed that a fully managed parking detection system is implemented within the Development. This will include a number of strategies including:

- Variable Message Signs (VMS)
- Aerial Parking Occupancy Detectors

**Variable Message Signs**

Variable Message Signs (VMS), provide information to vehicles upon entry to the car park on the number of car bays available and where available car bays are located. VMS could be provided both internally within the various car parking levels, and externally prior to major access points to the Development.

Potential locations of external VMS are shown in Figure 6-4, which will be worked through during detailed design. The first visible signs at the far western and eastern ends of Karrinyup Road could indicate the total number of car bays available within both the western and eastern car parks. Upon entry into each car park, VMS similar to that shown in Figure 6-5 could indicate to drivers the number of car bays available at each level of the car park they are entering (i.e. western car park or eastern car park).

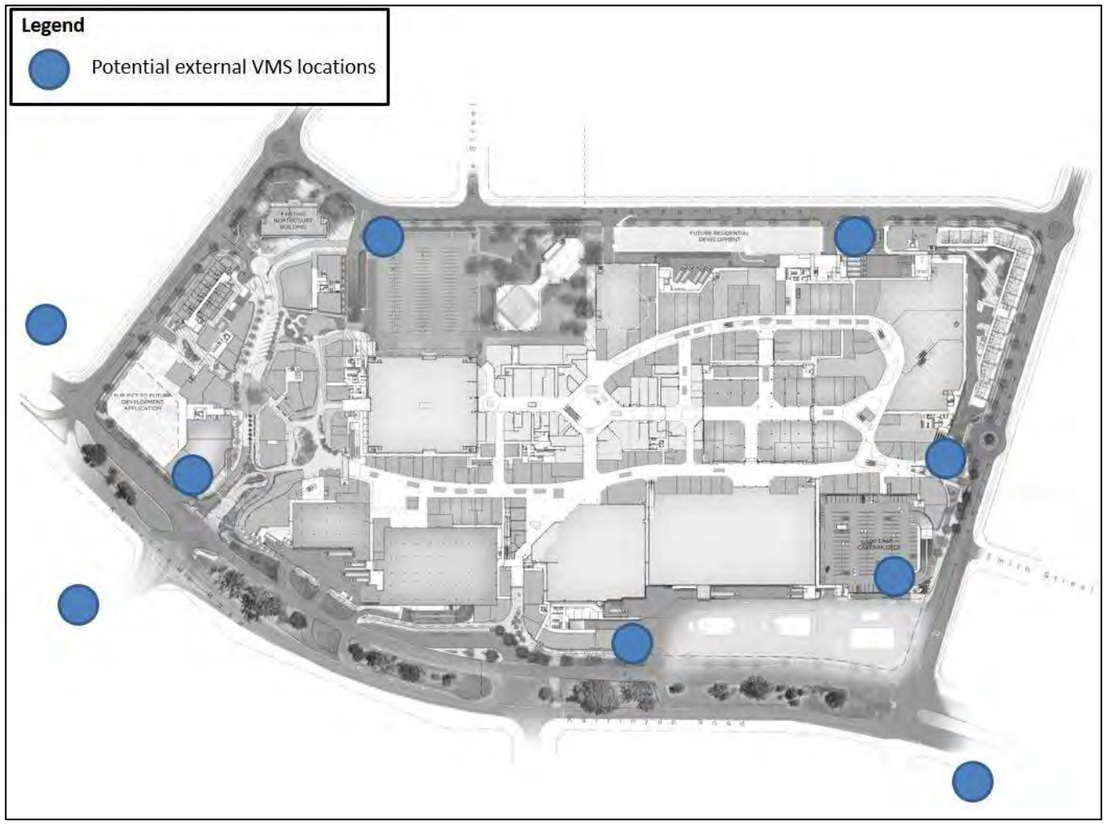



**Figure 6-4 Potential external VMS locations**

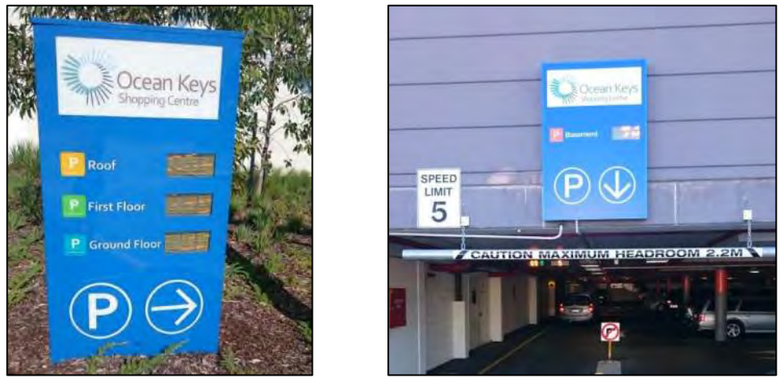



**Figure 6-5 Examples of external VMS**

Internal VMS are used to direct vehicles to under-utilised areas of the car parks. Examples of internal VMS are shown in Figure 6-6 and Figure 6-7.

**Figure 6-6 Example of internal VMS**

**Figure 6-7 Example of internal VMS**

### Aerial Parking Occupancy Detectors

Aerial parking occupancy detectors could potentially be used within the Development, which are used to identify occupied and available car bays within a car park. This is achieved through the use of aerial colour coded sensors where 'red' sensors identify occupied bays, 'green' sensors identify available bays and 'blue' sensors identify disabled bays. Aerial parking occupancy detectors are best implemented with the abovementioned VMS strategy. An example of these used are shown in Figure 6-8. These can be implemented to indicate an available bay exists within the surrounding four bays.

**Figure 6-8 Internal VMS examples**

## Mix of Short and Long Stay Parking

A mixture of both short and long term parking is proposed for the Development to cater for the demands for visitor and staff parking. The locations of short and long term parking will be strategically placed throughout the Development to ensure adequate access to the Development for both staff and visitors.

### Time Limited Parking

Short stay planning is based on the idea of giving priority to the provision of short-stay parking that serves the Development as a whole, rather than be dedicated to serving individual developments. As a result, it is proposed that all public car parks within the Development have a four hour (4P) time limit. This will be managed and administrated by shopping centre parking rangers who will patrol the car parking areas issuing fines to cars which exceed the 4P time limit.

### Staff Parking

Long term staff parking is proposed within the Development, and will be located in areas such that staff does not occupy more easily accessible car parks. Staff parking is proposed to be dispersed throughout the Centre car parks so that peak commuter traffic is distributed to various access points. This will assist in reducing the traffic impact on the surrounding road network during peak periods. It is proposed that staff parking is located on portions of level B02, B01 and L02 (both west and east car parks), Level L01 mezzanine level, and the level L00 adjacent to Davenport Street, noting that this is subject to change during detailed design process.

Staff parking will be enforced using car number plate recognition, as per the existing situation. The number plates of all staff car parking bays are compiled from all cars parked in the staff parking bays that stay at the shopping centre for more than four hours. All areas outside the staff parking area are checked twice a day, once in the morning and again in the afternoon, representing a four hour time frame. If staff cars are found outside the staff parking area they receive a breach notice. The program has continued to be a great success with the prime parking bays undercover and outside the major stores remaining free for customer use.

It is proposed that staff will be required to pay for a parking permit to park at the developed Centre (noting this is currently not the case). This will provide incentive for staff not to drive to the Centre, and encourage sustainable modes of transport.

## Publicise Public and Active Transport to the Development

A key aspect of managing parking demand will be to strongly publicise the proposed improvements to public and active transport to the Development.

In terms of public transport, it is proposed that real time information for bus services are situated throughout the Development to create awareness for shoppers (discussed further in Section 7.1.3). Additionally, flyers and online promotion of the proposed bus infrastructure and increase in bus services explaining the benefits for visitors and staff will be circulated throughout the Development.

The improvements in pedestrian infrastructure throughout the Development and the additional cycling infrastructure will be similarly promoted to encourage mode shift from visitors and staff.

## Peak Shopping Periods

During peak shopping periods, for example pre-Christmas week, it is proposed to continue existing arrangements with the City of Stirling and local schools, where staff park at nearby reserves and school ovals. Shuttle buses are provided to transfer staff to and from the Development where it is out of walking distance range.

### 6.1.3. Motorcycle Parking

There are no formal guidelines as to how many motorcycle parking bays should be provided for developments and activity centres. The 2011 census data for WA shows that 6,532 out of 1,104,104 (0.6%) work trips are undertaken by motorcycle (profile.id.com.au).

Given that the current mode share for motorcycle trips to Karrinyup less than 1%, it is proposed to allocate 1% of the retail and office parking to motorcycles, i.e. 50 bays. Although a proportion of motorcycle bays will be provided, motorcycles will continue to park in the regular parking bays.

The variability of parking needs for residential developments does not make it conducive to providing motorcycle parking as a percentage of car parking spaces, and thus the 1% motorcycle parking is not proposed to be applied to residential buildings.

## 6.2. Bicycle Parking

The research and guidance on the provision of bicycle parking is fairly poor. While the residential development codes (State Planning Policy 3.1) recommend a rate of 0.43 spaces per unit for residential developments, no such guidance is available for retail, office or industrial type developments in WA.

The City of Stirling Bicycle Parking policy outlines provisions for developments in excess of 400m$^2$ gross floor area. The total number of bicycle parking bays required for a large centre, such as Karrinyup, is approximately 500 bays (250 for visitors, 250 for staff) which would far outstrip even the most optimistic forecasts.

Whist it is imperative to promote cycling to improve the mode share it is important to include an appropriate number of bicycle parking facilities. In this instance, the bicycle parking is proposed to be split up as follows:

- 160 customer bicycle spaces dispersed amongst the four major entrances to the shopping centre and along the main street
- Secure, enclosed end of trip facility for staff located at the southern major entrance to the shopping centre, near the Karrinyup Bus Station (as indicated on Figure 6-9), consisting of:
  - 200 bicycle spaces
  - 200 lockers
  - Separate female and male change rooms incorporating 5 showers and 1 toilet in each

By 2031 it is anticipated that the Development will have approximately 1500 employees. Taking into consideration the proposed mode share target of 6% for cycling in 2031, it can therefore be assumed that at least 90 employees will use the end of trip facilities. The proposed size of end of trip is therefore more than sufficient.

Whilst it is proposed to provide 160 customer bicycle parking spaces there is capacity within the Development to allow for the provision of extra bicycle parking spaces if there is the demand. The landowner will monitor the usage of the bike racks.

It can be noted that the State Planning Policy 4.2 states that the typical supply of motorcycles and bicycles for an activity centre is 5-10% of all bays. For this Development, 360 bicycle bays and 50 motorcycle bays are proposed, equating to 8.3% of the total number of bays.

All bicycle facilities are proposed to be accessible at ground floor level, close to main entrances to the Development and connecting with the external proposed cycle infrastructure network (discussed in Section 9).

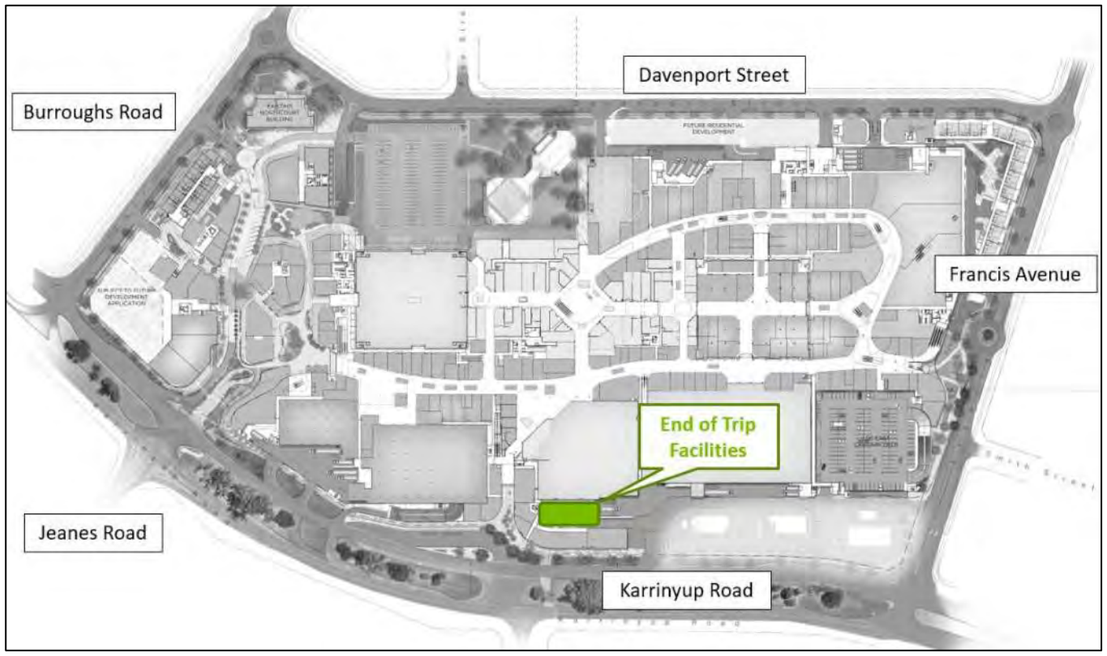



**Figure 6-9 Proposed location of bicycle end of trip facilities**

## 6.3. Parking Management Objectives

A Parking Management Plan will be used as a tool to manage parking demand by identifying the future users of the Mixed Use Expansion of Karrinyup. Prior to the commencement of site works for the centre, a Parking Management Plan is proposed to be implemented which will detail the staging of parking provision and management tools that have been described in the above sections.

The overall objective of the Parking Management Plan is to prioritise usage on the basis of specific functions or requirements. Table 6-1 lists the identified objectives and outcomes for parking management at the Mixed Use Expansion of Karrinyup.

**Table 6-1 Parking management objectives and outcomes**

| # | Objective | Proposal | Outcomes |
|---|---|---|---|
| 1 | **Consumer choice –** *people should have viable parking and travel options* | • A balance between the number of parking bays and improvements in public transport, cycling and walking facilities. | • Flexibility in travel options for all users to the Development. |
| 2 | **User information –** *motorists should have information on their parking and travel options* | • Wayfinding signage.<br>• Variable Message Signs (VMS).<br>• Aerial Parking Occupancy Detectors. | • Efficient signage that makes it easy for users to access the Development and limiting traffic congestion in the surrounding road network. |
| 3 | **Sharing –** *Parking facilities should serve multiple users and destinations* | • A balance of general vehicle, motorcycle and bicycle parking bays amongst the key entrances to the shopping centre.<br>• Appropriate number and location of accessible bays. | • All types of users to the Development to have an available parking space. |
| 4 | **Efficient Utilisation –** *Parking facilities should be sized and managed so spaces are frequently occupied* | • A total of up to 4,880 parking bays are proposed, equating to a parking rate of up to 4.2 bays per 100m$^2$ of floor area. | • 95% parking utilisation during peak periods. |
| 5 | **Flexibility –** *Parking plan should accommodate uncertainty and change* | • Constant review and monitoring of staff parking utilisation and infringements. | • Low numbers of staff infringement |
| 6 | **Prioritisation –** *The most desirable spaces should be managed to favour higher-priority uses.* | • Designated staff parking in areas away from main entrances to the shopping centre. | • Prime parking bays outside major stores and key entrances are always utilised by shoppers. |
| 7 | **Peak Management –** *special efforts should be made to deal with peak-demand* | • Parking provided at nearby school ovals during peak shopping periods, for example pre-Christmas week. Shuttle buses provided where out of walking range. | • An effective and safe method of managing demand during peak shopping periods. |
| 8 | **Quality vs. Quantity –** *Parking facility quality should be considered as important as quantity, including aesthetics, security, accessibility and user information.* | • Parking bay dimensions and aisle widths are larger than typically required.<br>• All parking will be covered.<br>• Appropriate number of mobility impaired parking, located near main entrances to the retail centre.<br>• Improved CCTV within car parking areas. | • Parking facilities that are comfortable and accessible for all users. |

# 7. Public Transport Access

## 7.1. Prioritisation of Public Transport

Public transport accessibility has been recognised as a key area of improvement for the Mixed Use Expansion at Karrinyup. In order to make public transport an attractive alternative to private vehicle, a number of factors need to be taken into consideration, including:

- Directness and convenience of routes
- Time taken to get to and from bus stops and train stations
- Frequency of services
- Flexibility of services
- Personal security
- Reliability and variability
- Route (real time) information

A number of measures have been incorporated into the design of the Mixed Use Expansion at Karrinyup and are proposed to encourage customers to use public transport as a viable transport mode. These include operational improvements, improved integration with the shopping centre, real time bus timetable information, improved bus priority infrastructure surrounding the Development and travel behaviour change initiatives, as discussed in the following sections.

It is understood that the Public Transport Authority (PTA) do not have any future planned changes to bus route alignments, other than minor route adjustments and general bus frequency increases to Karrinyup Bus Station services.

### 7.1.1. Operational Improvements

A number of bus routes provide a reliable, direct connection between Stirling Station and Karrinyup Bus Station, for example Route 423 and Route 425. The 423 route runs as frequently as every 10 minutes during peak periods, and 30 minutes on Saturdays and during off-peak periods.

Routes between other destinations, particularly north of the Development (for example Route 424 to Warwick), are not as direct and offer uncompetitive journey times when compared to private car. This is mainly because the curvilinear road network is not conducive to providing attractive, direct bus routes to service residential areas. These routes, however, are still important in providing a public transport option for residents in those areas.

The Public Transport Plan 2031 identifies the importance of public transport for Perth and particularly the need for improved mass transit services between major centres outside of the central area.

The optimal frequency of bus routes at Karrinyup Bus Station would be between 5 and 15 minutes as this would give customers enough flexibility, promoting 'walk-up' patronage to the Development. For the Development, increases in frequency are particularly important during peak shopping times (Saturday). Any amendments to bus frequencies should be coordinated with train frequencies to encourage mode transfers. Increasing bus frequency to/from Stirling Station, is seen as the most valuable as it provides direct transfers to the rail network.

The Public Transport Authority (PTA) hope to achieve increased frequencies of the bus routes servicing Karrinyup Bus Station, as shown in Table 7-1, although there is currently no PTA funding commitment for this.

**Table 7-1 PTA Planned 2031 bus route frequencies (sourced from Transperth)**

| Bus Route | Weekday Peak | Weekday Off-peak | Evening | Saturday | Sunday |
|---|---|---|---|---|---|
| **422** | 20 | 30 | N/A | 30 | 60 |
| **423** | 10 | 15 | 30 | 15 | 30 |
| **424** | 20 | 30 | N/A | 15 | 30 |
| **425** | 10 | 30 | N/A | 15 | 30 |

*Note only one service is provided in the time period

Increasing bus frequencies can often be difficult to justify, from both a financial point of view and also based on current demand. The implementation of bus priority infrastructure provides an opportunity to increase the frequencies of the bus routes (particularly for contra-flow peak commuter periods and weekend peaks) in order to take advantage of the improved infrastructure. This would ultimately increase the attractiveness of public transport to the Development, and consequently increase patronage. A funding contribution is proposed to increase the frequency of bus services between the Centre and Stirling Station for a period of 7 years. This will involve services relating to either or both the 423 and 425 routes with a goal of achieving 10-minute headways in the morning and evening Centre weekday peaks. During the weekends, movements will be on one route (Route 425), which will be more easily identifiable for Centre customers, with 15-minute headways on the shoulders of and during the Centre weekend opening hours.

In terms of existing bus stop locations, these are considered appropriately spaced to capture the local catchment and changes to this would not add value.

### 7.1.2. Bus Station Integration with the Development

Currently the Development does not open out into the bus station. To improve the transition between public transport and the Development, the Development aims to create a seamless, legible connection and emphasise the integration of the two.

CPTED (Crime Prevention through Environmental Design) principles are proposed in the upgrade of the Karrinyup Bus Station to improve personal security. This includes improved lighting and the introduction of CCTV (closed circuit television) cameras to provide active surveillance. Additionally, weather cover will be provided at the bus station.

Digital signage will also be provided within the Karrinyup Bus Station and Stirling Station to inform staff and customers of the next bus to and from the Centre, regardless of the route.

Improvements to pedestrian / cyclist paths to Karrinyup Bus Station will also promote public transport use, both of which are described further in Sections 8 and 9 respectively.

### 7.1.3. Real Time Information

Currently the provision of information at the Karrinyup Bus Station is limited to stand specific route and timetable information on stand number signs.

It is proposed that all stands at the bus station are upgraded to show real time timetable information to indicate to customers when a bus is scheduled to arrive. Display screens are proposed to be provided throughout the Development to indicate real time information for departing buses. Additionally, interactive bus schedule planning information screens are proposed to be situated throughout the Development, with real time bus information integrated with phone applications. The global positioning system (GPS) tracking of buses is also now in effect which will significantly improve the accessibility of real time bus information to customers.

These initiatives will encourage greater awareness of public transport options for customers.

### 7.1.4. Bus Priority Infrastructure

In order to make public transport options competitive with private vehicle use, buses must be reliable. Transport modelling has identified some locations where bus lanes would improve bus journey times and reliability by allowing buses to bypass queued general traffic.

It is therefore proposed that the following bus priority infrastructure is implemented in the road network surrounding the Development. These conceptual upgrades are indicated on Figure 7-1 and have been further described in Section 5.

- An eastbound bus queue jump lane on Karrinyup Road, on both the approach and departure side of the Francis Avenue intersection, integrating with the Karrinyup bus station. This will ensure that buses have no delay in exiting the bus station to enter the bus lane.
- A westbound bus lane along Karrinyup Road from the west of North Beach Road to the west of the Huntriss Road intersection.
- An additional right turn traffic lane is also proposed on the Karrinyup Road west approach to the Huntriss Road intersection. Although the right turn lane is not proposed to be a bus-only lane, the additional capacity for the right turn will in effect provide better traffic flows for all vehicles through the intersection.

It is understood that the Public Transport Authority have the desire for stronger bus priority along Huntriss Road, servicing the 423 route, as this is currently the most frequent service to Karrinyup. Physical constraints along Huntriss Road, however, limit bus infrastructure improvements to this route without significant effect on adjacent properties. The additional eastbound right turn lane proposed on Karrinyup Road at Huntriss Road intersection aims to improve the capacity of the turn movement for the 423 route, therefore improving bus reliability through this intersection. If there is only one general traffic turn lane and one bus lane, buses remain queued behind general vehicles and miss the green phase.

As a result, it has therefore been proposed to improve priority for the 425 route by including bus lanes along Karrinyup Road. The transport modelling has shown a reduction in travel time of 1 minute for buses during the Saturday peak period with the introduction of these lanes. Also, not only do the lanes provide improved journey times and reliability, but it provides a visual incentive for general vehicles queued along Karrinyup Road to consider switching modes. Additionally, bus lanes along Karrinyup Road are more effective in the long term, as Karrinyup Road is a primary distributor with a wide road reserve and is better suited to moving more people.

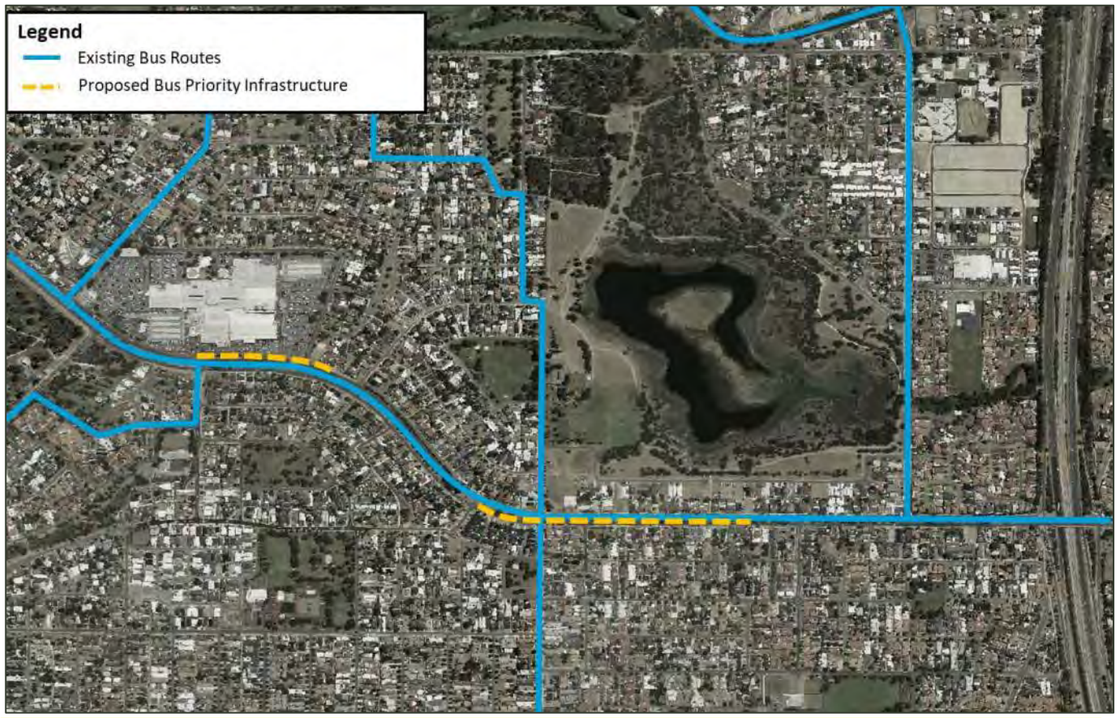



**Figure 7-1 Proposed bus priority infrastructure**

### 7.1.5. Travel Behaviour Change Initiatives

Travel behaviour change is considered one of the most important tools in order to help curb the car-centric nature of Karrinyup users, to not only encourage mode shift to public transport, but also to walking and cycling. The principles of behaviour change include **Inspiration**, **Enablement**, **Invitation** and **Trial and Satisfaction**, as identified by the Department of Transport (DoT) and should be considered in the introduction of behaviour change programmes.

By providing subsidised SmartRider cars to staff, the behavioural shift to public transport is expected to occur even before the redeveloped centre opens. The Centre will also promote travel behaviour change during this period. Increased bus frequencies will be provided during construction for staff and construction employees.

A Travel Behaviour Change and Parking Management Plan will be developed, after further consultation with Department of Transport.

## 7.2. Taxi Services

Taxis make an important contribution to public transport at shopping centres. They enable short trips to be made in a timely and efficient manner. A taxi rank holding up to four taxis is proposed along the main street immediately adjacent to the town square/ piazza entry to the Development. This is in a central position allowing convenient access to/ from the Development.

# 8. Pedestrian Access

## 8.1. Pedestrian Priority

Walking is the most common form of transport as nearly everyone is a pedestrian at multiple times in their daily travels. As such, high importance has been given to improving pedestrian access, safety and comfort to the Karrinyup Development.

The introduction of residential dwellings as part of the Development is likely to increase the proportion of pedestrians accessing the Development. The expected future redevelopment of the draft Structure Plan area will further increase pedestrian access to the Development.

The following sections highlight the improvements proposed in order to improve walkability within and surrounding the Development, with the aim of increasing walking trips to the Development.

### 8.1.1. Infrastructure

Walking access to the Development is currently limited by the lack of dedicated pedestrian links. The width of the footpath around the perimeter of the Development is narrow and crossings are generally not DDA (Disability Discrimination Act) compliant. To improve access to the Development, it is proposed to provide dedicated walking access paths to the Development by upgrading the surrounding pedestrian network. This includes widening the existing footpaths around the perimeter of the Development (on the side adjacent to the Development) to at least 2.0m, or providing 3.5m shared paths as indicated in Figure 8-1, which would tie in to the surrounding footpath network. These pedestrian links provide adequate connections to the existing pedestrian network to facilitate movement to and from the Development and increase walking as a mode to the Development.

A connected shared path network has been proposed due to the limited road reserve area, with wider paved shared areas at crossing points (refer to the schematic road upgrade drawings in Appendix A). The use of shared paths is considered acceptable for this Development environment since bicycle speeds are not expected to be excessive. A 3.5m shared path width is described by Austroads Guide to Road Design Part 6A as appropriate for frequent bidirectional commuting and recreation (concurrently) with bike speeds greater than 30km/hr.

To make it more attractive to walk to and from the Centre, a contribution is proposed to expand the extent of the local path network to provide a footpath on one side of local streets that do not currently have a footpath. This contribution will be to an amount of $400,000.

In addition, there is likely to be a greater likelihood of pedestrian use of the paths if the amenity for users is improved. As such it is also proposed to make a contribution of $50,000 to the City to provide additional street trees to help shade those paths that are devoid of any street trees. It is believed that the improved infrastructure for pedestrians, combined with the increase in residential density surrounding the Centre, will increase the pedestrian mode split, particularly for customers.

Internally, the proposed design incorporates four pedestrian gateways to the retail core of the Development; North Gate, South Gate, East Gate and West Gate. The gateways will all be accessible from the footpath surrounding the Development, making the Development easier to reach from the surrounding residential catchment.

### 8.1.2. Crossings

Improving pedestrian safety during the crossing of main roads and parking lots has been given high priority in the proposed Development. There are three existing signalised pedestrian crossings accessible from Karrinyup Road, all of which are proposed to be maintained i.e. Jeanes Road, Francis Avenue and the signalised pedestrian crossing adjacent to Miles Street. These crossings are well spaced along the segment of Karrinyup Road adjacent to the Development, and provide safe, visible access to the Development.

Along Burroughs Road, Davenport Street and Francis Avenue, it is proposed that pedestrian refuges are provided at the locations of the main gateway entrances to the Development. This will ensure that pedestrian desire lines to the Development are met with safe crossing points. All crossings along these streets will be DDA compliant, with appropriate ramps and tactile ground surface indicators. A central median is also proposed to be provided along Burroughs Road to enable safer access for pedestrians.

In some areas within the Development, visitors are currently required to cross roads through car parks to reach the entrance to the Development, which poses potential safety concerns. A zebra crossing, the length of a parking aisle is proposed to be provided within each reconfigured car parking level to provide safe, visible access directly to shopping centre entrance points and vertical transportation. The zebra crossing facilities also provide improved safety for trolley users, parents with prams and mobility impaired users to access the shopping centre

With the above control measures, the proposed Development aims to reduce the number of conflict points between vehicles and pedestrians.

Additionally, it is proposed that the phasing at signalised intersections provide a balance between all transport modes, including pedestrians. This will be discussed with Main Roads WA during detailed design.

### 8.1.3. Aesthetics and Amenity

In order to help make walking a preferred mode of transport, high levels of amenity are required for all key pedestrian corridors and paths.

These gateways will be wide, landscaped areas forming a green pedestrianised environment, while dining opportunities will also be available at each. The main street component will be occupied by food and beverage uses which offer dining opportunities outside of traditional trading hours. Street furniture, lighting and weather cover will be incorporated into the detailed design for pedestrian corridors to ensure a high level of amenity. This will make walking to and within the Development more inviting and enjoyable.

Way-finding signage is proposed to direct pedestrians to the main gateways to the Development, and also to vertical transportation through car parking levels. Signage is also proposed in the local residential area, within a 10 minute walk to the Development. This will promote the legibility and visibility of the pedestrian network.

## 8.2. Safety

Pedestrian safety will be improved by the Development. The Development will enable pedestrian to enter the shopping centre via upgrades to the surrounding footpath network and the pedestrianised gateways. Pedestrians will be able to circulate from the main gateways to the surrounding network without needing to cross the car park road network, other than Main Street which will be a shared area. Pedestrian access and safety will also be improved within the proposed car parks with the provision of zebra crossings that connect through each car park area to the Development entries. These clearly provide a pedestrian walk way clear of traffic and will be supported with way finding signage to improve their usage.

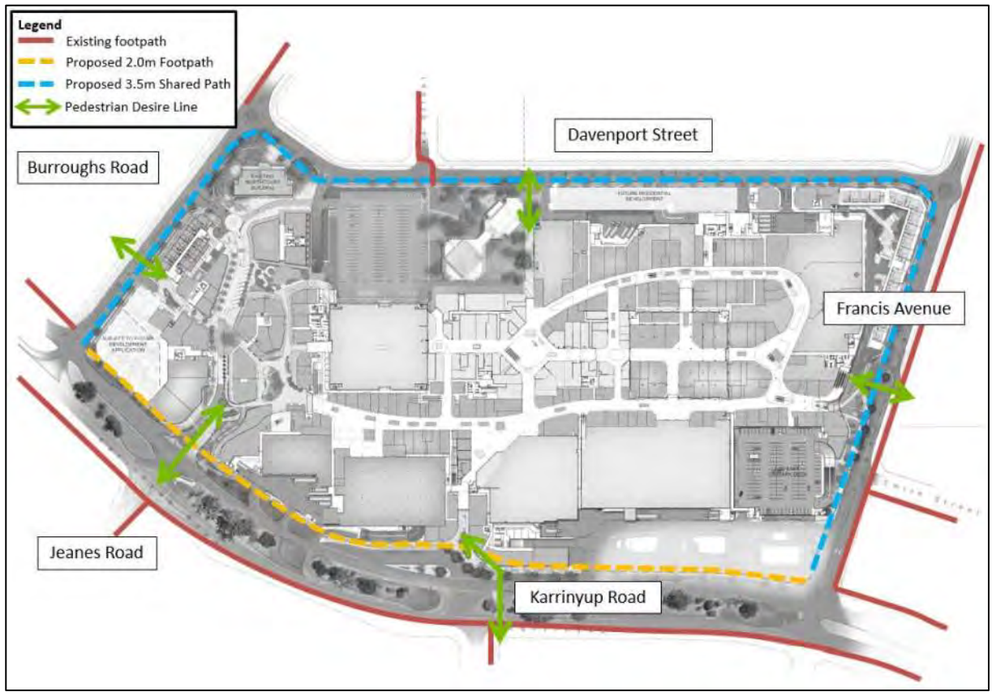



**Figure 8-1 Proposed pedestrian infrastructure surrounding the Development**

# 9. Cycling Access

There are some existing cycling facilities within the Development; however, in order to encourage mode shift there is a strong need for substantial cycle infrastructure improvements to improve useability and safety for cyclists, particularly within the immediate vicinity of the Development. A number of improvements to the cycling infrastructure surrounding the Development, as well as ways to promote cycling to the Development are described in the following sections.

## 9.1. Proposed Infrastructure

As one type of infrastructure cannot fulfil the same function for all cyclists in a safe and effective way, it is important that the types of cyclists that will access the Mixed Use Expansion at Karrinyup are considered. It is expected that a combination of users will access the Development, including staff, shoppers and parents with children. It is not expected that there will be high numbers of high speed cyclists commuting to the Perth CBD in areas surrounding the Development. Considering the mixed-use nature of the development and family type environment, it is proposed that the surrounding cycle network should cater for inexperienced cyclists. Inexperienced cyclists refer to bicycle users who either rely on or enjoy cycling, but are not necessarily confident or experienced enough to cycle amongst general road traffic or with other cyclists who travel at higher speeds, in a safe manner. Inexperienced cyclists tend to travel at speeds lower than 20km/h and distances less than 5km (equating to an approximate 15-20 minute journey time). It is therefore proposed that cycling infrastructure to the Development should consist primarily of continuous off-road shared/separated bicycle paths with safe crossings into the Development.

A number of cycle paths are proposed in order to increase the effectiveness of the surrounding cycle network, with the aim of tying in to the Perth Bicycle Network (PBN) routes particularly from the east and south, to promote bicycle access to the Development. The proposed infrastructure improvements are described below, as indicated on Figure 9-1, with schematic road upgrade drawings shown in Appendix A.

### 9.1.1. Karrinyup Road

Along Karrinyup Road, the following cycle infrastructure upgrades are proposed:

- Installation of a new segregated 2.5m two-way cycle path adjacent to the existing shared path between West Coast Highway and Francis Avenue. The existing shared path (currently of sub-standard width for a shared path) would be converted to a dedicated footpath. This path is predominantly located adjacent to parkland with minimal crossovers and interruptions for cyclists and provides a safe connection to the PBN Route NW 2 along Marmion Avenue and West Coast Highway.
- Installation of a one-way segregated 1.5m off-road cycle path in each direction of Karrinyup Road between Francis Avenue and Huntriss Road which would provide good connectivity to the Development. The PBN Route NW1 is also located east of the Development along Huntriss Road, providing an additional link between the suburbs of Innaloo and Duncraig. There is currently no existing direct link to these routes from the Development, and as such this connection would be highly beneficial in promoting cycle access to the Development. Alternatively, the development of a safe active street along a parallel route should be further considered.
- Upgrading of the existing midblock pedestrian crossing on Karrinyup Road to a combined pedestrian/cyclist crossing or ‘toucan’ crossing (including bicycle signal lantern). Although cyclists can currently use this crossing by dismounting, this would formalise the crossing and promote awareness for cyclists.

### 9.1.2. Burroughs Road

Along Burroughs Road, the following cycle infrastructure upgrades are proposed:

- Installation of a two-way off-road shared path to the west of the Development along the eastern side of Burroughs Road between Karrinyup Road and Davenport Street. Separation between the shared path and the traffic lanes is provided as it reduces the risk of ‘dooring’ (cyclists being hit by opening car doors). North of Davenport Street, cyclists can ride on-road. This is considered satisfactory given the reduced conflict (clear of the shopping centre area), reduced traffic volumes, 50km/h speed environment, and there is adequate road width to allow vehicles to pass cyclists. To enhance the connection to the Pascoe Street PBN Route NW7 signage directing cyclists to the Development should be provided. This, combined with the segregated path immediately adjacent to the Development, should improve cycling from the local community to the Development.

### 9.1.3. Davenport Street

Along Davenport Street, the following cycle infrastructure upgrades are proposed:

- Installation of a two-way off-road shared path to the north of the Development along the southern side of Davenport Street between Burroughs Road and Francis Avenue. Separation between the shared path and the traffic lanes is still provided to ensure appropriate protection from parked vehicles and other obstacles. Providing a continuous segregated shared path around the perimeter will promote cycling movement to and within the Development.

### 9.1.4. Francis Avenue

Along Francis Avenue, the following cycle infrastructure upgrades are proposed:

- Installation of a two-way off-road shared path to the east of the Development along the western side of Francis Avenue between Karrinyup Road and Davenport Street. Providing a segregated shared path around the perimeter will promote cycling movement to and within the Development. North of Davenport Street, cyclists can ride on-road to connect to the Pascoe Street PBN Route NW7, similarly to Burroughs Road.

### 9.1.5. Jeanes Road

Along Jeanes Road, the following cycle infrastructure upgrades are proposed:

- Installation of a segregated 2.5m two-way cycle path between Deanmore Road and Karrinyup Road. This path is located adjacent to a park with minimal crossovers and interruptions for cyclists, and fills a gap in the cycling network providing a safe connection to the PBN Route NW 2 that continues along Jeanes Avenue/Deanmore Road. The cycle path can be deviated to avoid existing light poles, which would require the path deviating into the adjacent land reserve.

Another important improvement for cycle friendly networks is to ensure intersections will accommodate cyclists appropriately. Given tight road width constraints, some areas (at intersections or otherwise) will require short sections of shared paths/areas, for both pedestrians and cyclists (refer to the schematic road upgrade drawings in Appendix A). This is necessary and acceptable as the area surrounding the Development will not be a high speed cycling environment, and cyclists would be required to slow down upon reaching intersections anyway, and. Shared path areas will need to be delineated and signed appropriately to advise all path users. Further detail would be incorporated into detailed intersection design and signal design.

#### 9.1.6. Wider Cycling Network

Lake Gwelup is a significant public open space that will be used by the residents in the Development. In general, the surrounding residential roads that connect to Lake Gwelup carry low traffic volumes at low speed, and therefore cyclists can be accommodated on the road. Footpaths are provided along the majority of residential roads to the east of the Development to connect pedestrians to Lake Gwelup Reserve. From the Development, there is dedicated pedestrian and cycling infrastructure proposed to connect to these surrounding residential roads, and then once reaching Lake Gwelup Reserve, there is an existing shared path network within Lake Gwelup Reserve. Wayfinding signage details will be confirmed during detailed design stages and should include Lake Gwelup as a key cycle route.

In terms of connecting to the wider cycling network, there is a number of existing Perth Bicycle Network (PBN) routes that surround the Development, which are being revisited as part of the new Western Australian Bicycle Network Plan.

With reference to the City of Stirling Draft Integrated Cycling Strategy (January 2015), an audit of the PBN network routes in the wider cycling network surrounding Karrinyup Shopping Centre was undertaken by the City. The City suggests that with some improvements, the existing PBN network could form the basis of a familiar and functional secondary cycle network.

The proposed cycling infrastructure described above provides infrastructure where there is believed to be no future plans for infrastructure and will encourage cycling to the Development.

**Figure 9-1 Proposed cycle infrastructure surrounding the Development**

## 9.2. Bicycle Parking and End of Trip Facilities

Minimal bicycle parking facilities currently exist and access to these are somewhat problematic as dedicated routes from the Karrinyup access locations are not provided and bike users are expected to cycle through parking areas. As discussed in Section 6.2, it is proposed that a quantity of bicycle racks are installed at all main pedestrian entrances to the Development. A centralised end of trip facility for staff at the Development is proposed near the South Gate entrance, near the Karrinyup Bus Station. The facility will include secure, enclosed bicycle storage, lockers and change room facilities. The proposed formalising of the existing signalised pedestrian crossing on Karrinyup road to a shared toucan crossing for cyclists will provide appropriate access to the bicycle end of trip facilities.

## 9.3. Promotion of Cycling

In addition to infrastructure changes, it is important that cycling is promoted in other ways to initiate behaviour change and encourage cycling. It is proposed that way-finding signage is installed to direct cyclists towards the Development at major intersection points. Inappropriate and often inadequate signage along these routes and the failure to integrate with commercial centres, such as at Karrinyup, reduces the effectiveness of the cycling network. Cycling network maps are also proposed to be made available within the Centre to promote awareness of cycling.

## 9.4. Safety

Cycling safety will be improved with the provision of formalised cycle paths on the roads surrounding the Development and direct access into the Development. Bicycle parking will be provided at all the entries in an area with good passive surveillance. The provision of bicycle lanterns at the pedestrian crossing on Karrinyup Road will enable cyclist to easily cross from the southern side improving access for cyclists on Karrinyup Road, Jeanes Road and for those coming from West Coast Highway.

# 10. Servicing Access

## 10.1. Type of Service Vehicle

Appropriate access for heavy commercial vehicles was considered when locating servicing loading areas within the Mixed Use Expansion at Karrinyup, and to ensure that entrance and exit of service delivery vehicles can be facilitated through access points. Access to the Development is left-in left out in as much as possible in order to provide safer connections that reduce the likelihood of conflicting movements.

The typical service delivery vehicles that are anticipated to require access to and from the Development include:

- Delivery vehicles of various sizes, (ranging from small courier vans to large 19.0m articulated vehicles)
- Waste collection vehicles
- Emergency vehicles

A total of nine (9) service delivery yards are proposed within the Mixed Use Expansion at Karrinyup, as shown in Figure 10-1. The proposed service delivery yards are well separated from the general public and the reversing of all vehicles is contained within each service delivery yard.

The number of service delivery yards is believed to be sufficient for the expected number of servicing trips required for the Development.

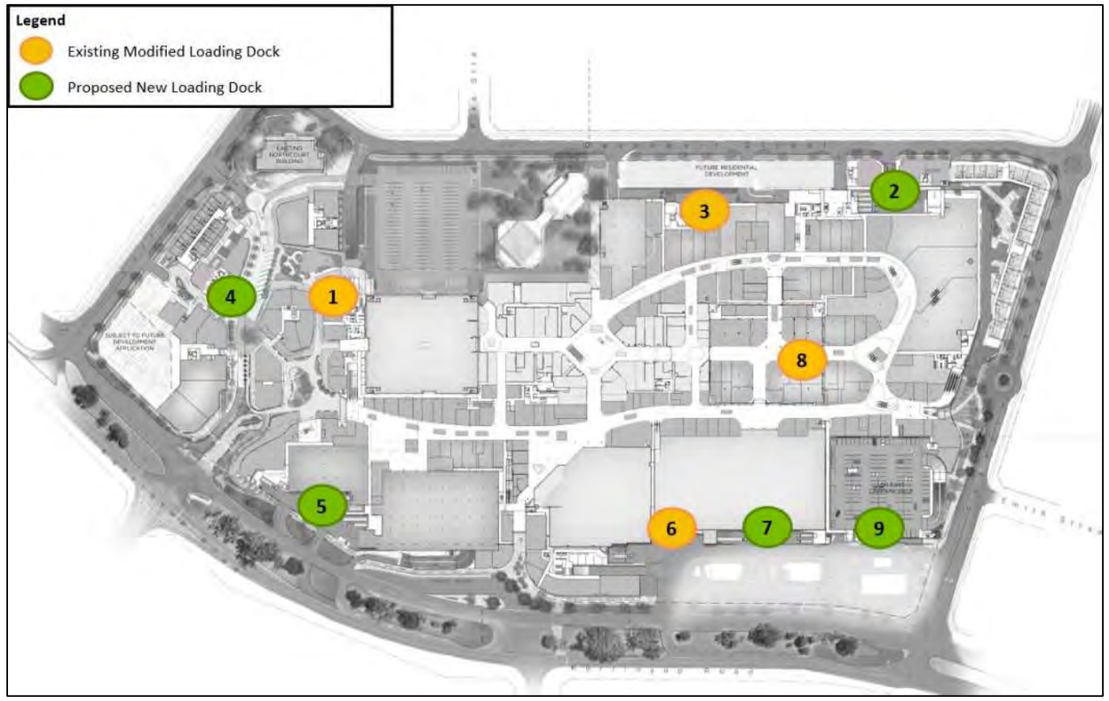



**Figure 10-1 Proposed service delivery yards within the Mixed Use Expansion at Karrinyup**

## 10.2. Vehicle Swept Path Analysis

An assessment of vehicle swept paths within the Development was undertaken using AutoTURN software (Transoft Solutions Inc.).

### 10.2.1. External

The schematic design of the roads surrounding the Development (Burroughs Road, Francis Avenue and Davenport Street) allows for the movement of service vehicles to access the loading docks within the Development, as shown in Figure 10-2. All the intersections immediately surrounding the Development have been designed to accommodate a 19.0m articulated vehicle (semi-trailer) circulating in an anti-clockwise direction. This provides flexibility in the movement of articulated vehicles and facilitates access for the small number of semi-trailers that may need to head west from service delivery yards 1, 5, 6 and 7. The design ensures that 12.5m heavy rigid trucks can access the service delivery yards from Davenport Street. The left and right turn movements out of both Burroughs Road on to Karrinyup Road, and also Francis Avenue from Karrinyup Road, have been designed to cater for 19.0m semi-trailers to ensure added flexibility.

At some access points into the Centre, mountable kerbing is proposed to allow for a19.0m articulated vehicle left turn movement. Any modifications to kerbing external to the site will require the relevant approvals to be obtained from the City prior to the commencement of the works'.

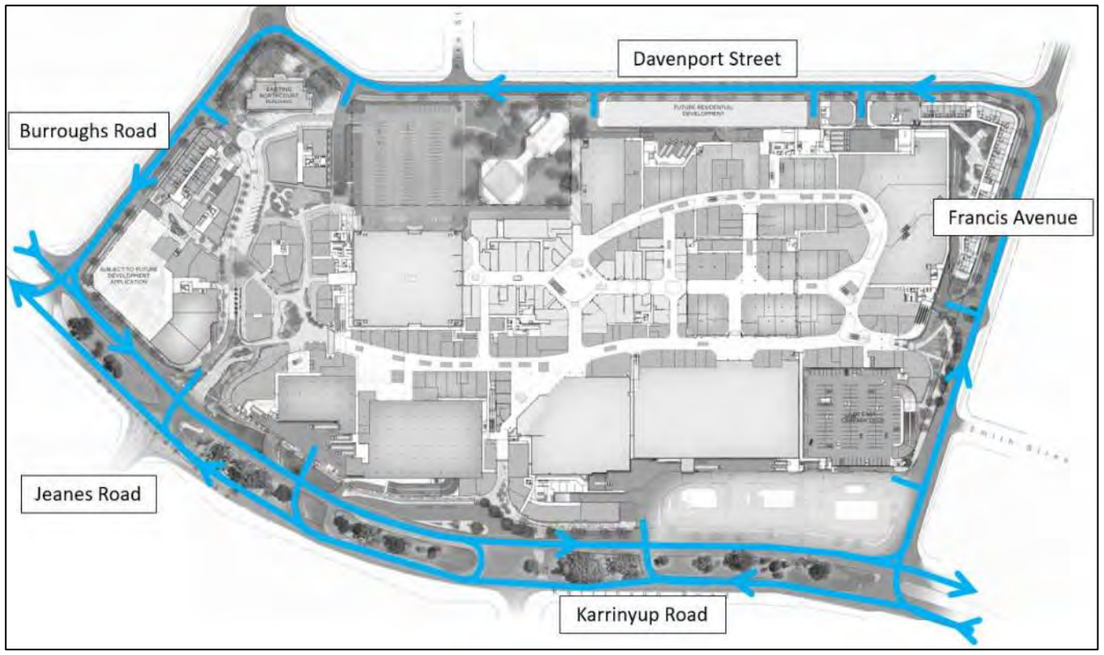



**Figure 10-2 Circulation of service vehicles external to the Development**

### 10.2.2. Internal

The appropriate vehicle swept paths for each loading bay are described below, as well as the vehicle type expected to be used. The vehicle swept paths are shown according to Figure 10-3, and indicate a vehicle clearance of 500mm. The vehicle body includes overhang and therefore represents the most conservative path.

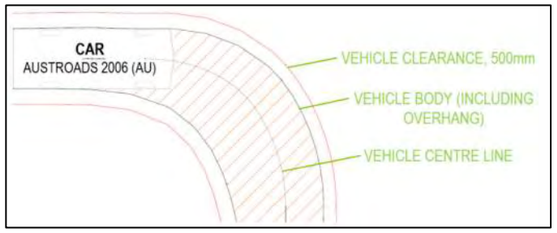



**Figure 10-3 Vehicle swept path legend**

#### Service Delivery Yard 1

This is an existing service delivery yard that is proposed to continue to service Myer in the proposed redevelopment.

The entry and exit to this delivery yard for all vehicles is via Access 9 from Davenport Street. Referring to both Figure 10-4 and Figure 10-6, the yard has been modified to allow a 19.0m articulated vehicle to enter and exit the yard from Davenport Street in a forward directiont. This modification improves the safety of the manoeuvre, since the existing scenario requires a 12.5m vehicle to reverse in from the public parking circulation area for a long distance.

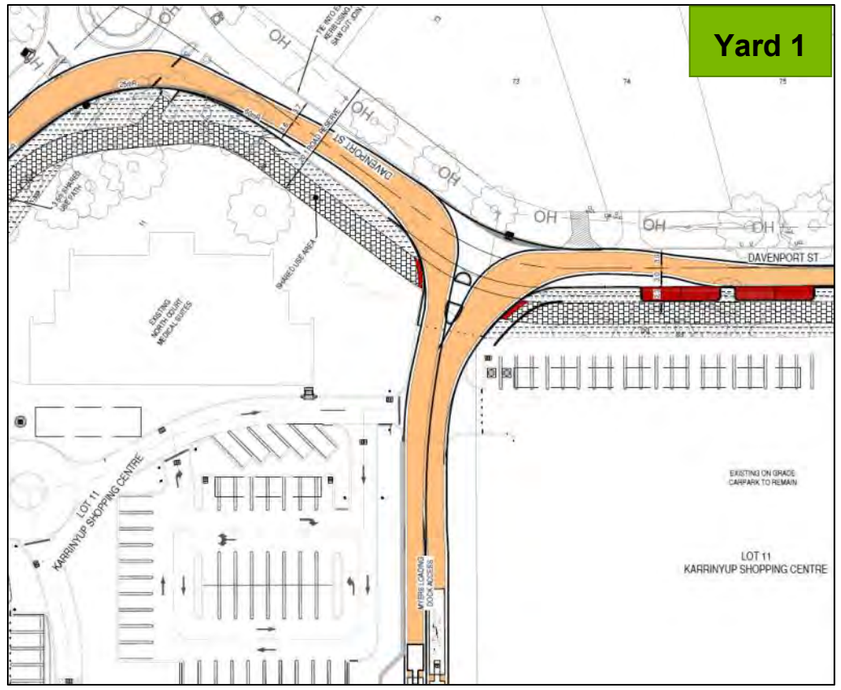



**Figure 10-4 Yard 1 – Access from Davenport Street to Yard 1**

The delivery yard layout has been further modified to include a total of 5 loading bays and 3 waste compactors. The modified layout showing vehicle access is shown in the following figures.

Referring to Figure 10-5 and Figure 10-6 respectively, bays 1 to 5 have been allocated as common loading to smaller tenancies, while bays 6 to 8 have been allocated to service Myer. Up to a 19.0m articulated vehicle is able to access Bay 8. There are some cases as to when bays cannot be accessed whilst certain waste compactors are in use, however it is anticipated that waste compactors will be accessed outside of business hours, and otherwise will need to be managed to suit other deliveries.

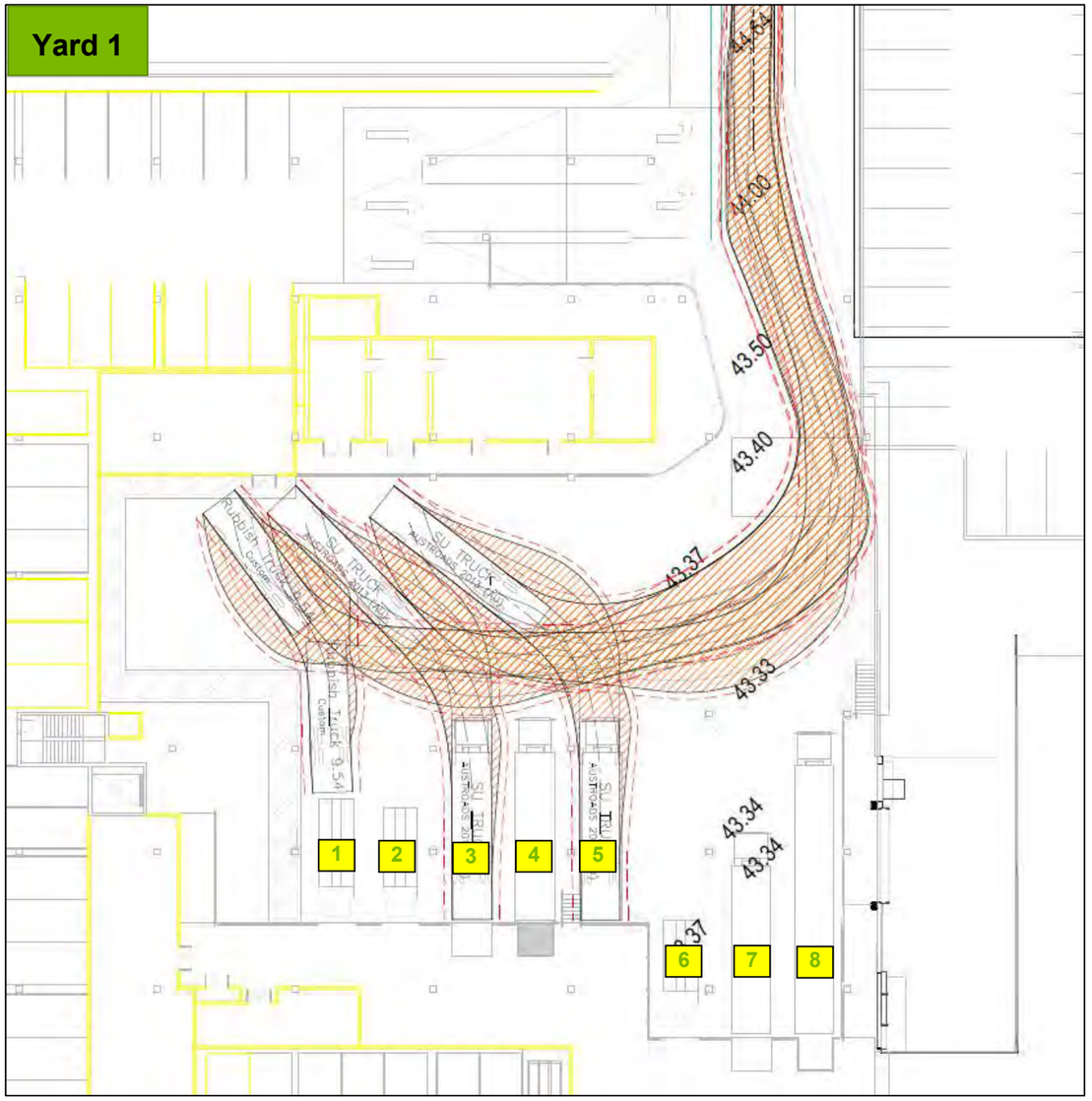



**Figure 10-5 Yard 1 – Vehicle swept path for bays 1 to 5 (common loading)**

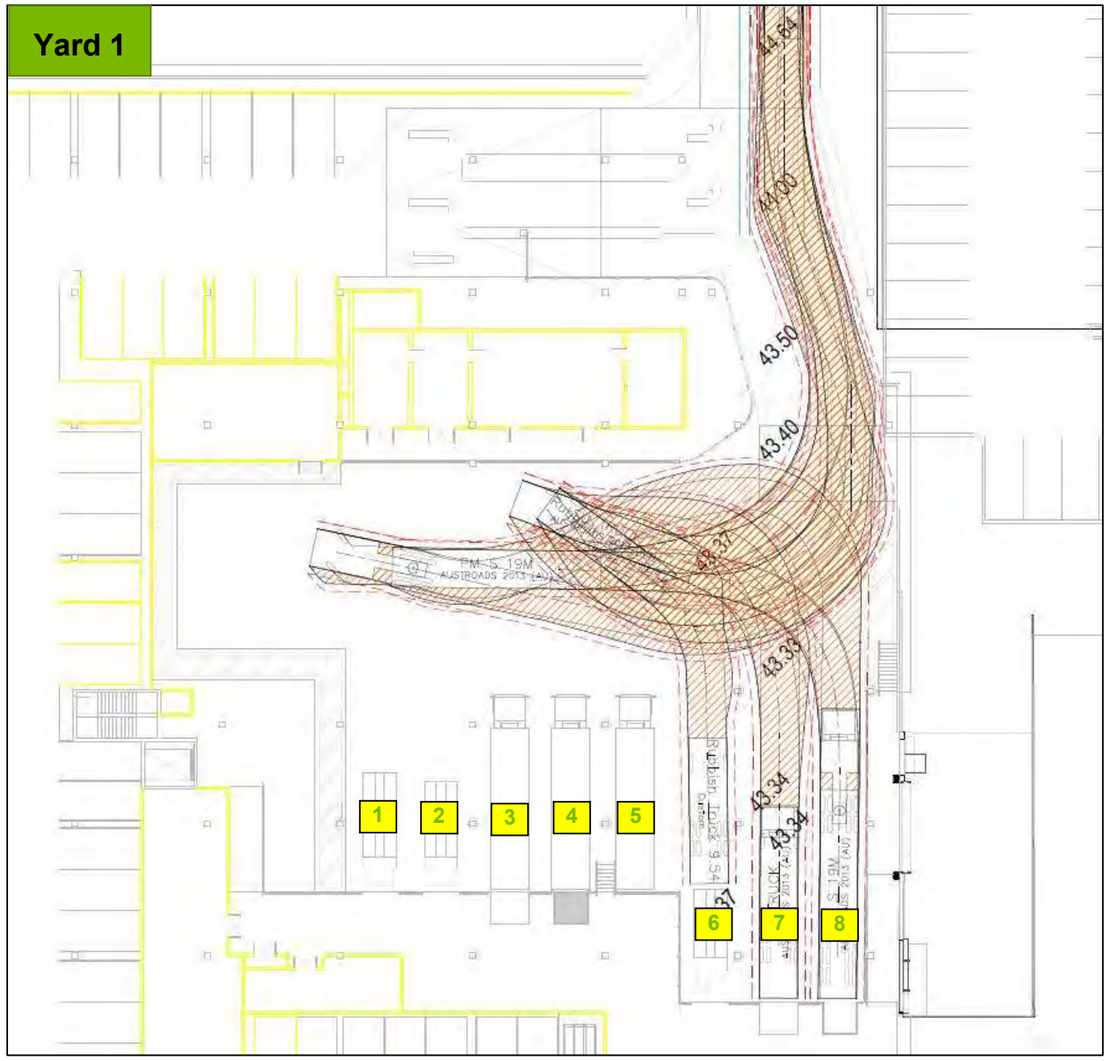



Figure 10-6 Yard 1 – Vehicle swept path for bays 6 to 8 (Myer loading)

### Service Delivery Yard 2

This proposed service delivery yard allows access for 12.5m heavy rigid vehicles. This service access is sufficiently separated from the car park access, reducing the potential for confusion and allowing the loading yard to operate without conflict with car park users. The service trucks can left turn in without crossing the Davenport Street centreline and the exit onto Davenport Street has clear sightlines.

An acoustic gate is proposed to operate prior to 7:00 AM in order to mitigate any noise from reversing vehicles (please refer to the Acoustics report for further details).

The delivery yard accommodates four spaces for 12.5m heavy rigid vehicles and two spaces for 9.54m waste trucks (accessing waste compactors). Vehicle access to the delivery yard is shown in the following figures. There are some cases as to when bays cannot be accessed by heavy rigid vehicles (12.5m) whilst certain waste compactors are in use, however it is anticipated that waste compactors will be accessed outside of business hours, and otherwise will need to be managed to suit other deliveries.

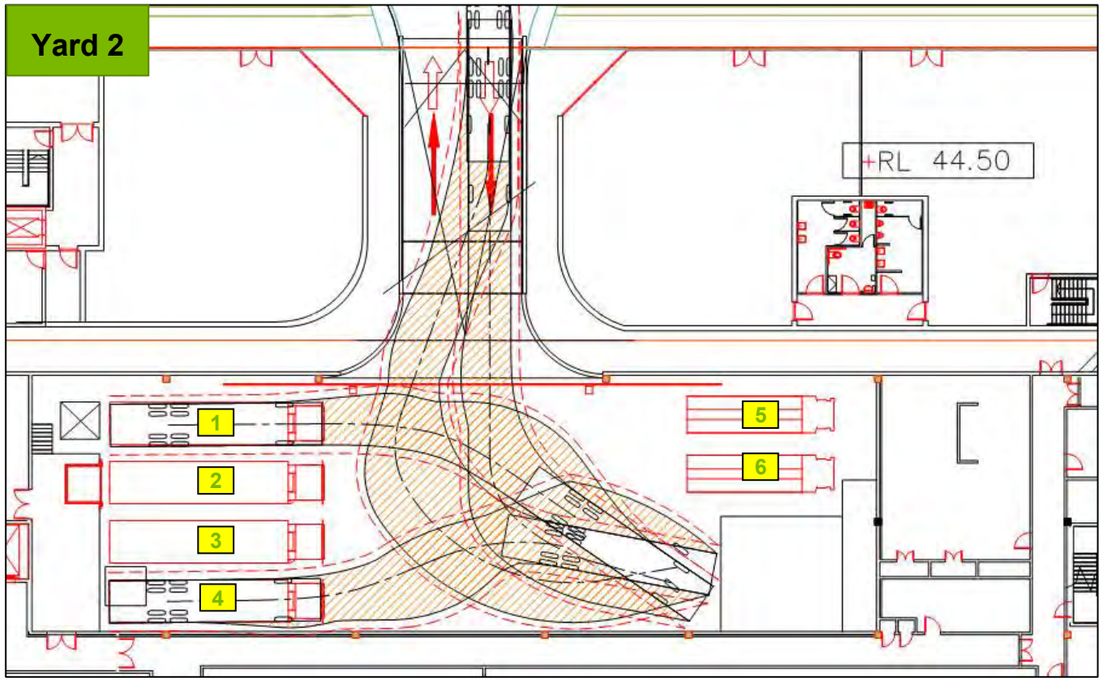



Figure 10-7 Yard 2 – Vehicle swept path movements for heavy rigid vehicles (12.5m)

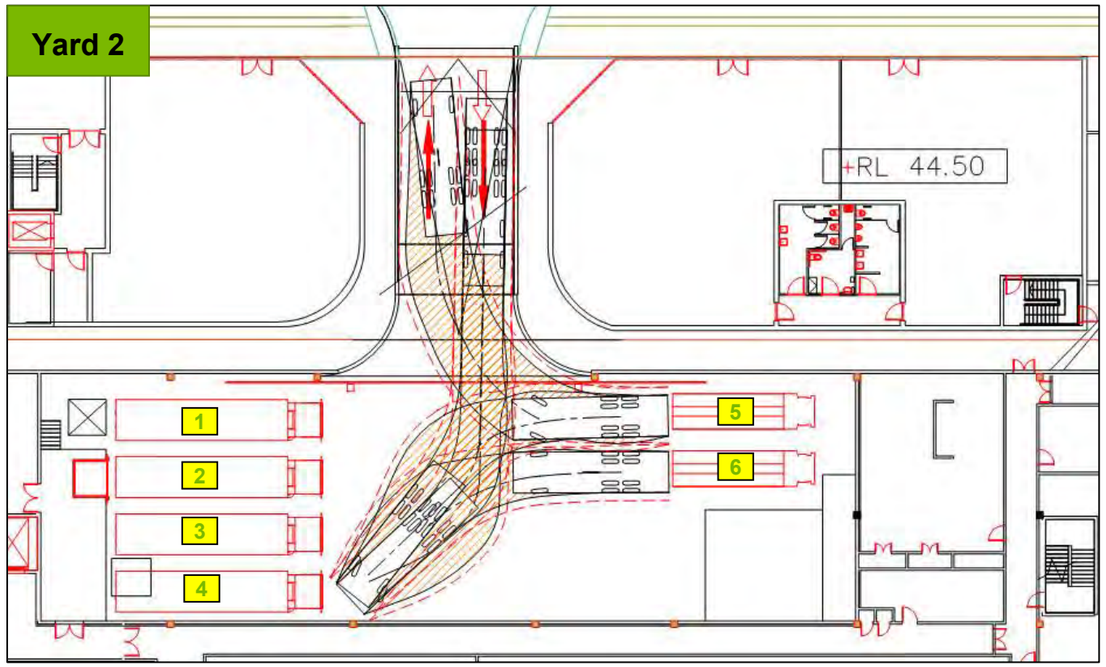



Figure 10-8 Yard 2 – Vehicle swept path movements for waste vehicles

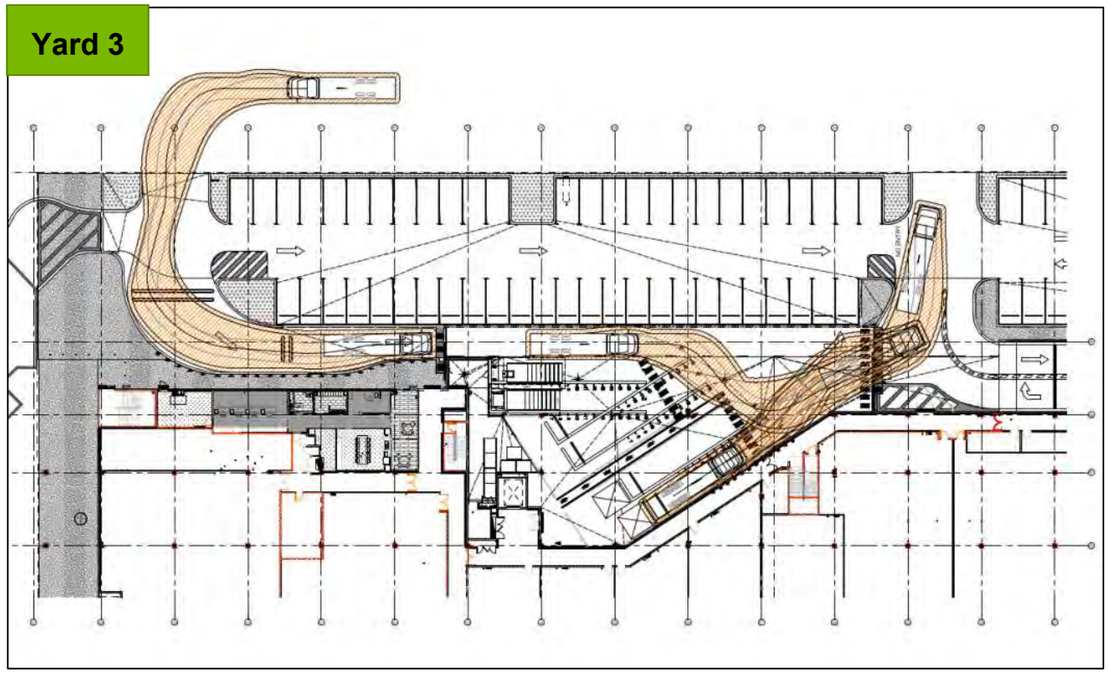



Figure 10-9 Yard 3 – Vehicle swept paths for 12.5m heavy rigid vehicle

### Service Delivery Yard 3

This existing service delivery yard is located in the north east of the Development and is proposed to be modified in order to contain the reversing movement within the yard itself, as this reduces potential conflict with general public car park circulation. This delivery yard allows access for 12.5m heavy rigid vehicles, as shown in the following figures. Currently, refrigerated trucks utilise this delivery yard, however this will not occur in the proposed redevelopment.

This delivery yard has been modified to service the extended retail formed as part of the development of the Bankwest site. The service vehicles will enter via the modified Access 8B via a one-way service only entry before exiting via Access 8A, as shown in Figure 10-9. Signage and line marking will be used to indicate no access for general vehicles.

The yard includes four bays for 12.5m heavy rigid vehicles, plus two spaces to access waste compactors (refer to Figure 10-9 and Figure 10-10). The two western heavy rigid vehicle bays cannot be accessed when the waste compactors are in use, however it is anticipated that waste compactors will be accessed outside of business hours, and otherwise will need to be managed to suit other deliveries.

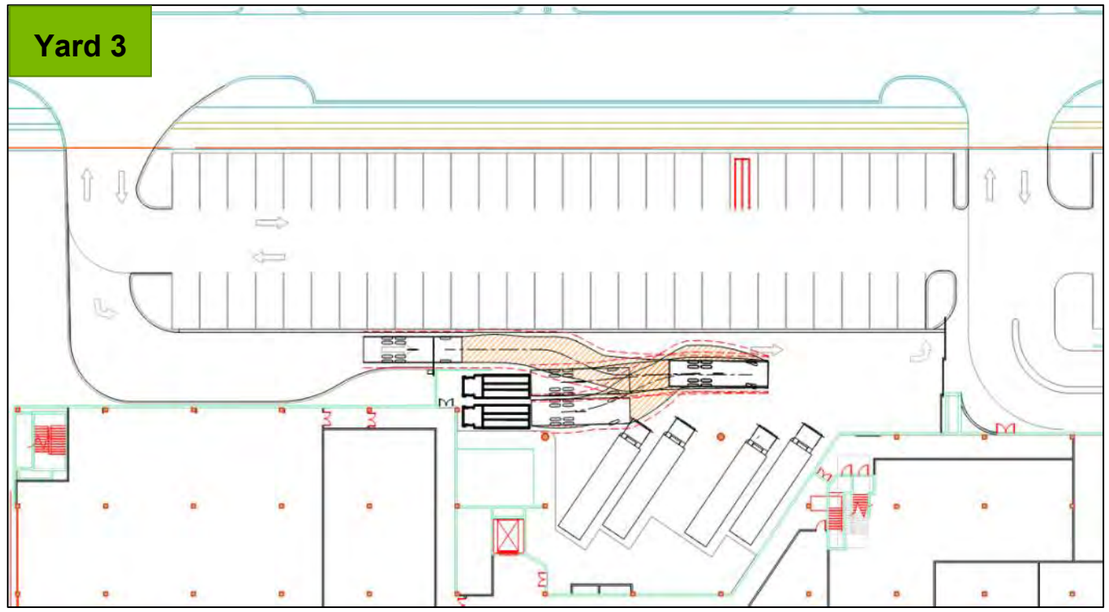



Figure 10-10 Yard 3 – Vehicle swept paths for waste vehicles

### Service Delivery Yard 4

This service delivery yard is intended to be utilised for courier services and waste collection for both commercial and food and beverage stores in proximity to the main street. Delivery bays located along the west side of the main street will allow access for an 8.8m medium rigid vehicle.

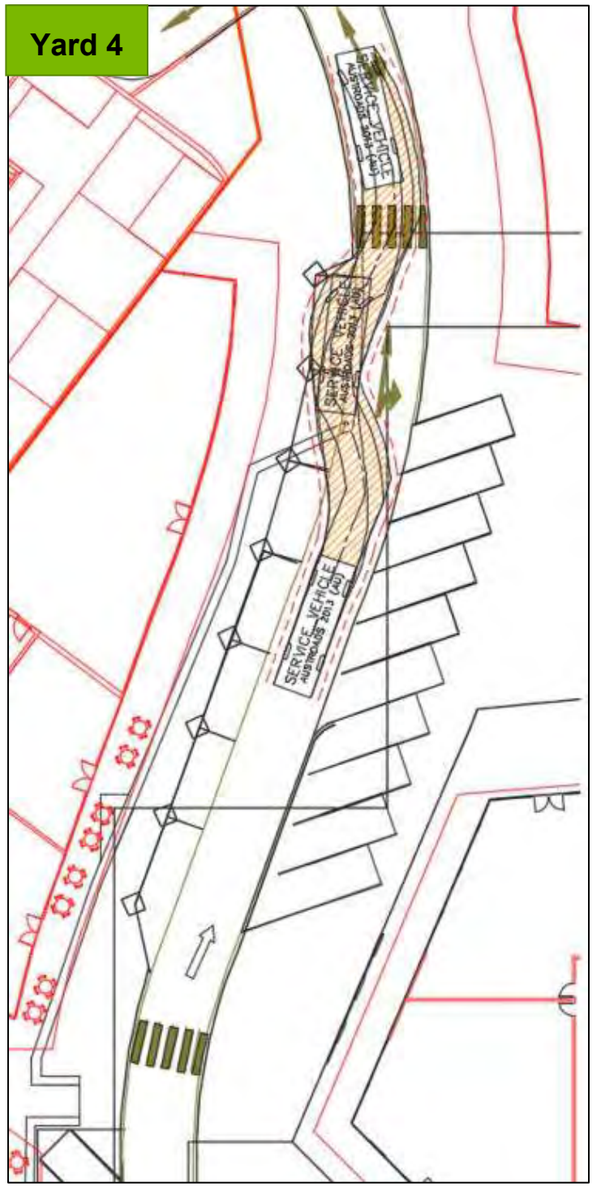



**Figure 10-11 Yard 4 – Vehicle swept path for 8.8m medium rigid vehicle**

### Service Delivery Yard 5

This service delivery yard is intended to serve future food stores at the Development, which would require refrigerated trucks.

The crossover for the delivery yard has been split into separate entry and exit only crossovers. This delivery yard is expected to service two major tenancies as well as common loading, with a total of five spaces for vehicle delivery and access to two waste compactors. Referring to the figures below, bay 1 has been assigned to the cinema and can cater for a 12.5m heavy rigid vehicle, while bays 2 and 5 have been assigned to major tenancies and can cater for 19.0m articulated vehicles. Deliveries from articulated vehicles are expected to be infrequent, i.e. no more than once/twice daily per tenant. It should be noted that bay 2 cannot be accessed while bay 3 is in use, and bay 6 cannot be accessed while bay 7 is in use (and vice versa), therefore access will need to be managed. Other than that, all the other movements can be performed simultaneously while all other spaces are in use.

Protection for columns within the yard will also be required.

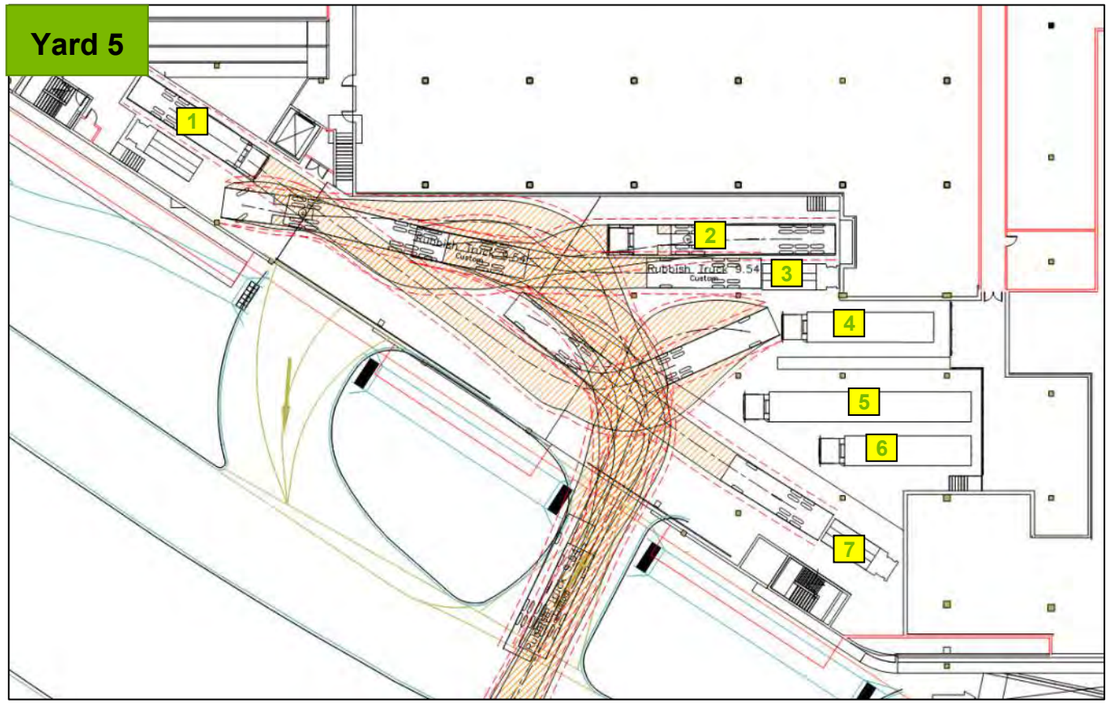



**Figure 10-12 Yard 5 – Vehicle swept path movements for bays 1, 2, 3 and 7**

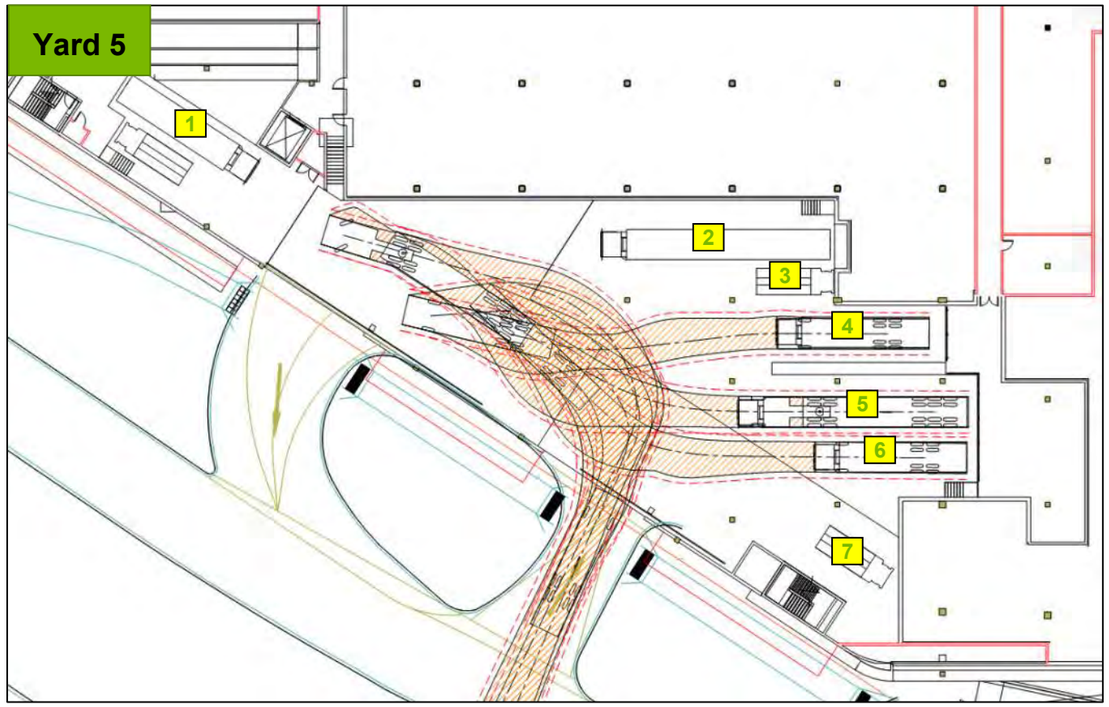



**Figure 10-13 Yard 5 – Vehicle swept path movements for bays 4, 5 and 6**

Access to Service Delivery Yard 5 is provided from Karrinyup Road, as per Figure 10-14, via left and right in, and left turn only out. The same access point also provides general vehicle access to a ramp up to a lower basement car park level (ingress only), and accommodates the existing bus u-turn facility into the Bus Station.

The service vehicle access point has been separated from the general vehicle access and the existing bus u-turn facility into the Bus Station. The proposed layout separates the service vehicle access in the Karrinyup Road median allowing one controlled movement out onto Karrinyup Road at both locations. The service vehicle access is proposed to be delineated in contrast to the public/bus access, with details to be confirmed during the detailed design. It is also proposed to provide alternating pavement colouring and line marking delineating the bus station entrances from the car park access. No high landscaping is planned in this area to ensure that high visibility is maintained for service vehicles. The arrangement of this access way should minimise conflict whilst ensuring clear sight lines for the trucks turning out of the delivery yard onto Karrinyup Road.

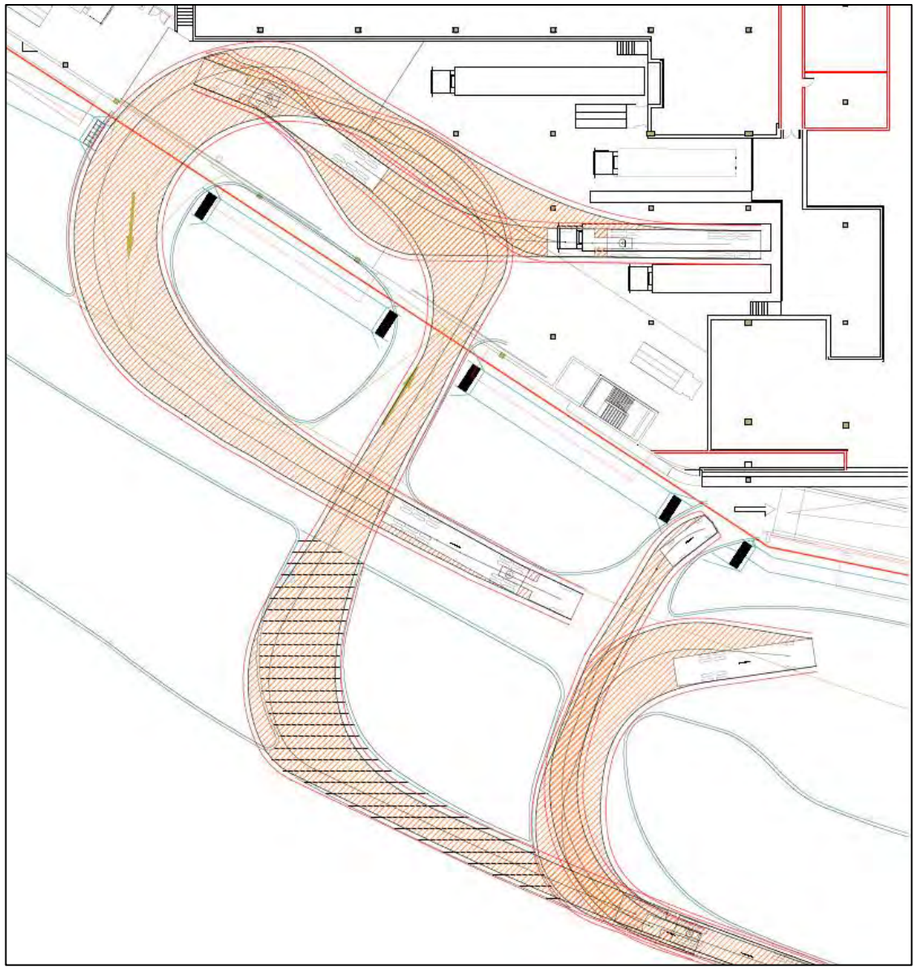


**Figure 10-14 Access into the Development for cars, buses and articulated vehicles**

### Service Delivery Yard 6

This is an existing service delivery yard that services Big W and Woolworths. This service delivery yard is proposed to be slightly modified in order to contain the reversing movement of articulated vehicles within the yard itself. Currently, articulated vehicles reverse into the yard from the circulation roadway, causing potential safety concerns with general vehicles.

The layout of the delivery yard has been modified, with the eastern dock shifted to the western side of the yard. The modified delivery yard is proposed to cater for a 12.5m heavy rigid vehicle and a waste compactor. The road alignment leading into the dock has been modified to improve the intersection arrangement just south of the delivery yard area.

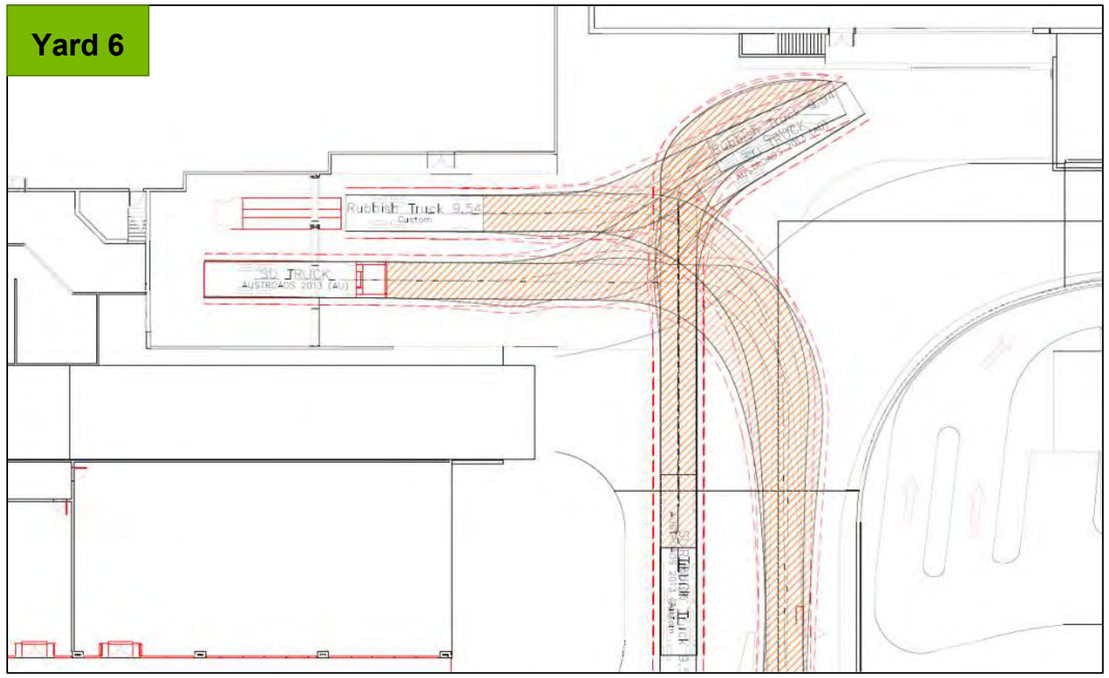



**Figure 10-15 Yard 6 – Vehicle swept path movements**

### Service Delivery Yard 7

The layout of the delivery yard includes one delivery bay for a 19.0m articulated vehicle, and three bays to access waste compactors. The proposed vehicle movements are shown below, with vehicles entering from Karrinyup Road to access the western spaces and vehicles entering from Francis Street to access the eastern spaces. The two western bays are proposed to accommodate a 19.0m articulated vehicle and a waste compactor, while the eastern bays are proposed to accommodate 12.5m heavy rigid vehicles.

The articulated vehicle will be able to exit via Karrinyup Road circling through the service station.

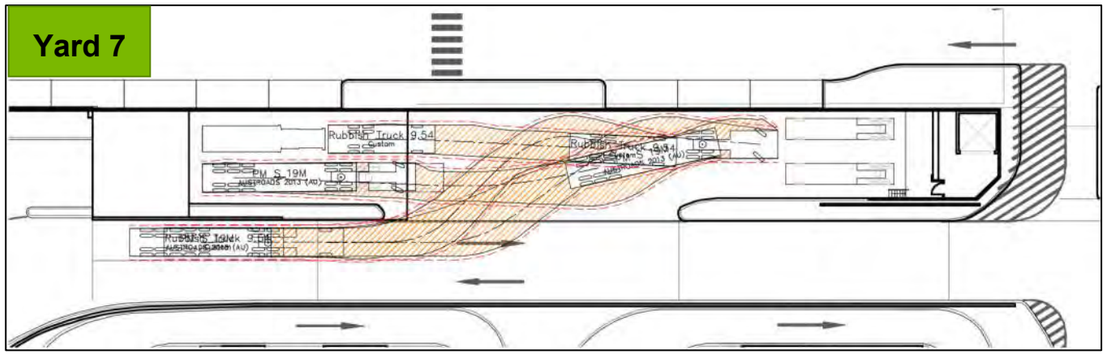



**Figure 10-16 Yard 7 – Vehicle swept path movements for western bays**

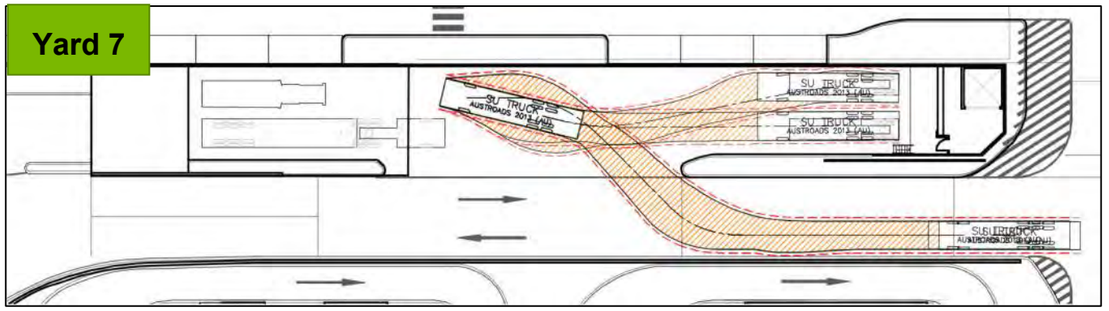



**Figure 10-17 Yard 7 – Vehicle swept path movements for eastern bays**

### Service Delivery Yard 8

This delivery yard is an existing yard for David Jones and has been modified to cater for one space for a 12.5m heavy rigid vehicle. Vehicles are proposed to access the yard from the south via Karrinyup Road and the internal circulation road. Reversing of the vehicle is retained within the yard area and the vehicle will exit in the forward direction via Davenport Street.

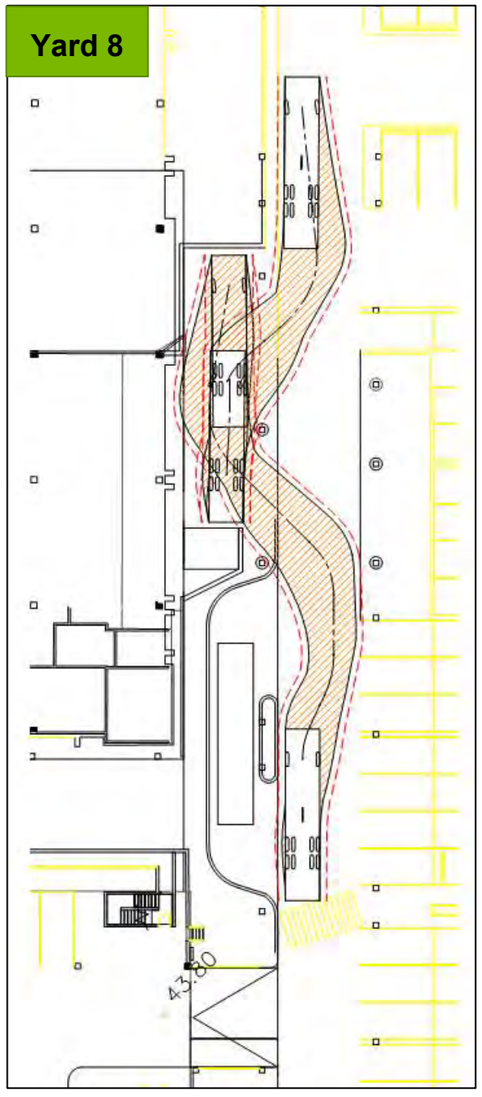



**Figure 10-18 Yard 8 – Vehicle swept path movement**

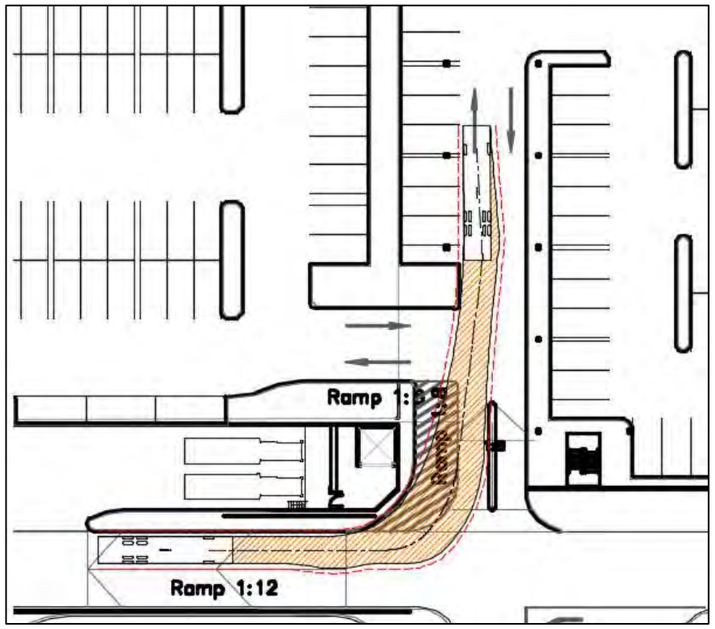



**Figure 10-19 Yard 8 – Access to delivery yard via internal road**

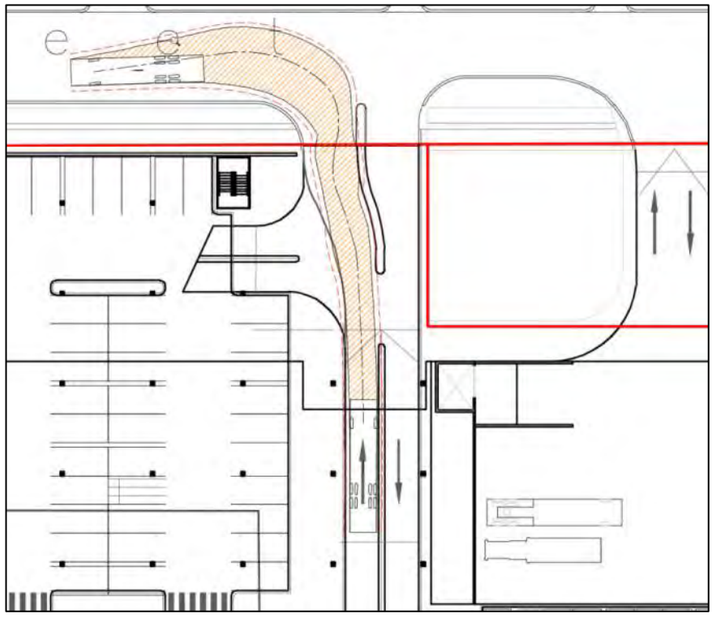


**Figure 10-20 Yard 8 – Vehicle exit via Davenport Street**

### Service Delivery Yard 9

Yard 9 is proposed to accommodate waste compactors for common loading areas, with the vehicle movements shown in Figure 10-21. Vehicles will be required to enter via Access 3 on Karrinyup Road and exit via Francis Avenue. A waste vehicle using the northern bay will not be able to exit while the southern bay is in use.

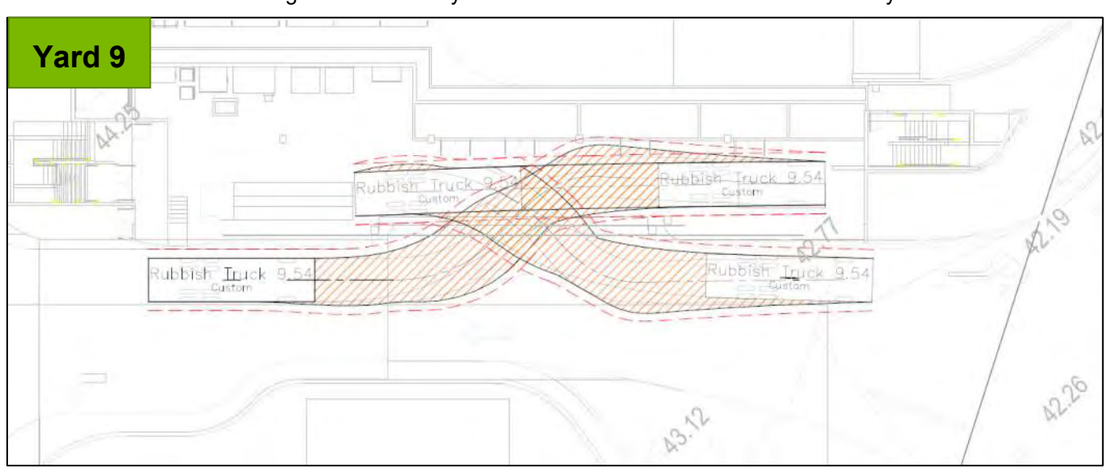



**Figure 10-21 Yard 9 – Vehicle swept path movements for waste vehicles**

### Service Delivery Yard 10

Fast food outlets and a service station are proposed on the south east corner of the Development. The two fast food outlets have been provided with loading bays that cater for 12.5m heavy rigid vehicles (left tenancy) and 8.8m rigid vehicles (right tenancy), while the service station accommodates a 19.0m articulated vehicle as shown in Figure 10-22 and Figure 10-23 respectively. A priority controlled four-way intersection is provided between the internal road, fast food area and the Basement 01 car park.

A second two-way access point into the proposed fast food area has been included in the proposed development, as shown in Figure 10-22. This additional access point allows improved circulation through the area by allowing flexibility for vehicles entering and exiting the fast food area. The second access point is located at an appropriate distance from the Karrinyup Road intersection to minimise any impact on Karrinyup Road.

**Figure 10-22 Vehicle swept path for service station access from Karrinyup Road (19.0m articulated truck)**

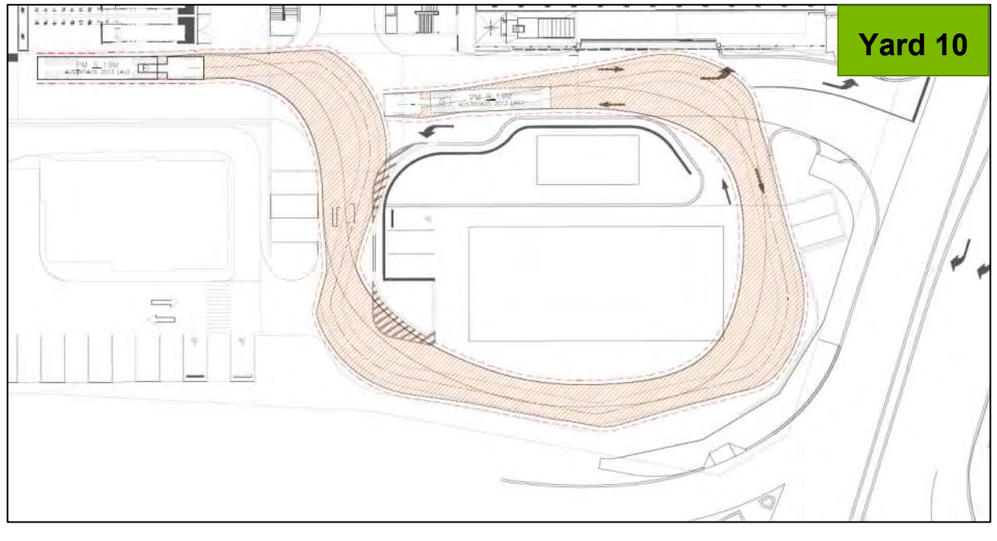



**Figure 10-23 Vehicle swept path for service station access (19.0m articulated truck)**

**Figure 10-24 Vehicle swept paths for fast food delivery – left tenancy (12.5m rigid truck)**

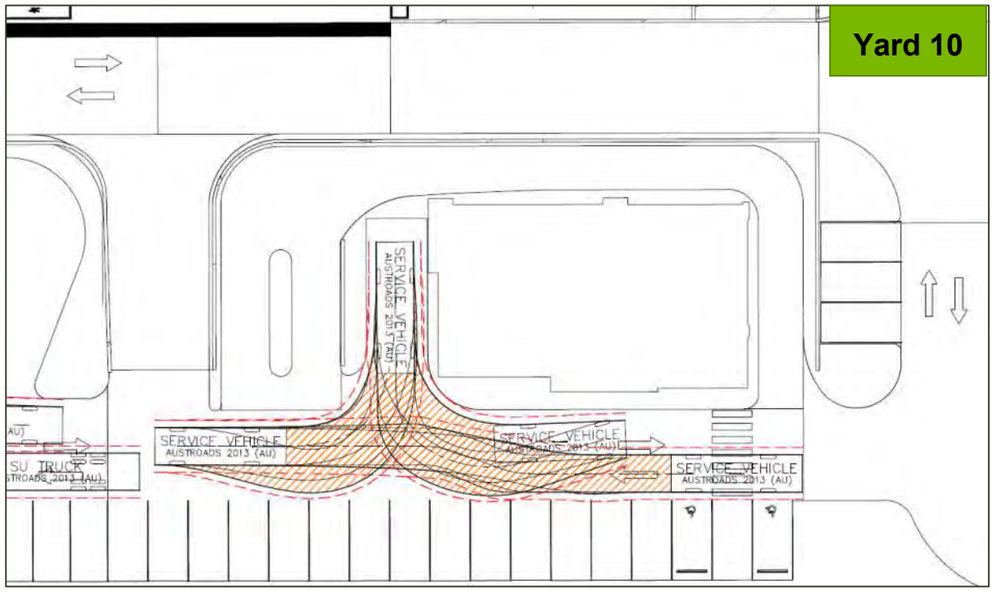



**Figure 10-25 Vehicle swept paths for fast food delivery – right tenancy (8.8m rigid truck)**

# 11. Conclusions

Aurecon was commissioned by AMP Capital Funds Management Ltd to undertake a Transport Plant (TP) for the Development Application for the Mixed Use Expansion at Karrinyup ('the Development'). Significant redevelopment is proposed with an increase in retail floor space from approximately 54,000 $m^2$ to 93,355 $m^2$ upon completion. There are also proposed increases in office, eating/entertainment and community/health floor space, and provision for residential dwellings within the Development. The design incorporates a 'main street' as an extension of Jeanes Road, allowing for an open streetscape with pedestrian walkways, landscaping, high quality-built form and features, and mixed use development that will create an area of high activity during and beyond normal trading hours

The main aim of this TP is to address access requirements to the Development by all modes of transport. A transport model was developed for this study in order to analyse the performance of the road network with and without the Development. Strategies to increase sustainable transport to the Development are included in this TP, including proposals for improved public transport, pedestrian and cycling access. Parking management and servicing strategies are also considered.

A Traffic and Transport Assessment was previously undertaken as part of the Draft Karrinyup Secondary Centre Activity Centre Structure Plan. This TP builds on this previous work to ensure that the Development proposal is consistent with the overall structure planning of the area and to provide a greater level of technical detail of the Development and its immediate surrounds.

The key objective of the TP is to promote a mode shift to increase the potential mode share of public transport, cycling and walking to help ensure that traffic congestion does not threaten the economic viability of the Development. There is a significant opportunity with this Development to create an attractive and comfortable environment for pedestrians and cyclists by upgrading preferred routes for these modes and strengthening links to the Development. Similarly public transport access should be prioritised by ensuring the integration of the existing bus station with the Development and increased bus priority infrastructure on the surrounding network to improve bus reliability and journey times and encourage use of public transport to and from the Development.

### 1. Public Transport

It is apparent that there is currently minimal public transport infrastructure to support higher frequency services to Karrinyup and encourage increased patronage. A number of measures are proposed to encourage visitors to use public transport as a viable mode to access the Development, including:

- Better integration of the bus station with the entrance to the Development whilst including improved personal security i.e. CCTV, lighting, weather cover
- Real time bus timetable information at the bus station and throughout the Development
- Improved infrastructure including dedicated bus lanes at various locations along Karrinyup Road
- Travel behaviour change initiatives to promote mode shift

A funding contribution is proposed to increase the frequency of bus services between the Centre and Stirling Station for a period of 7 years. This will involve services relating to either or both the 423 and 425 routes with a goal of achieving 10-minute headways in the morning and evening Centre weekday peaks. During the weekends, movements will be on one route (Route 425), which will be more easily identifiable for Centre customers, with 15-minute headways on the shoulders of and during the weekend Centre open hours. The final details of the provision of additional bus kilometres will be agreed with the Transport Portfolio.

### 2. Walking

In order to improve the walkability of the existing environment and increase walking trips to the Development, the following is proposed:

- Providing a contribution to expand the extent of the local path network to provide a footpath on one side of local streets that do not currently have a footpath. This contribution will be to an amount of $400,000.
- It is also proposed to make a contribution of $50,000 to the City to provide additional street trees to help shade those paths that are devoid of any street trees
- Pedestrian entrances to the Development that link directly to the surrounding pedestrian network
- Widening of existing footpaths around the perimeter of the Development to 2.0m or a 2-way 3.5m shared path
- Providing suitable pedestrian crossings within and surrounding the Development that are compliant with DDA standards
- Providing way-finding signage at strategic locations to provide legibility and awareness of pedestrian links to the Development
- Improved pedestrian amenities including street furniture, lighting and weather cover

### 3. Cycling

There is a strong need for substantial cycle infrastructure improvements to improve usability and safety for cyclists, particularly within the immediate vicinity of the Development. It is proposed that a combination of shared and segregated cycle paths be installed around the perimeter of the Development, and along sections of Karrinyup Road and Jeanes Road, to promote cyclist access the Development.

A number of other measures are proposed, including:

- Ensuring that intersections surrounding the Development will accommodate cyclists appropriately
- Providing improved way-finding signage to direct cyclists towards the Development
- Providing improved the bicycle access, parking and end of trip facilities within the Development

Bicycle parking and end-of-trip facilities are proposed at strategic locations, including:

- 160 public bicycle parking spaces in the form of bicycle racks dispersed amongst the four major entrances to the Development and along the main street
- A secure, enclosed end-of-trip facility for staff located at the southern major entrance to the development, near the Karrinyup Bus Station, capable of storing 200 bicycle racks and lockers. This also includes separate female and male change rooms incorporating 5 showers and 1 toilet in each.

### 4. Road Network

As part of the TP, transport modelling was undertaken for a wider area to investigate the impacts of the Development on the surrounding road network. To ensure the surrounding road network will operate at an acceptable level in the future with the Development in place, a number of upgrades have been proposed, and have been included in the transport model, to bring connectivity and usability to the area. These upgrades include lane extensions and additional turning pockets at locations where required. At most locations, intersection capacities are reached both now and in the future, with or without the Development.

Further potential upgrades have also been raised and are to be further discussed, in line with local and state authority's plans.

## 5. Parking

It is proposed to apply a reduced rate of parking for the Mixed Use Expansion at Karrinyup. The proposed Development incorporates a total of up to 4,880 car parking bays, at a rate of up to 4.2 bays per 100m$^2$ of the total floor space. This includes provision for parking for people with disabilities, as well as provision for motorcycle bays. In addition, localised parking is provided for the proposed residential dwellings.

A number of parking management strategies are proposed, including:

- Parking way-finding signage, including available parking numbers
- Fully managed parking detection system
- Mix of short and long term parking for visitors and staff
- Publicity for improved public transport and cycling provisions

## 6. Servicing

A total of nine (9) service delivery yards are proposed within the Development. The proposed service delivery yards are separated from the general public and the reversing of all vehicles is contained within each service delivery yard.

## 7. Development Approval Conditions

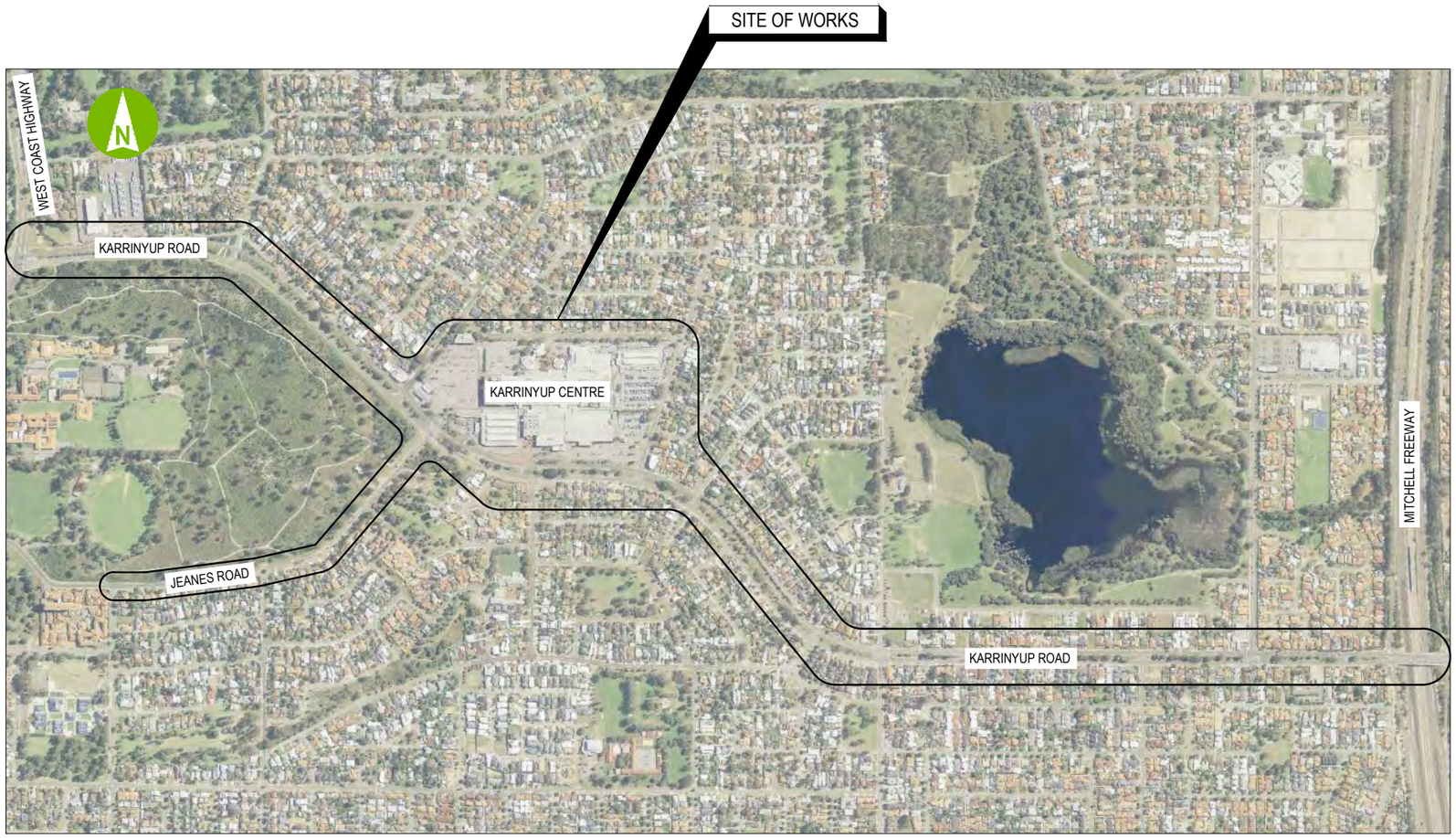
The following development approval conditions have been addressed in this TP:

- The schematic road upgrade drawing for Karrinyup Road/ Jeanes Road/ Main Street is included in Appendix G. The traffic modelling presented in this plan includes this design.
- Supplementary information has been provided regarding the impact of the Development on the adjacent residential road network. This information shows that while there is an increase in traffic on some of the surrounding roads, the volume of traffic is expected to still be within the designated values for the corresponding road hierarchy levels for each road

It should be noted that other conditions of the development approval have not been considered for this Amended Development Application and will be included in future works as part of the detailed design stage.

# Appendix A
# Schematic Road Upgrade Drawings

# MIXED USE EXPANSION AT KARRINYUP




## LOCATION PLAN

SCALE: NTS

## DRAWING INDEX


| | |
|---|---|
| 239230-DRG-CC-0001-CS | DRAWING INDEX AND LOCATION PLAN |
| 239230-DRG-CC-0002-GA | WEST COAST HIGHWAY / KARRINYUP ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0003-GA | KARRINYUP ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0004-GA | KARRINYUP ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0005-GA | KARRINYUP ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0006-GA | KARRINYUP ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0007-GA | KARRINYUP ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0008-GA | KARRINYUP ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0009-GA | KARRINYUP ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0010-GA | KARRINYUP ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0011-GA | JEANES ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0012-GA | JEANES ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0013-GA | BURROUGHS ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0014-GA | DAVENPORT ROAD DESIGN MODIFICATIONS |
| 239230-DRG-CC-0015-GA | FRANCIS AVENUE DESIGN MODIFICATIONS |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DRAWN: PJH
DESIGNED: LD
CHECKED:

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NOT FOR CONSTRUCTION

APPROVED
DATE
AJ

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: DRAWING INDEX AND LOCATION PLAN

DRAWING No.: 239230 - DRG - CC - 0001 - CS - E

(PROJECT No. / DOC. TYP. / SEC / DRG NO. / DRG. TYP. / REV)

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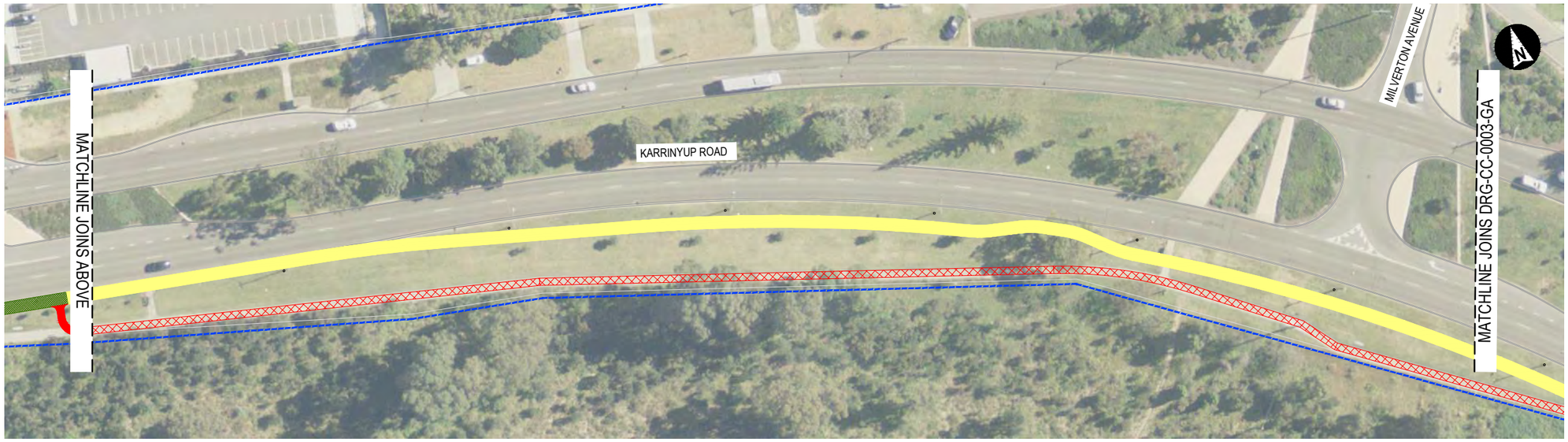


PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
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DESIGNED: LD

CHECKED: AJ

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DATE

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: WEST COAST HIGHWAY
KARRINYUP ROAD INTERSECTION
EXTENSION OF RIGHT TURN POCKETS

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PLAN VIEW
SCALE: 1:500

PLAN VIEW
SCALE: 1:500

## LEGEND

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DRAWN: PJH
DESIGNED: LD
CHECKED: AJ

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DATE

PROJECT: MIXED USE EXPANSION AT KARRINYUP
TITLE: KARRINYUP ROAD DESIGN MODIFICATIONS

| DRAWING No. | PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
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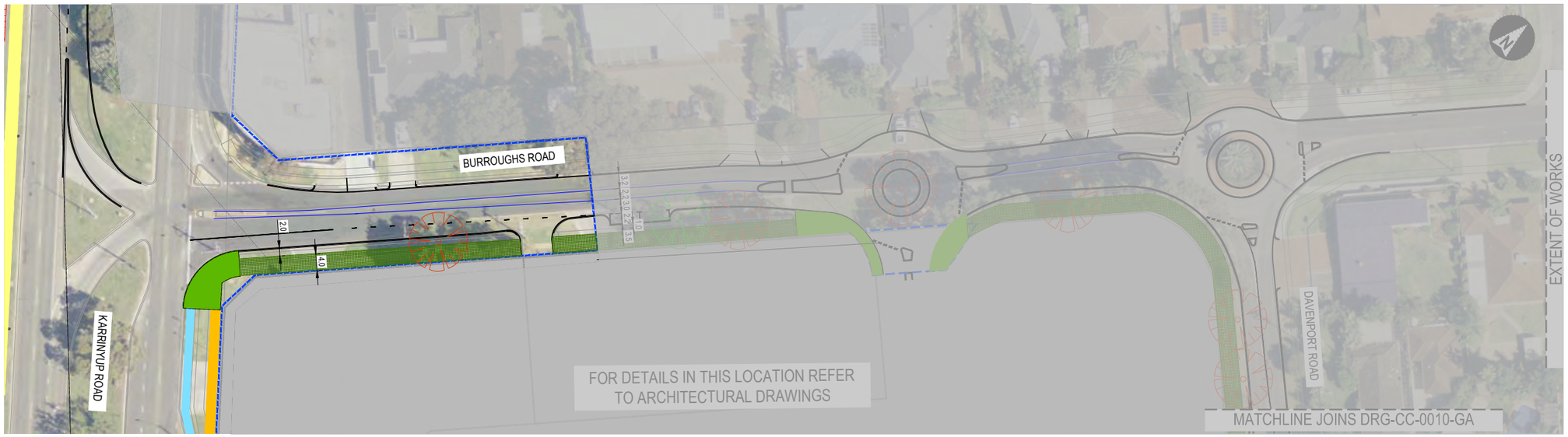


# PLAN VIEW

SCALE: 1:500

## LEGEND

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5. PARKING BAY TREE : TO BE PLATANUS ACERFOLIA (LONDON PLAIN TREE) OR SIMILAR WITH APPROVAL OF CITY OF STIRLING.
6. STREET TREE : TO BE PYRUS CALLERYANA CULTIVARS (ORNAMENTAL PEAR TREE) OR SIMILAR WITH APPROVAL OF CITY OF STIRLING.
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DESIGNED: LD
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PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: KARRINYUP ROAD DESIGN MODIFICATIONS

| DRAWING No. | PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
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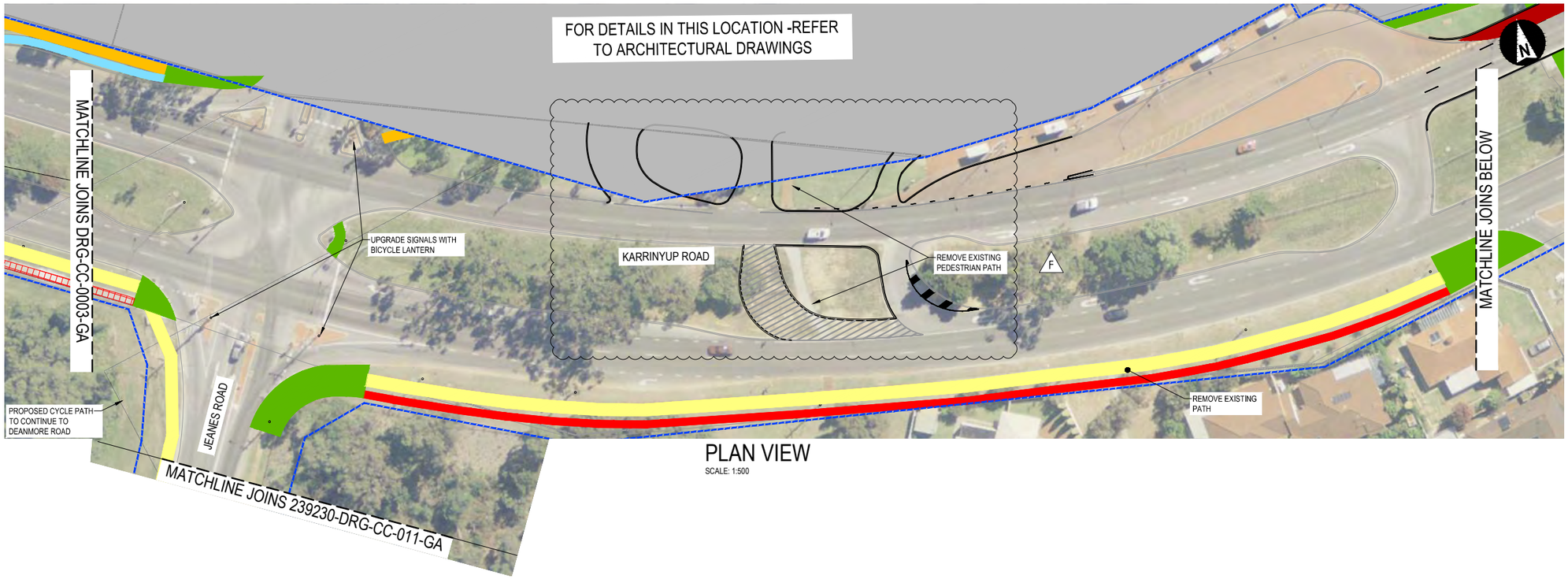


PLAN VIEW

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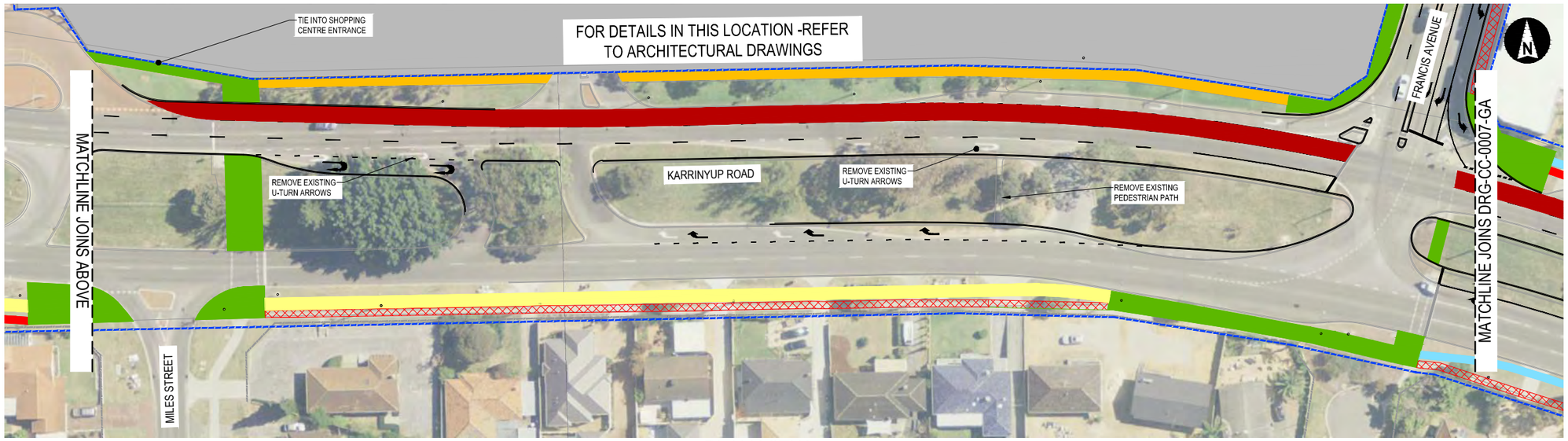


PLAN VIEW

SCALE: 1:500

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| F | 31.10.16 | RE-ISSUED | LD |
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DESIGNED: LD
CHECKED: AJ

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PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: KARRINYUP ROAD DESIGN MODIFICATIONS

DRAWING No.: 239230 - DRG - CC - 0005 - GA - G

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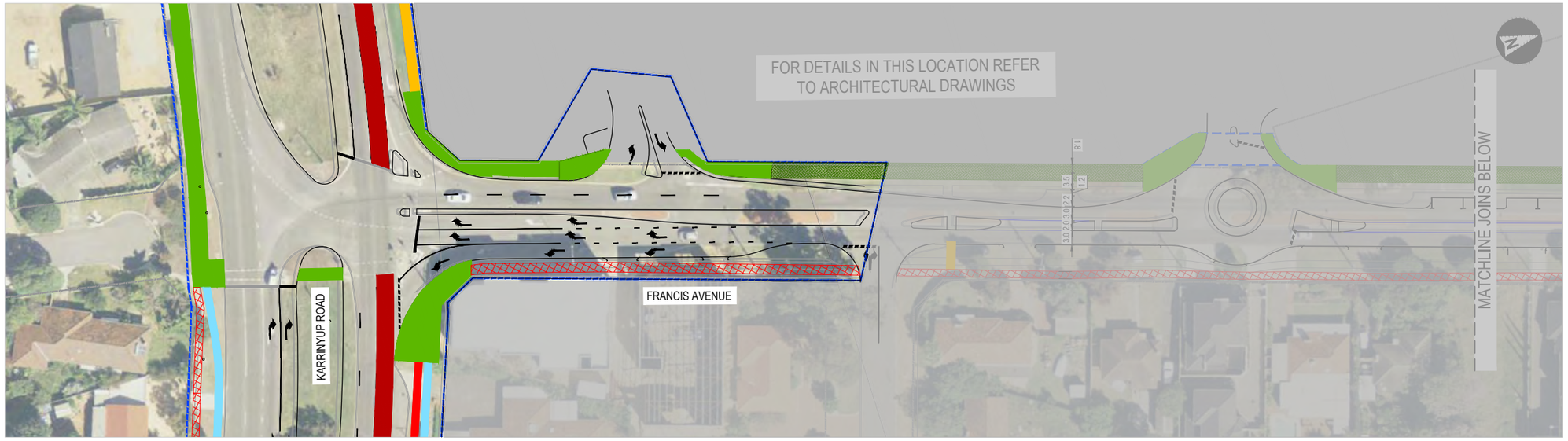


PLAN VIEW

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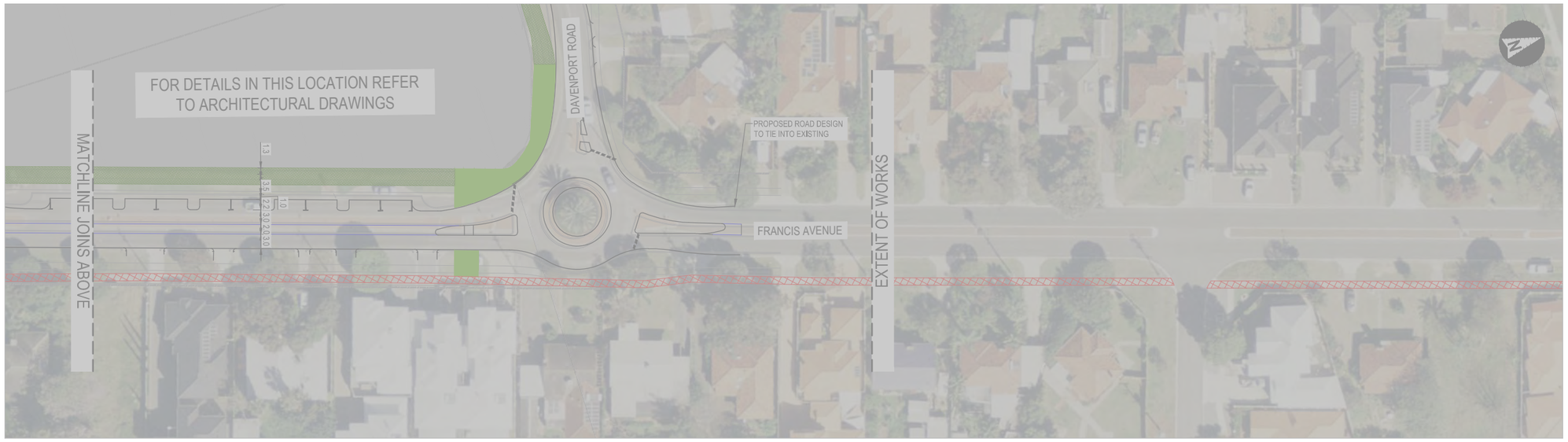


PLAN VIEW

SCALE: 1:500

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| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 18.02.15 | PRELIMINARY | LD |
| B | 25.02.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| C | 15.06.15 | RE-ISSUED FOR DEVELOPMENT APPROVAL | LD |
| D | 14.10.15 | RE-ISSUED | LD |
| E | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
|---|---|
| 1:500 | A1 |

DRAWN: PJH
DESIGNED: LD
CHECKED:

PRELIMINARY
NOT FOR CONSTRUCTION

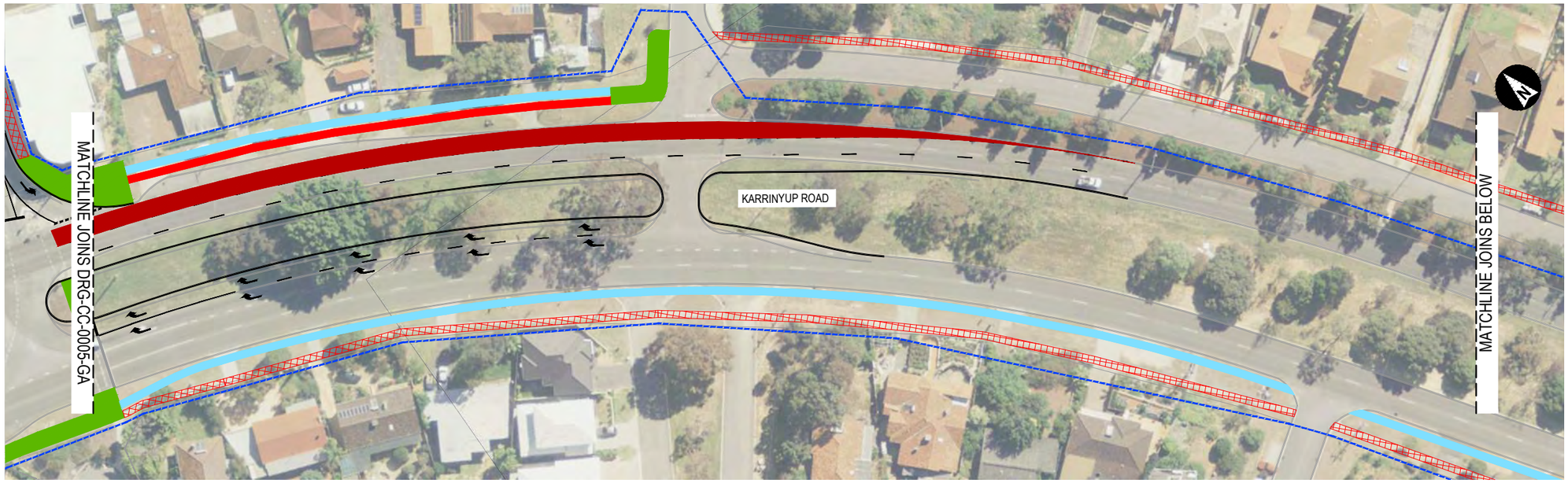
APPROVED
DATE
AJ

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: KARRINYUP ROAD DESIGN MODIFICATIONS

| DRAWING No. | PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
|---|---|---|---|---|---|---|
| | 239230 | DRG | CC | 0006 | GA | E |

CAD Ref: P:\239230 - Karrinyup Shopping Centre Structure Plan\3.0 Project Delivery\CADD\Drawings\ 239230-0000-DRG-CC-0006-GA.dwg




PLAN VIEW

SCALE: 1:500

PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
- PROPOSED 2.0m PEDESTRIAN PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED 1.5m PEDESTRIAN PATH
- PROPOSED SHARED AREA
- PROPOSED UNBROKEN SEPARATION LINE
- 450mm INTERSECTION STOP LINE (CONTINUOUS)
- 80mm CONTINUITY LINE (1.0m LINE x 3.0m GAP)
- 80mm BROKEN LANE LINE (3.0m LINE x 9.0m GAP)
- PROPOSED PAVEMENT ARROWS
- PROPOSED STREET TREE
- PROPOSED PARKING BAY TREE
- AREA UNDER CARE OF MAIN ROADS W.A AND ASSOCIATED WITH OPERATION OF KARRINYUP ROAD
- PROPOSED ROAD RESERVE WIDENING

## NOTES

1. FOR DIRECTIONAL TACTILE, RAMP TYPE A DETAILS, REFER TO MRWA DRG 9831-5649-1.
2. PAVEMENT ARROWS TO BE AS PER MRWA STANDARD DETAIL DRAWING NUMBER 9531-2010-4.
3. ALL SIGNAGE AND LINE MARKING TO BE IN ACCORDANCE WITH MAIN ROAD WA STANDARDS AND APPROVALS.
4. DRAINAGE TO BE MODIFIED AS REQUIRED IN ACCORDANCE WITH WATER SENSITIVE DESIGN PRINCIPLES.
5. STREET LIGHTING TO BE UPGRADED AS REQUIRED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARD(S).
6. PROPOSED 1 WAY SEPARATED BIKE PATH TO BE PAVED WITH RED ASPHALT OR OTHERWISE AGREED MATERIAL.
7. PROPOSED SHARED AREA TO BE PAVED WITH INSITU CONCRETE PAVING OR OTHERWISE AGREED MATERIAL.

1:500

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| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 18.02.15 | PRELIMINARY | LD |
| B | 25.02.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| C | 15.06.15 | RE-ISSUED FOR DEVELOPMENT APPROVAL | LD |
| D | 14.10.15 | RE-ISSUED | LD |
| E | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
|---|---|
| 1:500 | A1 |

DRAWN: PJH

DESIGNED: LD

CHECKED: AJ

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED

DATE

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: KARRINYUP ROAD DESIGN MODIFICATIONS

| DRAWING No. | PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
|---|---|---|---|---|---|---|
| | 239230 | DRG | CC | 0007 | GA | E |

Last saved: Wed, 10 Jul 2019 08:08 am
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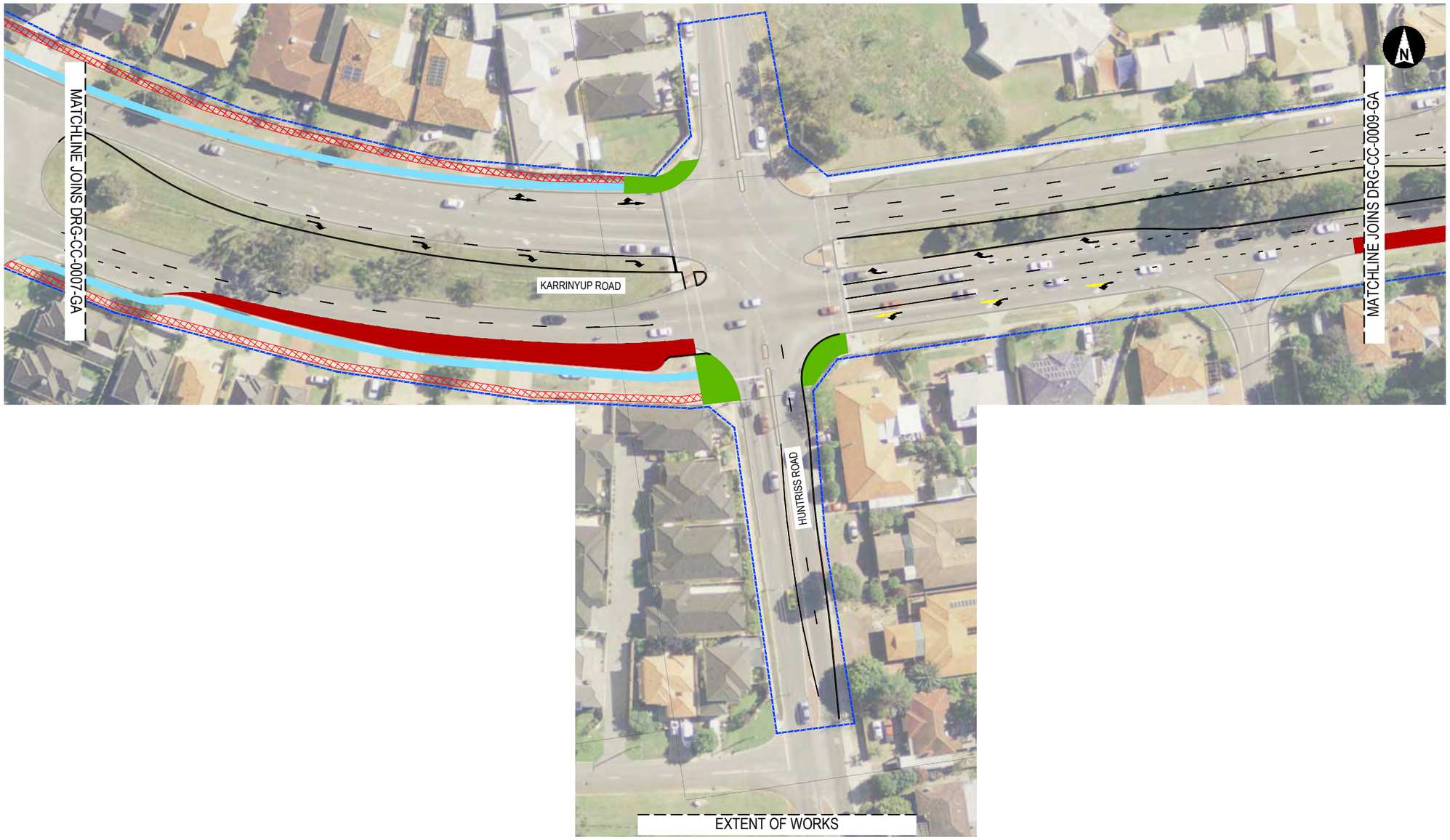


## PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
- PROPOSED 2.0m PEDESTRIAN PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED 1.5m PEDESTRIAN PATH
- PROPOSED SHARED AREA
- PROPOSED UNBROKEN SEPARATION LINE
- 450mm INTERSECTION STOP LINE (CONTINUOUS)
- 80mm CONTINUITY LINE (1.0m LINE x 3.0m GAP)
- 80mm BROKEN LANE LINE (3.0m LINE x 9.0m GAP)
- PROPOSED PAVEMENT ARROWS
- PROPOSED STREET TREE
- PROPOSED PARKING BAY TREE
- AREA UNDER CARE OF MAIN ROADS W.A AND ASSOCIATED WITH OPERATION OF KARRINYUP ROAD
- PROPOSED ROAD RESERVE WIDENING

## NOTES

1. FOR DIRECTIONAL TACTILE, RAMP TYPE A DETAILS, REFER TO MRWA DRG 9831-5649-1.
2. PAVEMENT ARROWS TO BE AS PER MRWA STANDARD DETAIL DRAWING NUMBER 9531-2010-4.
3. ALL SIGNAGE AND LINE MARKING TO BE IN ACCORDANCE WITH MAIN ROAD WA STANDARDS AND APPROVALS.
4. DRAINAGE TO BE MODIFIED AS REQUIRED IN ACCORDANCE WITH WATER SENSITIVE DESIGN PRINCIPLES.
5. STREET LIGHTING TO BE UPGRADED AS REQUIRED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARD(S).
6. PROPOSED 1 WAY SEPARATED BIKE PATH TO BE PAVED WITH RED ASPHALT OR OTHERWISE AGREED MATERIAL.
7. PROPOSED SHARED AREA TO BE PAVED WITH INSITU CONCRETE PAVING OR OTHERWISE AGREED MATERIAL.

1:500

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| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 18.02.15 | PRELIMINARY | LD |
| B | 25.02.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| C | 15.06.15 | RE-ISSUED FOR DEVELOPMENT APPROVAL | LD |
| D | 14.10.15 | RE-ISSUED | LD |
| E | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
|---|---|
| 1:500 | A1 |

DRAWN: PJH
DESIGNED: LD
CHECKED: AJ

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED
DATE

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: KARRINYUP ROAD DESIGN MODIFICATIONS

DRAWING No.: 239230 – DRG – CC – 0008 – GA – E

| PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
|---|---|---|---|---|---|
| 239230 | DRG | CC | 0008 | GA | E |

CAD Ref: P:\239230 - Karrinyup Shopping Centre Structure Plan\3.0 Project Delivery\CADD\Drawings\ 239230-0000-DRG-CC-0008-GA.dwg

Last saved: Wed, 10 Jul 2019 08:07 am

Last saved: Wed, 10 Jul 2019 08:07 am

PLAN VIEW

SCALE: 1:500

PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
- PROPOSED 2.0m PEDESTRIAN PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED 1.5m PEDESTRIAN PATH
- PROPOSED SHARED AREA
- PROPOSED UNBROKEN SEPARATION LINE
- 450mm INTERSECTION STOP LINE (CONTINUOUS)
- 80mm CONTINUITY LINE (1.0m LINE x 3.0m GAP)
- 80mm BROKEN LANE LINE (3.0m LINE x 9.0m GAP)
- PROPOSED PAVEMENT ARROWS
- PROPOSED STREET TREE
- PROPOSED PARKING BAY TREE
- AREA UNDER CARE OF MAIN ROADS W.A AND ASSOCIATED WITH OPERATION OF KARRINYUP ROAD
- PROPOSED ROAD RESERVE WIDENING

## NOTES

1. FOR DIRECTIONAL TACTILE, RAMP TYPE A DETAILS, REFER TO MRWA DRG 9831-5649-1.
2. PAVEMENT ARROWS TO BE AS PER MRWA STANDARD DETAIL DRAWING NUMBER 9531-2010-4.
3. ALL SIGNAGE AND LINE MARKING TO BE IN ACCORDANCE WITH MAIN ROAD WA STANDARDS AND APPROVALS.
4. DRAINAGE TO BE MODIFIED AS REQUIRED IN ACCORDANCE WITH WATER SENSITIVE DESIGN PRINCIPLES.
5. STREET LIGHTING TO BE UPGRADED AS REQUIRED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARD(S).

1:500

CAD Ref: P:\239230 - Karrinyup Shopping Centre Structure Plan\3.0 Project Delivery\CADD\Drawings\ 239230-0000-DRG-CC-0009-GA.dwg

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|---|---|---|---|
| A | 18.02.15 | PRELIMINARY | LD |
| B | 25.02.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| C | 15.06.15 | RE-ISSUED FOR DEVELOPMENT APPROVAL | LD |
| D | 14.10.15 | RE-ISSUED | LD |
| E | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
|---|---|
| 1:500 | A1 |

DRAWN: PJH
DESIGNED: LD
CHECKED: AJ

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED
DATE

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: KARRINYUP ROAD DESIGN MODIFICATIONS

DRAWING No.: 239230 - DRG - CC - 0009 - GA - E

| PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
|---|---|---|---|---|---|
| 239230 | DRG | CC | 0009 | GA | E |

PLAN VIEW

SCALE: 1:500

PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
- PROPOSED 2.0m PEDESTRIAN PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED 1.5m PEDESTRIAN PATH
- PROPOSED SHARED AREA
- PROPOSED UNBROKEN SEPARATION LINE
- 450mm INTERSECTION STOP LINE (CONTINUOUS)
- 80mm CONTINUITY LINE (1.0m LINE x 3.0m GAP)
- 80mm BROKEN LANE LINE (3.0m LINE x 9.0m GAP)
- PROPOSED PAVEMENT ARROWS
- PROPOSED STREET TREE
- PROPOSED PARKING BAY TREE
- AREA UNDER CARE OF MAIN ROADS W.A AND ASSOCIATED WITH OPERATION OF KARRINYUP ROAD
- PROPOSED ROAD RESERVE WIDENING

## NOTES

1. FOR DIRECTIONAL TACTILE, RAMP TYPE A DETAILS, REFER TO MRWA DRG 9831-5649-1.
2. PAVEMENT ARROWS TO BE AS PER MRWA STANDARD DETAIL DRAWING NUMBER 9531-2010-4.
3. ALL SIGNAGE AND LINE MARKING TO BE IN ACCORDANCE WITH MAIN ROAD WA STANDARDS AND APPROVALS.
4. DRAINAGE TO BE MODIFIED AS REQUIRED IN ACCORDANCE WITH WATER SENSITIVE DESIGN PRINCIPLES.
5. STREET LIGHTING TO BE UPGRADED AS REQUIRED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARD(S).

1:500

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| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 18.02.15 | PRELIMINARY | LD |
| B | 25.02.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| C | 15.06.15 | RE-ISSUED FOR DEVELOPMENT APPROVAL | LD |
| D | 14.10.15 | RE-ISSUED | LD |
| E | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
|---|---|
| 1:500 | A1 |

DRAWN: PJH
DESIGNED: LD
CHECKED: AJ

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED
DATE

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: KARRINYUP ROAD DESIGN MODIFICATIONS

| DRAWING No. | PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
|---|---|---|---|---|---|---|
| | 239230 | DRG | CC | 0010 | GA | E |

CAD Ref: P:\239230 - Karrinyup Shopping Centre Structure Plan\3.0 Project Delivery\CADD\Drawings\ 239230-0000-DRG-CC-0010-GA.dwg

Last saved: Wed, 10 Jul 2019 08:04 am

PLAN VIEW

SCALE: 1:500

PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
- PROPOSED 2.0m PEDESTRIAN PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED 1.5m PEDESTRIAN PATH
- PROPOSED SHARED AREA
- PROPOSED UNBROKEN SEPARATION LINE
- 450mm INTERSECTION STOP LINE (CONTINUOUS)
- 80mm CONTINUITY LINE (1.0m LINE x 3.0m GAP)
- 80mm BROKEN LANE LINE (3.0m LINE x 9.0m GAP)
- PROPOSED PAVEMENT ARROWS
- PROPOSED STREET TREE
- PROPOSED PARKING BAY TREE
- AREA UNDER CARE OF MAIN ROADS W.A AND ASSOCIATED WITH OPERATION OF KARRINYUP ROAD
- PROPOSED ROAD RESERVE WIDENING

## NOTES

1. FOR DIRECTIONAL TACTILE, RAMP TYPE A DETAILS, REFER TO MRWA DRG 9831-5649-1.
2. PAVEMENT ARROWS TO BE AS PER MRWA STANDARD DETAIL DRAWING NUMBER 9531-2010-4.
3. PROPOSED 2 WAY SEPARATED BIKE PATH TO BE PAVED WITH RED ASPHALT OR OTHERWISE AGREED MATERIAL.
4. PROPOSED SHARED AREA TO BE PAVED WITH INSITU CONCRETE PAVING OR OTHERWISE AGREED MATERIAL.

1:500

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| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 18.02.15 | PRELIMINARY | LD |
| B | 25.02.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| C | 15.06.15 | RE-ISSUED FOR DEVELOPMENT APPROVAL | LD |
| D | 14.10.15 | RE-ISSUED | LD |
| E | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
|---|---|
| 1:500 | A1 |

DRAWN: PJH
DESIGNED: LD
CHECKED:

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED
DATE
AJ

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: JEANES ROAD DESIGN MODIFICATIONS CITY OF STIRLING NETWORK

| DRAWING No. | PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
|---|---|---|---|---|---|---|
| | 239231 | DRG | CC | 0011 | GA | E |

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# PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
- PROPOSED 2.0m PEDESTRIAN PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED 1.5m PEDESTRIAN PATH
- PROPOSED SHARED AREA
- PROPOSED UNBROKEN SEPARATION LINE
- 450mm INTERSECTION STOP LINE (CONTINUOUS)
- 80mm CONTINUITY LINE (1.0m LINE x 3.0m GAP)
- 80mm BROKEN LANE LINE (3.0m LINE x 9.0m GAP)
- PROPOSED PAVEMENT ARROWS
- PROPOSED STREET TREE
- PROPOSED PARKING BAY TREE
- AREA UNDER CARE OF MAIN ROADS W.A AND ASSOCIATED WITH OPERATION OF KARRINYUP ROAD
- PROPOSED ROAD RESERVE WIDENING

## NOTES

1. FOR DIRECTIONAL TACTILE, RAMP TYPE A DETAILS, REFER TO MRWA DRG 9831-5649-1.
2. PAVEMENT ARROWS TO BE AS PER MRWA STANDARD DETAIL DRAWING NUMBER 9531-2010-4.
3. PROPOSED 2 WAY SEPARATED BIKE PATH TO BE PAVED WITH RED ASPHALT OR OTHERWISE AGREED MATERIAL.
4. PROPOSED SHARED AREA TO BE PAVED WITH INSITU CONCRETE PAVING OR OTHERWISE AGREED MATERIAL.

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|---|---|---|---|
| A | 18.02.15 | PRELIMINARY | LD |
| B | 25.02.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| C | 15.06.15 | RE-ISSUED FOR DEVELOPMENT APPROVAL | LD |
| D | 14.10.15 | RE-ISSUED | LD |
| E | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
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| 1:500 | A1 |

DRAWN: PJH
DESIGNED: LD
CHECKED:

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED
DATE
AJ

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: JEANES ROAD DESIGN MODIFICATIONS CITY OF STIRLING NETWORK

DRAWING No.: PROJECT No. 239232 – DOC. TYP. DRG – SEC CC – DRG NO. 0012 – DRG. TYP. GA – REV E

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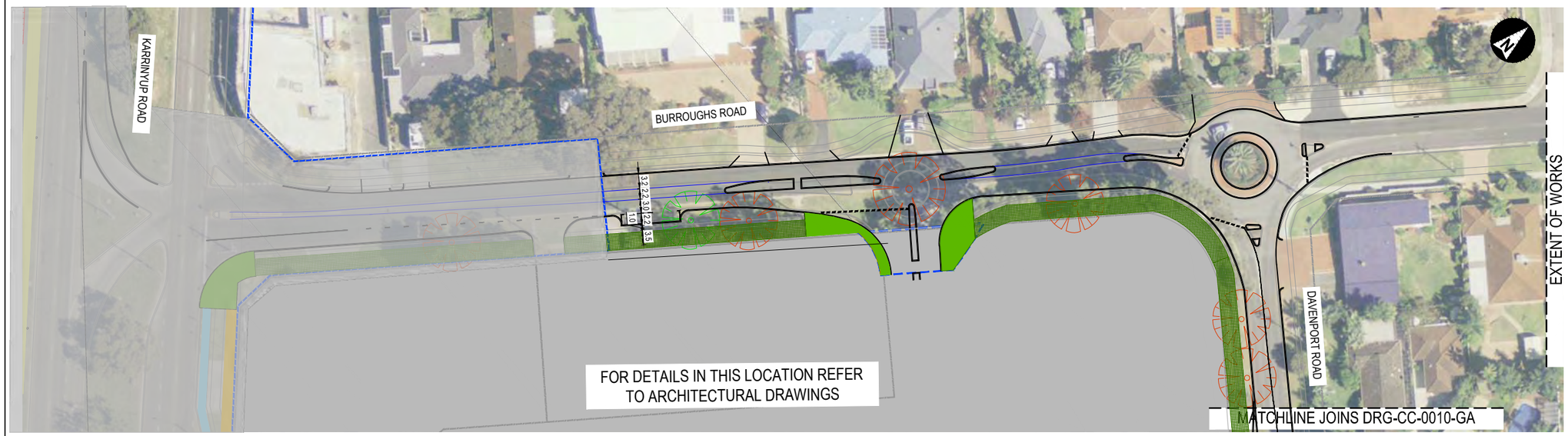


## PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
- PROPOSED 2.0m PEDESTRIAN PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED 1.5m PEDESTRIAN PATH
- PROPOSED SHARED AREA
- PROPOSED UNBROKEN SEPARATION LINE
- 450mm INTERSECTION STOP LINE (CONTINUOUS)
- 80mm CONTINUITY LINE (1.0m LINE x 3.0m GAP)
- 80mm BROKEN LANE LINE (3.0m LINE x 9.0m GAP)
- PROPOSED PAVEMENT ARROWS
- PROPOSED STREET TREE
- PROPOSED PARKING BAY TREE
- AREA UNDER CARE OF MAIN ROADS W.A AND ASSOCIATED WITH OPERATION OF KARRINYUP ROAD
- PROPOSED ROAD RESERVE WIDENING

## NOTES

1. FOR DIRECTIONAL TACTILE, RAMP TYPE A DETAILS, REFER TO MRWA DRG 9831-5649-1.
2. PAVEMENT ARROWS TO BE AS PER MRWA STANDARD DETAIL DRAWING NUMBER 9531-2010-4.
3. ALL SIGNAGE AND LINE MARKING TO BE IN ACCORDANCE WITH MAIN ROAD WA STANDARDS AND APPROVALS.
4. DRAINAGE TO BE MODIFIED AS REQUIRED IN ACCORDANCE WITH WATER SENSITIVE DESIGN PRINCIPLES.
5. PARKING BAY TREE : TO BE PLATANUS ACERFOLIA (LONDON PLAIN TREE) OR SIMILAR WITH APPROVAL OF CITY OF STIRLING.
6. STREET TREE : TO BE PYRUS CALLERYANA CULTIVARS (ORNAMENTAL PEAR TREE) OR SIMILAR WITH APPROVAL OF CITY OF STIRLING.
7. STREET LIGHTING TO BE UPGRADED AS REQUIRED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARD(S).
8. THE FINISHED LEVELS OF FOOTPATHS / PAVED AREAS TO BE COORDINATED WITH THE ROAD / KERB LEVELS AND THE FINISHED GROUND LEVELS OF THE ENTRANCES / PATHS ON THE ADJOINING LAND.
9. PROPOSED 2 WAY SHARED PATH TO BE PAVED WITH RED ASPHALT OR OTHERWISE AGREED MATERIAL.
10. PROPOSED SHARED AREA TO BE PAVED WITH INSITU CONCRETE PAVING OR OTHERWISE AGREED MATERIAL.
11. AREA UNDER CARE OF CITY OF STIRLING.

1:500

CAD Ref: P:\239230 - Karrinyup Shopping Centre Structure Plan\3.0 Project Delivery\CADD\Drawings\ 239230-0000-DRG-CC-0013-GA.dwg

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| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 29.09.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| B | 19.05.17 | RE-ISSUED FOR DEVELOPMENT APPROVAL | ML |
| C | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
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| 1:500 | A1 |

DRAWN: PJH
DESIGNED: LD
CHECKED: AJ

PRELIMINARY
NOT FOR CONSTRUCTION

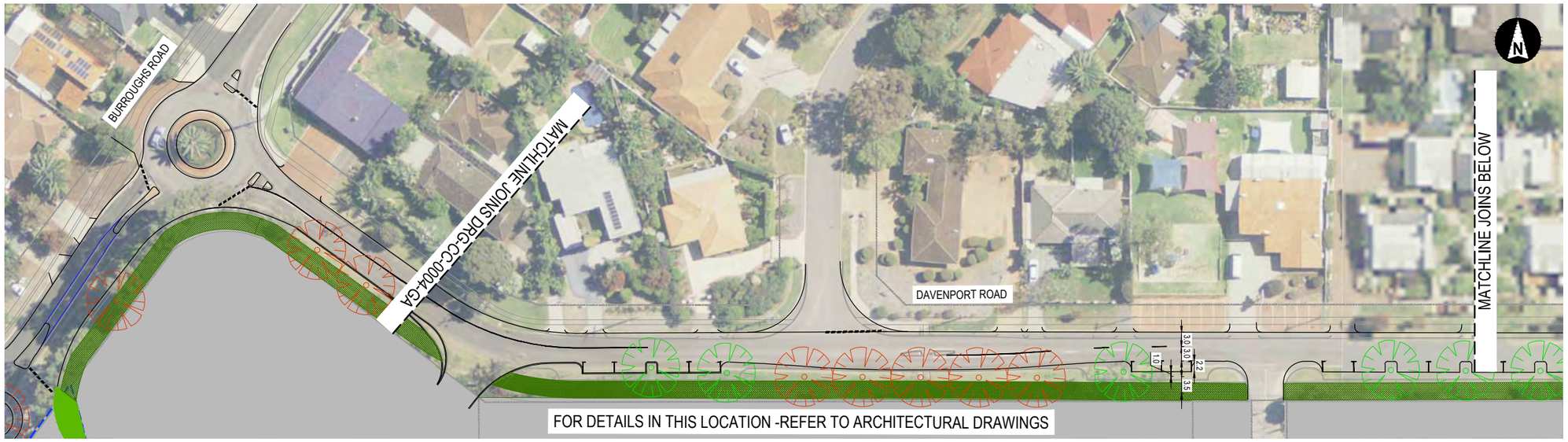
APPROVED
DATE

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: BURROUGHS ROAD DESIGN MODIFICATIONS CITY OF STIRLING NETWORK

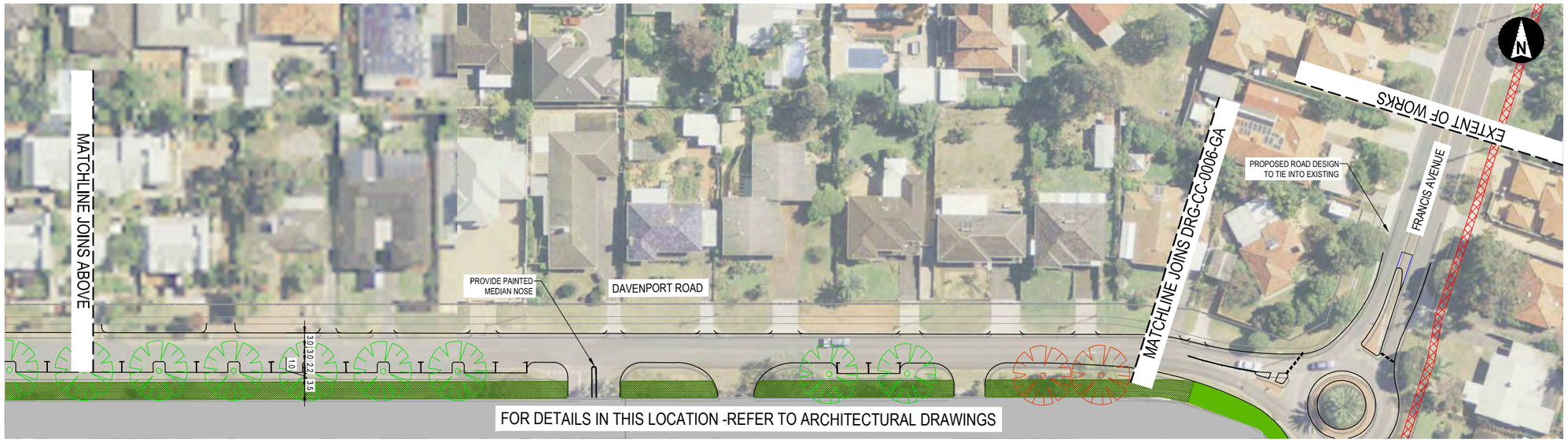
DRAWING No.: 239230 – DRG – CC – 0013 – GA – C

| PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
|---|---|---|---|---|---|
| 239230 | DRG | CC | 0013 | GA | C |




PLAN VIEW

SCALE: 1:500




PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
- PROPOSED 2.0m PEDESTRIAN PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED 1.5m PEDESTRIAN PATH
- PROPOSED SHARED AREA
- PROPOSED UNBROKEN SEPARATION LINE
- 450mm INTERSECTION STOP LINE (CONTINUOUS)
- 80mm CONTINUITY LINE (1.0m LINE x 3.0m GAP)
- 80mm BROKEN LANE LINE (3.0m LINE x 9.0m GAP)
- PROPOSED PAVEMENT ARROWS
- PROPOSED STREET TREE
- PROPOSED PARKING BAY TREE
- AREA UNDER CARE OF MAIN ROADS W.A AND ASSOCIATED WITH OPERATION OF KARRINYUP ROAD
- PROPOSED ROAD RESERVE WIDENING

## NOTES

1. FOR DIRECTIONAL TACTILE, RAMP TYPE A DETAILS, REFER TO MRWA DRG 9831-5649-1.
2. PAVEMENT ARROWS TO BE AS PER MRWA STANDARD DETAIL DRAWING NUMBER 9531-2010-4.
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4. DRAINAGE TO BE MODIFIED AS REQUIRED IN ACCORDANCE WITH WATER SENSITIVE DESIGN PRINCIPLES.
5. PARKING BAY TREE : TO BE PLATANUS ACERFOLIA (LONDON PLAIN TREE) OR SIMILAR WITH APPROVAL OF CITY OF STIRLING.
6. STREET TREE : TO BE PYRUS CALLERYANA CULTIVARS (ORNAMENTAL PEAR TREE) OR SIMILAR WITH APPROVAL OF CITY OF STIRLING.
7. STREET LIGHTING TO BE UPGRADED AS REQUIRED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARD(S).
8. THE FINISHED LEVELS OF FOOTPATHS / PAVED AREAS TO BE COORDINATED WITH THE ROAD / KERB LEVELS AND THE FINISHED GROUND LEVELS OF THE ENTRANCES / PATHS ON THE ADJOINING LAND.
9. PROPOSED 2 WAY SHARED PATH TO BE PAVED WITH RED ASPHALT OR OTHERWISE AGREED MATERIAL.
10. PROPOSED SHARED AREA TO BE PAVED WITH INSITU CONCRETE PAVING OR OTHERWISE AGREED MATERIAL.
11. AREA UNDER CARE OF CITY OF STIRLING.

1:500

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| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 18.02.15 | PRELIMINARY | LD |
| B | 25.02.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| C | 15.06.15 | RE-ISSUED FOR DEVELOPMENT APPROVAL | LD |
| D | 14.10.15 | RE-ISSUED | LD |
| E | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
|---|---|
| 1:500 | A1 |

DRAWN: PJH
DESIGNED: LD
CHECKED: AJ

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED
DATE

PROJECT: MIXED USE EXPANSION AT KARRINYUP

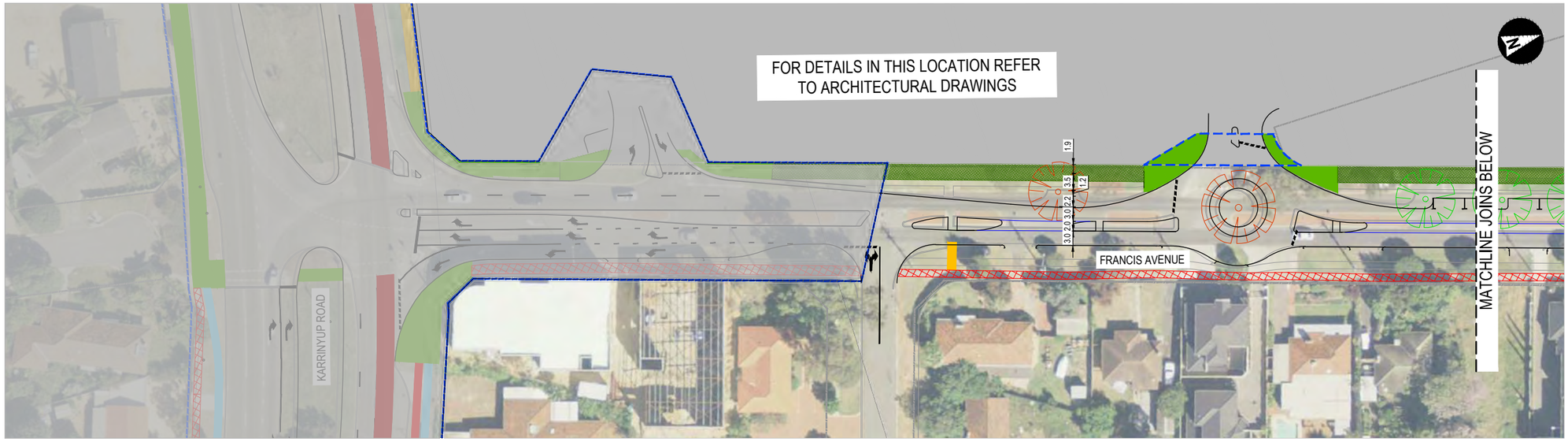
TITLE: DAVENPORT ROAD DESIGN MODIFICATIONS CITY OF STIRLING NETWORK

| DRAWING No. | PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
|---|---|---|---|---|---|---|
| | 239230 | DRG | CC | 0014 | GA | E |

Last saved: Wed, 10 Jul 2019 08:01 am

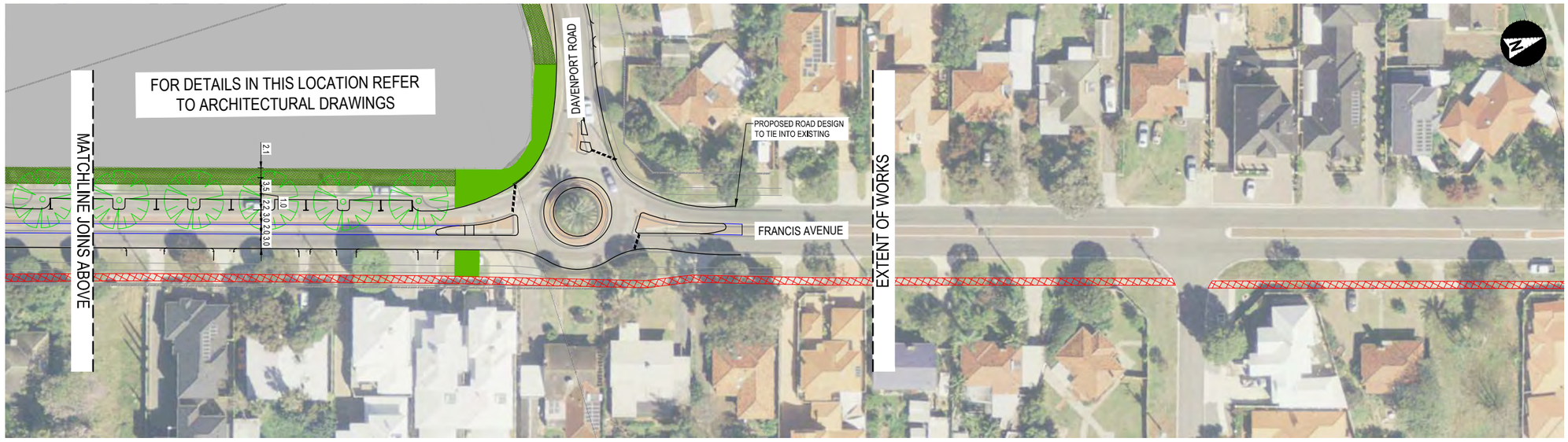
CAD Ref: P:\239230 - Karrinyup Shopping Centre Structure Plan\3.0 Project Delivery\CADD\Drawings\ 239230-0000-DRG-CC-0014-GA.dwg

3 AREA UNDER CARE OF CITY OF STIRLING




## PLAN VIEW

SCALE: 1:500




## PLAN VIEW

SCALE: 1:500

## LEGEND

- PROPOSED KERBING
- PROPOSED RED BUS LANE PAVEMENT
- PROPOSED 2 WAY SHARED PATH
- PROPOSED 2 WAY SEPARATED BICYCLE PATH
- PROPOSED 1 WAY SEPARATED BICYCLE PATH
- PROPOSED 2.0m PEDESTRIAN PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED 1.5m PEDESTRIAN PATH
- PROPOSED SHARED AREA
- PROPOSED UNBROKEN SEPARATION LINE
- 450mm INTERSECTION STOP LINE (CONTINUOUS)
- 80mm CONTINUITY LINE (1.0m LINE x 3.0m GAP)
- 80mm BROKEN LANE LINE (3.0m LINE x 9.0m GAP)
- PROPOSED PAVEMENT ARROWS
- PROPOSED STREET TREE
- PROPOSED PARKING BAY TREE
- AREA UNDER CARE OF MAIN ROADS W.A AND ASSOCIATED WITH OPERATION OF KARRINYUP ROAD
- PROPOSED ROAD RESERVE WIDENING

## NOTES

1. FOR DIRECTIONAL TACTILE, RAMP TYPE A DETAILS, REFER TO MRWA DRG 9831-5649-1.
2. PAVEMENT ARROWS TO BE AS PER MRWA STANDARD DETAIL DRAWING NUMBER 9531-2010-4.
3. ALL SIGNAGE AND LINE MARKING TO BE IN ACCORDANCE WITH MAIN ROAD WA STANDARDS AND APPROVALS.
4. DRAINAGE TO BE MODIFIED AS REQUIRED IN ACCORDANCE WITH WATER SENSITIVE DESIGN PRINCIPLES.
5. PARKING BAY TREE : TO BE PLATANUS ACERFOLIA (LONDON PLAIN TREE) OR SIMILAR WITH APPROVAL OF CITY OF STIRLING.
6. STREET TREE : TO BE PYRUS CALLERYANA CULTIVARS (ORNAMENTAL PEAR TREE) OR SIMILAR WITH APPROVAL OF CITY OF STIRLING.
7. STREET LIGHTING TO BE UPGRADED AS REQUIRED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARD(S).
8. THE FINISHED LEVELS OF FOOTPATHS / PAVED AREAS TO BE COORDINATED WITH THE ROAD / KERB LEVELS AND THE FINISHED GROUND LEVELS OF THE ENTRANCES / PATHS ON THE ADJOINING LAND.
9. PROPOSED 2 WAY SHARED PATH TO BE PAVED WITH RED ASPHALT OR OTHERWISE AGREED MATERIAL.
10. PROPOSED SHARED AREA TO BE PAVED WITH INSITU CONCRETE PAVING OR OTHERWISE AGREED MATERIAL.
11. AREA UNDER CARE OF CITY OF STIRLING.

1:500

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| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 29.09.15 | ISSUED FOR DEVELOPMENT APPROVAL | LD |
| B | 09.07.19 | RE-ISSUED | LD |

| SCALE | SIZE |
|---|---|
| 1:500 | A1 |

DRAWN: PJH
DESIGNED: LD
CHECKED: AJ

PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED
DATE

PROJECT: MIXED USE EXPANSION AT KARRINYUP

TITLE: FRANCIS AVENUE DESIGN MODIFICATIONS CITY OF STIRLING NETWORK

| DRAWING No. | PROJECT No. | DOC. TYP. | SEC | DRG NO. | DRG. TYP. | REV |
|---|---|---|---|---|---|---|
| | 239230 | DRG | CC | 0015 | GA | B |

Last saved: Wed, 10 Jul 2019 08:10 am
CAD Ref: P:\239230 - Karrinyup Shopping Centre Structure Plan\3.0 Project Delivery\CADD\Drawings_239230-0000-DRG-CC-0015-GA.dwg

# Appendix B
## Transport Model Details

# 1 Introduction

This report outlines the development, calibration and validation of the Aimsun model built on behalf of AMP Capital for the Karrinyup Regional Centre Structure Plan. The modelling focuses on a network analysis modelling methodology to test the performance of proposed measures within the study area.

The initial stage was to develop of a fully calibrated and validated base Aimsun model reflecting the existing traffic conditions. Subsequent stages involve the assessment of future probable schemes and associated traffic generation associated with the Karrinyup Regional Centre Structure Plan. The base model included three peak periods consisting of the weekday morning and afternoon peaks and Saturday midday peak.

The road network was constructed and calibrated utilising the Aimsun hybrid modelling software with integrated SCATS signal control. Detailed coding of lane and junction descriptions were developed using latest aerial photographs of the region, on-street measurements and knowledge of the network operations. During the calibration process, model parameters are adjusted to align the model to that of the existing on-street behaviour.

This report focuses on the aspects of the model development, operation and adherence to good practice and summarises the results of the model calibration and validation. A model peer review has taken place and revisions from the peer review comments have been included were possible.

# 2 Model Form

## 2.1 Aimsun

The modelling software used was Aimsun with the hybrid model experiment type and integrated adaptive SCATS signals. A hybrid model operates as a microsimulation model within user defined cordon areas, simulating individual vehicles and their interaction with other vehicles and the surrounding road environment. Outside of this cordon, a mesoscopic model environment is used to replicate the flow, delay and route choice of variables using more simplistic algorithms.

As with real traffic conditions, these interactions can vary for each model run, resulting in unique results.

The Aimsun version used for all the modelling is version 8.0.5 (R29862 x64). It is recommended that all option testing be undertaken using the same version of the software.

To obtain statistically meaningful results, the average network performance is taken from multiple simulation runs. Previous experience indicates that five model runs are sufficient to obtain stable results for a network or this size, nature and purpose.

## 2.2 SIDRA Intersection

To satisfy Main Roads WA requirements, SIDRA models were also developed as a secondary analysis method to provide further confidence with the Aimsun results. SIDRA is a software modelling package commonly used to analyse signalised and unsignalised intersections. The SIDRA version used is version 6.0.24.4877 and all option testing should be undertaken using the same version as stated. The SIDRA models will incorporate the same volumes and similar parameters developed in Aimsun.

## 2.3 Base Model Network

The base model network, as shown in Figure 2-1, is the area enclosed by Reid Highway to the north, Mitchell Freeway to the east, Cedric Avenue/ Barnes Street/ Sackville Terrace to the south and West Coast Highway to the west.

All roads considered major within this area have been integrated in the model. Driveways and roads carrying what is considered low traffic volumes which do not significantly influence traffic flow within the model have not been included.

The mesocopic model area of the hybrid model is the cordon outside the green dotted lines and covers the wider area. The key area within the network was modelled using the more detailed micro-simulation cordon environment. The micro-simulation cordon area consists of Karrinyup Centre, Karrinyup Road, and the connecting roads.

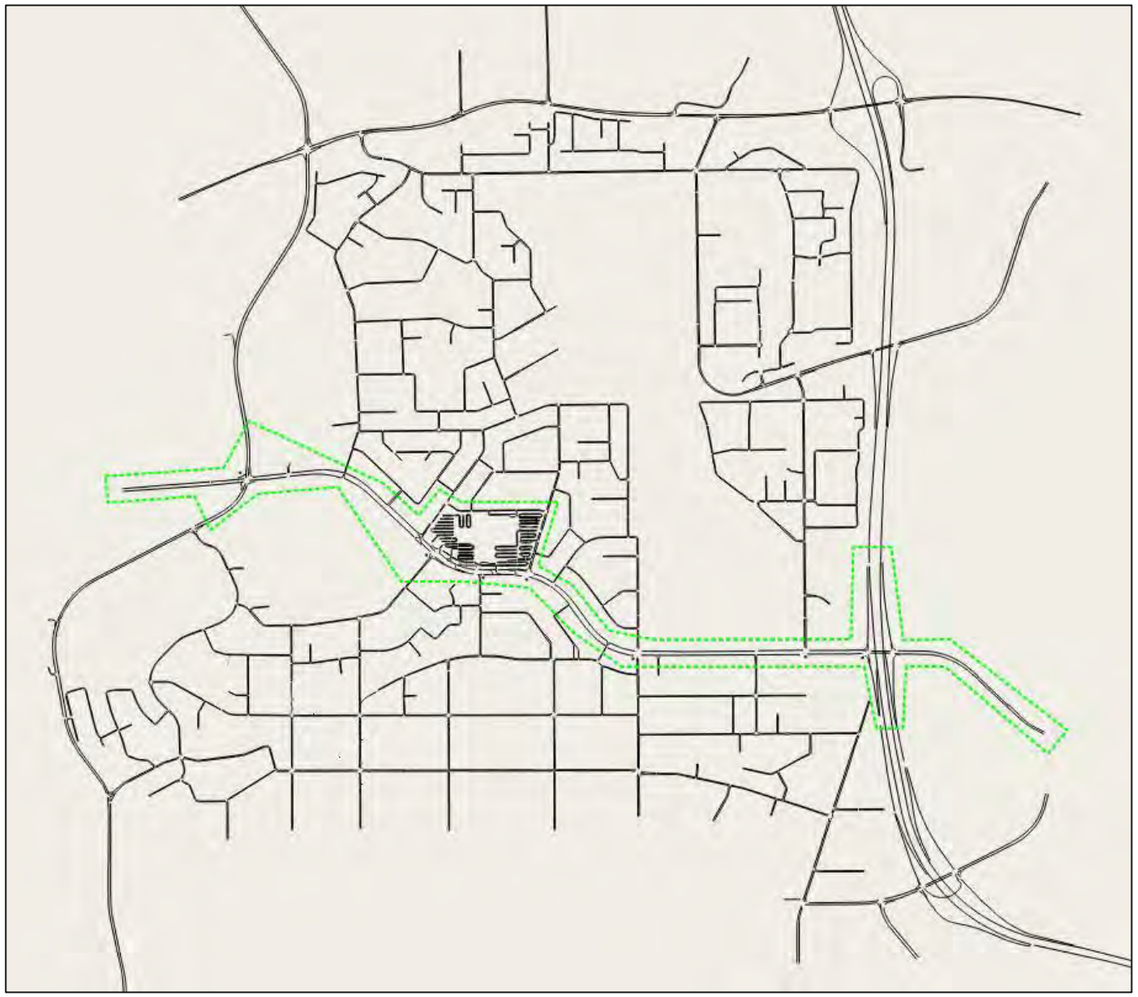


**Figure 2-1 Base Network**

The base model network was built using available digital aerial photography, with site visits to confirm the accuracy and operation of the modelled network. Based on the supplied data, the model was constructed to a 1:1 scale, ensuring correct vehicle operation and accurate driver behaviour.

## 2.4 Model Periods

All Aimsun models have been developed with a two hour peak period and analysed for the peak hour. The model duration of the two hours was used to ensure the shoulders to the peaks of the background traffic and development traffic are adequately modelled. The extended peak period also allows the model to 'warm up' before the peak hour to load traffic into the model and ensure SCATS has adjusted to the volumes. The peak traffic periods and peak traffic hours are as follows:

- Morning Peak (AM) between 07:00 – 09:30, with a peak hour period of 08:00 – 09:00
- Afternoon Peak (PM) between 16:00 – 18:30, with a peak hour period of 17:00 – 18:00
- Saturday (Sat) between 11:00 – 13:30, with a peak hour period of 12:00 – 13:00

## 2.5 Site Visits

Site visits were undertaken by Aurecon staff on Saturday 6 July 2013, Thursday 21 November 2013, Saturday 23 November 2013, and Wednesday 11 June 2014 to confirm the model form and ensure realistic vehicle behaviour is replicated within the model.

# 3 Traffic Data Collection

## 3.1 Survey Data

Data collection and availability is fundamental in ensuring the results, recommendations and final outcomes of the study are robust and are as accurately evaluated as possible. Therefore, the data were collected from a number of sources including Main Roads WA and the Public Transport Authority (PTA). Signalised and non-signalised intersection counts were collected by Austraffic with additional signalised counts obtained from SCATS volume files provided by Main Roads WA. The data that was used for the modelling was predominately collected on Thursday 21 November 2013, Saturday 23 November 2013, Wednesday 11 June 2014, Thursday 14 May 2015, and Saturday 23 May 2015. The following sections summaries the traffic data collection process and methodology.

## 3.2 Traffic Count Data

### 3.2.1 Turn Count Data

In total data for 17 intersections were collected for the weekday model and 36 intersections were collected for the Saturday model. These counts consisted of both full and partial turning count data. Full count refers to all movements that is both turns and through movements collected for all approaches to the intersection. Partial counts refer to the collection of turning movements only.

Those intersections counted are listed below:

- Karrinyup Road & Marmion Avenue
- Karrinyup Road & Burroughs Road
- Karrinyup Road & Jeanes Road
- Karrinyup Road & Francis Avenue
- Karrinyup Road & Huntriss Road
- Karrinyup Road & North Beach Road
- Karrinyup Road & Kwinana Northbound Ramps
- Karrinyup Road & Kwinana Southbound Ramps
- Francis Avenue & Davenport Street
- Burroughs Road & Davenport Street
- Erindale Road & Kwinana Southbound Ramp
- Cedric Road & Kwinana Northbound Ramps
- Cedric Road & Kwinana Southbound Ramps
- North Beach Road & Duffy Road
- North Beach Road & Clement Drive
- North Beach Road & Reid Highway
- Reid Highway & Marimon Avenue
- Pascoe Street & Burroughs Road
- Pascoe Street & Clement Drive
- Jeanes Road & Elliot Road
- West Coast Highway & Pearl Parade
- Sackville Terrace & Deanmore Road
- Sackville Terrace & Huntriss Road
- Barnes Street & Odin Road
- Newborough Street & Duke Street
- Wilding Street & Newborough Street
- Mitchell Freeway at Karrinyup overpass
- Reid Highway & Marion Avenue
- Reid Highway & Okely Road

In addition, count data at all access points to the centre, including the petrol station, was collected on for Thursday AM and PM peak period as well as for the Saturday peak period.

### 3.2.2 Tube Count Data

Tube counts are commonly used for traffic counts along the stretch of a road. A total of six tube counts were collected for the weekday peak period and nine tube counts for the Saturday peak period.

Those roads counted are listed below:

- Burroughs Road between Davenport Street and Elworthy Place
- Erindale Road between North Beach Road and Kwinana northbound ramp
- Francis Ave between Davenport Street and Hall Street
- Grand Promenade between Jackson Ave and Newborough Street
- Miles Street between Karrinyup Road and Northgate Street
- Milverton Avenue between Clevedon Way
- Milverton Avenue between Karrinyup Road and Wincanton Road
- Milverton Avenue between North Beach Road and Beckington Way
- Pike Street between Davenport Street and Taunton Way
- Deanmore Road south of Sackville Terrace
- Duke Street south of Sackville Terrace
- North Beach Road south of Balcatta Road
- Pearl Parade east of West Coast Highway
- Reid Highway east of Duffy Road
- Sackville Terrace west of Deanmore Road

## 3.3 Journey Time Data

To form part of the validation process travel time surveys were undertaken eastbound and westbound along Karrinyup Road between Cedric Street and Arnott Street. This survey was undertaken using a floating car method on days which the traffic data were collected.

## 3.4 Traffic Signal Data

SCATS traffic data and files were collated for the same days which the traffic counts were collected. The SCATS files supplied by Main Roads WA included VS, SM, IDM, LX, sft, tc, ram, and database files. These files allowed adaptive SCATS signal control to be enabled in the microsimulation area and fixed signal timings to be derived in the mesoscopic areas.

## 3.5 Public Transport Information

All bus route data entered into the base models was obtained from the Transperth website and consisted of routes, schedules, and stop locations. Bus stop dwell times were assumed and fixed at 20 seconds with a 5 second deviation.

**Table 3-1 Bus Routes**

| Bus Route Number | Bus Route Description |
|---|---|
| 98 | Circle Route – Clockwise |
| 99 | Circle Route – Anticlockwise |
| 402 | Stirling Station – Perth via Main Street and Loftus Street |
| 403 | Stirling Station – Perth via Royal Street and Loftus Street |
| 404 | Osborne Park – Perth via Swan Street and Loftus Street |
| 410 | Stirling Station – Scarborough Beach |
| 412 | Stirling Station – Scarborough Beach via Woodlands |
| 413 | Stirling Station – Glendalough Station via Osborne Park |
| 414 | Stirling Station – Glendalough Station via Balcatta |
| 415 | Stirling Station – Mirrabooka Bus Station via Amelia Street |
| 421 | Stirling Station – Scarborough Beach via Sackville Terrace |
| 422 | Stirling Station – Scarborough Beach via Karrinyup Bus Station |
| 423 | Stirling Station – Warwick Station via Karrinyup Bus Station & Hillary's Boat Harbour |
| 424 | Stirling Station – Karrinyup Bus Station via North Beach Road and Gwelup |
| 425 | Stirling Station – Warwick Station via Karrinyup Bus Station and Carine |
| 427 | Stirling Station – Warwick Station via North Beach Road and Erindale Road |
| 428 | Stirling Station – Warwick Station via Balcatta |
| 458 | Scarborough – Whitfords Station via Hillary's Boat Harbour |

# 4 Traffic Demand and Assignment

## 4.1 Zone Structure

There is a degree of interdependence between the definitions of the study area/ zoning system and the network, such that one should not define one without reference to the other.

The foremost component in defining the zoning structure for the model was the existing zone structure utilised with the Main Roads WA higher tier Regional Operations Model (ROM). Disaggregation of these ROM zones has been undertaken where considered applicable, based on the main areas of trip generation through the suburb of Karrinyup within the study area.

In total 48 zones have been applied to the model, nine of these within the Karrinyup Shopping centre and nine as internal filler zones.

## 4.2 Demand Matrices Development

In total 3 vehicle demand matrices have been assigned to the network. These represent cars, heavy goods vehicles (HGVs), and Karrinyup Centre traffic. These all use the ROM prior matrix as a base.

### 4.2.1 ROM Demand Matrices

ROM cordon matrices were extracted from the 2011 ROM model. These matrices are considered coarse in the Karrinyup Centre model area with a total of 31 zones covering the model area. It was noted that only one zone was defined for the Karrinyup Shopping Centre.

With this, the ROM matrices underwent an adjustment process to better reflect the traffic generators within the model area, as detailed below.

The ROM model was found to have a more evenly spread distribution for the Karrinyup Centre zone whereas the traffic counts indicate an origin and destination that is much more skewed to the east on Karrinyup Road.

Below are some approximate distributions based on matrix origin/ destination pairs. These are for comparative purposes only as the actual distribution is dependent on network route choice assignment.

**Table 4-1 AM Distributions**

| ROM Distribution | | Network Distribution | |
|---|---|---|---|
| **From East to Centre** | **From West to Centre** | **From East to Centre** | **From West to Centre** |
| 40% | 16% | 29% | 19% |
| **To East from Centre** | **To West from Centre** | **To East from Centre** | **To West from Centre** |
| 36% | 13% | 79% | 3% |
| **Network East to West** | **Network East to West** | **Network East to West** | **Network East to West** |
| 3% | 1% | 3% | 2% |

Table 4-2 PM Distributions

| ROM Distribution | | Network Distribution | |
|---|---|---|---|
| **From East to Centre** | **From West to Centre** | **From East to Centre** | **From West to Centre** |
| 35% | 13% | 75% | 3% |
| **To East from Centre** | **To West from Centre** | **To East from Centre** | **To West from Centre** |
| 36% | 15% | 40% | 37% |
| **Network East to West** | **Network East to West** | **Network East to West** | **Network East to West** |
| 2% | 2% | 2% | 1% |

Table 4-3 Saturday Distributions

| ROM Distribution | | Network Distribution | |
|---|---|---|---|
| **From East to Centre** | **From West to Centre** | **From East to Centre** | **From West to Centre** |
| 38% | 15% | 59% | 13% |
| **To East from Centre** | **To West from Centre** | **To East from Centre** | **To West from Centre** |
| 37% | 13% | 71% | 12% |
| **Network East to West** | **Network East to West** | **Network East to West** | **Network East to West** |
| 2% | 2% | 1% | 3% |

## 4.3 Aimsun Matrix Development

The methodology for the creation of the demand matrix development is detailed below.

1. Cordon origin/ destination (O/D) demand matrices were extracted from the 2011 ROM model by Main Roads WA. These matrices were realigned to reflect the Aimsun proposed zone structure. Disaggregation was also undertaken to reflect the areas within the Aimsun model where no zones were available in the ROM model.

2. The matrices were adjusted to collected survey data using the Furness method. The Furness method of matrix updating is an iterative process to derive matrices that results in the best match to survey data. Trip end totals for each Aimsun zone were formed from external link survey data, internal link survey data, and other filler zones with values based on their survey differences, surrounding land use, and number of individual households.

3. As part of the calibration process the matrices were adjusted using the Aimsun matrix adjustment process to refine the distributions created by the ROM zone disaggregation. These were then checked to make sure large changes had not been made and further manual refinement or containment then took place where necessary.

## 4.4 Traffic Demand Profiles

Demand profiles have been applied to dispense traffic demands in defined time intervals over the model periods. Global release profiles have been developed for car and goods vehicles (GV). These profiles were developed based on the survey data collected by Austraffic, which were collated in 15 minute intervals. The following traffic profiles were developed from the data at signalised intersections on Karrinyup Road immediately outside of the centre and were subsequently used in the model. The figures are displayed as a percentage peak factor of the peak hour. The morning peak period profile, illustrated in Figure 4-1 shows a peak hour between 08:00 to 09:00. In Figure 4-2, the afternoon peak profile shows a peak hour between 17:00 to 18:00 and the Saturday peak period illustrated in Figure 4-3 shows that the peak hour is between 12:00 to 13:00.

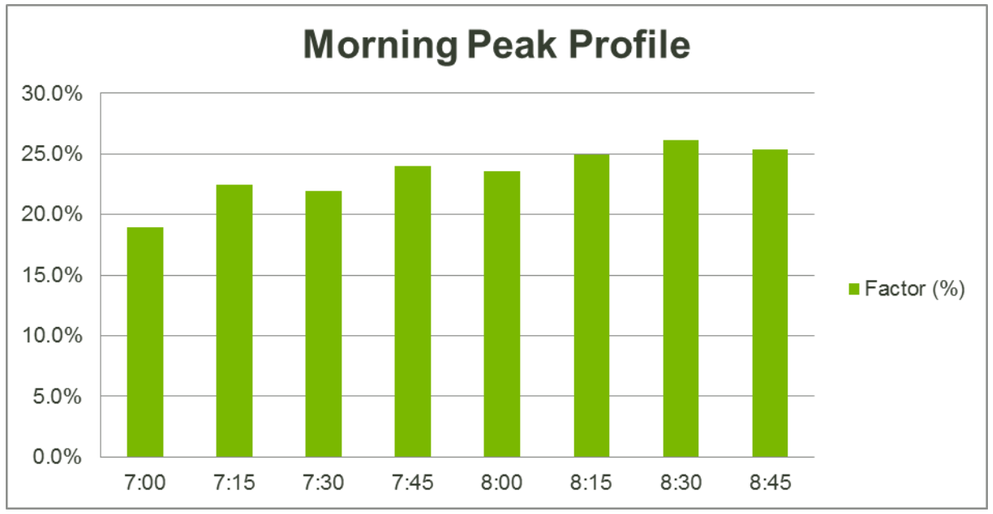



Figure 4-1 Morning Peak Profile

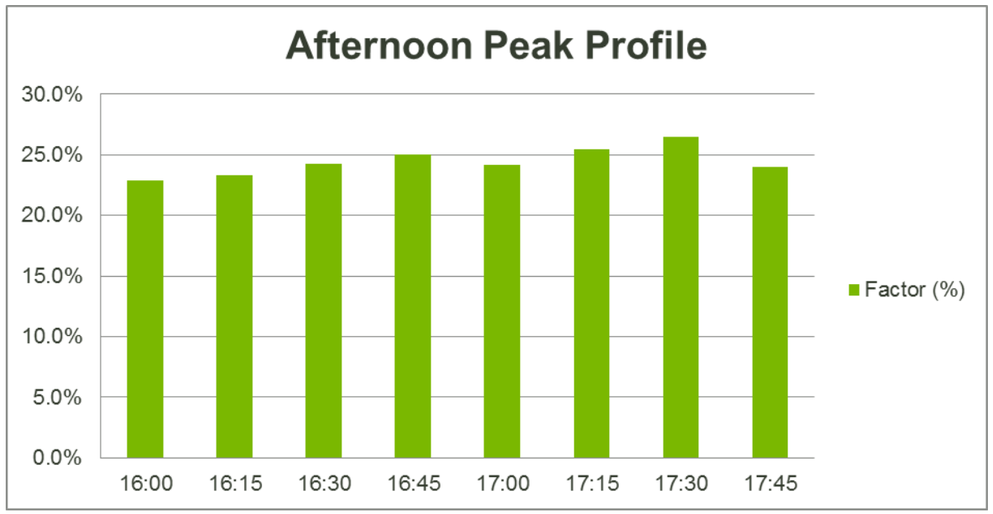



Figure 4-2 Afternoon Peak Profile

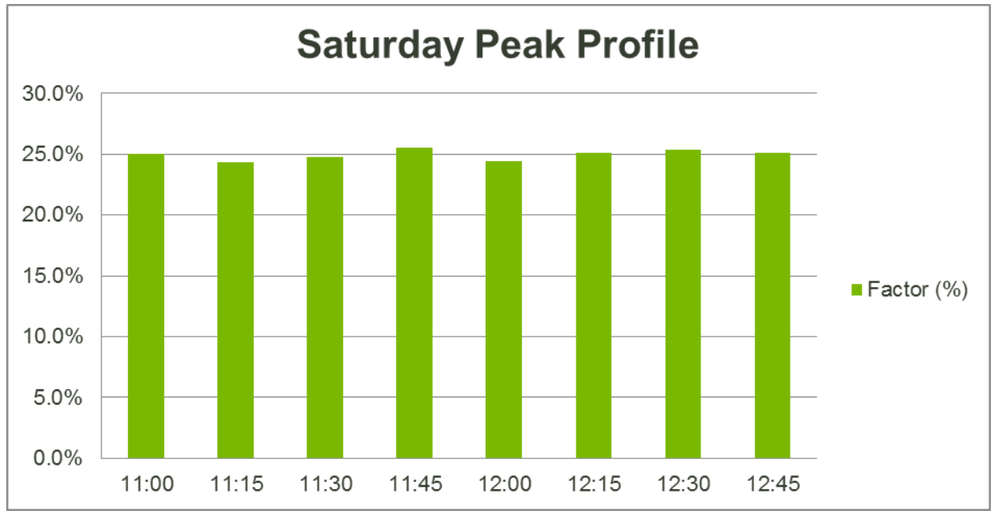



**Figure 4-3 Saturday Peak Profile**

The split of HGVs for the model area was based on survey data and is calculated as follows for the following peak periods. It was applied as separate matrix.

- Morning: 1.37%
- Afternoon: 0.33%
- Saturday Peak: 1.67%.

### 4.5 Pedestrians

Whilst individual pedestrian movements have not been modelled within the base model, the effect of pedestrian movements on traffic signals and timings has been taken into account. This has been done by including pedestrian demand captured by the SCATS signal data.

# 5 Traffic Alignment Calibration Process

### 5.1 Path Assignment

Within Aimsun, the initial static assignment route choice is calculated by cost equations by taking into consideration section capacity and section travel times. Following this the dynamic traffic assignment operates during the model run by using current section travel times for every feedback time period. The section capacities and global route choice parameters including attractiveness weighting can be modified to aid calibration. The initial path assignment file was collected as an .apa file and then loaded with each model run.

### 5.2 Dynamic Route Choice

Route choice parameters were chosen from experience with similar models as well as through the calibration process. The key with route choice values is to achieve a robust model that can also adjust to changes in the network or demands.

The percentage of stochastic assignment was adjusted to what is considered to be realistic for a model of this size; this is 50% of traffic through the network follow the static assignment with the remainder being dynamic.

The settings used with the modelling are listed below.

| Parameter | Value |
|---|---|
| **Route Choice** | |
| Cycle | 0:03:00 |
| Number of Intervals | 3 |
| Attractiveness Waiting | 8 |
| User Defined Cost Weight | 0 |
| **Use of O/D Routes and Path Assignment Results** | |
| Car and HGV following O/D Routes | 100% |
| Car and HGV following Path Assignment Results | 50% |
| **Route Choice Model** | |
| Route Choice Model | C-Logit |
| Dynamic | Enabled |
| Initial K-SPs | 3 |
| Max Number to Keep | 6 |
| Max Number of Paths | 3 |
| **Parameters** | |
| Scale | 8 |
| Beta | 0.15 |
| Gamma | 1 |

### 5.3 Fixed O/D Route

A fixed O/D route was applied from zone 2 to zone 23, Balcatta Road to Mitchell Freeway North because in this section of Reid Highway, extensive delay is present. A fixed path was used to ensure vehicles would not use another route which would require perfect knowledge of the network and Perth drivers would not take this route.

# 6 Model Coding

Through the calibration process adjustments have been made to the modelling parameters to ensure the model replicates the existing observed traffic conditions.

## 6.1 Behaviour

Queensland Department of Transport and Main Roads (DTMR) default values have been used in the absence of other relevant templates.

## 6.2 Configuration

- **Global arrivals release style**

The release style of exponential has been used.

- **Simulation Step**

The time step value of 0.45 seconds is used in the models.

- **Mean Reaction Time**

The mean reaction time of each driver, in seconds, is associated with the lag in time between a change in speed of the preceding vehicle and the following vehicles reaction to the change. The value of 0.9 seconds is utilised in this model with a reaction time at stop of 1.10 seconds.

## 6.3 Distance Zones

The default node zone distance has been used for most sections; however some have been modified to better replicate the lane changing behaviour on street. This was found to have more of an impact in the microsimulation area and a negligible impact in the mesoscopic area. Future year model values were maintained with the base model.

## 6.4 Road Types

In total 7 road types have been used in the model. The road types generally reflect the speed, capacities, and distance zones of the roads within the network.

## 6.5 Turn Speeds

Some turning speeds have been reduced at intersections and left slip lanes as the default turn speeds appeared unrealistic for a give-way movement.

## 6.6 Turn Penalties

Turn penalty functions were applied in certain locations during the matrix adjustment and calibration process to replicate turning delay on movements that may be overrepresented in the model and its network assignment. These penalties were applied in the following locations.

- Cedric Street right turn into Ellen Stirling Boulevard
- Jeanes Road right turn into Karrinyup Road
- Reid Highway right turn into Mitchell Freeway southbound onramp
- Karrinyup Road left turn into Francis Avenue
- Francis Avenue right turn into Karrinyup Road

## 6.7 Version

The model has been developed in version 8.0.5 R29862 x64 of Aimsun. This was the latest current version at the time of model development.

# 7 Model Calibration

## 7.1 Calibration / Validation Criteria

Model calibration/ validation is necessary to ensure that a model accurately represents an existing traffic situation and can be used with confidence to test alternatives. Model calibration for this model has been based on the following:

**Vehicle Behaviour:** Undertaking a visual check to confirm the observed on-street vehicle behaviour is consistent with that observed in the model
**Turn Counts:** Comparing observed and modelled turning movements for general traffic over the modelled peak hour periods
**Link Counts:** Comparing observed and modelled link counts for general traffic over the modelled peak hour periods
**Journey Times:** Comparing observed and modelled journey travel times for general traffic over the modelled peak hour periods
**Queue Lengths:** Undertaking a visual check to confirm the modelled queue operation is consistent with those observed on site
**SCATS Signal Timings:** Comparing observed and modelled signal timings over the modelled peak hour periods

While there are no prescribed calibration criteria for a hybrid model, the set of criteria selected to be the most appropriate is from NZTA Economic Evaluation Manual. It has been referenced to assess the acceptability of the level of calibration achieved in the model. This calibration criteria is presented in Table 3-1. It must be remembered that this is not a microsimulation model, rather it is a large hybrid model with a mesoscopic buffer area with network vehicles loaded far from the centre and given multiple route choice.

Guidelines for hybrid models are currently being developed but it is believed that these guidelines are the most suitable at this stage. WA does not have its own set of guidelines.

Model calibration/ validation is often a difficult task of balancing the model's ability to replicate existing conditions to that of its ability to adapt to the local and network impacts of option testing. If the model becomes too constrained, in an attempt to match survey data, it may not react as it should during the option testing stage. It is believed that this balance has been reached with this model calibration/ validation and other criteria would constrain the model too much. It should also be noted that there is route choice within the centre area, rather than the centre only loading traffic on to the external network.

Also as the model covers three time periods, parameters are shared across all three periods. Therefore the focus was on the PM and Saturday periods as this is when the impact from traffic on both the road and centre network is more critical.

Discussions were had with the external peer reviewer and a focus was made on volumes greater than 200 vehicles per hour (vph) as these are considered more critical. Therefore results without the very low volumes are also presented.

Table 7-1 Model Calibration Criteria

| Criteria and Measures | Range |
|---|---|
| Calibration Acceptance Targets - Within 30% of Observed | < 99 vph |
| | 100 -199 vph |
| | 200 - 499 vph |
| | 500 - 999 vph |
| | > 1,000 vph |
| | > 100 vph |
| **Turn Count $R^2$ Measure** | **Criteria** |
| $R^2$ value for modelled versus observed volumes for all individual turns | > 0.85 |
| **Turn Criteria and Measures** | **Criteria** |
| GEH statistic < 5.0 for individual Links volumes | >60% of cases |
| GEH statistic < 10.0 for individual Links volumes | >95% of cases |
| GEH statistic < 12.0 for individual Links volumes | 100% of cases |
| **Link Count $R^2$ Measure** | **Criteria** |
| $R^2$ value for modelled versus observed volumes for all individual Links | > 0.85 |
| **Links Criteria and Measures** | **Criteria** |
| GEH statistic < 5.0 for individual Links volumes | >60% of cases |
| GEH statistic < 10.0 for individual Links volumes | >95% of cases |
| GEH statistic < 12.0 for individual Links volumes | 100% of cases |
| Individual Link Volumes | +/- 20% |
| **Criteria and Measures** | **Criteria** |
| Percentage RMSE Turns | <30% |

## 7.2 Model Stability

The coefficient of variation (COV) has been used to assess the variability between each run on the network statistics. The COV is a measure of the variation between model runs. Typically 5% is considered a good level of correlation. The coefficient of variance is calculated by divided the mean by the standard deviation as follows:

$$COV = \frac{SD}{\mu} \times 100$$

Where: SD = Standard Deviation

μ = Mean

The following tables illustrate output statistics and COV for the weekday morning, afternoon and Saturday peak periods.

Table 7-2 AM Model Stability Outputs

| Log Run | Average Travel Time (s) | Total Number of Vehicles | Mean Speed (kph) |
|---|---|---|---|
| **Mean** | 478 | 9,341 | 44 |
| **Std Dev** | 5 | 37 | 0.5 |
| **Min** | 472 | 9,310 | 43 |
| **Max** | 485 | 9,400 | 44 |
| **Range** | 14 | 90 | 1.4 |
| **CoV** | 1.1% | 0.4% | 1.1% |

Table 7-3 PM Model Stability Outputs

| Log Run | Average Travel Time (s) | Total Number of Vehicles | Mean Speed (kph) |
|---|---|---|---|
| **Mean** | 762 | 9,905 | 44 |
| **Std Dev** | 18 | 57 | 0.5 |
| **Min** | 741 | 9,834 | 44 |
| **Max** | 781 | 9,984 | 45 |
| **Range** | 41 | 150 | 1.1 |
| **CoV** | 2.3% | 0.6% | 1.0% |

Table 7-4 Saturday Model Stability Outputs

| Log Run | Average Travel Time (s) | Total Number of Vehicles | Mean Speed (kph) |
|---|---|---|---|
| **Mean** | 448 | 10,297 | 53 |
| **Std Dev** | 11 | 51 | 0.4 |
| **Min** | 437 | 10,214 | 52 |
| **Max** | 465 | 10,339 | 53 |
| **Range** | 27 | 125 | 1.2 |
| **CoV** | 2.4% | 0.5% | 0.8% |

The general network statistics for all peak periods achieved a COV of less than 3%. Although the morning and afternoon peak periods achieved a 2.3% and 2.4% COV respectively, it is considerably less than the 5% acceptable limit. Overall, it is considered that the model is stable over the three peak periods.

## 7.3 Turn Count Calibration

This section illustrates the comparisons between observed and modelled turn counts for the peak periods, by organising the observed counts into volume ranges. This allows the data to be assessed with more emphasis placed on the higher volume movements. The comparison includes averaged modelled results from all five runs. Graphical comparisons are also presented.

The following tables present the results achieved comparing observed and modelled count data for each individual link with a survey target during the weekday peak hour periods and Saturday peak hour period. The links have been organised into ranges by their observed count.

As it is one model covering three periods, parameters within the model to provide the best calibration across all three periods. However, more parameter alignment was given to the Saturday period calibration as this is considered to be the most critical period.

**Table 7-5 Morning Peak Turn Calibration Results Tabulated**

| Criteria and Measures | Range | Observed Total | Modelled Achieved | Achieved (%) |
|---|---|---|---|---|
| Calibration Acceptance Targets - Within 30% of Observed | < 99 vph | 59 | 14 | 24% |
| | 100 -199 vph | 17 | 9 | 53% |
| | 200 - 499 vph | 21 | 16 | 76% |
| | 500 - 999 vph | 10 | 10 | 100% |
| | > 1,000 vph | 8 | 8 | 100% |
| | > 100 vph | 56 | 43 | 77% |
| **Turn Count $R^2$ Measure** | **Criteria** | **Modelled R2 Value** | | |
| $R^2$ value for modelled versus observed volumes for all individual turns | **> 0.85** | **0.97** | | |
| **Turn Criteria and Measures** | **Criteria** | **Observed Total** | **Modelled Achieved** | **Achieved (%)** |
| GEH statistic < 5.0 for individual turn volumes | >60% of cases | 115 | 92 | 80% |
| GEH statistic < 10.0 for individual turn volumes | >95% of cases | 115 | 113 | 98% |
| GEH statistic < 12.0 for individual turn volumes | 100% of cases | 115 | 114 | 99% |
| **Criteria and Measures** | **Criteria** | **Modelled RMSE Value** | | |
| Percentage RMSE Turns | <30% | 24% | | |

**Table 7-6 Afternoon Peak Turn Calibration Results Tabulated**

| Criteria and Measures | Range | Observed Total | Modelled Achieved | Achieved (%) |
|---|---|---|---|---|
| Calibration Acceptance Targets - Within 30% of Observed | < 99 vph | 52 | 10 | 19% |
| | 100 -199 vph | 26 | 11 | 42% |
| | 200 - 499 vph | 18 | 16 | 89% |
| | 500 - 999 vph | 11 | 11 | 100% |
| | > 1,000 vph | 8 | 8 | 100% |
| | > 100 vph | 63 | 46 | 73% |
| **Turn Count $R^2$ Measure** | **Criteria** | **Modelled R2 Value** | | |
| $R^2$ value for modelled versus observed volumes for all individual turns | **> 0.85** | **0.97** | | |
| **Turn Criteria and Measures** | **Criteria** | **Observed Total** | **Modelled Achieved** | **Achieved (%)** |
| GEH statistic < 5.0 for individual turn volumes | >60% of cases | 115 | 85 | 74% |
| GEH statistic < 10.0 for individual turn volumes | >95% of cases | 115 | 111 | 97% |
| GEH statistic < 12.0 for individual turn volumes | 100% of cases | 115 | 113 | 98% |
| **Criteria and Measures** | **Criteria** | **Modelled RMSE Value** | | |
| Percentage RMSE Turns | <30% | 22% | | |

**Table 7-7 Saturday Peak Turn Calibration Results Tabulated**

| Criteria and Measures | Range | Observed Total | Modelled Achieved | Achieved (%) |
|---|---|---|---|---|
| Calibration Acceptance Targets - Within 30% of Observed | < 99 vph | 47 | 13 | 28% |
| | 100 -199 vph | 30 | 9 | 30% |
| | 200 - 499 vph | 21 | 20 | 95% |
| | 500 - 999 vph | 12 | 12 | 100% |
| | > 1,000 vph | 11 | 11 | 100% |
| | > 100 vph | 74 | 52 | 70% |
| **Turn Count $R^2$ Measure** | **Criteria** | **Modelled R2 Value** | | |
| $R^2$ value for modelled versus observed volumes for all individual turns | **> 0.85** | **0.97** | | |
| **Turn Criteria and Measures** | **Criteria** | **Observed Total** | **Modelled Achieved** | **Achieved (%)** |
| GEH statistic < 5.0 for individual turn volumes | >60% of cases | 121 | 84 | 69% |
| GEH statistic < 10.0 for individual turn volumes | >95% of cases | 121 | 115 | 95% |
| GEH statistic < 12.0 for individual turn volumes | 100% of cases | 121 | 120 | 99% |
| **Criteria and Measures** | **Criteria** | **Modelled RMSE Value** | | |
| Percentage RMSE Turns | <30% | 22% | | |

As shown in the tables above, the majority of the criteria are satisfied and those that were not met are for lower volume movements that have less of an influence on the network performance. Overall the linear regressions ($R^2$) turn counts, which are the key indicative statistics, are well above the criteria requirements.

A further calibration check was undertaken by examining the GEH of those turn counts that were above 200 vph. This output table is below and shows that all volumes above 200 vph have a GEH less than 10% and only the AM period, at 79%, has less than 80% of turns below a GEH of 5.

**Table 7-8 Turn Calibration Results for volumes greater than 200 vph**

| Turn Criteria and Measures | AM | PM | SAT |
|---|---|---|---|
| GEH statistic < 5.0 for individual turn volumes >200 vph | 79% | 86% | 86% |
| GEH statistic < 10.0 for individual turn volumes >200 vph | 100% | 100% | 100% |
| GEH statistic < 12.0 for individual turn volumes >200 vph | 100% | 100% | 100% |

The following graphs presents a plot of observed counts against modelled counts for the peak periods.

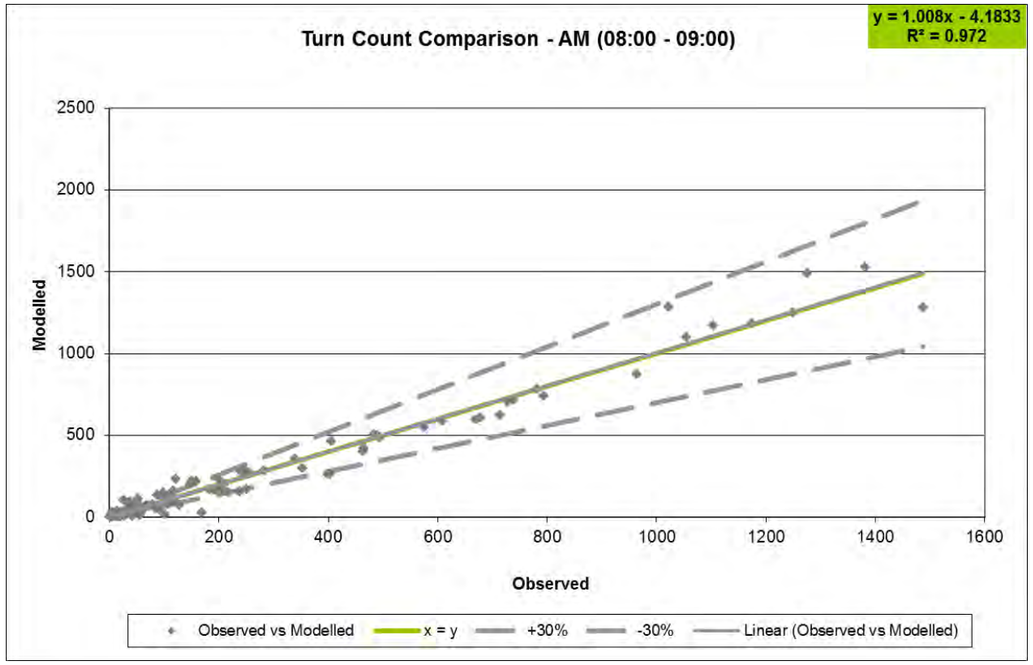



Figure 7-1 Morning Peak Turn Count Comparison

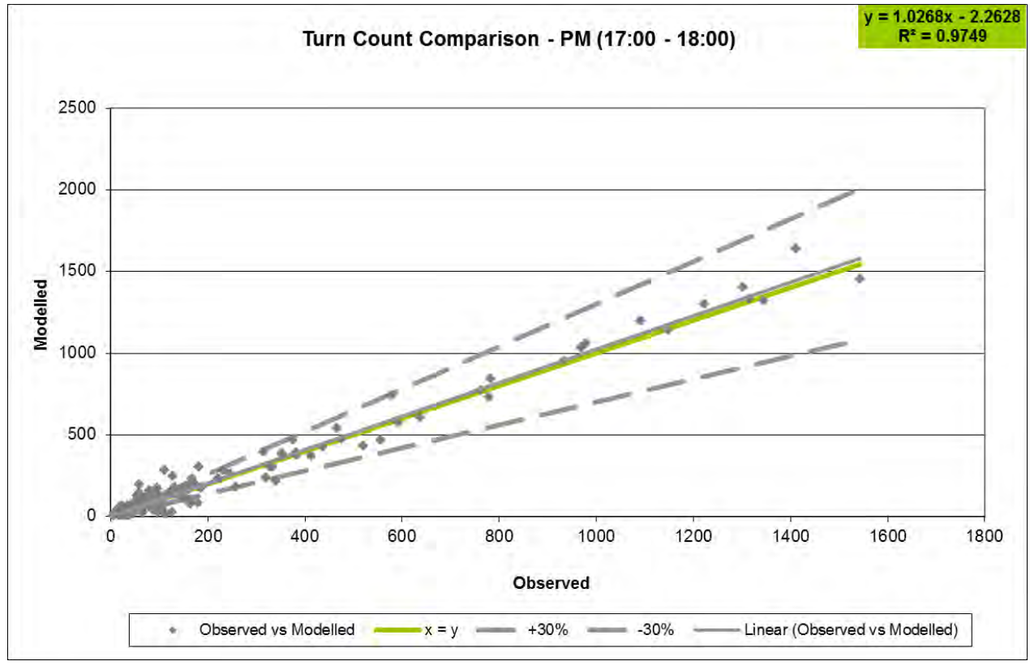



Figure 7-2 Afternoon Peak Turn Count Comparison

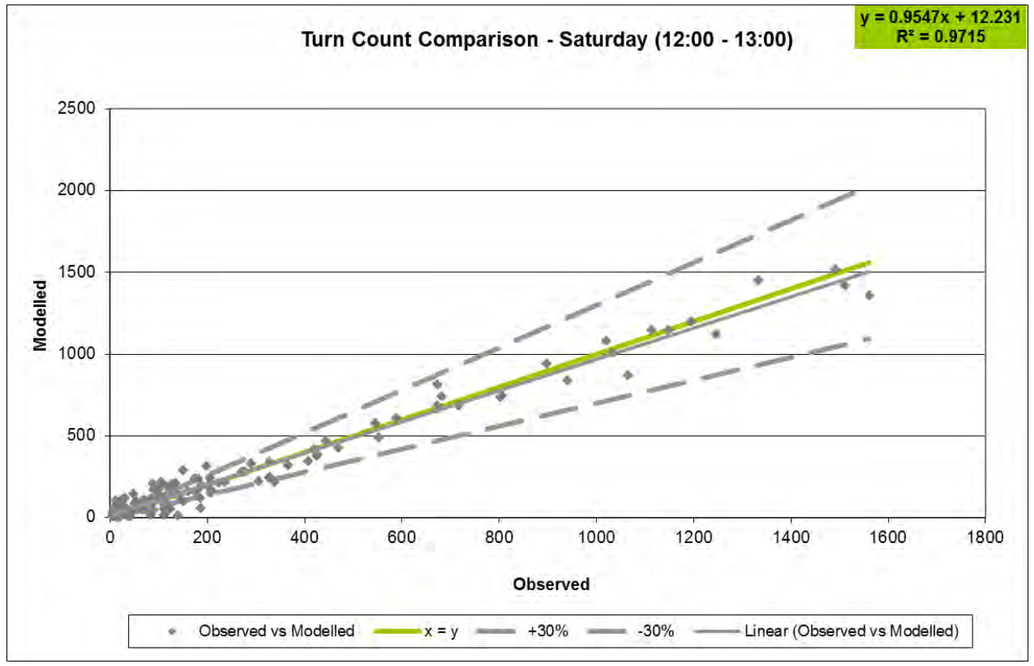



Figure 7-3 Saturday Peak Turn Count Comparison

The graphs shown above illustrate a strong correlation between observed and modelled counts. The minimal requirement to satisfy the criteria is 0.85 and all the models have achieved it.

## 7.4 Link Count Calibration

Link counts have been compared based on approach and exit link flows at intersections. That is, the link counts are comprised from the same set of data used for turn count comparisons.

The following sections compare the observed and modelled link counts for each peak hour period, by organising the observed counts into volume ranges. This allows the data to be assessed with more emphasis placed on the higher volume movements. The comparison includes averaged modelled results from all five runs. Graphical comparisons are also presented.

The following tables present the results achieved from comparing observed and modelled count data for each individual link with a survey target during the weekday peak hour periods and Saturday peak hour period. The links have been organised into ranges by their observed count.

**Table 7-9 Tabulated Morning Peak Link Calibration Results**

| Link Count $R^2$ Measure | Criteria | Modelled $R^2$ Value | | |
|---|---|---|---|---|
| $R^2$ value for modelled versus observed volumes for all individual Links | **> 0.85** | **0.99** | | |
| **Links Criteria and Measures** | **Criteria** | **Observed Total** | **Modelled Achieved** | **Achieved (%)** |
| GEH statistic < 5.0 for individual Links volumes | >60% of cases | 191 | 157 | 82% |
| GEH statistic < 10.0 for individual Links volumes | >95% of cases | 191 | 184 | 96% |
| GEH statistic < 12.0 for individual Links volumes | 100% of cases | 191 | 188 | 98% |
| Individual Link Volumes | **+/- 20%** | | | |
| | flows <99 vph | 24% | | |
| | 100-199 vph | 53% | | |
| | 200-499 vph | 76% | | |
| | 500-999 vph | 100% | | |
| | flows >1,000 vph | 100% | | |
| | All | 77% | | |

**Table 7-10 Tabulated Afternoon Peak Link Calibration Results**

| Link Count $R^2$ Measure | Criteria | Modelled $R^2$ Value | | |
|---|---|---|---|---|
| $R^2$ value for modelled versus observed volumes for all individual Links | **> 0.85** | **0.97** | | |
| **Links Criteria and Measures** | **Criteria** | **Observed Total** | **Modelled Achieved** | **Achieved (%)** |
| GEH statistic < 5.0 for individual Links volumes | >60% of cases | 191 | 147 | 77% |
| GEH statistic < 10.0 for individual Links volumes | >95% of cases | 191 | 178 | 93% |
| GEH statistic < 12.0 for individual Links volumes | 100% of cases | 191 | 185 | 97% |
| Individual Link Volumes | **+/- 20%** | | | |
| | flows <99 vph | 19% | | |
| | 100-199 vph | 42% | | |
| | 200-499 vph | 89% | | |
| | 500-999 vph | 100% | | |
| | flows >1,000 vph | 100% | | |
| | All | 73% | | |

**Table 7-11 Tabulated Saturday Peak Link Calibration Results**

| Link Count $R^2$ Measure | Criteria | Modelled $R^2$ Value | | |
|---|---|---|---|---|
| $R^2$ value for modelled versus observed volumes for all individual Links | **> 0.85** | **0.98** | | |
| **Links Criteria and Measures** | **Criteria** | **Observed Total** | **Modelled Achieved** | **Achieved (%)** |
| GEH statistic < 5.0 for individual Links volumes | >60% of cases | 281 | 209 | 74% |
| GEH statistic < 10.0 for individual Links volumes | >95% of cases | 281 | 273 | 97% |
| GEH statistic < 12.0 for individual Links volumes | 100% of cases | 281 | 275 | 98% |
| Individual Link Volumes | **+/- 20%** | | | |
| | flows <99 vph | 28% | | |
| | 100-199 vph | 30% | | |
| | 200-499 vph | 95% | | |
| | 500-999 vph | 100% | | |
| | flows >1,000 vph | 100% | | |
| | All | 70% | | |

The above tables detail the link calibration results for the morning peak period. One GEH statistic requirement was not met, GEH <12.0. The individual link volume criteria show that 77% of the modelled link counts are within 20% of the actual counts. Overall the key calibration indication, the linear regression is well above the minimum requirement.

The afternoon peak period calibration results are shown in Table 7-10. Two GEH statistic requirements were not met. It should be noted that the GEH value of greater than 12, have been taken into account during the option testing stage. A linear regression value of 0.99 was achieved between the modelled and actual figures.

Similar to the afternoon peak period, the Saturday peak period results tabulated in Table 7-11 shows that the GEH statistics <12 for individual link volumes criterion was not met. However, the model achieved a linear regression figure of 0.98.

Undertaking a similar task as the turn counts, by looking at volumes above 200 vph, the following table was produced. This shows that the volumes above 200 vph and therefore more critical are much closer to or exceeding the stated criteria.

**Table 7-12 Link Calibration Results for volumes greater than 200 vph**

| Turn Criteria and Measures | AM | PM | SAT |
|---|---|---|---|
| GEH statistic < 5.0 for individual turn volumes >200 vph | 91% | 87% | 85% |
| GEH statistic < 10.0 for individual turn volumes >200 vph | 99% | 99% | 99% |
| GEH statistic < 12.0 for individual turn volumes >200 vph | 99% | 99% | 99% |

The following graphs present a plot of observed counts against modelled counts for the peak periods.

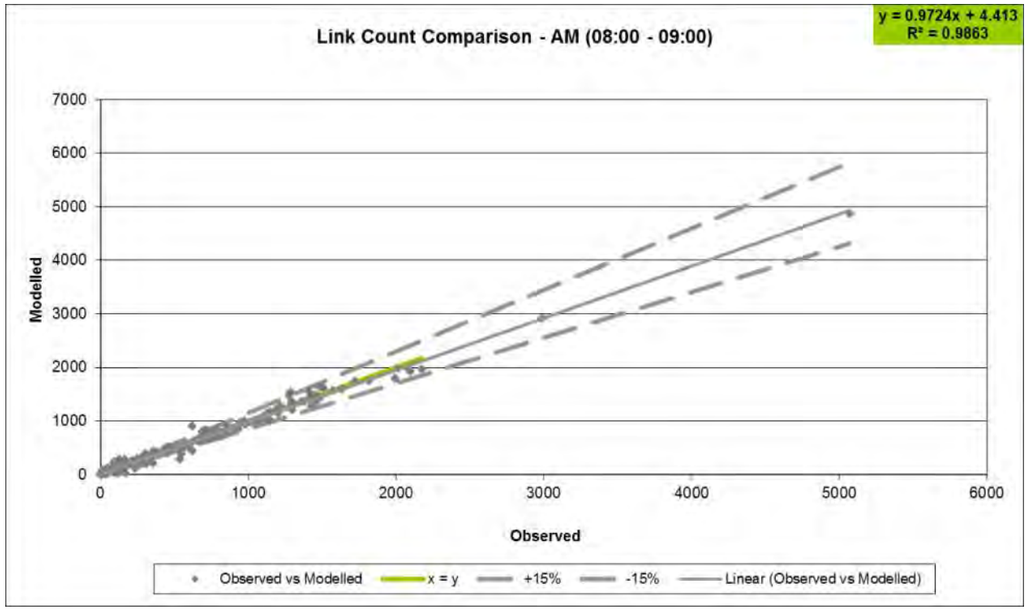



**Figure 7-4 Morning Peak Turn Count Comparison**

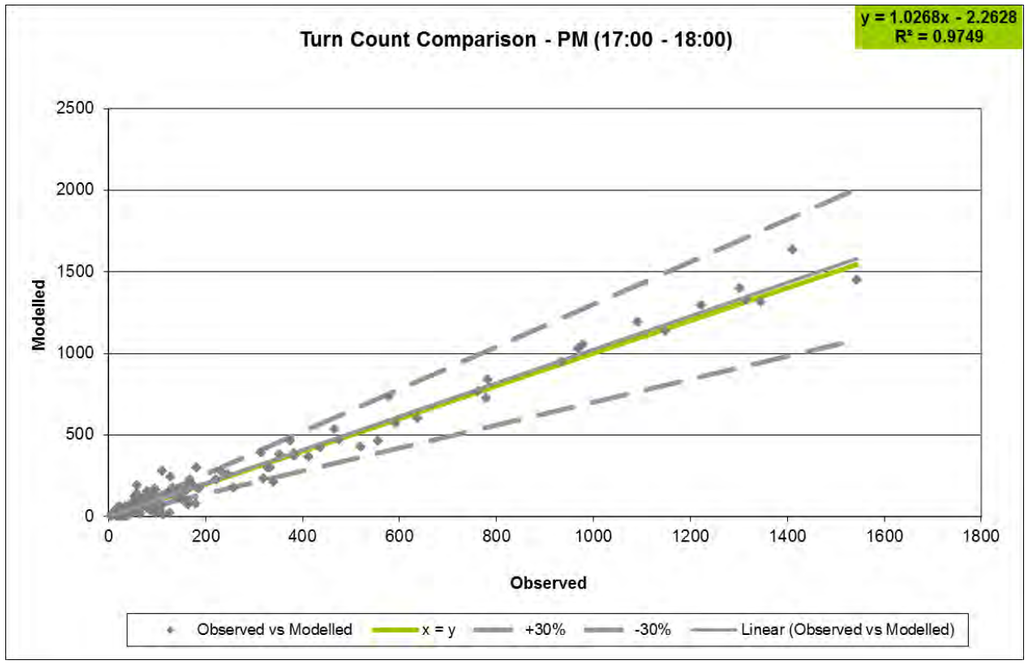



**Figure 7-5 Afternoon Peak Turn Count Comparison**

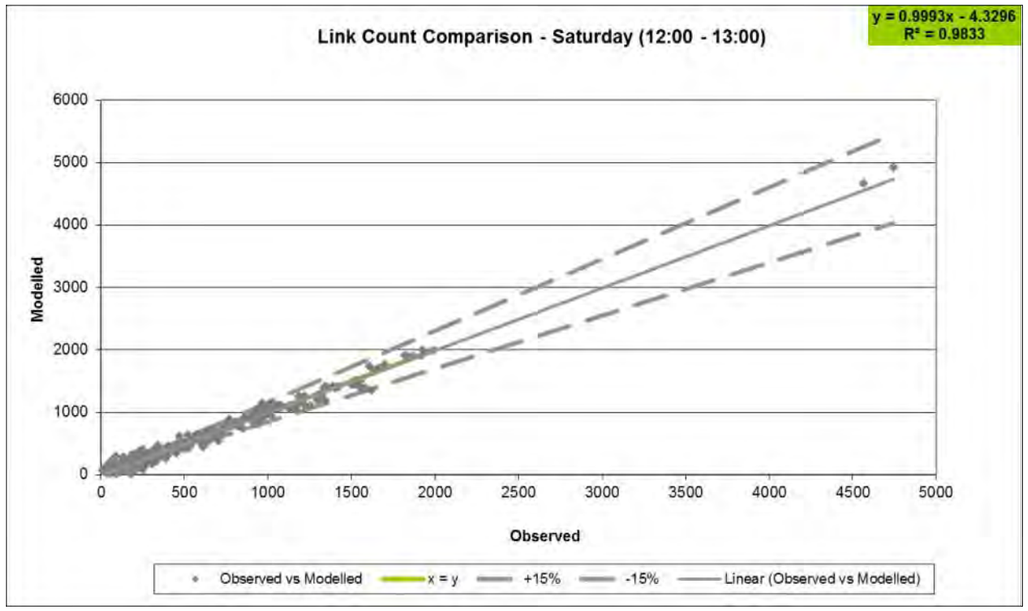



**Figure 7-6 Saturday Peak Turn Count Comparison**

The linear regression graphs for the peak periods illustrate a good correlation between observed and modelled counts, reinforced by a $R^2$ value of greater 0.97.

## 7.5 Travel Time Validation

Travel time comparisons have been undertaken for the peak periods along Karrinyup Road for a Wednesday and Saturday peak period. The comparison includes the average of the average model results from all five runs. It is also worth noting that the modelled travel times comprise of numerous vehicle runs over the period specified however the observed journey times comprise of a few runs undertaken sometime during this period. This should be taken into consideration when reviewing the results below.

Criteria states the journey times should be within 1 minute or within 15%, whichever is greater.

The observed and modelled travel times in minutes are presented along with the difference and percentage figures in the tables below. Based on the tables, the results illustrate a good correlation between observed and modelled journey times, with the majority of the routes having a difference of less than 1 minute or 15%. The exception to this is the AM eastbound direction where the model is over estimating the travel time. This is due to the modelled coordination between the interchange signals and the adjacent North Beach Road signals being slightly different to on-site.

Table 7-13 Morning Peak Travel Time Comparison

| Route Name | Observed | Modelled | Diff | % Diff |
|---|---|---|---|---|
| Karrinyup Road Westbound | 07:11 | 06:12 | 00:59 | 16% |
| Karrinyup Road Eastbound | 05:02 | 06:14 | 01:12 | 24% |

Table 7-14 Afternoon Peak Travel Time Comparison

| Route Name | Observed | Modelled | Diff | % Diff |
|---|---|---|---|---|
| Karrinyup Road Westbound | 06:30 | 06:28 | 00:02 | 0% |
| Karrinyup Road Eastbound | 06:35 | 05:42 | 00:53 | 15% |

Table 7-15 Saturday Peak Travel Time Comparison

| Route Name | Observed | Modelled | Diff | % Diff |
|---|---|---|---|---|
| Karrinyup Road Westbound | 08:09 | 07:25 | 00:44 | 10% |
| Karrinyup Road Eastbound | 07:02 | 07:17 | 00:15 | 4% |

Travel time graphs with 95% confidence intervals are provided below and show the time taken for vehicles as they move through the Karrinyup Road corridor.

In the AM period, the largest discrepancy between the observed and modelled data occurs on the eastbound approach to the Mitchell Freeway Interchange where the model overestimates the delay. This is due to the modelled coordination between the interchange signals and the adjacent North Beach Road signals not operating quite correctly.

In the PM period, the westbound observed data shows delay at each intersection, whereas the modelled data is a more steady average gradient through this data. There, the observed speeds appear slightly slower in some sections but this is suspected to be due to vehicles travelling slower than the posted speed limit which is modelled. Lastly, the model over-estimates the delay on the westbound approach to West Coast Highway.

In the Saturday period, the observed and modelled data are reasonably similar.

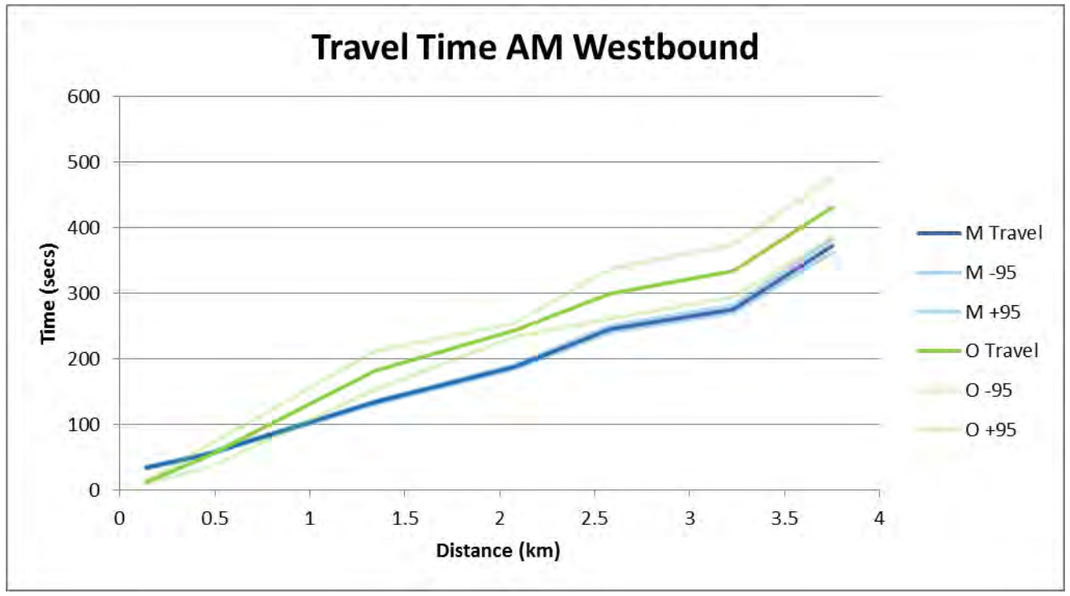



Figure 7-7 Morning Westbound Travel Time Graph

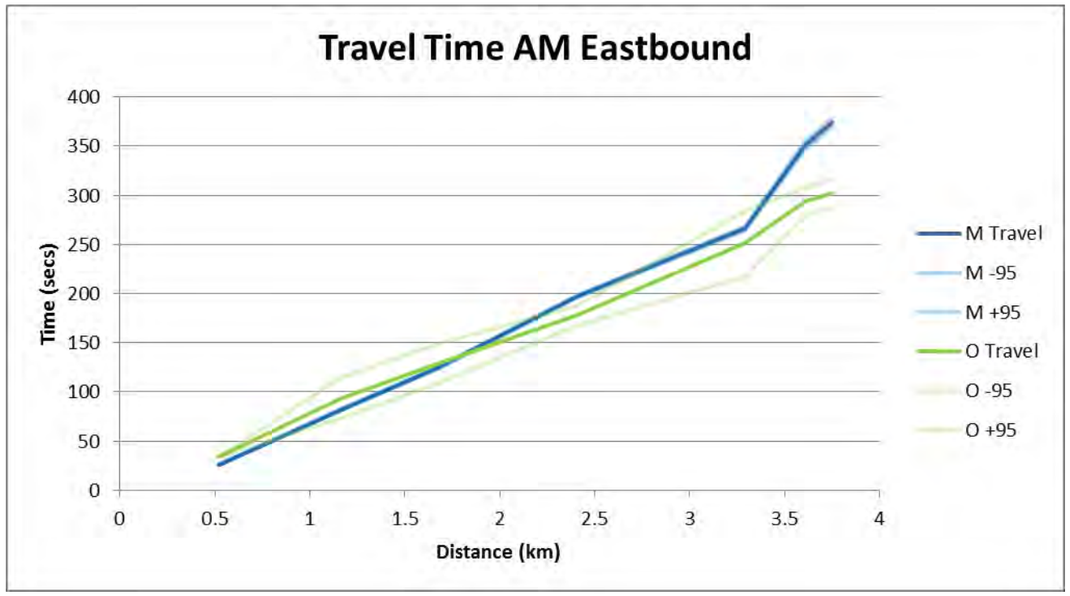



Figure 7-8 Morning Eastbound Travel Time Graph

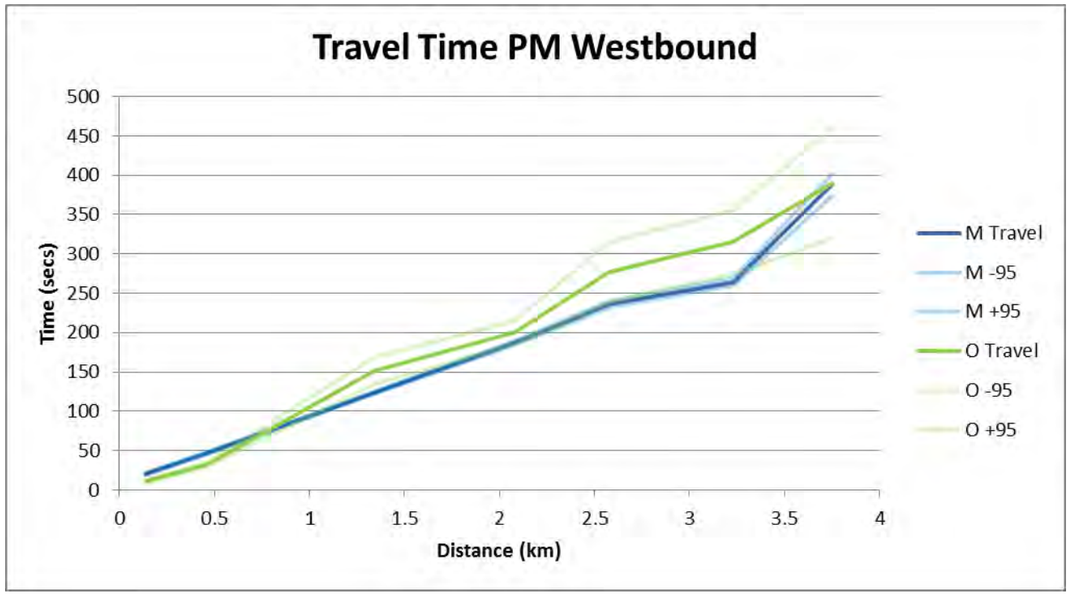



Figure 7-9 Evening Westbound Travel Time Graph

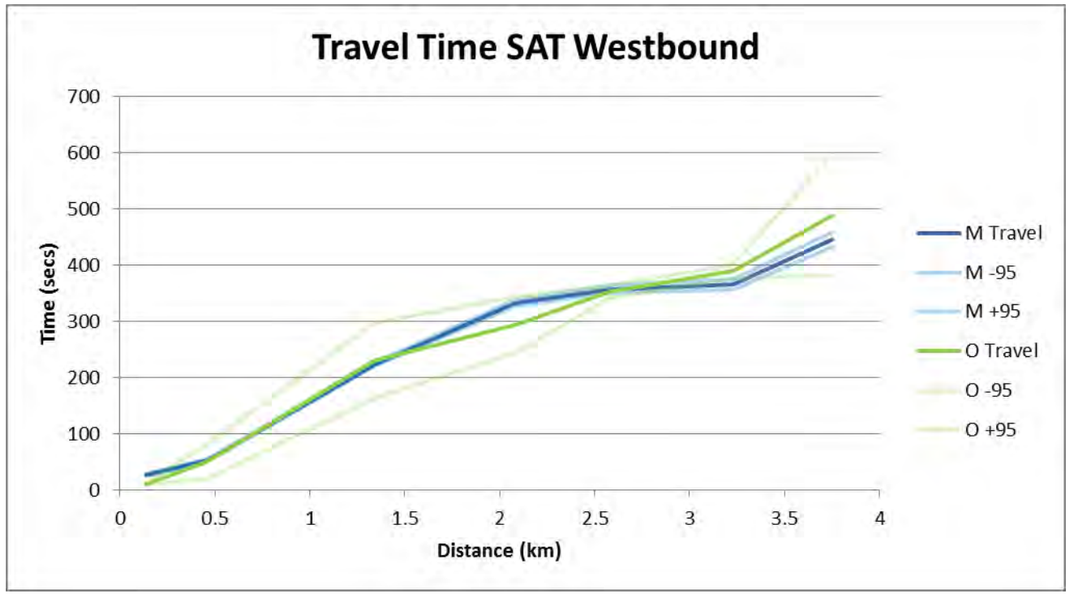



Figure 7-11 Saturday Westbound Travel Time Graph

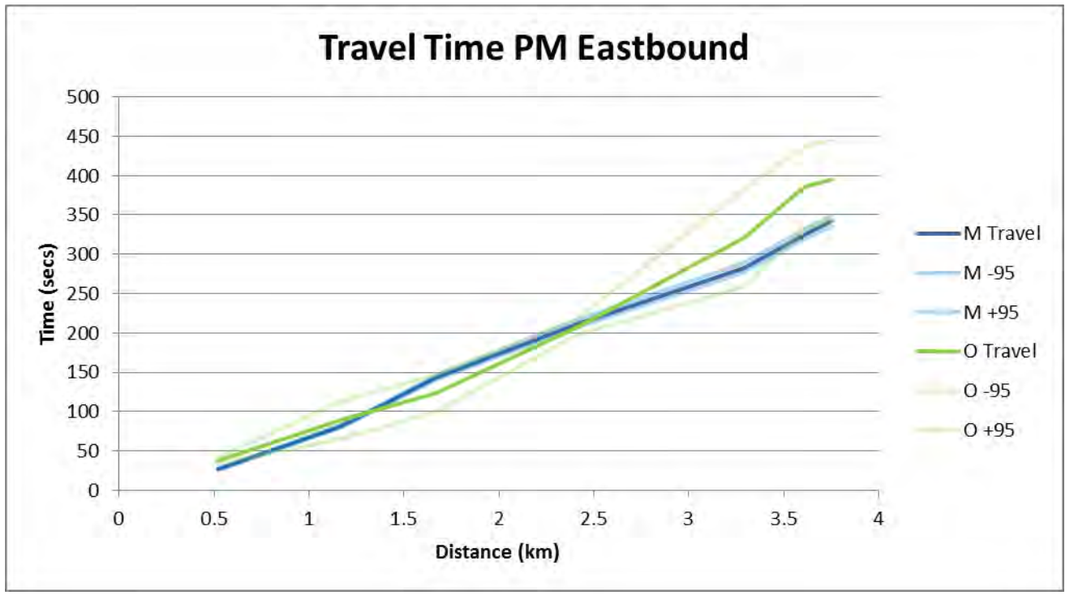



Figure 7-10 Evening Eastbound Travel Time Graph

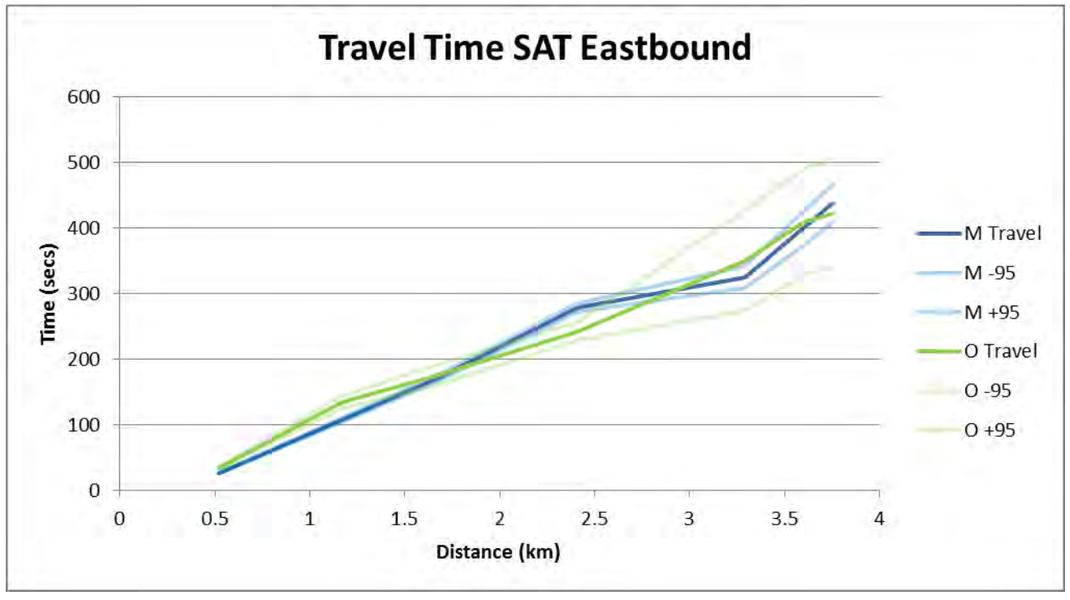



Figure 7-12 Saturday Eastbound Travel Time Graph

## 7.6 Queue Length Calibration

Queuing is an inherently unstable phenomenon which can vary greatly from day to day. Queue measurements can be very subjective as the definition of what vehicles count as “queued” can differ between observers and between modelling packages.

Notwithstanding the issues relating to queue variability, queue comparisons are still valuable and have been made between observed and modelled queue length data to ensure queue patterns are appropriately represented in the model. However these observed queues are reflected in the model. Particular queue lengths of interest were the Saturday queuing on the Karrinyup Road east approach to Huntriss Road and right turn from Karrinyup Road into Francis Avenue. The most notable queue in the evening period was the Karrinyup Road right turn into Marmion Avenue.

These observed and modelled comparisons are provided below.

Figure 7-13 Observed Karrinyup Road queue lengths

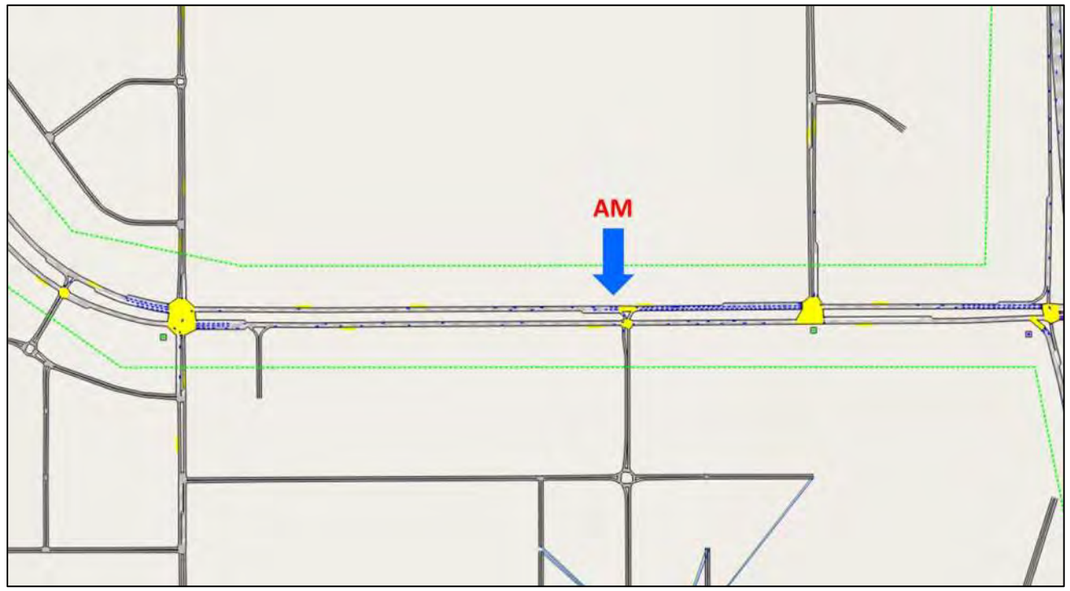



Figure 7-14 Modelled AM Eastbound Karrinyup Road queue lengths

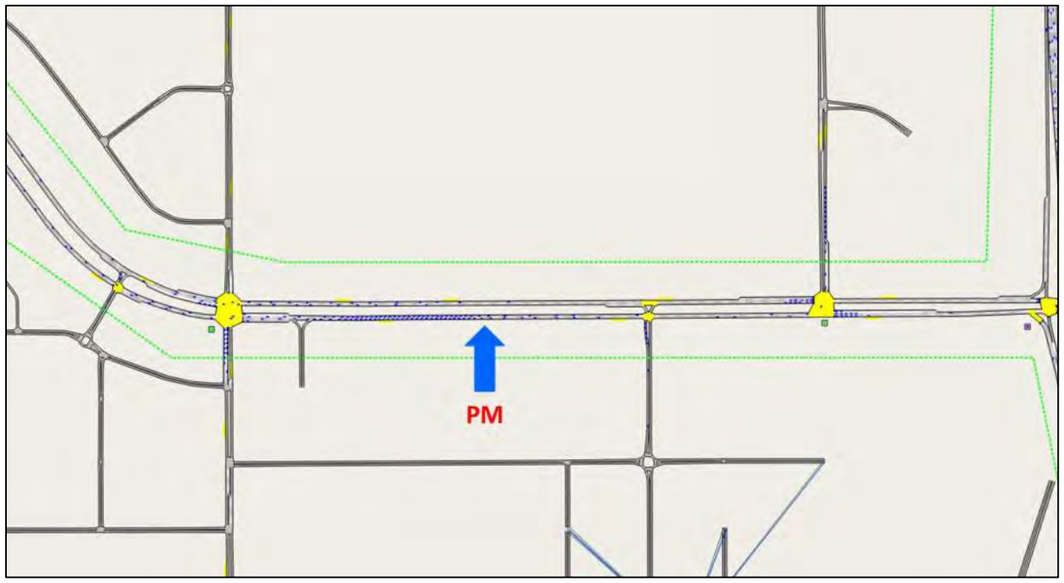



Figure 7-15 Modelled PM Westbound Karrinyup Road queue lengths

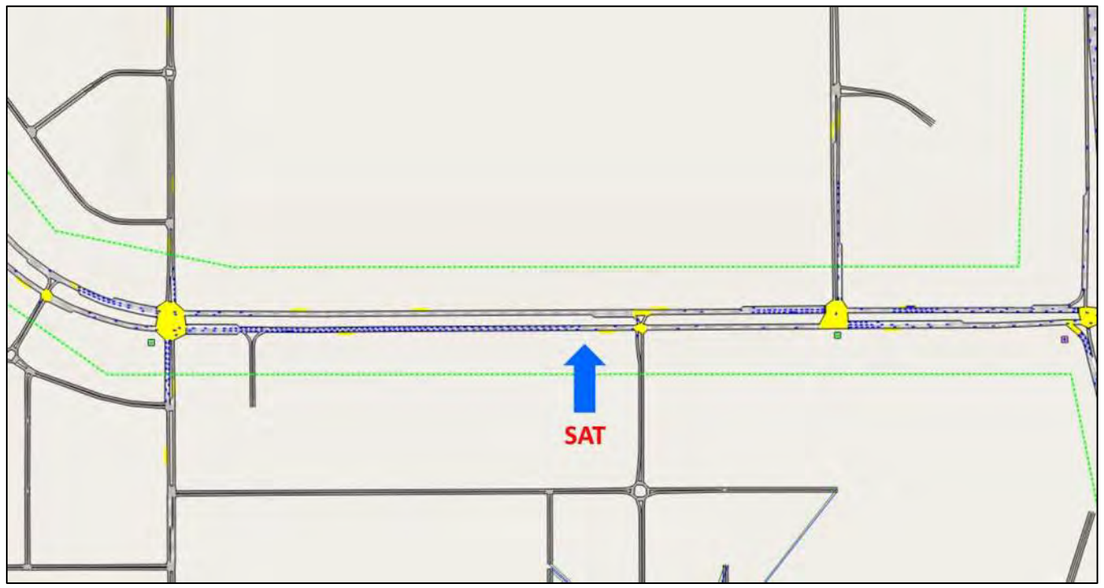



Figure 7-16 Modelled Saturday Westbound Karrinyup Road queue lengths

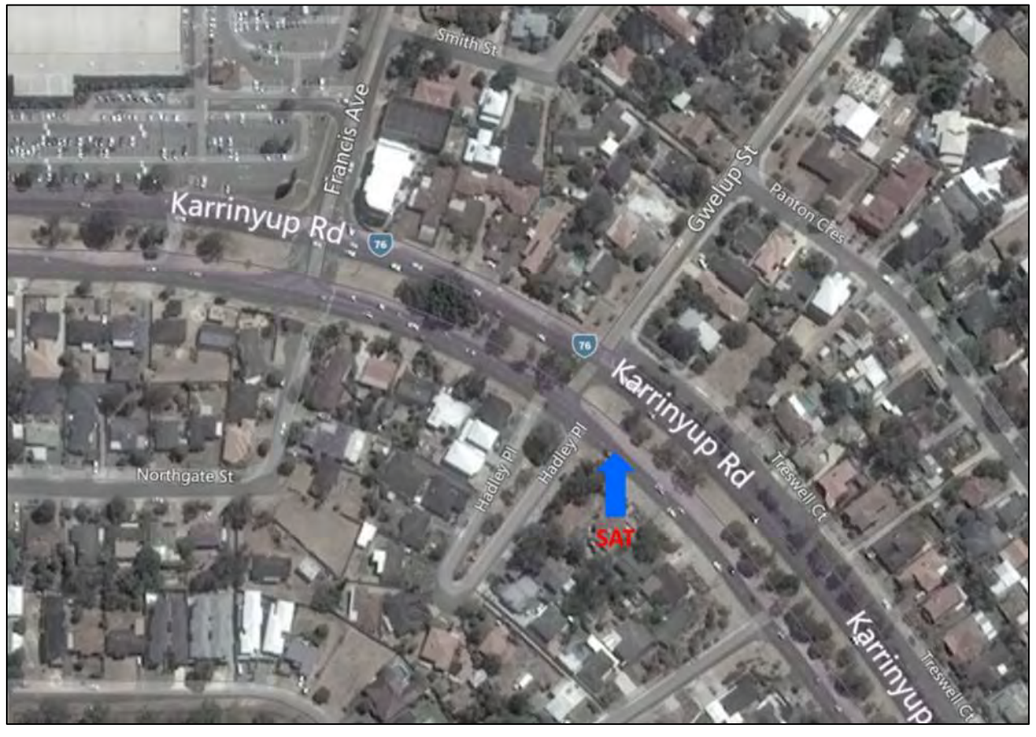



Figure 7-17 Observed Saturday Westbound Karrinyup Road right turn into Francis Avenue queue lengths

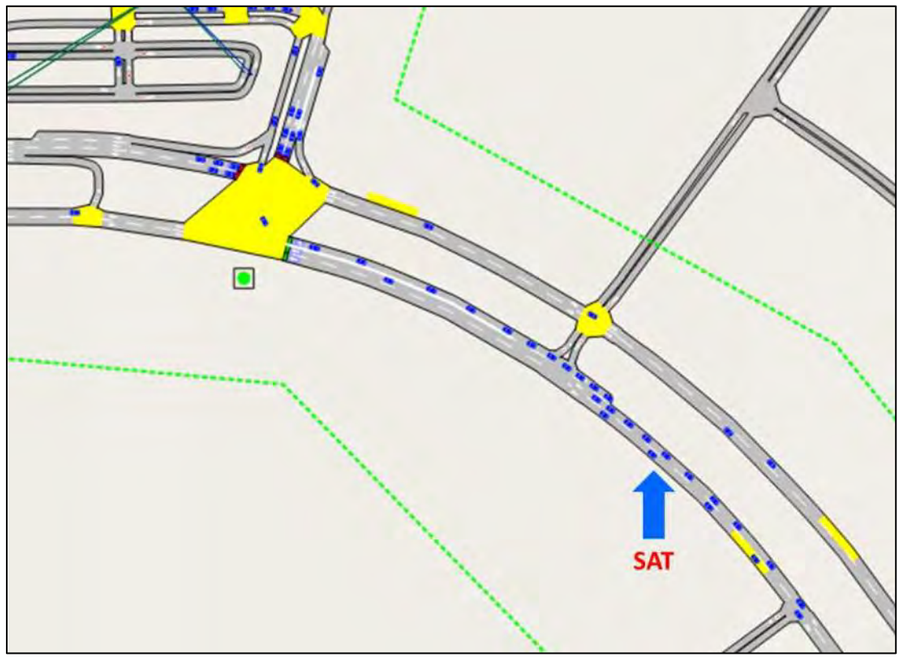



Figure 7-18 Modelled Saturday Westbound Karrinyup Road right turn into Francis Avenue queue lengths

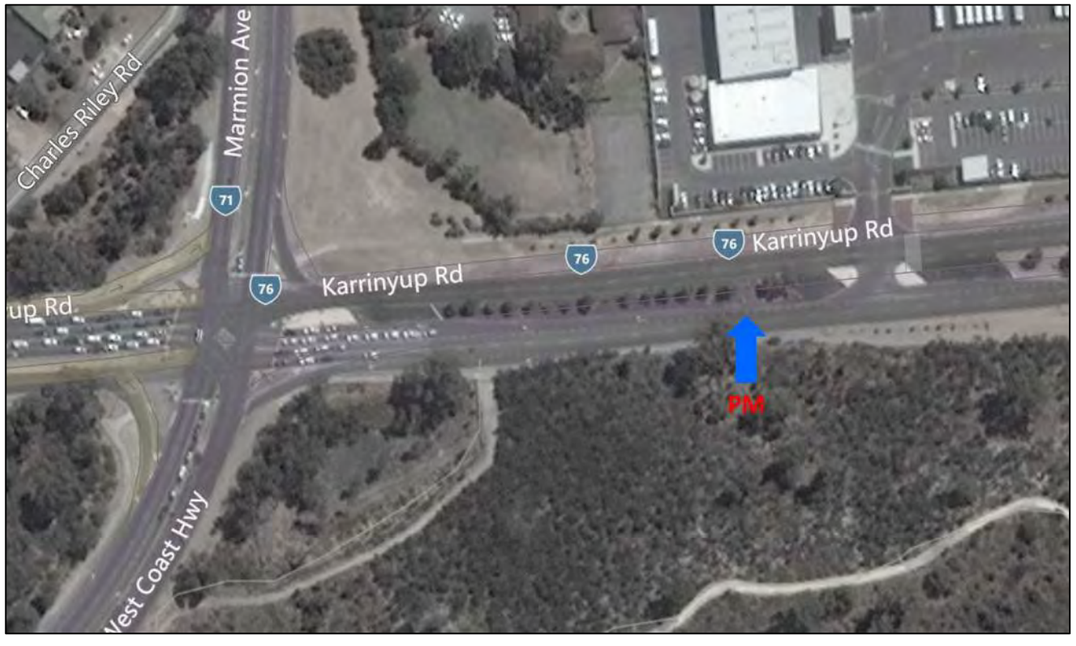



Figure 7-19 Observed Saturday Westbound Karrinyup Road right turn into Marmion Avenue queue lengths

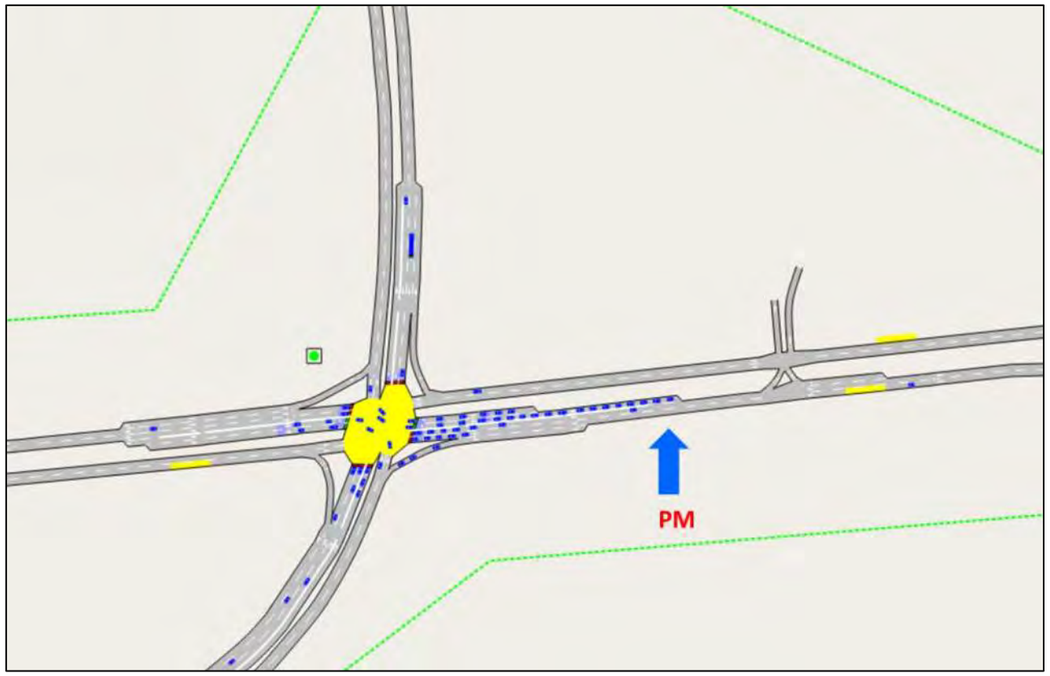
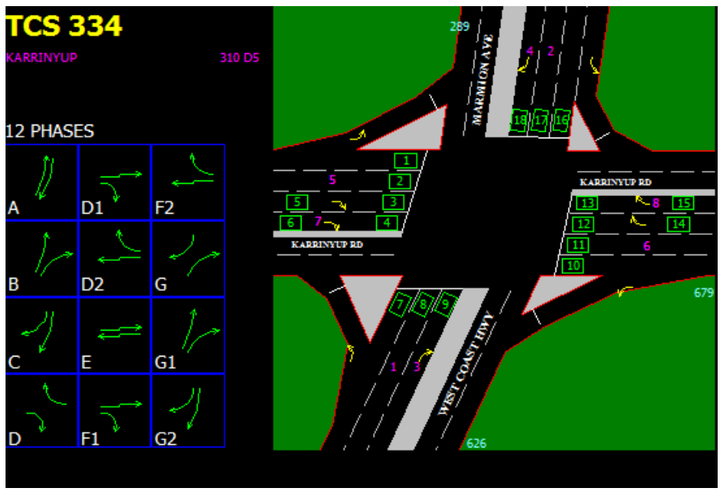



Figure 7-20 Observed Saturday Westbound Karrinyup Road right turn into Marmion Avenue queue lengths

## 7.7 SCATS Signal Timings

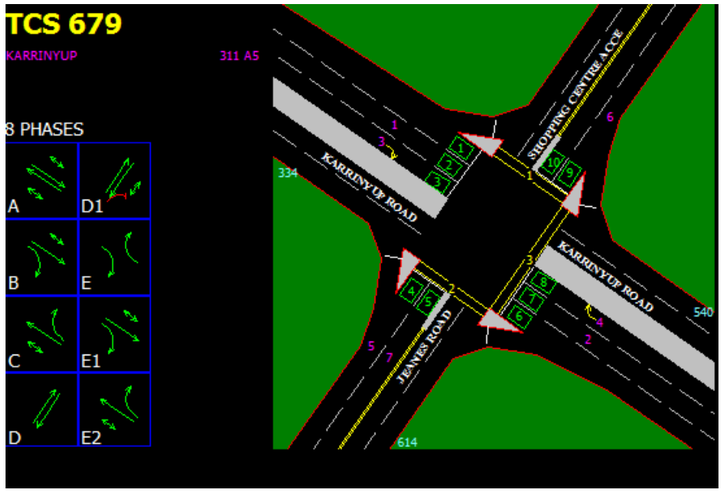
The following details the comparison of the SCATS signal timings versus the on-street recorded timings. SCATS is an adaptive signal system and is guided by loop detections. Therefore there will inevitably be some variation between the model and the on-street timings, as well as day to day variations. The following shows that whilst there are variations, they are not of a significant.

**TCS 334 – Karrinyup Road/ Marmion Avenue**




| | AM Period | | | PM Period | | | SAT Period | | |
|---|---|---|---|---|---|---|---|---|---|
| | Actual | Model | Diff | Actual | Model | Diff | Actual | Model | Diff |
| **Start Time** | 08:00 | 08:00 | | 17:00 | 17:00 | | 12:00 | 12:00 | |
| **Avg Act CT** | 183 | 175 | -9 | 187 | 171 | -16 | 136 | 143 | 7 |
| **% A-Phase** | 44 | 43 | -2 | 45 | 47 | 2 | 41 | 38 | -3 |
| **% D-Phase** | 22 | 24 | 2 | 21 | 22 | 0 | 22 | 23 | 1 |
| **% E-Phase** | 19 | 15 | -3 | 19 | 17 | -2 | 19 | 19 | 0 |

**TCS 679 - Karrinyup Road/ Jeanes Road**

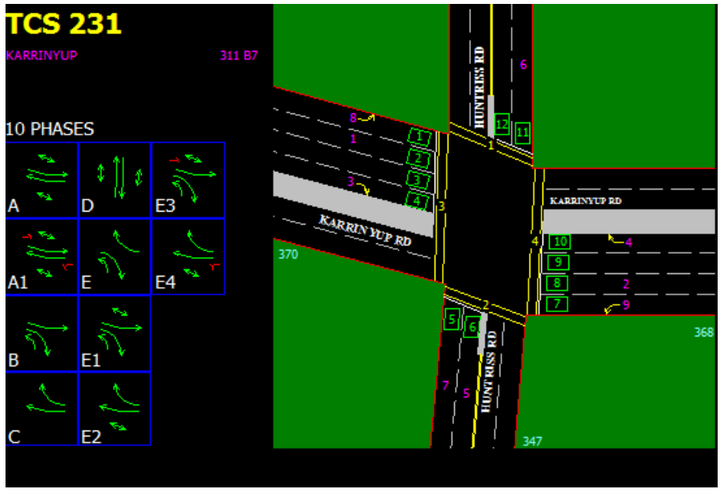



| | AM Period | | | PM Period | | | SAT Period | | |
|---|---|---|---|---|---|---|---|---|---|
| | Actual | Model | Diff | Actual | Model | Diff | Actual | Model | Diff |
| **Start Time** | 08:00 | 08:00 | | 17:00 | 17:00 | | 12:00 | 12:00 | |
| **Avg Act CT** | 129 | 126 | -3 | 131 | 115 | -17 | 107 | 118 | 11 |
| **% A-Phase** | 34 | 46 | 12 | 46 | 54 | 8 | 51 | 48 | -2 |
| **% B-Phase** | 17 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **% D-Phase** | 27 | 21 | -6 | 33 | 24 | -8 | 27 | 28 | 2 |
| **% E-Phase** | 22 | 16 | -6 | 21 | 22 | 0 | 22 | 23 | 1 |

**TCS 370 - Karrinyup Road/ Francis Avenue**

| | AM Period | | | PM Period | | | SAT Period | | |
|---|---|---|---|---|---|---|---|---|---|
| | Actual | Model | Diff | Actual | Model | Diff | Actual | Model | Diff |
| **Start Time** | 08:00 | 08:00 | | 17:00 | 17:00 | | 12:00 | 12:00 | |
| **Avg Act CT** | 130 | 126 | -5 | 135 | 127 | -9 | 121 | 127 | 6 |
| **% A-Phase** | 64 | 59 | -5 | 54 | 47 | -6 | 52 | 46 | -6 |
| **% B-Phase** | 13 | 17 | 4 | 14 | 19 | 6 | 14 | 19 | 6 |
| **% C-Phase** | 23 | 24 | 1 | 32 | 33 | 1 | 34 | 35 | 1 |

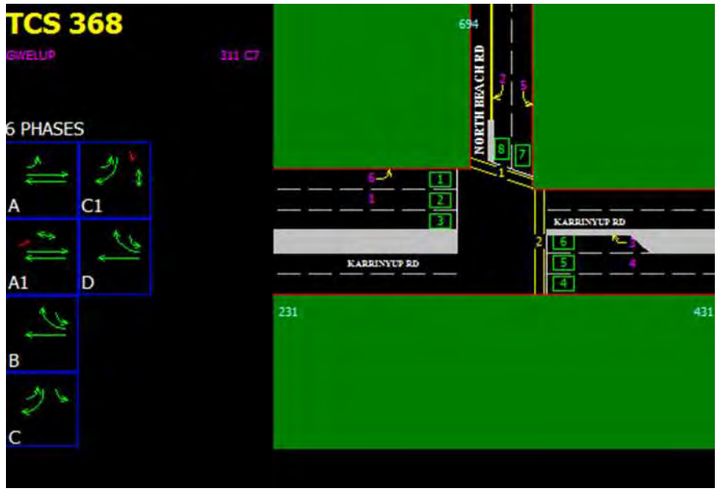
**TCS 231 – Karrinyup Road/ Huntriss Road**




| | AM Period | | | PM Period | | | SAT Period | | |
|---|---|---|---|---|---|---|---|---|---|
| | Actual | Model | Diff | Actual | Model | Diff | Actual | Model | Diff |
| **Start Time** | 08:00 | 08:00 | | 17:00 | 17:00 | | 12:00 | 12:00 | |
| **Avg Act CT** | 112 | 114 | 1 | 131 | 129 | -2 | 92 | 113 | 20 |
| **% A-Phase** | 46 | 47 | 1 | 40 | 40 | 0 | 50 | 47 | -3 |
| **% B-Phase** | 0 | 0 | 0 | 18 | 20 | 2 | 0 | 0 | 0 |
| **% C-Phase** | 36 | 33 | -4 | 29 | 26 | -2 | 28 | 30 | 2 |
| **% D-Phase** | 18 | 21 | 3 | 13 | 14 | 1 | 22 | 23 | 1 |

| | AM Period | | | PM Period | | | SAT Period | | |
|---|---|---|---|---|---|---|---|---|---|
| | Actual | Model | Diff | Actual | Model | Diff | Actual | Model | Diff |
| **Start Time** | 08:00 | 08:00 | | 17:00 | 17:00 | | 12:00 | 12:00 | |
| **Avg Act CT** | 134 | 126 | -8 | 134 | 127 | -8 | 121 | 136 | 15 |
| **% A-Phase** | 39 | 41 | 2 | 44 | 48 | 4 | 47 | 41 | -5 |
| **% D-Phase** | 31 | 34 | 3 | 32 | 33 | 1 | 29 | 31 | 2 |
| **% E-Phase** | 30 | 26 | -5 | 24 | 18 | -6 | 25 | 28 | 3 |

**TCS 368 – Karrinyup Road/ North Beach Road**



# Appendix C

# Modelling Performance – 2021 and 2031

# 1 Modified Development

## 1.1 Karrinyup Road / West Coast Highway / Marmion Avenue

**2013 Base AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 39 | D |
| | West | Karrinyup Road | 63 | E |
| | South | West Coast Highway | 16 | B |
| | East | Karrinyup Road | 56 | E |

**2013 Base PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 20 | C |
| | West | Karrinyup Road | 71 | E |
| | South | West Coast Highway | 18 | B |
| | East | Karrinyup Road | 78 | E |

**2013 Base Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 16 | B |
| | West | Karrinyup Road | 57 | E |
| | South | West Coast Highway | 13 | B |
| | East | Karrinyup Road | 44 | D |

**2021 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 136 | F |
| | West | Karrinyup Road | 12 | B |
| | South | West Coast Highway | 82 | F |
| | East | Karrinyup Road | 52 | D |

**2021 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 21 | C |
| | West | Karrinyup Road | 72 | E |
| | South | West Coast Highway | 19 | B |
| | East | Karrinyup Road | 96 | F |

**2021 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 17 | B |
| | West | Karrinyup Road | 57 | E |
| | South | West Coast Highway | 18 | B |
| | East | Karrinyup Road | 50 | D |

**2021 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 31 | C |
| | West | Karrinyup Road | 59 | E |
| | South | West Coast Highway | 13 | B |
| | East | Karrinyup Road | 56 | E |

**2021 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 17 | B |
| | West | Karrinyup Road | 73 | E |
| | South | West Coast Highway | 20 | C |
| | East | Karrinyup Road | 77 | E |

**2021 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 17 | B |
| | West | Karrinyup Road | 60 | E |
| | South | West Coast Highway | 20 | B |
| | East | Karrinyup Road | 52 | D |

**2031 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 32 | C |
| | West | Karrinyup Road | 120 | F |
| | South | West Coast Highway | 17 | B |
| | East | Karrinyup Road | 55 | D |

**2031 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 12 | B |
| | West | Karrinyup Road | 71 | E |
| | South | West Coast Highway | 19 | B |
| | East | Karrinyup Road | 75 | E |

**2031 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 17 | B |
| | West | Karrinyup Road | 58 | E |
| | South | West Coast Highway | 14 | B |
| | East | Karrinyup Road | 45 | D |

**2031 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 29 | C |
| | West | Karrinyup Road | 110 | F |
| | South | West Coast Highway | 12 | B |
| | East | Karrinyup Road | 54 | D |

**2031 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 19 | B |
| | West | Karrinyup Road | 69 | E |
| | South | West Coast Highway | 17 | B |
| | East | Karrinyup Road | 64 | E |

**2031 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / West Coast Highway / Marmion Avenue | North | Marmion Avenue | 14 | B |
| | West | Karrinyup Road | 71 | E |
| | South | West Coast Highway | 12 | B |
| | East | Karrinyup Road | 43 | D |

## 1.2 Karrinyup Road / Burroughs Road

**2013 Base AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 58 | F |
| | West | Karrinyup Road | 6 | A |
| | East | Karrinyup Road | 44 | E |

**2013 Base PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 24 | C |
| | West | Karrinyup Road | 1 | A |
| | East | Karrinyup Road | 10 | A |

**2013 Base Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 36 | E |
| | West | Karrinyup Road | 26 | D |
| | East | Karrinyup Road | 40 | E |

**2021 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 92 | F |
| | West | Karrinyup Road | 6 | A |
| | East | Karrinyup Road | 4 | A |

**2021 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 26 | C |
| | West | Karrinyup Road | 1 | A |
| | East | Karrinyup Road | 2 | A |

**2021 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 37 | D |
| | West | Karrinyup Road | 2 | A |
| | East | Karrinyup Road | 4 | A |

**2021 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 84 | F |
| | West | Karrinyup Road | 5 | A |
| | East | Karrinyup Road | 5 | A |

**2021 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 36 | D |
| | West | Karrinyup Road | 1 | A |
| | East | Karrinyup Road | 3 | A |

**2021 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 40 | D |
| | West | Karrinyup Road | 1 | A |
| | East | Karrinyup Road | 4 | A |

**2031 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 100 | F |
| | West | Karrinyup Road | 7 | A |
| | East | Karrinyup Road | 4 | A |

**2031 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 23 | C |
| | West | Karrinyup Road | 1 | A |
| | East | Karrinyup Road | 2 | A |

**2031 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 30 | C |
| | West | Karrinyup Road | 2 | A |
| | East | Karrinyup Road | 3 | A |

**2031 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 93 | F |
| | West | Karrinyup Road | 6 | A |
| | East | Karrinyup Road | 6 | A |

**2031 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 39 | D |
| | West | Karrinyup Road | 2 | A |
| | East | Karrinyup Road | 3 | A |

**2031 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Burroughs Road | North | Burroughs Road | 69 | E |
| | West | Karrinyup Road | 56 | E |
| | East | Karrinyup Road | 14 | B |

## 1.3 Karrinyup Road / Jeanes Road

**2013 Base AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 17 | B |
| | West | Karrinyup Road | 17 | B |
| | South | Jeanes Road | 13 | B |
| | East | Karrinyup Road | 24 | C |

**2013 Base PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 21 | C |
| | West | Karrinyup Road | 21 | C |
| | South | Jeanes Road | 8 | A |
| | East | Karrinyup Road | 21 | C |

**2013 Base Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 11 | B |
| | West | Karrinyup Road | 29 | C |
| | South | Jeanes Road | 9 | A |
| | East | Karrinyup Road | 29 | C |

**2021 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 20 | C |
| | West | Karrinyup Road | 17 | B |
| | South | Jeanes Road | 13 | B |
| | East | Karrinyup Road | 25 | C |

**2021 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 20 | C |
| | West | Karrinyup Road | 18 | B |
| | South | Jeanes Road | 11 | B |
| | East | Karrinyup Road | 19 | B |

**2021 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 11 | B |
| | West | Karrinyup Road | 22 | C |
| | South | Jeanes Road | 8 | A |
| | East | Karrinyup Road | 21 | C |

**2021 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 50 | D |
| | West | Karrinyup Road | 17 | B |
| | South | Jeanes Road | 12 | B |
| | East | Karrinyup Road | 15 | B |

**2021 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 39 | D |
| | West | Karrinyup Road | 18 | B |
| | South | Jeanes Road | 11 | B |
| | East | Karrinyup Road | 19 | B |

**2021 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 44 | D |
| | West | Karrinyup Road | 18 | B |
| | South | Jeanes Road | 13 | B |
| | East | Karrinyup Road | 20 | C |

**2031 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 19 | B |
| | West | Karrinyup Road | 16 | B |
| | South | Jeanes Road | 19 | B |
| | East | Karrinyup Road | 23 | C |

**2031 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 22 | C |
| | West | Karrinyup Road | 21 | C |
| | South | Jeanes Road | 8 | A |
| | East | Karrinyup Road | 21 | C |

**2031 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 12 | B |
| | West | Karrinyup Road | 22 | C |
| | South | Jeanes Road | 8 | A |
| | East | Karrinyup Road | 23 | C |

**2031 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 48 | D |
| | West | Karrinyup Road | 17 | B |
| | South | Jeanes Road | 17 | B |
| | East | Karrinyup Road | 16 | B |

**2031 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 47 | D |
| | West | Karrinyup Road | 20 | C |
| | South | Jeanes Road | 8 | A |
| | East | Karrinyup Road | 21 | C |

**2031 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Jeanes Road | North | Development Access | 53 | D |
| | West | Karrinyup Road | 86 | F |
| | South | Jeanes Road | 60 | E |
| | East | Karrinyup Road | 58 | E |

## 1.4 Karrinyup Road / Francis Avenue

**2013 Base AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 39 | D |
| | West | Karrinyup Road | 13 | B |
| | East | Karrinyup Road | 18 | B |

**2013 Base PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 35 | D |
| | West | Karrinyup Road | 25 | C |
| | East | Karrinyup Road | 20 | C |

**2013 Base Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 32 | C |
| | West | Karrinyup Road | 38 | D |
| | East | Karrinyup Road | 33 | C |

**2021 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 37 | D |
| | West | Karrinyup Road | 12 | B |
| | East | Karrinyup Road | 17 | B |

**2021 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 35 | C |
| | West | Karrinyup Road | 22 | C |
| | East | Karrinyup Road | 19 | B |

**2021 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 32 | C |
| | West | Karrinyup Road | 43 | D |
| | East | Karrinyup Road | 49 | D |

**2021 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 22 | C |
| | West | Karrinyup Road | 8 | A |
| | East | Karrinyup Road | 15 | B |

**2021 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 14 | B |
| | West | Karrinyup Road | 9 | A |
| | East | Karrinyup Road | 9 | A |

**2021 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 24 | C |
| | West | Karrinyup Road | 14 | B |
| | East | Karrinyup Road | 18 | B |

**2031 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 38 | D |
| | West | Karrinyup Road | 16 | B |
| | East | Karrinyup Road | 18 | B |

**2031 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 34 | C |
| | West | Karrinyup Road | 22 | C |
| | East | Karrinyup Road | 19 | B |

**2031 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 32 | C |
| | West | Karrinyup Road | 41 | D |
| | East | Karrinyup Road | 32 | C |

**2031 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 32 | C |
| | West | Karrinyup Road | 16 | B |
| | East | Karrinyup Road | 15 | B |

**2031 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 19 | B |
| | West | Karrinyup Road | 14 | B |
| | East | Karrinyup Road | 17 | B |

**2031 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Francis Avenue | North | Francis Avenue | 17 | B |
| | West | Karrinyup Road | 25 | C |
| | East | Karrinyup Road | 56 | E |

## 1.5 Karrinyup Road / Huntriss Road

**2013 Base AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 5 | A |
| | West | Karrinyup Road | 32 | C |
| | South | Huntriss Road | 40 | D |
| | East | Karrinyup Road | 41 | D |

**2013 Base PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 9 | A |
| | West | Karrinyup Road | 17 | B |
| | South | Huntriss Road | 23 | C |
| | East | Karrinyup Road | 53 | D |

**2013 Base Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 9 | A |
| | West | Karrinyup Road | 44 | D |
| | South | Huntriss Road | 25 | C |
| | East | Karrinyup Road | 127 | F |

**2021 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 6 | A |
| | West | Karrinyup Road | 33 | C |
| | South | Huntriss Road | 34 | C |
| | East | Karrinyup Road | 42 | D |

**2021 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 12 | B |
| | West | Karrinyup Road | 20 | B |
| | South | Huntriss Road | 23 | C |
| | East | Karrinyup Road | 64 | E |

**2021 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 10 | B |
| | West | Karrinyup Road | 40 | D |
| | South | Huntriss Road | 23 | C |
| | East | Karrinyup Road | 131 | F |

**2021 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 6 | A |
| | West | Karrinyup Road | 26 | C |
| | South | Huntriss Road | 53 | D |
| | East | Karrinyup Road | 27 | C |

**2021 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 11 | B |
| | West | Karrinyup Road | 23 | C |
| | South | Huntriss Road | 21 | C |
| | East | Karrinyup Road | 27 | C |

**2021 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 9 | A |
| | West | Karrinyup Road | 38 | D |
| | South | Huntriss Road | 23 | C |
| | East | Karrinyup Road | 78 | E |

**2031 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 7 | A |
| | West | Karrinyup Road | 36 | D |
| | South | Huntriss Road | 24 | C |
| | East | Karrinyup Road | 42 | D |

**2031 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 10 | B |
| | West | Karrinyup Road | 18 | B |
| | South | Huntriss Road | 23 | C |
| | East | Karrinyup Road | 45 | D |

**2031 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 10 | A |
| | West | Karrinyup Road | 48 | D |
| | South | Huntriss Road | 17 | B |
| | East | Karrinyup Road | 133 | F |

**2031 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 15 | B |
| | West | Karrinyup Road | 54 | D |
| | South | Huntriss Road | 35 | D |
| | East | Karrinyup Road | 27 | C |

**2031 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 10 | A |
| | West | Karrinyup Road | 19 | B |
| | South | Huntriss Road | 25 | C |
| | East | Karrinyup Road | 38 | D |

**2031 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Huntriss Road | North | Huntriss Road | 14 | B |
| | West | Karrinyup Road | 35 | D |
| | South | Huntriss Road | 30 | C |
| | East | Karrinyup Road | 127 | F |

## 1.6 Karrinyup Road / North Beach Road

**2013 Base AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 9 | A |
| | West | Karrinyup Road | 35 | D |
| | East | Karrinyup Road | 18 | B |

**2013 Base PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 5 | A |
| | West | Karrinyup Road | 33 | C |
| | East | Karrinyup Road | 16 | B |

**2013 Base Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 3 | A |
| | West | Karrinyup Road | 53 | D |
| | East | Karrinyup Road | 21 | C |

**2021 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 15 | B |
| | West | Karrinyup Road | 43 | D |
| | East | Karrinyup Road | 19 | B |

**2021 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 2 | A |
| | West | Karrinyup Road | 32 | C |
| | East | Karrinyup Road | 15 | B |

**2021 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 2 | A |
| | West | Karrinyup Road | 47 | D |
| | East | Karrinyup Road | 24 | C |

**2021 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 9 | A |
| | West | Karrinyup Road | 30 | C |
| | East | Karrinyup Road | 18 | B |

**2021 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 2 | A |
| | West | Karrinyup Road | 31 | C |
| | East | Karrinyup Road | 12 | B |

**2021 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 3 | A |
| | West | Karrinyup Road | 52 | D |
| | East | Karrinyup Road | 21 | C |

**2031 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 21 | C |
| | West | Karrinyup Road | 66 | E |
| | East | Karrinyup Road | 25 | C |

**2031 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 6 | A |
| | West | Karrinyup Road | 35 | C |
| | East | Karrinyup Road | 16 | B |

**2031 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 3 | A |
| | West | Karrinyup Road | 61 | E |
| | East | Karrinyup Road | 25 | C |

**2031 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 9 | A |
| | West | Karrinyup Road | 70 | E |
| | East | Karrinyup Road | 17 | B |

**2031 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 5 | A |
| | West | Karrinyup Road | 41 | D |
| | East | Karrinyup Road | 16 | B |

**2031 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / North Beach Road | North | North Beach Road | 4 | A |
| | West | Karrinyup Road | 62 | E |
| | East | Karrinyup Road | 42 | C |

## 1.7 Karrinyup Road / Mitchell Freeway Northbound Ramp

**2013 Base AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 62 | E |
| | South | Mitchell Freeway | 35 | D |
| | East | Karrinyup Road | 28 | C |

**2013 Base PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 32 | C |
| | South | Mitchell Freeway | 45 | D |
| | East | Karrinyup Road | 25 | C |

**2013 Base Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 42 | D |
| | South | Mitchell Freeway | 43 | D |
| | East | Karrinyup Road | 21 | C |

**2021 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 70 | E |
| | South | Mitchell Freeway | 37 | D |
| | East | Karrinyup Road | 19 | B |

**2021 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 25 | C |
| | South | Mitchell Freeway | 55 | E |
| | East | Karrinyup Road | 27 | C |

**2021 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 49 | D |
| | South | Mitchell Freeway | 44 | D |
| | East | Karrinyup Road | 19 | B |

**2021 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 53 | D |
| | South | Mitchell Freeway | 37 | D |
| | East | Karrinyup Road | 18 | B |

**2021 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 29 | C |
| | South | Mitchell Freeway | 46 | D |
| | East | Karrinyup Road | 28 | C |

**2021 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 82 | F |
| | South | Mitchell Freeway | 64 | E |
| | East | Karrinyup Road | 24 | C |

**2031 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 97 | F |
| | South | Mitchell Freeway | 49 | D |
| | East | Karrinyup Road | 25 | C |

**2031 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 26 | C |
| | South | Mitchell Freeway | 64 | E |
| | East | Karrinyup Road | 23 | C |

**2031 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 49 | D |
| | South | Mitchell Freeway | 48 | D |
| | East | Karrinyup Road | 15 | B |

**2031 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 75 | E |
| | South | Mitchell Freeway | 50 | D |
| | East | Karrinyup Road | 23 | C |

**2031 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 28 | C |
| | South | Mitchell Freeway | 63 | E |
| | East | Karrinyup Road | 22 | C |

**2031 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Northbound Ramp | West | Karrinyup Road | 61 | E |
| | South | Mitchell Freeway | 113 | F |
| | East | Karrinyup Road | 22 | C |

## 1.8 Karrinyup Road / Mitchell Freeway Southbound Ramp

**2013 Base AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 37 | D |
| | West | Karrinyup Road | 13 | B |
| | East | Karrinyup Road | 42 | D |

**2013 Base PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 119 | F |
| | West | Karrinyup Road | 11 | B |
| | East | Karrinyup Road | 181 | F |

**2013 Base Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 136 | F |
| | West | Karrinyup Road | 12 | B |
| | East | Karrinyup Road | 82 | F |

**2021 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 60 | E |
| | West | Karrinyup Road | 13 | B |
| | East | Karrinyup Road | 44 | D |

**2021 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 44 | D |
| | West | Karrinyup Road | 11 | B |
| | East | Karrinyup Road | 108 | F |

**2021 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 71 | E |
| | West | Karrinyup Road | 12 | B |
| | East | Karrinyup Road | 68 | E |

**2021 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 52 | D |
| | West | Karrinyup Road | 13 | B |
| | East | Karrinyup Road | 45 | D |

**2021 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 63 | E |
| | West | Karrinyup Road | 11 | B |
| | East | Karrinyup Road | 110 | F |

**2021 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 70 | E |
| | West | Karrinyup Road | 19 | B |
| | East | Karrinyup Road | 93 | F |

**2031 Do-minimum AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 56 | E |
| | West | Karrinyup Road | 15 | B |
| | East | Karrinyup Road | 51 | D |

**2031 Do-minimum PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 53 | D |
| | West | Karrinyup Road | 19 | B |
| | East | Karrinyup Road | 75 | E |

**2031 Do-minimum Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 60 | E |
| | West | Karrinyup Road | 16 | B |
| | East | Karrinyup Road | 49 | D |

**2031 Option AM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 48 | D |
| | West | Karrinyup Road | 18 | B |
| | East | Karrinyup Road | 37 | D |

**2031 Option PM**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 139 | F |
| | West | Karrinyup Road | 16 | B |
| | East | Karrinyup Road | 60 | E |

**2031 Option Saturday**

| Intersection | Approach | Street Name | Delay (sec/veh) | LOS |
|---|---|---|---|---|
| Karrinyup Road / Mitchell Freeway Southbound Ramp | North | Mitchell Freeway | 107 | F |
| | West | Karrinyup Road | 17 | B |
| | East | Karrinyup Road | 110 | F |

# Appendix D
# SIDRA Analysis Outputs

# 1 Modified Development

## 1.1 Karrinyup Road and Marmion Avenue

### 2013 Base AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 24 | 6.9 | 0.016 | 8.3 | LOS A | 0.2 | 1.5 | 0.13 | 0.63 | 61.1 |
| 2 | T1 | 588 | 5.1 | 0.320 | 30.1 | LOS C | 15.6 | 113.7 | 0.65 | 0.57 | 48.1 |
| 3 | R2 | 231 | 5.7 | 1.128 | 234.9 | LOS F | 34.7 | 254.6 | 1.00 | 1.17 | 12.9 |
| Approach | | 843 | 5.3 | 1.128 | 85.6 | LOS F | 34.7 | 254.6 | 0.73 | 0.74 | 27.6 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 181 | 3.5 | 0.243 | 39.6 | LOS D | 10.1 | 72.8 | 0.68 | 0.75 | 40.0 |
| 5 | T1 | 198 | 4.1 | 0.329 | 73.6 | LOS E | 7.8 | 56.8 | 0.93 | 0.74 | 29.1 |
| 6 | R2 | 148 | 2.8 | 0.266 | 80.2 | LOS F | 5.8 | 41.8 | 0.93 | 0.77 | 27.7 |
| Approach | | 527 | 3.5 | 0.329 | 63.8 | LOS E | 10.1 | 72.6 | 0.84 | 0.75 | 31.6 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 483 | 2.4 | 0.402 | 21.1 | LOS C | 17.1 | 122.1 | 0.50 | 0.79 | 48.6 |
| 8 | T1 | 1280 | 3.1 | 0.975 | 91.3 | LOS F | 80.4 | 577.4 | 0.95 | 1.07 | 26.4 |
| 9 | R2 | 28 | 9.1 | 0.420 | 105.0 | LOS F | 2.6 | 19.6 | 1.00 | 0.72 | 23.0 |
| Approach | | 1791 | 3.0 | 0.975 | 72.6 | LOS E | 80.4 | 577.4 | 0.83 | 0.99 | 30.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 105 | 0.0 | 0.080 | 9.3 | LOS A | 1.6 | 10.9 | 0.22 | 0.64 | 60.0 |
| 11 | T1 | 607 | 1.6 | 0.822 | 80.8 | LOS F | 27.1 | 192.5 | 1.00 | 0.91 | 27.6 |
| 12 | R2 | 497 | 0.4 | 0.722 | 82.4 | LOS F | 21.0 | 147.4 | 1.00 | 0.85 | 27.3 |
| Approach | | 1209 | 1.0 | 0.822 | 75.2 | LOS E | 27.1 | 192.5 | 0.93 | 0.86 | 28.8 |
| All Vehicles | | 4370 | 3.0 | 1.128 | 74.8 | LOS E | 80.4 | 577.4 | 0.84 | 0.88 | 29.4 |

### 2013 Base PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 78 | 1.0 | 0.055 | 10.4 | LOS B | 1.2 | 8.8 | 0.22 | 0.65 | 59.8 |
| 2 | T1 | 1449 | 1.4 | 0.905 | 46.4 | LOS D | 67.5 | 477.9 | 0.90 | 0.85 | 39.8 |
| 3 | R2 | 141 | 8.4 | 0.680 | 94.0 | LOS F | 12.6 | 94.2 | 1.00 | 0.82 | 25.3 |
| Approach | | 1668 | 1.9 | 0.905 | 48.8 | LOS D | 67.5 | 477.9 | 0.88 | 0.84 | 38.6 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 179 | 2.5 | 0.139 | 10.9 | LOS B | 3.5 | 25.0 | 0.27 | 0.66 | 58.2 |
| 5 | T1 | 534 | 1.5 | 0.627 | 70.2 | LOS E | 21.8 | 154.5 | 0.96 | 0.82 | 30.0 |
| 6 | R2 | 465 | 1.2 | 0.862 | 94.3 | LOS F | 21.7 | 153.3 | 1.00 | 0.91 | 25.1 |
| Approach | | 1178 | 1.5 | 0.862 | 70.7 | LOS E | 21.8 | 154.5 | 0.87 | 0.83 | 29.9 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 100 | 3.7 | 0.071 | 9.0 | LOS A | 1.4 | 10.3 | 0.20 | 0.63 | 57.8 |
| 8 | T1 | 604 | 1.4 | 0.373 | 39.1 | LOS D | 18.4 | 130.5 | 0.74 | 0.64 | 42.1 |
| 9 | R2 | 23 | 0.0 | 0.230 | 100.5 | LOS F | 2.1 | 14.5 | 0.99 | 0.71 | 23.8 |
| Approach | | 727 | 1.7 | 0.373 | 36.9 | LOS D | 18.4 | 130.5 | 0.67 | 0.64 | 42.6 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 3 | 0.0 | 0.004 | 32.2 | LOS C | 0.1 | 1.0 | 0.56 | 0.63 | 43.6 |
| 11 | T1 | 173 | 3.7 | 0.291 | 74.7 | LOS E | 6.9 | 50.1 | 0.93 | 0.73 | 28.9 |
| 12 | R2 | 226 | 0.5 | 0.541 | 91.6 | LOS F | 9.8 | 69.1 | 0.99 | 0.80 | 25.6 |
| Approach | | 402 | 1.9 | 0.541 | 83.9 | LOS F | 9.8 | 69.1 | 0.96 | 0.77 | 27.0 |
| All Vehicles | | 3975 | 1.8 | 0.905 | 56.6 | LOS E | 67.5 | 477.9 | 0.85 | 0.79 | 34.7 |

### 2013 Base SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 100 | 2.0 | 0.070 | 9.9 | LOS A | 1.5 | 10.5 | 0.21 | 0.65 | 60.1 |
| 2 | T1 | 810 | 1.6 | 0.537 | 40.2 | LOS D | 28.1 | 199.8 | 0.79 | 0.70 | 42.7 |
| 3 | R2 | 209 | 0.9 | 0.849 | 97.7 | LOS F | 19.3 | 136.4 | 1.00 | 0.90 | 24.8 |
| Approach | | 1119 | 1.5 | 0.849 | 48.2 | LOS D | 28.1 | 199.8 | 0.78 | 0.73 | 38.5 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 277 | 0.4 | 0.239 | 16.2 | LOS B | 8.4 | 59.0 | 0.41 | 0.70 | 53.9 |
| 5 | T1 | 322 | 0.8 | 0.393 | 65.3 | LOS E | 12.1 | 85.2 | 0.91 | 0.75 | 31.2 |
| 6 | R2 | 220 | 0.7 | 0.243 | 64.6 | LOS E | 7.7 | 54.0 | 0.85 | 0.78 | 31.5 |
| Approach | | 819 | 0.6 | 0.393 | 48.5 | LOS D | 12.1 | 85.2 | 0.72 | 0.74 | 36.5 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 280 | 0.6 | 0.215 | 14.1 | LOS B | 7.7 | 53.9 | 0.36 | 0.68 | 53.7 |
| 8 | T1 | 664 | 1.0 | 0.498 | 49.4 | LOS D | 22.7 | 160.2 | 0.85 | 0.74 | 37.7 |
| 9 | R2 | 114 | 0.0 | 1.105 | 215.0 | LOS F | 16.0 | 111.8 | 1.00 | 1.16 | 13.7 |
| Approach | | 1058 | 0.8 | 1.105 | 57.9 | LOS E | 22.7 | 160.2 | 0.73 | 0.77 | 33.9 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 17 | 3.1 | 0.015 | 12.6 | LOS B | 0.4 | 2.6 | 0.30 | 0.63 | 56.5 |
| 11 | T1 | 414 | 1.4 | 0.742 | 81.5 | LOS F | 17.8 | 126.3 | 1.00 | 0.86 | 27.4 |
| 12 | R2 | 465 | 0.7 | 0.708 | 81.9 | LOS F | 19.3 | 136.0 | 1.00 | 0.84 | 27.4 |
| Approach | | 896 | 1.1 | 0.742 | 80.4 | LOS F | 19.3 | 136.0 | 0.99 | 0.84 | 27.7 |
| All Vehicles | | 3892 | 1.0 | 1.105 | 58.3 | LOS E | 28.1 | 199.8 | 0.80 | 0.77 | 33.8 |

### 2021 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 23 | 6.9 | 0.015 | 8.2 | LOS A | 0.2 | 1.3 | 0.13 | 0.63 | 61.2 |
| 2 | T1 | 664 | 5.1 | 0.381 | 33.5 | LOS C | 18.6 | 136.0 | 0.70 | 0.62 | 46.1 |
| 3 | R2 | 197 | 5.7 | 0.764 | 90.4 | LOS F | 17.2 | 126.6 | 1.00 | 0.86 | 26.0 |
| Approach | | 884 | 5.3 | 0.764 | 45.5 | LOS D | 18.6 | 136.0 | 0.75 | 0.67 | 39.5 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 212 | 3.5 | 0.249 | 29.0 | LOS C | 9.6 | 69.5 | 0.59 | 0.74 | 45.1 |
| 5 | T1 | 171 | 4.1 | 0.737 | 95.1 | LOS F | 7.8 | 56.6 | 1.00 | 0.83 | 24.9 |
| 6 | R2 | 191 | 2.8 | 0.726 | 99.5 | LOS F | 8.6 | 62.0 | 1.00 | 0.83 | 24.2 |
| Approach | | 574 | 3.4 | 0.737 | 72.1 | LOS E | 9.6 | 69.5 | 0.85 | 0.80 | 29.5 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 593 | 2.4 | 0.489 | 20.5 | LOS C | 21.7 | 155.4 | 0.54 | 0.80 | 49.0 |
| 8 | T1 | 1140 | 3.1 | 0.762 | 39.8 | LOS D | 45.8 | 329.0 | 0.84 | 0.76 | 41.7 |
| 9 | R2 | 29 | 9.1 | 0.115 | 78.6 | LOS E | 2.2 | 16.7 | 0.90 | 0.73 | 27.5 |
| Approach | | 1762 | 3.0 | 0.762 | 33.9 | LOS C | 45.8 | 329.0 | 0.74 | 0.77 | 43.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 224 | 0.0 | 0.171 | 10.9 | LOS B | 4.4 | 30.8 | 0.28 | 0.66 | 58.4 |
| 11 | T1 | 549 | 1.6 | 0.753 | 75.4 | LOS E | 23.1 | 163.8 | 1.00 | 0.87 | 28.7 |
| 12 | R2 | 547 | 0.4 | 0.738 | 79.9 | LOS E | 22.7 | 159.5 | 1.00 | 0.86 | 27.8 |
| Approach | | 1320 | 0.8 | 0.753 | 66.3 | LOS E | 23.1 | 163.8 | 0.88 | 0.83 | 31.0 |
| All Vehicles | | 4540 | 2.9 | 0.764 | 50.4 | LOS D | 45.8 | 329.0 | 0.80 | 0.77 | 36.4 |

## 2021 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 72 | 6.9 | 0.052 | 10.9 | LOS B | 1.2 | 9.2 | 0.24 | 0.65 | 58.5 |
| 2 | T1 | 1490 | 5.1 | 0.763 | 31.8 | LOS C | 50.5 | 368.7 | 0.81 | 0.75 | 47.0 |
| 3 | R2 | 142 | 5.7 | 0.349 | 40.2 | LOS D | 5.7 | 41.8 | 0.88 | 0.78 | 40.2 |
| Approach | | 1704 | 5.2 | 0.763 | 31.6 | LOS C | 50.5 | 368.7 | 0.79 | 0.75 | 46.8 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 164 | 3.5 | 0.127 | 11.9 | LOS B | 3.5 | 24.9 | 0.30 | 0.66 | 57.1 |
| 5 | T1 | 543 | 4.1 | 0.757 | 75.7 | LOS E | 22.9 | 165.9 | 1.00 | 0.87 | 28.6 |
| 6 | R2 | 468 | 2.8 | 0.665 | 73.5 | LOS E | 18.3 | 130.9 | 0.95 | 0.83 | 29.2 |
| Approach | | 1175 | 3.5 | 0.757 | 85.9 | LOS E | 22.9 | 165.9 | 0.88 | 0.82 | 31.0 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 140 | 2.4 | 0.096 | 8.7 | LOS A | 1.8 | 12.9 | 0.20 | 0.64 | 58.1 |
| 8 | T1 | 582 | 3.1 | 0.472 | 51.7 | LOS D | 20.1 | 144.6 | 0.85 | 0.74 | 36.7 |
| 9 | R2 | 27 | 9.1 | 0.464 | 105.2 | LOS F | 2.5 | 18.8 | 1.00 | 0.72 | 23.0 |
| Approach | | 749 | 3.2 | 0.472 | 45.6 | LOS D | 20.1 | 144.6 | 0.74 | 0.72 | 38.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 12 | 0.0 | 0.015 | 26.4 | LOS C | 0.5 | 3.3 | 0.51 | 0.66 | 46.9 |
| 11 | T1 | 157 | 1.6 | 0.666 | 93.3 | LOS F | 7.1 | 50.2 | 1.00 | 0.80 | 25.2 |
| 12 | R2 | 260 | 0.4 | 0.743 | 96.1 | LOS F | 11.6 | 81.6 | 1.00 | 0.84 | 24.8 |
| Approach | | 429 | 0.8 | 0.743 | 93.1 | LOS F | 11.6 | 81.6 | 0.99 | 0.82 | 25.3 |
| All Vehicles | | 4057 | 3.9 | 0.763 | 50.6 | LOS D | 50.5 | 368.7 | 0.83 | 0.77 | 36.7 |

## 2021 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 120 | 6.9 | 0.085 | 9.7 | LOS A | 1.7 | 12.4 | 0.20 | 0.65 | 59.7 |
| 2 | T1 | 869 | 5.1 | 0.568 | 43.7 | LOS D | 28.9 | 211.2 | 0.83 | 0.74 | 40.8 |
| 3 | R2 | 225 | 5.7 | 0.614 | 43.8 | LOS D | 10.3 | 75.5 | 0.96 | 0.82 | 38.7 |
| Approach | | 1214 | 5.4 | 0.614 | 40.4 | LOS D | 28.9 | 211.2 | 0.79 | 0.75 | 41.7 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 257 | 3.5 | 0.233 | 17.0 | LOS B | 8.0 | 57.8 | 0.43 | 0.70 | 52.9 |
| 5 | T1 | 308 | 4.1 | 0.608 | 80.0 | LOS F | 12.9 | 93.4 | 0.99 | 0.81 | 27.7 |
| 6 | R2 | 334 | 2.8 | 0.434 | 72.6 | LOS E | 12.7 | 90.9 | 0.92 | 0.81 | 29.4 |
| Approach | | 899 | 3.4 | 0.608 | 59.3 | LOS E | 12.9 | 93.4 | 0.80 | 0.78 | 32.9 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 223 | 2.4 | 0.173 | 11.6 | LOS B | 4.7 | 33.5 | 0.30 | 0.67 | 55.5 |
| 8 | T1 | 673 | 3.1 | 0.621 | 59.8 | LOS E | 25.4 | 182.7 | 0.93 | 0.81 | 34.0 |
| 9 | R2 | 74 | 9.1 | 0.364 | 86.7 | LOS F | 6.1 | 45.9 | 0.97 | 0.77 | 26.0 |
| Approach | | 970 | 3.4 | 0.621 | 50.7 | LOS D | 25.4 | 182.7 | 0.79 | 0.77 | 36.4 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 20 | 0.0 | 0.018 | 14.7 | LOS B | 0.5 | 3.5 | 0.34 | 0.64 | 55.1 |
| 11 | T1 | 280 | 1.6 | 0.544 | 79.2 | LOS E | 11.6 | 82.3 | 0.98 | 0.80 | 27.9 |
| 12 | R2 | 479 | 0.4 | 0.613 | 75.6 | LOS E | 19.0 | 133.6 | 0.96 | 0.84 | 28.8 |
| Approach | | 779 | 0.8 | 0.613 | 75.3 | LOS E | 19.0 | 133.6 | 0.95 | 0.82 | 28.8 |
| All Vehicles | | 3862 | 3.5 | 0.621 | 54.4 | LOS D | 28.9 | 211.2 | 0.83 | 0.77 | 35.1 |

## 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 34 | 6.9 | 0.023 | 8.4 | LOS A | 0.3 | 2.3 | 0.14 | 0.63 | 61.0 |
| 2 | T1 | 640 | 5.1 | 0.372 | 33.9 | LOS C | 18.0 | 131.5 | 0.70 | 0.62 | 45.8 |
| 3 | R2 | 206 | 5.7 | 0.799 | 92.4 | LOS F | 18.4 | 135.0 | 1.00 | 0.87 | 25.6 |
| Approach | | 880 | 5.3 | 0.799 | 46.6 | LOS D | 18.4 | 135.0 | 0.75 | 0.68 | 39.0 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 228 | 3.5 | 0.280 | 32.8 | LOS C | 11.3 | 81.4 | 0.54 | 0.76 | 43.1 |
| 5 | T1 | 218 | 4.1 | 0.794 | 95.1 | LOS F | 10.0 | 72.8 | 1.00 | 0.87 | 24.9 |
| 6 | R2 | 174 | 2.8 | 0.716 | 100.2 | LOS F | 7.9 | 56.6 | 1.00 | 0.82 | 24.1 |
| Approach | | 620 | 3.5 | 0.794 | 73.6 | LOS E | 11.3 | 81.4 | 0.87 | 0.81 | 29.1 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 558 | 2.4 | 0.469 | 20.8 | LOS C | 21.0 | 150.3 | 0.54 | 0.79 | 48.8 |
| 8 | T1 | 1184 | 3.1 | 0.806 | 41.7 | LOS D | 49.4 | 355.1 | 0.86 | 0.78 | 40.8 |
| 9 | R2 | 31 | 9.1 | 0.123 | 78.7 | LOS E | 2.4 | 17.9 | 0.91 | 0.79 | 27.5 |
| Approach | | 1773 | 3.0 | 0.806 | 35.7 | LOS D | 49.4 | 355.1 | 0.76 | 0.79 | 42.6 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 235 | 0.0 | 0.177 | 10.7 | LOS B | 4.5 | 31.6 | 0.28 | 0.66 | 58.6 |
| 11 | T1 | 559 | 1.6 | 0.724 | 72.5 | LOS E | 22.9 | 162.9 | 1.00 | 0.85 | 29.4 |
| 12 | R2 | 571 | 0.4 | 0.793 | 83.8 | LOS F | 24.6 | 173.0 | 1.00 | 0.88 | 27.0 |
| Approach | | 1365 | 0.8 | 0.793 | 66.6 | LOS E | 24.6 | 173.0 | 0.87 | 0.83 | 30.9 |
| All Vehicles | | 4638 | 2.9 | 0.806 | 51.9 | LOS D | 49.4 | 355.1 | 0.81 | 0.78 | 35.8 |

## 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 76 | 6.9 | 0.055 | 10.3 | LOS B | 1.2 | 8.8 | 0.22 | 0.65 | 59.1 |
| 2 | T1 | 1417 | 5.1 | 0.785 | 34.8 | LOS C | 51.3 | 374.8 | 0.83 | 0.77 | 45.3 |
| 3 | R2 | 234 | 5.7 | 0.621 | 60.2 | LOS E | 13.5 | 99.2 | 0.96 | 0.88 | 33.0 |
| Approach | | 1727 | 5.3 | 0.785 | 37.2 | LOS D | 51.3 | 374.8 | 0.82 | 0.78 | 43.5 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 196 | 3.5 | 0.155 | 12.5 | LOS B | 4.4 | 32.1 | 0.32 | 0.67 | 56.5 |
| 5 | T1 | 529 | 4.1 | 0.660 | 69.9 | LOS E | 21.2 | 153.8 | 0.97 | 0.83 | 30.0 |
| 6 | R2 | 685 | 2.8 | 0.787 | 77.3 | LOS E | 28.7 | 205.5 | 1.00 | 0.88 | 28.3 |
| Approach | | 1410 | 3.4 | 0.787 | 65.5 | LOS E | 28.7 | 205.5 | 0.90 | 0.83 | 31.1 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 212 | 2.4 | 0.155 | 11.0 | LOS B | 4.1 | 29.6 | 0.28 | 0.66 | 56.0 |
| 8 | T1 | 634 | 3.1 | 0.533 | 54.4 | LOS D | 22.7 | 162.9 | 0.88 | 0.76 | 35.8 |
| 9 | R2 | 19 | 9.1 | 0.327 | 104.3 | LOS F | 1.7 | 13.1 | 1.00 | 0.70 | 23.1 |
| Approach | | 865 | 3.1 | 0.533 | 44.8 | LOS D | 22.7 | 162.9 | 0.74 | 0.74 | 38.7 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 7 | 0.0 | 0.010 | 32.6 | LOS C | 0.3 | 2.2 | 0.58 | 0.65 | 43.5 |
| 11 | T1 | 207 | 1.6 | 0.743 | 93.1 | LOS F | 9.4 | 66.6 | 1.00 | 0.84 | 25.3 |
| 12 | R2 | 257 | 0.4 | 0.694 | 93.6 | LOS F | 11.3 | 79.1 | 1.00 | 0.82 | 25.2 |
| Approach | | 471 | 0.9 | 0.743 | 92.5 | LOS F | 11.3 | 79.1 | 0.99 | 0.83 | 25.4 |
| All Vehicles | | 4473 | 3.8 | 0.787 | 53.4 | LOS D | 51.3 | 374.8 | 0.85 | 0.79 | 35.6 |

## 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 54 | 6.9 | 0.040 | 10.2 | LOS B | 0.8 | 6.1 | 0.22 | 0.65 | 59.2 |
| 2 | T1 | 826 | 5.1 | 0.540 | 43.1 | LOS D | 27.1 | 197.8 | 0.82 | 0.73 | 41.1 |
| 3 | R2 | 230 | 5.7 | 0.645 | 44.6 | LOS D | 10.7 | 78.6 | 0.97 | 0.83 | 38.4 |
| Approach | | 1110 | 5.3 | 0.645 | 41.8 | LOS D | 27.1 | 197.8 | 0.82 | 0.74 | 41.1 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 196 | 3.5 | 0.172 | 16.1 | LOS B | 5.8 | 41.5 | 0.40 | 0.69 | 53.6 |
| 5 | T1 | 451 | 4.1 | 0.646 | 73.4 | LOS E | 18.4 | 133.1 | 0.98 | 0.82 | 29.2 |
| 6 | R2 | 315 | 2.8 | 0.519 | 80.5 | LOS F | 12.7 | 90.8 | 0.96 | 0.81 | 27.7 |
| Approach | | 964 | 3.5 | 0.646 | 64.0 | LOS E | 18.4 | 133.1 | 0.86 | 0.79 | 31.6 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 291 | 2.4 | 0.236 | 12.5 | LOS B | 6.9 | 49.0 | 0.34 | 0.68 | 54.8 |
| 8 | T1 | 698 | 3.1 | 0.644 | 60.3 | LOS E | 26.6 | 191.0 | 0.94 | 0.81 | 33.9 |
| 9 | R2 | 48 | 9.1 | 0.248 | 86.3 | LOS F | 3.9 | 29.4 | 0.95 | 0.75 | 26.0 |
| Approach | | 1037 | 3.2 | 0.644 | 48.1 | LOS D | 26.6 | 191.0 | 0.77 | 0.77 | 37.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 17 | 0.0 | 0.015 | 14.0 | LOS B | 0.4 | 2.9 | 0.33 | 0.64 | 55.6 |
| 11 | T1 | 326 | 1.6 | 0.461 | 70.5 | LOS E | 12.7 | 90.5 | 0.94 | 0.78 | 29.9 |
| 12 | R2 | 405 | 0.4 | 0.656 | 82.4 | LOS F | 16.7 | 117.5 | 0.99 | 0.83 | 27.3 |
| Approach | | 748 | 0.9 | 0.656 | 75.7 | LOS E | 16.7 | 117.5 | 0.96 | 0.80 | 28.7 |
| All Vehicles | | 3859 | 3.4 | 0.656 | 55.6 | LOS E | 27.1 | 197.8 | 0.84 | 0.78 | 34.7 |

## 2031 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 31 | 6.9 | 0.020 | 8.0 | LOS A | 0.2 | 1.6 | 0.12 | 0.63 | 61.4 |
| 2 | T1 | 612 | 5.1 | 0.394 | 39.4 | LOS D | 18.5 | 135.1 | 0.75 | 0.66 | 42.9 |
| 3 | R2 | 202 | 5.7 | 0.849 | 98.0 | LOS F | 18.7 | 137.6 | 1.00 | 0.90 | 24.7 |
| Approach | | 845 | 5.3 | 0.849 | 52.2 | LOS D | 18.7 | 137.6 | 0.79 | 0.71 | 36.8 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 290 | 3.5 | 0.380 | 35.1 | LOS D | 15.6 | 112.6 | 0.69 | 0.78 | 42.0 |
| 5 | T1 | 144 | 4.1 | 0.620 | 92.7 | LOS F | 6.4 | 46.7 | 1.00 | 0.78 | 25.3 |
| 6 | R2 | 325 | 2.8 | 0.845 | 100.3 | LOS F | 15.1 | 108.5 | 1.00 | 0.90 | 24.1 |
| Approach | | 759 | 3.3 | 0.845 | 73.9 | LOS E | 15.6 | 112.6 | 0.88 | 0.83 | 29.1 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 433 | 2.4 | 0.379 | 22.4 | LOS C | 16.7 | 119.4 | 0.53 | 0.78 | 47.8 |
| 8 | T1 | 1150 | 3.1 | 0.847 | 51.0 | LOS D | 51.3 | 368.6 | 0.92 | 0.85 | 37.0 |
| 9 | R2 | 18 | 9.1 | 0.077 | 80.0 | LOS E | 1.4 | 10.4 | 0.91 | 0.71 | 27.2 |
| Approach | | 1601 | 3.0 | 0.847 | 43.6 | LOS D | 51.3 | 368.6 | 0.81 | 0.83 | 39.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 84 | 0.0 | 0.066 | 12.1 | LOS B | 1.8 | 12.5 | 0.30 | 0.65 | 57.3 |
| 11 | T1 | 719 | 1.6 | 0.864 | 80.7 | LOS F | 32.7 | 232.4 | 1.00 | 0.95 | 27.6 |
| 12 | R2 | 589 | 0.4 | 0.609 | 68.9 | LOS E | 22.5 | 158.4 | 0.94 | 0.84 | 30.4 |
| Approach | | 1392 | 1.0 | 0.864 | 71.6 | LOS E | 32.7 | 232.4 | 0.93 | 0.89 | 29.7 |
| All Vehicles | | 4597 | 2.9 | 0.864 | 58.7 | LOS E | 51.3 | 368.6 | 0.86 | 0.83 | 33.6 |

## 2031 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 57 | 6.9 | 0.040 | 10.1 | LOS B | 0.9 | 6.3 | 0.21 | 0.64 | 59.3 |
| 2 | T1 | 1532 | 5.1 | 0.747 | 30.0 | LOS C | 49.8 | 364.1 | 0.79 | 0.74 | 48.1 |
| 3 | R2 | 92 | 5.7 | 0.442 | 50.4 | LOS D | 4.5 | 33.3 | 0.97 | 0.77 | 36.2 |
| Approach | | 1681 | 5.2 | 0.747 | 30.4 | LOS C | 49.8 | 364.1 | 0.78 | 0.74 | 47.6 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 200 | 3.5 | 0.160 | 11.5 | LOS B | 4.1 | 29.8 | 0.30 | 0.67 | 57.4 |
| 5 | T1 | 461 | 4.1 | 0.753 | 79.6 | LOS E | 19.8 | 143.2 | 1.00 | 0.87 | 27.8 |
| 6 | R2 | 439 | 2.8 | 0.622 | 74.9 | LOS E | 17.3 | 123.6 | 0.95 | 0.83 | 28.9 |
| Approach | | 1100 | 3.5 | 0.753 | 65.4 | LOS E | 19.8 | 143.2 | 0.85 | 0.81 | 31.2 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 172 | 2.4 | 0.112 | 8.1 | LOS A | 1.9 | 13.6 | 0.18 | 0.63 | 58.6 |
| 8 | T1 | 611 | 3.1 | 0.355 | 34.1 | LOS C | 17.1 | 123.2 | 0.70 | 0.81 | 44.5 |
| 9 | R2 | 29 | 9.1 | 0.499 | 105.5 | LOS F | 2.7 | 20.3 | 1.00 | 0.72 | 22.9 |
| Approach | | 812 | 3.2 | 0.499 | 31.1 | LOS C | 17.1 | 123.2 | 0.60 | 0.62 | 45.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 15 | 0.0 | 0.019 | 25.5 | LOS C | 0.6 | 4.0 | 0.50 | 0.66 | 47.4 |
| 11 | T1 | 141 | 1.6 | 0.658 | 94.4 | LOS F | 6.4 | 45.3 | 1.00 | 0.79 | 25.0 |
| 12 | R2 | 289 | 0.4 | 0.739 | 94.2 | LOS F | 12.8 | 89.9 | 1.00 | 0.84 | 25.1 |
| Approach | | 445 | 0.8 | 0.739 | 91.9 | LOS F | 12.8 | 89.9 | 0.98 | 0.82 | 25.5 |
| All Vehicles | | 4038 | 3.8 | 0.753 | 46.9 | LOS D | 49.8 | 364.1 | 0.79 | 0.74 | 38.1 |

## 2031 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 55 | 6.9 | 0.037 | 8.8 | LOS A | 0.6 | 4.3 | 0.16 | 0.64 | 60.6 |
| 2 | T1 | 896 | 5.1 | 0.562 | 41.7 | LOS D | 29.2 | 213.4 | 0.82 | 0.73 | 41.8 |
| 3 | R2 | 236 | 5.7 | 0.595 | 42.2 | LOS D | 10.3 | 75.6 | 0.95 | 0.82 | 39.3 |
| Approach | | 1187 | 5.3 | 0.595 | 40.3 | LOS D | 29.2 | 213.4 | 0.81 | 0.74 | 41.9 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 270 | 3.5 | 0.246 | 17.1 | LOS B | 8.5 | 61.3 | 0.43 | 0.71 | 52.8 |
| 5 | T1 | 242 | 4.1 | 0.603 | 84.3 | LOS F | 10.3 | 74.8 | 1.00 | 0.80 | 26.8 |
| 6 | R2 | 305 | 2.8 | 0.538 | 82.4 | LOS F | 12.4 | 89.0 | 0.97 | 0.81 | 27.3 |
| Approach | | 817 | 3.4 | 0.603 | 61.4 | LOS E | 12.4 | 89.0 | 0.80 | 0.77 | 32.3 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 282 | 2.4 | 0.230 | 13.0 | LOS B | 6.9 | 49.4 | 0.35 | 0.68 | 54.4 |
| 8 | T1 | 672 | 3.1 | 0.608 | 58.8 | LOS E | 25.2 | 180.8 | 0.92 | 0.80 | 34.3 |
| 9 | R2 | 49 | 9.1 | 0.230 | 84.1 | LOS F | 3.9 | 29.6 | 0.94 | 0.75 | 26.4 |
| Approach | | 1003 | 3.2 | 0.608 | 47.2 | LOS D | 25.2 | 180.8 | 0.76 | 0.76 | 37.7 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 44 | 0.0 | 0.039 | 14.8 | LOS B | 1.1 | 7.9 | 0.35 | 0.65 | 55.0 |
| 11 | T1 | 351 | 1.6 | 0.546 | 74.2 | LOS E | 14.2 | 100.5 | 0.97 | 0.80 | 29.0 |
| 12 | R2 | 483 | 0.4 | 0.602 | 74.7 | LOS E | 19.0 | 133.8 | 0.96 | 0.83 | 29.0 |
| Approach | | 878 | 0.9 | 0.602 | 71.5 | LOS E | 19.0 | 133.8 | 0.93 | 0.81 | 29.7 |
| All Vehicles | | 3885 | 3.4 | 0.608 | 53.5 | LOS D | 29.2 | 213.4 | 0.82 | 0.77 | 35.4 |

## 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 32 | 6.9 | 0.021 | 8.1 | LOS A | 0.2 | 1.8 | 0.12 | 0.63 | 51.3 |
| 2 | T1 | 609 | 5.1 | 0.334 | 30.2 | LOS C | 16.1 | 117.3 | 0.66 | 0.58 | 48.0 |
| 3 | R2 | 116 | 5.7 | 0.780 | 100.5 | LOS F | 10.6 | 77.9 | 1.00 | 0.85 | 24.3 |
| Approach | | 757 | 5.3 | 0.780 | 40.0 | LOS D | 16.1 | 117.3 | 0.69 | 0.63 | 42.1 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 285 | 3.5 | 0.392 | 37.7 | LOS D | 15.8 | 114.1 | 0.72 | 0.79 | 40.8 |
| 5 | T1 | 173 | 4.1 | 0.683 | 92.7 | LOS F | 7.8 | 56.4 | 1.00 | 0.81 | 25.3 |
| 6 | R2 | 222 | 2.8 | 0.784 | 100.5 | LOS F | 10.2 | 73.0 | 1.00 | 0.85 | 24.0 |
| Approach | | 680 | 3.4 | 0.784 | 72.2 | LOS E | 15.8 | 114.1 | 0.88 | 0.81 | 29.5 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 399 | 2.4 | 0.323 | 16.7 | LOS B | 13.6 | 96.9 | 0.44 | 0.71 | 51.6 |
| 8 | T1 | 1312 | 3.1 | 0.811 | 39.0 | LOS D | 53.0 | 381.0 | 0.86 | 0.79 | 42.0 |
| 9 | R2 | 20 | 9.1 | 0.138 | 90.4 | LOS F | 1.7 | 12.5 | 0.96 | 0.71 | 25.3 |
| Approach | | 1731 | 3.0 | 0.811 | 34.5 | LOS C | 53.0 | 381.0 | 0.77 | 0.77 | 43.6 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 102 | 0.0 | 0.078 | 10.3 | LOS B | 1.8 | 12.4 | 0.25 | 0.65 | 59.0 |
| 11 | T1 | 694 | 1.6 | 0.809 | 74.2 | LOS E | 29.7 | 211.0 | 1.00 | 0.90 | 29.0 |
| 12 | R2 | 605 | 0.4 | 0.700 | 74.3 | LOS E | 24.2 | 170.3 | 0.98 | 0.85 | 29.1 |
| Approach | | 1401 | 1.0 | 0.809 | 69.6 | LOS E | 29.7 | 211.0 | 0.94 | 0.86 | 30.1 |
| All Vehicles | | 4569 | 2.8 | 0.811 | 51.6 | LOS D | 53.0 | 381.0 | 0.82 | 0.78 | 35.9 |

## 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 36 | 6.9 | 0.026 | 10.8 | LOS B | 0.6 | 4.5 | 0.23 | 0.64 | 58.6 |
| 2 | T1 | 1498 | 5.1 | 0.781 | 35.1 | LOS D | 52.4 | 382.8 | 0.85 | 0.79 | 45.1 |
| 3 | R2 | 90 | 5.7 | 0.478 | 50.9 | LOS D | 4.2 | 31.0 | 0.98 | 0.77 | 36.0 |
| Approach | | 1624 | 5.2 | 0.781 | 35.5 | LOS D | 52.4 | 382.8 | 0.84 | 0.78 | 44.7 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 223 | 3.5 | 0.177 | 11.6 | LOS B | 4.7 | 33.9 | 0.30 | 0.67 | 57.3 |
| 5 | T1 | 582 | 4.1 | 0.766 | 74.6 | LOS E | 24.5 | 177.6 | 1.00 | 0.88 | 28.9 |
| 6 | R2 | 530 | 2.8 | 0.609 | 71.9 | LOS E | 20.6 | 147.8 | 0.95 | 0.84 | 29.6 |
| Approach | | 1335 | 3.5 | 0.766 | 63.0 | LOS E | 24.5 | 177.6 | 0.86 | 0.83 | 31.8 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 85 | 2.4 | 0.056 | 8.0 | LOS A | 0.9 | 6.4 | 0.17 | 0.62 | 58.7 |
| 8 | T1 | 587 | 3.1 | 0.364 | 37.4 | LOS D | 17.2 | 123.6 | 0.73 | 0.63 | 42.8 |
| 9 | R2 | 18 | 9.1 | 0.310 | 104.2 | LOS F | 1.6 | 12.4 | 1.00 | 0.70 | 23.1 |
| Approach | | 690 | 3.2 | 0.364 | 35.5 | LOS D | 17.2 | 123.6 | 0.67 | 0.63 | 43.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 9 | 0.0 | 0.012 | 28.9 | LOS C | 0.4 | 2.6 | 0.54 | 0.65 | 45.5 |
| 11 | T1 | 157 | 1.6 | 0.610 | 91.3 | LOS F | 7.0 | 49.4 | 1.00 | 0.78 | 25.6 |
| 12 | R2 | 294 | 0.4 | 0.752 | 94.7 | LOS F | 13.1 | 91.9 | 1.00 | 0.84 | 25.0 |
| Approach | | 460 | 0.8 | 0.752 | 92.2 | LOS F | 13.1 | 91.9 | 0.99 | 0.82 | 25.4 |
| All Vehicles | | 4109 | 3.8 | 0.781 | 50.8 | LOS D | 52.4 | 382.8 | 0.84 | 0.78 | 36.6 |

## 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: West Coast Highway (S) | | | | | | | | | | | |
| 1 | L2 | 116 | 6.9 | 0.078 | 8.6 | LOS A | 1.2 | 8.7 | 0.16 | 0.64 | 60.6 |
| 2 | T1 | 950 | 5.1 | 0.612 | 44.2 | LOS D | 32.2 | 235.3 | 0.85 | 0.76 | 40.6 |
| 3 | R2 | 238 | 5.7 | 0.616 | 42.9 | LOS D | 10.7 | 78.4 | 0.96 | 0.82 | 39.0 |
| Approach | | 1304 | 5.4 | 0.616 | 40.8 | LOS D | 32.2 | 235.3 | 0.81 | 0.76 | 41.6 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 291 | 3.5 | 0.276 | 18.6 | LOS B | 9.9 | 71.4 | 0.46 | 0.72 | 51.7 |
| 5 | T1 | 216 | 4.1 | 0.602 | 86.1 | LOS F | 9.3 | 67.4 | 1.00 | 0.79 | 26.5 |
| 6 | R2 | 196 | 2.8 | 0.359 | 80.8 | LOS F | 7.8 | 55.6 | 0.94 | 0.78 | 27.6 |
| Approach | | 703 | 3.5 | 0.602 | 56.7 | LOS E | 9.9 | 71.4 | 0.76 | 0.76 | 33.7 |
| North: Marmion Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 230 | 2.4 | 0.185 | 11.7 | LOS B | 4.9 | 35.1 | 0.31 | 0.67 | 55.5 |
| 8 | T1 | 673 | 3.1 | 0.621 | 59.6 | LOS E | 25.4 | 182.7 | 0.93 | 0.81 | 34.0 |
| 9 | R2 | 40 | 9.1 | 0.188 | 83.5 | LOS F | 3.2 | 24.0 | 0.94 | 0.74 | 26.5 |
| Approach | | 943 | 3.2 | 0.621 | 49.0 | LOS D | 25.4 | 182.7 | 0.78 | 0.77 | 37.1 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 55 | 0.0 | 0.047 | 14.3 | LOS B | 1.4 | 9.6 | 0.34 | 0.66 | 55.4 |
| 11 | T1 | 256 | 1.6 | 0.362 | 69.0 | LOS E | 9.8 | 69.5 | 0.92 | 0.75 | 30.3 |
| 12 | R2 | 558 | 0.4 | 0.631 | 72.2 | LOS E | 21.8 | 153.4 | 0.95 | 0.84 | 29.5 |
| Approach | | 869 | 0.7 | 0.631 | 67.6 | LOS E | 21.8 | 153.4 | 0.91 | 0.80 | 30.7 |
| All Vehicles | | 3819 | 3.4 | 0.631 | 51.9 | LOS D | 32.2 | 235.3 | 0.81 | 0.77 | 36.0 |

## 1.2 Karrinyup Road and Burroughs Road

### 2013 Base AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 75 | 3.6 | 0.473 | 36.6 | LOS E | 1.7 | 12.4 | 0.94 | 1.04 | 26.8 |
| Approach | | 75 | 3.6 | 0.473 | 36.6 | NA | 1.7 | 12.4 | 0.94 | 1.04 | 26.8 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 104 | 0.9 | 0.253 | 15.7 | LOS C | 0.9 | 6.6 | 0.72 | 1.03 | 36.3 |
| 26 | R2 | 27 | 4.0 | 0.165 | 29.3 | LOS D | 0.5 | 3.5 | 0.90 | 1.01 | 38.1 |
| Approach | | 131 | 1.5 | 0.253 | 18.5 | LOS C | 0.9 | 6.6 | 0.76 | 1.02 | 36.8 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 71 | 0.8 | 0.044 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 1529 | 1.8 | 0.397 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.9 |
| Approach | | 1600 | 1.8 | 0.397 | 0.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.02 | 59.1 |
| All Vehicles | | 1806 | 1.8 | 0.473 | 3.1 | NA | 1.7 | 12.4 | 0.09 | 0.14 | 53.9 |

### 2021 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 62 | 3.6 | 0.401 | 35.0 | LOS E | 1.4 | 10.0 | 0.93 | 1.02 | 27.4 |
| Approach | | 62 | 3.6 | 0.401 | 35.0 | NA | 1.4 | 10.0 | 0.93 | 1.02 | 27.4 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 82 | 0.9 | 0.202 | 15.3 | LOS C | 0.7 | 4.9 | 0.71 | 1.01 | 36.5 |
| 26 | R2 | 62 | 4.0 | 0.382 | 34.7 | LOS D | 1.3 | 9.1 | 0.92 | 1.05 | 36.1 |
| Approach | | 144 | 2.2 | 0.382 | 23.7 | LOS C | 1.3 | 9.1 | 0.80 | 1.03 | 36.3 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 74 | 0.8 | 0.045 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 1541 | 1.8 | 0.400 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.9 |
| Approach | | 1615 | 1.8 | 0.400 | 0.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 59.1 |
| All Vehicles | | 1821 | 1.9 | 0.401 | 3.3 | NA | 1.4 | 10.0 | 0.10 | 0.14 | 53.7 |

### 2013 Base PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 276 | 0.5 | 0.296 | 7.2 | LOS A | 1.4 | 9.7 | 0.53 | 0.74 | 42.9 |
| Approach | | 276 | 0.5 | 0.296 | 7.2 | NA | 1.4 | 9.7 | 0.53 | 0.74 | 42.9 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 241 | 1.4 | 0.254 | 8.9 | LOS A | 1.1 | 7.6 | 0.37 | 0.90 | 40.6 |
| 26 | R2 | 134 | 0.9 | 0.203 | 11.8 | LOS B | 0.7 | 5.2 | 0.58 | 1.00 | 46.3 |
| Approach | | 375 | 1.2 | 0.254 | 9.9 | LOS A | 1.1 | 7.6 | 0.45 | 0.93 | 43.2 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 105 | 2.0 | 0.065 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 425 | 2.0 | 0.110 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 530 | 2.0 | 0.110 | 1.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 56.8 |
| All Vehicles | | 1181 | 1.4 | 0.296 | 5.3 | NA | 1.4 | 9.7 | 0.26 | 0.52 | 48.3 |

### 2021 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 184 | 3.6 | 0.239 | 8.1 | LOS A | 1.0 | 7.1 | 0.57 | 0.79 | 42.1 |
| Approach | | 184 | 3.6 | 0.239 | 8.1 | NA | 1.0 | 7.1 | 0.57 | 0.79 | 42.1 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 150 | 0.9 | 0.172 | 9.2 | LOS A | 0.7 | 4.7 | 0.41 | 0.91 | 40.3 |
| 26 | R2 | 128 | 4.0 | 0.216 | 12.7 | LOS B | 0.8 | 5.7 | 0.62 | 1.01 | 45.8 |
| Approach | | 278 | 2.3 | 0.216 | 10.8 | LOS B | 0.8 | 5.7 | 0.51 | 0.96 | 43.4 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 128 | 1.8 | 0.079 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 570 | 0.8 | 0.147 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 698 | 1.0 | 0.147 | 1.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 57.0 |
| All Vehicles | | 1160 | 1.7 | 0.239 | 4.5 | NA | 1.0 | 7.1 | 0.21 | 0.42 | 50.2 |

### 2013 Base SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 212 | 1.4 | 0.334 | 10.5 | LOS B | 1.6 | 11.3 | 0.65 | 0.90 | 40.2 |
| Approach | | 212 | 1.4 | 0.334 | 10.5 | NA | 1.6 | 11.3 | 0.65 | 0.90 | 40.2 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 235 | 0.5 | 0.299 | 10.2 | LOS B | 1.3 | 9.2 | 0.50 | 0.96 | 39.7 |
| 26 | R2 | 83 | 0.7 | 0.178 | 14.4 | LOS B | 0.6 | 4.3 | 0.71 | 1.00 | 45.0 |
| Approach | | 318 | 0.6 | 0.299 | 11.3 | LOS B | 1.3 | 9.2 | 0.58 | 0.97 | 41.6 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 191 | 0.0 | 0.117 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 734 | 1.2 | 0.190 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 925 | 1.0 | 0.190 | 1.2 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 56.7 |
| All Vehicles | | 1455 | 0.9 | 0.334 | 4.7 | NA | 1.6 | 11.3 | 0.22 | 0.42 | 49.9 |

### 2021 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 164 | 3.6 | 0.271 | 10.3 | LOS B | 1.2 | 8.4 | 0.65 | 0.87 | 40.4 |
| Approach | | 164 | 3.6 | 0.271 | 10.3 | NA | 1.2 | 8.4 | 0.65 | 0.87 | 40.4 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 202 | 0.9 | 0.261 | 10.1 | LOS B | 1.0 | 7.4 | 0.50 | 0.95 | 39.8 |
| 26 | R2 | 108 | 4.0 | 0.233 | 15.0 | LOS B | 0.9 | 6.2 | 0.72 | 1.02 | 44.6 |
| Approach | | 310 | 2.0 | 0.261 | 11.8 | LOS B | 1.0 | 7.4 | 0.57 | 0.98 | 42.0 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 182 | 1.8 | 0.112 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 755 | 0.8 | 0.195 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 937 | 1.0 | 0.195 | 1.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 56.8 |
| All Vehicles | | 1411 | 1.5 | 0.271 | 4.5 | NA | 1.2 | 8.4 | 0.20 | 0.39 | 50.5 |

## 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 71 | 3.6 | 0.397 | 30.8 | LOS D | 1.4 | 10.2 | 0.92 | 1.02 | 29.0 |
| Approach | | 71 | 3.6 | 0.397 | 30.8 | NA | 1.4 | 10.2 | 0.92 | 1.02 | 29.0 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 65 | 0.9 | 0.150 | 14.3 | LOS B | 0.5 | 3.6 | 0.67 | 1.00 | 37.1 |
| 26 | R2 | 56 | 4.0 | 0.310 | 30.4 | LOS D | 1.0 | 7.3 | 0.90 | 1.04 | 37.7 |
| Approach | | 121 | 2.3 | 0.310 | 21.7 | LOS C | 1.0 | 7.3 | 0.78 | 1.02 | 37.5 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 86 | 0.8 | 0.053 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 1472 | 1.8 | 0.382 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.9 |
| Approach | | 1558 | 1.8 | 0.382 | 0.4 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 58.9 |
| All Vehicles | | 1750 | 1.9 | 0.397 | 3.1 | NA | 1.4 | 10.2 | 0.09 | 0.14 | 54.1 |

## 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 216 | 3.6 | 0.286 | 8.6 | LOS A | 1.3 | 9.4 | 0.59 | 0.84 | 41.7 |
| Approach | | 216 | 3.6 | 0.286 | 8.6 | NA | 1.3 | 9.4 | 0.59 | 0.84 | 41.7 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 86 | 0.9 | 0.099 | 9.1 | LOS A | 0.4 | 2.6 | 0.39 | 0.90 | 40.4 |
| 26 | R2 | 171 | 4.0 | 0.313 | 14.2 | LOS B | 1.3 | 9.4 | 0.68 | 1.05 | 45.0 |
| Approach | | 257 | 3.0 | 0.313 | 12.5 | LOS B | 1.3 | 9.4 | 0.59 | 1.00 | 43.9 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 176 | 0.8 | 0.108 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 582 | 1.8 | 0.151 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 758 | 1.6 | 0.151 | 1.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.13 | 56.4 |
| All Vehicles | | 1231 | 2.2 | 0.313 | 4.9 | NA | 1.3 | 9.4 | 0.23 | 0.43 | 50.1 |

## 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 238 | 3.6 | 0.388 | 11.2 | LOS B | 2.0 | 14.3 | 0.68 | 0.93 | 39.6 |
| Approach | | 238 | 3.6 | 0.388 | 11.2 | NA | 2.0 | 14.3 | 0.68 | 0.93 | 39.6 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 99 | 0.9 | 0.127 | 9.8 | LOS A | 0.5 | 3.3 | 0.45 | 0.93 | 40.0 |
| 26 | R2 | 132 | 4.0 | 0.298 | 16.1 | LOS C | 1.2 | 8.4 | 0.75 | 1.05 | 44.0 |
| Approach | | 231 | 2.7 | 0.298 | 13.4 | LOS B | 1.2 | 8.4 | 0.62 | 1.00 | 42.7 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 141 | 0.8 | 0.087 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 741 | 1.8 | 0.192 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 882 | 1.7 | 0.192 | 0.9 | LOS A | 0.0 | 0.0 | 0.00 | 0.09 | 57.3 |
| All Vehicles | | 1351 | 2.2 | 0.388 | 4.9 | NA | 2.0 | 14.3 | 0.23 | 0.39 | 50.3 |

## 2031 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 69 | 3.6 | 0.432 | 35.0 | LOS E | 1.5 | 11.1 | 0.93 | 1.03 | 27.4 |
| Approach | | 69 | 3.6 | 0.432 | 35.0 | NA | 1.5 | 11.1 | 0.93 | 1.03 | 27.4 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 90 | 0.9 | 0.218 | 15.3 | LOS C | 0.8 | 5.5 | 0.71 | 1.01 | 36.5 |
| 26 | R2 | 110 | 4.0 | 0.663 | 44.7 | LOS E | 2.7 | 19.2 | 0.96 | 1.16 | 32.9 |
| Approach | | 200 | 2.6 | 0.663 | 31.5 | LOS D | 2.7 | 19.2 | 0.84 | 1.10 | 34.0 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 71 | 0.8 | 0.044 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 1526 | 1.8 | 0.396 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.9 |
| Approach | | 1597 | 1.8 | 0.396 | 0.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.02 | 59.1 |
| All Vehicles | | 1866 | 1.9 | 0.663 | 4.9 | NA | 2.7 | 19.2 | 0.12 | 0.18 | 51.7 |

## 2031 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 169 | 3.6 | 0.207 | 7.7 | LOS A | 0.9 | 6.2 | 0.54 | 0.76 | 42.4 |
| Approach | | 169 | 3.6 | 0.207 | 7.7 | NA | 0.9 | 6.2 | 0.54 | 0.76 | 42.4 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 160 | 0.9 | 0.178 | 9.0 | LOS A | 0.7 | 4.9 | 0.39 | 0.90 | 40.4 |
| 26 | R2 | 134 | 4.0 | 0.210 | 12.1 | LOS B | 0.8 | 5.6 | 0.59 | 1.00 | 46.1 |
| Approach | | 294 | 2.3 | 0.210 | 10.4 | LOS B | 0.8 | 5.6 | 0.48 | 0.95 | 43.6 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 130 | 0.8 | 0.080 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 520 | 1.8 | 0.135 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 650 | 1.6 | 0.135 | 1.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 56.8 |
| All Vehicles | | 1113 | 2.1 | 0.210 | 4.6 | NA | 0.9 | 6.2 | 0.21 | 0.43 | 50.1 |

## 2031 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 157 | 3.6 | 0.273 | 10.7 | LOS B | 1.2 | 8.4 | 0.67 | 0.88 | 40.0 |
| Approach | | 157 | 3.6 | 0.273 | 10.7 | NA | 1.2 | 8.4 | 0.67 | 0.88 | 40.0 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 191 | 0.9 | 0.253 | 10.3 | LOS B | 1.0 | 7.1 | 0.50 | 0.96 | 39.7 |
| 26 | R2 | 78 | 4.0 | 0.179 | 15.1 | LOS C | 0.6 | 4.4 | 0.72 | 1.00 | 44.6 |
| Approach | | 269 | 1.8 | 0.253 | 11.7 | LOS B | 1.0 | 7.1 | 0.57 | 0.97 | 41.6 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 213 | 0.8 | 0.131 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 789 | 1.8 | 0.205 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 1002 | 1.6 | 0.205 | 1.2 | LOS A | 0.0 | 0.0 | 0.00 | 0.12 | 56.6 |
| All Vehicles | | 1428 | 1.9 | 0.273 | 4.2 | NA | 1.2 | 8.4 | 0.18 | 0.36 | 50.9 |

## 2031 Option AM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 102 | 3.6 | 0.397 | 22.8 | LOS C | 1.5 | 11.2 | 0.88 | 1.01 | 32.5 |
| Approach | | 102 | 3.6 | 0.397 | 22.8 | NA | 1.5 | 11.2 | 0.88 | 1.01 | 32.5 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 111 | 0.9 | 0.216 | 13.2 | LOS B | 0.8 | 5.5 | 0.63 | 1.01 | 37.8 |
| 26 | R2 | 106 | 4.0 | 0.457 | 28.0 | LOS D | 1.7 | 12.4 | 0.90 | 1.09 | 38.6 |
| Approach | | 217 | 2.4 | 0.457 | 20.4 | LOS C | 1.7 | 12.4 | 0.76 | 1.05 | 38.3 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 124 | 0.8 | 0.076 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 1288 | 1.8 | 0.334 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.9 |
| Approach | | 1412 | 1.7 | 0.334 | 0.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 58.4 |
| All Vehicles | | 1731 | 1.9 | 0.457 | 4.3 | NA | 1.7 | 12.4 | 0.15 | 0.23 | 51.9 |

## 2031 Option PM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 364 | 3.6 | 0.352 | 6.7 | LOS A | 1.8 | 13.3 | 0.48 | 0.69 | 43.3 |
| Approach | | 364 | 3.6 | 0.352 | 6.7 | NA | 1.8 | 13.3 | 0.48 | 0.69 | 43.3 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 188 | 0.9 | 0.185 | 8.4 | LOS A | 0.7 | 5.3 | 0.30 | 0.89 | 40.8 |
| 26 | R2 | 236 | 4.0 | 0.365 | 13.2 | LOS B | 1.7 | 12.3 | 0.63 | 1.07 | 45.5 |
| Approach | | 424 | 2.6 | 0.365 | 11.0 | LOS B | 1.7 | 12.3 | 0.49 | 0.99 | 43.9 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 94 | 0.8 | 0.056 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 313 | 1.8 | 0.081 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 407 | 1.6 | 0.081 | 1.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.13 | 56.4 |
| All Vehicles | | 1195 | 2.6 | 0.365 | 6.4 | NA | 1.8 | 13.3 | 0.32 | 0.60 | 47.2 |

## 2031 Option SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 23 | R2 | 190 | 3.6 | 0.203 | 6.9 | LOS A | 0.9 | 6.2 | 0.49 | 0.70 | 43.2 |
| Approach | | 190 | 3.6 | 0.203 | 6.9 | NA | 0.9 | 6.2 | 0.49 | 0.70 | 43.2 |
| NorthEast: Burroughs Road (NE) | | | | | | | | | | | |
| 24 | L2 | 81 | 0.9 | 0.084 | 8.5 | LOS A | 0.3 | 2.2 | 0.32 | 0.88 | 40.7 |
| 26 | R2 | 195 | 4.0 | 0.279 | 11.9 | LOS B | 1.2 | 8.4 | 0.58 | 1.03 | 46.2 |
| Approach | | 276 | 3.1 | 0.279 | 10.9 | LOS B | 1.2 | 8.4 | 0.50 | 0.99 | 45.0 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 168 | 0.8 | 0.103 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.55 | 50.6 |
| 28 | T1 | 403 | 1.8 | 0.105 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 571 | 1.5 | 0.105 | 1.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 55.6 |
| All Vehicles | | 1037 | 2.3 | 0.279 | 5.1 | NA | 1.2 | 8.4 | 0.22 | 0.48 | 49.8 |

## 1.3 Karrinyup Road and Jeanes Road

### 2013 Base AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 164 | 1.0 | 0.155 | 13.0 | LOS B | 3.5 | 24.9 | 0.42 | 0.67 | 45.9 |
| 22 | T1 | 435 | 8.1 | 0.398 | 39.7 | LOS D | 11.2 | 83.7 | 0.85 | 0.72 | 36.3 |
| 23 | R2 | 50 | 0.9 | 0.165 | 56.0 | LOS E | 2.7 | 19.2 | 0.90 | 0.74 | 23.0 |
| Approach | | 649 | 5.8 | 0.398 | 34.2 | LOS C | 11.2 | 83.7 | 0.75 | 0.71 | 37.3 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 83 | 0.0 | 0.156 | 16.4 | LOS B | 2.7 | 18.8 | 0.63 | 0.60 | 36.2 |
| 25 | T1 | 4 | 0.0 | 0.156 | 14.9 | LOS B | 2.7 | 18.8 | 0.63 | 0.60 | 33.9 |
| 26 | R2 | 3 | 10.5 | 0.010 | 43.6 | LOS D | 0.1 | 1.1 | 0.81 | 0.57 | 25.0 |
| Approach | | 90 | 0.4 | 0.156 | 17.2 | LOS B | 2.7 | 18.8 | 0.64 | 0.60 | 35.6 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 78 | 1.3 | 0.053 | 6.3 | LOS A | 0.4 | 2.8 | 0.15 | 0.59 | 47.7 |
| 28 | T1 | 1285 | 2.3 | 0.835 | 34.3 | LOS C | 38.7 | 276.5 | 0.88 | 0.83 | 38.4 |
| 29 | R2 | 264 | 0.8 | 0.497 | 27.4 | LOS C | 7.9 | 55.7 | 0.89 | 0.80 | 38.7 |
| Approach | | 1627 | 2.0 | 0.835 | 31.8 | LOS C | 38.7 | 276.5 | 0.84 | 0.82 | 38.7 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 160 | 3.3 | 0.417 | 23.4 | LOS C | 5.8 | 41.4 | 0.82 | 0.77 | 40.2 |
| 31 | T1 | 57 | 0.0 | 0.417 | 22.1 | LOS C | 5.8 | 41.4 | 0.82 | 0.77 | 30.9 |
| 32 | R2 | 169 | 0.8 | 0.456 | 51.4 | LOS D | 9.3 | 65.4 | 0.91 | 0.80 | 30.8 |
| Approach | | 386 | 1.7 | 0.456 | 35.5 | LOS D | 9.3 | 65.4 | 0.86 | 0.78 | 34.3 |
| All Vehicles | | 2752 | 2.8 | 0.835 | 32.4 | LOS C | 38.7 | 276.5 | 0.82 | 0.78 | 37.6 |

### 2013 Base SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov. | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 116 | 0.0 | 0.096 | 10.4 | LOS B | 1.8 | 12.7 | 0.37 | 0.65 | 47.4 |
| 22 | T1 | 679 | 1.1 | 0.368 | 20.3 | LOS C | 11.8 | 83.6 | 0.69 | 0.60 | 45.0 |
| 23 | R2 | 186 | 0.0 | 1.090 | 158.1 | LOS F | 18.6 | 130.5 | 1.00 | 1.35 | 10.9 |
| Approach | | 961 | 0.8 | 1.090 | 45.2 | LOS D | 18.6 | 130.5 | 0.71 | 0.75 | 32.6 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 287 | 1.3 | 0.437 | 8.6 | LOS A | 5.1 | 36.4 | 0.62 | 0.62 | 41.2 |
| 25 | T1 | 17 | 0.0 | 0.437 | 7.4 | LOS A | 5.1 | 36.4 | 0.62 | 0.62 | 38.3 |
| 26 | R2 | 12 | 0.0 | 0.031 | 33.6 | LOS C | 0.5 | 3.3 | 0.77 | 0.60 | 28.4 |
| Approach | | 316 | 1.1 | 0.437 | 9.7 | LOS A | 5.1 | 36.4 | 0.62 | 0.62 | 40.4 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 151 | 0.5 | 0.119 | 7.1 | LOS A | 1.3 | 9.5 | 0.24 | 0.62 | 46.8 |
| 28 | T1 | 684 | 1.3 | 0.376 | 20.4 | LOS C | 12.0 | 84.6 | 0.69 | 0.60 | 45.0 |
| 29 | R2 | 113 | 0.0 | 0.649 | 60.8 | LOS E | 6.2 | 43.5 | 1.00 | 0.82 | 28.6 |
| Approach | | 958 | 1.0 | 0.649 | 22.9 | LOS C | 12.0 | 84.6 | 0.65 | 0.63 | 42.1 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 207 | 0.0 | 0.388 | 15.6 | LOS B | 5.2 | 36.2 | 0.72 | 0.75 | 43.9 |
| 31 | T1 | 49 | 0.8 | 0.388 | 14.3 | LOS B | 5.2 | 36.2 | 0.72 | 0.75 | 34.5 |
| 32 | R2 | 173 | 0.8 | 0.410 | 40.9 | LOS D | 7.8 | 54.7 | 0.87 | 0.79 | 33.8 |
| Approach | | 429 | 0.4 | 0.410 | 25.7 | LOS C | 7.8 | 54.7 | 0.78 | 0.76 | 38.3 |
| All Vehicles | | 2684 | 0.8 | 1.090 | 30.0 | LOS C | 18.6 | 130.5 | 0.69 | 0.69 | 37.2 |

### 2013 Base PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 154 | 0.7 | 0.122 | 9.3 | LOS A | 2.2 | 15.5 | 0.33 | 0.64 | 48.1 |
| 22 | T1 | 1132 | 1.6 | 0.720 | 27.3 | LOS C | 27.6 | 196.1 | 0.84 | 0.75 | 41.4 |
| 23 | R2 | 174 | 0.0 | 1.226 | 272.0 | LOS F | 24.8 | 173.3 | 1.00 | 1.58 | 6.9 |
| Approach | | 1460 | 1.3 | 1.226 | 54.6 | LOS D | 27.6 | 196.1 | 0.80 | 0.83 | 30.3 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 169 | 1.0 | 0.288 | 11.6 | LOS B | 4.1 | 29.1 | 0.62 | 0.60 | 39.3 |
| 25 | T1 | 23 | 0.0 | 0.288 | 10.1 | LOS B | 4.1 | 29.1 | 0.62 | 0.60 | 36.6 |
| 26 | R2 | 101 | 0.0 | 0.220 | 34.8 | LOS C | 4.4 | 30.7 | 0.79 | 0.68 | 28.0 |
| Approach | | 293 | 0.6 | 0.288 | 19.5 | LOS B | 4.4 | 30.7 | 0.68 | 0.63 | 34.3 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 127 | 0.0 | 0.087 | 6.2 | LOS A | 0.6 | 4.3 | 0.15 | 0.59 | 47.7 |
| 28 | T1 | 468 | 3.3 | 0.271 | 22.1 | LOS C | 8.6 | 61.7 | 0.67 | 0.57 | 44.1 |
| 29 | R2 | 67 | 0.0 | 0.463 | 65.2 | LOS E | 3.9 | 27.4 | 1.00 | 0.76 | 27.7 |
| Approach | | 662 | 2.4 | 0.463 | 23.4 | LOS C | 8.6 | 61.7 | 0.61 | 0.59 | 41.8 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 300 | 0.5 | 0.442 | 18.3 | LOS B | 10.1 | 71.0 | 0.70 | 0.79 | 42.4 |
| 31 | T1 | 12 | 0.0 | 0.442 | 17.0 | LOS B | 10.1 | 71.0 | 0.70 | 0.79 | 33.0 |
| 32 | R2 | 144 | 1.8 | 0.313 | 39.0 | LOS D | 6.5 | 46.0 | 0.81 | 0.76 | 34.4 |
| Approach | | 456 | 0.9 | 0.442 | 24.8 | LOS C | 10.1 | 71.0 | 0.74 | 0.78 | 39.3 |
| All Vehicles | | 2871 | 1.4 | 1.226 | 39.1 | LOS D | 27.6 | 196.1 | 0.73 | 0.75 | 34.1 |

### 2021 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 198 | 1.0 | 0.187 | 11.5 | LOS B | 4.2 | 29.5 | 0.37 | 0.66 | 46.8 |
| 22 | T1 | 554 | 8.1 | 0.642 | 56.6 | LOS E | 18.7 | 139.9 | 0.96 | 0.82 | 31.1 |
| 23 | R2 | 52 | 0.9 | 0.697 | 89.1 | LOS F | 4.1 | 28.9 | 1.00 | 0.80 | 17.1 |
| Approach | | 804 | 5.9 | 0.697 | 47.6 | LOS D | 18.7 | 139.9 | 0.82 | 0.78 | 32.8 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 92 | 0.0 | 0.157 | 15.5 | LOS B | 3.1 | 22.0 | 0.60 | 0.59 | 36.8 |
| 25 | T1 | 6 | 0.0 | 0.157 | 14.0 | LOS B | 3.1 | 22.0 | 0.60 | 0.59 | 34.4 |
| 26 | R2 | 15 | 10.5 | 0.032 | 35.6 | LOS D | 0.7 | 5.4 | 0.69 | 0.57 | 27.5 |
| Approach | | 113 | 1.4 | 0.157 | 18.1 | LOS B | 3.1 | 22.0 | 0.61 | 0.58 | 35.1 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 78 | 1.3 | 0.052 | 6.3 | LOS A | 0.5 | 3.4 | 0.14 | 0.58 | 47.6 |
| 28 | T1 | 1247 | 2.3 | 0.824 | 35.3 | LOS D | 40.9 | 292.2 | 0.85 | 0.78 | 38.0 |
| 29 | R2 | 286 | 0.8 | 0.644 | 35.1 | LOS D | 11.3 | 79.3 | 0.96 | 0.83 | 35.8 |
| Approach | | 1611 | 2.0 | 0.824 | 33.9 | LOS C | 40.9 | 292.2 | 0.84 | 0.78 | 37.8 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 110 | 3.3 | 0.231 | 20.4 | LOS C | 4.7 | 33.3 | 0.67 | 0.70 | 41.5 |
| 31 | T1 | 47 | 0.0 | 0.231 | 19.1 | LOS B | 4.7 | 33.3 | 0.67 | 0.70 | 32.2 |
| 32 | R2 | 179 | 0.8 | 0.801 | 79.3 | LOS E | 13.6 | 96.1 | 1.00 | 0.90 | 25.0 |
| Approach | | 336 | 1.5 | 0.801 | 51.6 | LOS D | 13.6 | 96.1 | 0.85 | 0.81 | 29.7 |
| All Vehicles | | 2854 | 3.0 | 0.824 | 39.2 | LOS D | 40.9 | 292.2 | 0.82 | 0.78 | 35.1 |

## 2021 Do-minimum PM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 153 | 1.0 | 0.116 | 7.3 | LOS A | 1.3 | 9.4 | 0.25 | 0.62 | 49.4 |
| 22 | T1 | 1035 | 8.1 | 0.801 | 35.1 | LOS D | 26.8 | 200.9 | 0.93 | 0.87 | 38.1 |
| 23 | R2 | 151 | 0.9 | 0.594 | 32.1 | LOS C | 4.8 | 33.6 | 0.99 | 0.79 | 30.4 |
| Approach | | 1339 | 6.5 | 0.801 | 31.6 | LOS C | 26.8 | 200.9 | 0.85 | 0.83 | 38.4 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 160 | 0.0 | 0.217 | 8.3 | LOS A | 2.7 | 18.7 | 0.54 | 0.55 | 41.7 |
| 25 | T1 | 20 | 0.0 | 0.217 | 6.9 | LOS A | 2.7 | 18.7 | 0.54 | 0.55 | 38.7 |
| 26 | R2 | 124 | 10.5 | 0.232 | 26.9 | LOS C | 4.6 | 34.9 | 0.73 | 0.66 | 30.8 |
| Approach | | 304 | 4.3 | 0.232 | 15.8 | LOS B | 4.6 | 34.9 | 0.61 | 0.59 | 36.3 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 124 | 1.3 | 0.159 | 23.8 | LOS C | 3.8 | 27.1 | 0.66 | 0.72 | 34.7 |
| 28 | T1 | 462 | 2.3 | 0.501 | 39.5 | LOS D | 11.0 | 78.5 | 0.92 | 0.77 | 36.4 |
| 29 | R2 | 94 | 0.8 | 0.776 | 66.5 | LOS E | 5.5 | 38.7 | 1.00 | 0.87 | 27.4 |
| Approach | | 680 | 1.9 | 0.776 | 40.4 | LOS D | 11.0 | 78.5 | 0.88 | 0.77 | 34.5 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 241 | 3.3 | 0.354 | 15.1 | LOS B | 6.8 | 49.0 | 0.63 | 0.73 | 44.1 |
| 31 | T1 | 17 | 0.0 | 0.354 | 13.8 | LOS B | 6.8 | 49.0 | 0.63 | 0.73 | 34.7 |
| 32 | R2 | 132 | 0.8 | 0.763 | 62.2 | LOS E | 7.5 | 53.0 | 1.00 | 0.90 | 28.3 |
| Approach | | 390 | 2.3 | 0.763 | 31.0 | LOS C | 7.5 | 53.0 | 0.76 | 0.78 | 36.7 |
| All Vehicles | | 2713 | 4.5 | 0.801 | 31.9 | LOS C | 26.8 | 200.9 | 0.82 | 0.78 | 36.9 |

## 2021 Do-minimum SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 102 | 1.0 | 0.154 | 23.5 | LOS C | 2.9 | 20.2 | 0.72 | 0.72 | 40.6 |
| 22 | T1 | 796 | 8.1 | 0.818 | 39.3 | LOS D | 18.5 | 138.9 | 1.00 | 0.97 | 36.5 |
| 23 | R2 | 176 | 0.9 | 0.772 | 51.6 | LOS D | 8.2 | 58.1 | 1.00 | 0.90 | 24.0 |
| Approach | | 1074 | 6.3 | 0.818 | 39.8 | LOS D | 18.5 | 138.9 | 0.97 | 0.93 | 34.9 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 274 | 0.0 | 0.310 | 6.9 | LOS A | 4.7 | 32.6 | 0.50 | 0.54 | 42.7 |
| 25 | T1 | 15 | 0.0 | 0.310 | 5.5 | LOS A | 4.7 | 32.6 | 0.50 | 0.54 | 39.6 |
| 26 | R2 | 34 | 10.5 | 0.063 | 19.9 | LOS B | 0.9 | 7.1 | 0.65 | 0.57 | 34.0 |
| Approach | | 323 | 1.1 | 0.310 | 6.2 | LOS A | 4.7 | 32.6 | 0.52 | 0.54 | 41.5 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 160 | 1.3 | 0.150 | 7.1 | LOS A | 1.3 | 9.3 | 0.27 | 0.63 | 46.8 |
| 28 | T1 | 691 | 2.3 | 0.697 | 33.7 | LOS C | 14.2 | 101.6 | 0.96 | 0.84 | 38.6 |
| 29 | R2 | 113 | 0.8 | 0.485 | 47.1 | LOS D | 4.8 | 34.1 | 0.98 | 0.76 | 32.1 |
| Approach | | 984 | 1.9 | 0.697 | 30.4 | LOS C | 14.2 | 101.6 | 0.84 | 0.79 | 38.5 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 113 | 3.3 | 0.169 | 13.1 | LOS B | 2.8 | 20.1 | 0.53 | 0.65 | 45.2 |
| 31 | T1 | 26 | 0.0 | 0.169 | 11.8 | LOS B | 2.8 | 20.1 | 0.53 | 0.65 | 35.9 |
| 32 | R2 | 115 | 0.8 | 0.724 | 52.5 | LOS D | 5.4 | 38.1 | 1.00 | 0.87 | 30.5 |
| Approach | | 254 | 1.8 | 0.724 | 30.8 | LOS C | 5.4 | 38.1 | 0.74 | 0.74 | 36.3 |
| All Vehicles | | 2635 | 3.6 | 0.818 | 31.6 | LOS C | 18.5 | 138.9 | 0.84 | 0.81 | 36.9 |

## 2021 Option AM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 190 | 1.0 | 0.152 | 7.7 | LOS A | 2.1 | 15.0 | 0.24 | 0.62 | 49.2 |
| 22 | T1 | 427 | 8.1 | 0.384 | 38.5 | LOS D | 10.7 | 79.9 | 0.84 | 0.70 | 36.7 |
| 23 | R2 | 30 | 0.9 | 0.264 | 71.4 | LOS E | 1.9 | 13.5 | 0.99 | 0.72 | 19.8 |
| Approach | | 647 | 5.7 | 0.384 | 31.0 | LOS C | 10.7 | 79.9 | 0.57 | 0.68 | 38.7 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 36 | 0.0 | 0.085 | 52.9 | LOS D | 1.4 | 9.5 | 0.89 | 0.68 | 22.6 |
| 25 | T1 | 13 | 0.0 | 0.085 | 50.9 | LOS D | 1.4 | 9.5 | 0.89 | 0.66 | 22.0 |
| 26 | R2 | 16 | 10.5 | 0.070 | 52.9 | LOS D | 0.9 | 6.7 | 0.89 | 0.66 | 22.5 |
| Approach | | 65 | 2.6 | 0.085 | 52.5 | LOS D | 1.4 | 9.5 | 0.89 | 0.67 | 22.5 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 40 | 1.3 | 0.031 | 10.9 | LOS B | 0.7 | 5.1 | 0.33 | 0.61 | 43.4 |
| 28 | T1 | 1274 | 2.3 | 0.550 | 12.8 | LOS B | 21.8 | 155.7 | 0.57 | 0.52 | 49.6 |
| 29 | R2 | 278 | 0.8 | 0.369 | 34.1 | LOS C | 12.1 | 85.6 | 0.74 | 0.79 | 35.9 |
| Approach | | 1592 | 2.0 | 0.550 | 16.5 | LOS B | 21.8 | 155.7 | 0.60 | 0.57 | 46.4 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 141 | 3.3 | 0.180 | 13.8 | LOS B | 3.6 | 26.0 | 0.49 | 0.66 | 44.7 |
| 31 | T1 | 7 | 0.0 | 0.180 | 12.4 | LOS B | 3.6 | 26.0 | 0.49 | 0.66 | 35.4 |
| 32 | R2 | 115 | 0.8 | 0.526 | 61.5 | LOS E | 7.0 | 49.1 | 0.97 | 0.80 | 28.2 |
| Approach | | 263 | 2.1 | 0.526 | 34.6 | LOS C | 7.0 | 49.1 | 0.70 | 0.72 | 35.4 |
| All Vehicles | | 2567 | 3.0 | 0.550 | 22.9 | LOS C | 21.8 | 155.7 | 0.63 | 0.61 | 42.2 |

## 2021 Option PM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 161 | 1.0 | 0.107 | 6.1 | LOS A | 0.6 | 5.5 | 0.14 | 0.59 | 50.2 |
| 22 | T1 | 1042 | 8.1 | 0.769 | 36.1 | LOS D | 28.5 | 213.4 | 0.91 | 0.81 | 37.7 |
| 23 | R2 | 51 | 0.9 | 0.449 | 72.5 | LOS E | 3.3 | 23.3 | 1.00 | 0.75 | 19.6 |
| Approach | | 1254 | 6.9 | 0.769 | 33.8 | LOS C | 28.5 | 213.4 | 0.81 | 0.78 | 38.0 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 31 | 0.0 | 0.030 | 26.2 | LOS C | 0.9 | 6.1 | 0.62 | 0.56 | 31.0 |
| 25 | T1 | 15 | 0.0 | 0.030 | 24.2 | LOS C | 0.9 | 6.1 | 0.62 | 0.50 | 29.9 |
| 26 | R2 | 203 | 10.5 | 0.367 | 31.0 | LOS C | 9.0 | 68.5 | 0.74 | 0.70 | 28.9 |
| Approach | | 249 | 8.6 | 0.367 | 30.0 | LOS C | 9.0 | 68.6 | 0.72 | 0.67 | 29.2 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 45 | 1.3 | 0.046 | 19.3 | LOS B | 1.3 | 9.0 | 0.51 | 0.65 | 37.4 |
| 28 | T1 | 584 | 2.3 | 0.387 | 30.1 | LOS C | 13.1 | 93.6 | 0.76 | 0.66 | 40.2 |
| 29 | R2 | 44 | 0.8 | 0.387 | 72.2 | LOS E | 2.8 | 20.0 | 1.00 | 0.74 | 26.1 |
| Approach | | 673 | 2.1 | 0.387 | 32.1 | LOS C | 13.1 | 93.6 | 0.76 | 0.66 | 38.7 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 376 | 3.3 | 0.654 | 28.5 | LOS C | 14.6 | 104.7 | 0.82 | 0.91 | 36.0 |
| 31 | T1 | 46 | 0.0 | 0.654 | 27.1 | LOS C | 14.6 | 104.7 | 0.82 | 0.91 | 28.8 |
| 32 | R2 | 177 | 0.8 | 0.316 | 32.6 | LOS C | 7.6 | 53.6 | 0.72 | 0.75 | 36.2 |
| Approach | | 599 | 2.3 | 0.654 | 29.6 | LOS C | 14.6 | 104.7 | 0.79 | 0.87 | 36.9 |
| All Vehicles | | 2775 | 4.9 | 0.769 | 32.1 | LOS C | 28.5 | 213.4 | 0.79 | 0.76 | 37.3 |

## 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 70 | 1.0 | 0.046 | 6.0 | LOS A | 0.3 | 2.0 | 0.12 | 0.58 | 50.2 |
| 22 | T1 | 691 | 8.1 | 0.425 | 26.8 | LOS C | 14.9 | 111.8 | 0.74 | 0.64 | 41.7 |
| 23 | R2 | 108 | 0.9 | 0.423 | 61.9 | LOS E | 6.4 | 45.2 | 0.96 | 0.78 | 21.6 |
| Approach | | 869 | 6.7 | 0.425 | 29.5 | LOS C | 14.9 | 111.8 | 0.72 | 0.66 | 39.4 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 217 | 0.0 | 0.220 | 39.9 | LOS D | 5.6 | 39.3 | 0.80 | 0.71 | 26.0 |
| 25 | T1 | 16 | 0.0 | 0.220 | 37.9 | LOS D | 5.6 | 39.3 | 0.80 | 0.71 | 25.0 |
| 26 | R2 | 65 | 10.5 | 0.160 | 39.2 | LOS D | 3.1 | 23.6 | 0.79 | 0.68 | 26.1 |
| Approach | | 298 | 2.3 | 0.220 | 39.7 | LOS D | 5.6 | 39.3 | 0.80 | 0.70 | 25.9 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 96 | 1.3 | 0.098 | 18.1 | LOS B | 2.7 | 19.3 | 0.50 | 0.67 | 38.1 |
| 28 | T1 | 717 | 2.3 | 0.433 | 26.7 | LOS C | 15.8 | 112.9 | 0.74 | 0.64 | 41.7 |
| 29 | R2 | 33 | 0.8 | 0.129 | 59.0 | LOS E | 1.9 | 13.1 | 0.91 | 0.72 | 26.9 |
| Approach | | 848 | 2.1 | 0.433 | 27.0 | LOS C | 15.8 | 112.9 | 0.72 | 0.65 | 40.7 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 179 | 3.3 | 0.248 | 11.3 | LOS B | 3.6 | 26.2 | 0.50 | 0.67 | 46.2 |
| 31 | T1 | 13 | 0.0 | 0.248 | 9.8 | LOS A | 3.6 | 26.2 | 0.50 | 0.67 | 36.9 |
| 32 | R2 | 126 | 0.8 | 0.424 | 50.6 | LOS D | 6.9 | 48.7 | 0.89 | 0.79 | 30.8 |
| Approach | | 318 | 2.2 | 0.424 | 26.8 | LOS C | 6.9 | 48.7 | 0.66 | 0.72 | 38.2 |
| All Vehicles | | 2333 | 3.8 | 0.433 | 29.5 | LOS C | 15.8 | 112.9 | 0.72 | 0.67 | 38.0 |

## 2031 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 216 | 1.0 | 0.192 | 11.0 | LOS B | 4.4 | 30.8 | 0.35 | 0.66 | 47.1 |
| 22 | T1 | 597 | 8.1 | 0.581 | 49.4 | LOS D | 19.7 | 147.8 | 0.91 | 0.78 | 33.2 |
| 23 | R2 | 48 | 0.9 | 0.644 | 88.3 | LOS F | 3.7 | 26.4 | 1.00 | 0.78 | 17.2 |
| Approach | | 861 | 6.0 | 0.644 | 41.9 | LOS D | 19.7 | 147.8 | 0.78 | 0.75 | 34.7 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 69 | 0.0 | 0.162 | 17.7 | LOS B | 3.4 | 23.9 | 0.64 | 0.61 | 35.5 |
| 25 | T1 | 8 | 0.0 | 0.162 | 16.3 | LOS B | 3.4 | 23.9 | 0.64 | 0.61 | 33.3 |
| 26 | R2 | 18 | 10.5 | 0.041 | 37.2 | LOS D | 0.9 | 6.7 | 0.70 | 0.58 | 27.0 |
| Approach | | 115 | 1.6 | 0.162 | 20.7 | LOS C | 3.4 | 23.9 | 0.65 | 0.60 | 33.7 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 77 | 1.3 | 0.051 | 6.3 | LOS A | 0.5 | 3.3 | 0.14 | 0.58 | 47.6 |
| 28 | T1 | 1323 | 2.3 | 0.824 | 33.8 | LOS C | 43.1 | 307.3 | 0.86 | 0.79 | 38.6 |
| 29 | R2 | 252 | 0.8 | 0.684 | 50.0 | LOS D | 11.8 | 82.8 | 0.98 | 0.89 | 31.3 |
| Approach | | 1652 | 2.0 | 0.824 | 35.0 | LOS D | 43.1 | 307.3 | 0.84 | 0.79 | 37.4 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 114 | 3.3 | 0.249 | 20.9 | LOS C | 4.5 | 32.3 | 0.69 | 0.71 | 41.3 |
| 31 | T1 | 48 | 0.0 | 0.249 | 19.6 | LOS B | 4.5 | 32.3 | 0.69 | 0.71 | 32.0 |
| 32 | R2 | 165 | 0.8 | 0.829 | 82.6 | LOS F | 12.6 | 90.6 | 1.00 | 0.93 | 24.4 |
| Approach | | 327 | 1.6 | 0.829 | 51.9 | LOS D | 12.8 | 90.6 | 0.85 | 0.82 | 29.6 |
| All Vehicles | | 2955 | 3.1 | 0.829 | 38.3 | LOS D | 43.1 | 307.3 | 0.82 | 0.78 | 35.5 |

## 2031 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 149 | 1.0 | 0.112 | 7.3 | LOS A | 1.3 | 9.1 | 0.24 | 0.62 | 49.4 |
| 22 | T1 | 986 | 8.1 | 0.753 | 32.2 | LOS C | 24.1 | 180.7 | 0.91 | 0.82 | 39.3 |
| 23 | R2 | 128 | 0.9 | 0.581 | 33.1 | LOS C | 4.1 | 28.9 | 0.99 | 0.78 | 30.0 |
| Approach | | 1263 | 6.6 | 0.753 | 29.3 | LOS C | 24.1 | 180.7 | 0.84 | 0.79 | 39.5 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 153 | 0.0 | 0.204 | 7.8 | LOS A | 2.4 | 17.1 | 0.51 | 0.53 | 42.1 |
| 25 | T1 | 18 | 0.0 | 0.204 | 6.3 | LOS A | 2.4 | 17.1 | 0.51 | 0.53 | 39.1 |
| 26 | R2 | 122 | 10.5 | 0.227 | 26.2 | LOS C | 4.4 | 33.9 | 0.72 | 0.65 | 31.1 |
| Approach | | 293 | 4.4 | 0.227 | 15.3 | LOS B | 4.4 | 33.9 | 0.60 | 0.58 | 36.5 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 101 | 1.3 | 0.075 | 6.6 | LOS A | 0.6 | 4.4 | 0.19 | 0.60 | 47.3 |
| 28 | T1 | 462 | 2.3 | 0.482 | 38.5 | LOS D | 10.8 | 77.4 | 0.91 | 0.76 | 36.8 |
| 29 | R2 | 80 | 0.8 | 0.770 | 67.5 | LOS E | 4.7 | 33.1 | 1.00 | 0.86 | 27.2 |
| Approach | | 643 | 1.9 | 0.770 | 37.1 | LOS D | 10.8 | 77.4 | 0.81 | 0.75 | 35.9 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 243 | 3.3 | 0.389 | 17.7 | LOS B | 7.4 | 52.9 | 0.67 | 0.77 | 42.8 |
| 31 | T1 | 33 | 0.0 | 0.389 | 16.4 | LOS B | 7.4 | 52.9 | 0.67 | 0.77 | 33.4 |
| 32 | R2 | 138 | 0.8 | 0.740 | 60.7 | LOS E | 7.8 | 54.7 | 1.00 | 0.88 | 28.6 |
| Approach | | 414 | 2.2 | 0.740 | 31.9 | LOS C | 7.8 | 54.7 | 0.78 | 0.81 | 36.1 |
| All Vehicles | | 2613 | 4.5 | 0.770 | 30.1 | LOS C | 24.1 | 180.7 | 0.79 | 0.76 | 37.7 |

## 2031 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 112 | 1.0 | 0.144 | 22.5 | LOS C | 3.3 | 23.2 | 0.65 | 0.71 | 41.0 |
| 22 | T1 | 816 | 8.1 | 0.725 | 36.6 | LOS D | 19.4 | 145.4 | 0.96 | 0.85 | 37.5 |
| 23 | R2 | 175 | 0.9 | 0.758 | 57.9 | LOS E | 9.4 | 66.1 | 1.00 | 0.88 | 22.5 |
| Approach | | 1103 | 6.3 | 0.758 | 38.5 | LOS D | 19.4 | 145.4 | 0.93 | 0.84 | 35.4 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 276 | 0.0 | 0.316 | 7.5 | LOS A | 5.3 | 37.0 | 0.51 | 0.55 | 42.3 |
| 25 | T1 | 14 | 0.0 | 0.316 | 6.0 | LOS A | 5.3 | 37.0 | 0.51 | 0.55 | 39.2 |
| 26 | R2 | 12 | 10.5 | 0.023 | 23.0 | LOS C | 0.4 | 2.9 | 0.65 | 0.54 | 32.5 |
| Approach | | 302 | 0.4 | 0.316 | 8.0 | LOS A | 5.3 | 37.0 | 0.52 | 0.55 | 41.6 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 162 | 1.3 | 0.133 | 7.4 | LOS A | 1.4 | 10.2 | 0.26 | 0.62 | 46.6 |
| 28 | T1 | 654 | 2.3 | 0.575 | 33.9 | LOS C | 14.3 | 101.8 | 0.90 | 0.77 | 38.6 |
| 29 | R2 | 65 | 0.8 | 0.276 | 51.9 | LOS D | 3.1 | 21.9 | 0.95 | 0.75 | 30.8 |
| Approach | | 881 | 2.0 | 0.575 | 30.3 | LOS C | 14.3 | 101.8 | 0.79 | 0.74 | 38.6 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 107 | 3.3 | 0.215 | 19.9 | LOS B | 4.4 | 31.5 | 0.63 | 0.73 | 41.8 |
| 31 | T1 | 53 | 0.0 | 0.215 | 18.6 | LOS B | 4.4 | 31.5 | 0.63 | 0.73 | 32.5 |
| 32 | R2 | 116 | 0.8 | 0.693 | 58.6 | LOS E | 6.2 | 43.7 | 1.00 | 0.85 | 29.1 |
| Approach | | 276 | 1.6 | 0.693 | 35.9 | LOS D | 6.2 | 43.7 | 0.79 | 0.78 | 33.8 |
| All Vehicles | | 2562 | 3.6 | 0.758 | 31.8 | LOS C | 19.4 | 145.4 | 0.82 | 0.76 | 36.7 |

## 2031 Option AM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 249 | 1.0 | 0.174 | 7.4 | LOS A | 2.6 | 18.3 | 0.23 | 0.62 | 49.3 |
| 22 | T1 | 445 | 8.1 | 0.237 | 18.9 | LOS B | 7.7 | 58.0 | 0.60 | 0.51 | 45.8 |
| 23 | R2 | 8 | 0.9 | 0.030 | 56.7 | LOS E | 0.4 | 3.1 | 0.88 | 0.67 | 22.7 |
| Approach | | 702 | 5.5 | 0.237 | 15.2 | LOS B | 7.7 | 58.0 | 0.47 | 0.55 | 45.7 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 34 | 0.0 | 0.063 | 46.2 | LOS D | 1.3 | 8.8 | 0.83 | 0.65 | 24.3 |
| 25 | T1 | 15 | 0.0 | 0.063 | 44.2 | LOS D | 1.3 | 8.8 | 0.83 | 0.63 | 23.6 |
| 26 | R2 | 7 | 10.5 | 0.023 | 45.7 | LOS D | 0.4 | 2.7 | 0.82 | 0.61 | 24.3 |
| Approach | | 56 | 1.3 | 0.063 | 45.6 | LOS D | 1.3 | 8.8 | 0.83 | 0.64 | 24.1 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 24 | 1.3 | 0.020 | 12.2 | LOS B | 0.5 | 3.3 | 0.36 | 0.62 | 42.3 |
| 28 | T1 | 1197 | 2.3 | 0.680 | 24.4 | LOS C | 30.2 | 215.5 | 0.78 | 0.70 | 42.9 |
| 29 | R2 | 176 | 0.8 | 0.652 | 63.5 | LOS E | 10.8 | 76.2 | 1.00 | 0.82 | 27.9 |
| Approach | | 1397 | 2.1 | 0.680 | 29.1 | LOS C | 30.2 | 215.5 | 0.80 | 0.71 | 40.1 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 82 | 3.3 | 0.134 | 14.1 | LOS B | 1.9 | 13.3 | 0.56 | 0.66 | 44.6 |
| 31 | T1 | 10 | 0.0 | 0.134 | 12.7 | LOS B | 1.9 | 13.3 | 0.56 | 0.66 | 35.3 |
| 32 | R2 | 196 | 0.8 | 0.675 | 58.1 | LOS E | 11.9 | 83.7 | 0.98 | 0.84 | 29.0 |
| Approach | | 288 | 1.5 | 0.675 | 44.0 | LOS D | 11.9 | 83.7 | 0.85 | 0.79 | 32.4 |
| All Vehicles | | 2443 | 3.0 | 0.680 | 27.2 | LOS C | 30.2 | 215.5 | 0.71 | 0.67 | 40.2 |

## 2031 Option PM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 126 | 1.0 | 0.087 | 6.6 | LOS A | 0.9 | 6.5 | 0.18 | 0.60 | 49.8 |
| 22 | T1 | 887 | 8.1 | 0.592 | 31.1 | LOS C | 21.6 | 161.6 | 0.83 | 0.73 | 39.7 |
| 23 | R2 | 23 | 0.9 | 0.180 | 69.5 | LOS E | 1.4 | 10.1 | 0.97 | 0.71 | 20.1 |
| Approach | | 1036 | 7.1 | 0.592 | 29.0 | LOS C | 21.6 | 161.6 | 0.75 | 0.71 | 40.2 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 79 | 0.0 | 0.101 | 29.7 | LOS C | 3.0 | 20.9 | 0.68 | 0.63 | 29.5 |
| 25 | T1 | 66 | 0.0 | 0.101 | 27.7 | LOS C | 3.0 | 20.9 | 0.68 | 0.55 | 28.8 |
| 26 | R2 | 243 | 10.5 | 0.481 | 34.0 | LOS C | 11.4 | 87.2 | 0.79 | 0.73 | 27.8 |
| Approach | | 388 | 6.6 | 0.481 | 32.1 | LOS C | 11.4 | 87.2 | 0.75 | 0.68 | 28.3 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 54 | 1.3 | 0.050 | 18.7 | LOS B | 1.3 | 9.3 | 0.45 | 0.65 | 39.7 |
| 28 | T1 | 367 | 2.3 | 0.230 | 26.0 | LOS C | 7.4 | 52.8 | 0.69 | 0.57 | 42.1 |
| 29 | R2 | 76 | 0.8 | 0.594 | 72.5 | LOS E | 5.0 | 34.9 | 1.00 | 0.78 | 26.1 |
| Approach | | 497 | 2.0 | 0.594 | 32.0 | LOS C | 7.4 | 52.8 | 0.71 | 0.61 | 38.2 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 294 | 3.3 | 0.443 | 13.7 | LOS B | 7.8 | 56.2 | 0.63 | 0.74 | 44.8 |
| 31 | T1 | 7 | 0.0 | 0.443 | 12.3 | LOS B | 7.8 | 56.2 | 0.63 | 0.74 | 35.4 |
| 32 | R2 | 170 | 0.8 | 0.372 | 38.3 | LOS D | 6.1 | 56.8 | 0.79 | 0.77 | 34.3 |
| Approach | | 471 | 2.4 | 0.443 | 22.6 | LOS C | 6.1 | 56.8 | 0.69 | 0.75 | 40.2 |
| All Vehicles | | 2392 | 5.0 | 0.594 | 28.9 | LOS C | 21.6 | 161.6 | 0.73 | 0.69 | 38.1 |

## 2031 Option SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 56 | 1.0 | 0.039 | 6.5 | LOS A | 0.4 | 2.5 | 0.16 | 0.59 | 50.0 |
| 22 | T1 | 320 | 8.1 | 0.267 | 34.8 | LOS C | 7.5 | 55.8 | 0.78 | 0.65 | 38.2 |
| 23 | R2 | 38 | 0.9 | 0.167 | 61.5 | LOS E | 2.2 | 15.5 | 0.93 | 0.73 | 21.7 |
| Approach | | 414 | 6.5 | 0.267 | 33.4 | LOS C | 7.5 | 55.8 | 0.71 | 0.65 | 37.8 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 200 | 0.0 | 0.190 | 27.5 | LOS C | 6.0 | 41.8 | 0.67 | 0.64 | 30.5 |
| 25 | T1 | 97 | 0.0 | 0.190 | 25.5 | LOS C | 6.0 | 41.8 | 0.67 | 0.59 | 29.4 |
| 26 | R2 | 57 | 10.5 | 0.106 | 27.1 | LOS C | 2.2 | 16.9 | 0.65 | 0.61 | 30.4 |
| Approach | | 354 | 1.7 | 0.190 | 26.9 | LOS C | 6.0 | 41.8 | 0.67 | 0.62 | 30.2 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 79 | 1.3 | 0.055 | 6.1 | LOS A | 0.4 | 2.5 | 0.13 | 0.58 | 47.8 |
| 28 | T1 | 343 | 2.3 | 0.275 | 34.9 | LOS C | 8.0 | 57.2 | 0.79 | 0.65 | 38.2 |
| 29 | R2 | 61 | 0.8 | 0.268 | 62.4 | LOS E | 3.6 | 25.3 | 0.95 | 0.75 | 28.1 |
| Approach | | 483 | 1.9 | 0.276 | 33.6 | LOS C | 8.0 | 57.2 | 0.70 | 0.65 | 37.2 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 126 | 3.3 | 0.260 | 16.9 | LOS B | 4.1 | 28.9 | 0.64 | 0.70 | 43.4 |
| 31 | T1 | 67 | 0.0 | 0.260 | 15.4 | LOS B | 4.1 | 28.9 | 0.64 | 0.70 | 34.0 |
| 32 | R2 | 114 | 0.8 | 0.275 | 35.7 | LOS D | 5.1 | 36.0 | 0.74 | 0.75 | 35.2 |
| Approach | | 307 | 1.7 | 0.275 | 23.5 | LOS C | 5.1 | 36.0 | 0.68 | 0.72 | 38.2 |
| All Vehicles | | 1558 | 3.0 | 0.276 | 30.1 | LOS C | 8.0 | 57.2 | 0.69 | 0.66 | 36.2 |

## 1.4 Karrinyup Road and Francis Avenue

### 2013 Base AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 595 | 5.0 | 0.266 | 13.4 | LOS B | 8.9 | 64.7 | 0.51 | 0.45 | 49.0 |
| 6 | R2 | 266 | 0.9 | 0.781 | 63.8 | LOS E | 17.0 | 120.0 | 1.00 | 0.89 | 27.9 |
| Approach | | 861 | 3.7 | 0.781 | 29.0 | LOS C | 17.0 | 120.0 | 0.66 | 0.58 | 39.6 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 163 | 0.6 | 0.206 | 10.7 | LOS B | 3.8 | 26.5 | 0.42 | 0.65 | 46.4 |
| 9 | R2 | 135 | 2.1 | 0.436 | 68.0 | LOS E | 4.2 | 30.2 | 0.99 | 0.76 | 26.4 |
| Approach | | 298 | 1.3 | 0.436 | 36.7 | LOS D | 4.2 | 30.2 | 0.68 | 0.70 | 34.7 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 60 | 1.5 | 0.042 | 8.2 | LOS A | 0.7 | 5.3 | 0.24 | 0.60 | 48.6 |
| 11 | T1 | 1249 | 1.8 | 0.548 | 16.9 | LOS B | 23.5 | 166.9 | 0.65 | 0.59 | 46.7 |
| Approach | | 1309 | 1.8 | 0.548 | 16.5 | LOS B | 23.5 | 166.9 | 0.63 | 0.59 | 46.8 |
| All Vehicles | | 2468 | 2.4 | 0.781 | 23.3 | LOS C | 23.5 | 166.9 | 0.65 | 0.60 | 42.3 |

### 2021 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 627 | 5.0 | 0.313 | 18.0 | LOS B | 10.9 | 79.5 | 0.60 | 0.52 | 46.1 |
| 6 | R2 | 279 | 0.9 | 0.578 | 50.7 | LOS D | 15.4 | 108.9 | 0.93 | 0.83 | 31.0 |
| Approach | | 906 | 3.7 | 0.578 | 28.0 | LOS C | 15.4 | 108.9 | 0.70 | 0.61 | 40.0 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 137 | 0.6 | 0.155 | 10.9 | LOS B | 3.0 | 21.4 | 0.41 | 0.64 | 46.3 |
| 9 | R2 | 141 | 2.1 | 0.557 | 71.1 | LOS E | 4.6 | 32.6 | 1.00 | 0.77 | 25.8 |
| Approach | | 278 | 1.4 | 0.557 | 41.4 | LOS D | 4.6 | 32.6 | 0.71 | 0.70 | 33.1 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 60 | 1.5 | 0.043 | 8.1 | LOS A | 0.7 | 5.1 | 0.24 | 0.60 | 48.6 |
| 11 | T1 | 1202 | 1.8 | 0.591 | 22.0 | LOS C | 25.8 | 183.2 | 0.74 | 0.66 | 43.8 |
| Approach | | 1262 | 1.8 | 0.591 | 21.4 | LOS C | 25.8 | 183.2 | 0.71 | 0.66 | 44.0 |
| All Vehicles | | 2446 | 2.5 | 0.591 | 26.1 | LOS C | 25.8 | 183.2 | 0.71 | 0.65 | 40.9 |

### 2013 Base PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1324 | 1.5 | 0.691 | 27.5 | LOS C | 32.7 | 232.0 | 0.82 | 0.75 | 41.0 |
| 6 | R2 | 466 | 0.0 | 0.916 | 73.6 | LOS E | 35.4 | 247.9 | 1.00 | 0.99 | 26.0 |
| Approach | | 1790 | 1.1 | 0.916 | 39.5 | LOS D | 35.4 | 247.9 | 0.87 | 0.81 | 35.6 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 212 | 0.6 | 0.196 | 7.3 | LOS A | 3.1 | 21.9 | 0.29 | 0.60 | 48.5 |
| 9 | R2 | 278 | 1.0 | 0.783 | 74.4 | LOS E | 9.6 | 68.1 | 1.00 | 0.89 | 25.2 |
| Approach | | 490 | 0.8 | 0.783 | 45.4 | LOS D | 9.6 | 68.1 | 0.69 | 0.76 | 31.9 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 39 | 0.0 | 0.031 | 12.1 | LOS B | 0.8 | 5.6 | 0.34 | 0.61 | 46.2 |
| 11 | T1 | 766 | 1.3 | 0.399 | 22.6 | LOS C | 15.6 | 110.1 | 0.67 | 0.59 | 43.5 |
| Approach | | 805 | 1.2 | 0.399 | 22.1 | LOS C | 15.6 | 110.1 | 0.66 | 0.59 | 43.6 |
| All Vehicles | | 3085 | 1.1 | 0.916 | 35.9 | LOS D | 35.4 | 247.9 | 0.79 | 0.75 | 36.7 |

### 2021 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1330 | 5.0 | 0.763 | 30.4 | LOS C | 34.0 | 248.5 | 0.88 | 0.80 | 39.7 |
| 6 | R2 | 413 | 0.9 | 0.746 | 50.3 | LOS D | 23.9 | 168.3 | 0.97 | 0.87 | 31.1 |
| Approach | | 1743 | 4.0 | 0.763 | 35.1 | LOS D | 34.0 | 248.5 | 0.90 | 0.82 | 37.2 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 225 | 0.6 | 0.204 | 8.0 | LOS A | 3.7 | 25.9 | 0.32 | 0.61 | 48.1 |
| 9 | R2 | 263 | 2.1 | 0.719 | 69.6 | LOS E | 8.6 | 61.2 | 1.00 | 0.85 | 26.0 |
| Approach | | 488 | 1.4 | 0.719 | 41.2 | LOS D | 8.6 | 61.2 | 0.69 | 0.74 | 33.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 40 | 1.5 | 0.032 | 10.3 | LOS B | 0.7 | 4.7 | 0.31 | 0.61 | 47.2 |
| 11 | T1 | 790 | 1.8 | 0.444 | 25.1 | LOS C | 16.7 | 118.9 | 0.73 | 0.64 | 42.2 |
| Approach | | 830 | 1.8 | 0.444 | 24.4 | LOS C | 16.7 | 118.9 | 0.71 | 0.64 | 42.4 |
| All Vehicles | | 3061 | 3.0 | 0.763 | 33.2 | LOS C | 34.0 | 248.5 | 0.81 | 0.75 | 37.7 |

### 2013 Base SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 869 | 0.7 | 0.275 | 3.1 | LOS A | 6.6 | 46.7 | 0.26 | 0.23 | 57.0 |
| 6 | R2 | 488 | 0.2 | 0.807 | 53.0 | LOS D | 30.5 | 214.1 | 0.98 | 0.90 | 30.4 |
| Approach | | 1357 | 0.5 | 0.807 | 21.1 | LOS C | 30.5 | 214.1 | 0.52 | 0.47 | 43.2 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 428 | 0.2 | 0.407 | 15.1 | LOS B | 14.6 | 102.6 | 0.60 | 0.77 | 44.1 |
| 9 | R2 | 215 | 0.0 | 0.601 | 70.0 | LOS E | 7.1 | 49.4 | 1.00 | 0.79 | 26.0 |
| Approach | | 643 | 0.1 | 0.601 | 33.5 | LOS C | 14.6 | 102.6 | 0.74 | 0.78 | 35.9 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 45 | 0.9 | 0.037 | 12.0 | LOS B | 0.9 | 6.4 | 0.35 | 0.62 | 46.2 |
| 11 | T1 | 1008 | 1.3 | 0.588 | 29.9 | LOS C | 24.7 | 174.8 | 0.81 | 0.72 | 39.9 |
| Approach | | 1053 | 1.3 | 0.588 | 29.2 | LOS C | 24.7 | 174.8 | 0.79 | 0.72 | 40.2 |
| All Vehicles | | 3053 | 0.7 | 0.807 | 26.5 | LOS C | 30.5 | 214.1 | 0.66 | 0.62 | 40.4 |

### 2021 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 940 | 5.0 | 0.622 | 32.8 | LOS C | 23.3 | 170.3 | 0.85 | 0.75 | 38.7 |
| 6 | R2 | 438 | 0.9 | 0.643 | 41.9 | LOS D | 22.8 | 161.1 | 0.89 | 0.84 | 33.5 |
| Approach | | 1378 | 3.7 | 0.643 | 35.7 | LOS D | 23.3 | 170.3 | 0.86 | 0.78 | 36.8 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 433 | 0.6 | 0.394 | 15.1 | LOS B | 13.2 | 92.6 | 0.57 | 0.76 | 44.0 |
| 9 | R2 | 209 | 2.1 | 0.619 | 68.6 | LOS E | 6.7 | 47.6 | 1.00 | 0.80 | 26.2 |
| Approach | | 642 | 1.1 | 0.619 | 32.5 | LOS C | 13.2 | 92.6 | 0.71 | 0.78 | 36.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 43 | 1.5 | 0.036 | 10.0 | LOS A | 0.7 | 4.9 | 0.31 | 0.62 | 47.4 |
| 11 | T1 | 997 | 1.8 | 0.649 | 33.7 | LOS C | 25.5 | 181.2 | 0.87 | 0.77 | 38.3 |
| Approach | | 1040 | 1.8 | 0.649 | 32.7 | LOS C | 25.5 | 181.2 | 0.85 | 0.76 | 38.6 |
| All Vehicles | | 3060 | 2.5 | 0.649 | 34.0 | LOS C | 25.5 | 181.2 | 0.82 | 0.77 | 37.3 |

## 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 694 | 5.0 | 0.317 | 16.4 | LOS B | 12.3 | 89.5 | 0.55 | 0.48 | 47.1 |
| 6 | R2 | 243 | 0.9 | 0.273 | 53.5 | LOS D | 7.0 | 49.0 | 0.86 | 0.77 | 30.4 |
| Approach | | 937 | 3.9 | 0.317 | 26.0 | LOS C | 12.3 | 89.5 | 0.63 | 0.56 | 41.1 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 426 | 0.6 | 0.510 | 21.9 | LOS C | 19.7 | 138.7 | 0.77 | 0.88 | 40.8 |
| 9 | R2 | 31 | 2.1 | 0.154 | 77.9 | LOS E | 1.1 | 7.8 | 0.98 | 0.69 | 24.7 |
| Approach | | 457 | 0.7 | 0.510 | 25.7 | LOS C | 19.7 | 138.7 | 0.78 | 0.87 | 39.1 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 22 | 1.5 | 0.015 | 6.4 | LOS A | 0.1 | 1.0 | 0.14 | 0.58 | 49.8 |
| 11 | T1 | 1202 | 1.8 | 0.533 | 19.5 | LOS B | 25.2 | 178.0 | 0.66 | 0.59 | 45.2 |
| Approach | | 1224 | 1.8 | 0.533 | 19.3 | LOS B | 25.2 | 178.0 | 0.65 | 0.59 | 45.3 |
| All Vehicles | | 2618 | 2.4 | 0.533 | 22.8 | LOS C | 25.2 | 178.0 | 0.66 | 0.63 | 42.5 |

## 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1495 | 5.0 | 0.683 | 21.9 | LOS C | 35.3 | 257.8 | 0.74 | 0.68 | 43.9 |
| 6 | R2 | 234 | 0.9 | 0.263 | 53.3 | LOS D | 6.7 | 47.1 | 0.85 | 0.77 | 30.4 |
| Approach | | 1729 | 4.4 | 0.683 | 26.2 | LOS C | 35.3 | 257.8 | 0.76 | 0.69 | 41.4 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 587 | 0.6 | 0.567 | 9.3 | LOS A | 18.5 | 130.1 | 0.54 | 0.72 | 47.3 |
| 9 | R2 | 25 | 2.1 | 0.124 | 77.6 | LOS E | 0.9 | 6.2 | 0.98 | 0.68 | 24.8 |
| Approach | | 612 | 0.7 | 0.567 | 12.0 | LOS B | 18.5 | 130.1 | 0.56 | 0.72 | 45.6 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 97 | 1.5 | 0.064 | 6.4 | LOS A | 0.7 | 4.8 | 0.15 | 0.59 | 49.8 |
| 11 | T1 | 721 | 1.8 | 0.320 | 16.5 | LOS B | 12.8 | 90.3 | 0.55 | 0.49 | 47.0 |
| Approach | | 818 | 1.8 | 0.320 | 15.3 | LOS B | 12.8 | 90.3 | 0.51 | 0.50 | 47.3 |
| All Vehicles | | 3159 | 3.0 | 0.683 | 20.6 | LOS C | 35.3 | 257.8 | 0.65 | 0.65 | 43.6 |

## 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1394 | 5.0 | 0.695 | 23.6 | LOS C | 31.8 | 231.9 | 0.79 | 0.72 | 43.0 |
| 6 | R2 | 434 | 0.9 | 0.437 | 47.9 | LOS D | 11.4 | 80.4 | 0.88 | 0.80 | 31.9 |
| Approach | | 1828 | 4.0 | 0.695 | 29.4 | LOS C | 31.8 | 231.9 | 0.81 | 0.74 | 39.7 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 625 | 0.6 | 0.687 | 25.1 | LOS C | 24.3 | 171.1 | 0.83 | 0.97 | 39.4 |
| 9 | R2 | 37 | 2.1 | 0.164 | 69.6 | LOS E | 1.2 | 8.3 | 0.98 | 0.70 | 26.2 |
| Approach | | 662 | 0.7 | 0.687 | 27.5 | LOS C | 24.3 | 171.1 | 0.84 | 0.96 | 38.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 68 | 1.5 | 0.049 | 7.2 | LOS A | 0.6 | 4.6 | 0.20 | 0.60 | 49.2 |
| 11 | T1 | 1121 | 1.8 | 0.543 | 21.2 | LOS C | 22.9 | 161.9 | 0.71 | 0.64 | 44.3 |
| Approach | | 1189 | 1.8 | 0.543 | 20.4 | LOS C | 22.9 | 161.9 | 0.68 | 0.63 | 44.5 |
| All Vehicles | | 3679 | 2.7 | 0.696 | 26.2 | LOS C | 31.8 | 231.9 | 0.77 | 0.74 | 40.8 |

## 2031 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 750 | 5.0 | 0.380 | 19.3 | LOS B | 13.8 | 100.6 | 0.63 | 0.56 | 45.3 |
| 6 | R2 | 290 | 0.9 | 0.584 | 50.0 | LOS D | 16.0 | 112.7 | 0.92 | 0.83 | 31.2 |
| Approach | | 1040 | 3.9 | 0.584 | 27.9 | LOS C | 16.0 | 112.7 | 0.71 | 0.63 | 40.1 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 118 | 0.6 | 0.131 | 10.6 | LOS B | 2.5 | 17.5 | 0.39 | 0.63 | 46.5 |
| 9 | R2 | 148 | 2.1 | 0.584 | 71.4 | LOS E | 4.8 | 34.3 | 1.00 | 0.78 | 25.7 |
| Approach | | 266 | 1.4 | 0.584 | 44.4 | LOS D | 4.8 | 34.3 | 0.73 | 0.71 | 32.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 59 | 1.5 | 0.043 | 8.1 | LOS A | 0.7 | 5.0 | 0.24 | 0.60 | 48.6 |
| 11 | T1 | 1182 | 1.8 | 0.589 | 22.6 | LOS C | 25.5 | 181.6 | 0.74 | 0.67 | 43.5 |
| Approach | | 1241 | 1.8 | 0.589 | 21.9 | LOS C | 25.5 | 181.6 | 0.72 | 0.67 | 43.7 |
| All Vehicles | | 2547 | 2.6 | 0.589 | 26.7 | LOS C | 25.5 | 181.6 | 0.72 | 0.66 | 40.7 |

## 2031 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1210 | 5.0 | 0.718 | 30.7 | LOS C | 30.4 | 222.2 | 0.87 | 0.78 | 39.6 |
| 6 | R2 | 410 | 0.9 | 0.722 | 48.7 | LOS D | 23.1 | 163.3 | 0.95 | 0.86 | 31.6 |
| Approach | | 1620 | 4.0 | 0.722 | 35.3 | LOS D | 30.4 | 222.2 | 0.89 | 0.80 | 37.1 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 212 | 0.6 | 0.183 | 7.1 | LOS A | 2.9 | 20.3 | 0.28 | 0.60 | 48.6 |
| 9 | R2 | 275 | 2.1 | 0.698 | 68.2 | LOS E | 8.9 | 63.2 | 1.00 | 0.84 | 26.3 |
| Approach | | 487 | 1.5 | 0.698 | 41.6 | LOS D | 8.9 | 63.2 | 0.69 | 0.73 | 33.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 43 | 1.5 | 0.034 | 10.0 | LOS B | 0.7 | 4.9 | 0.31 | 0.61 | 47.4 |
| 11 | T1 | 687 | 1.8 | 0.400 | 25.7 | LOS C | 14.5 | 102.9 | 0.72 | 0.63 | 41.9 |
| Approach | | 730 | 1.8 | 0.400 | 24.8 | LOS C | 14.5 | 102.9 | 0.70 | 0.63 | 42.2 |
| All Vehicles | | 2837 | 3.0 | 0.722 | 33.7 | LOS C | 30.4 | 222.2 | 0.80 | 0.74 | 37.5 |

## 2031 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 963 | 5.0 | 0.663 | 34.9 | LOS C | 24.7 | 180.6 | 0.88 | 0.78 | 37.8 |
| 6 | R2 | 474 | 0.9 | 0.668 | 41.0 | LOS D | 24.7 | 174.5 | 0.89 | 0.85 | 33.8 |
| Approach | | 1437 | 3.6 | 0.668 | 36.9 | LOS D | 24.7 | 180.6 | 0.88 | 0.80 | 36.4 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 438 | 0.6 | 0.390 | 14.5 | LOS B | 12.9 | 90.6 | 0.55 | 0.75 | 44.4 |
| 9 | R2 | 219 | 2.1 | 0.648 | 69.1 | LOS E | 7.0 | 50.2 | 1.00 | 0.81 | 26.2 |
| Approach | | 657 | 1.1 | 0.648 | 32.7 | LOS C | 12.9 | 90.6 | 0.70 | 0.77 | 36.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 54 | 1.5 | 0.046 | 10.6 | LOS B | 0.9 | 6.6 | 0.33 | 0.62 | 47.0 |
| 11 | T1 | 968 | 1.8 | 0.656 | 35.1 | LOS D | 25.2 | 178.9 | 0.88 | 0.78 | 37.7 |
| Approach | | 1022 | 1.8 | 0.656 | 33.8 | LOS C | 25.2 | 178.9 | 0.85 | 0.77 | 38.1 |
| All Vehicles | | 3116 | 2.5 | 0.668 | 35.0 | LOS C | 25.2 | 180.6 | 0.83 | 0.79 | 36.9 |

## 2031 Option AM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 785 | 5.0 | 0.378 | 18.7 | LOS B | 14.8 | 107.8 | 0.60 | 0.53 | 45.7 |
| 6 | R2 | 198 | 0.9 | 0.215 | 50.1 | LOS D | 5.3 | 37.6 | 0.83 | 0.76 | 31.3 |
| Approach | | 983 | 4.2 | 0.378 | 25.0 | LOS C | 14.8 | 107.8 | 0.65 | 0.58 | 41.7 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 409 | 0.6 | 0.481 | 23.2 | LOS C | 17.7 | 124.4 | 0.75 | 0.89 | 40.2 |
| 9 | R2 | 150 | 2.1 | 0.574 | 75.7 | LOS E | 5.2 | 37.1 | 1.00 | 0.77 | 25.1 |
| Approach | | 559 | 1.0 | 0.574 | 37.3 | LOS D | 17.7 | 124.4 | 0.82 | 0.86 | 34.7 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 38 | 1.5 | 0.025 | 6.2 | LOS A | 0.2 | 1.5 | 0.13 | 0.58 | 49.9 |
| 11 | T1 | 1268 | 1.8 | 0.592 | 22.1 | LOS C | 28.2 | 199.3 | 0.72 | 0.65 | 43.8 |
| Approach | | 1306 | 1.8 | 0.592 | 21.7 | LOS C | 28.2 | 199.3 | 0.70 | 0.65 | 43.9 |
| All Vehicles | | 2848 | 2.5 | 0.592 | 25.9 | LOS C | 28.2 | 199.3 | 0.71 | 0.67 | 41.0 |

## 2031 Option PM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1431 | 5.0 | 0.654 | 21.4 | LOS C | 32.9 | 240.4 | 0.72 | 0.66 | 44.2 |
| 6 | R2 | 482 | 0.9 | 0.541 | 57.3 | LOS E | 14.9 | 105.0 | 0.93 | 0.82 | 29.5 |
| Approach | | 1913 | 4.0 | 0.654 | 30.4 | LOS C | 32.9 | 240.4 | 0.77 | 0.70 | 39.2 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 555 | 0.6 | 0.542 | 9.3 | LOS A | 16.7 | 117.6 | 0.52 | 0.71 | 47.3 |
| 9 | R2 | 110 | 2.1 | 0.545 | 80.6 | LOS F | 4.0 | 28.6 | 1.00 | 0.76 | 24.3 |
| Approach | | 665 | 0.9 | 0.545 | 21.1 | LOS C | 16.7 | 117.6 | 0.60 | 0.72 | 41.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 76 | 1.5 | 0.054 | 7.7 | LOS A | 0.9 | 6.4 | 0.21 | 0.60 | 48.9 |
| 11 | T1 | 741 | 1.8 | 0.329 | 16.5 | LOS B | 13.2 | 93.5 | 0.56 | 0.49 | 46.9 |
| Approach | | 817 | 1.8 | 0.329 | 15.8 | LOS B | 13.2 | 93.5 | 0.53 | 0.50 | 47.1 |
| All Vehicles | | 3395 | 2.8 | 0.654 | 25.1 | LOS C | 32.9 | 240.4 | 0.68 | 0.66 | 41.2 |

## 2031 Option SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 500 | 5.0 | 0.391 | 34.8 | LOS C | 11.9 | 87.0 | 0.81 | 0.69 | 37.9 |
| 6 | R2 | 554 | 0.9 | 0.434 | 40.6 | LOS D | 13.4 | 94.7 | 0.82 | 0.80 | 34.1 |
| Approach | | 1054 | 2.8 | 0.434 | 37.8 | LOS D | 13.4 | 94.7 | 0.81 | 0.75 | 35.7 |
| North: Francis Avenue (N) | | | | | | | | | | | |
| 7 | L2 | 721 | 0.6 | 0.567 | 14.9 | LOS B | 16.9 | 132.7 | 0.60 | 0.82 | 44.1 |
| 9 | R2 | 66 | 2.1 | 0.102 | 52.9 | LOS D | 1.8 | 12.5 | 0.87 | 0.71 | 29.9 |
| Approach | | 787 | 0.7 | 0.567 | 18.1 | LOS B | 18.9 | 132.7 | 0.62 | 0.81 | 42.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 104 | 1.5 | 0.081 | 7.8 | LOS A | 1.2 | 8.5 | 0.24 | 0.61 | 48.8 |
| 11 | T1 | 775 | 1.8 | 0.588 | 38.0 | LOS D | 20.1 | 141.9 | 0.88 | 0.77 | 36.7 |
| Approach | | 879 | 1.8 | 0.588 | 34.4 | LOS C | 20.1 | 141.9 | 0.81 | 0.75 | 37.8 |
| All Vehicles | | 2720 | 1.9 | 0.588 | 31.0 | LOS C | 20.1 | 141.9 | 0.75 | 0.77 | 38.2 |

## 1.5 Karrinyup Road and Huntriss Road

### 2013 Base AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 77 | 2.5 | 0.208 | 42.1 | LOS D | 5.6 | 40.0 | 0.79 | 0.71 | 33.4 |
| 2 | T1 | 38 | 3.5 | 0.208 | 37.5 | LOS D | 5.6 | 40.0 | 0.79 | 0.71 | 32.2 |
| 3 | R2 | 232 | 1.5 | 1.165 | 241.6 | LOS F | 32.3 | 229.0 | 1.00 | 1.56 | 11.9 |
| Approach | | 347 | 1.9 | 1.165 | 175.0 | LOS F | 32.3 | 229.0 | 0.93 | 1.28 | 15.0 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 355 | 4.0 | 0.648 | 44.1 | LOS D | 18.9 | 136.7 | 0.87 | 0.83 | 32.7 |
| 5 | T1 | 782 | 3.9 | 0.651 | 38.9 | LOS D | 22.8 | 164.8 | 0.89 | 0.77 | 36.6 |
| 6 | R2 | 16 | 2.0 | 0.053 | 56.3 | LOS E | 0.9 | 6.3 | 0.87 | 0.89 | 29.5 |
| Approach | | 1153 | 3.9 | 0.651 | 40.8 | LOS D | 22.8 | 164.8 | 0.88 | 0.79 | 35.2 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 216 | 1.5 | 0.535 | 48.2 | LOS D | 11.7 | 82.9 | 0.88 | 0.80 | 31.2 |
| 8 | T1 | 159 | 2.5 | 0.368 | 42.4 | LOS D | 8.9 | 63.9 | 0.85 | 0.71 | 31.6 |
| 9 | R2 | 11 | 1.5 | 0.368 | 47.0 | LOS D | 8.9 | 63.9 | 0.85 | 0.71 | 33.0 |
| Approach | | 386 | 1.9 | 0.535 | 45.8 | LOS D | 11.7 | 82.9 | 0.87 | 0.76 | 31.4 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 1.0 | 0.001 | 27.9 | LOS C | 0.0 | 0.3 | 0.58 | 0.60 | 38.3 |
| 11 | T1 | 1019 | 2.3 | 0.613 | 31.2 | LOS C | 25.4 | 181.3 | 0.83 | 0.74 | 39.7 |
| 12 | R2 | 261 | 3.0 | 0.566 | 52.6 | LOS D | 14.9 | 107.1 | 0.93 | 0.83 | 30.4 |
| Approach | | 1281 | 2.4 | 0.613 | 35.5 | LOS D | 25.4 | 181.3 | 0.85 | 0.76 | 37.4 |
| All Vehicles | | 3167 | 2.8 | 1.165 | 54.0 | LOS D | 32.3 | 229.0 | 0.87 | 0.83 | 30.9 |

### 2013 Base SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 250 | 0.9 | 0.673 | 48.3 | LOS D | 20.2 | 142.8 | 0.92 | 0.82 | 31.6 |
| 2 | T1 | 104 | 1.4 | 0.673 | 43.7 | LOS D | 20.2 | 142.8 | 0.92 | 0.82 | 30.5 |
| 3 | R2 | 339 | 1.8 | 1.527 | 561.7 | LOS F | 74.0 | 526.3 | 1.00 | 2.16 | 5.8 |
| Approach | | 693 | 1.4 | 1.527 | 298.7 | LOS F | 74.0 | 526.3 | 0.96 | 1.48 | 10.0 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 329 | 2.4 | 0.475 | 39.8 | LOS D | 16.5 | 117.7 | 0.81 | 0.81 | 34.0 |
| 5 | T1 | 1123 | 0.5 | 0.961 | 75.0 | LOS E | 47.7 | 335.0 | 0.94 | 1.12 | 26.9 |
| 6 | R2 | 202 | 0.0 | 0.828 | 75.0 | LOS E | 14.3 | 100.3 | 1.00 | 0.90 | 25.6 |
| Approach | | 1654 | 0.8 | 0.961 | 69.0 | LOS E | 47.7 | 335.0 | 0.92 | 1.03 | 27.9 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 205 | 3.4 | 0.451 | 48.8 | LOS D | 11.3 | 81.1 | 0.87 | 0.80 | 31.0 |
| 8 | T1 | 54 | 2.1 | 0.156 | 47.3 | LOS D | 3.2 | 22.8 | 0.85 | 0.67 | 30.3 |
| 9 | R2 | 5 | 0.0 | 0.156 | 51.9 | LOS D | 3.2 | 22.8 | 0.85 | 0.67 | 31.6 |
| Approach | | 264 | 3.1 | 0.451 | 48.6 | LOS D | 11.3 | 81.1 | 0.87 | 0.77 | 30.9 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 7.7 | 0.001 | 25.7 | LOS C | 0.0 | 0.3 | 0.54 | 0.60 | 39.1 |
| 11 | T1 | 1145 | 0.9 | 0.660 | 29.3 | LOS C | 30.3 | 213.5 | 0.82 | 0.73 | 40.5 |
| 12 | R2 | 217 | 0.6 | 0.536 | 56.8 | LOS E | 12.9 | 90.8 | 0.94 | 0.82 | 29.4 |
| Approach | | 1363 | 0.8 | 0.660 | 33.7 | LOS C | 30.3 | 213.5 | 0.84 | 0.75 | 38.2 |
| All Vehicles | | 3974 | 1.1 | 1.527 | 95.2 | LOS F | 74.0 | 526.3 | 0.89 | 0.99 | 23.0 |

### 2013 Base PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 371 | 2.0 | 1.040 | 154.0 | LOS F | 49.7 | 354.1 | 1.00 | 1.27 | 16.5 |
| 2 | T1 | 91 | 2.5 | 1.040 | 149.4 | LOS F | 49.7 | 354.1 | 1.00 | 1.27 | 16.2 |
| 3 | R2 | 389 | 0.4 | 1.317 | 370.7 | LOS F | 68.8 | 483.1 | 1.00 | 1.85 | 8.4 |
| Approach | | 851 | 1.3 | 1.317 | 252.6 | LOS F | 68.8 | 483.1 | 1.00 | 1.53 | 11.4 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 419 | 1.5 | 0.804 | 43.9 | LOS D | 22.9 | 162.3 | 0.84 | 0.86 | 32.8 |
| 5 | T1 | 1398 | 2.0 | 1.098 | 175.9 | LOS F | 96.2 | 685.0 | 1.00 | 1.62 | 15.4 |
| 6 | R2 | 68 | 0.5 | 0.189 | 54.3 | LOS D | 3.7 | 26.2 | 0.88 | 0.75 | 30.0 |
| Approach | | 1885 | 1.8 | 1.098 | 142.2 | LOS F | 96.2 | 685.0 | 0.96 | 1.42 | 17.9 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 123 | 1.4 | 0.242 | 44.8 | LOS D | 6.2 | 43.9 | 0.82 | 0.76 | 32.1 |
| 8 | T1 | 52 | 1.5 | 0.114 | 38.7 | LOS D | 2.7 | 19.2 | 0.78 | 0.61 | 32.7 |
| 9 | R2 | 4 | 1.0 | 0.114 | 43.2 | LOS D | 2.7 | 19.2 | 0.78 | 0.61 | 34.1 |
| Approach | | 179 | 1.4 | 0.242 | 43.0 | LOS D | 6.2 | 43.9 | 0.81 | 0.71 | 32.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 0.2 | 0.001 | 30.9 | LOS C | 0.0 | 0.3 | 0.62 | 0.60 | 37.1 |
| 11 | T1 | 860 | 1.2 | 0.562 | 33.5 | LOS C | 21.6 | 152.9 | 0.83 | 0.73 | 38.7 |
| 12 | R2 | 79 | 2.2 | 0.223 | 54.7 | LOS D | 4.4 | 31.1 | 0.88 | 0.76 | 29.9 |
| Approach | | 940 | 1.3 | 0.562 | 35.3 | LOS D | 21.6 | 152.9 | 0.84 | 0.74 | 37.8 |
| All Vehicles | | 3855 | 1.6 | 1.317 | 135.9 | LOS F | 96.2 | 685.0 | 0.93 | 1.24 | 18.3 |

### 2021 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 81 | 2.5 | 0.151 | 30.9 | LOS C | 4.4 | 31.4 | 0.67 | 0.68 | 37.1 |
| 2 | T1 | 29 | 3.5 | 0.151 | 26.4 | LOS C | 4.4 | 31.4 | 0.67 | 0.68 | 35.6 |
| 3 | R2 | 239 | 1.5 | 0.771 | 56.1 | LOS E | 15.1 | 107.3 | 0.98 | 0.91 | 29.5 |
| Approach | | 349 | 1.9 | 0.771 | 47.8 | LOS D | 15.1 | 107.3 | 0.88 | 0.84 | 31.4 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 337 | 4.0 | 0.663 | 46.8 | LOS D | 18.2 | 131.6 | 0.91 | 0.84 | 31.9 |
| 5 | T1 | 836 | 3.8 | 0.793 | 45.9 | LOS D | 27.1 | 196.3 | 0.95 | 0.88 | 34.3 |
| 6 | R2 | 17 | 2.0 | 0.201 | 73.8 | LOS E | 1.1 | 7.9 | 0.99 | 0.69 | 25.8 |
| Approach | | 1190 | 3.9 | 0.793 | 46.5 | LOS D | 27.1 | 196.3 | 0.94 | 0.86 | 33.4 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 195 | 1.5 | 0.308 | 36.9 | LOS D | 8.9 | 62.8 | 0.77 | 0.77 | 34.5 |
| 8 | T1 | 144 | 2.5 | 0.232 | 31.5 | LOS C | 6.7 | 48.0 | 0.74 | 0.62 | 35.0 |
| 9 | R2 | 8 | 1.5 | 0.232 | 36.0 | LOS D | 6.7 | 48.0 | 0.74 | 0.62 | 36.6 |
| Approach | | 347 | 1.9 | 0.308 | 34.6 | LOS C | 8.9 | 62.8 | 0.76 | 0.70 | 34.8 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 1.0 | 0.001 | 25.1 | LOS C | 0.0 | 0.2 | 0.55 | 0.60 | 39.4 |
| 11 | T1 | 915 | 2.3 | 0.516 | 26.2 | LOS C | 20.2 | 144.3 | 0.76 | 0.67 | 41.9 |
| 12 | R2 | 286 | 3.0 | 0.786 | 62.6 | LOS E | 18.2 | 130.9 | 1.00 | 0.89 | 28.1 |
| Approach | | 1202 | 2.4 | 0.786 | 34.9 | LOS C | 20.2 | 144.3 | 0.82 | 0.72 | 37.5 |
| All Vehicles | | 3088 | 2.9 | 0.793 | 40.8 | LOS D | 27.1 | 196.3 | 0.86 | 0.79 | 34.8 |

## 2021 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 364 | 2.5 | 0.656 | 31.3 | LOS C | 20.7 | 148.3 | 0.77 | 0.78 | 36.9 |
| 2 | T1 | 96 | 3.5 | 0.656 | 26.7 | LOS C | 20.7 | 148.3 | 0.77 | 0.78 | 35.4 |
| 3 | R2 | 402 | 1.5 | 1.073 | 167.8 | LOS F | 46.9 | 332.7 | 1.00 | 1.37 | 15.5 |
| Approach | | 862 | 2.1 | 1.073 | 94.5 | LOS F | 46.9 | 332.7 | 0.88 | 1.05 | 22.4 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 385 | 4.0 | 0.664 | 38.2 | LOS D | 18.7 | 135.5 | 0.83 | 0.82 | 34.6 |
| 5 | T1 | 1334 | 3.9 | 1.063 | 147.2 | LOS F | 82.3 | 594.8 | 1.00 | 1.51 | 17.6 |
| 6 | R2 | 70 | 2.0 | 0.710 | 76.6 | LOS E | 4.8 | 33.8 | 1.00 | 0.83 | 25.3 |
| Approach | | 1789 | 3.8 | 1.063 | 121.0 | LOS F | 82.3 | 594.8 | 0.96 | 1.34 | 19.9 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 134 | 1.5 | 0.176 | 29.9 | LOS C | 5.3 | 37.4 | 0.67 | 0.72 | 37.0 |
| 8 | T1 | 49 | 2.5 | 0.084 | 29.6 | LOS C | 2.2 | 15.7 | 0.70 | 0.55 | 35.5 |
| 9 | R2 | 4 | 1.5 | 0.084 | 34.2 | LOS C | 2.2 | 15.7 | 0.70 | 0.55 | 37.2 |
| Approach | | 187 | 1.8 | 0.176 | 30.0 | LOS C | 5.3 | 37.4 | 0.68 | 0.68 | 36.6 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 2 | 1.0 | 0.003 | 30.5 | LOS C | 0.1 | 0.5 | 0.62 | 0.61 | 37.2 |
| 11 | T1 | 859 | 2.3 | 0.570 | 33.0 | LOS C | 21.1 | 150.8 | 0.84 | 0.74 | 39.0 |
| 12 | R2 | 105 | 3.0 | 1.072 | 160.2 | LOS F | 11.0 | 79.0 | 1.00 | 1.21 | 16.0 |
| Approach | | 966 | 2.3 | 1.072 | 46.8 | LOS D | 21.1 | 150.8 | 0.86 | 0.79 | 33.7 |
| All Vehicles | | 3804 | 3.0 | 1.073 | 91.6 | LOS F | 82.3 | 594.8 | 0.90 | 1.10 | 23.5 |

## 2021 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 243 | 2.5 | 0.468 | 34.0 | LOS C | 16.1 | 115.6 | 0.78 | 0.76 | 36.1 |
| 2 | T1 | 111 | 3.5 | 0.468 | 29.4 | LOS C | 16.1 | 115.6 | 0.78 | 0.76 | 34.6 |
| 3 | R2 | 340 | 1.5 | 1.019 | 127.1 | LOS F | 34.5 | 244.4 | 1.00 | 1.25 | 18.8 |
| Approach | | 694 | 2.2 | 1.019 | 78.9 | LOS E | 34.5 | 244.4 | 0.89 | 1.00 | 24.7 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 299 | 4.0 | 0.439 | 37.9 | LOS D | 14.0 | 101.7 | 0.80 | 0.80 | 34.6 |
| 5 | T1 | 1159 | 3.9 | 1.001 | 109.3 | LOS F | 56.9 | 411.3 | 1.00 | 1.31 | 21.5 |
| 6 | R2 | 198 | 2.0 | 0.879 | 77.3 | LOS E | 14.0 | 100.0 | 1.00 | 0.95 | 25.2 |
| Approach | | 1656 | 3.7 | 1.001 | 92.6 | LOS F | 56.9 | 411.3 | 0.96 | 1.17 | 23.5 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 191 | 1.5 | 0.276 | 34.5 | LOS C | 8.3 | 59.0 | 0.74 | 0.76 | 35.4 |
| 8 | T1 | 52 | 2.5 | 0.116 | 34.4 | LOS C | 2.8 | 19.6 | 0.75 | 0.61 | 33.9 |
| 9 | R2 | 9 | 1.5 | 0.116 | 39.0 | LOS D | 2.8 | 19.6 | 0.75 | 0.61 | 35.4 |
| Approach | | 252 | 1.7 | 0.276 | 34.7 | LOS C | 8.3 | 59.0 | 0.74 | 0.72 | 35.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 1.0 | 0.001 | 33.1 | LOS C | 0.0 | 0.3 | 0.65 | 0.60 | 36.3 |
| 11 | T1 | 1141 | 2.3 | 0.869 | 48.7 | LOS D | 39.2 | 279.5 | 0.98 | 0.97 | 33.4 |
| 12 | R2 | 199 | 3.0 | 1.016 | 121.3 | LOS F | 18.2 | 131.0 | 1.00 | 1.13 | 19.3 |
| Approach | | 1341 | 2.4 | 1.016 | 59.5 | LOS E | 39.2 | 279.5 | 0.98 | 0.99 | 30.1 |
| All Vehicles | | 3943 | 2.8 | 1.019 | 75.2 | LOS E | 56.9 | 411.3 | 0.94 | 1.05 | 26.3 |

## 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 76 | 2.5 | 0.162 | 35.9 | LOS D | 4.4 | 31.7 | 0.73 | 0.70 | 35.3 |
| 2 | T1 | 26 | 3.5 | 0.162 | 31.3 | LOS C | 4.4 | 31.7 | 0.73 | 0.70 | 34.0 |
| 3 | R2 | 179 | 1.5 | 0.701 | 57.1 | LOS E | 11.0 | 78.1 | 0.97 | 0.87 | 29.2 |
| Approach | | 281 | 2.0 | 0.701 | 49.0 | LOS D | 11.0 | 78.1 | 0.88 | 0.80 | 31.1 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 284 | 4.0 | 0.375 | 31.7 | LOS C | 12.3 | 91.3 | 0.72 | 0.77 | 36.9 |
| 5 | T1 | 867 | 3.9 | 0.517 | 28.1 | LOS C | 19.7 | 141.4 | 0.78 | 0.68 | 41.1 |
| 6 | R2 | 13 | 2.0 | 0.058 | 60.2 | LOS E | 0.7 | 5.2 | 0.91 | 0.69 | 28.6 |
| Approach | | 1164 | 3.9 | 0.517 | 29.3 | LOS C | 19.7 | 141.4 | 0.76 | 0.71 | 39.8 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 181 | 1.5 | 0.338 | 42.4 | LOS D | 8.9 | 62.9 | 0.82 | 0.78 | 32.8 |
| 8 | T1 | 168 | 2.5 | 0.343 | 37.9 | LOS D | 8.9 | 63.5 | 0.82 | 0.69 | 33.0 |
| 9 | R2 | 13 | 1.5 | 0.343 | 42.4 | LOS D | 8.9 | 63.5 | 0.82 | 0.69 | 34.6 |
| Approach | | 362 | 2.0 | 0.343 | 40.3 | LOS D | 8.9 | 63.5 | 0.82 | 0.73 | 33.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 1.0 | 0.001 | 26.8 | LOS C | 0.0 | 0.2 | 0.57 | 0.60 | 38.7 |
| 11 | T1 | 1137 | 2.3 | 0.675 | 31.0 | LOS C | 28.4 | 203.0 | 0.86 | 0.77 | 39.8 |
| 12 | R2 | 300 | 3.0 | 0.670 | 66.7 | LOS E | 9.5 | 68.0 | 1.00 | 0.83 | 27.3 |
| Approach | | 1438 | 2.4 | 0.675 | 38.4 | LOS D | 28.4 | 203.0 | 0.89 | 0.78 | 36.3 |
| All Vehicles | | 3245 | 2.8 | 0.701 | 36.3 | LOS D | 28.4 | 203.0 | 0.84 | 0.75 | 36.5 |

## 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 515 | 2.5 | 0.740 | 30.9 | LOS C | 25.5 | 182.8 | 0.80 | 0.81 | 36.7 |
| 2 | T1 | 36 | 3.5 | 0.740 | 26.4 | LOS C | 25.5 | 182.8 | 0.80 | 0.81 | 35.3 |
| 3 | R2 | 122 | 1.5 | 0.387 | 48.4 | LOS D | 6.5 | 46.1 | 0.87 | 0.78 | 31.4 |
| Approach | | 673 | 2.4 | 0.740 | 33.9 | LOS C | 25.5 | 182.8 | 0.81 | 0.81 | 35.6 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 409 | 4.0 | 0.578 | 37.4 | LOS D | 20.5 | 151.2 | 0.83 | 0.82 | 34.8 |
| 5 | T1 | 1076 | 3.9 | 0.697 | 33.7 | LOS C | 28.3 | 203.1 | 0.88 | 0.79 | 38.6 |
| 6 | R2 | 35 | 2.0 | 0.414 | 75.1 | LOS E | 2.3 | 16.5 | 1.00 | 0.73 | 25.6 |
| Approach | | 1520 | 3.8 | 0.697 | 35.6 | LOS D | 28.3 | 203.1 | 0.87 | 0.80 | 37.1 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 149 | 1.5 | 0.199 | 30.9 | LOS C | 6.0 | 42.5 | 0.68 | 0.73 | 36.6 |
| 8 | T1 | 54 | 2.5 | 0.141 | 38.7 | LOS D | 3.0 | 21.6 | 0.80 | 0.64 | 32.7 |
| 9 | R2 | 9 | 1.5 | 0.141 | 43.2 | LOS D | 3.0 | 21.6 | 0.80 | 0.64 | 34.2 |
| Approach | | 212 | 1.8 | 0.199 | 33.4 | LOS C | 6.0 | 42.5 | 0.72 | 0.70 | 35.4 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 3 | 1.0 | 0.004 | 29.3 | LOS C | 0.1 | 0.8 | 0.61 | 0.62 | 37.7 |
| 11 | T1 | 1149 | 2.3 | 0.752 | 34.7 | LOS C | 31.5 | 224.9 | 0.91 | 0.81 | 38.2 |
| 12 | R2 | 124 | 3.0 | 0.739 | 78.5 | LOS E | 4.3 | 30.7 | 1.00 | 0.83 | 25.1 |
| Approach | | 1276 | 2.3 | 0.752 | 39.0 | LOS D | 31.5 | 224.9 | 0.92 | 0.82 | 36.4 |
| All Vehicles | | 3681 | 2.9 | 0.752 | 36.3 | LOS D | 31.5 | 224.9 | 0.87 | 0.80 | 36.5 |

## 2021 Option SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 314 | 2.5 | 0.687 | 40.3 | LOS D | 20.5 | 147.0 | 0.87 | 0.82 | 33.8 |
| 2 | T1 | 86 | 3.5 | 0.687 | 35.7 | LOS D | 20.5 | 147.0 | 0.87 | 0.82 | 32.6 |
| 3 | R2 | 207 | 1.5 | 0.953 | 94.7 | LOS F | 17.3 | 122.5 | 1.00 | 1.13 | 22.5 |
| Approach | | 607 | 2.3 | 0.953 | 56.2 | LOS E | 20.5 | 147.0 | 0.91 | 0.92 | 28.7 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 172 | 4.0 | 0.250 | 30.6 | LOS C | 7.5 | 57.4 | 0.68 | 0.73 | 37.4 |
| 5 | T1 | 1489 | 3.9 | 0.940 | 59.6 | LOS E | 58.8 | 422.0 | 0.98 | 1.08 | 30.3 |
| 6 | R2 | 115 | 2.0 | 0.907 | 84.9 | LOS F | 8.4 | 60.1 | 1.00 | 0.98 | 24.0 |
| Approach | | 1776 | 3.7 | 0.940 | 58.4 | LOS E | 58.8 | 422.0 | 0.95 | 1.04 | 30.4 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 210 | 1.5 | 0.473 | 46.8 | LOS D | 11.0 | 77.9 | 0.87 | 0.80 | 31.6 |
| 8 | T1 | 80 | 2.5 | 0.219 | 39.6 | LOS D | 5.1 | 36.4 | 0.82 | 0.68 | 32.3 |
| 9 | R2 | 24 | 1.5 | 0.219 | 44.1 | LOS D | 5.1 | 36.4 | 0.82 | 0.68 | 33.8 |
| Approach | | 314 | 1.8 | 0.473 | 44.7 | LOS D | 11.0 | 77.9 | 0.86 | 0.76 | 31.9 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 7 | 1.0 | 0.007 | 21.0 | LOS C | 0.2 | 1.4 | 0.49 | 0.53 | 41.2 |
| 11 | T1 | 1271 | 2.3 | 0.634 | 23.4 | LOS C | 28.4 | 202.5 | 0.77 | 0.70 | 43.4 |
| 12 | R2 | 376 | 3.0 | 0.896 | 58.7 | LOS E | 8.9 | 63.7 | 1.00 | 1.00 | 29.1 |
| Approach | | 1654 | 2.4 | 0.896 | 31.4 | LOS C | 28.4 | 202.5 | 0.82 | 0.77 | 39.0 |
| All Vehicles | | 4351 | 2.9 | 0.953 | 47.1 | LOS D | 58.8 | 422.0 | 0.89 | 0.90 | 33.0 |

## 2031 Do-minimum AM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 96 | 2.5 | 0.200 | 30.3 | LOS C | 6.1 | 43.4 | 0.68 | 0.67 | 37.5 |
| 2 | T1 | 56 | 3.5 | 0.200 | 25.7 | LOS C | 6.1 | 43.4 | 0.68 | 0.67 | 36.0 |
| 3 | R2 | 283 | 1.5 | 0.826 | 59.2 | LOS E | 18.9 | 134.3 | 0.99 | 0.96 | 28.8 |
| Approach | | 435 | 2.0 | 0.826 | 48.5 | LOS D | 18.9 | 134.3 | 0.88 | 0.86 | 31.2 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 365 | 4.0 | 0.675 | 42.9 | LOS D | 18.9 | 136.8 | 0.88 | 0.83 | 33.1 |
| 5 | T1 | 962 | 3.9 | 0.835 | 45.7 | LOS D | 32.8 | 237.5 | 0.94 | 0.91 | 34.3 |
| 6 | R2 | 25 | 2.0 | 0.296 | 74.5 | LOS E | 1.6 | 11.7 | 1.00 | 0.71 | 25.7 |
| Approach | | 1352 | 3.9 | 0.835 | 45.5 | LOS D | 32.8 | 237.5 | 0.93 | 0.88 | 33.8 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 211 | 1.5 | 0.311 | 34.2 | LOS C | 9.2 | 65.2 | 0.74 | 0.76 | 35.5 |
| 8 | T1 | 108 | 2.5 | 0.169 | 27.9 | LOS C | 4.8 | 34.4 | 0.69 | 0.58 | 36.1 |
| 9 | R2 | 9 | 1.5 | 0.169 | 32.5 | LOS C | 4.8 | 34.4 | 0.69 | 0.58 | 37.9 |
| Approach | | 328 | 1.8 | 0.311 | 32.1 | LOS C | 9.2 | 65.2 | 0.72 | 0.70 | 35.8 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 1.0 | 0.001 | 27.4 | LOS C | 0.0 | 0.2 | 0.58 | 0.60 | 38.5 |
| 11 | T1 | 1012 | 2.3 | 0.611 | 30.4 | LOS C | 24.5 | 175.0 | 0.83 | 0.74 | 40.0 |
| 12 | R2 | 196 | 3.0 | 0.824 | 71.8 | LOS E | 13.2 | 95.1 | 1.00 | 0.91 | 26.2 |
| Approach | | 1209 | 2.4 | 0.824 | 37.1 | LOS D | 24.5 | 175.0 | 0.86 | 0.77 | 36.9 |
| All Vehicles | | 3324 | 2.9 | 0.835 | 41.5 | LOS D | 32.8 | 237.5 | 0.88 | 0.82 | 34.6 |

## 2031 Do-minimum PM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 349 | 2.5 | 0.516 | 30.9 | LOS C | 19.3 | 138.6 | 0.76 | 0.77 | 37.0 |
| 2 | T1 | 98 | 3.5 | 0.516 | 26.3 | LOS C | 19.3 | 138.6 | 0.76 | 0.77 | 35.5 |
| 3 | R2 | 387 | 1.5 | 1.026 | 134.2 | LOS F | 40.6 | 287.9 | 1.00 | 1.26 | 18.1 |
| Approach | | 824 | 2.1 | 1.026 | 78.9 | LOS E | 40.6 | 287.9 | 0.87 | 1.00 | 24.8 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 422 | 4.0 | 0.785 | 41.2 | LOS D | 21.9 | 158.8 | 0.84 | 0.85 | 33.6 |
| 5 | T1 | 1288 | 3.9 | 1.027 | 122.2 | LOS F | 73.2 | 529.0 | 1.00 | 1.39 | 20.0 |
| 6 | R2 | 78 | 2.0 | 0.923 | 88.6 | LOS F | 5.8 | 41.5 | 1.00 | 0.98 | 23.4 |
| Approach | | 1788 | 3.8 | 1.027 | 101.6 | LOS F | 73.2 | 529.0 | 0.96 | 1.24 | 22.2 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 175 | 1.5 | 0.229 | 30.6 | LOS C | 7.1 | 50.1 | 0.69 | 0.74 | 36.7 |
| 8 | T1 | 52 | 2.5 | 0.076 | 26.8 | LOS C | 2.1 | 15.2 | 0.66 | 0.52 | 36.6 |
| 9 | R2 | 2 | 1.5 | 0.076 | 31.3 | LOS C | 2.1 | 15.2 | 0.66 | 0.52 | 38.4 |
| Approach | | 229 | 1.7 | 0.229 | 29.7 | LOS C | 7.1 | 50.1 | 0.68 | 0.69 | 36.7 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 2 | 1.0 | 0.003 | 29.9 | LOS C | 0.1 | 0.5 | 0.62 | 0.61 | 37.5 |
| 11 | T1 | 787 | 2.3 | 0.512 | 31.3 | LOS C | 18.6 | 133.0 | 0.81 | 0.71 | 39.6 |
| 12 | R2 | 78 | 3.0 | 0.929 | 89.7 | LOS F | 5.9 | 42.2 | 1.00 | 0.99 | 23.2 |
| Approach | | 867 | 2.3 | 0.929 | 36.6 | LOS D | 18.6 | 133.0 | 0.82 | 0.73 | 37.3 |
| All Vehicles | | 3708 | 3.0 | 1.027 | 76.9 | LOS E | 73.2 | 529.0 | 0.89 | 1.04 | 25.9 |

## 2031 Do-minimum SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 233 | 2.5 | 0.488 | 38.1 | LOS D | 17.1 | 122.8 | 0.81 | 0.77 | 34.7 |
| 2 | T1 | 114 | 3.5 | 0.488 | 33.5 | LOS C | 17.1 | 122.8 | 0.81 | 0.77 | 33.4 |
| 3 | R2 | 301 | 1.5 | 0.985 | 109.0 | LOS F | 28.7 | 203.6 | 1.00 | 1.18 | 20.7 |
| Approach | | 648 | 2.2 | 0.985 | 70.2 | LOS E | 28.7 | 203.6 | 0.90 | 0.96 | 26.3 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 281 | 4.0 | 0.375 | 34.7 | LOS C | 12.7 | 91.7 | 0.74 | 0.79 | 35.7 |
| 5 | T1 | 1268 | 3.9 | 0.997 | 90.5 | LOS F | 58.0 | 419.6 | 0.95 | 1.22 | 24.2 |
| 6 | R2 | 212 | 2.0 | 0.868 | 77.6 | LOS E | 15.4 | 109.4 | 1.00 | 0.94 | 25.2 |
| Approach | | 1761 | 3.7 | 0.997 | 80.0 | LOS F | 58.0 | 419.6 | 0.92 | 1.12 | 25.6 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 233 | 1.5 | 0.382 | 38.8 | LOS D | 11.2 | 79.5 | 0.79 | 0.78 | 34.0 |
| 8 | T1 | 56 | 2.5 | 0.115 | 36.1 | LOS D | 2.9 | 20.8 | 0.76 | 0.60 | 33.4 |
| 9 | R2 | 6 | 1.5 | 0.115 | 40.6 | LOS D | 2.9 | 20.8 | 0.76 | 0.60 | 34.9 |
| Approach | | 295 | 1.7 | 0.382 | 38.3 | LOS D | 11.2 | 79.5 | 0.78 | 0.74 | 33.9 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 1.0 | 0.001 | 32.7 | LOS C | 0.0 | 0.3 | 0.64 | 0.60 | 36.4 |
| 11 | T1 | 1175 | 2.3 | 0.856 | 46.6 | LOS D | 40.3 | 287.7 | 0.97 | 0.94 | 34.0 |
| 12 | R2 | 175 | 3.0 | 0.999 | 114.8 | LOS F | 15.8 | 113.1 | 1.00 | 1.10 | 20.0 |
| Approach | | 1351 | 2.3 | 0.999 | 55.5 | LOS E | 40.3 | 287.7 | 0.97 | 0.96 | 31.2 |
| All Vehicles | | 4055 | 2.8 | 0.999 | 67.2 | LOS E | 58.0 | 419.6 | 0.92 | 1.01 | 27.9 |

## 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 56 | 2.5 | 0.242 | 46.8 | LOS D | 5.5 | 39.4 | 0.84 | 0.72 | 32.3 |
| 2 | T1 | 52 | 3.5 | 0.242 | 42.2 | LOS D | 5.5 | 39.4 | 0.84 | 0.72 | 31.1 |
| 3 | R2 | 123 | 1.5 | 0.611 | 61.4 | LOS E | 7.6 | 53.6 | 0.98 | 0.82 | 28.3 |
| Approach | | 231 | 2.2 | 0.611 | 53.5 | LOS D | 7.6 | 53.6 | 0.92 | 0.77 | 29.8 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 476 | 4.0 | 0.497 | 26.2 | LOS C | 18.9 | 137.1 | 0.69 | 0.79 | 39.0 |
| 5 | T1 | 977 | 3.9 | 0.490 | 20.4 | LOS C | 19.6 | 141.5 | 0.68 | 0.61 | 45.0 |
| 6 | R2 | 17 | 2.0 | 0.086 | 62.7 | LOS E | 1.0 | 7.0 | 0.93 | 0.70 | 28.0 |
| Approach | | 1470 | 3.9 | 0.497 | 22.7 | LOS C | 19.6 | 141.5 | 0.68 | 0.67 | 42.6 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 144 | 1.5 | 0.351 | 50.6 | LOS D | 7.7 | 54.8 | 0.89 | 0.78 | 30.6 |
| 8 | T1 | 133 | 2.5 | 0.412 | 47.6 | LOS D | 8.6 | 61.3 | 0.91 | 0.75 | 30.3 |
| 9 | R2 | 23 | 1.5 | 0.412 | 52.2 | LOS D | 8.6 | 61.3 | 0.91 | 0.75 | 31.6 |
| Approach | | 300 | 1.9 | 0.412 | 49.4 | LOS D | 8.6 | 61.3 | 0.90 | 0.77 | 30.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 1.0 | 0.001 | 20.3 | LOS C | 0.0 | 0.2 | 0.48 | 0.59 | 41.6 |
| 11 | T1 | 1261 | 2.3 | 0.648 | 22.5 | LOS C | 29.5 | 210.5 | 0.76 | 0.68 | 43.8 |
| 12 | R2 | 227 | 3.0 | 0.580 | 67.1 | LOS E | 7.1 | 50.9 | 1.00 | 0.79 | 27.2 |
| Approach | | 1489 | 2.4 | 0.648 | 29.4 | LOS C | 29.5 | 210.5 | 0.79 | 0.70 | 40.1 |
| All Vehicles | | 3490 | 3.0 | 0.648 | 29.9 | LOS C | 29.5 | 210.5 | 0.76 | 0.70 | 39.1 |

## 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 251 | 2.5 | 0.535 | 43.9 | LOS D | 15.9 | 113.8 | 0.88 | 0.81 | 32.7 |
| 2 | T1 | 54 | 3.5 | 0.535 | 39.4 | LOS D | 15.9 | 113.8 | 0.88 | 0.81 | 31.5 |
| 3 | R2 | 167 | 1.5 | 0.782 | 67.8 | LOS E | 11.1 | 78.8 | 1.00 | 0.91 | 26.9 |
| Approach | | 472 | 2.3 | 0.782 | 51.9 | LOS D | 15.9 | 113.8 | 0.92 | 0.85 | 30.3 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 341 | 4.0 | 0.366 | 22.7 | LOS C | 12.5 | 93.5 | 0.60 | 0.74 | 40.6 |
| 5 | T1 | 1635 | 3.8 | 0.760 | 23.7 | LOS C | 40.6 | 290.9 | 0.84 | 0.77 | 43.2 |
| 6 | R2 | 46 | 2.0 | 0.544 | 76.0 | LOS E | 3.1 | 21.9 | 1.00 | 0.75 | 25.4 |
| Approach | | 2022 | 3.8 | 0.760 | 24.7 | LOS C | 40.6 | 290.9 | 0.80 | 0.76 | 42.1 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 108 | 1.5 | 0.225 | 45.0 | LOS D | 5.4 | 38.0 | 0.83 | 0.76 | 32.1 |
| 8 | T1 | 55 | 2.5 | 0.229 | 49.9 | LOS D | 3.8 | 27.1 | 0.90 | 0.71 | 29.6 |
| 9 | R2 | 14 | 1.5 | 0.229 | 54.5 | LOS D | 3.8 | 27.1 | 0.90 | 0.71 | 30.9 |
| Approach | | 177 | 1.8 | 0.229 | 47.3 | LOS D | 5.4 | 38.0 | 0.85 | 0.74 | 31.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 1.0 | 0.001 | 18.9 | LOS B | 0.0 | 0.2 | 0.46 | 0.59 | 42.2 |
| 11 | T1 | 1213 | 2.3 | 0.570 | 20.0 | LOS B | 24.7 | 175.9 | 0.70 | 0.64 | 45.2 |
| 12 | R2 | 51 | 3.0 | 0.304 | 74.6 | LOS E | 1.7 | 12.0 | 1.00 | 0.71 | 25.8 |
| Approach | | 1265 | 2.3 | 0.570 | 22.2 | LOS C | 24.7 | 175.9 | 0.72 | 0.64 | 43.9 |
| All Vehicles | | 3936 | 3.1 | 0.782 | 28.2 | LOS C | 40.6 | 290.9 | 0.79 | 0.73 | 40.1 |

## 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Huntriss Road (S) | | | | | | | | | | | |
| 1 | L2 | 116 | 2.5 | 0.640 | 50.6 | LOS D | 17.3 | 124.2 | 0.94 | 0.82 | 31.5 |
| 2 | T1 | 190 | 3.5 | 0.640 | 46.0 | LOS D | 17.3 | 124.2 | 0.94 | 0.82 | 30.4 |
| 3 | R2 | 127 | 1.5 | 0.699 | 65.6 | LOS E | 8.2 | 58.1 | 1.00 | 0.87 | 27.4 |
| Approach | | 433 | 2.6 | 0.699 | 53.0 | LOS D | 17.3 | 124.2 | 0.96 | 0.83 | 29.7 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 468 | 4.0 | 0.570 | 32.2 | LOS C | 21.7 | 159.8 | 0.78 | 0.82 | 36.7 |
| 5 | T1 | 990 | 3.9 | 0.608 | 26.3 | LOS C | 25.4 | 181.9 | 0.77 | 0.69 | 41.9 |
| 6 | R2 | 192 | 2.0 | 0.717 | 65.3 | LOS E | 12.1 | 86.3 | 1.00 | 0.85 | 27.5 |
| Approach | | 1650 | 3.7 | 0.717 | 32.5 | LOS C | 25.4 | 181.9 | 0.80 | 0.74 | 38.0 |
| North: Huntriss Road (N) | | | | | | | | | | | |
| 7 | L2 | 192 | 1.5 | 0.476 | 49.1 | LOS D | 10.3 | 72.9 | 0.89 | 0.80 | 31.0 |
| 8 | T1 | 112 | 2.5 | 0.360 | 49.5 | LOS D | 6.9 | 49.2 | 0.91 | 0.74 | 29.9 |
| 9 | R2 | 12 | 1.5 | 0.360 | 54.0 | LOS D | 6.9 | 49.2 | 0.91 | 0.74 | 31.1 |
| Approach | | 316 | 1.9 | 0.476 | 49.4 | LOS D | 10.3 | 72.9 | 0.90 | 0.77 | 30.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 1 | 1.0 | 0.001 | 24.5 | LOS C | 0.0 | 0.2 | 0.54 | 0.60 | 39.7 |
| 11 | T1 | 1232 | 2.3 | 0.709 | 28.7 | LOS C | 31.8 | 227.1 | 0.84 | 0.76 | 40.8 |
| 12 | R2 | 181 | 3.0 | 0.341 | 60.2 | LOS E | 5.3 | 37.7 | 0.94 | 0.77 | 28.7 |
| Approach | | 1414 | 2.3 | 0.709 | 32.7 | LOS C | 31.8 | 227.1 | 0.86 | 0.76 | 38.7 |
| All Vehicles | | 3813 | 2.9 | 0.717 | 36.3 | LOS D | 31.8 | 227.1 | 0.85 | 0.76 | 36.4 |

## 1.6 Karrinyup Road and North Beach Road

### 2013 Base AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 874 | 3.4 | 0.389 | 13.0 | LOS B | 12.5 | 90.1 | 0.57 | 0.51 | 47.5 |
| 6 | R2 | 133 | 3.0 | 0.585 | 57.2 | LOS E | 7.1 | 51.1 | 0.99 | 0.80 | 26.2 |
| Approach | | 1007 | 3.3 | 0.585 | 18.8 | LOS B | 12.5 | 90.1 | 0.63 | 0.54 | 42.9 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 285 | 2.5 | 0.324 | 23.5 | LOS C | 9.4 | 67.5 | 0.65 | 0.75 | 36.7 |
| 9 | R2 | 402 | 2.5 | 0.780 | 45.0 | LOS D | 20.7 | 148.0 | 0.95 | 0.89 | 32.1 |
| Approach | | 687 | 2.5 | 0.780 | 36.1 | LOS D | 20.7 | 148.0 | 0.83 | 0.83 | 33.7 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 291 | 1.0 | 0.206 | 9.3 | LOS A | 4.3 | 30.2 | 0.30 | 0.66 | 47.5 |
| 11 | T1 | 1183 | 1.8 | 0.748 | 30.1 | LOS C | 27.4 | 194.9 | 0.91 | 0.82 | 37.3 |
| Approach | | 1474 | 1.6 | 0.748 | 26.0 | LOS C | 27.4 | 194.9 | 0.79 | 0.79 | 39.3 |
| All Vehicles | | 3168 | 2.3 | 0.780 | 25.9 | LOS C | 27.4 | 194.9 | 0.75 | 0.72 | 38.7 |

### 2013 Base PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1634 | 1.5 | 0.634 | 13.4 | LOS B | 29.7 | 210.8 | 0.63 | 0.58 | 47.2 |
| 6 | R2 | 231 | 0.5 | 0.568 | 31.7 | LOS C | 7.8 | 54.9 | 0.94 | 0.81 | 33.8 |
| Approach | | 1865 | 1.3 | 0.834 | 15.7 | LOS B | 29.7 | 210.8 | 0.67 | 0.61 | 45.0 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 168 | 1.0 | 0.165 | 19.8 | LOS B | 5.2 | 36.7 | 0.52 | 0.69 | 38.5 |
| 9 | R2 | 365 | 1.0 | 0.916 | 74.1 | LOS E | 27.0 | 190.4 | 1.00 | 1.01 | 25.6 |
| Approach | | 533 | 1.0 | 0.916 | 57.0 | LOS E | 27.0 | 190.4 | 0.85 | 0.91 | 28.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 379 | 0.4 | 0.342 | 12.9 | LOS B | 7.0 | 49.3 | 0.54 | 0.73 | 45.4 |
| 11 | T1 | 1053 | 1.2 | 0.784 | 41.3 | LOS D | 31.3 | 221.5 | 0.95 | 0.86 | 32.7 |
| Approach | | 1432 | 1.0 | 0.784 | 33.8 | LOS C | 31.3 | 221.5 | 0.84 | 0.83 | 35.8 |
| All Vehicles | | 3830 | 1.1 | 0.916 | 28.2 | LOS C | 31.3 | 221.5 | 0.76 | 0.73 | 37.8 |

### 2013 Base SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1519 | 0.6 | 0.608 | 12.4 | LOS B | 23.9 | 168.4 | 0.64 | 0.58 | 47.9 |
| 6 | R2 | 241 | 1.9 | 0.867 | 65.4 | LOS E | 14.7 | 104.6 | 1.00 | 0.95 | 24.4 |
| Approach | | 1760 | 0.8 | 0.867 | 19.7 | LOS B | 23.9 | 168.4 | 0.69 | 0.63 | 42.3 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 55 | 1.6 | 0.066 | 22.6 | LOS C | 1.7 | 11.7 | 0.59 | 0.68 | 37.1 |
| 9 | R2 | 387 | 0.9 | 0.849 | 55.2 | LOS E | 22.5 | 158.7 | 1.00 | 0.95 | 29.5 |
| Approach | | 442 | 1.0 | 0.849 | 51.1 | LOS D | 22.5 | 158.7 | 0.95 | 0.92 | 30.1 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 242 | 0.6 | 0.177 | 10.1 | LOS B | 3.8 | 27.0 | 0.32 | 0.67 | 47.0 |
| 11 | T1 | 1450 | 0.8 | 0.894 | 42.1 | LOS D | 44.7 | 315.1 | 0.97 | 1.01 | 32.4 |
| Approach | | 1692 | 0.7 | 0.894 | 37.5 | LOS D | 44.7 | 315.1 | 0.88 | 0.96 | 34.2 |
| All Vehicles | | 3894 | 0.8 | 0.894 | 31.0 | LOS C | 44.7 | 315.1 | 0.80 | 0.81 | 36.8 |

### 2021 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 918 | 3.4 | 0.422 | 12.9 | LOS B | 12.5 | 90.2 | 0.61 | 0.54 | 47.5 |
| 6 | R2 | 178 | 3.0 | 0.753 | 55.0 | LOS E | 9.1 | 65.1 | 1.00 | 0.88 | 26.7 |
| Approach | | 1096 | 3.3 | 0.753 | 19.8 | LOS B | 12.5 | 90.2 | 0.67 | 0.59 | 42.2 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 277 | 2.5 | 0.410 | 29.8 | LOS C | 10.0 | 71.8 | 0.79 | 0.78 | 34.1 |
| 9 | R2 | 415 | 2.5 | 0.734 | 39.0 | LOS D | 18.6 | 133.2 | 0.95 | 0.87 | 33.9 |
| Approach | | 692 | 2.5 | 0.734 | 35.3 | LOS D | 18.6 | 133.2 | 0.89 | 0.83 | 34.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 306 | 1.0 | 0.286 | 16.8 | LOS B | 7.4 | 52.3 | 0.54 | 0.73 | 43.3 |
| 11 | T1 | 1091 | 1.8 | 0.745 | 29.3 | LOS C | 23.3 | 165.2 | 0.93 | 0.83 | 37.7 |
| Approach | | 1397 | 1.6 | 0.745 | 26.6 | LOS C | 23.3 | 165.2 | 0.84 | 0.81 | 39.0 |
| All Vehicles | | 3185 | 2.4 | 0.753 | 28.1 | LOS C | 23.3 | 165.2 | 0.79 | 0.74 | 38.6 |

### 2021 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1573 | 3.4 | 0.665 | 13.1 | LOS B | 24.5 | 176.6 | 0.70 | 0.64 | 47.4 |
| 6 | R2 | 206 | 3.0 | 0.708 | 51.1 | LOS D | 10.1 | 72.3 | 1.00 | 0.86 | 27.7 |
| Approach | | 1779 | 3.3 | 0.708 | 17.5 | LOS B | 24.5 | 176.6 | 0.73 | 0.67 | 43.8 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 178 | 2.5 | 0.279 | 29.8 | LOS C | 6.2 | 44.7 | 0.76 | 0.76 | 34.1 |
| 9 | R2 | 327 | 2.5 | 0.689 | 41.4 | LOS D | 14.7 | 105.2 | 0.96 | 0.85 | 33.2 |
| Approach | | 505 | 2.5 | 0.689 | 37.3 | LOS D | 14.7 | 105.2 | 0.89 | 0.82 | 33.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 406 | 1.0 | 0.393 | 18.8 | LOS B | 11.1 | 78.0 | 0.61 | 0.76 | 42.3 |
| 11 | T1 | 1074 | 1.8 | 0.696 | 26.8 | LOS C | 21.8 | 154.8 | 0.89 | 0.79 | 38.9 |
| Approach | | 1480 | 1.5 | 0.696 | 24.6 | LOS C | 21.8 | 154.8 | 0.81 | 0.78 | 39.9 |
| All Vehicles | | 3764 | 2.5 | 0.708 | 22.9 | LOS C | 24.5 | 176.6 | 0.79 | 0.73 | 40.4 |

### 2021 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1511 | 3.4 | 0.619 | 11.4 | LOS B | 21.7 | 156.2 | 0.65 | 0.59 | 48.8 |
| 6 | R2 | 213 | 3.0 | 0.837 | 58.3 | LOS E | 11.4 | 82.0 | 1.00 | 0.94 | 25.9 |
| Approach | | 1724 | 3.3 | 0.837 | 17.2 | LOS B | 21.7 | 156.2 | 0.69 | 0.63 | 44.0 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 82 | 2.5 | 0.145 | 31.4 | LOS C | 2.9 | 20.8 | 0.76 | 0.73 | 33.5 |
| 9 | R2 | 382 | 2.5 | 0.872 | 54.2 | LOS D | 20.9 | 149.7 | 1.00 | 0.98 | 29.7 |
| Approach | | 464 | 2.5 | 0.872 | 50.2 | LOS D | 20.9 | 149.7 | 0.96 | 0.94 | 30.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 268 | 1.0 | 0.255 | 17.0 | LOS B | 6.5 | 45.8 | 0.54 | 0.73 | 43.2 |
| 11 | T1 | 1418 | 1.8 | 0.855 | 33.2 | LOS C | 35.6 | 252.6 | 0.96 | 0.95 | 35.9 |
| Approach | | 1686 | 1.6 | 0.855 | 30.7 | LOS C | 35.6 | 252.6 | 0.89 | 0.92 | 37.0 |
| All Vehicles | | 3874 | 2.5 | 0.872 | 27.0 | LOS C | 35.6 | 252.6 | 0.81 | 0.79 | 38.4 |

## 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 929 | 3.4 | 0.389 | 10.1 | LOS B | 11.1 | 79.8 | 0.54 | 0.48 | 49.6 |
| 6 | R2 | 178 | 3.0 | 0.816 | 35.8 | LOS D | 5.9 | 42.0 | 1.00 | 0.90 | 32.3 |
| Approach | | 1107 | 3.3 | 0.816 | 14.2 | LOS B | 11.1 | 79.8 | 0.61 | 0.54 | 45.8 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 346 | 2.5 | 0.612 | 24.1 | LOS C | 10.6 | 75.8 | 0.90 | 0.82 | 36.4 |
| 9 | R2 | 390 | 2.5 | 0.822 | 47.8 | LOS D | 19.8 | 141.6 | 1.00 | 0.94 | 31.4 |
| Approach | | 736 | 2.5 | 0.822 | 36.7 | LOS D | 19.8 | 141.6 | 0.96 | 0.88 | 33.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 325 | 1.0 | 0.383 | 16.3 | LOS B | 7.0 | 49.6 | 0.70 | 0.77 | 43.5 |
| 11 | T1 | 1169 | 1.8 | 0.798 | 32.3 | LOS C | 26.8 | 190.1 | 0.96 | 0.90 | 36.3 |
| Approach | | 1494 | 1.6 | 0.798 | 28.8 | LOS C | 26.8 | 190.1 | 0.90 | 0.87 | 37.9 |
| All Vehicles | | 3337 | 2.4 | 0.822 | 25.7 | LOS C | 26.8 | 190.1 | 0.82 | 0.76 | 38.7 |

## 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1362 | 3.4 | 0.499 | 6.9 | LOS A | 14.6 | 104.7 | 0.48 | 0.44 | 52.7 |
| 6 | R2 | 244 | 3.0 | 0.746 | 31.8 | LOS C | 8.1 | 58.4 | 1.00 | 0.86 | 33.7 |
| Approach | | 1606 | 3.3 | 0.746 | 10.7 | LOS B | 14.6 | 104.7 | 0.56 | 0.50 | 48.5 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 199 | 2.5 | 0.390 | 24.3 | LOS C | 5.9 | 42.1 | 0.85 | 0.78 | 36.4 |
| 9 | R2 | 214 | 2.5 | 0.690 | 48.6 | LOS D | 10.3 | 73.6 | 0.99 | 0.85 | 31.1 |
| Approach | | 413 | 2.5 | 0.690 | 37.0 | LOS D | 10.3 | 73.6 | 0.93 | 0.82 | 33.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 322 | 1.0 | 0.426 | 18.7 | LOS B | 7.9 | 55.6 | 0.76 | 0.78 | 42.3 |
| 11 | T1 | 1202 | 1.8 | 0.760 | 27.8 | LOS C | 25.5 | 181.0 | 0.92 | 0.83 | 38.4 |
| Approach | | 1524 | 1.6 | 0.760 | 25.9 | LOS C | 25.5 | 181.0 | 0.89 | 0.82 | 39.3 |
| All Vehicles | | 3543 | 2.5 | 0.760 | 20.3 | LOS C | 25.5 | 181.0 | 0.74 | 0.68 | 41.8 |

## 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1709 | 3.4 | 0.626 | 6.0 | LOS A | 21.3 | 152.9 | 0.57 | 0.52 | 51.6 |
| 6 | R2 | 232 | 3.0 | 0.851 | 38.8 | LOS D | 8.9 | 63.9 | 1.00 | 0.93 | 31.3 |
| Approach | | 1941 | 3.3 | 0.851 | 11.7 | LOS B | 21.3 | 152.9 | 0.62 | 0.57 | 47.9 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 120 | 2.5 | 0.263 | 25.3 | LOS C | 3.6 | 25.6 | 0.84 | 0.75 | 35.9 |
| 9 | R2 | 251 | 2.5 | 0.809 | 53.4 | LOS D | 13.0 | 93.1 | 1.00 | 0.93 | 29.9 |
| Approach | | 371 | 2.5 | 0.809 | 44.3 | LOS D | 13.0 | 93.1 | 0.95 | 0.87 | 31.4 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 300 | 1.0 | 0.370 | 17.3 | LOS B | 6.9 | 48.5 | 0.71 | 0.77 | 43.1 |
| 11 | T1 | 1370 | 1.8 | 0.807 | 28.6 | LOS C | 30.5 | 216.7 | 0.94 | 0.88 | 38.0 |
| Approach | | 1670 | 1.6 | 0.807 | 26.6 | LOS C | 30.5 | 216.7 | 0.90 | 0.86 | 39.0 |
| All Vehicles | | 3982 | 2.5 | 0.851 | 21.0 | LOS C | 30.5 | 216.7 | 0.76 | 0.72 | 41.6 |

## 2031 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1071 | 3.4 | 0.453 | 10.7 | LOS B | 13.6 | 98.0 | 0.57 | 0.51 | 49.4 |
| 6 | R2 | 323 | 3.0 | 0.807 | 50.6 | LOS D | 16.4 | 117.8 | 1.00 | 0.91 | 27.8 |
| Approach | | 1394 | 3.3 | 0.807 | 19.9 | LOS B | 16.4 | 117.8 | 0.67 | 0.60 | 41.8 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 305 | 2.5 | 0.408 | 27.0 | LOS C | 10.5 | 75.2 | 0.76 | 0.78 | 35.2 |
| 9 | R2 | 383 | 2.5 | 0.807 | 46.7 | LOS D | 19.1 | 136.7 | 1.00 | 0.92 | 31.7 |
| Approach | | 688 | 2.5 | 0.807 | 38.0 | LOS D | 19.1 | 136.7 | 0.89 | 0.86 | 33.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 438 | 1.0 | 0.475 | 23.1 | LOS C | 13.9 | 98.2 | 0.70 | 0.79 | 40.3 |
| 11 | T1 | 1092 | 1.8 | 0.833 | 38.1 | LOS D | 27.0 | 191.8 | 0.99 | 0.96 | 33.9 |
| Approach | | 1530 | 1.5 | 0.833 | 33.8 | LOS C | 27.0 | 191.8 | 0.91 | 0.91 | 35.8 |
| All Vehicles | | 3612 | 2.4 | 0.833 | 29.2 | LOS C | 27.0 | 191.8 | 0.81 | 0.78 | 37.1 |

## 2031 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1597 | 3.4 | 0.664 | 12.5 | LOS B | 24.5 | 176.3 | 0.69 | 0.63 | 47.9 |
| 6 | R2 | 299 | 3.0 | 0.747 | 47.6 | LOS D | 14.4 | 103.6 | 0.99 | 0.88 | 28.6 |
| Approach | | 1896 | 3.3 | 0.747 | 18.0 | LOS B | 24.5 | 176.3 | 0.74 | 0.67 | 43.3 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 201 | 2.5 | 0.275 | 26.3 | LOS C | 6.6 | 47.1 | 0.72 | 0.75 | 35.5 |
| 9 | R2 | 340 | 2.5 | 0.745 | 44.1 | LOS D | 16.1 | 114.9 | 0.98 | 0.88 | 32.4 |
| Approach | | 541 | 2.5 | 0.745 | 37.5 | LOS D | 16.1 | 114.9 | 0.88 | 0.83 | 33.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 404 | 1.0 | 0.438 | 22.6 | LOS C | 12.5 | 88.4 | 0.69 | 0.78 | 40.5 |
| 11 | T1 | 1046 | 1.8 | 0.775 | 33.1 | LOS C | 23.7 | 168.4 | 0.96 | 0.88 | 35.9 |
| Approach | | 1450 | 1.5 | 0.775 | 30.2 | LOS C | 23.7 | 168.4 | 0.88 | 0.85 | 37.3 |
| All Vehicles | | 3887 | 2.5 | 0.775 | 25.3 | LOS C | 24.5 | 176.3 | 0.81 | 0.76 | 39.1 |

## 2031 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1570 | 3.4 | 0.611 | 10.6 | LOS B | 23.0 | 165.9 | 0.60 | 0.55 | 49.4 |
| 6 | R2 | 285 | 3.0 | 0.862 | 62.0 | LOS E | 16.9 | 121.6 | 1.00 | 0.95 | 25.1 |
| Approach | | 1855 | 3.3 | 0.862 | 18.5 | LOS B | 23.0 | 165.9 | 0.66 | 0.61 | 43.0 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 111 | 2.5 | 0.181 | 32.2 | LOS C | 4.2 | 29.9 | 0.74 | 0.74 | 33.2 |
| 9 | R2 | 352 | 2.5 | 0.884 | 61.3 | LOS E | 21.4 | 153.3 | 1.00 | 0.99 | 28.1 |
| Approach | | 463 | 2.5 | 0.884 | 54.3 | LOS D | 21.4 | 153.3 | 0.94 | 0.93 | 29.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 283 | 1.0 | 0.277 | 19.2 | LOS B | 7.9 | 55.5 | 0.56 | 0.74 | 42.1 |
| 11 | T1 | 1431 | 1.8 | 0.888 | 40.8 | LOS D | 42.9 | 304.9 | 0.97 | 1.00 | 32.8 |
| Approach | | 1714 | 1.6 | 0.888 | 37.3 | LOS D | 42.9 | 304.9 | 0.90 | 0.96 | 34.3 |
| All Vehicles | | 4032 | 2.5 | 0.888 | 30.6 | LOS C | 42.9 | 304.9 | 0.80 | 0.80 | 36.7 |

## 2031 Option AM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1106 | 3.4 | 0.464 | 10.7 | LOS B | 14.1 | 101.3 | 0.57 | 0.51 | 49.3 |
| 6 | R2 | 154 | 3.0 | 0.706 | 32.3 | LOS C | 4.7 | 33.5 | 1.00 | 0.83 | 33.5 |
| Approach | | 1260 | 3.3 | 0.706 | 13.4 | LOS B | 14.1 | 101.3 | 0.63 | 0.55 | 46.6 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 322 | 2.5 | 0.569 | 23.8 | LOS C | 9.7 | 69.4 | 0.89 | 0.81 | 36.6 |
| 9 | R2 | 396 | 2.5 | 0.835 | 48.9 | LOS D | 20.4 | 146.1 | 1.00 | 0.95 | 31.1 |
| Approach | | 718 | 2.5 | 0.835 | 37.6 | LOS D | 20.4 | 146.1 | 0.95 | 0.89 | 33.1 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 359 | 1.0 | 0.406 | 15.6 | LOS B | 7.5 | 53.0 | 0.69 | 0.77 | 43.9 |
| 11 | T1 | 1229 | 1.8 | 0.839 | 35.8 | LOS D | 30.1 | 213.7 | 0.98 | 0.96 | 34.8 |
| Approach | | 1588 | 1.6 | 0.839 | 31.2 | LOS C | 30.1 | 213.7 | 0.91 | 0.92 | 36.8 |
| All Vehicles | | 3566 | 2.4 | 0.839 | 26.2 | LOS C | 30.1 | 213.7 | 0.82 | 0.78 | 38.6 |

## 2031 Option PM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1826 | 3.4 | 0.698 | 10.3 | LOS B | 26.6 | 191.0 | 0.66 | 0.61 | 49.6 |
| 6 | R2 | 188 | 3.0 | 0.739 | 33.1 | LOS C | 6.2 | 44.9 | 1.00 | 0.86 | 33.2 |
| Approach | | 2014 | 3.3 | 0.739 | 12.4 | LOS B | 26.6 | 191.0 | 0.69 | 0.63 | 47.4 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 192 | 2.5 | 0.390 | 24.9 | LOS C | 5.8 | 41.2 | 0.86 | 0.78 | 36.1 |
| 9 | R2 | 287 | 2.5 | 0.786 | 49.9 | LOS D | 14.4 | 103.1 | 1.00 | 0.91 | 30.8 |
| Approach | | 479 | 2.5 | 0.786 | 39.9 | LOS D | 14.4 | 103.1 | 0.94 | 0.86 | 32.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 308 | 1.0 | 0.371 | 16.8 | LOS B | 6.9 | 48.4 | 0.70 | 0.77 | 43.3 |
| 11 | T1 | 1266 | 1.8 | 0.782 | 28.3 | LOS C | 27.4 | 195.0 | 0.93 | 0.86 | 38.1 |
| Approach | | 1574 | 1.6 | 0.782 | 26.0 | LOS C | 27.4 | 195.0 | 0.88 | 0.84 | 39.2 |
| All Vehicles | | 4067 | 2.6 | 0.786 | 20.9 | LOS C | 27.4 | 195.0 | 0.80 | 0.74 | 41.6 |

## 2031 Option SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1552 | 3.4 | 0.602 | 9.7 | LOS A | 20.5 | 147.3 | 0.60 | 0.55 | 50.2 |
| 6 | R2 | 180 | 3.0 | 0.762 | 55.3 | LOS E | 9.2 | 66.1 | 1.00 | 0.88 | 26.6 |
| Approach | | 1732 | 3.3 | 0.762 | 14.4 | LOS B | 20.5 | 147.3 | 0.64 | 0.58 | 45.9 |
| North: North Beach Road (N) | | | | | | | | | | | |
| 7 | L2 | 122 | 2.5 | 0.167 | 25.2 | LOS C | 3.8 | 27.1 | 0.68 | 0.72 | 36.0 |
| 9 | R2 | 294 | 2.5 | 0.767 | 48.2 | LOS D | 14.5 | 103.5 | 1.00 | 0.90 | 31.3 |
| Approach | | 416 | 2.5 | 0.767 | 41.4 | LOS D | 14.5 | 103.5 | 0.91 | 0.85 | 32.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 181 | 1.0 | 0.192 | 12.8 | LOS B | 2.5 | 17.4 | 0.57 | 0.72 | 45.4 |
| 11 | T1 | 1456 | 1.8 | 0.803 | 25.2 | LOS C | 31.7 | 225.3 | 0.90 | 0.84 | 39.7 |
| Approach | | 1637 | 1.7 | 0.803 | 23.8 | LOS C | 31.7 | 225.3 | 0.87 | 0.83 | 40.4 |
| All Vehicles | | 3785 | 2.5 | 0.803 | 21.4 | LOS C | 31.7 | 225.3 | 0.77 | 0.72 | 41.3 |

## 1.7 Karrinyup Road / Mitchell Freeway Northbound Ramp

### 2013 Base AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 269 | 2.0 | 0.211 | 40.2 | LOS D | 6.3 | 44.8 | 0.74 | 0.76 | 35.2 |
| 3 | R2 | 45 | 2.0 | 0.162 | 61.5 | LOS E | 2.7 | 18.9 | 0.91 | 0.74 | 22.9 |
| Approach | | 314 | 2.0 | 0.211 | 43.3 | LOS D | 6.3 | 44.8 | 0.77 | 0.76 | 33.2 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 740 | 2.5 | 0.426 | 17.3 | LOS B | 17.5 | 124.8 | 0.59 | 0.52 | 39.0 |
| 6 | R2 | 224 | 2.0 | 0.716 | 59.2 | LOS E | 13.8 | 98.2 | 0.95 | 0.84 | 23.5 |
| Approach | | 964 | 2.4 | 0.716 | 27.1 | LOS C | 17.5 | 124.8 | 0.67 | 0.59 | 32.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 326 | 1.4 | 0.177 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1173 | 1.9 | 0.684 | 26.5 | LOS C | 33.2 | 235.9 | 0.78 | 0.70 | 31.6 |
| Approach | | 1499 | 1.8 | 0.684 | 22.2 | LOS C | 33.2 | 235.9 | 0.61 | 0.68 | 37.8 |
| All Vehicles | | 2777 | 2.0 | 0.716 | 26.3 | LOS C | 33.2 | 235.9 | 0.65 | 0.66 | 35.2 |

### 2013 Base PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 734 | 2.0 | 0.668 | 53.1 | LOS D | 22.8 | 162.4 | 0.93 | 0.85 | 30.6 |
| 3 | R2 | 29 | 2.0 | 0.095 | 61.0 | LOS E | 1.7 | 12.3 | 0.88 | 0.72 | 23.0 |
| Approach | | 763 | 2.0 | 0.668 | 53.4 | LOS D | 22.8 | 162.4 | 0.93 | 0.84 | 30.3 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1137 | 1.7 | 0.742 | 19.2 | LOS B | 42.8 | 303.8 | 0.71 | 0.65 | 37.2 |
| 6 | R2 | 260 | 0.3 | 0.765 | 59.5 | LOS E | 16.6 | 116.7 | 0.93 | 0.85 | 23.8 |
| Approach | | 1397 | 1.4 | 0.765 | 26.7 | LOS C | 42.8 | 303.8 | 0.75 | 0.69 | 32.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 324 | 0.3 | 0.175 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 59.2 |
| 11 | T1 | 838 | 1.2 | 0.510 | 28.6 | LOS C | 22.1 | 156.1 | 0.74 | 0.66 | 30.3 |
| Approach | | 1162 | 0.9 | 0.510 | 22.5 | LOS C | 22.1 | 156.1 | 0.54 | 0.63 | 38.4 |
| All Vehicles | | 3322 | 1.4 | 0.765 | 31.4 | LOS C | 42.8 | 303.8 | 0.71 | 0.70 | 33.4 |

### 2013 Base SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 609 | 0.7 | 0.488 | 47.6 | LOS D | 18.7 | 131.5 | 0.83 | 0.81 | 32.5 |
| 3 | R2 | 110 | 0.0 | 0.437 | 73.5 | LOS E | 7.8 | 54.3 | 0.97 | 0.79 | 20.4 |
| Approach | | 719 | 0.6 | 0.488 | 51.6 | LOS D | 18.7 | 131.5 | 0.85 | 0.81 | 30.3 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1147 | 0.6 | 0.800 | 25.6 | LOS C | 51.7 | 364.2 | 0.79 | 0.72 | 32.2 |
| 6 | R2 | 167 | 1.0 | 0.379 | 58.7 | LOS E | 10.5 | 74.3 | 0.89 | 0.80 | 23.7 |
| Approach | | 1314 | 0.7 | 0.800 | 29.8 | LOS C | 51.7 | 364.2 | 0.80 | 0.73 | 30.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 291 | 1.5 | 0.158 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.8 |
| 11 | T1 | 1146 | 1.4 | 0.652 | 28.2 | LOS C | 34.9 | 247.5 | 0.76 | 0.68 | 30.5 |
| Approach | | 1437 | 1.4 | 0.652 | 23.8 | LOS C | 34.9 | 247.5 | 0.61 | 0.66 | 36.4 |
| All Vehicles | | 3470 | 1.0 | 0.800 | 31.8 | LOS C | 51.7 | 364.2 | 0.73 | 0.72 | 32.4 |

### 2021 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 257 | 2.0 | 0.386 | 50.0 | LOS D | 6.2 | 44.0 | 0.93 | 0.79 | 31.8 |
| 3 | R2 | 55 | 2.0 | 0.472 | 83.5 | LOS E | 3.0 | 21.7 | 1.00 | 0.75 | 22.4 |
| Approach | | 312 | 2.0 | 0.472 | 52.4 | LOS D | 6.2 | 44.0 | 0.94 | 0.78 | 29.9 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 840 | 2.5 | 0.386 | 6.4 | LOS A | 11.1 | 79.0 | 0.41 | 0.36 | 54.1 |
| 6 | R2 | 214 | 2.0 | 0.514 | 46.3 | LOS D | 10.2 | 72.5 | 0.93 | 0.82 | 27.3 |
| Approach | | 1054 | 2.4 | 0.514 | 14.5 | LOS B | 11.1 | 79.0 | 0.51 | 0.46 | 42.7 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 248 | 1.4 | 0.135 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1094 | 1.9 | 0.521 | 16.9 | LOS B | 18.4 | 131.0 | 0.68 | 0.61 | 39.4 |
| Approach | | 1342 | 1.8 | 0.521 | 15.0 | LOS B | 18.4 | 131.0 | 0.56 | 0.60 | 44.0 |
| All Vehicles | | 2708 | 2.0 | 0.521 | 19.1 | LOS B | 18.4 | 131.0 | 0.58 | 0.57 | 40.2 |

### 2021 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 674 | 2.0 | 0.605 | 41.4 | LOS D | 15.7 | 111.6 | 0.90 | 0.83 | 34.7 |
| 3 | R2 | 38 | 2.0 | 0.326 | 62.7 | LOS E | 2.1 | 14.8 | 0.99 | 0.73 | 22.6 |
| Approach | | 712 | 2.0 | 0.605 | 42.5 | LOS D | 15.7 | 111.6 | 0.91 | 0.83 | 34.0 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1104 | 2.5 | 0.618 | 14.8 | LOS B | 23.9 | 170.5 | 0.86 | 0.59 | 41.6 |
| 6 | R2 | 296 | 2.0 | 0.456 | 35.1 | LOS D | 12.2 | 86.9 | 0.82 | 0.81 | 31.8 |
| Approach | | 1400 | 2.4 | 0.618 | 19.1 | LOS B | 23.9 | 170.5 | 0.69 | 0.64 | 38.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 260 | 1.4 | 0.141 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 836 | 1.9 | 0.519 | 25.4 | LOS C | 16.6 | 117.8 | 0.80 | 0.70 | 32.3 |
| Approach | | 1096 | 1.8 | 0.519 | 21.0 | LOS C | 16.6 | 117.8 | 0.61 | 0.67 | 39.0 |
| All Vehicles | | 3208 | 2.1 | 0.618 | 24.9 | LOS C | 23.9 | 170.5 | 0.71 | 0.69 | 37.0 |

### 2021 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 602 | 2.0 | 0.583 | 43.4 | LOS D | 14.0 | 99.6 | 0.91 | 0.83 | 33.9 |
| 3 | R2 | 87 | 2.0 | 0.523 | 60.3 | LOS E | 4.7 | 33.3 | 1.00 | 0.77 | 23.2 |
| Approach | | 689 | 2.0 | 0.583 | 45.5 | LOS D | 14.0 | 99.6 | 0.93 | 0.82 | 32.5 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1118 | 2.5 | 0.598 | 13.0 | LOS B | 22.7 | 162.4 | 0.62 | 0.56 | 43.8 |
| 6 | R2 | 157 | 2.0 | 0.524 | 52.1 | LOS D | 7.9 | 56.2 | 0.96 | 0.80 | 25.4 |
| Approach | | 1275 | 2.4 | 0.598 | 17.8 | LOS B | 22.7 | 162.4 | 0.66 | 0.59 | 39.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 248 | 1.4 | 0.135 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1161 | 1.9 | 0.519 | 14.6 | LOS B | 18.4 | 131.1 | 0.65 | 0.58 | 41.9 |
| Approach | | 1409 | 1.8 | 0.519 | 13.2 | LOS B | 18.4 | 131.1 | 0.53 | 0.58 | 45.8 |
| All Vehicles | | 3373 | 2.1 | 0.598 | 21.6 | LOS C | 22.7 | 162.4 | 0.66 | 0.63 | 38.9 |

## 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 263 | 2.0 | 0.395 | 50.1 | LOS D | 6.3 | 45.1 | 0.93 | 0.79 | 31.5 |
| 3 | R2 | 54 | 2.0 | 0.360 | 60.4 | LOS E | 2.9 | 20.5 | 0.98 | 0.75 | 23.2 |
| Approach | | 317 | 2.0 | 0.395 | 51.8 | LOS D | 6.3 | 45.1 | 0.94 | 0.78 | 30.1 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 844 | 2.5 | 0.388 | 6.4 | LOS A | 11.1 | 79.5 | 0.41 | 0.36 | 54.0 |
| 6 | R2 | 196 | 2.0 | 0.406 | 41.9 | LOS D | 8.7 | 62.1 | 0.87 | 0.80 | 28.8 |
| Approach | | 1040 | 2.4 | 0.406 | 13.1 | LOS B | 11.1 | 79.5 | 0.50 | 0.45 | 44.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 315 | 1.4 | 0.171 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1154 | 1.9 | 0.407 | 18.9 | LOS B | 13.0 | 92.3 | 0.68 | 0.60 | 37.4 |
| Approach | | 1469 | 1.8 | 0.407 | 16.3 | LOS B | 13.0 | 92.3 | 0.54 | 0.59 | 42.9 |
| All Vehicles | | 2826 | 2.0 | 0.407 | 19.1 | LOS B | 13.0 | 92.3 | 0.57 | 0.56 | 40.4 |

## 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 592 | 2.0 | 0.556 | 42.3 | LOS D | 13.5 | 96.2 | 0.90 | 0.83 | 34.4 |
| 3 | R2 | 39 | 2.0 | 0.260 | 59.8 | LOS E | 2.1 | 14.6 | 0.97 | 0.73 | 23.3 |
| Approach | | 631 | 2.0 | 0.556 | 43.4 | LOS D | 13.5 | 96.2 | 0.90 | 0.82 | 33.6 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1009 | 2.5 | 0.548 | 13.0 | LOS B | 19.9 | 142.0 | 0.60 | 0.54 | 43.8 |
| 6 | R2 | 289 | 2.0 | 0.434 | 34.1 | LOS C | 11.7 | 83.2 | 0.81 | 0.81 | 32.1 |
| Approach | | 1298 | 2.4 | 0.548 | 17.7 | LOS B | 19.9 | 142.0 | 0.65 | 0.60 | 39.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 302 | 1.4 | 0.164 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 982 | 1.9 | 0.435 | 26.3 | LOS C | 12.8 | 91.1 | 0.78 | 0.67 | 31.7 |
| Approach | | 1284 | 1.8 | 0.435 | 21.7 | LOS C | 12.8 | 91.1 | 0.60 | 0.65 | 38.4 |
| All Vehicles | | 3213 | 2.1 | 0.556 | 24.3 | LOS C | 19.9 | 142.0 | 0.68 | 0.66 | 37.2 |

## 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 812 | 2.0 | 0.687 | 40.2 | LOS D | 19.7 | 140.1 | 0.91 | 0.85 | 35.2 |
| 3 | R2 | 68 | 2.0 | 0.454 | 61.0 | LOS E | 3.7 | 26.1 | 0.99 | 0.76 | 23.0 |
| Approach | | 880 | 2.0 | 0.687 | 41.8 | LOS D | 19.7 | 140.1 | 0.92 | 0.84 | 34.2 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1130 | 2.5 | 0.664 | 17.0 | LOS B | 26.4 | 188.7 | 0.71 | 0.64 | 39.3 |
| 6 | R2 | 265 | 2.0 | 0.482 | 39.8 | LOS D | 11.7 | 83.2 | 0.87 | 0.82 | 29.6 |
| Approach | | 1395 | 2.4 | 0.664 | 21.4 | LOS C | 26.4 | 188.7 | 0.74 | 0.67 | 36.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 190 | 1.4 | 0.103 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1237 | 1.9 | 0.471 | 22.2 | LOS C | 15.2 | 108.2 | 0.74 | 0.65 | 34.7 |
| Approach | | 1427 | 1.8 | 0.471 | 20.1 | LOS C | 15.2 | 108.2 | 0.64 | 0.64 | 38.3 |
| All Vehicles | | 3702 | 2.1 | 0.687 | 25.7 | LOS C | 26.4 | 188.7 | 0.74 | 0.70 | 36.1 |

## 2031 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 525 | 2.0 | 0.298 | 24.9 | LOS C | 8.4 | 60.0 | 0.64 | 0.76 | 42.9 |
| 3 | R2 | 138 | 2.0 | 0.691 | 60.6 | LOS E | 7.6 | 54.0 | 1.00 | 0.83 | 23.1 |
| Approach | | 663 | 2.0 | 0.691 | 32.3 | LOS C | 8.4 | 60.0 | 0.72 | 0.78 | 37.7 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 372 | 2.5 | 0.296 | 22.8 | LOS C | 8.3 | 59.4 | 0.70 | 0.58 | 34.2 |
| 6 | R2 | 309 | 2.0 | 0.697 | 45.2 | LOS D | 15.0 | 106.6 | 0.94 | 0.84 | 27.6 |
| Approach | | 681 | 2.2 | 0.697 | 33.0 | LOS C | 15.0 | 106.6 | 0.81 | 0.70 | 30.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 270 | 1.4 | 0.147 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1181 | 1.9 | 0.711 | 24.5 | LOS C | 27.1 | 192.5 | 0.84 | 0.75 | 33.0 |
| Approach | | 1451 | 1.8 | 0.711 | 21.2 | LOS C | 27.1 | 192.5 | 0.68 | 0.72 | 38.2 |
| All Vehicles | | 2795 | 2.0 | 0.711 | 26.7 | LOS C | 27.1 | 192.5 | 0.72 | 0.73 | 36.0 |

## 2031 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 541 | 2.0 | 0.647 | 44.9 | LOS D | 15.4 | 109.9 | 0.94 | 0.84 | 33.4 |
| 3 | R2 | 180 | 2.0 | 0.569 | 52.4 | LOS D | 9.1 | 64.6 | 0.97 | 0.81 | 25.3 |
| Approach | | 821 | 2.0 | 0.647 | 46.5 | LOS D | 15.4 | 109.9 | 0.95 | 0.83 | 31.6 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1251 | 2.5 | 0.681 | 13.4 | LOS B | 28.2 | 201.3 | 0.65 | 0.59 | 43.3 |
| 6 | R2 | 270 | 2.0 | 0.630 | 43.7 | LOS D | 12.6 | 89.9 | 0.92 | 0.82 | 28.2 |
| Approach | | 1521 | 2.4 | 0.681 | 18.8 | LOS B | 28.2 | 201.3 | 0.70 | 0.63 | 38.4 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 295 | 1.4 | 0.160 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 854 | 1.9 | 0.554 | 27.2 | LOS C | 17.6 | 125.0 | 0.83 | 0.72 | 31.1 |
| Approach | | 1149 | 1.8 | 0.554 | 22.0 | LOS C | 17.6 | 125.0 | 0.61 | 0.68 | 38.5 |
| All Vehicles | | 3491 | 2.1 | 0.681 | 26.3 | LOS C | 28.2 | 201.3 | 0.73 | 0.70 | 35.9 |

## 2031 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 548 | 2.0 | 0.633 | 47.7 | LOS D | 13.4 | 95.3 | 0.95 | 0.83 | 32.3 |
| 3 | R2 | 64 | 2.0 | 0.549 | 84.0 | LOS E | 3.6 | 25.4 | 1.00 | 0.76 | 22.3 |
| Approach | | 612 | 2.0 | 0.633 | 49.4 | LOS D | 13.4 | 95.3 | 0.96 | 0.83 | 31.2 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1296 | 2.5 | 0.645 | 11.0 | LOS B | 25.6 | 182.8 | 0.59 | 0.54 | 46.5 |
| 6 | R2 | 170 | 2.0 | 0.537 | 51.4 | LOS D | 8.5 | 60.6 | 0.96 | 0.81 | 25.6 |
| Approach | | 1466 | 2.4 | 0.645 | 15.7 | LOS B | 25.6 | 182.8 | 0.63 | 0.57 | 41.1 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 184 | 1.4 | 0.100 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1218 | 1.9 | 0.530 | 13.6 | LOS B | 19.0 | 135.1 | 0.63 | 0.57 | 43.0 |
| Approach | | 1402 | 1.8 | 0.530 | 12.7 | LOS B | 19.0 | 135.1 | 0.55 | 0.57 | 45.9 |
| All Vehicles | | 3480 | 2.1 | 0.645 | 20.4 | LOS C | 25.6 | 182.8 | 0.66 | 0.62 | 39.2 |

## 2031 Option AM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 483 | 2.0 | 0.427 | 39.2 | LOS D | 10.3 | 73.6 | 0.85 | 0.80 | 35.6 |
| 3 | R2 | 115 | 2.0 | 0.461 | 54.9 | LOS D | 5.9 | 41.8 | 0.97 | 0.79 | 24.6 |
| Approach | | 598 | 2.0 | 0.461 | 42.2 | LOS D | 10.3 | 73.6 | 0.87 | 0.80 | 33.4 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 770 | 2.5 | 0.431 | 13.0 | LOS B | 14.2 | 101.5 | 0.57 | 0.50 | 43.8 |
| 6 | R2 | 233 | 2.0 | 0.466 | 41.8 | LOS D | 10.5 | 74.7 | 0.88 | 0.81 | 28.8 |
| Approach | | 1003 | 2.4 | 0.466 | 19.7 | LOS B | 14.2 | 101.5 | 0.64 | 0.58 | 37.8 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 261 | 1.4 | 0.142 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1165 | 1.9 | 0.472 | 24.1 | LOS C | 14.8 | 105.5 | 0.77 | 0.67 | 33.2 |
| Approach | | 1426 | 1.8 | 0.472 | 20.9 | LOS C | 14.8 | 105.5 | 0.63 | 0.65 | 38.3 |
| All Vehicles | | 3027 | 2.0 | 0.472 | 24.7 | LOS C | 14.8 | 105.5 | 0.58 | 0.66 | 36.6 |

## 2031 Option PM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 773 | 2.0 | 0.723 | 44.2 | LOS D | 19.4 | 137.8 | 0.95 | 0.86 | 33.6 |
| 3 | R2 | 45 | 2.0 | 0.300 | 60.0 | LOS E | 2.4 | 17.0 | 0.98 | 0.74 | 23.3 |
| Approach | | 818 | 2.0 | 0.723 | 45.0 | LOS D | 19.4 | 137.8 | 0.95 | 0.85 | 33.0 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1250 | 2.5 | 0.696 | 15.2 | LOS B | 29.0 | 207.6 | 0.69 | 0.62 | 41.2 |
| 6 | R2 | 242 | 2.0 | 0.415 | 37.5 | LOS D | 10.2 | 72.7 | 0.83 | 0.80 | 30.6 |
| Approach | | 1492 | 2.4 | 0.696 | 18.8 | LOS B | 29.0 | 207.6 | 0.71 | 0.65 | 38.3 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 333 | 1.4 | 0.181 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1023 | 1.9 | 0.406 | 22.6 | LOS C | 12.4 | 88.3 | 0.73 | 0.63 | 34.3 |
| Approach | | 1356 | 1.8 | 0.406 | 18.7 | LOS B | 12.4 | 88.3 | 0.55 | 0.62 | 41.0 |
| All Vehicles | | 3666 | 2.1 | 0.723 | 24.5 | LOS C | 29.0 | 207.6 | 0.71 | 0.68 | 37.2 |

## 2031 Option SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Mitchell Freeway (S) | | | | | | | | | | | |
| 1 | L2 | 448 | 2.0 | 0.585 | 49.5 | LOS D | 11.0 | 78.5 | 0.95 | 0.82 | 31.7 |
| 3 | R2 | 44 | 2.0 | 0.294 | 60.0 | LOS E | 2.3 | 16.6 | 0.98 | 0.74 | 23.3 |
| Approach | | 492 | 2.0 | 0.585 | 50.4 | LOS D | 11.0 | 78.5 | 0.96 | 0.81 | 31.0 |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 5 | T1 | 1259 | 2.5 | 0.601 | 9.2 | LOS A | 22.4 | 160.0 | 0.54 | 0.49 | 49.3 |
| 6 | R2 | 155 | 2.0 | 0.388 | 45.7 | LOS D | 7.2 | 51.2 | 0.90 | 0.79 | 27.5 |
| Approach | | 1414 | 2.4 | 0.601 | 13.2 | LOS B | 22.4 | 160.0 | 0.58 | 0.52 | 44.0 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 10 | L2 | 231 | 1.4 | 0.126 | 6.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.57 | 58.9 |
| 11 | T1 | 1217 | 1.9 | 0.393 | 15.9 | LOS B | 12.6 | 89.7 | 0.63 | 0.55 | 40.5 |
| Approach | | 1448 | 1.8 | 0.393 | 14.4 | LOS B | 12.6 | 89.7 | 0.53 | 0.56 | 44.3 |
| All Vehicles | | 3354 | 2.1 | 0.601 | 19.2 | LOS B | 22.4 | 160.0 | 0.61 | 0.58 | 40.2 |

## 1.8 Karrinyup Road / Mitchell Freeway Southbound Ramp

### 2013 Base AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 31 | 4.8 | 0.026 | 8.3 | LOS A | 0.3 | 2.2 | 0.20 | 0.62 | 57.4 |
| 5 | T1 | 705 | 2.5 | 0.604 | 43.8 | LOS D | 20.2 | 144.1 | 0.91 | 0.79 | 29.2 |
| Approach | | 736 | 2.6 | 0.604 | 42.3 | LOS D | 20.2 | 144.1 | 0.88 | 0.78 | 30.2 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 423 | 0.4 | 0.458 | 8.6 | LOS A | 6.4 | 44.8 | 0.30 | 0.68 | 58.3 |
| 9 | R2 | 262 | 4.3 | 0.669 | 60.2 | LOS E | 16.3 | 118.3 | 0.97 | 0.84 | 23.4 |
| Approach | | 685 | 1.9 | 0.669 | 28.3 | LOS C | 16.3 | 118.3 | 0.56 | 0.74 | 41.4 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 716 | 2.6 | 0.268 | 8.2 | LOS A | 8.8 | 62.8 | 0.40 | 0.35 | 55.5 |
| 12 | R2 | 502 | 1.9 | 0.409 | 41.8 | LOS D | 12.7 | 90.0 | 0.80 | 0.80 | 28.6 |
| Approach | | 1218 | 2.3 | 0.409 | 22.1 | LOS C | 12.7 | 90.0 | 0.57 | 0.54 | 40.0 |
| All Vehicles | | 2639 | 2.3 | 0.669 | 29.3 | LOS C | 20.2 | 144.1 | 0.65 | 0.66 | 37.3 |

### 2021 Do-minimum AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 27 | 4.8 | 0.022 | 8.6 | LOS A | 0.3 | 1.8 | 0.24 | 0.63 | 57.1 |
| 5 | T1 | 722 | 2.5 | 0.609 | 34.9 | LOS C | 16.5 | 118.2 | 0.91 | 0.78 | 33.1 |
| Approach | | 749 | 2.6 | 0.609 | 34.0 | LOS C | 16.5 | 118.2 | 0.88 | 0.78 | 34.0 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 448 | 0.4 | 0.436 | 9.0 | LOS A | 6.5 | 45.6 | 0.36 | 0.70 | 57.9 |
| 9 | R2 | 332 | 4.3 | 0.614 | 42.3 | LOS D | 15.4 | 111.7 | 0.91 | 0.84 | 28.7 |
| Approach | | 780 | 2.1 | 0.614 | 23.2 | LOS C | 15.4 | 111.7 | 0.60 | 0.76 | 44.1 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 653 | 2.6 | 0.288 | 11.7 | LOS B | 8.5 | 60.7 | 0.53 | 0.46 | 51.0 |
| 12 | R2 | 495 | 1.9 | 0.594 | 47.0 | LOS D | 12.0 | 85.6 | 0.95 | 0.83 | 26.8 |
| Approach | | 1148 | 2.3 | 0.594 | 26.9 | LOS C | 12.0 | 85.6 | 0.71 | 0.62 | 36.7 |
| All Vehicles | | 2677 | 2.3 | 0.614 | 27.8 | LOS C | 16.5 | 118.2 | 0.73 | 0.70 | 38.2 |

### 2013 Base PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 23 | 0.0 | 0.017 | 7.5 | LOS A | 0.2 | 1.1 | 0.16 | 0.61 | 59.4 |
| 5 | T1 | 1028 | 1.7 | 1.001 | 102.7 | LOS F | 48.4 | 343.7 | 1.00 | 1.25 | 16.4 |
| Approach | | 1051 | 1.6 | 1.001 | 100.6 | LOS F | 48.4 | 343.7 | 0.98 | 1.23 | 16.8 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 190 | 0.6 | 0.179 | 7.7 | LOS A | 1.6 | 11.3 | 0.19 | 0.64 | 59.0 |
| 9 | R2 | 371 | 0.5 | 0.746 | 55.7 | LOS E | 22.5 | 158.4 | 0.98 | 0.87 | 24.5 |
| Approach | | 561 | 0.5 | 0.746 | 39.4 | LOS D | 22.5 | 158.4 | 0.71 | 0.79 | 33.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 569 | 1.2 | 0.229 | 10.6 | LOS B | 7.6 | 53.8 | 0.45 | 0.39 | 52.4 |
| 12 | R2 | 299 | 4.2 | 0.253 | 40.7 | LOS D | 7.1 | 51.4 | 0.77 | 0.78 | 29.2 |
| Approach | | 868 | 2.2 | 0.253 | 20.9 | LOS C | 7.6 | 53.8 | 0.56 | 0.52 | 41.1 |
| All Vehicles | | 2480 | 1.6 | 1.001 | 58.9 | LOS E | 48.4 | 343.7 | 0.77 | 0.88 | 25.0 |

### 2021 Do-minimum PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 25 | 4.8 | 0.018 | 7.6 | LOS A | 0.2 | 1.2 | 0.18 | 0.62 | 58.0 |
| 5 | T1 | 1106 | 2.5 | 0.623 | 23.7 | LOS C | 22.3 | 159.2 | 0.81 | 0.72 | 39.9 |
| Approach | | 1131 | 2.5 | 0.623 | 23.4 | LOS C | 22.3 | 159.2 | 0.80 | 0.72 | 40.3 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 169 | 0.4 | 0.167 | 7.8 | LOS A | 1.3 | 9.3 | 0.22 | 0.64 | 59.0 |
| 9 | R2 | 292 | 4.3 | 0.615 | 45.2 | LOS D | 13.9 | 101.0 | 0.93 | 0.83 | 27.7 |
| Approach | | 461 | 2.9 | 0.615 | 31.5 | LOS C | 13.9 | 101.0 | 0.67 | 0.77 | 37.4 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 620 | 2.6 | 0.258 | 9.6 | LOS A | 7.3 | 51.9 | 0.48 | 0.41 | 53.6 |
| 12 | R2 | 253 | 1.9 | 0.633 | 58.7 | LOS E | 6.8 | 48.6 | 1.00 | 0.81 | 23.5 |
| Approach | | 873 | 2.4 | 0.633 | 23.8 | LOS C | 7.3 | 51.9 | 0.63 | 0.53 | 39.1 |
| All Vehicles | | 2465 | 2.5 | 0.633 | 25.1 | LOS C | 22.3 | 159.2 | 0.71 | 0.66 | 39.2 |

### 2013 Base SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 41 | 0.0 | 0.034 | 8.7 | LOS A | 0.5 | 3.4 | 0.21 | 0.63 | 58.3 |
| 5 | T1 | 942 | 0.9 | 0.852 | 61.2 | LOS E | 36.4 | 256.4 | 1.00 | 0.95 | 23.7 |
| Approach | | 983 | 0.9 | 0.852 | 59.0 | LOS E | 36.4 | 256.4 | 0.97 | 0.94 | 24.7 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 198 | 0.5 | 0.204 | 7.9 | LOS A | 2.0 | 14.1 | 0.19 | 0.64 | 58.9 |
| 9 | R2 | 373 | 0.2 | 0.843 | 73.2 | LOS E | 28.8 | 201.9 | 1.00 | 0.91 | 20.6 |
| Approach | | 571 | 0.3 | 0.843 | 50.5 | LOS D | 28.8 | 201.9 | 0.72 | 0.82 | 29.6 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 682 | 1.0 | 0.257 | 9.8 | LOS A | 9.6 | 67.8 | 0.41 | 0.36 | 53.3 |
| 12 | R2 | 575 | 1.6 | 0.573 | 46.2 | LOS D | 16.4 | 116.6 | 0.82 | 0.81 | 27.1 |
| Approach | | 1257 | 1.3 | 0.573 | 26.5 | LOS C | 16.4 | 116.6 | 0.60 | 0.57 | 37.0 |
| All Vehicles | | 2811 | 1.0 | 0.852 | 42.7 | LOS D | 36.4 | 256.4 | 0.75 | 0.75 | 30.1 |

### 2021 Do-minimum SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 58 | 4.8 | 0.048 | 9.0 | LOS A | 0.6 | 4.5 | 0.27 | 0.64 | 56.7 |
| 5 | T1 | 906 | 2.5 | 0.725 | 35.2 | LOS D | 21.6 | 154.7 | 0.94 | 0.83 | 33.0 |
| Approach | | 964 | 2.6 | 0.725 | 33.7 | LOS C | 21.6 | 154.7 | 0.90 | 0.82 | 34.4 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 168 | 0.4 | 0.171 | 8.1 | LOS A | 1.5 | 10.8 | 0.24 | 0.65 | 58.7 |
| 9 | R2 | 370 | 4.3 | 0.729 | 46.2 | LOS D | 18.4 | 133.7 | 0.96 | 0.87 | 27.4 |
| Approach | | 538 | 3.1 | 0.729 | 34.3 | LOS C | 18.4 | 133.7 | 0.74 | 0.80 | 35.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 699 | 2.6 | 0.299 | 10.9 | LOS B | 8.8 | 63.0 | 0.51 | 0.45 | 52.0 |
| 12 | R2 | 551 | 1.9 | 0.726 | 49.2 | LOS D | 14.0 | 99.6 | 0.97 | 0.85 | 26.1 |
| Approach | | 1250 | 2.3 | 0.726 | 27.8 | LOS C | 14.0 | 99.6 | 0.71 | 0.63 | 36.2 |
| All Vehicles | | 2752 | 2.6 | 0.729 | 31.1 | LOS C | 21.6 | 154.7 | 0.78 | 0.73 | 35.4 |

## 2021 Option AM

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 25 | 4.8 | 0.020 | 8.4 | LOS A | 0.2 | 1.5 | 0.23 | 0.62 | 57.3 |
| 5 | T1 | 731 | 2.5 | 0.582 | 33.1 | LOS C | 16.3 | 116.6 | 0.89 | 0.77 | 34.0 |
| Approach | | 756 | 2.6 | 0.582 | 32.3 | LOS C | 16.3 | 116.6 | 0.87 | 0.76 | 34.8 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 461 | 0.4 | 0.472 | 9.6 | LOS A | 7.9 | 55.8 | 0.42 | 0.72 | 57.3 |
| 9 | R2 | 307 | 4.3 | 0.586 | 42.7 | LOS D | 14.2 | 103.0 | 0.91 | 0.83 | 28.6 |
| Approach | | 768 | 2.0 | 0.586 | 22.8 | LOS C | 14.2 | 103.0 | 0.61 | 0.76 | 44.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 729 | 2.6 | 0.317 | 11.5 | LOS B | 9.5 | 67.9 | 0.53 | 0.46 | 51.2 |
| 12 | R2 | 478 | 1.9 | 0.598 | 47.8 | LOS D | 11.7 | 83.3 | 0.95 | 0.83 | 26.6 |
| Approach | | 1207 | 2.3 | 0.598 | 25.9 | LOS C | 11.7 | 83.3 | 0.70 | 0.61 | 37.4 |
| All Vehicles | | 2731 | 2.3 | 0.598 | 26.8 | LOS C | 16.3 | 116.6 | 0.72 | 0.69 | 38.9 |

## 2021 Option PM

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 30 | 4.8 | 0.022 | 7.8 | LOS A | 0.2 | 1.5 | 0.19 | 0.62 | 57.9 |
| 5 | T1 | 953 | 2.5 | 0.636 | 29.1 | LOS C | 20.7 | 148.0 | 0.87 | 0.77 | 36.3 |
| Approach | | 983 | 2.5 | 0.636 | 28.5 | LOS C | 20.7 | 148.0 | 0.85 | 0.76 | 37.0 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 162 | 0.4 | 0.161 | 8.3 | LOS A | 1.6 | 11.0 | 0.25 | 0.65 | 58.5 |
| 9 | R2 | 345 | 4.3 | 0.620 | 41.7 | LOS D | 15.9 | 115.5 | 0.91 | 0.84 | 29.0 |
| Approach | | 507 | 3.1 | 0.620 | 31.0 | LOS C | 15.9 | 115.5 | 0.70 | 0.78 | 37.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 703 | 2.6 | 0.315 | 12.5 | LOS B | 9.5 | 67.9 | 0.55 | 0.48 | 50.1 |
| 12 | R2 | 315 | 1.9 | 0.630 | 55.8 | LOS E | 8.3 | 59.0 | 0.99 | 0.81 | 24.2 |
| Approach | | 1018 | 2.4 | 0.630 | 25.9 | LOS C | 9.5 | 67.9 | 0.69 | 0.58 | 37.7 |
| All Vehicles | | 2508 | 2.6 | 0.636 | 27.9 | LOS C | 20.7 | 148.0 | 0.75 | 0.69 | 37.3 |

## 2021 Option SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 72 | 4.8 | 0.058 | 8.9 | LOS A | 0.7 | 5.4 | 0.26 | 0.64 | 55.9 |
| 5 | T1 | 1052 | 2.5 | 0.745 | 32.2 | LOS C | 24.9 | 178.0 | 0.93 | 0.82 | 34.5 |
| Approach | | 1124 | 2.6 | 0.745 | 30.7 | LOS C | 24.9 | 178.0 | 0.89 | 0.81 | 36.0 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 221 | 0.4 | 0.242 | 8.5 | LOS A | 2.4 | 17.0 | 0.28 | 0.67 | 58.3 |
| 9 | R2 | 344 | 4.3 | 0.750 | 49.4 | LOS D | 17.8 | 129.0 | 0.98 | 0.88 | 26.3 |
| Approach | | 565 | 2.8 | 0.750 | 33.4 | LOS C | 17.8 | 129.0 | 0.71 | 0.79 | 36.7 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 786 | 2.6 | 0.322 | 9.7 | LOS A | 9.5 | 67.7 | 0.49 | 0.43 | 53.5 |
| 12 | R2 | 520 | 1.9 | 0.711 | 50.5 | LOS D | 13.3 | 94.9 | 0.98 | 0.85 | 25.7 |
| Approach | | 1306 | 2.3 | 0.711 | 25.9 | LOS C | 13.3 | 94.9 | 0.68 | 0.60 | 37.4 |
| All Vehicles | | 2995 | 2.5 | 0.750 | 29.2 | LOS C | 24.9 | 178.0 | 0.76 | 0.72 | 36.7 |

## 2031 Do-minimum AM

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 44 | 4.8 | 0.037 | 8.8 | LOS A | 0.4 | 3.2 | 0.26 | 0.63 | 56.9 |
| 5 | T1 | 774 | 2.5 | 0.569 | 30.8 | LOS C | 16.8 | 119.9 | 0.86 | 0.75 | 35.4 |
| Approach | | 818 | 2.6 | 0.569 | 29.7 | LOS C | 16.8 | 119.9 | 0.83 | 0.74 | 36.6 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 451 | 0.4 | 0.519 | 9.0 | LOS A | 7.1 | 50.0 | 0.39 | 0.71 | 57.8 |
| 9 | R2 | 408 | 4.3 | 0.566 | 50.1 | LOS D | 10.1 | 73.1 | 0.95 | 0.82 | 26.1 |
| Approach | | 859 | 2.3 | 0.566 | 28.5 | LOS C | 10.1 | 73.1 | 0.66 | 0.76 | 40.5 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 768 | 2.6 | 0.290 | 6.9 | LOS A | 7.8 | 55.8 | 0.41 | 0.37 | 57.4 |
| 12 | R2 | 554 | 1.9 | 0.548 | 41.7 | LOS D | 12.7 | 90.0 | 0.90 | 0.83 | 28.7 |
| Approach | | 1322 | 2.3 | 0.548 | 21.5 | LOS C | 12.7 | 90.0 | 0.62 | 0.56 | 40.4 |
| All Vehicles | | 2999 | 2.4 | 0.569 | 25.7 | LOS C | 16.8 | 119.9 | 0.69 | 0.67 | 39.4 |

## 2031 Do-minimum PM

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 15 | 4.8 | 0.011 | 8.2 | LOS A | 0.1 | 0.9 | 0.22 | 0.62 | 57.5 |
| 5 | T1 | 1083 | 2.5 | 0.622 | 24.4 | LOS C | 22.0 | 157.0 | 0.82 | 0.73 | 39.5 |
| Approach | | 1098 | 2.5 | 0.622 | 24.1 | LOS C | 22.0 | 157.0 | 0.81 | 0.73 | 39.8 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 249 | 0.4 | 0.260 | 7.7 | LOS A | 2.0 | 14.1 | 0.23 | 0.65 | 59.0 |
| 9 | R2 | 435 | 4.3 | 0.604 | 50.5 | LOS D | 10.8 | 78.6 | 0.96 | 0.82 | 26.0 |
| Approach | | 684 | 2.9 | 0.604 | 34.9 | LOS C | 10.8 | 78.6 | 0.69 | 0.76 | 35.7 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 624 | 2.6 | 0.235 | 6.6 | LOS A | 6.0 | 43.2 | 0.40 | 0.34 | 57.9 |
| 12 | R2 | 401 | 1.9 | 0.602 | 51.0 | LOS D | 10.1 | 71.9 | 0.97 | 0.82 | 25.6 |
| Approach | | 1025 | 2.3 | 0.602 | 24.0 | LOS C | 10.1 | 71.9 | 0.62 | 0.53 | 38.8 |
| All Vehicles | | 2807 | 2.5 | 0.622 | 26.7 | LOS C | 22.0 | 157.0 | 0.71 | 0.66 | 38.2 |

## 2031 Do-minimum SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 53 | 4.8 | 0.043 | 8.8 | LOS A | 0.5 | 3.9 | 0.26 | 0.64 | 56.9 |
| 5 | T1 | 927 | 2.5 | 0.650 | 30.6 | LOS C | 20.6 | 147.3 | 0.89 | 0.78 | 35.5 |
| Approach | | 980 | 2.6 | 0.650 | 29.5 | LOS C | 20.6 | 147.3 | 0.85 | 0.77 | 36.7 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 207 | 0.4 | 0.228 | 8.1 | LOS A | 1.9 | 13.4 | 0.25 | 0.66 | 58.7 |
| 9 | R2 | 545 | 4.3 | 0.666 | 48.9 | LOS D | 13.5 | 98.3 | 0.97 | 0.84 | 26.5 |
| Approach | | 752 | 3.3 | 0.666 | 37.6 | LOS D | 13.5 | 98.3 | 0.77 | 0.79 | 33.6 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 743 | 2.6 | 0.292 | 8.1 | LOS A | 8.1 | 58.3 | 0.45 | 0.39 | 55.6 |
| 12 | R2 | 537 | 1.9 | 0.651 | 46.5 | LOS D | 13.1 | 92.9 | 0.95 | 0.83 | 27.0 |
| Approach | | 1280 | 2.3 | 0.651 | 24.2 | LOS C | 13.1 | 92.9 | 0.66 | 0.58 | 38.5 |
| All Vehicles | | 3012 | 2.6 | 0.666 | 29.3 | LOS C | 20.6 | 147.3 | 0.75 | 0.69 | 36.4 |

## 2031 Option AM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 41 | 4.8 | 0.033 | 8.4 | LOS A | 0.4 | 2.7 | 0.23 | 0.63 | 57.3 |
| 5 | T1 | 740 | 2.5 | 0.493 | 27.1 | LOS C | 14.9 | 106.6 | 0.81 | 0.70 | 37.7 |
| Approach | | 781 | 2.6 | 0.493 | 26.1 | LOS C | 14.9 | 106.6 | 0.78 | 0.70 | 38.8 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 408 | 0.4 | 0.493 | 8.8 | LOS A | 5.9 | 41.4 | 0.36 | 0.70 | 58.0 |
| 9 | R2 | 266 | 4.3 | 0.427 | 51.2 | LOS D | 6.5 | 47.3 | 0.94 | 0.79 | 25.8 |
| Approach | | 674 | 2.0 | 0.493 | 25.6 | LOS C | 6.5 | 47.3 | 0.59 | 0.74 | 42.9 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 795 | 2.6 | 0.289 | 5.8 | LOS A | 7.4 | 53.1 | 0.38 | 0.34 | 59.1 |
| 12 | R2 | 485 | 1.9 | 0.485 | 41.9 | LOS D | 11.0 | 78.1 | 0.89 | 0.82 | 28.6 |
| Approach | | 1280 | 2.3 | 0.485 | 19.5 | LOS B | 11.0 | 78.1 | 0.57 | 0.52 | 42.1 |
| All Vehicles | | 2735 | 2.3 | 0.493 | 22.9 | LOS C | 14.9 | 106.6 | 0.64 | 0.62 | 41.4 |

## 2031 Option PM

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 16 | 4.8 | 0.012 | 7.9 | LOS A | 0.1 | 0.9 | 0.20 | 0.61 | 57.6 |
| 5 | T1 | 1110 | 2.5 | 0.590 | 21.4 | LOS C | 21.2 | 151.3 | 0.77 | 0.69 | 41.7 |
| Approach | | 1126 | 2.5 | 0.590 | 21.2 | LOS C | 21.2 | 151.3 | 0.76 | 0.69 | 42.0 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 217 | 0.4 | 0.247 | 7.9 | LOS A | 1.9 | 13.1 | 0.24 | 0.65 | 58.9 |
| 9 | R2 | 384 | 4.3 | 0.586 | 51.9 | LOS D | 9.7 | 70.1 | 0.97 | 0.82 | 25.6 |
| Approach | | 601 | 2.9 | 0.586 | 36.0 | LOS D | 9.7 | 70.1 | 0.70 | 0.76 | 35.2 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 722 | 2.6 | 0.265 | 6.0 | LOS A | 6.8 | 48.6 | 0.38 | 0.34 | 58.8 |
| 12 | R2 | 345 | 1.9 | 0.575 | 52.4 | LOS D | 8.8 | 62.4 | 0.97 | 0.81 | 25.2 |
| Approach | | 1067 | 2.3 | 0.575 | 21.0 | LOS C | 8.8 | 62.4 | 0.57 | 0.49 | 41.1 |
| All Vehicles | | 2794 | 2.5 | 0.590 | 24.3 | LOS C | 21.2 | 151.3 | 0.68 | 0.63 | 39.7 |

## 2031 Option SATURDAY

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: Karrinyup Road (E) | | | | | | | | | | | |
| 4 | L2 | 50 | 4.8 | 0.040 | 8.8 | LOS A | 0.5 | 3.7 | 0.26 | 0.63 | 56.9 |
| 5 | T1 | 1083 | 2.5 | 0.651 | 26.0 | LOS C | 22.9 | 163.6 | 0.84 | 0.75 | 38.3 |
| Approach | | 1133 | 2.6 | 0.651 | 25.3 | LOS C | 22.9 | 163.6 | 0.82 | 0.75 | 39.3 |
| North: Mitchell Freeway (N) | | | | | | | | | | | |
| 7 | L2 | 213 | 0.4 | 0.247 | 7.7 | LOS A | 1.7 | 11.9 | 0.22 | 0.65 | 59.0 |
| 9 | R2 | 377 | 4.3 | 0.640 | 54.3 | LOS D | 9.7 | 70.8 | 0.99 | 0.82 | 24.9 |
| Approach | | 590 | 2.9 | 0.640 | 37.5 | LOS D | 9.7 | 70.8 | 0.71 | 0.76 | 34.6 |
| West: Karrinyup Road (W) | | | | | | | | | | | |
| 11 | T1 | 722 | 2.6 | 0.259 | 5.3 | LOS A | 6.4 | 45.5 | 0.36 | 0.32 | 59.9 |
| 12 | R2 | 540 | 1.9 | 0.659 | 46.6 | LOS D | 13.2 | 93.5 | 0.95 | 0.83 | 27.0 |
| Approach | | 1262 | 2.3 | 0.659 | 23.0 | LOS C | 13.2 | 93.5 | 0.61 | 0.54 | 39.4 |
| All Vehicles | | 2985 | 2.5 | 0.659 | 26.7 | LOS C | 22.9 | 163.6 | 0.71 | 0.66 | 38.1 |

# Appendix E
# Flow Density Plots

# 1 Modified Development

The flow density plots for the each model case are shown in the following sections. These highlight locations where there is a high density of traffic, leading to congestion.

## 1.1 2014 Base

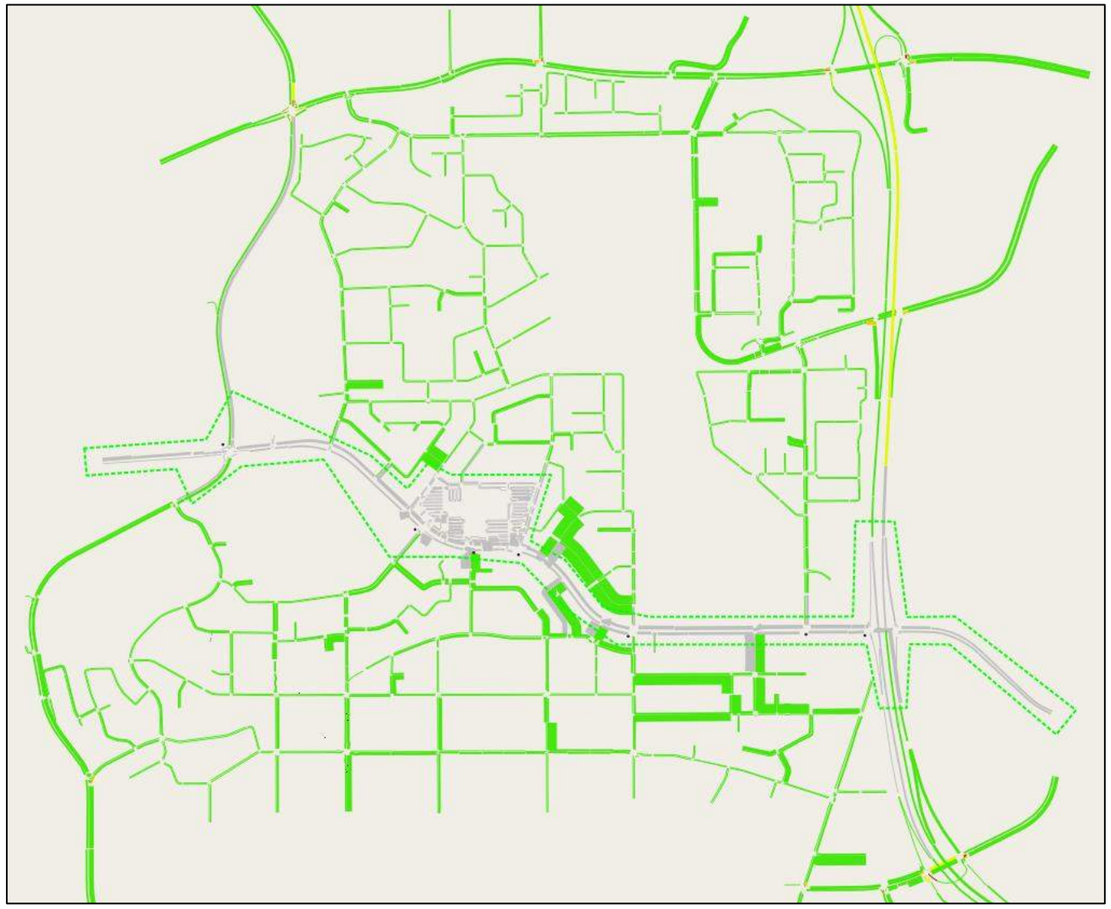


Figure 1-1 Flow density plot – 2014 Base AM

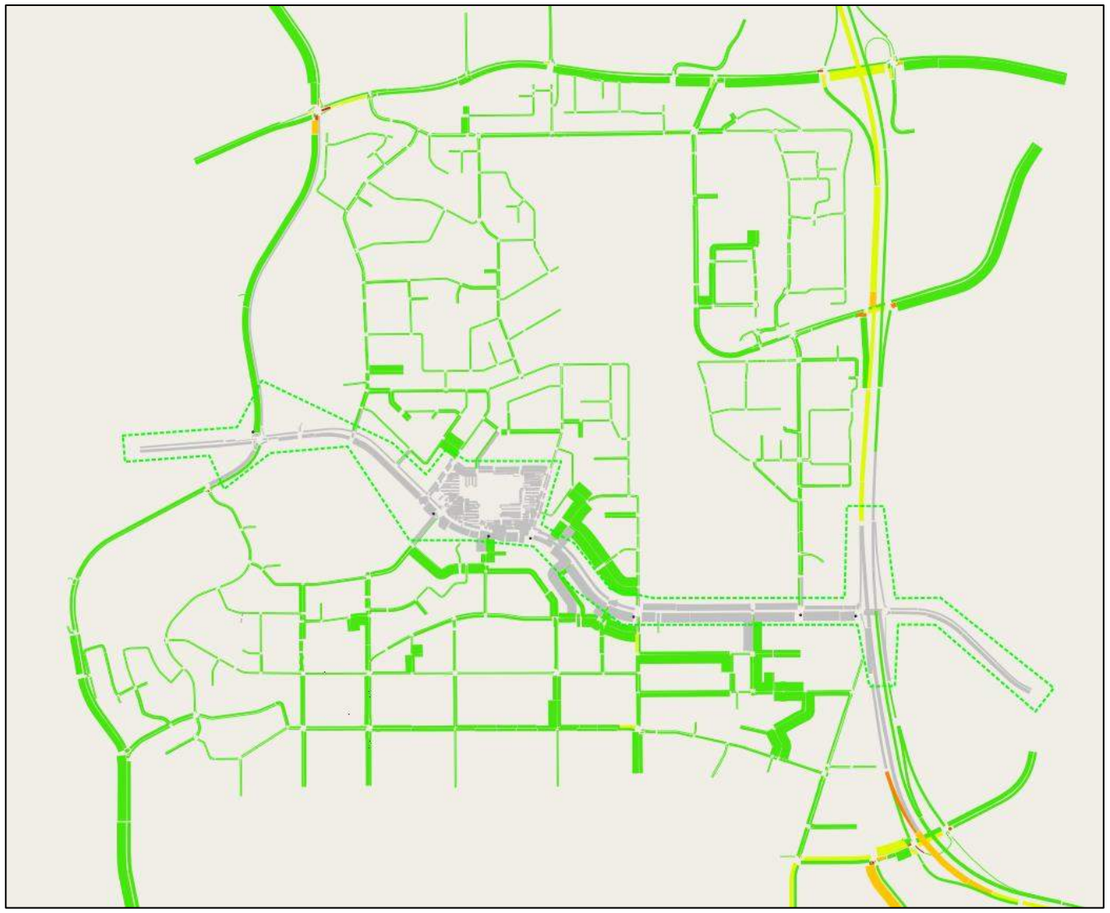


Figure 1-2 Flow density plot – 2014 Base PM

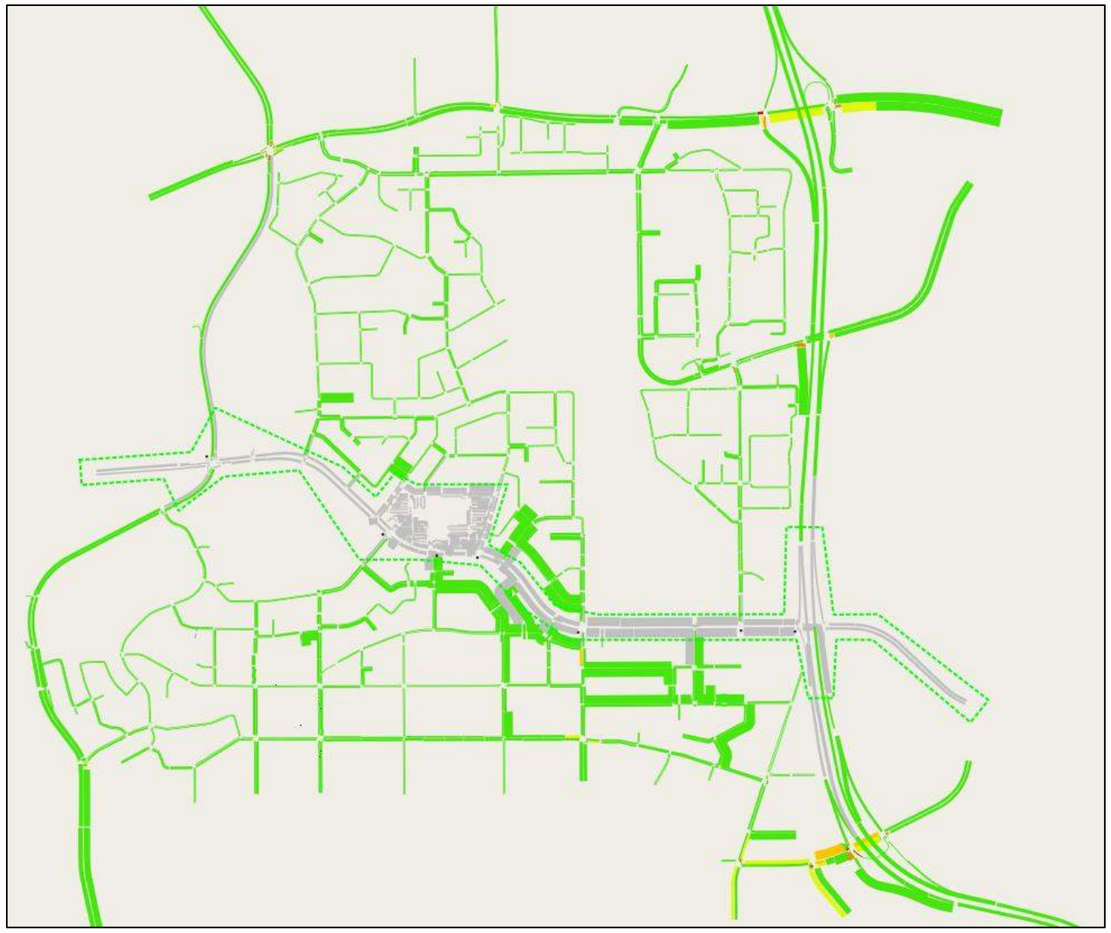


Figure 1-3 Flow density plot – 2014 Base Saturday

## 1.2 2021 Do-minimum

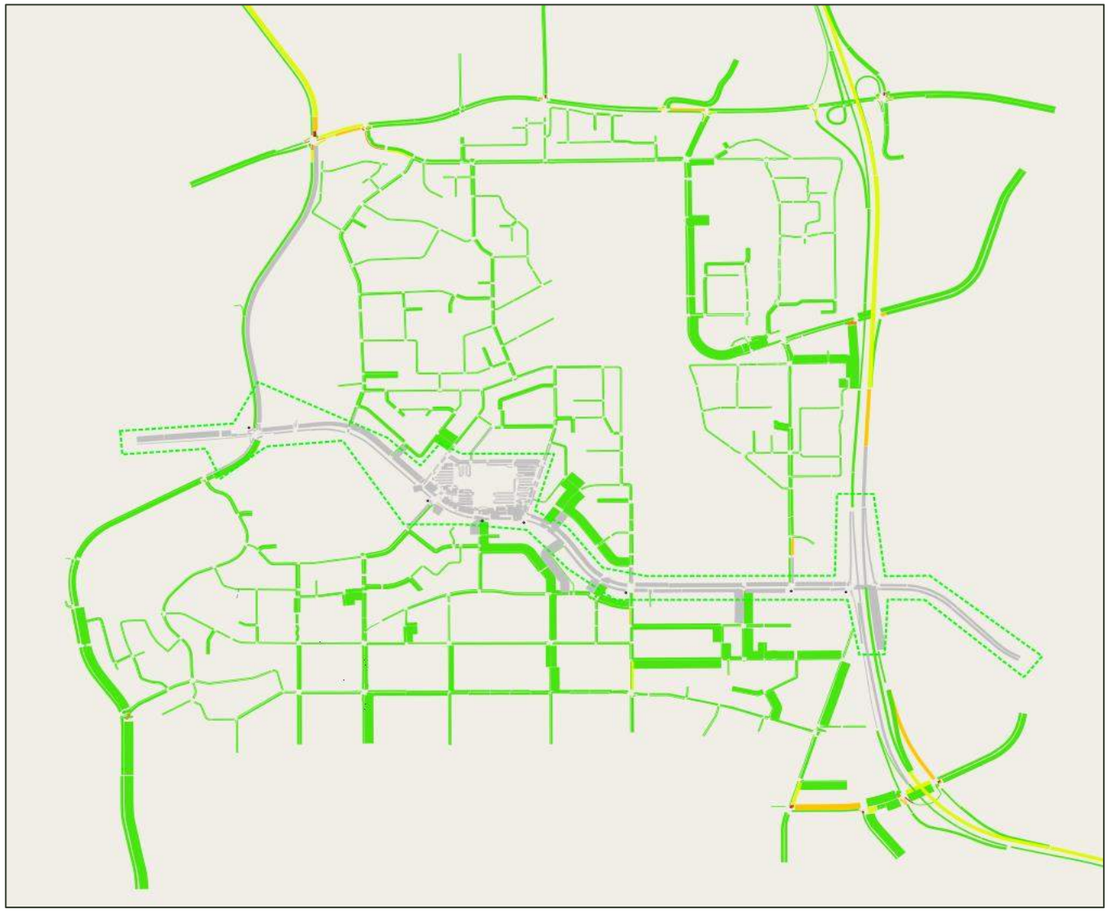


Figure 1-4 Flow density plot – 2021 Do-minimum AM

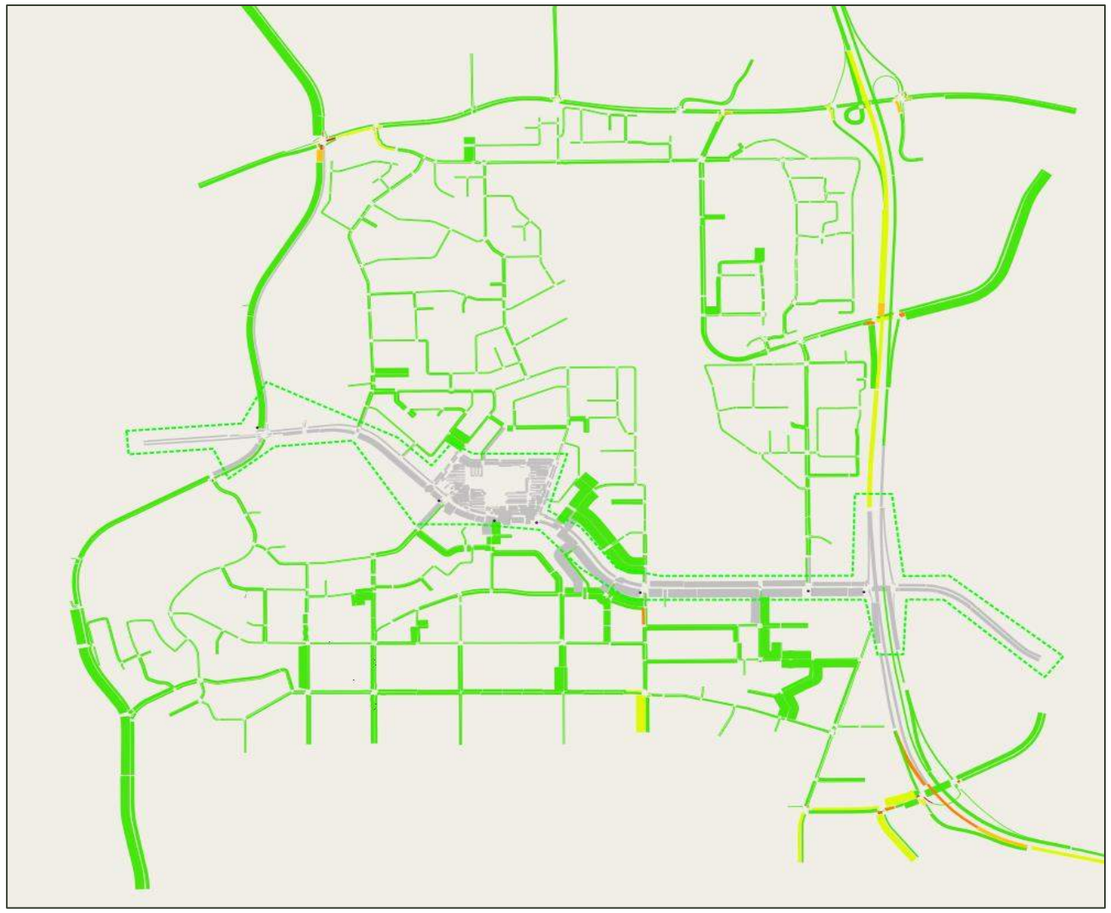


Figure 1-5 Flow density plot – 2021 Do-minimum PM

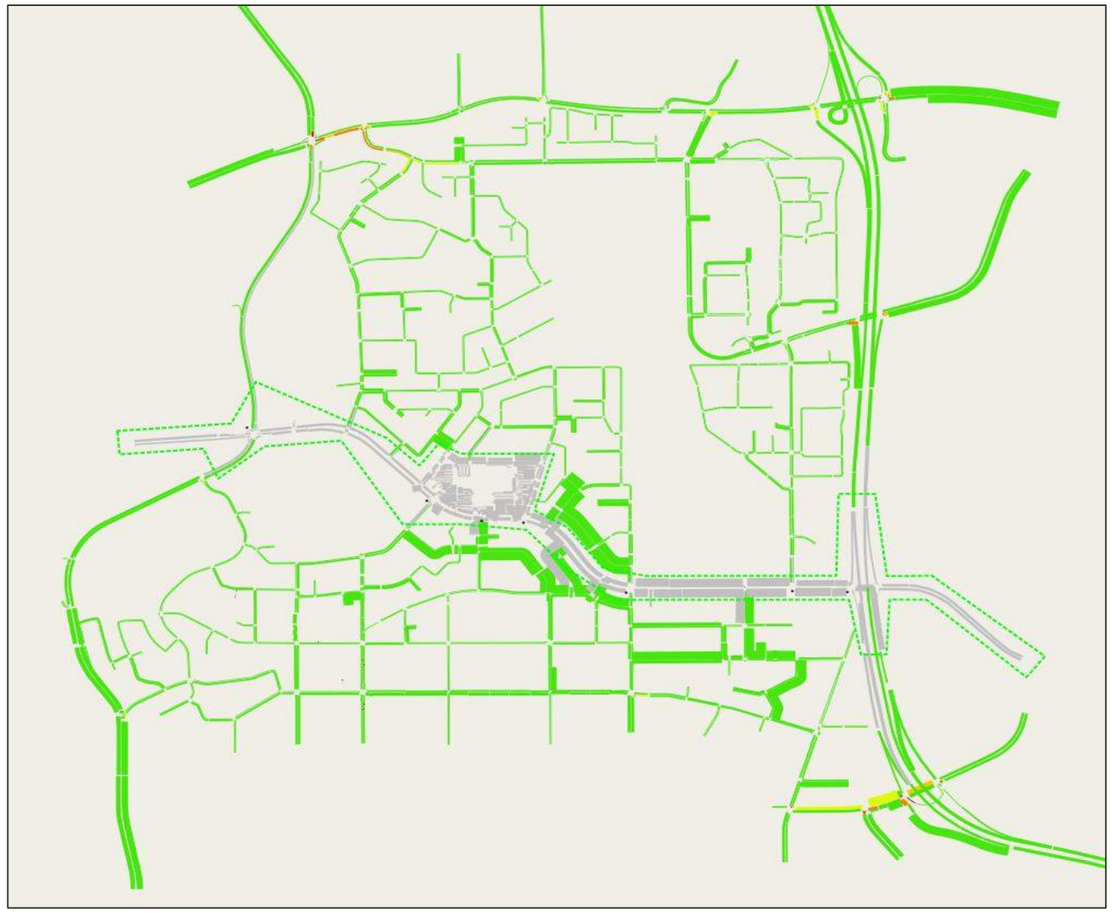


Figure 1-6 Flow density plot – 2021 Do-minimum Saturday

## 1.3 2021 Option

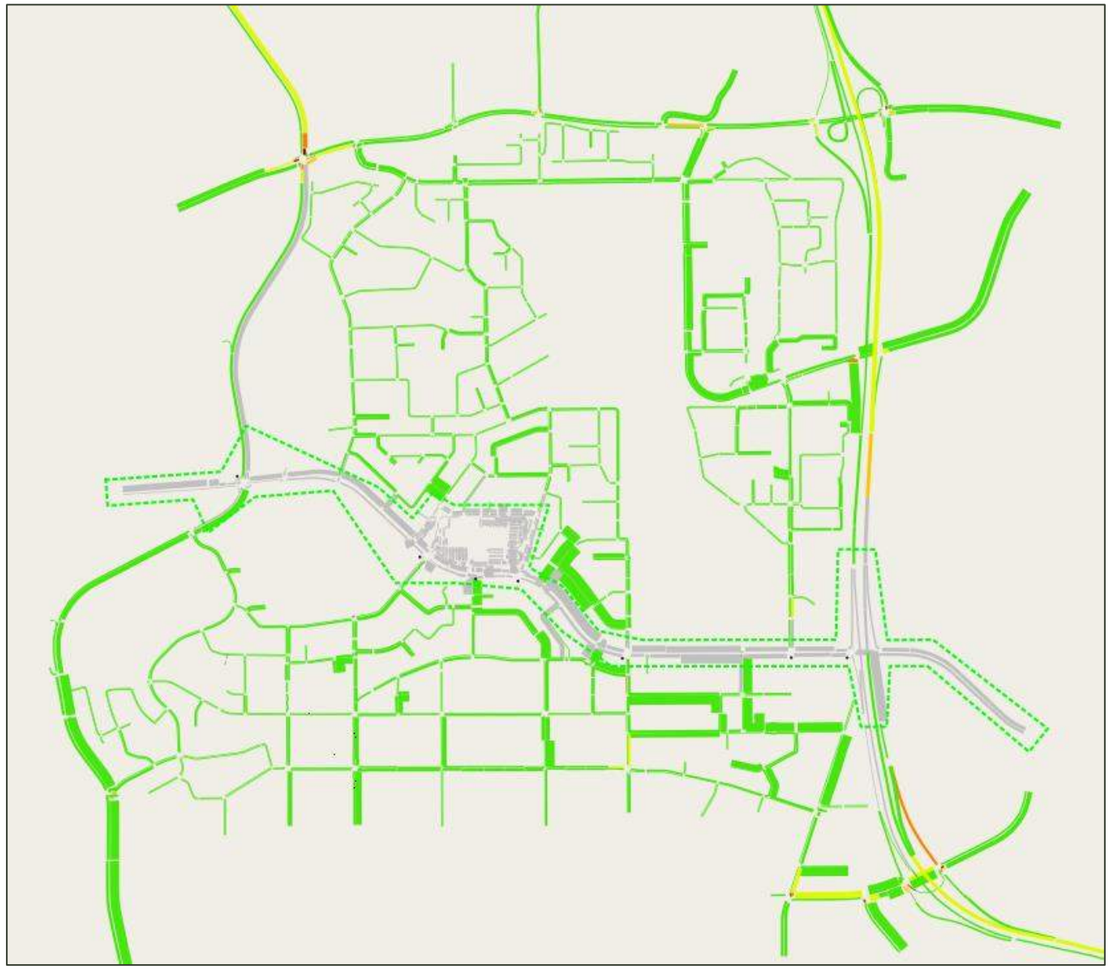


Figure 1-7 Flow density plot – 2021 Option AM

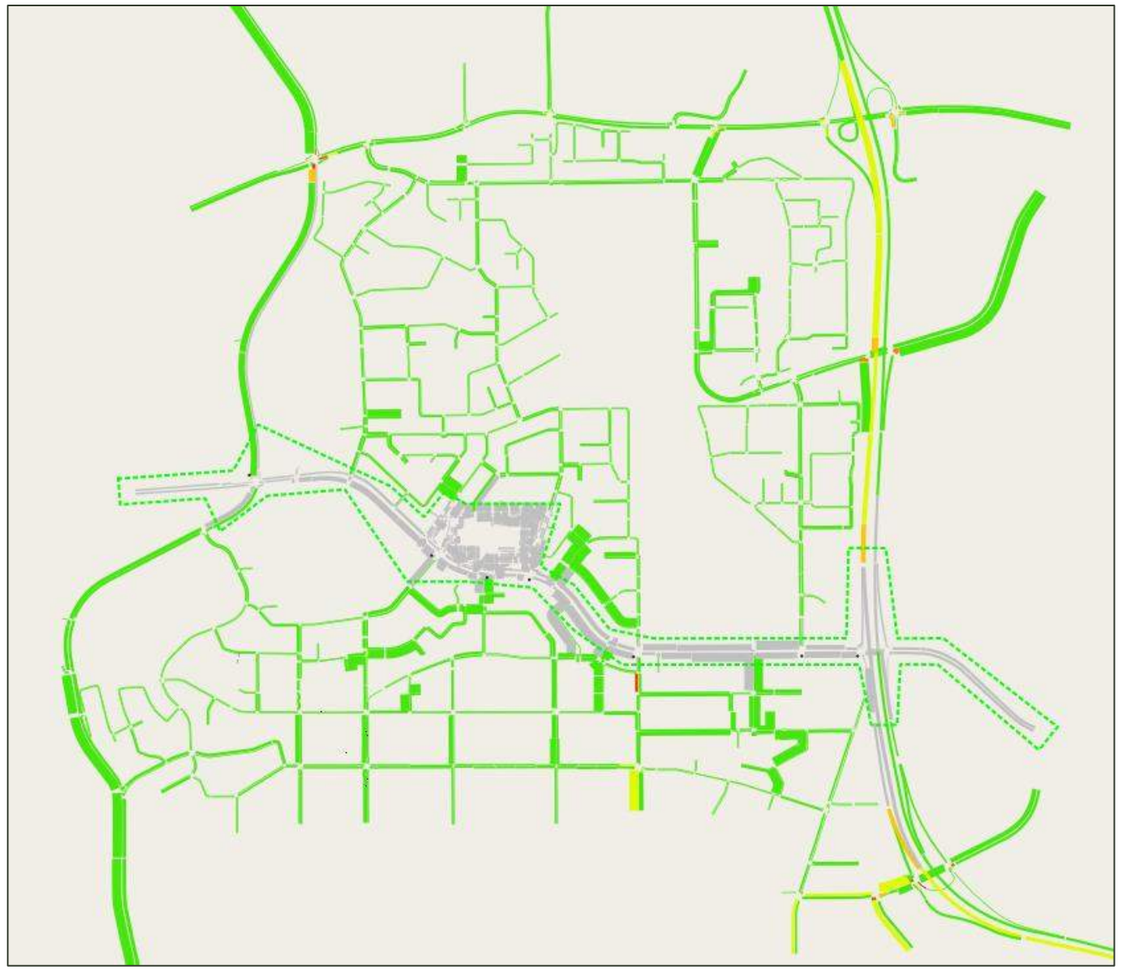


Figure 1-8 Flow density plot – 2021 Option PM

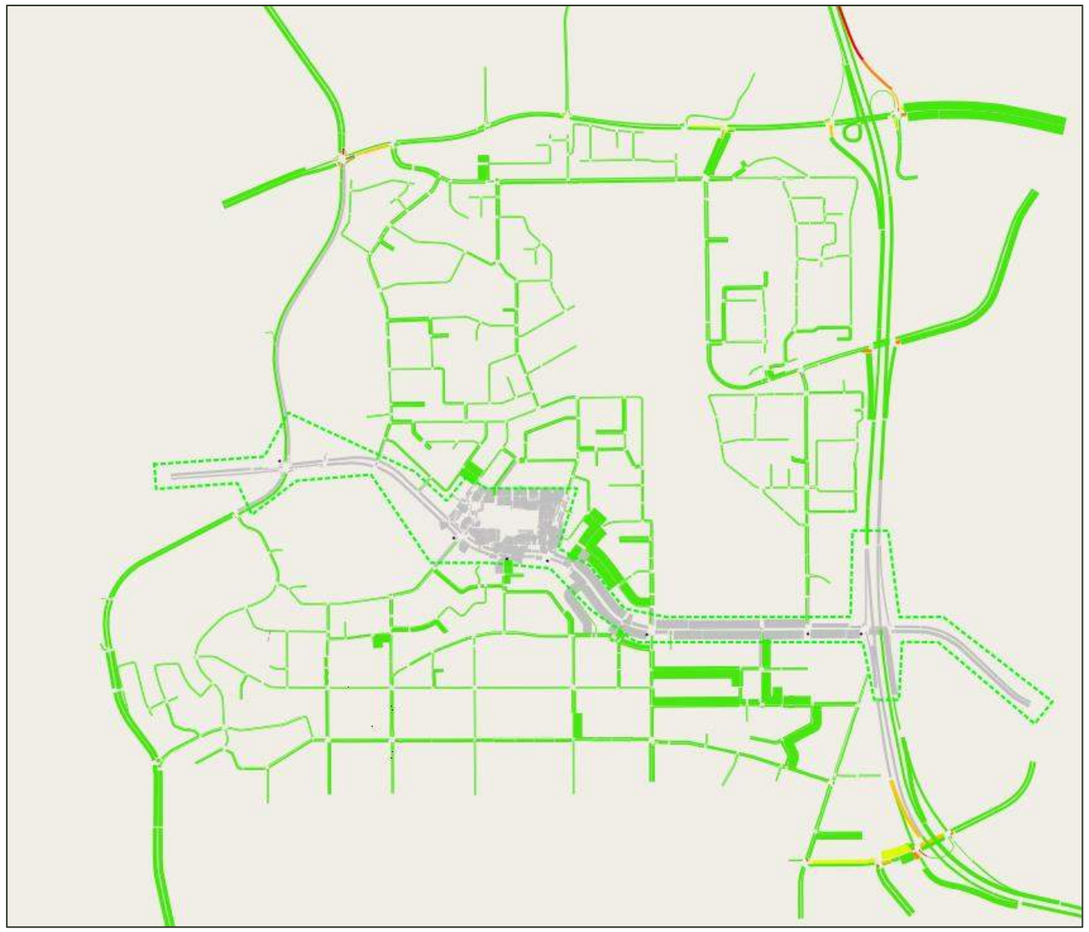


Figure 1-9 Flow density plot – 2021 Option Saturday

## 1.4 2031 Do-minimum

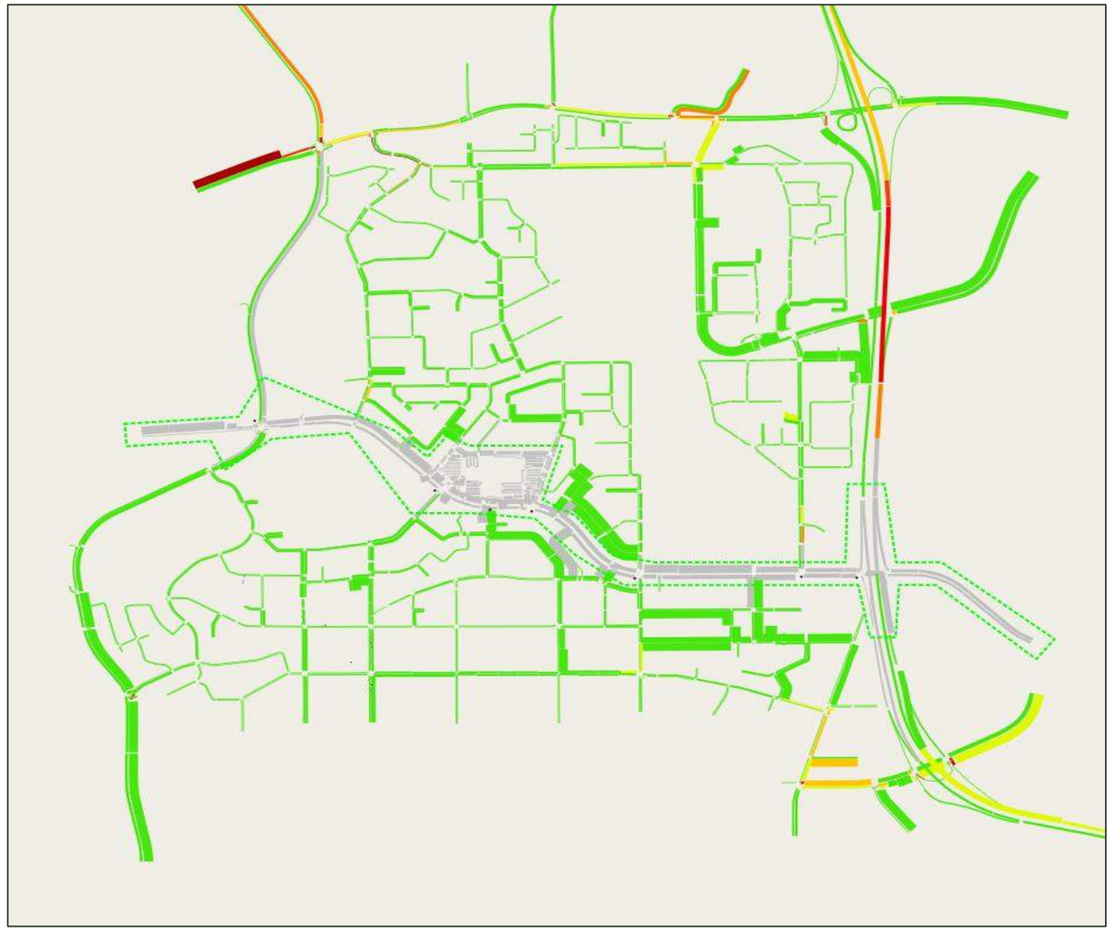


Figure 1-10 Flow density plot – 2031 Do-minimum AM

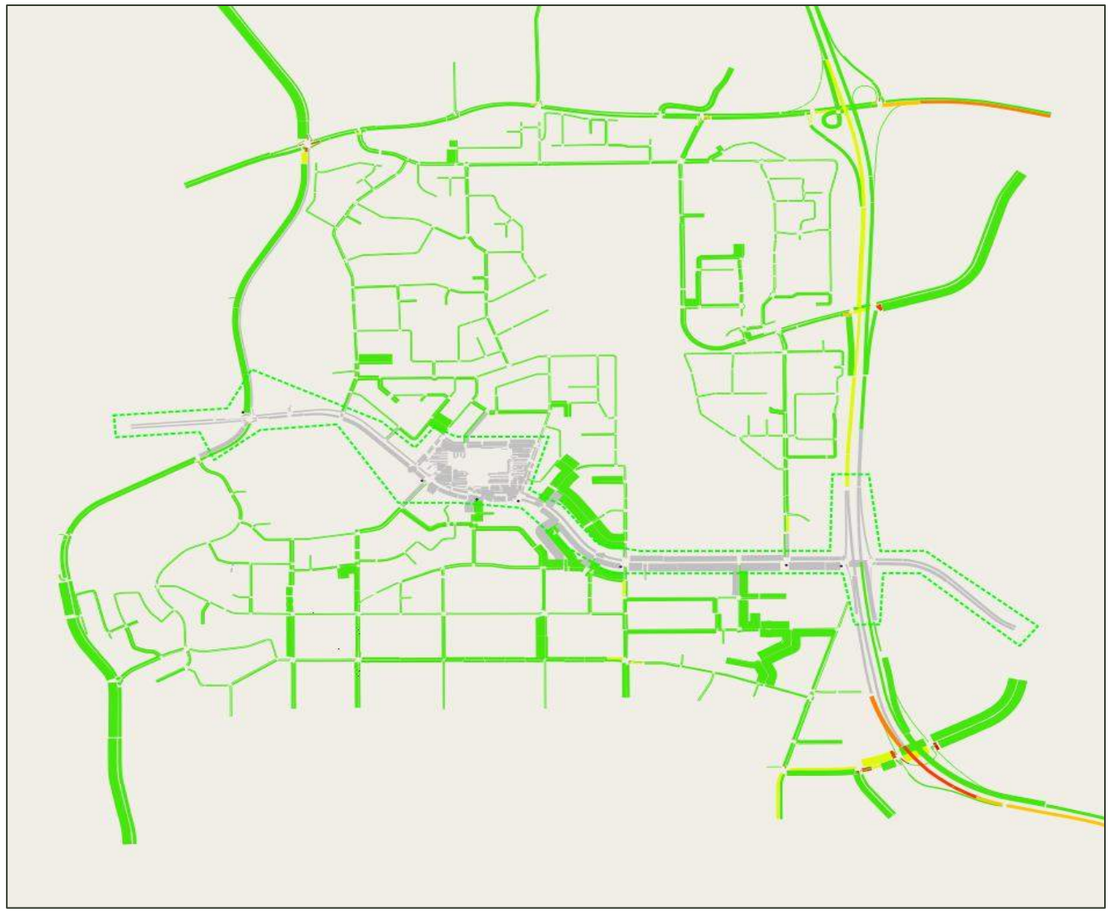


Figure 1-11 Flow density plot – 2031 Do-minimum PM

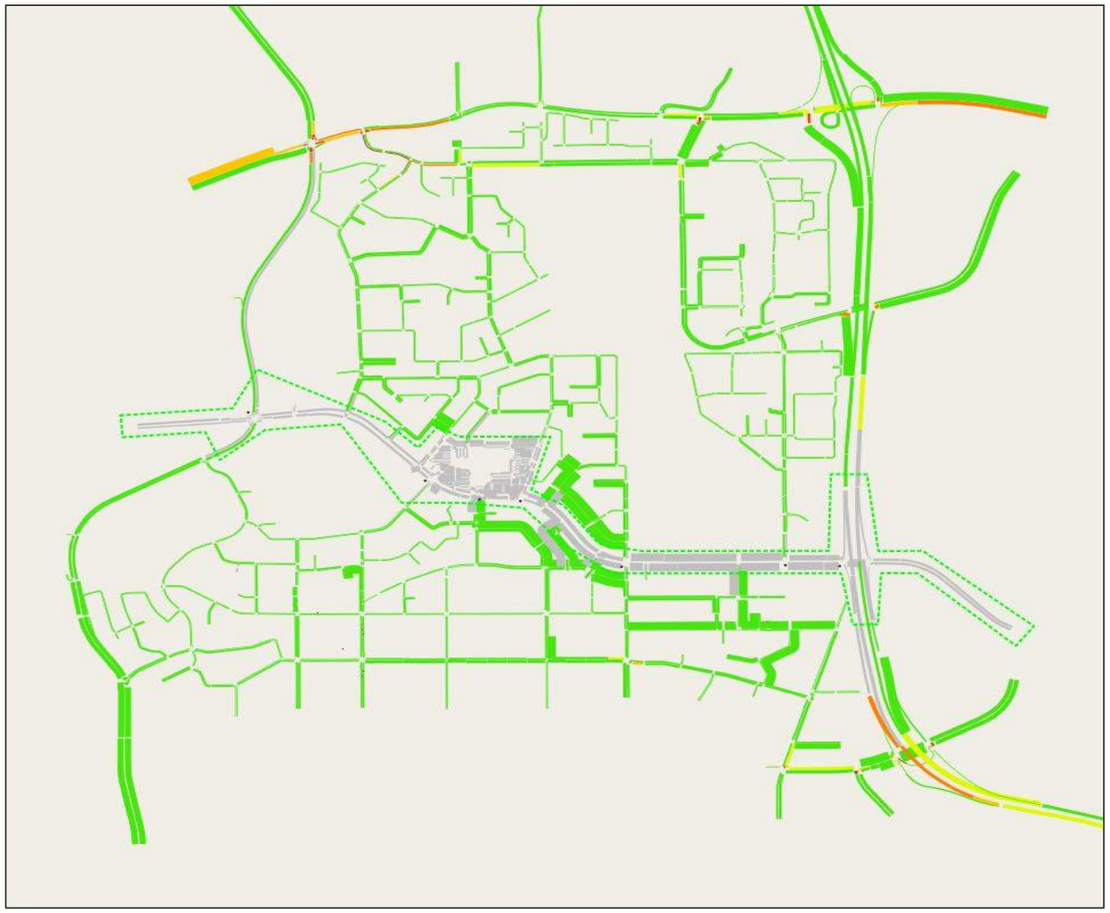


Figure 1-12 Flow density plot – 2031 Do-minimum Saturday

## 1.5 2031 Option

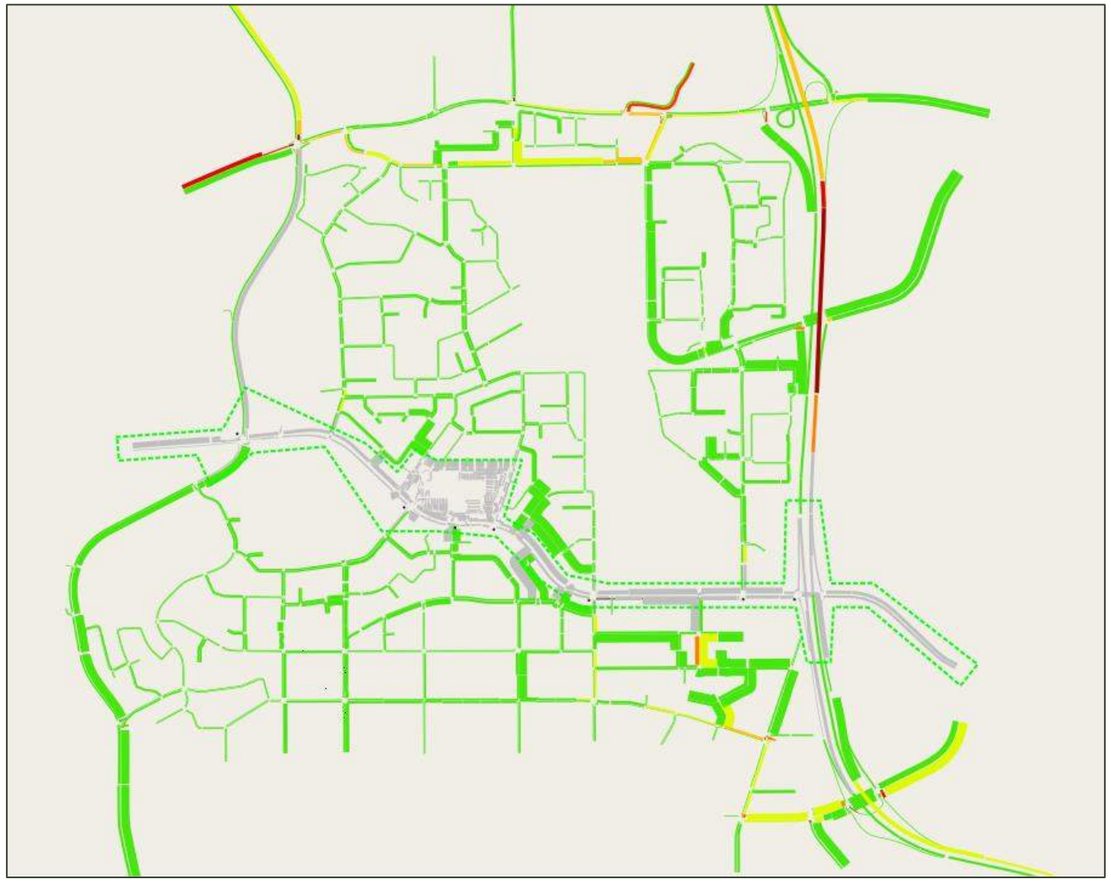


Figure 1-13 Flow density plot – 2031 Option AM

Figure 1-14 Flow density plot – 2031 Option PM

**Figure 1-15 Flow density plot – 2031 Option Saturday**

# Appendix F

# Development Access SIDRA Analysis Outputs

# 1 Modified Development

## 1.1 Karrinyup Road / Jeanes Road - Access Way 1

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 185 | 1.0 | 0.141 | 8.1 | LOS A | 2.2 | 15.8 | 0.27 | 0.63 | 48.9 |
| 22 | T1 | 398 | 8.1 | 0.316 | 34.7 | LOS C | 9.5 | 71.2 | 0.79 | 0.66 | 38.3 |
| 23 | R2 | 29 | 0.9 | 0.337 | 74.7 | LOS E | 1.9 | 13.4 | 1.00 | 0.72 | 19.3 |
| Approach | | 612 | 5.7 | 0.337 | 28.5 | LOS C | 9.5 | 71.2 | 0.64 | 0.66 | 39.8 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 33 | 0.0 | 0.095 | 55.0 | LOS E | 1.4 | 9.7 | 0.91 | 0.68 | 22.1 |
| 25 | T1 | 16 | 0.0 | 0.095 | 53.0 | LOS D | 1.4 | 9.7 | 0.91 | 0.67 | 21.7 |
| 26 | R2 | 19 | 10.5 | 0.091 | 54.8 | LOS D | 1.1 | 8.2 | 0.90 | 0.67 | 22.3 |
| Approach | | 68 | 2.9 | 0.095 | 54.5 | LOS D | 1.4 | 9.7 | 0.90 | 0.68 | 22.1 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 34 | 1.3 | 0.025 | 10.7 | LOS B | 0.6 | 4.2 | 0.32 | 0.61 | 43.6 |
| 28 | T1 | 1309 | 2.3 | 0.582 | 12.5 | LOS B | 25.3 | 180.6 | 0.57 | 0.52 | 49.8 |
| 29 | R2 | 260 | 0.8 | 0.433 | 26.6 | LOS C | 8.4 | 59.0 | 0.84 | 0.79 | 39.1 |
| Approach | | 1603 | 2.0 | 0.582 | 14.7 | LOS B | 25.3 | 180.6 | 0.61 | 0.56 | 47.6 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 144 | 3.3 | 0.217 | 16.1 | LOS B | 3.9 | 27.8 | 0.59 | 0.69 | 43.5 |
| 31 | T1 | 9 | 0.0 | 0.217 | 14.8 | LOS B | 3.9 | 27.8 | 0.59 | 0.69 | 34.2 |
| 32 | R2 | 99 | 0.8 | 0.501 | 63.0 | LOS E | 6.0 | 42.6 | 0.98 | 0.79 | 28.1 |
| Approach | | 252 | 2.2 | 0.501 | 34.5 | LOS C | 6.0 | 42.6 | 0.74 | 0.73 | 35.5 |
| All Vehicles | | 2535 | 2.9 | 0.582 | 21.1 | LOS C | 25.3 | 180.6 | 0.64 | 0.61 | 43.2 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 176 | 1.0 | 0.113 | 6.3 | LOS A | 1.0 | 6.8 | 0.15 | 0.59 | 50.1 |
| 22 | T1 | 1004 | 8.1 | 0.564 | 24.1 | LOS C | 22.4 | 167.6 | 0.74 | 0.66 | 43.0 |
| 23 | R2 | 49 | 0.9 | 0.488 | 74.1 | LOS E | 3.2 | 22.7 | 1.00 | 0.74 | 19.4 |
| Approach | | 1229 | 6.8 | 0.564 | 23.6 | LOS C | 22.4 | 167.6 | 0.67 | 0.65 | 42.6 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 48 | 0.0 | 0.058 | 37.1 | LOS D | 1.4 | 10.0 | 0.75 | 0.63 | 26.9 |
| 25 | T1 | 15 | 0.0 | 0.058 | 35.1 | LOS D | 1.4 | 10.0 | 0.75 | 0.60 | 26.1 |
| 26 | R2 | 221 | 10.5 | 0.551 | 43.7 | LOS D | 11.9 | 90.5 | 0.89 | 0.78 | 25.0 |
| Approach | | 284 | 8.2 | 0.551 | 42.1 | LOS D | 11.9 | 90.5 | 0.86 | 0.74 | 25.4 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 40 | 1.3 | 0.026 | 6.4 | LOS A | 0.2 | 1.7 | 0.16 | 0.58 | 47.5 |
| 28 | T1 | 558 | 2.3 | 0.290 | 20.6 | LOS C | 10.4 | 74.5 | 0.63 | 0.54 | 44.8 |
| 29 | R2 | 43 | 0.8 | 0.419 | 73.6 | LOS E | 2.8 | 19.7 | 1.00 | 0.74 | 26.0 |
| Approach | | 641 | 2.1 | 0.419 | 23.3 | LOS C | 10.4 | 74.5 | 0.63 | 0.56 | 42.8 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 31 | 3.3 | 0.210 | 36.7 | LOS D | 2.8 | 19.5 | 0.86 | 0.76 | 35.2 |
| 31 | T1 | 45 | 0.0 | 0.210 | 35.4 | LOS D | 2.8 | 19.5 | 0.86 | 0.76 | 26.2 |
| 32 | R2 | 177 | 0.8 | 0.448 | 45.9 | LOS D | 9.3 | 65.5 | 0.87 | 0.79 | 32.3 |
| Approach | | 253 | 1.0 | 0.448 | 42.9 | LOS D | 9.3 | 65.5 | 0.87 | 0.78 | 31.8 |
| All Vehicles | | 2407 | 5.1 | 0.564 | 27.7 | LOS C | 22.4 | 167.6 | 0.70 | 0.65 | 39.2 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 94 | 1.0 | 0.061 | 6.3 | LOS A | 0.5 | 3.4 | 0.15 | 0.59 | 50.1 |
| 22 | T1 | 710 | 8.1 | 0.397 | 23.8 | LOS C | 14.7 | 110.1 | 0.70 | 0.61 | 43.2 |
| 23 | R2 | 77 | 0.9 | 0.413 | 66.7 | LOS E | 4.7 | 33.4 | 0.98 | 0.77 | 20.8 |
| Approach | | 881 | 6.8 | 0.413 | 25.7 | LOS C | 14.7 | 110.1 | 0.66 | 0.62 | 41.3 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 207 | 0.0 | 0.226 | 41.6 | LOS D | 5.5 | 38.5 | 0.82 | 0.72 | 25.5 |
| 25 | T1 | 16 | 0.0 | 0.226 | 39.6 | LOS D | 5.5 | 38.5 | 0.82 | 0.71 | 24.6 |
| 26 | R2 | 63 | 10.5 | 0.164 | 40.5 | LOS D | 3.1 | 23.4 | 0.80 | 0.67 | 25.9 |
| Approach | | 286 | 2.3 | 0.226 | 41.2 | LOS D | 5.5 | 38.5 | 0.82 | 0.71 | 25.5 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 80 | 1.3 | 0.075 | 17.5 | LOS B | 2.2 | 15.3 | 0.49 | 0.66 | 38.5 |
| 28 | T1 | 751 | 2.3 | 0.416 | 24.0 | LOS C | 15.5 | 110.4 | 0.70 | 0.62 | 43.1 |
| 29 | R2 | 42 | 0.8 | 0.221 | 65.0 | LOS E | 2.5 | 17.7 | 0.96 | 0.74 | 27.7 |
| Approach | | 873 | 2.1 | 0.416 | 25.4 | LOS C | 15.5 | 110.4 | 0.70 | 0.63 | 41.6 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 180 | 3.3 | 0.274 | 12.2 | LOS B | 3.7 | 26.5 | 0.55 | 0.69 | 45.6 |
| 31 | T1 | 16 | 0.0 | 0.274 | 10.9 | LOS B | 3.7 | 26.5 | 0.55 | 0.69 | 36.3 |
| 32 | R2 | 115 | 0.8 | 0.407 | 51.9 | LOS D | 6.4 | 44.8 | 0.90 | 0.78 | 30.7 |
| Approach | | 311 | 2.2 | 0.407 | 26.8 | LOS C | 6.4 | 44.8 | 0.68 | 0.72 | 38.3 |
| All Vehicles | | 2351 | 3.9 | 0.416 | 27.6 | LOS C | 15.5 | 110.4 | 0.70 | 0.65 | 39.1 |

## 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 207 | 1.0 | 0.166 | 8.2 | LOS A | 2.6 | 18.2 | 0.28 | 0.63 | 48.8 |
| 22 | T1 | 451 | 8.1 | 0.395 | 38.7 | LOS D | 11.5 | 86.1 | 0.84 | 0.71 | 36.7 |
| 23 | R2 | 16 | 0.9 | 0.186 | 73.7 | LOS E | 1.0 | 7.3 | 0.99 | 0.69 | 19.5 |
| Approach | | 674 | 5.8 | 0.395 | 30.2 | LOS C | 11.5 | 86.1 | 0.67 | 0.69 | 39.3 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 31 | 0.0 | 0.088 | 54.0 | LOS D | 1.3 | 9.4 | 0.90 | 0.68 | 22.4 |
| 25 | T1 | 17 | 0.0 | 0.088 | 51.9 | LOS D | 1.3 | 9.4 | 0.90 | 0.66 | 21.9 |
| 26 | R2 | 21 | 10.5 | 0.097 | 53.9 | LOS D | 1.2 | 8.9 | 0.90 | 0.67 | 22.5 |
| Approach | | 69 | 3.2 | 0.097 | 53.5 | LOS D | 1.3 | 9.4 | 0.90 | 0.67 | 22.3 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 32 | 1.3 | 0.024 | 11.0 | LOS B | 0.6 | 4.1 | 0.33 | 0.61 | 43.3 |
| 28 | T1 | 1284 | 2.3 | 0.543 | 12.8 | LOS B | 22.4 | 159.6 | 0.57 | 0.52 | 49.6 |
| 29 | R2 | 295 | 0.8 | 0.395 | 35.8 | LOS D | 13.3 | 93.7 | 0.77 | 0.79 | 35.6 |
| Approach | | 1611 | 2.0 | 0.543 | 17.0 | LOS B | 22.4 | 159.6 | 0.60 | 0.57 | 46.2 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 104 | 3.3 | 0.343 | 32.4 | LOS C | 5.8 | 41.4 | 0.85 | 0.77 | 36.6 |
| 31 | T1 | 32 | 0.0 | 0.343 | 31.1 | LOS C | 5.8 | 41.4 | 0.85 | 0.77 | 27.5 |
| 32 | R2 | 109 | 0.8 | 0.523 | 62.3 | LOS E | 6.6 | 46.8 | 0.98 | 0.79 | 28.2 |
| Approach | | 245 | 1.8 | 0.523 | 45.5 | LOS D | 6.6 | 46.8 | 0.91 | 0.78 | 31.4 |
| All Vehicles | | 2599 | 3.0 | 0.543 | 24.0 | LOS C | 22.4 | 159.6 | 0.66 | 0.62 | 41.7 |

## 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 89 | 1.0 | 0.060 | 6.8 | LOS A | 0.7 | 4.8 | 0.19 | 0.60 | 49.7 |
| 22 | T1 | 962 | 8.1 | 0.619 | 30.0 | LOS C | 24.1 | 180.6 | 0.82 | 0.73 | 40.2 |
| 23 | R2 | 61 | 0.9 | 0.354 | 67.3 | LOS E | 3.8 | 26.5 | 0.98 | 0.76 | 20.6 |
| Approach | | 1112 | 7.2 | 0.619 | 30.2 | LOS C | 24.1 | 180.6 | 0.78 | 0.72 | 39.6 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 50 | 0.0 | 0.066 | 34.9 | LOS C | 1.7 | 12.1 | 0.73 | 0.63 | 27.5 |
| 25 | T1 | 28 | 0.0 | 0.066 | 32.9 | LOS C | 1.7 | 12.1 | 0.73 | 0.58 | 26.9 |
| 26 | R2 | 204 | 10.5 | 0.462 | 39.5 | LOS D | 10.3 | 78.5 | 0.84 | 0.75 | 26.3 |
| Approach | | 282 | 7.6 | 0.462 | 38.0 | LOS D | 10.3 | 78.5 | 0.81 | 0.71 | 26.6 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 57 | 1.3 | 0.050 | 14.5 | LOS B | 1.3 | 9.2 | 0.43 | 0.64 | 40.6 |
| 28 | T1 | 487 | 2.3 | 0.290 | 25.5 | LOS C | 10.0 | 71.6 | 0.59 | 0.59 | 42.3 |
| 29 | R2 | 102 | 0.8 | 0.580 | 68.9 | LOS E | 6.4 | 45.4 | 1.00 | 0.76 | 26.9 |
| Approach | | 646 | 2.0 | 0.580 | 31.4 | LOS C | 10.0 | 71.6 | 0.72 | 0.62 | 38.6 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 252 | 3.3 | 0.481 | 19.4 | LOS B | 9.0 | 64.3 | 0.79 | 0.79 | 41.9 |
| 31 | T1 | 25 | 0.0 | 0.481 | 18.1 | LOS B | 9.0 | 64.3 | 0.79 | 0.79 | 32.6 |
| 32 | R2 | 153 | 0.8 | 0.367 | 42.5 | LOS D | 7.6 | 53.7 | 0.83 | 0.77 | 33.3 |
| Approach | | 430 | 2.2 | 0.481 | 27.6 | LOS C | 9.0 | 64.3 | 0.80 | 0.79 | 37.9 |
| All Vehicles | | 2470 | 5.0 | 0.619 | 30.9 | LOS C | 24.1 | 180.6 | 0.77 | 0.70 | 37.6 |

## 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Karrinyup Road (SE) | | | | | | | | | | | |
| 21 | L2 | 94 | 1.0 | 0.064 | 6.8 | LOS A | 0.7 | 5.1 | 0.19 | 0.60 | 49.7 |
| 22 | T1 | 665 | 8.1 | 0.385 | 24.9 | LOS C | 14.0 | 104.7 | 0.71 | 0.61 | 42.6 |
| 23 | R2 | 82 | 0.9 | 0.381 | 64.4 | LOS E | 4.9 | 34.9 | 0.97 | 0.77 | 21.2 |
| Approach | | 841 | 6.6 | 0.385 | 26.7 | LOS C | 14.0 | 104.7 | 0.68 | 0.63 | 40.8 |
| NorthEast: Shopping Centre Access (NE) | | | | | | | | | | | |
| 24 | L2 | 275 | 0.0 | 0.342 | 42.9 | LOS D | 8.6 | 60.0 | 0.85 | 0.74 | 25.1 |
| 25 | T1 | 46 | 0.0 | 0.342 | 40.6 | LOS D | 7.7 | 53.9 | 0.84 | 0.73 | 24.4 |
| 26 | R2 | 69 | 10.5 | 0.187 | 41.7 | LOS D | 3.4 | 26.0 | 0.81 | 0.69 | 25.6 |
| Approach | | 390 | 1.9 | 0.342 | 42.4 | LOS D | 8.6 | 60.0 | 0.84 | 0.73 | 25.1 |
| NorthWest: Karrinyup Road (NW) | | | | | | | | | | | |
| 27 | L2 | 77 | 1.3 | 0.053 | 6.4 | LOS A | 0.5 | 3.3 | 0.16 | 0.59 | 47.5 |
| 28 | T1 | 724 | 2.3 | 0.414 | 25.2 | LOS C | 15.2 | 106.4 | 0.72 | 0.63 | 42.5 |
| 29 | R2 | 90 | 0.8 | 0.410 | 64.6 | LOS E | 5.4 | 38.3 | 0.97 | 0.77 | 27.8 |
| Approach | | 891 | 2.1 | 0.414 | 27.6 | LOS C | 15.2 | 106.4 | 0.70 | 0.64 | 40.5 |
| SouthWest: Jeanes Road (SW) | | | | | | | | | | | |
| 30 | L2 | 143 | 3.3 | 0.340 | 20.1 | LOS C | 4.7 | 33.4 | 0.76 | 0.75 | 41.7 |
| 31 | T1 | 44 | 0.0 | 0.340 | 18.8 | LOS B | 4.7 | 33.4 | 0.76 | 0.75 | 32.3 |
| 32 | R2 | 97 | 0.8 | 0.414 | 54.7 | LOS D | 5.5 | 38.9 | 0.92 | 0.78 | 30.0 |
| Approach | | 284 | 1.9 | 0.414 | 31.7 | LOS C | 5.5 | 38.9 | 0.81 | 0.76 | 35.6 |
| All Vehicles | | 2406 | 3.6 | 0.414 | 30.2 | LOS C | 15.2 | 108.4 | 0.73 | 0.66 | 37.4 |

## 1.2 Karrinyup Road - Access Way 2

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 72 | 0.0 | 0.295 | 14.9 | LOS B | 1.0 | 8.0 | 0.84 | 0.96 | 21.1 |
| 3a | R1 | 9 | 100.0 | 0.295 | 50.5 | LOS F | 1.0 | 8.0 | 0.84 | 0.96 | 21.1 |
| Approach | | 81 | 11.1 | 0.295 | 18.9 | LOS C | 1.0 | 8.0 | 0.84 | 0.96 | 21.1 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 80 | 0.0 | 0.367 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 54.7 |
| 10a | L1 | 16 | 100.0 | 0.367 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 54.1 |
| 11 | T1 | 1311 | 0.8 | 0.367 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.04 | 59.6 |
| Approach | | 1409 | 2.0 | 0.367 | 0.5 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 59.3 |
| All Vehicles | | 1490 | 2.5 | 0.367 | 1.4 | NA | 1.0 | 8.0 | 0.05 | 0.10 | 58.0 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 233 | 0.0 | 0.323 | 8.4 | LOS A | 1.5 | 10.9 | 0.61 | 0.85 | 29.3 |
| 3a | R1 | 7 | 100.0 | 0.323 | 17.7 | LOS C | 1.5 | 10.9 | 0.61 | 0.85 | 29.3 |
| Approach | | 240 | 2.9 | 0.323 | 8.7 | LOS A | 1.5 | 10.9 | 0.61 | 0.85 | 29.3 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 96 | 0.0 | 0.209 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.20 | 53.6 |
| 10a | L1 | 22 | 100.0 | 0.209 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.20 | 53.2 |
| 11 | T1 | 674 | 0.6 | 0.209 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.08 | 59.3 |
| Approach | | 792 | 3.3 | 0.209 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 58.7 |
| All Vehicles | | 1032 | 3.2 | 0.323 | 2.7 | NA | 1.5 | 10.9 | 0.14 | 0.27 | 55.2 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 326 | 0.0 | 0.585 | 13.6 | LOS B | 3.6 | 25.4 | 0.79 | 1.07 | 24.4 |
| 3a | R1 | 6 | 100.0 | 0.585 | 32.6 | LOS D | 3.6 | 25.4 | 0.79 | 1.07 | 24.4 |
| Approach | | 332 | 1.8 | 0.585 | 13.9 | LOS B | 3.6 | 25.4 | 0.79 | 1.07 | 24.4 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 71 | 0.0 | 0.277 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 54.6 |
| 10a | L1 | 14 | 100.0 | 0.277 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 54.1 |
| 11 | T1 | 977 | 0.5 | 0.277 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 59.5 |
| Approach | | 1062 | 1.8 | 0.277 | 0.5 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 59.3 |
| All Vehicles | | 1394 | 1.6 | 0.585 | 3.7 | NA | 3.6 | 25.4 | 0.19 | 0.30 | 54.3 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 44 | 0.0 | 0.244 | 14.7 | LOS B | 0.8 | 6.5 | 0.85 | 0.95 | 19.7 |
| 3a | R1 | 10 | 100.0 | 0.244 | 51.1 | LOS F | 0.8 | 6.5 | 0.85 | 0.95 | 19.7 |
| Approach | | 54 | 18.5 | 0.244 | 21.4 | LOS C | 0.8 | 6.5 | 0.85 | 0.95 | 19.7 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 25 | 0.0 | 0.372 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 55.4 |
| 10a | L1 | 17 | 100.0 | 0.372 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 54.6 |
| 11 | T1 | 1388 | 0.6 | 0.372 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.02 | 59.8 |
| Approach | | 1430 | 2.0 | 0.372 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.02 | 59.7 |
| All Vehicles | | 1484 | 2.6 | 0.372 | 1.0 | NA | 0.8 | 6.5 | 0.03 | 0.06 | 58.7 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 206 | 0.0 | 0.243 | 6.8 | LOS A | 1.0 | 7.2 | 0.53 | 0.73 | 31.3 |
| 3a | R1 | 7 | 100.0 | 0.243 | 12.7 | LOS B | 1.0 | 7.2 | 0.53 | 0.73 | 31.4 |
| Approach | | 213 | 3.3 | 0.243 | 7.0 | LOS A | 1.0 | 7.2 | 0.53 | 0.73 | 31.3 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 19 | 0.0 | 0.163 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 54.9 |
| 10a | L1 | 21 | 100.0 | 0.163 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 54.5 |
| 11 | T1 | 578 | 0.5 | 0.163 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 59.7 |
| Approach | | 618 | 3.9 | 0.163 | 0.5 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 59.4 |
| All Vehicles | | 831 | 3.7 | 0.243 | 2.1 | NA | 1.0 | 7.2 | 0.14 | 0.23 | 56.0 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 93 | 0.0 | 0.121 | 6.7 | LOS A | 0.5 | 3.4 | 0.51 | 0.70 | 31.3 |
| 3a | R1 | 6 | 100.0 | 0.121 | 12.4 | LOS B | 0.5 | 3.4 | 0.51 | 0.70 | 31.3 |
| Approach | | 99 | 6.1 | 0.121 | 7.1 | LOS A | 0.5 | 3.4 | 0.51 | 0.70 | 31.3 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 66 | 0.0 | 0.171 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 54.1 |
| 10a | L1 | 11 | 100.0 | 0.171 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 53.7 |
| 11 | T1 | 579 | 0.3 | 0.171 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.07 | 59.4 |
| Approach | | 656 | 1.9 | 0.171 | 0.7 | NA | 0.0 | 0.0 | 0.00 | 0.08 | 59.0 |
| All Vehicles | | 755 | 2.5 | 0.171 | 1.5 | NA | 0.5 | 3.4 | 0.07 | 0.16 | 57.3 |

## 1.3 Karrinyup Road - Access Way 3

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 54 | 0.0 | 0.122 | 11.2 | LOS B | 0.4 | 2.8 | 0.73 | 0.87 | 26.4 |
| Approach | | 54 | 0.0 | 0.122 | 11.2 | LOS B | 0.4 | 2.8 | 0.73 | 0.87 | 26.4 |
| North: Access 3 | | | | | | | | | | | |
| 7 | L2 | 152 | 0.0 | 0.153 | 4.1 | LOS A | 0.6 | 4.3 | 0.51 | 0.60 | 47.3 |
| Approach | | 152 | 0.0 | 0.153 | 4.1 | LOS A | 0.6 | 4.3 | 0.51 | 0.60 | 47.3 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 63 | 0.0 | 0.296 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.07 | 30.0 |
| 11 | T1 | 1078 | 1.7 | 0.296 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 59.6 |
| Approach | | 1141 | 1.6 | 0.296 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.03 | 57.9 |
| All Vehicles | | 1347 | 1.4 | 0.296 | 1.2 | NA | 0.6 | 4.3 | 0.09 | 0.13 | 56.5 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 194 | 0.0 | 0.219 | 6.7 | LOS A | 0.8 | 5.9 | 0.52 | 0.74 | 33.3 |
| Approach | | 194 | 0.0 | 0.219 | 6.7 | LOS A | 0.8 | 5.9 | 0.52 | 0.74 | 33.3 |
| North: Access 3 | | | | | | | | | | | |
| 7 | L2 | 337 | 0.0 | 0.243 | 2.7 | LOS A | 1.1 | 8.0 | 0.32 | 0.42 | 48.3 |
| Approach | | 337 | 0.0 | 0.243 | 2.7 | LOS A | 1.1 | 8.0 | 0.32 | 0.42 | 48.3 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 99 | 0.0 | 0.151 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.20 | 29.5 |
| 11 | T1 | 476 | 2.7 | 0.151 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.08 | 59.2 |
| Approach | | 577 | 2.2 | 0.151 | 1.0 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 53.6 |
| All Vehicles | | 1108 | 1.2 | 0.243 | 2.5 | NA | 1.1 | 8.0 | 0.19 | 0.31 | 51.0 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 319 | 0.0 | 0.488 | 10.8 | LOS B | 2.6 | 18.2 | 0.72 | 0.98 | 27.0 |
| Approach | | 319 | 0.0 | 0.488 | 10.8 | LOS B | 2.6 | 18.2 | 0.72 | 0.98 | 27.0 |
| North: Access 3 | | | | | | | | | | | |
| 7 | L2 | 506 | 0.0 | 0.388 | 3.2 | LOS A | 2.0 | 14.3 | 0.43 | 0.50 | 47.8 |
| Approach | | 506 | 0.0 | 0.388 | 3.2 | LOS A | 2.0 | 14.3 | 0.43 | 0.50 | 47.8 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 166 | 0.0 | 0.221 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.23 | 29.4 |
| 11 | T1 | 681 | 1.6 | 0.221 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.09 | 59.1 |
| Approach | | 847 | 1.3 | 0.221 | 1.1 | NA | 0.0 | 0.0 | 0.00 | 0.12 | 52.9 |
| All Vehicles | | 1672 | 0.7 | 0.488 | 3.6 | NA | 2.6 | 18.2 | 0.27 | 0.40 | 49.4 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 102 | 0.0 | 0.275 | 14.3 | LOS B | 1.0 | 6.9 | 0.81 | 0.94 | 23.2 |
| Approach | | 102 | 0.0 | 0.275 | 14.3 | LOS B | 1.0 | 6.9 | 0.81 | 0.94 | 23.2 |
| North: Access 3 | | | | | | | | | | | |
| 7 | L2 | 107 | 0.0 | 0.115 | 4.4 | LOS A | 0.4 | 3.1 | 0.52 | 0.61 | 47.0 |
| Approach | | 107 | 0.0 | 0.115 | 4.4 | LOS A | 0.4 | 3.1 | 0.52 | 0.61 | 47.0 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 68 | 0.0 | 0.327 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.06 | 30.0 |
| 11 | T1 | 1189 | 1.8 | 0.327 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 59.6 |
| Approach | | 1257 | 1.7 | 0.327 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.03 | 57.9 |
| All Vehicles | | 1466 | 1.5 | 0.327 | 1.6 | NA | 1.0 | 6.9 | 0.09 | 0.14 | 56.3 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 493 | 0.0 | 0.511 | 7.9 | LOS A | 3.4 | 24.1 | 0.60 | 0.89 | 31.2 |
| Approach | | 493 | 0.0 | 0.511 | 7.9 | LOS A | 3.4 | 24.1 | 0.60 | 0.89 | 31.2 |
| North: Access 3 | | | | | | | | | | | |
| 7 | L2 | 365 | 0.0 | 0.267 | 2.8 | LOS A | 1.3 | 8.9 | 0.35 | 0.43 | 48.2 |
| Approach | | 365 | 0.0 | 0.267 | 2.8 | LOS A | 1.3 | 8.9 | 0.35 | 0.43 | 48.2 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 41 | 0.0 | 0.129 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 29.9 |
| 11 | T1 | 454 | 2.0 | 0.129 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.04 | 59.6 |
| Approach | | 495 | 1.8 | 0.129 | 0.5 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 56.9 |
| All Vehicles | | 1353 | 0.7 | 0.511 | 3.8 | NA | 3.4 | 24.1 | 0.31 | 0.46 | 50.2 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Karrinyup Road (East Right Turn Movement) | | | | | | | | | | | |
| 2 | T1 | 191 | 0.0 | 0.206 | 6.4 | LOS A | 0.8 | 5.5 | 0.50 | 0.72 | 33.8 |
| Approach | | 191 | 0.0 | 0.206 | 6.4 | LOS A | 0.8 | 5.5 | 0.50 | 0.72 | 33.8 |
| North: Access 3 | | | | | | | | | | | |
| 7 | L2 | 475 | 0.0 | 0.325 | 2.5 | LOS A | 1.7 | 11.8 | 0.29 | 0.39 | 48.4 |
| Approach | | 475 | 0.0 | 0.325 | 2.5 | LOS A | 1.7 | 11.8 | 0.29 | 0.39 | 48.4 |
| West: Karrinyup Road | | | | | | | | | | | |
| 10 | L2 | 131 | 0.0 | 0.140 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.29 | 29.1 |
| 11 | T1 | 404 | 1.6 | 0.140 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 59.1 |
| Approach | | 535 | 1.2 | 0.140 | 1.4 | NA | 0.0 | 0.0 | 0.00 | 0.14 | 51.2 |
| All Vehicles | | 1201 | 0.5 | 0.325 | 2.6 | NA | 1.7 | 11.8 | 0.19 | 0.33 | 49.3 |

## 1.4 Francis Avenue - Access Way 4

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 48 | 0.0 | 0.026 | 3.4 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 40.8 |
| 2 | T1 | 218 | 0.0 | 0.112 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 50.0 |
| Approach | | 266 | 0.0 | 0.112 | 0.6 | NA | 0.0 | 0.0 | 0.00 | 0.09 | 47.1 |
| West: Access 4 | | | | | | | | | | | |
| 10 | L2 | 7 | 0.0 | 0.004 | 2.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 31.8 |
| Approach | | 7 | 0.0 | 0.004 | 2.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 31.8 |
| All Vehicles | | 273 | 0.0 | 0.112 | 0.7 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 46.1 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 74 | 0.0 | 0.040 | 3.4 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 40.8 |
| 2 | T1 | 256 | 0.0 | 0.131 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 50.0 |
| Approach | | 330 | 0.0 | 0.131 | 0.8 | NA | 0.0 | 0.0 | 0.00 | 0.11 | 46.5 |
| West: Access 4 | | | | | | | | | | | |
| 10 | L2 | 135 | 0.0 | 0.083 | 2.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 31.2 |
| Approach | | 135 | 0.0 | 0.083 | 2.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 31.2 |
| All Vehicles | | 465 | 0.0 | 0.131 | 1.1 | NA | 0.0 | 0.0 | 0.00 | 0.18 | 38.4 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 96 | 0.0 | 0.052 | 3.4 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 40.8 |
| 2 | T1 | 406 | 0.0 | 0.208 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 50.0 |
| Approach | | 502 | 0.0 | 0.208 | 0.7 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 46.9 |
| West: Access 4 | | | | | | | | | | | |
| 10 | L2 | 111 | 0.0 | 0.068 | 2.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 31.8 |
| Approach | | 111 | 0.0 | 0.068 | 2.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 31.8 |
| All Vehicles | | 613 | 0.0 | 0.208 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.14 | 41.2 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 19 | 0.0 | 0.020 | 3.4 | LOS A | 0.0 | 0.0 | 0.00 | 0.26 | 44.1 |
| 2 | T1 | 216 | 0.0 | 0.101 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.02 | 49.3 |
| Approach | | 235 | 0.0 | 0.101 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.04 | 48.6 |
| West: Access 4 | | | | | | | | | | | |
| 10 | L2 | 12 | 0.0 | 0.007 | 2.0 | LOS A | 0.0 | 0.2 | 0.07 | 0.31 | 31.5 |
| Approach | | 12 | 0.0 | 0.007 | 2.0 | LOS A | 0.0 | 0.2 | 0.07 | 0.31 | 31.5 |
| All Vehicles | | 247 | 0.0 | 0.101 | 0.4 | NA | 0.0 | 0.2 | 0.00 | 0.06 | 46.3 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 57 | 0.0 | 0.048 | 3.4 | LOS A | 0.0 | 0.0 | 0.00 | 0.33 | 43.2 |
| 2 | T1 | 501 | 0.0 | 0.240 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.02 | 49.3 |
| Approach | | 558 | 0.0 | 0.240 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 48.2 |
| West: Access 4 | | | | | | | | | | | |
| 10 | L2 | 56 | 0.0 | 0.035 | 2.1 | LOS A | 0.1 | 1.0 | 0.10 | 0.32 | 31.4 |
| Approach | | 56 | 0.0 | 0.035 | 2.1 | LOS A | 0.1 | 1.0 | 0.10 | 0.32 | 31.4 |
| All Vehicles | | 614 | 0.0 | 0.240 | 0.5 | NA | 0.1 | 1.0 | 0.01 | 0.08 | 44.3 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 144 | 0.0 | 0.078 | 3.4 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 40.8 |
| 2 | T1 | 516 | 0.0 | 0.265 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 50.0 |
| Approach | | 660 | 0.0 | 0.265 | 0.7 | NA | 0.0 | 0.0 | 0.00 | 0.11 | 46.6 |
| West: Access 4 | | | | | | | | | | | |
| 10 | L2 | 152 | 0.0 | 0.093 | 2.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 31.8 |
| Approach | | 152 | 0.0 | 0.093 | 2.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 31.8 |
| All Vehicles | | 812 | 0.0 | 0.265 | 1.0 | NA | 0.0 | 0.0 | 0.00 | 0.15 | 40.9 |

## 1.5 Francis Avenue - Access Way 5

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 84 | 0.0 | 0.144 | 4.5 | LOS A | 0.8 | 5.8 | 0.08 | 0.49 | 33.8 |
| 2 | T1 | 132 | 0.0 | 0.144 | 4.8 | LOS A | 0.8 | 5.8 | 0.08 | 0.49 | 43.7 |
| 3u | U | 8 | 0.0 | 0.144 | 9.8 | LOS A | 0.8 | 5.8 | 0.08 | 0.49 | 37.4 |
| Approach | | 224 | 0.0 | 0.144 | 4.9 | LOS A | 0.8 | 5.8 | 0.08 | 0.49 | 39.5 |
| North: Francis Avenue | | | | | | | | | | | |
| 8 | T1 | 294 | 0.0 | 0.262 | 5.7 | LOS A | 1.6 | 11.0 | 0.39 | 0.53 | 38.3 |
| 9 | R2 | 11 | 0.0 | 0.262 | 9.0 | LOS A | 1.6 | 11.0 | 0.39 | 0.53 | 37.0 |
| Approach | | 305 | 0.0 | 0.262 | 5.8 | LOS A | 1.6 | 11.0 | 0.39 | 0.53 | 38.2 |
| West: Access 5 | | | | | | | | | | | |
| 10 | L2 | 12 | 0.0 | 0.144 | 1.9 | LOS A | 0.7 | 5.1 | 0.31 | 0.49 | 31.5 |
| 12 | R2 | 157 | 0.0 | 0.144 | 4.3 | LOS A | 0.7 | 5.1 | 0.31 | 0.49 | 28.6 |
| Approach | | 169 | 0.0 | 0.144 | 4.1 | LOS A | 0.7 | 5.1 | 0.31 | 0.49 | 28.8 |
| All Vehicles | | 698 | 0.0 | 0.262 | 5.1 | LOS A | 1.6 | 11.0 | 0.27 | 0.51 | 35.9 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 132 | 0.0 | 0.271 | 4.7 | LOS A | 1.9 | 13.1 | 0.20 | 0.53 | 32.3 |
| 2 | T1 | 177 | 0.0 | 0.271 | 5.0 | LOS A | 1.9 | 13.1 | 0.20 | 0.53 | 41.2 |
| 3u | U | 80 | 0.0 | 0.271 | 10.0 | LOS A | 1.9 | 13.1 | 0.20 | 0.53 | 35.4 |
| Approach | | 389 | 0.0 | 0.271 | 5.9 | LOS A | 1.9 | 13.1 | 0.20 | 0.53 | 36.8 |
| North: Francis Avenue | | | | | | | | | | | |
| 8 | T1 | 240 | 0.0 | 0.299 | 7.2 | LOS A | 1.8 | 12.8 | 0.60 | 0.68 | 36.3 |
| 9 | R2 | 41 | 0.0 | 0.299 | 10.5 | LOS B | 1.8 | 12.8 | 0.60 | 0.68 | 35.1 |
| Approach | | 281 | 0.0 | 0.299 | 7.7 | LOS A | 1.8 | 12.8 | 0.60 | 0.68 | 36.1 |
| West: Access 5 | | | | | | | | | | | |
| 10 | L2 | 6 | 0.0 | 0.286 | 2.8 | LOS A | 1.7 | 11.8 | 0.49 | 0.59 | 30.7 |
| 12 | R2 | 296 | 0.0 | 0.286 | 5.2 | LOS A | 1.7 | 11.8 | 0.49 | 0.59 | 27.9 |
| Approach | | 302 | 0.0 | 0.286 | 5.1 | LOS A | 1.7 | 11.8 | 0.49 | 0.59 | 27.9 |
| All Vehicles | | 972 | 0.0 | 0.299 | 6.2 | LOS A | 1.9 | 13.1 | 0.40 | 0.59 | 33.4 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 186 | 0.0 | 0.280 | 4.6 | LOS A | 2.0 | 14.0 | 0.12 | 0.53 | 32.7 |
| 2 | T1 | 166 | 0.0 | 0.280 | 4.8 | LOS A | 2.0 | 14.0 | 0.12 | 0.53 | 42.0 |
| 3u | U | 84 | 0.0 | 0.280 | 9.8 | LOS A | 2.0 | 14.0 | 0.12 | 0.53 | 36.0 |
| Approach | | 436 | 0.0 | 0.280 | 5.7 | LOS A | 2.0 | 14.0 | 0.12 | 0.53 | 36.7 |
| North: Francis Avenue | | | | | | | | | | | |
| 8 | T1 | 290 | 0.0 | 0.330 | 7.3 | LOS A | 2.1 | 14.5 | 0.62 | 0.69 | 36.4 |
| 9 | R2 | 17 | 0.0 | 0.330 | 10.7 | LOS B | 2.1 | 14.5 | 0.62 | 0.69 | 35.2 |
| Approach | | 307 | 0.0 | 0.330 | 7.5 | LOS A | 2.1 | 14.5 | 0.62 | 0.69 | 36.4 |
| West: Access 5 | | | | | | | | | | | |
| 10 | L2 | 9 | 0.0 | 0.295 | 2.8 | LOS A | 1.7 | 12.1 | 0.47 | 0.58 | 30.8 |
| 12 | R2 | 306 | 0.0 | 0.295 | 5.1 | LOS A | 1.7 | 12.1 | 0.47 | 0.58 | 27.9 |
| Approach | | 315 | 0.0 | 0.295 | 5.1 | LOS A | 1.7 | 12.1 | 0.47 | 0.58 | 28.0 |
| All Vehicles | | 1058 | 0.0 | 0.330 | 6.0 | LOS A | 2.1 | 14.5 | 0.37 | 0.59 | 33.6 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 33 | 0.0 | 0.152 | 4.5 | LOS A | 0.9 | 6.0 | 0.07 | 0.48 | 34.0 |
| 2 | T1 | 195 | 0.0 | 0.152 | 4.8 | LOS A | 0.9 | 6.0 | 0.07 | 0.48 | 43.7 |
| 3u | U | 11 | 0.0 | 0.152 | 9.8 | LOS A | 0.9 | 6.0 | 0.07 | 0.48 | 37.4 |
| Approach | | 239 | 0.0 | 0.152 | 5.0 | LOS A | 0.9 | 6.0 | 0.07 | 0.48 | 41.9 |
| North: Francis Avenue | | | | | | | | | | | |
| 8 | T1 | 370 | 0.0 | 0.292 | 5.3 | LOS A | 1.8 | 12.9 | 0.30 | 0.49 | 39.1 |
| 9 | R2 | 9 | 0.0 | 0.292 | 8.6 | LOS A | 1.8 | 12.9 | 0.30 | 0.49 | 37.7 |
| Approach | | 379 | 0.0 | 0.292 | 5.4 | LOS A | 1.8 | 12.9 | 0.30 | 0.49 | 39.0 |
| West: Access 5 | | | | | | | | | | | |
| 10 | L2 | 4 | 0.0 | 0.079 | 2.2 | LOS A | 0.4 | 2.7 | 0.36 | 0.51 | 31.3 |
| 12 | R2 | 83 | 0.0 | 0.079 | 4.6 | LOS A | 0.4 | 2.7 | 0.36 | 0.51 | 28.4 |
| Approach | | 87 | 0.0 | 0.079 | 4.5 | LOS A | 0.4 | 2.7 | 0.36 | 0.51 | 28.5 |
| All Vehicles | | 705 | 0.0 | 0.292 | 5.1 | LOS A | 1.8 | 12.9 | 0.23 | 0.49 | 38.3 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 162 | 0.0 | 0.351 | 4.6 | LOS A | 2.8 | 19.4 | 0.11 | 0.52 | 32.8 |
| 2 | T1 | 293 | 0.0 | 0.351 | 4.8 | LOS A | 2.8 | 19.4 | 0.11 | 0.52 | 42.0 |
| 3u | U | 109 | 0.0 | 0.351 | 9.8 | LOS A | 2.8 | 19.4 | 0.11 | 0.52 | 36.1 |
| Approach | | 564 | 0.0 | 0.351 | 5.7 | LOS A | 2.8 | 19.4 | 0.11 | 0.52 | 38.0 |
| North: Francis Avenue | | | | | | | | | | | |
| 8 | T1 | 339 | 0.0 | 0.373 | 7.3 | LOS A | 2.4 | 17.0 | 0.63 | 0.69 | 36.4 |
| 9 | R2 | 13 | 0.0 | 0.373 | 10.6 | LOS B | 2.4 | 17.0 | 0.63 | 0.69 | 35.2 |
| Approach | | 352 | 0.0 | 0.373 | 7.4 | LOS A | 2.4 | 17.0 | 0.63 | 0.69 | 36.4 |
| West: Access 5 | | | | | | | | | | | |
| 10 | L2 | 3 | 0.0 | 0.278 | 3.7 | LOS A | 1.6 | 11.2 | 0.57 | 0.66 | 30.0 |
| 12 | R2 | 260 | 0.0 | 0.278 | 6.1 | LOS A | 1.6 | 11.2 | 0.57 | 0.66 | 27.2 |
| Approach | | 263 | 0.0 | 0.278 | 6.1 | LOS A | 1.6 | 11.2 | 0.57 | 0.66 | 27.2 |
| All Vehicles | | 1179 | 0.0 | 0.373 | 6.3 | LOS A | 2.8 | 19.4 | 0.37 | 0.60 | 34.6 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Francis Avenue | | | | | | | | | | | |
| 1 | L2 | 192 | 0.0 | 0.415 | 4.7 | LOS A | 3.5 | 24.7 | 0.24 | 0.51 | 32.3 |
| 2 | T1 | 325 | 0.0 | 0.415 | 5.0 | LOS A | 3.5 | 24.7 | 0.24 | 0.51 | 41.3 |
| 3u | U | 95 | 0.0 | 0.415 | 10.0 | LOS B | 3.5 | 24.7 | 0.24 | 0.51 | 35.4 |
| Approach | | 612 | 0.0 | 0.415 | 5.7 | LOS A | 3.5 | 24.7 | 0.24 | 0.51 | 37.3 |
| North: Francis Avenue | | | | | | | | | | | |
| 8 | T1 | 307 | 0.0 | 0.403 | 8.0 | LOS A | 2.7 | 19.1 | 0.71 | 0.76 | 35.5 |
| 9 | R2 | 40 | 0.0 | 0.403 | 11.3 | LOS B | 2.7 | 19.1 | 0.71 | 0.76 | 34.4 |
| Approach | | 347 | 0.0 | 0.403 | 8.4 | LOS A | 2.7 | 19.1 | 0.71 | 0.76 | 35.4 |
| West: Access 5 | | | | | | | | | | | |
| 10 | L2 | 27 | 0.0 | 0.423 | 4.3 | LOS A | 2.8 | 19.5 | 0.66 | 0.72 | 29.6 |
| 12 | R2 | 363 | 0.0 | 0.423 | 6.6 | LOS A | 2.8 | 19.5 | 0.66 | 0.72 | 26.8 |
| Approach | | 390 | 0.0 | 0.423 | 6.5 | LOS A | 2.8 | 19.5 | 0.66 | 0.72 | 27.0 |
| All Vehicles | | 1349 | 0.0 | 0.423 | 6.6 | LOS A | 3.5 | 24.7 | 0.48 | 0.63 | 33.3 |

## 1.6 Davenport Street - Access Way 6

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 6 | | | | | | | | | | | |
| 1 | L2 | 20 | 0.0 | 0.014 | 2.2 | LOS A | 0.1 | 0.4 | 0.18 | 0.33 | 28.5 |
| 3 | R2 | 1 | 0.0 | 0.014 | 3.0 | LOS A | 0.1 | 0.4 | 0.18 | 0.33 | 27.4 |
| Approach | | 21 | 0.0 | 0.014 | 2.2 | LOS A | 0.1 | 0.4 | 0.18 | 0.33 | 28.5 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 8 | 0.0 | 0.051 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.04 | 46.0 |
| 5 | T1 | 92 | 0.0 | 0.051 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.04 | 48.4 |
| Approach | | 100 | 0.0 | 0.051 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.04 | 48.1 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 92 | 0.0 | 0.072 | 0.1 | LOS A | 0.2 | 1.6 | 0.13 | 0.16 | 42.2 |
| 12 | R2 | 39 | 0.0 | 0.072 | 4.9 | LOS A | 0.2 | 1.6 | 0.13 | 0.16 | 34.1 |
| Approach | | 131 | 0.0 | 0.072 | 1.5 | NA | 0.2 | 1.6 | 0.13 | 0.16 | 38.9 |
| All Vehicles | | 252 | 0.0 | 0.072 | 1.1 | NA | 0.2 | 1.6 | 0.08 | 0.13 | 40.3 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 6 | | | | | | | | | | | |
| 1 | L2 | 16 | 0.0 | 0.081 | 2.4 | LOS A | 0.3 | 1.9 | 0.34 | 0.50 | 27.1 |
| 3 | R2 | 59 | 0.0 | 0.081 | 4.2 | LOS A | 0.3 | 1.9 | 0.34 | 0.50 | 25.0 |
| Approach | | 75 | 0.0 | 0.081 | 3.8 | LOS A | 0.3 | 1.9 | 0.34 | 0.50 | 26.3 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 73 | 0.0 | 0.117 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.18 | 42.7 |
| 5 | T1 | 151 | 0.0 | 0.117 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.18 | 44.0 |
| Approach | | 224 | 0.0 | 0.117 | 1.4 | NA | 0.0 | 0.0 | 0.00 | 0.18 | 43.5 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 230 | 0.0 | 0.141 | 0.2 | LOS A | 0.3 | 1.8 | 0.10 | 0.07 | 45.5 |
| 12 | R2 | 33 | 0.0 | 0.141 | 5.4 | LOS A | 0.3 | 1.8 | 0.10 | 0.07 | 35.7 |
| Approach | | 263 | 0.0 | 0.141 | 0.8 | NA | 0.3 | 1.8 | 0.10 | 0.07 | 43.6 |
| All Vehicles | | 562 | 0.0 | 0.141 | 1.4 | NA | 0.3 | 1.9 | 0.09 | 0.17 | 39.6 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 6 | | | | | | | | | | | |
| 1 | L2 | 10 | 0.0 | 0.097 | 2.6 | LOS A | 0.3 | 2.2 | 0.43 | 0.60 | 26.0 |
| 3 | R2 | 64 | 0.0 | 0.097 | 5.2 | LOS A | 0.3 | 2.2 | 0.43 | 0.60 | 25.0 |
| Approach | | 74 | 0.0 | 0.097 | 4.8 | LOS A | 0.3 | 2.2 | 0.43 | 0.60 | 25.1 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 75 | 0.0 | 0.138 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.15 | 43.2 |
| 5 | T1 | 190 | 0.0 | 0.138 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.15 | 44.7 |
| Approach | | 265 | 0.0 | 0.138 | 1.2 | NA | 0.0 | 0.0 | 0.00 | 0.15 | 44.2 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 363 | 0.0 | 0.195 | 0.1 | LOS A | 0.1 | 0.7 | 0.03 | 0.02 | 48.6 |
| 12 | R2 | 12 | 0.0 | 0.195 | 5.6 | LOS A | 0.1 | 0.7 | 0.03 | 0.02 | 37.2 |
| Approach | | 375 | 0.0 | 0.195 | 0.2 | NA | 0.1 | 0.7 | 0.03 | 0.02 | 48.0 |
| All Vehicles | | 714 | 0.0 | 0.195 | 1.1 | NA | 0.3 | 2.2 | 0.06 | 0.13 | 42.0 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 6 | | | | | | | | | | | |
| 1 | L2 | 3 | 0.0 | 0.008 | 2.3 | LOS A | 0.0 | 0.2 | 0.25 | 0.40 | 27.9 |
| 3 | R2 | 5 | 0.0 | 0.008 | 3.7 | LOS A | 0.0 | 0.2 | 0.25 | 0.40 | 26.8 |
| Approach | | 8 | 0.0 | 0.008 | 3.2 | LOS A | 0.0 | 0.2 | 0.25 | 0.40 | 27.2 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 24 | 0.0 | 0.073 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.09 | 44.7 |
| 5 | T1 | 117 | 0.0 | 0.073 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.09 | 46.6 |
| Approach | | 141 | 0.0 | 0.073 | 0.7 | NA | 0.0 | 0.0 | 0.00 | 0.09 | 46.2 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 235 | 0.0 | 0.136 | 0.1 | LOS A | 0.2 | 1.2 | 0.06 | 0.05 | 46.9 |
| 12 | R2 | 24 | 0.0 | 0.136 | 5.0 | LOS A | 0.2 | 1.2 | 0.06 | 0.05 | 36.4 |
| Approach | | 259 | 0.0 | 0.136 | 0.5 | NA | 0.2 | 1.2 | 0.06 | 0.05 | 45.4 |
| All Vehicles | | 408 | 0.0 | 0.136 | 0.6 | NA | 0.2 | 1.2 | 0.04 | 0.07 | 45.0 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 6 | | | | | | | | | | | |
| 1 | L2 | 23 | 0.0 | 0.046 | 2.9 | LOS A | 0.2 | 1.1 | 0.40 | 0.50 | 26.9 |
| 3 | R2 | 19 | 0.0 | 0.046 | 5.4 | LOS A | 0.2 | 1.1 | 0.40 | 0.50 | 25.9 |
| Approach | | 42 | 0.0 | 0.046 | 4.0 | LOS A | 0.2 | 1.1 | 0.40 | 0.50 | 26.5 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 34 | 0.0 | 0.165 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.06 | 45.6 |
| 5 | T1 | 286 | 0.0 | 0.165 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.06 | 47.8 |
| Approach | | 320 | 0.0 | 0.165 | 0.5 | NA | 0.0 | 0.0 | 0.00 | 0.06 | 47.5 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 340 | 0.0 | 0.186 | 0.1 | LOS A | 0.1 | 1.0 | 0.05 | 0.02 | 48.1 |
| 12 | R2 | 15 | 0.0 | 0.186 | 5.9 | LOS A | 0.1 | 1.0 | 0.05 | 0.02 | 37.0 |
| Approach | | 355 | 0.0 | 0.186 | 0.3 | NA | 0.1 | 1.0 | 0.05 | 0.02 | 47.4 |
| All Vehicles | | 717 | 0.0 | 0.186 | 0.6 | NA | 0.2 | 1.1 | 0.05 | 0.07 | 44.9 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 6 | | | | | | | | | | | |
| 1 | L2 | 47 | 0.0 | 0.129 | 3.8 | LOS A | 0.4 | 3.1 | 0.53 | 0.65 | 25.3 |
| 3 | R2 | 43 | 0.0 | 0.129 | 7.6 | LOS A | 0.4 | 3.1 | 0.53 | 0.65 | 24.2 |
| Approach | | 90 | 0.0 | 0.129 | 5.6 | LOS A | 0.4 | 3.1 | 0.53 | 0.65 | 24.8 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 69 | 0.0 | 0.281 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.07 | 45.3 |
| 5 | T1 | 475 | 0.0 | 0.281 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.07 | 47.4 |
| Approach | | 544 | 0.0 | 0.281 | 0.5 | NA | 0.0 | 0.0 | 0.00 | 0.07 | 47.1 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 313 | 0.0 | 0.201 | 0.6 | LOS A | 0.5 | 3.4 | 0.18 | 0.07 | 44.2 |
| 12 | R2 | 40 | 0.0 | 0.201 | 7.3 | LOS A | 0.5 | 3.4 | 0.18 | 0.07 | 35.1 |
| Approach | | 353 | 0.0 | 0.201 | 1.3 | NA | 0.5 | 3.4 | 0.18 | 0.07 | 42.6 |
| All Vehicles | | 987 | 0.0 | 0.281 | 1.3 | NA | 0.5 | 3.4 | 0.11 | 0.12 | 41.5 |

## 1.7 Davenport Street - Access Way 7

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 7 | | | | | | | | | | | |
| 1 | L2 | 6 | 0.0 | 0.004 | 2.2 | LOS A | 0.0 | 0.1 | 0.18 | 0.32 | 33.2 |
| 3 | R2 | 5 | 0.0 | 0.005 | 3.3 | LOS A | 0.0 | 0.1 | 0.31 | 0.43 | 27.2 |
| Approach | | 11 | 0.0 | 0.005 | 2.7 | LOS A | 0.0 | 0.1 | 0.24 | 0.37 | 30.6 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 20 | 0.0 | 0.058 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 44.8 |
| 5 | T1 | 92 | 0.0 | 0.058 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 47.5 |
| Approach | | 112 | 0.0 | 0.058 | 0.8 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 47.0 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 126 | 0.0 | 0.101 | 0.2 | LOS A | 0.3 | 2.4 | 0.15 | 0.17 | 44.1 |
| 12 | R2 | 58 | 0.0 | 0.101 | 4.9 | LOS A | 0.3 | 2.4 | 0.15 | 0.17 | 37.7 |
| Approach | | 184 | 0.0 | 0.101 | 1.7 | NA | 0.3 | 2.4 | 0.15 | 0.17 | 41.7 |
| All Vehicles | | 307 | 0.0 | 0.101 | 1.4 | NA | 0.3 | 2.4 | 0.10 | 0.15 | 42.8 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 7 | | | | | | | | | | | |
| 1 | L2 | 24 | 0.0 | 0.016 | 2.2 | LOS A | 0.1 | 0.4 | 0.16 | 0.32 | 33.3 |
| 3 | R2 | 19 | 0.0 | 0.023 | 4.1 | LOS A | 0.1 | 0.5 | 0.41 | 0.53 | 26.4 |
| Approach | | 43 | 0.0 | 0.023 | 3.0 | LOS A | 0.1 | 0.5 | 0.27 | 0.41 | 30.4 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 89 | 0.0 | 0.088 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.29 | 40.4 |
| 5 | T1 | 79 | 0.0 | 0.088 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.29 | 43.2 |
| Approach | | 168 | 0.0 | 0.088 | 2.4 | NA | 0.0 | 0.0 | 0.00 | 0.29 | 41.8 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 244 | 0.0 | 0.182 | 0.2 | LOS A | 0.6 | 4.2 | 0.17 | 0.14 | 44.5 |
| 12 | R2 | 85 | 0.0 | 0.182 | 5.2 | LOS A | 0.6 | 4.2 | 0.17 | 0.14 | 37.9 |
| Approach | | 329 | 0.0 | 0.182 | 1.5 | NA | 0.6 | 4.2 | 0.17 | 0.14 | 42.4 |
| All Vehicles | | 540 | 0.0 | 0.182 | 1.9 | NA | 0.6 | 4.2 | 0.13 | 0.21 | 40.9 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 7 | | | | | | | | | | | |
| 1 | L2 | 20 | 0.0 | 0.013 | 2.3 | LOS A | 0.1 | 0.4 | 0.19 | 0.33 | 33.1 |
| 3 | R2 | 32 | 0.0 | 0.044 | 4.9 | LOS A | 0.1 | 1.0 | 0.47 | 0.61 | 25.6 |
| Approach | | 52 | 0.0 | 0.044 | 3.9 | LOS A | 0.1 | 1.0 | 0.36 | 0.50 | 28.6 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 90 | 0.0 | 0.104 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.24 | 41.3 |
| 5 | T1 | 109 | 0.0 | 0.104 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.24 | 44.1 |
| Approach | | 199 | 0.0 | 0.104 | 2.1 | NA | 0.0 | 0.0 | 0.00 | 0.24 | 42.9 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 343 | 0.0 | 0.230 | 0.2 | LOS A | 0.6 | 4.4 | 0.15 | 0.11 | 45.6 |
| 12 | R2 | 79 | 0.0 | 0.230 | 5.4 | LOS A | 0.6 | 4.4 | 0.15 | 0.11 | 38.6 |
| Approach | | 422 | 0.0 | 0.230 | 1.2 | NA | 0.6 | 4.4 | 0.15 | 0.11 | 43.9 |
| All Vehicles | | 673 | 0.0 | 0.230 | 1.7 | NA | 0.6 | 4.4 | 0.12 | 0.18 | 42.0 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 7 | | | | | | | | | | | |
| 1 | L2 | 12 | 0.0 | 0.008 | 2.2 | LOS A | 0.0 | 0.2 | 0.19 | 0.33 | 33.2 |
| 3 | R2 | 17 | 0.0 | 0.019 | 3.9 | LOS A | 0.1 | 0.4 | 0.38 | 0.50 | 26.7 |
| Approach | | 29 | 0.0 | 0.019 | 3.2 | LOS A | 0.1 | 0.4 | 0.30 | 0.43 | 29.5 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 20 | 0.0 | 0.063 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.09 | 45.0 |
| 5 | T1 | 101 | 0.0 | 0.063 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.09 | 47.7 |
| Approach | | 121 | 0.0 | 0.063 | 0.8 | NA | 0.0 | 0.0 | 0.00 | 0.09 | 47.2 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 241 | 0.0 | 0.159 | 0.1 | LOS A | 0.4 | 2.6 | 0.10 | 0.10 | 46.1 |
| 12 | R2 | 55 | 0.0 | 0.159 | 5.0 | LOS A | 0.4 | 2.6 | 0.10 | 0.10 | 38.9 |
| Approach | | 296 | 0.0 | 0.159 | 1.0 | NA | 0.4 | 2.6 | 0.10 | 0.10 | 44.4 |
| All Vehicles | | 446 | 0.0 | 0.159 | 1.1 | NA | 0.4 | 2.6 | 0.09 | 0.12 | 43.7 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 7 | | | | | | | | | | | |
| 1 | L2 | 256 | 0.0 | 0.195 | 2.9 | LOS A | 0.9 | 6.0 | 0.36 | 0.45 | 32.3 |
| 3 | R2 | 60 | 0.0 | 0.084 | 5.2 | LOS A | 0.3 | 1.9 | 0.49 | 0.65 | 25.3 |
| Approach | | 316 | 0.0 | 0.195 | 3.3 | LOS A | 0.9 | 6.0 | 0.38 | 0.49 | 31.0 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 60 | 0.0 | 0.160 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 44.6 |
| 5 | T1 | 249 | 0.0 | 0.160 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 47.3 |
| Approach | | 309 | 0.0 | 0.160 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.11 | 46.8 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 294 | 0.0 | 0.181 | 0.2 | LOS A | 0.3 | 2.4 | 0.12 | 0.07 | 46.8 |
| 12 | R2 | 39 | 0.0 | 0.181 | 5.8 | LOS A | 0.3 | 2.4 | 0.12 | 0.07 | 39.3 |
| Approach | | 333 | 0.0 | 0.181 | 0.9 | NA | 0.3 | 2.4 | 0.12 | 0.07 | 45.6 |
| All Vehicles | | 958 | 0.0 | 0.195 | 1.7 | NA | 0.9 | 6.0 | 0.17 | 0.22 | 39.4 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 7 | | | | | | | | | | | |
| 1 | L2 | 130 | 0.0 | 0.111 | 3.3 | LOS A | 0.4 | 3.1 | 0.42 | 0.50 | 32.0 |
| 3 | R2 | 90 | 0.0 | 0.156 | 6.8 | LOS A | 0.5 | 3.6 | 0.59 | 0.75 | 23.8 |
| Approach | | 220 | 0.0 | 0.156 | 4.7 | LOS A | 0.5 | 3.6 | 0.49 | 0.60 | 28.7 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 158 | 0.0 | 0.272 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 43.1 |
| 5 | T1 | 364 | 0.0 | 0.272 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 45.9 |
| Approach | | 522 | 0.0 | 0.272 | 1.4 | NA | 0.0 | 0.0 | 0.00 | 0.16 | 45.1 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 265 | 0.0 | 0.213 | 1.1 | LOS A | 0.8 | 5.9 | 0.32 | 0.15 | 43.1 |
| 12 | R2 | 79 | 0.0 | 0.213 | 7.1 | LOS A | 0.8 | 5.9 | 0.32 | 0.15 | 37.0 |
| Approach | | 344 | 0.0 | 0.213 | 2.4 | NA | 0.8 | 5.9 | 0.32 | 0.15 | 41.4 |
| All Vehicles | | 1086 | 0.0 | 0.272 | 2.4 | NA | 0.8 | 5.9 | 0.20 | 0.25 | 39.3 |

## 1.8 Davenport Street - Access Way 8A

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 8 | | | | | | | | | | | |
| 1 | L2 | 22 | 0.0 | 0.071 | 2.1 | LOS A | 0.2 | 1.7 | 0.15 | 0.39 | 34.0 |
| 3 | R2 | 61 | 0.0 | 0.071 | 3.0 | LOS A | 0.2 | 1.7 | 0.15 | 0.39 | 32.2 |
| Approach | | 83 | 0.0 | 0.071 | 2.8 | LOS A | 0.2 | 1.7 | 0.15 | 0.39 | 32.7 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 58 | 0.0 | 0.052 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 41.8 |
| 5 | T1 | 40 | 0.0 | 0.052 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.32 | 44.3 |
| Approach | | 98 | 0.0 | 0.052 | 2.7 | NA | 0.0 | 0.0 | 0.00 | 0.32 | 42.9 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 123 | 0.0 | 0.072 | 0.0 | LOS A | 0.1 | 0.7 | 0.05 | 0.06 | 48.4 |
| 12 | R2 | 15 | 0.0 | 0.072 | 4.9 | LOS A | 0.1 | 0.7 | 0.05 | 0.06 | 39.7 |
| Approach | | 138 | 0.0 | 0.072 | 0.6 | NA | 0.1 | 0.7 | 0.05 | 0.06 | 47.3 |
| All Vehicles | | 319 | 0.0 | 0.072 | 1.8 | NA | 0.2 | 1.7 | 0.06 | 0.23 | 41.6 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 8 | | | | | | | | | | | |
| 1 | L2 | 126 | 0.0 | 0.304 | 2.2 | LOS A | 1.3 | 9.0 | 0.23 | 0.44 | 33.3 |
| 3 | R2 | 213 | 0.0 | 0.304 | 4.0 | LOS A | 1.3 | 9.0 | 0.23 | 0.44 | 31.6 |
| Approach | | 339 | 0.0 | 0.304 | 3.3 | LOS A | 1.3 | 9.0 | 0.23 | 0.44 | 32.3 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 34 | 0.0 | 0.054 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.18 | 44.3 |
| 5 | T1 | 69 | 0.0 | 0.054 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.18 | 46.7 |
| Approach | | 103 | 0.0 | 0.054 | 1.5 | NA | 0.0 | 0.0 | 0.00 | 0.18 | 46.0 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 116 | 0.0 | 0.138 | 0.3 | LOS A | 0.6 | 4.5 | 0.20 | 0.28 | 43.5 |
| 12 | R2 | 126 | 0.0 | 0.138 | 4.9 | LOS A | 0.6 | 4.5 | 0.20 | 0.28 | 36.0 |
| Approach | | 242 | 0.0 | 0.138 | 2.7 | NA | 0.6 | 4.5 | 0.20 | 0.28 | 39.4 |
| All Vehicles | | 684 | 0.0 | 0.304 | 2.8 | NA | 1.3 | 9.0 | 0.18 | 0.34 | 36.4 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 8 | | | | | | | | | | | |
| 1 | L2 | 101 | 0.0 | 0.394 | 2.4 | LOS A | 2.0 | 14.0 | 0.28 | 0.50 | 32.5 |
| 3 | R2 | 306 | 0.0 | 0.394 | 4.6 | LOS A | 2.0 | 14.0 | 0.28 | 0.50 | 30.8 |
| Approach | | 407 | 0.0 | 0.394 | 4.0 | LOS A | 2.0 | 14.0 | 0.28 | 0.50 | 31.2 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 67 | 0.0 | 0.068 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.28 | 42.5 |
| 5 | T1 | 62 | 0.0 | 0.068 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.28 | 44.9 |
| Approach | | 129 | 0.0 | 0.068 | 2.4 | NA | 0.0 | 0.0 | 0.00 | 0.28 | 43.8 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 117 | 0.0 | 0.151 | 0.4 | LOS A | 0.7 | 5.1 | 0.24 | 0.30 | 43.0 |
| 12 | R2 | 144 | 0.0 | 0.151 | 5.0 | LOS A | 0.7 | 5.1 | 0.24 | 0.30 | 35.6 |
| Approach | | 261 | 0.0 | 0.151 | 2.9 | NA | 0.7 | 5.1 | 0.24 | 0.30 | 38.8 |
| All Vehicles | | 797 | 0.0 | 0.394 | 3.4 | NA | 2.0 | 14.0 | 0.22 | 0.40 | 35.3 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 8 | | | | | | | | | | | |
| 1 | L2 | 10 | 0.0 | 0.048 | 2.1 | LOS A | 0.2 | 1.1 | 0.24 | 0.44 | 33.2 |
| 3 | R2 | 38 | 0.0 | 0.048 | 3.8 | LOS A | 0.2 | 1.1 | 0.24 | 0.44 | 31.4 |
| Approach | | 48 | 0.0 | 0.048 | 3.5 | LOS A | 0.2 | 1.1 | 0.24 | 0.44 | 31.8 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 45 | 0.0 | 0.059 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.22 | 43.7 |
| 5 | T1 | 68 | 0.0 | 0.059 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.22 | 46.0 |
| Approach | | 113 | 0.0 | 0.059 | 1.8 | NA | 0.0 | 0.0 | 0.00 | 0.22 | 45.2 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 257 | 0.0 | 0.153 | 0.1 | LOS A | 0.2 | 1.7 | 0.06 | 0.07 | 48.2 |
| 12 | R2 | 34 | 0.0 | 0.153 | 4.9 | LOS A | 0.2 | 1.7 | 0.06 | 0.07 | 39.5 |
| Approach | | 291 | 0.0 | 0.153 | 0.6 | NA | 0.2 | 1.7 | 0.06 | 0.07 | 47.1 |
| All Vehicles | | 452 | 0.0 | 0.153 | 1.2 | NA | 0.2 | 1.7 | 0.07 | 0.14 | 44.6 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 8 | | | | | | | | | | | |
| 1 | L2 | 66 | 0.0 | 0.289 | 3.6 | LOS A | 1.2 | 8.2 | 0.52 | 0.70 | 30.6 |
| 3 | R2 | 154 | 0.0 | 0.289 | 6.5 | LOS A | 1.2 | 8.2 | 0.52 | 0.70 | 29.1 |
| Approach | | 220 | 0.0 | 0.289 | 5.6 | LOS A | 1.2 | 8.2 | 0.52 | 0.70 | 29.7 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 153 | 0.0 | 0.263 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 44.6 |
| 5 | T1 | 352 | 0.0 | 0.263 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.16 | 46.9 |
| Approach | | 505 | 0.0 | 0.263 | 1.4 | NA | 0.0 | 0.0 | 0.00 | 0.16 | 46.3 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 181 | 0.0 | 0.150 | 1.0 | LOS A | 0.6 | 4.1 | 0.32 | 0.16 | 44.7 |
| 12 | R2 | 60 | 0.0 | 0.150 | 6.8 | LOS A | 0.6 | 4.1 | 0.32 | 0.16 | 36.9 |
| Approach | | 241 | 0.0 | 0.150 | 2.4 | NA | 0.6 | 4.1 | 0.32 | 0.16 | 42.7 |
| All Vehicles | | 966 | 0.0 | 0.289 | 2.6 | NA | 1.2 | 8.2 | 0.20 | 0.29 | 40.6 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 8 | | | | | | | | | | | |
| 1 | L2 | 68 | 0.0 | 0.213 | 3.1 | LOS A | 0.8 | 5.4 | 0.48 | 0.62 | 31.5 |
| 3 | R2 | 103 | 0.0 | 0.213 | 6.2 | LOS A | 0.8 | 5.4 | 0.48 | 0.62 | 29.8 |
| Approach | | 171 | 0.0 | 0.213 | 5.0 | LOS A | 0.8 | 5.4 | 0.48 | 0.62 | 30.5 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 181 | 0.0 | 0.258 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.20 | 44.0 |
| 5 | T1 | 313 | 0.0 | 0.258 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.20 | 46.3 |
| Approach | | 494 | 0.0 | 0.258 | 1.7 | NA | 0.0 | 0.0 | 0.00 | 0.20 | 45.5 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 241 | 0.0 | 0.161 | 0.6 | LOS A | 0.4 | 3.0 | 0.20 | 0.09 | 46.7 |
| 12 | R2 | 40 | 0.0 | 0.161 | 6.8 | LOS A | 0.4 | 3.0 | 0.20 | 0.09 | 38.4 |
| Approach | | 281 | 0.0 | 0.161 | 1.5 | NA | 0.4 | 3.0 | 0.20 | 0.09 | 45.4 |
| All Vehicles | | 946 | 0.0 | 0.258 | 2.2 | NA | 0.8 | 5.4 | 0.14 | 0.24 | 42.1 |

## 1.9 Davenport Street - Access Way 8B

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.032 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.01 | 47.8 |
| 5 | T1 | 62 | 0.0 | 0.032 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.01 | 49.8 |
| Approach | | 63 | 0.0 | 0.032 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 49.8 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 149 | 0.0 | 0.077 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| 12 | R2 | 1 | 0.0 | 0.077 | 5.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 40.5 |
| Approach | | 150 | 0.0 | 0.077 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 49.8 |
| All Vehicles | | 213 | 0.0 | 0.077 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 49.8 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.114 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 47.9 |
| 5 | T1 | 221 | 0.0 | 0.114 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| Approach | | 222 | 0.0 | 0.114 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 249 | 0.0 | 0.148 | 0.1 | LOS A | 0.2 | 1.6 | 0.09 | 0.06 | 48.0 |
| 12 | R2 | 29 | 0.0 | 0.148 | 5.6 | LOS A | 0.2 | 1.6 | 0.09 | 0.06 | 39.1 |
| Approach | | 278 | 0.0 | 0.148 | 0.7 | NA | 0.2 | 1.6 | 0.09 | 0.06 | 47.0 |
| All Vehicles | | 500 | 0.0 | 0.148 | 0.4 | NA | 0.2 | 1.6 | 0.05 | 0.04 | 48.3 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.092 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 47.9 |
| 5 | T1 | 178 | 0.0 | 0.092 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| Approach | | 179 | 0.0 | 0.092 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 279 | 0.0 | 0.173 | 0.1 | LOS A | 0.3 | 2.3 | 0.10 | 0.08 | 47.6 |
| 12 | R2 | 44 | 0.0 | 0.173 | 5.5 | LOS A | 0.3 | 2.3 | 0.10 | 0.08 | 38.8 |
| Approach | | 323 | 0.0 | 0.173 | 0.9 | NA | 0.3 | 2.3 | 0.10 | 0.08 | 46.3 |
| All Vehicles | | 502 | 0.0 | 0.173 | 0.6 | NA | 0.3 | 2.3 | 0.06 | 0.05 | 47.5 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.034 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.01 | 47.8 |
| 5 | T1 | 66 | 0.0 | 0.034 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.01 | 49.8 |
| Approach | | 67 | 0.0 | 0.034 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 49.8 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 299 | 0.0 | 0.153 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| 12 | R2 | 1 | 0.0 | 0.153 | 5.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 40.5 |
| Approach | | 300 | 0.0 | 0.153 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| All Vehicles | | 367 | 0.0 | 0.153 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.218 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 48.0 |
| 5 | T1 | 424 | 0.0 | 0.218 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| Approach | | 425 | 0.0 | 0.218 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 237 | 0.0 | 0.128 | 0.1 | LOS A | 0.1 | 0.6 | 0.04 | 0.02 | 49.2 |
| 12 | R2 | 8 | 0.0 | 0.128 | 6.6 | LOS A | 0.1 | 0.6 | 0.04 | 0.02 | 40.0 |
| Approach | | 245 | 0.0 | 0.128 | 0.3 | NA | 0.1 | 0.6 | 0.04 | 0.02 | 48.9 |
| All Vehicles | | 670 | 0.0 | 0.218 | 0.1 | NA | 0.1 | 0.6 | 0.02 | 0.01 | 49.5 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | Demand Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.191 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 48.0 |
| 5 | T1 | 371 | 0.0 | 0.191 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| Approach | | 372 | 0.0 | 0.191 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 49.9 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 278 | 0.0 | 0.155 | 0.1 | LOS A | 0.1 | 1.0 | 0.06 | 0.03 | 48.8 |
| 12 | R2 | 15 | 0.0 | 0.155 | 6.4 | LOS A | 0.1 | 1.0 | 0.06 | 0.03 | 39.7 |
| Approach | | 293 | 0.0 | 0.155 | 0.4 | NA | 0.1 | 1.0 | 0.06 | 0.03 | 48.3 |
| All Vehicles | | 665 | 0.0 | 0.191 | 0.2 | NA | 0.1 | 1.0 | 0.03 | 0.01 | 49.2 |

## 1.10 Davenport Street - Access Way 9

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 9 | | | | | | | | | | | |
| 1 | L2 | 1 | 0.0 | 0.023 | 2.1 | LOS A | 0.1 | 0.5 | 0.24 | 0.42 | 21.1 |
| 3 | R2 | 24 | 0.0 | 0.023 | 2.9 | LOS A | 0.1 | 0.5 | 0.24 | 0.42 | 32.7 |
| Approach | | 25 | 0.0 | 0.023 | 2.9 | LOS A | 0.1 | 0.5 | 0.24 | 0.42 | 32.3 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 22 | 0.0 | 0.046 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.13 | 45.5 |
| 5 | T1 | 67 | 0.0 | 0.046 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.13 | 46.5 |
| Approach | | 89 | 0.0 | 0.046 | 1.1 | NA | 0.0 | 0.0 | 0.00 | 0.13 | 46.2 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 96 | 0.0 | 0.062 | 0.1 | LOS A | 0.1 | 0.9 | 0.08 | 0.10 | 47.0 |
| 12 | R2 | 21 | 0.0 | 0.062 | 4.1 | LOS A | 0.1 | 0.9 | 0.08 | 0.10 | 34.6 |
| Approach | | 117 | 0.0 | 0.062 | 0.8 | NA | 0.1 | 0.9 | 0.08 | 0.10 | 44.8 |
| All Vehicles | | 231 | 0.0 | 0.062 | 1.2 | NA | 0.1 | 0.9 | 0.06 | 0.15 | 43.2 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 9 | | | | | | | | | | | |
| 1 | L2 | 134 | 0.0 | 0.136 | 2.4 | LOS A | 0.5 | 3.8 | 0.25 | 0.40 | 21.3 |
| 3 | R2 | 39 | 0.0 | 0.136 | 4.1 | LOS A | 0.5 | 3.8 | 0.25 | 0.40 | 32.8 |
| Approach | | 173 | 0.0 | 0.136 | 2.8 | LOS A | 0.5 | 3.8 | 0.25 | 0.40 | 24.0 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 18 | 0.0 | 0.082 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.06 | 46.9 |
| 5 | T1 | 141 | 0.0 | 0.082 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.06 | 48.3 |
| Approach | | 159 | 0.0 | 0.082 | 0.5 | NA | 0.0 | 0.0 | 0.00 | 0.06 | 48.1 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 176 | 0.0 | 0.140 | 0.2 | LOS A | 0.5 | 3.4 | 0.18 | 0.17 | 44.8 |
| 12 | R2 | 76 | 0.0 | 0.140 | 4.4 | LOS A | 0.5 | 3.4 | 0.18 | 0.17 | 33.0 |
| Approach | | 252 | 0.0 | 0.140 | 1.5 | NA | 0.5 | 3.4 | 0.18 | 0.17 | 41.1 |
| All Vehicles | | 584 | 0.0 | 0.140 | 1.6 | NA | 0.5 | 3.8 | 0.15 | 0.21 | 35.6 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 9 | | | | | | | | | | | |
| 1 | L2 | 86 | 0.0 | 0.129 | 2.3 | LOS A | 0.5 | 3.4 | 0.24 | 0.42 | 21.2 |
| 3 | R2 | 61 | 0.0 | 0.129 | 4.3 | LOS A | 0.5 | 3.4 | 0.24 | 0.42 | 32.7 |
| Approach | | 147 | 0.0 | 0.129 | 3.1 | LOS A | 0.5 | 3.4 | 0.24 | 0.42 | 26.1 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 31 | 0.0 | 0.076 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.12 | 45.9 |
| 5 | T1 | 115 | 0.0 | 0.076 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.12 | 47.0 |
| Approach | | 146 | 0.0 | 0.076 | 1.0 | NA | 0.0 | 0.0 | 0.00 | 0.12 | 46.7 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 199 | 0.0 | 0.171 | 0.3 | LOS A | 0.7 | 4.8 | 0.20 | 0.19 | 44.2 |
| 12 | R2 | 107 | 0.0 | 0.171 | 4.4 | LOS A | 0.7 | 4.8 | 0.20 | 0.19 | 32.6 |
| Approach | | 306 | 0.0 | 0.171 | 1.7 | NA | 0.7 | 4.8 | 0.20 | 0.19 | 40.0 |
| All Vehicles | | 599 | 0.0 | 0.171 | 1.9 | NA | 0.7 | 4.8 | 0.16 | 0.23 | 36.6 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 9 | | | | | | | | | | | |
| 1 | L2 | 1 | 0.0 | 0.027 | 2.1 | LOS A | 0.1 | 0.6 | 0.31 | 0.47 | 20.8 |
| 3 | R2 | 25 | 0.0 | 0.027 | 3.5 | LOS A | 0.1 | 0.6 | 0.31 | 0.47 | 32.3 |
| Approach | | 26 | 0.0 | 0.027 | 3.5 | LOS A | 0.1 | 0.6 | 0.31 | 0.47 | 31.9 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 20 | 67.0 | 0.041 | 5.2 | LOS A | 0.0 | 0.0 | 0.00 | 0.15 | 40.0 |
| 5 | T1 | 49 | 0.0 | 0.041 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.15 | 48.3 |
| Approach | | 69 | 19.4 | 0.041 | 1.5 | NA | 0.0 | 0.0 | 0.00 | 0.15 | 45.1 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 238 | 0.0 | 0.150 | 0.1 | LOS A | 0.3 | 2.1 | 0.07 | 0.09 | 47.3 |
| 12 | R2 | 46 | 0.0 | 0.150 | 4.1 | LOS A | 0.3 | 2.1 | 0.07 | 0.09 | 34.8 |
| Approach | | 284 | 0.0 | 0.150 | 0.7 | NA | 0.3 | 2.1 | 0.07 | 0.09 | 45.2 |
| All Vehicles | | 379 | 3.5 | 0.150 | 1.0 | NA | 0.3 | 2.1 | 0.07 | 0.13 | 43.7 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 9 | | | | | | | | | | | |
| 1 | L2 | 74 | 0.0 | 0.172 | 3.5 | LOS A | 0.6 | 4.4 | 0.47 | 0.61 | 20.3 |
| 3 | R2 | 77 | 0.0 | 0.172 | 5.4 | LOS A | 0.6 | 4.4 | 0.47 | 0.61 | 31.3 |
| Approach | | 151 | 0.0 | 0.172 | 4.4 | LOS A | 0.6 | 4.4 | 0.47 | 0.61 | 26.0 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 23 | 0.0 | 0.209 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 47.5 |
| 5 | T1 | 383 | 0.0 | 0.209 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 49.1 |
| Approach | | 406 | 0.0 | 0.209 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.03 | 49.0 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 151 | 0.0 | 0.120 | 0.7 | LOS A | 0.4 | 3.0 | 0.27 | 0.15 | 44.5 |
| 12 | R2 | 50 | 0.0 | 0.120 | 5.5 | LOS A | 0.4 | 3.0 | 0.27 | 0.15 | 32.8 |
| Approach | | 201 | 0.0 | 0.120 | 1.9 | NA | 0.4 | 3.0 | 0.27 | 0.15 | 41.5 |
| All Vehicles | | 758 | 0.0 | 0.209 | 1.5 | NA | 0.6 | 4.4 | 0.16 | 0.18 | 40.0 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Access 9 | | | | | | | | | | | |
| 1 | L2 | 57 | 0.0 | 0.220 | 2.8 | LOS A | 0.8 | 5.7 | 0.43 | 0.59 | 20.3 |
| 3 | R2 | 138 | 0.0 | 0.220 | 5.0 | LOS A | 0.8 | 5.7 | 0.43 | 0.59 | 31.4 |
| Approach | | 195 | 0.0 | 0.220 | 4.4 | LOS A | 0.8 | 5.7 | 0.43 | 0.59 | 28.2 |
| East: Davenport Road | | | | | | | | | | | |
| 4 | L2 | 109 | 0.0 | 0.182 | 4.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.17 | 44.9 |
| 5 | T1 | 240 | 0.0 | 0.182 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.17 | 45.7 |
| Approach | | 349 | 0.0 | 0.182 | 1.4 | NA | 0.0 | 0.0 | 0.00 | 0.17 | 45.4 |
| West: Davenport Road | | | | | | | | | | | |
| 11 | T1 | 140 | 0.0 | 0.149 | 0.9 | LOS A | 0.7 | 4.8 | 0.36 | 0.25 | 42.3 |
| 12 | R2 | 98 | 0.0 | 0.149 | 5.2 | LOS A | 0.7 | 4.8 | 0.36 | 0.25 | 31.2 |
| Approach | | 238 | 0.0 | 0.149 | 2.7 | NA | 0.7 | 4.8 | 0.36 | 0.25 | 37.6 |
| All Vehicles | | 782 | 0.0 | 0.220 | 2.5 | NA | 0.8 | 5.7 | 0.22 | 0.30 | 37.3 |

## 1.11 Burroughs Road - Access Way 10

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 10 | | | | | | | | | | | |
| 21 | L2 | 12 | 0.0 | 0.011 | 2.2 | LOS A | 0.0 | 0.3 | 0.19 | 0.34 | 27.8 |
| 23 | R2 | 3 | 0.0 | 0.011 | 3.0 | LOS A | 0.0 | 0.3 | 0.19 | 0.34 | 26.5 |
| Approach | | 15 | 0.0 | 0.011 | 2.4 | LOS A | 0.0 | 0.3 | 0.19 | 0.34 | 27.6 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 1 | 0.0 | 0.052 | 3.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.01 | 46.7 |
| 25 | T1 | 102 | 4.2 | 0.052 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.01 | 59.7 |
| Approach | | 103 | 4.2 | 0.052 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 59.5 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 116 | 2.1 | 0.069 | 0.1 | LOS A | 0.1 | 0.8 | 0.07 | 0.08 | 53.9 |
| 32 | R2 | 18 | 0.0 | 0.069 | 4.6 | LOS A | 0.1 | 0.8 | 0.07 | 0.08 | 38.4 |
| Approach | | 134 | 1.8 | 0.069 | 0.7 | NA | 0.1 | 0.8 | 0.07 | 0.08 | 50.1 |
| All Vehicles | | 252 | 2.7 | 0.069 | 0.5 | NA | 0.1 | 0.8 | 0.05 | 0.06 | 49.8 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 10 | | | | | | | | | | | |
| 21 | L2 | 5 | 0.0 | 0.018 | 2.6 | LOS A | 0.1 | 0.4 | 0.38 | 0.48 | 26.3 |
| 23 | R2 | 10 | 0.0 | 0.018 | 4.7 | LOS A | 0.1 | 0.4 | 0.38 | 0.48 | 25.0 |
| Approach | | 15 | 0.0 | 0.018 | 4.0 | LOS A | 0.1 | 0.4 | 0.38 | 0.48 | 25.5 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 1 | 0.0 | 0.116 | 3.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 46.8 |
| 25 | T1 | 224 | 5.8 | 0.116 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.8 |
| Approach | | 225 | 5.7 | 0.116 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 59.7 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 346 | 0.0 | 0.181 | 0.0 | LOS A | 0.1 | 0.8 | 0.03 | 0.02 | 57.8 |
| 32 | R2 | 13 | 0.0 | 0.181 | 5.2 | LOS A | 0.1 | 0.8 | 0.03 | 0.02 | 39.7 |
| Approach | | 361 | 0.0 | 0.181 | 0.2 | NA | 0.1 | 0.8 | 0.03 | 0.02 | 56.5 |
| All Vehicles | | 601 | 2.2 | 0.181 | 0.2 | NA | 0.1 | 0.8 | 0.03 | 0.03 | 55.3 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 10 | | | | | | | | | | | |
| 21 | L2 | 1 | 0.0 | 0.040 | 2.6 | LOS A | 0.1 | 0.9 | 0.45 | 0.57 | 25.6 |
| 23 | R2 | 29 | 0.0 | 0.040 | 4.7 | LOS A | 0.1 | 0.9 | 0.45 | 0.57 | 24.4 |
| Approach | | 30 | 0.0 | 0.040 | 4.6 | LOS A | 0.1 | 0.9 | 0.45 | 0.57 | 24.4 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 1 | 0.0 | 0.110 | 3.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 46.8 |
| 25 | T1 | 218 | 2.6 | 0.110 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.8 |
| Approach | | 219 | 2.6 | 0.110 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 59.7 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 322 | 0.9 | 0.181 | 0.1 | LOS A | 0.2 | 1.7 | 0.07 | 0.05 | 55.2 |
| 32 | R2 | 30 | 0.0 | 0.181 | 5.1 | LOS A | 0.2 | 1.7 | 0.07 | 0.05 | 38.8 |
| Approach | | 352 | 0.8 | 0.181 | 0.5 | NA | 0.2 | 1.7 | 0.07 | 0.05 | 52.5 |
| All Vehicles | | 601 | 1.4 | 0.181 | 0.6 | NA | 0.2 | 1.7 | 0.07 | 0.06 | 50.9 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 10 | | | | | | | | | | | |
| 21 | L2 | 5 | 0.0 | 0.009 | 2.4 | LOS A | 0.0 | 0.2 | 0.28 | 0.40 | 27.3 |
| 23 | R2 | 5 | 0.0 | 0.009 | 3.8 | LOS A | 0.0 | 0.2 | 0.28 | 0.40 | 26.0 |
| Approach | | 10 | 0.0 | 0.009 | 3.1 | LOS A | 0.0 | 0.2 | 0.28 | 0.40 | 26.7 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 1 | 0.0 | 0.083 | 3.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 46.8 |
| 25 | T1 | 159 | 7.2 | 0.083 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.8 |
| Approach | | 160 | 7.2 | 0.083 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 59.6 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 258 | 0.0 | 0.130 | 0.0 | LOS A | 0.0 | 0.2 | 0.01 | 0.01 | 59.4 |
| 32 | R2 | 3 | 0.0 | 0.130 | 4.8 | LOS A | 0.0 | 0.2 | 0.01 | 0.01 | 40.2 |
| Approach | | 261 | 0.0 | 0.130 | 0.1 | NA | 0.0 | 0.2 | 0.01 | 0.01 | 58.9 |
| All Vehicles | | 431 | 2.7 | 0.130 | 0.1 | NA | 0.0 | 0.2 | 0.01 | 0.01 | 56.9 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 10 | | | | | | | | | | | |
| 21 | L2 | 6 | 0.0 | 0.011 | 3.2 | LOS A | 0.0 | 0.3 | 0.44 | 0.48 | 26.1 |
| 23 | R2 | 3 | 0.0 | 0.011 | 6.2 | LOS A | 0.0 | 0.3 | 0.44 | 0.48 | 24.9 |
| Approach | | 9 | 0.0 | 0.011 | 4.2 | LOS A | 0.0 | 0.3 | 0.44 | 0.48 | 25.7 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 1 | 2.7 | 0.192 | 3.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 46.7 |
| 25 | T1 | 378 | 3.4 | 0.192 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.9 |
| Approach | | 379 | 3.4 | 0.192 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 59.8 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 371 | 4.7 | 0.227 | 0.4 | LOS A | 0.5 | 3.5 | 0.12 | 0.05 | 53.8 |
| 32 | R2 | 32 | 39.4 | 0.227 | 6.9 | LOS A | 0.5 | 3.5 | 0.12 | 0.05 | 38.2 |
| Approach | | 403 | 7.4 | 0.227 | 0.9 | NA | 0.5 | 3.5 | 0.12 | 0.05 | 51.4 |
| All Vehicles | | 791 | 5.4 | 0.227 | 0.5 | NA | 0.5 | 3.5 | 0.07 | 0.03 | 54.1 |

### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 10 | | | | | | | | | | | |
| 21 | L2 | 8 | 0.0 | 0.020 | 2.7 | LOS A | 0.1 | 0.5 | 0.38 | 0.47 | 26.5 |
| 23 | R2 | 10 | 0.0 | 0.020 | 4.8 | LOS A | 0.1 | 0.5 | 0.38 | 0.47 | 25.2 |
| Approach | | 18 | 0.0 | 0.020 | 3.9 | LOS A | 0.1 | 0.5 | 0.38 | 0.47 | 25.8 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 4 | 0.0 | 0.126 | 3.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.01 | 46.7 |
| 25 | T1 | 249 | 1.2 | 0.126 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.01 | 59.5 |
| Approach | | 253 | 1.2 | 0.126 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 59.1 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 307 | 1.0 | 0.185 | 0.2 | LOS A | 0.4 | 2.6 | 0.12 | 0.07 | 53.1 |
| 32 | R2 | 44 | 0.0 | 0.185 | 5.3 | LOS A | 0.4 | 2.6 | 0.12 | 0.07 | 38.1 |
| Approach | | 351 | 0.9 | 0.185 | 0.8 | NA | 0.4 | 2.6 | 0.12 | 0.07 | 49.7 |
| All Vehicles | | 622 | 1.0 | 0.185 | 0.6 | NA | 0.4 | 2.6 | 0.08 | 0.06 | 51.0 |

## 1.12 Burroughs Road - Access Way 11

### 2021 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 11 | | | | | | | | | | | |
| 21 | L2 | 102 | 0.0 | 0.094 | 2.3 | LOS A | 0.4 | 2.6 | 0.23 | 0.37 | 28.3 |
| 23 | R2 | 21 | 0.0 | 0.094 | 3.8 | LOS A | 0.4 | 2.6 | 0.23 | 0.37 | 27.2 |
| Approach | | 123 | 0.0 | 0.094 | 2.6 | LOS A | 0.4 | 2.6 | 0.23 | 0.37 | 28.1 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 7 | 0.0 | 0.066 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 34.5 |
| 25 | T1 | 120 | 2.6 | 0.066 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.2 |
| Approach | | 127 | 2.7 | 0.066 | 3.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.7 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 141 | 9.6 | 0.095 | 3.3 | LOS A | 0.6 | 4.5 | 0.30 | 0.39 | 21.4 |
| 32 | R2 | 17 | 0.0 | 0.095 | 14.4 | LOS B | 0.6 | 4.5 | 0.30 | 0.39 | 31.3 |
| Approach | | 158 | 8.8 | 0.095 | 4.5 | LOS A | 0.6 | 4.5 | 0.30 | 0.39 | 22.4 |
| All Vehicles | | 408 | 4.2 | 0.095 | 3.5 | NA | 0.6 | 4.5 | 0.19 | 0.42 | 24.6 |

### 2021 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 11 | | | | | | | | | | | |
| 21 | L2 | 12 | 0.0 | 0.011 | 2.7 | LOS A | 0.0 | 0.3 | 0.33 | 0.40 | 27.8 |
| 23 | R2 | 1 | 0.0 | 0.011 | 6.4 | LOS A | 0.0 | 0.3 | 0.33 | 0.40 | 26.7 |
| Approach | | 13 | 0.0 | 0.011 | 3.0 | LOS A | 0.0 | 0.3 | 0.33 | 0.40 | 27.8 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 1 | 0.0 | 0.134 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 34.6 |
| 25 | T1 | 258 | 1.9 | 0.134 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.3 |
| Approach | | 259 | 1.9 | 0.134 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.3 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 373 | 0.0 | 0.213 | 3.3 | LOS A | 1.8 | 12.4 | 0.40 | 0.33 | 21.0 |
| 32 | R2 | 18 | 0.0 | 0.213 | 43.3 | LOS E | 1.8 | 12.4 | 0.40 | 0.33 | 30.4 |
| Approach | | 391 | 0.0 | 0.213 | 5.2 | LOS A | 1.8 | 12.4 | 0.40 | 0.33 | 21.4 |
| All Vehicles | | 663 | 0.7 | 0.213 | 4.3 | NA | 1.8 | 12.4 | 0.24 | 0.40 | 22.2 |

### 2021 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 11 | | | | | | | | | | | |
| 21 | L2 | 19 | 0.0 | 0.016 | 2.6 | LOS A | 0.1 | 0.4 | 0.31 | 0.39 | 28.0 |
| 23 | R2 | 1 | 0.0 | 0.016 | 6.1 | LOS A | 0.1 | 0.4 | 0.31 | 0.39 | 26.9 |
| Approach | | 20 | 0.0 | 0.016 | 2.8 | LOS A | 0.1 | 0.4 | 0.31 | 0.39 | 27.9 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 4 | 0.0 | 0.122 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 34.6 |
| 25 | T1 | 232 | 0.7 | 0.122 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.3 |
| Approach | | 236 | 0.7 | 0.122 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.4 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 364 | 0.8 | 0.205 | 3.3 | LOS A | 1.7 | 11.7 | 0.38 | 0.34 | 21.1 |
| 32 | R2 | 15 | 0.0 | 0.205 | 44.9 | LOS E | 1.7 | 11.7 | 0.38 | 0.34 | 30.6 |
| Approach | | 379 | 0.8 | 0.205 | 5.0 | LOS A | 1.7 | 11.7 | 0.38 | 0.34 | 21.5 |
| All Vehicles | | 635 | 0.7 | 0.205 | 4.2 | NA | 1.7 | 11.7 | 0.24 | 0.40 | 22.4 |

### 2031 Option AM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 11 | | | | | | | | | | | |
| 21 | L2 | 66 | 0.0 | 0.129 | 2.7 | LOS A | 0.5 | 3.4 | 0.37 | 0.49 | 27.3 |
| 23 | R2 | 56 | 0.0 | 0.129 | 5.1 | LOS A | 0.5 | 3.4 | 0.37 | 0.49 | 26.2 |
| Approach | | 122 | 0.0 | 0.129 | 3.8 | LOS A | 0.5 | 3.4 | 0.37 | 0.49 | 26.8 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 6 | 0.0 | 0.116 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 34.6 |
| 25 | T1 | 218 | 1.8 | 0.116 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.3 |
| Approach | | 224 | 1.7 | 0.116 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.5 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 213 | 9.0 | 0.133 | 3.3 | LOS A | 1.0 | 7.5 | 0.40 | 0.33 | 20.7 |
| 32 | R2 | 14 | 0.0 | 0.133 | 35.5 | LOS E | 1.0 | 7.5 | 0.40 | 0.33 | 30.1 |
| Approach | | 227 | 8.4 | 0.133 | 5.3 | LOS A | 1.0 | 7.5 | 0.40 | 0.33 | 21.3 |
| All Vehicles | | 573 | 4.0 | 0.133 | 4.1 | NA | 1.0 | 7.5 | 0.24 | 0.44 | 23.3 |

### 2031 Option PM

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 11 | | | | | | | | | | | |
| 21 | L2 | 32 | 0.0 | 0.083 | 3.5 | LOS A | 0.3 | 2.0 | 0.52 | 0.61 | 25.2 |
| 23 | R2 | 22 | 0.0 | 0.083 | 9.0 | LOS A | 0.3 | 2.0 | 0.52 | 0.61 | 24.2 |
| Approach | | 54 | 0.0 | 0.083 | 5.8 | LOS A | 0.3 | 2.0 | 0.52 | 0.61 | 24.8 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 16 | 0.0 | 0.229 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 34.6 |
| 25 | T1 | 426 | 1.6 | 0.229 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.3 |
| Approach | | 442 | 1.5 | 0.229 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.6 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 385 | 0.0 | 0.314 | 3.6 | LOS A | 3.2 | 22.7 | 0.59 | 0.32 | 18.7 |
| 32 | R2 | 74 | 0.0 | 0.314 | 31.2 | LOS D | 3.2 | 22.7 | 0.59 | 0.32 | 26.7 |
| Approach | | 459 | 0.0 | 0.314 | 8.1 | LOS A | 3.2 | 22.7 | 0.59 | 0.32 | 19.9 |
| All Vehicles | | 955 | 0.7 | 0.314 | 5.6 | NA | 3.2 | 22.7 | 0.31 | 0.42 | 21.7 |

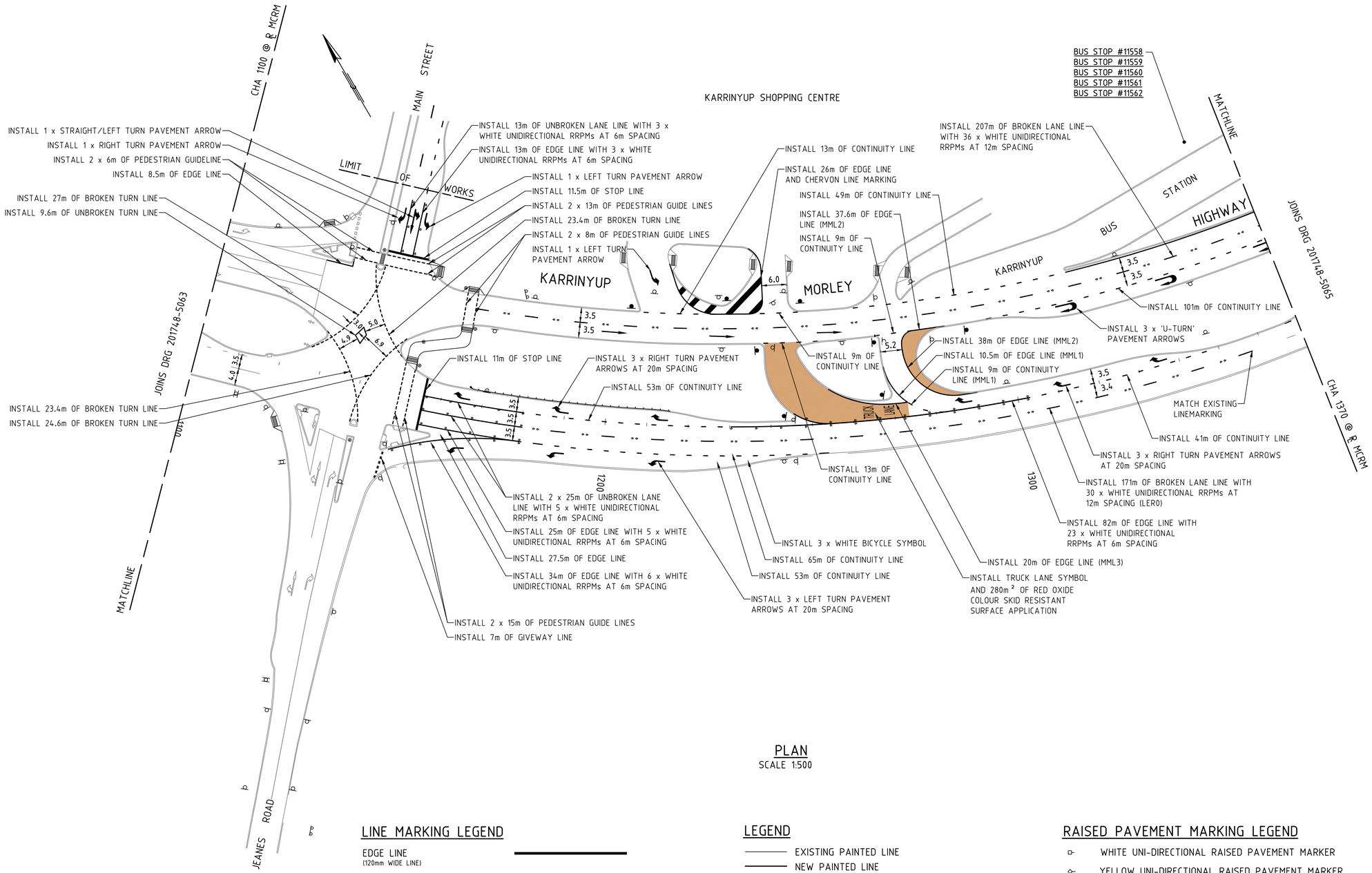
### 2031 Option SATURDAY

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SouthEast: Access 11 | | | | | | | | | | | |
| 21 | L2 | 30 | 0.0 | 0.090 | 2.9 | LOS A | 0.3 | 2.2 | 0.43 | 0.56 | 26.2 |
| 23 | R2 | 38 | 0.0 | 0.090 | 6.3 | LOS A | 0.3 | 2.2 | 0.43 | 0.56 | 25.1 |
| Approach | | 68 | 0.0 | 0.090 | 4.8 | LOS A | 0.3 | 2.2 | 0.43 | 0.56 | 25.6 |
| NorthEast: Burroughs Road | | | | | | | | | | | |
| 24 | L2 | 17 | 0.0 | 0.150 | 4.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 34.5 |
| 25 | T1 | 274 | 0.5 | 0.150 | 3.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.2 |
| Approach | | 291 | 0.5 | 0.150 | 3.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.51 | 23.8 |
| SouthWest: Burroughs Road | | | | | | | | | | | |
| 31 | T1 | 311 | 0.8 | 0.220 | 3.3 | LOS A | 1.8 | 12.4 | 0.46 | 0.34 | 20.4 |
| 32 | R2 | 46 | 0.0 | 0.220 | 23.2 | LOS C | 1.8 | 12.4 | 0.46 | 0.34 | 29.4 |
| Approach | | 357 | 0.7 | 0.220 | 5.9 | LOS A | 1.8 | 12.4 | 0.46 | 0.34 | 21.4 |
| All Vehicles | | 716 | 0.5 | 0.220 | 4.6 | NA | 1.8 | 12.4 | 0.27 | 0.43 | 22.7 |

# Appendix G

## Karrinyup Road/ Jeanes Road/ Main Street Schematic Road Upgrade Drawing




## PLAN
SCALE 1:500

## LINE MARKING LEGEND

| | |
|---|---|
| EDGE LINE (120mm WIDE LINE) | |
| BROKEN LANE LINE (80mm WIDE LINE) | 3m 9m 3m 9m 3m |
| UNBROKEN LANE LINE (80mm WIDE LINE) | |
| CONTINUITY LINES (120mm WIDE LINE) | 1m 3m 1m 3m 1m 3m 1m |
| GIVE WAY LINE (450mm WIDE LINE) | 0.6m LINE AND GAP |
| STOP LINE (450mm WIDE LINE) | |
| BROKEN TURN LINE (100mm WIDE LINE) | 0.6m LINE AND GAP |
| PEDESTRIAN GUIDE LINES (150mm WIDE LINE) | 1.0m LINE AND 0.3m GAP |

## LEGEND

- EXISTING PAINTED LINE
- NEW PAINTED LINE
- EXISTING PAVEMENT ARROW
- NEW PAVEMENT ARROW
- NEW URBAN LANE CHANGE PAVEMENT ARROW
- EXISTING ONE POST SIGN
- NEW OR REPOSITIONED ONE POST SIGN
- EXISTING TWO POST SIGN
- NEW OR REPOSITIONED TWO POST SIGN
- TRAFFIC SIGNAL POLE
- DIAGONAL MARKING
- TACTILE GROUND SURFACE INDICATOR
- COLOURED CYCLE LANE TREATMENT, REFER NOTE 4.
- RED ASPHALT BUS LANES
- (MLL2) MX STRING LABEL FOR SETOUT
- PROPOSED W-BEAM SAFETY BARRIER

## RAISED PAVEMENT MARKING LEGEND

- WHITE UNI-DIRECTIONAL RAISED PAVEMENT MARKER
- YELLOW UNI-DIRECTIONAL RAISED PAVEMENT MARKER
- YELLOW BI-DIRECTIONAL RAISED PAVEMENT MARKER

NOT FOR CONSTRUCTION

## AMENDMENTS

| No. | DESCRIPTION | APPROVED & DATE |
|---|---|---|
| A | ISSUED FOR MRWA 15% REVIEW | 27.02.17 |
| B | ISSUED FOR MRWA 85% REVIEW | 30.06.17 |
| C | ISSUED FOR MRWA 100% REVIEW | 05.02.18 |

## NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS PLAN TO BE PRINTED AND VIEWED IN COLOUR.
3. FOR SIGNAGE INFORMATION REFER TO DRGS. 201748-5073 TO 5085.
4. FOR PAVEMENT MARKING LINE TYPES REFER TO MRWA STANDARD DRG 9931-0198.
5. FOR PAVEMENT MARKING ARROW DETAILS REFER TO MRWA STANDARD DRG 9531-2010.
6. FOR RAISED RETRO-REFLECTIVE PAVEMENT MARKER LOCATIONS REFER TO MRWA STANDARD DRG 9120-0158
7. FOR BUS STOP PAVEMENT MARKINGS STANDARDS REFER TO MRWA STANDARD DRG 200331-092

## METADATA

GROUND SURVEY STANDARD: 67-08-43
DATE OF CAPTURE:
MAPPING SURVEY STANDARD:
DATE OF CAPTURE:
MAIN ROADS PROJECT ZONE: PCG94
HEIGHT DATUM: AHD

pritchard francis
civil and structural engineering consultants
Level 1, 430 Roberts Road
PO Box 2150
Subiaco WA 6904
Telephone: (08) 9382 5111
Facsimile: (08) 9382 5199
admin@pfeng.com.au
ACN: 008 891 094

DRAWING NUMBER/DOCUMENT ID 15-368/201748-5064
DESIGNED / DRAWN SM / NS
VERIFIED JT
DIRECTOR DI

mainroads WESTERN AUSTRALIA
ROAD NETWORK SERVICES
METROPOLITAN REGION
WATERLOO CRESCENT EAST PERTH 6004
Telephone (08) 9323 4111 Fax (08) 9323 4430

SCALES 1:500
A1

MRWA FILE NUMBER
APPROVED (MRWA)

# KARRINYUP ROAD UPGRADE
KARRINYUP MORLEY HIGHWAY (H028)
SLK 0 TO SLK 3.46
## PAVEMENT MARKING PLAN
CHA 1100 TO CHA 1370 @ MCRM

LOCAL AUTHORITY CITY OF STIRLING (125)
MRWA DRAWING NUMBER
201748-5064 C

E:\WORKING\2015\15-368 KARRINYUP SC\CIVIL\SARA WORKING

**Aurecon Australasia Pty Ltd**

Level 5, 863 Hay Street
Perth WA 6000
Australia
**T** +61 8 6145 9300
**F** +61 8 6145 5020
**E** perth@aurecongroup.com
**W** aurecongroup.com

**Key Contact**

Antony Johnstone,
Senior Transport Engineer,
Level 5, 863 Hay Street, Perth WA 6000
**T** +61 8 6145 9443
**E** antony.johnstone@aurecongroup.com

Aurecon offices are located in:
Angola, Australia, Bahrain, Botswana, China, Ethiopia, Hong Kong, Indonesia, Lesotho, Libya, Malawi, Mozambique, Namibia, New Zealand, Nigeria, Philippines, Singapore, South Africa, Swaziland, Tanzania, Thailand, Uganda, United Arab Emirates, Vietnam.

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Attachment 6c

aurecon

**Mixed Use Expansion at Karrinyup**

Travel Behaviour Change and Parking Management Plan

**AMP Capital**

**10 July 2019**

**Revision:** 4

**Reference:** 249825

Bringing ideas to life

# Document control record

Document prepared by:

**Aurecon Australasia Pty Ltd**
ABN 54 005 139 873
Level 5, 863 Hay Street
Perth WA 6000
Australia

**T** +61 8 6145 9300
**F** +61 8 6145 5020
**E** perth@aurecongroup.com
**W** aurecongroup.com

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| Name | M. La Galia | Name | A. Johnstone |
| Title | Transport Engineer | Title | Associate, Transport Services |

# Contents


**1 Introduction 1**

1.1 Introduction 1

1.2 Purpose of the Parking Management and Travel Plan 1

1.3 Policy and Strategic Context 2

**2 Context 3**

2.1 Existing Shopping Centre 3

2.2 The Future Shopping Centre 15

**3 Objectives 24**

**4 Strategies 25**

4.1 Issues and Opportunities 25

4.2 Consideration of Good Practice 27

4.3 TPMP Strategies 30

4.4 Consultation 35

**5 Decisions Made 36**

5.1 Car Parking 36

5.2 Car Parking Controls 39

5.3 Bicycle Parking 45

**6 Implementation Framework 46**

6.1 Steering Group 46

6.2 Promotion and Communication Strategies 46

6.3 Measure of Outcomes 48

**7 Monitoring, Review and Rectification 49**

7.1 Usage Monitoring Regime 49

7.2 Maintenance 50

7.3 Procedures and Responsibilities 50

7.4 Operational Commitments 51


## Appendices

No table of contents entries found.

# 1 Introduction

## 1.1 Introduction

Aurecon was commissioned by AMP Capital Funds Management Ltd to undertake a Travel Behaviour Change and Parking Management Plan (TPMP) for the Mixed-Use Expansion at Karrinyup Shopping Centre ('the Centre'). The Centre is proposed to undergo a significant redevelopment and be transformed into a 'community hub' with mixed use development within and surrounding the Centre. This includes the establishment of a main street which will be active during the day and also after hours.

The development of the TPMP forms part of the conditions of the development approval, and is required to be implemented with the commencement of use of the redeveloped Centre. This document is considered to be a live document and therefore is subject to ongoing review and change.

It should be noted that this document considers the fully developed Centre, with the staging of parking bays during construction addressed in the Site Management Plan. The applicant assumes all risk associated with staging delivery of the development, including implementing infrastructure that may be required to enable later stages.

## 1.2 Purpose of the Parking Management and Travel Plan

Like any major development, the economic, social and environmental sustainability of its transport system needs consideration. While many transport systems cannot completely satisfy these fundamental aspects, it is important that there is a targeted focus on achieving a greater balance of each aspect. Single occupancy private vehicles are typically the transport mode of choice to shopping centres, however there are a number of alternatives that can be facilitated and incentivised, including public transport, cycling and walking, which will contribute to achieving a greater transport system balance.

This document outlines a range of tools and strategies to manage parking demand and promote travel behaviour change at the redeveloped Centre, with the aim of providing efficient access and parking at the redeveloped Centre.

This document outlines the policies to be implemented and commitments regarding parking management and travel behaviour change strategies, whilst providing a mechanism to regularly review and modify the proposed strategies as necessary.

This document has been prepared in accordance with, but not limited to, the following guidelines:

- Parking Guidelines for Large Shopping Centres, Department of Transport, June 2016
- Travel Plan Guidelines for Large Shopping Centres, Department of Transport, June 2016

The successful management of parking and travel planning are closely linked as they maximise the benefits of each other. As such, this document aims to combine the requirements of the Parking Guidelines and Travel Plan Guidelines developed by the Department of Transport into a single streamlined document for simpler implementation and reference.

While the Mixed Use Expansion at Karrinyup Transport Plan outlines details regarding the 'hard' infrastructure improvements, including bus lanes along Karrinyup Road with increased peak bus frequencies, and new footpaths and cycle paths, this document aims to complement the infrastructure improvements with 'soft' measures.

## 1.3 Policy and Strategic Context

This section outlines the broad policy objectives that the TPMP are intended to achieve, including from both state and local government agencies. It is important the TPMP aligns with local and state government objectives to ensure consistency in the outcomes of the plan.

### 1.3.1 WA Transport Portfolio

The WA Transport Portfolio's Travel Demand Management Plan @3.5million (2016) identifies effective travel demand management (TDM) measures for the Perth and Peel region as it heads towards a population of 3.5 million.

The TDM identifies 'Parking Strategies' as one of the six key measures, with the following objectives:

- To improve parking management and parking use efficiencies;
- To discourage private car journeys to specific sites; and
- To encourage alternative modes and reallocate space for other uses (i.e. public space).

The TDM also identifies 'Travel Plans for New Developments' and 'Travel Behaviour Change Programs' as two of the six key measures for implementation in Perth. These measures are recommended for new major commercial developments and workplaces in major activity centres, and have the following objectives:

- Encourage voluntary changes in travel habits and patterns;
- Reduce dependence on private cars;
- Increase the share of trips by alternative modes such as cycling, walking, public transport and car-pooling;
- Increase physical activity; and
- Decrease the need for travel.

### 1.3.2 City of Stirling

The City of Stirling Parking and Access Policy outlines a number of objectives on a local area level. These include:

- Facilitation of adequate parking facilities;
- Safe, convenient and efficient access for pedestrians, cyclists and motorists;
- Minimised chances of major parking problems arising;
- Avoidance of impact to the character and amenity of an area; and
- Avoidance of the oversupply of parking and the corresponding effects on travel behaviour and urban character.

The City of Stirling's Integrated Transport Strategy identifies five objectives for transport planning with a view to enhance social, economic and environmental outcomes. Three of these objectives are linked to travel behaviour, which are:

- To encourage more sustainable transport of people and goods;
- To improve accessibility for pedestrians, cyclists and public transport users to a variety of destinations; and
- To encourage public transport modes over private transport modes.

# 2 Context

## 2.1 Existing Shopping Centre

### 2.1.1 Location

The Centre forms part of the Karrinyup Secondary Activity Centre within the Karrinyup-Gwelup locality in the City of Stirling, located approximately 12 km northwest of the Perth CBD.

### 2.1.2 Land Use

Referring to Figure 2-1, the Centre is bounded by Karrinyup Road, Burroughs Road, Davenport Street and Francis Avenue and is currently mixed-use consisting of commercial and civic facilities. The main retail facility is the Karrinyup Shopping Centre itself which forms the bulk of the built area, however the site also includes Karrinyup Library and Community Centre and Bankwest site between the shopping centre and Davenport Street, a service station on the corner of Burroughs Road and Karrinyup Road, fast food restaurants (drive-through) fronting Karrinyup Road and a three storey commercial building on the corner of Burroughs Road and Davenport Street. A Transperth bus interchange operated by the Public Transport Authority (PTA) is located alongside the Centre adjacent to Karrinyup Road. Table 2-1 shows the existing land use types.

**Figure 2-1: Location of the Karrinyup Centre**

Table 2-1: Existing land use at the Karrinyup Centre

| Land Use Type | Floor Space, $m^2$ (2011) |
|---|---|
| Retail | 53,544 |
| Office/Business | 4,184 |
| Eating/Entertainment/Culture | 2,382 |
| Community/Health/Welfare | 706 |
| Other Incidental Floor Space | 195 |
| **Total** | **61,011** |

The land use currently surrounding the Centre is predominantly single-unit residential dwellings (design code R20/R30) with various public reserves, including Lake Gwelup to the east. It is noted that there is a child care centre located to the north of Davenport Street opposite the shopping centre access point and across from the Stirling Community Centre.

### 2.1.3 Current Travel Behaviour

A Customer Exit Survey was conducted in 2011 which identified travel modes to the Development were 92% by car and 8% by other modes, as shown in Figure 2-2. This high rate of car use is 10% above the 82% benchmark for regional centres, indicating a significant reliance on car use. At similar regional centres, it is typical to see 6% of customers walking and 8% customers travelling by bus. The Development is slightly below the benchmark for customers walking and well below the benchmark for customers travelling by public transport (bus). This may be due to limited walking access and public transport services.

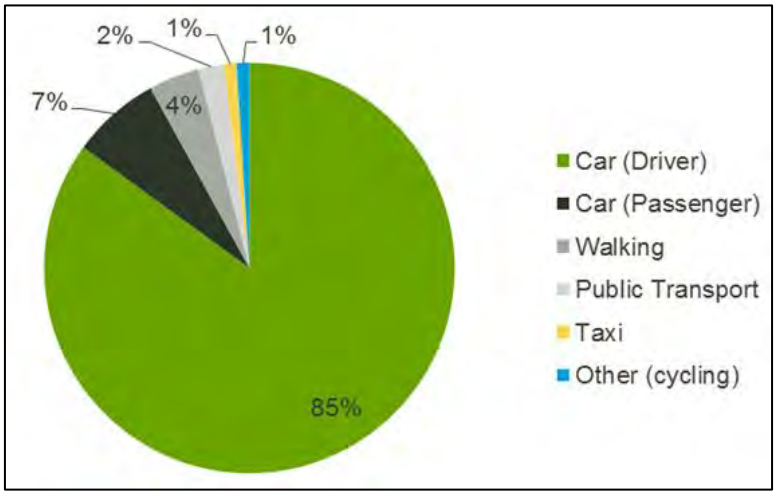



Figure 2-2 Existing travel mode share

### 2.1.4 Car Parking

#### Provision

There are currently 3,166 vehicle spaces within the Centre, located in open parking areas, undercover parking and roof parking. The parking bays are distributed within the Centre as shown in Figure 2-3 with the majority being visible and accessible from Francis Avenue and Burroughs Road.

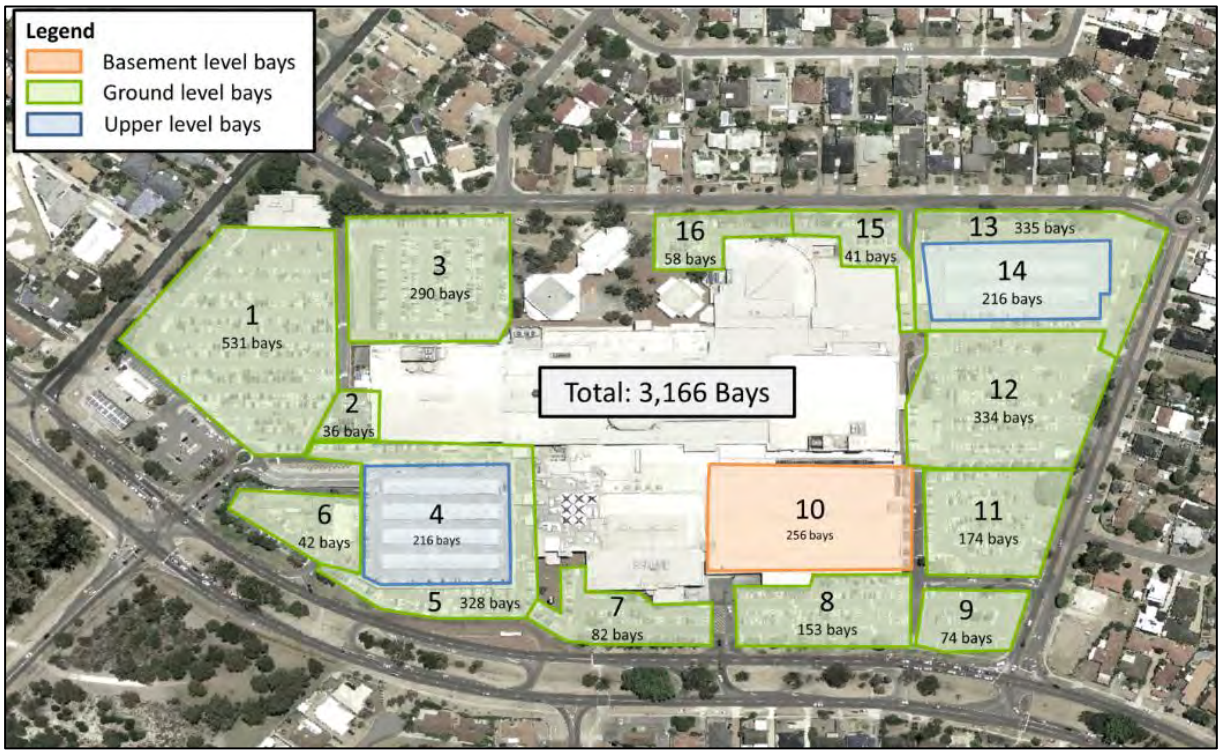



**Figure 2-3: Distribution of Parking**

#### Allocation

The existing parking allocation for various parking types is shown in Table 2-2.

**Table 2-2: Parking types & hierarchy**

| Parking Type | Description | Allocation (% of total spaces) | Location |
|---|---|---|---|
| Accessible Parking | Accessible parking only | 56 (1.8% of total) | Near pedestrian entrance points to the Centre |
| Parents with Prams | Parents with prams parking only | 42 (1.3% of total) | Near pedestrian entrance points to the Centre |
| Taxi Rank | Taxi only | 4 (0.1% of total) | Near the southern entrance to the Centre |
| Motorcycle | Motorcycles and scooters | 6 (0.2% of total) | On the western side of the Centre, as shown in Figure 2-4 |
| Emergency Vehicle | Emergency vehicles only | 1 (0.03% of total) | One on both the western and eastern sides of the Centre, as shown in Figure 2-4 |
| Short Term | 15 minute parking (P15)<br>1 hour parking (1P)<br>90 minute parking (P90) | 162 (5.1% of total) | At various locations throughout the Centre |
| General Patron | 4 hour parking (4P)<br>Unrestricted bays | 2,192 (69.2% of total) | |

| Parking Type | Description | Allocation (% of total spaces) | Location |
|---|---|---|---|
| Staff | Allocated retail staff bays | 673 (21.3% of total) | Long term staff parking is allocated within the general parking bays, as shown in Figure 2-4, to ensure that staff do not occupy more easily accessible car parks. Note that the bays are marked by a yellow dot and are not exclusive to staff. |
| Service Delivery | Loading zone only<br>Service vehicles only | 11 (0.4% of total) | At the existing service yards within the Centre |
| Other | TAB parking for customers and staff<br>Library staff parking | 19 (0.6% of total) | At the existing TAB and library sites |
| **Total:** | | **3,166** | |

**Figure 2-4: Existing parking type allocation**

### Utilisation

A parking survey was conducted on Saturday 23 November 2013, Tuesday 26 November 2013 and Thursday 28 November 2013 which entailed an hourly audit of usage. Parking utilisation is illustrated in Figure 2-5. From the parking audit analysis, the maximum parking utilisation for the Tuesday was 78% of all parking bays available, between 12:00 and 13:00. Utilisation of 72% or more occurred between 11:00 and 15:00.

On the Thursday, it was found that the maximum parking utilisation was 88% between 13:00 and 14:00 and that an 80% or above utilisation occurred between 11:00 and 16:00. The maximum evening utilisation was found to be 73% between 19:00 and 20:00.

The maximum parking utilisation for the Saturday was 95% between 12:00 and 13:00 and again between 14:00 and 15:00. Utilisation of 89% or more occurred between 11:00 and 16:00.

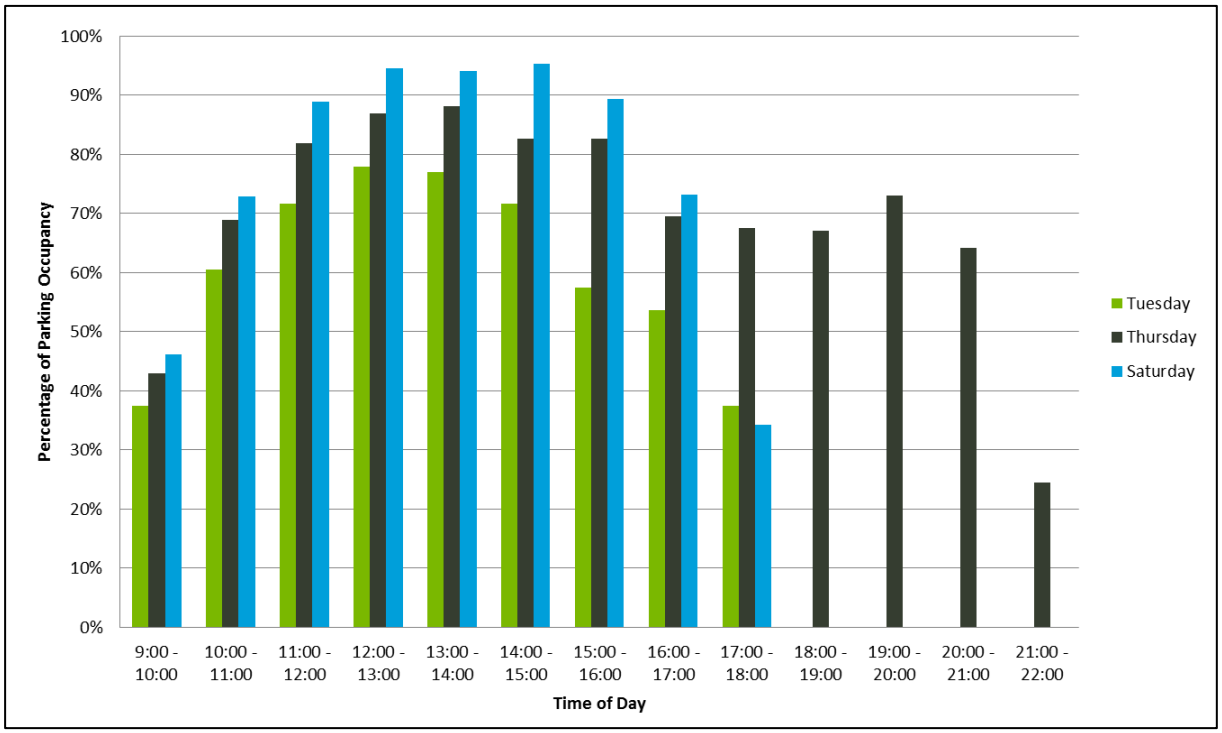



**Figure 2-5: Parking utilisation**

The busiest day (of those surveyed) in terms of parking utilisation was Saturday, both in terms of the average number of bays utilised and the most number of bays utilised.

It is generally considered that an efficient car park operates at 85% capacity with 90% occupancy considered to be the practical capacity, beyond which the difficulty in finding the remaining vacant parking spaces without guidance can impact on the operation of the facility.

The November 2013 surveys indicated that these utilisation levels are met or close to being met over a 5 hour period on a Thursday and are exceeded over a 3-5 hour period on a Saturday.

The car park currently contains no Variable Message Signs (VMS) indicating where bays are available, therefore with a utilisation of 85% plus the process of finding available bays can be time consuming and frustrating for drivers.

The 3,166 parking bays for 61,011m$^2$ of total floor space equates to a provision of approximately 5.2 parking bays per 100m$^2$ of land use. This is compared to the New South Wales Roads and Traffic Authority (RTA) Guide to Generating Traffic Developments which recommends a minimum rate of 4.1 spaces per 100m$^2$ for larger shopping centres (>30,000 gross leasable floor area).

### 2.1.5 Car Parking Controls

The car parking at the Centre is currently managed using the following strategies:

- Time Limited Parking
  - All public car parks within the Development have a four hour (4P) time limit. This is managed and administrated by shopping centre parking rangers who patrol the car parking areas and issue fines to cars which exceed the 4P time limit.
  - On-street parking is permitted on the northern side of Davenport Street, with no time limit. Parking is not permitted on the road or verge on the Centre side of any of the other surrounding roads of the Centre (Karrinyup Road, Francis Avenue and Burroughs Road). Within 400m of the Centre, there are generally no other parking restrictions on public roads with the exception of no standing zones within the minimum required distance from intersections.
- Staff Parking
  - Car parking areas within the Centre that are in the most inconvenient location for visitors are allocated to staff for long term parking, i.e. near the existing petrol station, with each bay marked by a yellow dot. Staff parking is enforced using car number plate recognition. The number plates of all staff car parking bays are compiled from all cars parked in the staff parking bays that stay at the shopping centre for more than four hours. All areas outside the staff parking area are checked twice a day, once in the morning and again in the afternoon, representing a four hour time frame. If staff cars are found outside the staff parking area they receive a breach notice. The program has historically been a great success with the prime parking bays located undercover and/or outside the major stores remaining free for customer use.
- Peak Shopping Periods
  - During peak shopping periods, for example pre-Christmas week, there is a current arrangement with the City of Stirling and nearby local schools to allow staff to park at nearby reserves and school ovals. Shuttle buses are provided to transfer staff to and from the Development where these parking areas are out of walking distance range.

There is some existing static wayfinding signage throughout the Centre car parking, generally directing vehicles to major stores and undercover or decked parking areas (refer to Figure 2-6).

**Figure 2-6: Examples of existing wayfinding signage**

### 2.1.6 Bicycle Parking

A minimal amount of existing public bicycle parking is available at some of the main entrances to the Centre (refer to Figure 2-7). There are limited end of trip facilities within major tenancies and there is currently no centre wide facility.

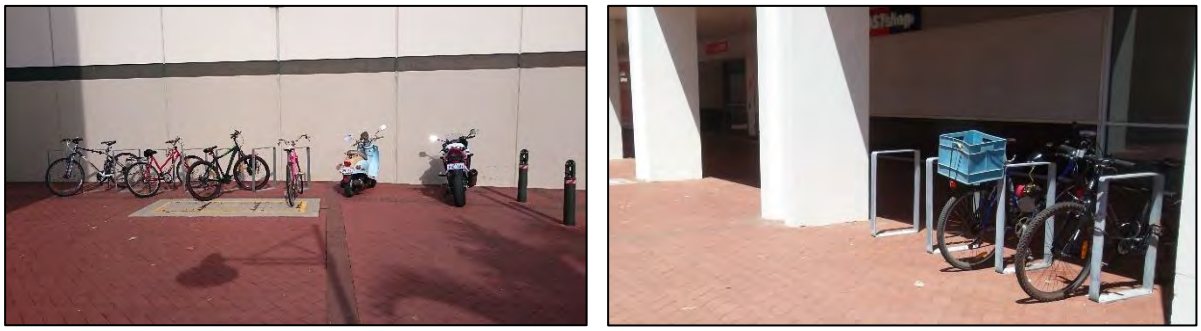


**Figure 2-7: Existing bicycle parking racks at the main entrances to the Centre**

### 2.1.7 Public Transport Access

Bus services are available direct to the Karrinyup Bus Station, primarily accessed via Karrinyup Road. Referring to Figure 2-8, the Karrinyup Bus Station currently provides standard bus shelters at each stand, consisting of a roof, seating and side panels that offer limited protection from sun, wind and rain. The provision of information at the bus station is limited to the stand specific route and timetable information on stand number signs.

A car park circulation road, with a zebra crossing, separates the bus station from the main pedestrian entrance to the Centre.

**Figure 2-8: Existing bus shelter (left) and road crossing from the bus station to access the main Centre entrance (right)**

The Karrinyup Bus Station is currently used by five bus services, with the routes of these services connecting to the surrounding area as shown in Figure 2-9.

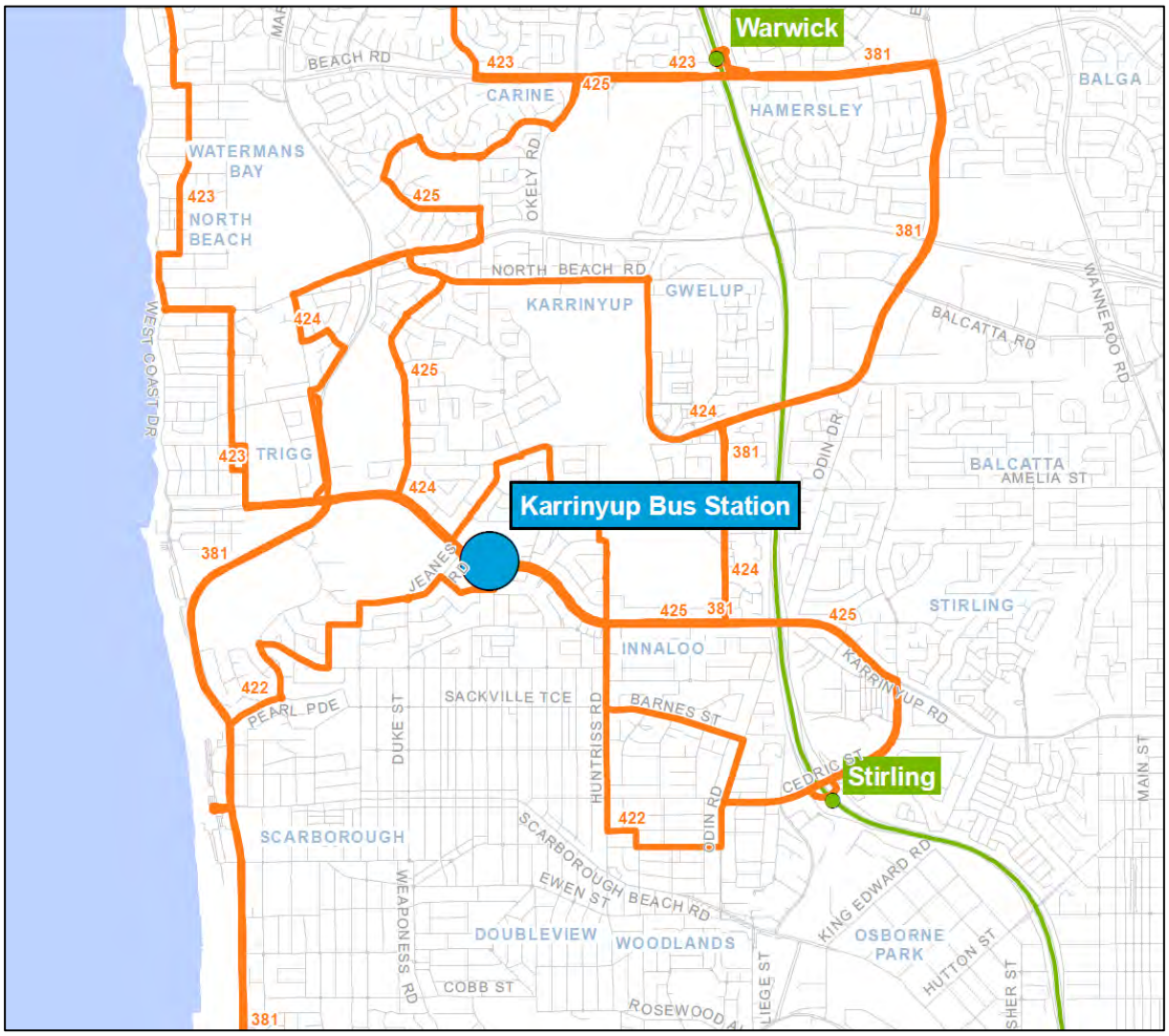



**Figure 2-9 Bus routes to/from the Centre**

Direct bus access from Karrinyup Bus Station is available to Scarborough Beach as well as a number of train stations including Stirling, Warwick and Fremantle. Weekday peak headways for these bus services range from 15 minutes to 2 hours, however the peak services align with the commuter peak in the early morning and late afternoon which in general does not coincide with peak customer shopping hours for the Centre.

Most off-peak weekday schedule services run hourly or twice per hour. However, the busiest times for the Centre are during weekends and in general weekend bus service frequencies are very poor, typically hourly or even none for some services.

A summary of bus services is listed below:

- **Route 423** is the most frequent route and operates between Stirling Station and Warwick Station via the Karrinyup Bus Station. During the weekday peak periods, the service runs at headways of approximately 10 to 20 minutes, and 30 minutes during off-peak and Saturdays. During Sundays and Public Holidays, the 423 service runs hourly.

- **Route 425** operates between Stirling Station and Warwick Station via Karrinyup Bus Station at approximately 15-20 minute intervals during the weekday peak periods and 30 minutes during the off-peak. On Saturdays, Sundays and Public Holidays, the 425 operates at hourly intervals.
- **Route 422** operates between Stirling Station and Scarborough Beach via Karrinyup Bus Station every 20 to 30 minutes during the weekday morning peak period and hourly during the weekday off-peak, afternoon peak and Saturdays. The service does not run on Sunday or Public Holidays.
- **Route 424** operates between Stirling Station and Karrinyup Bus Station every 20 minutes during the weekday morning peak period and every 30 minutes during the afternoon peak period. During the weekday off-peak and Saturday, the 424 operates at hourly headways. The service does not operate on Sundays and Public Holidays.
- **Route 381** operates between Karrinyup Bus Station and Fremantle Station. This service only runs twice a day during the weekdays, departing Karrinyup Bus Station at 7:10 AM during the morning, and during the afternoon, the service departs Fremantle Station at approximately 5:10 PM.

Passenger numbers were studied as part of the Mixed Use Expansion at Karrinyup Transport Plan (Aurecon, December 2016) by obtaining SmartRider data for the Karrinyup Bus Station. The peak period for bus patronage on Saturday was similar to the weekday AM and PM peak periods which indicated that it is mainly employees that are using public transport to commute to and from work, and there is currently limited use of public transport by customers.

Overall, the current bus services seem to be aimed at commuters travelling to and from the Perth CBD via Warwick and Stirling train stations or school children, with access to the Centre not being a key focus of the services. It is apparent that there is currently minimal public transport infrastructure to support higher frequency services to Karrinyup and encourage increased patronage.

### 2.1.8 Cycling Access

The facilities and opportunities for direct bicycle access to the Centre are poor.

Referring to Figure 2-10, a number of existing PBN routes are located in close proximity to the Centre with connecting 'local bicycle friendly streets' (good road riding environment) including:

#### East-West Routes

- PBN Route NW7 to the north of the Centre providing an east-west connection between Marmion Avenue and the Mitchell Freeway Principal Shared Path (PSP), encompassing College Court, Axbridge Street, Pascoe Street and Porter Street
- PBN Route NW8 to the south of the Centre providing an east-west connection between West Coast Highway and the Mitchell Freeway PSP, encompassing Sackville Terrace and Barnes Street

#### North-South Routes

- PBN Route NW2 to the west of the Centre providing a north-south route parallel to the coastline and connecting to Marmion Avenue
- PBN Route NW1 to the east of the Centre providing a north-south route between Pascoe Street and Barnes Street, encompassing Finnerty Street, Huntriss Road, Norman Street, Decima Street, Birdwood Street, Satin Way, Langley Crescent and Crocker Road
- Mitchell Freeway PSP located approximately 1.7 kilometres to the east of the Centre

#### Local Bicycle Friendly Streets

- Jeanes Road between Deanmore Road and Karrinyup Road
- Newborough Street between Elliott Road and Grand Promenade
- Burroughs Road between Karrinyup Road and Pascoe Street

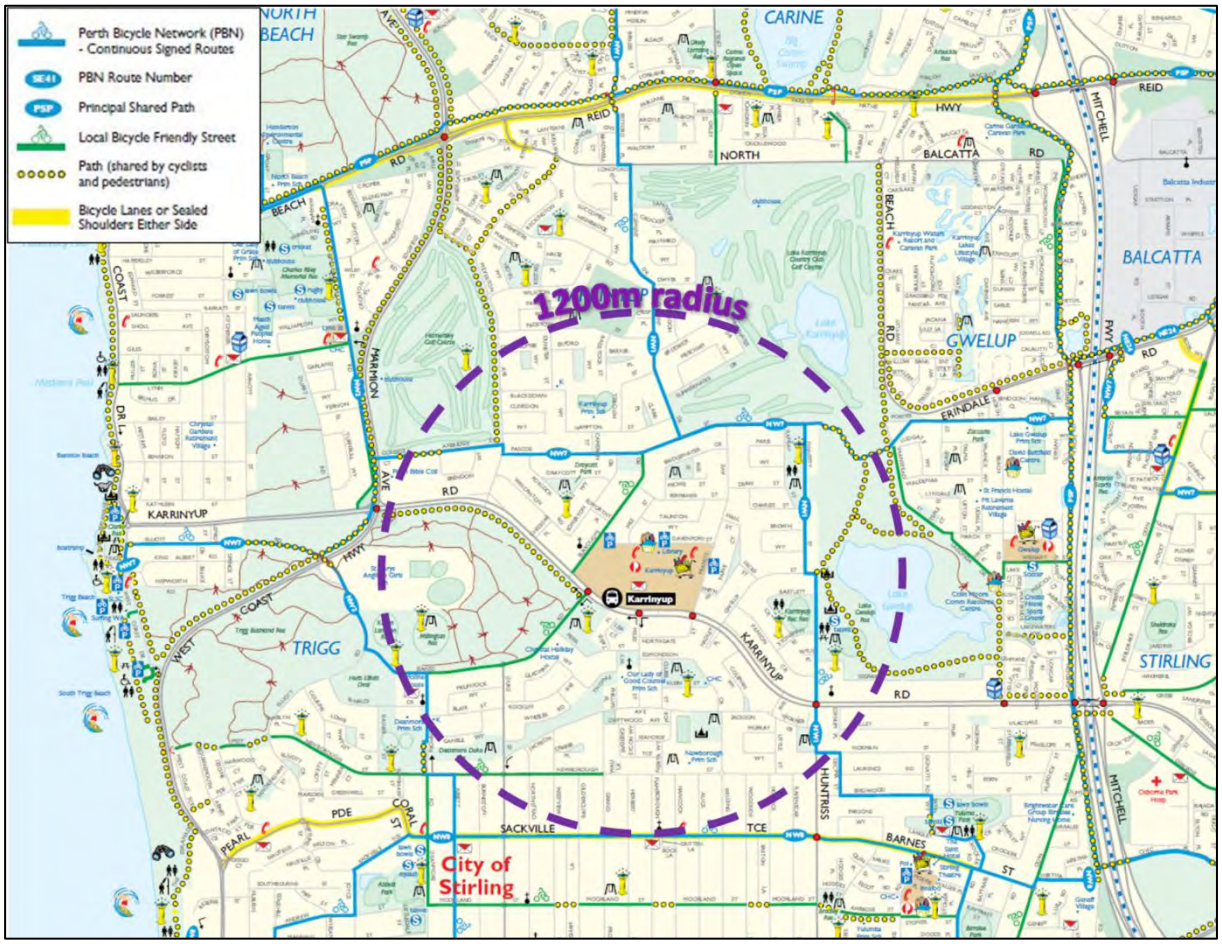



**Figure 2-10 Bicycle network surrounding the Centre (Department of Transport, 2014)**

In terms of the above mentioned strategic cycling routes, many are within one kilometre of the Centre and have the potential to provide good connectivity, however currently there isn't any dedicated cycling infrastructure (i.e. cycle lanes or paths) along many of these routes to support connections.

Referring to the Department of Transport TravelSmart Map (see Figure 2-10), the road network surrounding the Centre has dedicated bicycle infrastructure in the following locations:

- Shared path along West Coast Highway and Marmion Avenue
- Shared path along Karrinyup Road between West Coast Highway and Jeanes Road
- Bicycle Lane / Sealed shoulder along Pearl Parade, Coral Street, Sackville Terrace and Barnes Street (between West Coast Highway and Odin Road)
- Shared path around Lake Gwelup connecting to the principal shared path along Mitchell Freeway via North Bead Road and Karrinyup Road

From the above list, the only dedicated bicycle infrastructure providing direct access to the Centre is via the shared path along Karrinyup Road to the west of the Centre, although the width of the path is narrower than Austroads Guidelines and is not signed. From both the north and south, there is potential for the key cycling routes along West Coast Highway / Marmion Avenue and the Mitchell Freeway PSP to provide connectivity to the Karrinyup area. Direct access to the Centre from these major strategic routes is limited, and is primarily via non-dedicated cycling routes through residential areas.

### 2.1.9 Pedestrian Access

The Centre is situated within a large residential area, with many residents within walking distance. Walking access to the Centre is predominantly accommodated on footpaths and shared paths along the adjacent and surrounding road network. The surrounding road network has footpaths alongside the majority of directly accessible routes. The roads without footpaths tend to be lower order residential access routes, and generally do not present a safety concern for pedestrians due to low traffic volumes and generally low operating speeds. The walkable catchment (800m) is shown in Figure 2-13.

The main concerns for access on foot are the crossing of major roads, in this case Karrinyup Road, in terms of safety and time delays. There are currently three signalised crossings on Karrinyup Road giving safe and direct access to the Centre, namely at Jeanes Avenue, Francis Avenue, and the dedicated pedestrian crossing just east of Miles Street (see Figure 2-11). A continuous footpath also extends around the perimeter of the Centre, although most crossings are not Disability Discrimination Act (DDA) compliant.

Access to the pedestrian entrances to the Centre includes direct entrances into the Centre and also direct entrances into the shops themselves i.e. Myer and David Jones. Direct walking access to the entrances are provided from Karrinyup Road (via the Karrinyup Bus Station and signalised pedestrian crossing), and Francis Avenue (direct access to David Jones). Elsewhere, the customers are mostly expected to walk through car parks, whether they are walking from their cars or from the street, this increases the number of conflict points between cars and pedestrians (refer to Figure 2-12).

**Figure 2-11 Signalised pedestrian crossing on Karrinyup Road**

**Figure 2-12 Example of poor pedestrian access from car parking**

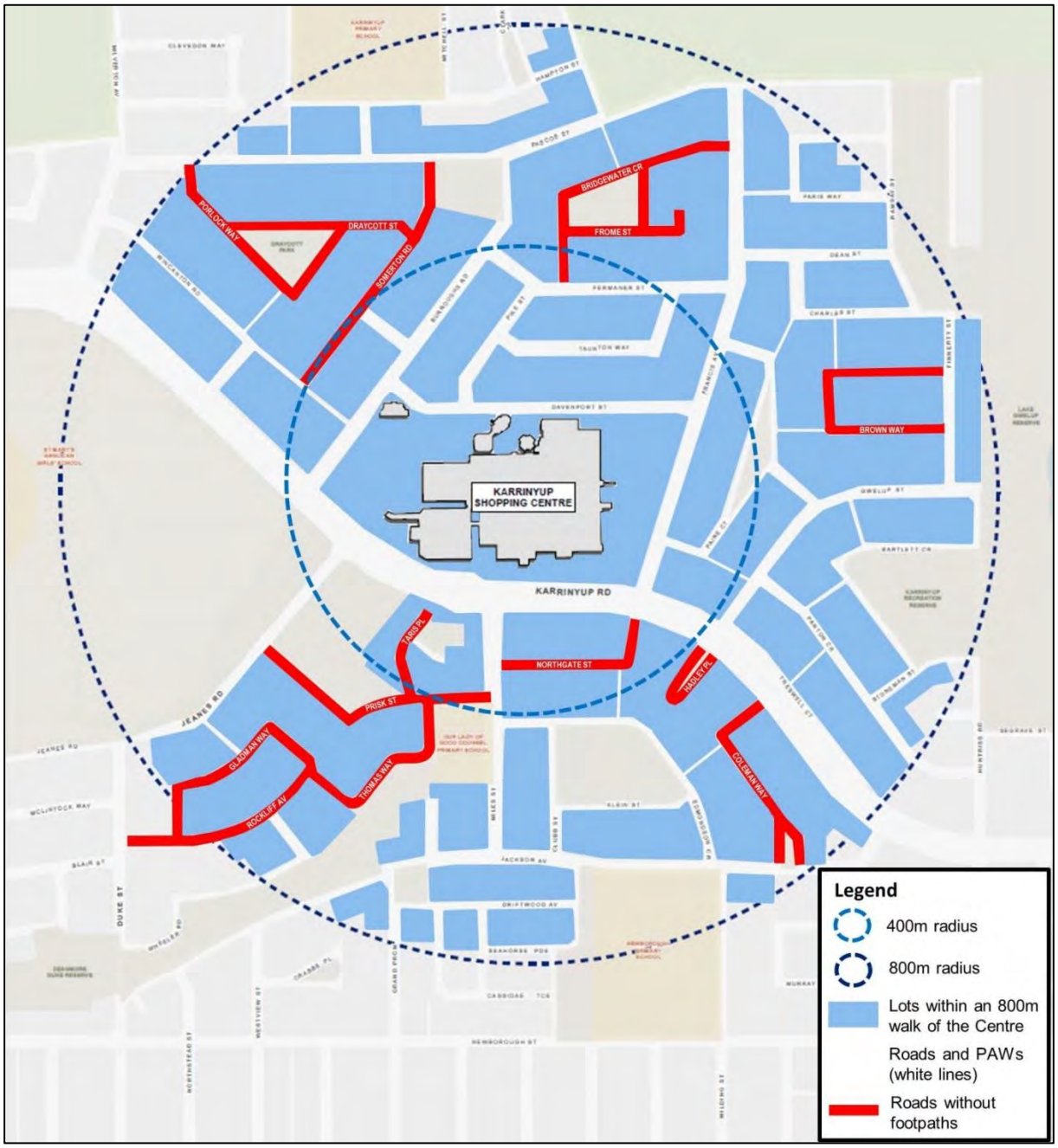



**Figure 2-13 Walkable catchment**

## 2.2 The Future Shopping Centre

### 2.2.1 Preamble

The approved Mixed Use Expansion at Karrinyup allows the site to increase its retail footprint, and include additional office, community and residential floor space.

### 2.2.2 Land Use

The Centre is shown in Figure 2-14. The retail floor space of the Centre increases from approximately 54,000 $m^2$ in retail to 93,355 $m^2$ on completion. There are also proposed increases in office/business, entertainment/community and health floor space, and provision for residential dwellings within the Centre (refer to Table 2-3).

**Table 2-3 Land use for the developed Karrinyup Centre**

| Land Use Type | Existing Floor Space, $m^2$ (2011) | Future Floor Space ($m^2$ NLA) |
|---|---|---|
| Retail | 53,544 | 93,355 |
| Office / Business | 4,184 | 10,394 |
| Eating / Entertainment / Culture | 2,382 | 3,916 |
| Community / Health / Welfare | 706 | 2,654 |
| Other Incidental Floor space | 195 | 300 |
| Cinema | - | 6,200 |
| **Total:** | **61,011** | **116,819** |
| **Residential Dwellings** | **-** | **134** |

The Centre will consist of the following:

- Four (4) consolidated pedestrian access points ("gateways") to the retail core of the Karrinyup Centre; North Gate, South Gate, East Gate and West Gate.
- Establishment of a pedestrian friendly 'main street' as an extension of Jeanes Road.
- Development of the existing Bankwest site on the northern side of the Centre to include retail floor space
- Multi-level car parking with a total of up to 4,880 bays (including general vehicles and parking for the mobility impaired), split between the eastern and western sides of the Centre.
- Revised road accesses into and throughout the Centre, ensuring the road network performs adequately.
- Upgrades to numerous intersections in the wider road network surrounding the Centre to improve access.

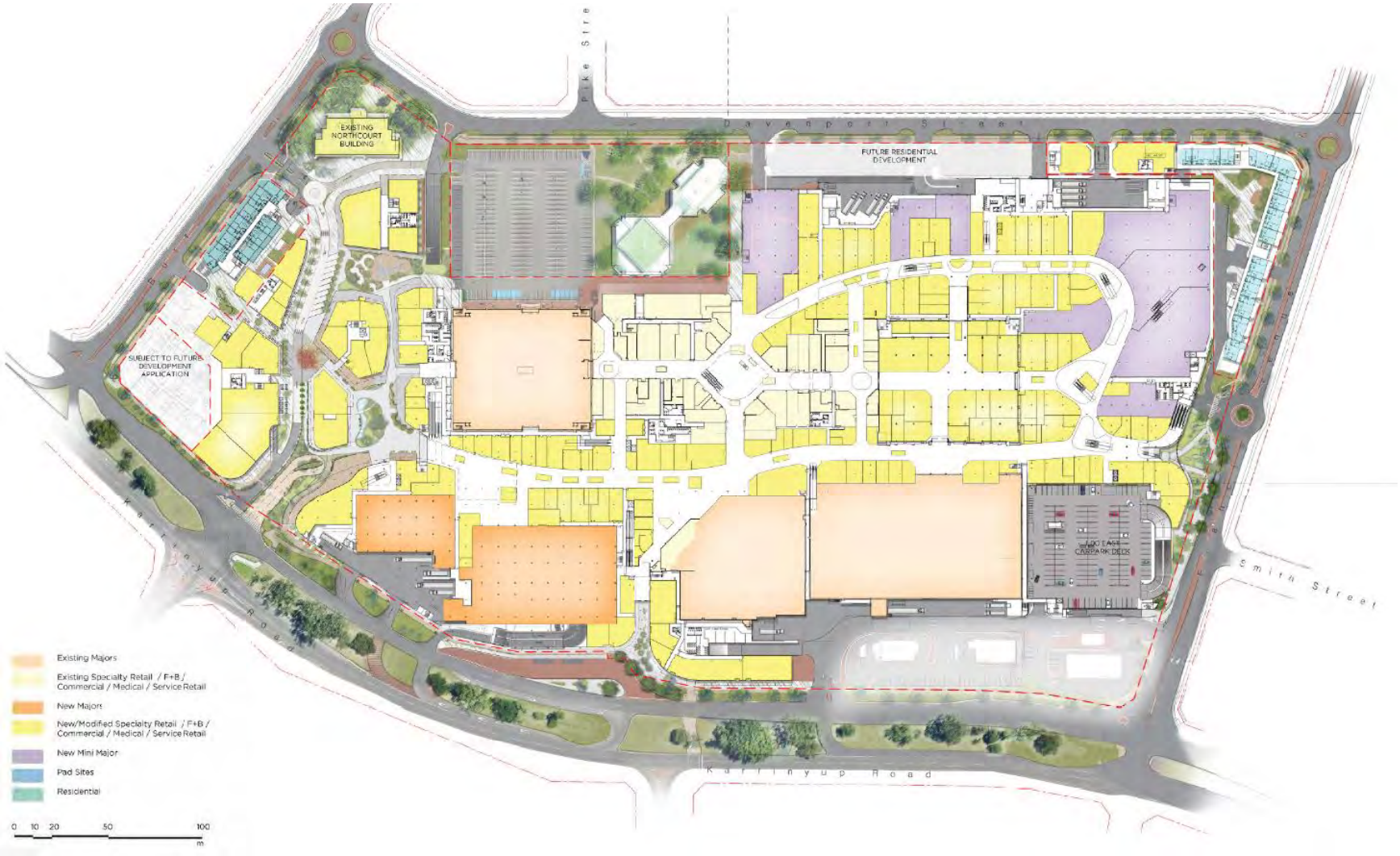



**Figure 2-14: Mixed Use Expansion at Karrinyup (ground floor)**

### 2.2.3 Travel Mode Share Targets and Trip Generation

Predicting travel behaviour in the future is challenging. Travel behaviour is guided by the attractiveness of each mode of transport which in turn could be heavily impacted by multiple factors, some of these include:

- Transport technology development, i.e. connected vehicles, autonomous vehicles, electric bikes (e-bikes);
- Future fuel and battery prices;
- Time cost of travel, i.e. preference to use phones/tablets/laptops whilst travelling;
- Society trends, i.e. the perceived status in society of each mode;
- Climate change impacts on active transport;
- Transport industry disrupters such as Uber and UberEATS; and
- External and internal infrastructure future capacity.

This plan will be used to monitor travel behaviour, and as such it is important that targets related to travel behaviour are specified so that they can be tracked against collected data. Two future mode share targets are proposed:

- Customer Mode Share Split – These are aligned to the overall mode share targets proposed in the Transport Plan.
- Staff Mode Share Split – These are based on the overall mode share targets with adjustments to align to desired staff travel behaviour

The proposed mode share targets are described below, along with the associated trip generation for each mode. The relationship between the trip generation and parking demand is discussed in Sections 5.2.2 and 5.2.3 (Car Parking Controls). The success of achieving the mode share targets will be driven by parking controls to ensure that private vehicle travel is not incentivised.

**Mode Share Targets – Customer**

The assumed customer mode share targets are aligned with the targets identified in the Mixed Use Expansion at Karrinyup Development Application Transport Plan. The travel mode share goal was based on an estimate that, by 2021, 5% of people accessing the Karrinyup Shopping Centre will shift from private motor vehicle to other modes of transport and by 2031, 10% will shift to other modes. In its entirety, trips associated with all modes will increase as a result of the Centre. Modal split targets for the horizon years 2021 and 2031 are shown in Figure 2-15.

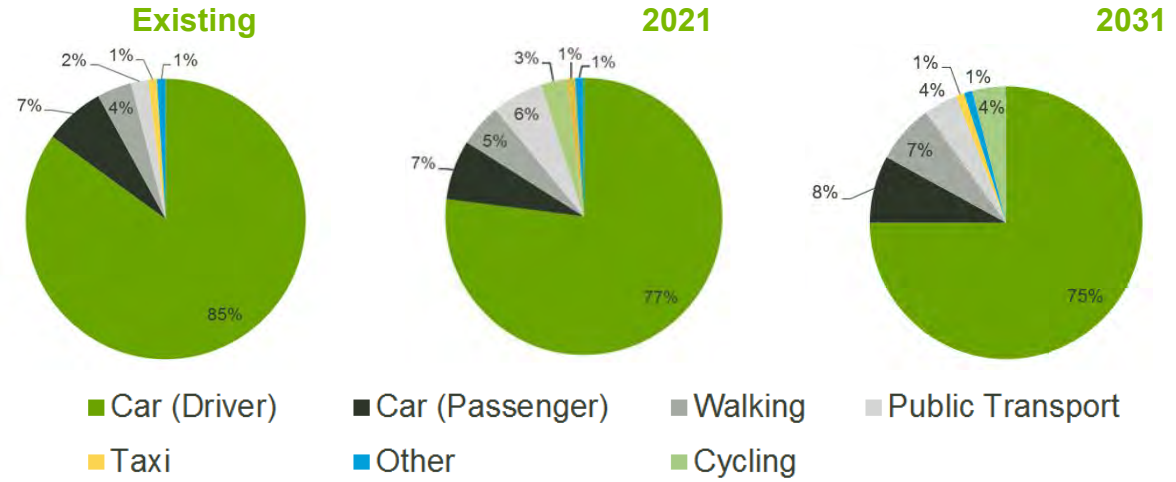



**Figure 2-15 Mode share targets for the Centre**

Considering the mode share targets for private vehicle access to the Centre, the number of trips for each mode was calculated using the current and target mode splits.

These trip numbers are shown in the tables below for each peak hour period.

**Table 2-4 Number of trips during weekdays AM and PM peak hours and Saturday peak hour - Existing situation**

| Existing | Target | AM Peak | PM Peak | Saturday Peak |
|---|---|---|---|---|
| **Car Driver** | 85% | 1,347 | 2,766 | 3,570 |
| **Car Passenger** | 7% | 111 | 228 | 294 |
| **Public Transport** | 2% | 32 | 65 | 84 |
| **Cycling** | 1% | 16 | 33 | 42 |
| **Walking** | 4% | 63 | 130 | 168 |
| **Taxi** | 1% | 16 | 33 | 42 |
| **Other** | 0% | 0 | 0 | 0 |
| **Total Trip Generation** | | **1,585** | **3,254** | **4,200** |

**Table 2-5 Number of trips during weekdays AM and PM peak hours and Saturday peak hour – 2021**

| 2021 | Target | AM Peak | PM Peak | Saturday Peak |
|---|---|---|---|---|
| **Car Driver** | 80% | 1,533 | 3,448 | 4,212 |
| **Car Passenger** | 7% | 134 | 302 | 369 |
| **Public Transport** | 3% | 58 | 129 | 158 |
| **Cycling** | 2% | 38 | 86 | 105 |
| **Walking** | 6% | 115 | 259 | 316 |
| **Taxi** | 1% | 19 | 43 | 53 |
| **Other** | 1% | 19 | 43 | 53 |
| **Total Trip Generation** | | **1,917** | **4,309** | **5,265** |

**Table 2-6 Number of trips during weekdays AM and PM peak hours and Saturday peak hour – 2031**

| 2031 | Target | AM Peak | PM Peak | Saturday Peak |
|---|---|---|---|---|
| **Car Driver** | 75% | 1,533 | 3,932 | 4,683 |
| **Car Passenger** | 8% | 164 | 419 | 500 |
| **Public Transport** | 4% | 82 | 210 | 250 |
| **Cycling** | 4% | 82 | 210 | 250 |
| **Walking** | 7% | 143 | 367 | 437 |
| **Taxi** | 1% | 20 | 52 | 62 |
| **Other** | 1% | 20 | 52 | 62 |
| **Total Trip Generation** | | **2,044** | **5,243** | **6,244** |

The values provided in the above tables are calculated from estimated projections of current trends. Relating back to the factors which will influence travel behaviour in the future, the key aspect which is estimated to impact the parking are drop-off trips. Uber is the current example of this, where people travel to an attractor by car but are simply dropped off within the site and the vehicle leaves without ever occupying a parking bay. As the payment occurs automatically, the drop off is also informal and quick. In the long term future it is anticipated that autonomous vehicles will behave in the same manner as Uber vehicles but run an even cheaper drop off service, with no demand on parking bays.

### Mode Share Targets – Staff

A strong focus of the TPMP is to encourage travel behaviour change for staff at the redeveloped Centre. By 2031 it is anticipated that the Centre may have up to 1,300 employees. There is no information available regarding the existing mode share for staff, and as such the staff mode share targets in Figure 2-16 have been estimated based on increased public and active transport mode share compared to the overall mode share targets.

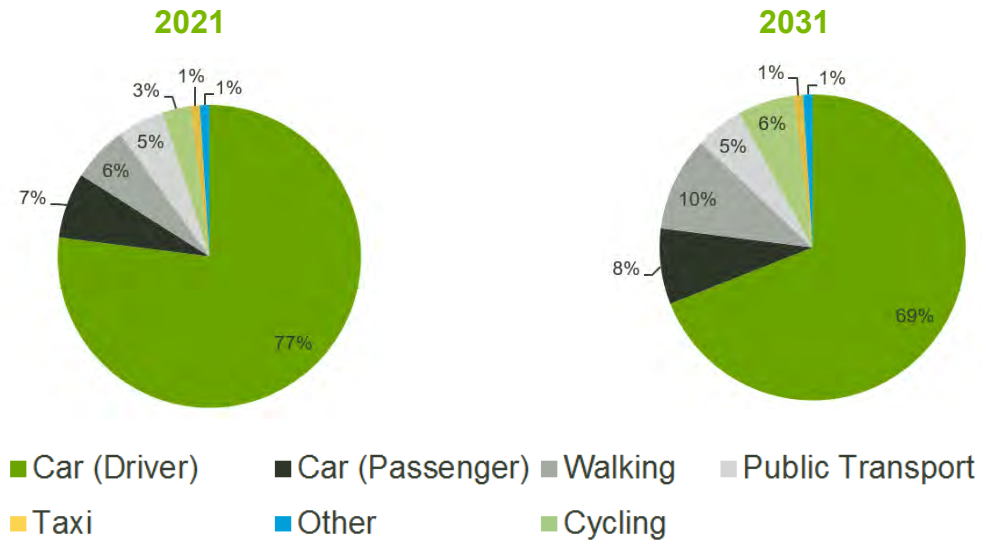



**Figure 2-16 Staff mode share targets for the Centre**

By applying the estimated staff mode splits to the estimated number of employees (assuming that this will be the worst case scenario), the estimated number of trips on one day for each transport mode is shown in Table 2-7.

**Table 2-7: Expected staff mode share targets**

| Targets | Measurement | |
|---|---|---|
| | 2021 (target) | 2031 (target) |
| Estimated number of staff arriving by car as the driver | 1001 | 897 |
| Estimated number of staff arriving as a car passenger | 91 | 104 |
| Estimated number of staff arriving by public transport | 65 | 65 |
| Estimated number of staff arriving by walking and cycling | 117 | 208 |

Taking into consideration the proposed mode share target of 6% for cycling in 2031, it can be assumed that at least 78 employees will use the end of trip facilities. The proposed size of end of trip is therefore more than sufficient. Additional capacity is available within the Centre facilities which can cater for the anticipated increase in popularity of e-bikes as they potentially become cheaper in the medium to long term future. Since cycling on an e-bike is easier than using a traditional bicycle, particularly on steeper gradients such as those found in the surrounding Karrinyup road network, it is possible that a significant uptake in the use of e-bikes may occur and lead to an increase in the number of cycle trips to the Centre.

With the proposed significant upgrades in public transport infrastructure and the public's changing perception of travel by public transport in WA, it is anticipated that the estimated number of staff arriving by public transport will also increase in the future.

The relationship between the trip generation and staff parking demand is discussed further discussion in Section 5.2.3 (Staff Parking Controls).

### 2.2.4 DA Conditions

Table 2-8 outlines the DA conditions to be satisfied that are relevant to the TPMP.

**Table 2-8: DA Conditions relevant to the TPMP**

| DA Condition | | Relevance |
|---|---|---|
| **3** | Prior to the commencement of site works for the centre, a Parking Management Plan shall be submitted to and approved in writing by the City of Stirling, upon advice from the Department of Transport. The approved parking management plan shall be implemented with the commencement of use of the redeveloped retail centre. | Requires this document to be approved and relevant components implemented before the site works commence. |
| **4** | Prior to the occupation of the development, a Travel Behaviour Change Plan particularly targeting centre employees but also customers, is to be approved, implemented and reviewed as required to the satisfaction of the City of Stirling on the advice of the Department of Transport. | Requires this document to be approved and relevant components implemented before the redeveloped site can be opened. |
| **5** | End of Trip bicycle facility(s) to include a total of 200 secure and covered bike racks and lockers for staff is to be designed and supplied to the satisfaction of the City of Stirling. A total of 160 customer bike racks are to be distributed in key locations around the site including the provision for at least 30 bikes being provided at each major ground floor entrance and at least an additional 20 being provided on the main street. | This document takes into consideration Condition 5. |
| **11** | Detailed design of Francis Street and Burroughs Road is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall generally be in accordance with plans 239230-9 and 11 of the transport Plan prepared by Aurecon dated 15 June 2015, including the changes marked in red (attached) and shall generally include the following:-<br>a. 3.0m lane widths, 2.2m wide parking bays only on the shopping centre side of the road, 2.0m cycling separator, 3.0m dual way cycling lane and 4.3m wide footpaths only on the shopping centre side of the road;<br>b. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;<br>c. The finish of the footpaths and/or paved areas to be seamless between public and private areas;<br>d. The surface finish of the traffic lanes, to the satisfaction of the City;<br>e. 40km/h design speed;<br>f. Two priority pedestrian crossings aligning with entrances to the shopping centre;<br>g. Platanus acerifolia (London Plain Tree) shall be planted a minimum 11m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;<br>h. Pyrus calleryana cultivars (ornamental pear tree) shall be planted at 5.0m spacing on footpaths;<br>i. All street tree plantings must be located to ensure adequate sightlines are maintained;<br>j. All landscaped areas are to be reticulated;<br>k. Street lighting is to be upgraded to suit the new Francis Street and Burroughs Road in compliance with Australian Lighting Standards and to the satisfaction of the City; | This document takes into consideration the parking requirements of Condition 11. |

| DA Condition | | Relevance |
|---|---|---|
| | l. New or modified roads shall be drained in accordance with water sensitive urban design principles and/or the major / minor drainage philosophy;<br>m. All signing and lining requirements are subject to Main Roads WA standards and approvals; and<br>n. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.<br>The works for Francis Street and Burroughs Road shall be undertaken in accordance with the design approved by the City. | |
| **12** | Detailed design of Davenport Road is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall generally be in accordance with plan 239230-10 (attached) including the changes marked in red and is to generally include the following:-<br>a. 3.0m lane widths, 2.2m wide parking bays only on the shopping centre side of the road, 2.0m cycling separator, 3.0m dual way cycling lane and 4.3m wide footpaths only on the shopping centre side of the road;<br>b. Public access easements to be provided for all footpaths and/or paved areas abutting the road reserve within private property;<br>c. The finish of the footpaths and/or paved areas to be seamless between public and private areas;<br>d. The surface finish of the traffic lanes, to the satisfaction of the City;<br>e. 40km/h design speed;<br>f. Two priority pedestrian crossings aligning with entrances to the shopping centre;<br>g. Platanus acerifolia (London Plain Tree) shall be planted a minimum 11m apart, with trees between every second on-street car bay in a minimum 2.0m wide planting nib;<br>h. Pyrus calleryana cultivars (ornamental pear tree) shall be planted at 5.0m spacing on footpaths;<br>i. All street tree plantings must be located to ensure adequate sightlines are maintained;<br>j. All landscaped areas are to be reticulated;<br>k. Street lighting is to be upgraded to suit the new Davenport Road in compliance with Australian Lighting Standards and to the satisfaction of the City;<br>l. Water sensitive urban design (WSUD) principles to be incorporated into street drainage and streetscapes shall include but not be limited to tree pits and/or rain gardens to reduce stormwater runoff and increase at source infiltration;<br>m. All signing and lining requirements are subject to Main Roads WA standards and approvals; and<br>n. Footpaths shall be paved with rectangular pavers (600mm x 300mm) format exposed aggregate concrete unit paver with milled finish. Charcoal colour with 5mm diameter bluestone and rainbow quartz aggregate mix Urbanstone 'Golden Gunmetal' or approved equivalent.<br>The works for Davenport Road shall be undertaken in accordance with the design approved by the City. | This document takes into consideration the parking requirements of Condition 12. |

| DA Condition | | Relevance |
|---|---|---|
| **27** | A detailed design of the Main Street is to be submitted to the City of Stirling for approval prior to the commencement of development. The design shall be generally in accordance with the road typologies contained with Part 5.2 of the Transport Plan (Attachment 18), and shall include:-<br>a. 3.0m lane widths, 2.4m wide parking bays and a pedestrian footpath;<br>b. The finish of the footpaths and/or paved areas to be seamless between public and private areas;<br>c. The surface finish of the traffic lanes, to the satisfaction of the City of Stirling;<br>d. 30km/h design speed, 20km/h posted speed, with a reduced a 10km/h shared zone for the piazza;<br>e. Accommodation of a 12.5m long Single Unit Truck;<br>f. Landscaping, paving and street furniture in accordance with the Landscaping Plan;<br>g. Street lighting is to be upgraded as needed in compliance with Australian Lighting Standards and to the satisfaction of the City of Stirling; | This document takes into consideration the parking requirements of Condition 27. |
| **38** | Further to Condition 5, the end of trip facilities for the non-residential development shall include a minimum of 20 showers and changing facilities. Detailed drawings identifying the location of all bicycle parking bays, lockers and showers shall be submitted to the City for its approval and be provided prior to the commencement of development in accordance with the approved detailed drawings to the City's satisfaction. | This document takes into consideration Condition 38. |
| **44** | A maximum of 4,880 car parking bays shall be provided and reserved as public parking bays, to the satisfaction of the City of Stirling. | This document takes into consideration Condition 44. |
| **45** | A minimum 50 motorbike parking bays shall be provided on site prior to occupation of the development, to the satisfaction of the City of Stirling. | This document takes into consideration Condition 45. |
| **49** | The car parking bays, driveways and access points shown on the approved plans shall be designed, constructed, drained and marked in accordance with the Australian Standard for Off-street Car Parking (AS/NZS2890.1), Off-street Parking for People with Disabilities (AS/NZS2890.6) and Off-street Commercial Vehicle Facilities (AS2890.2), prior to occupation of the development. A detailed design addressing this condition is to be submitted to the City of Stirling for approval prior to commencement of development or alternatively the applicant may provide certification from a suitably qualified engineer that compliance with this condition has been achieved. These bays are to be thereafter maintained to the satisfaction of the City of Stirling. | This document takes into consideration Condition 49. |
| **66** | A minimum of six visitors bicycle parking bays are to be provided for the eastern multiple dwelling building, and a minimum of three visitors bicycle parking bays for the western multiple dwelling building, in locations to the satisfaction of the City prior to the occupation of the development. | This document takes into consideration Condition 66. |

# 3 Objectives

The TPMP requires clear and practical objectives to guide the proposed management and supply of parking spaces and promotion of alternative travel modes.

The objectives of the TPMP are shown below:

1. To increase the mode share from single occupancy private vehicles to alternative transport modes leading to a lower demand for parking;
2. To minimise local congestion and associated impacts on the community and the environment, particularly at peak times;
3. To optimise the parking operations and make efficient use of parking bays to support access for staff and customer;
4. To manage and prioritise the allocation of more convenient parking spaces to favour higher-priority customers, including people with disabilities, parents with prams and the elderly; and
5. To enhance staff health, wellbeing and productivity.

# 4 Strategies

This section outlines the proposed strategies to meet the objectives of the TPMP. This section also explores some of the issues and potential opportunities relating to parking management and travel behaviour at the Centre, as well as how good practice examples have been considered in the development of the strategies.

## 4.1 Issues and Opportunities

The following issues and opportunities applicable to the Centre have been identified.

1. **Customer Access**

   With the Centre's major function to attract and provide retail services to its customers, it is common for customers to purchase goods which require storage during their departure journeys. For this reason for some trips alternative travel modes (public transport, cycling and walking) do not provide enough flexibility and are therefore not practical.

   In addition the current levels of parking provision on the site are relatively high compared to other shopping centres.

   As a result, the shopping centre has historically been accessed predominantly by private vehicles which is challenging to curtail. Nonetheless, with the development of the Main Street and activation of the Centre after normal trading hours, there is expected to be an increase in social and recreational trips which provides opportunities to increase mode share by alternative transport options.

2. **Staff Access**

   A considerable volume of staff the access the Centre on a daily basis. Unlike customers, the primary purpose of staff is to provide services, and so they are less likely to require storage of items during their journeys. There is therefore a distinct opportunity to target and influence the travel behaviour of staff away from single occupancy private vehicles. The provision of secure end of trip facilities should be addressed as well as improved public transport services for key commuter periods to the Centre.

   This will nonetheless remain a challenge, with major stores tending to have a higher proportion of part-time and casual staff who are typically more difficult to engage.

3. **Peak Hour Access**

   Another issue to consider is the difference between peak hour volumes (during late night shopping and weekends) and off-peak times. This can result in the Centre car parking being particularly underutilised during off-peak periods. With the development of the Main Street to including small businesses such as restaurants and other entertainment areas and possible change to the overall trading hours of the Centre, this will activate the Centre during non-peak hours and spread the parking utilisation across those times.

4. **Carpooling**

   With the redevelopment of the Centre there are opportunities to strengthen and encourage carpooling options for staff.

5. **Shared Use Bays**

   The redevelopment of the Centre will include the addition of mixed land uses, including office. As such, there is an opportunity to provide flexibility by allowing public use of these spaces where possible.

6. **Healthier Staff and Customers**

Active travel (or active transport) includes any travel mode that involves physical activity including walking, cycling, and any incidental activity associated with the use of public transport (Department of Transport TravelSmart Workplace fact sheet, 2013). Choosing to walk, cycle or catch public transport creates a multipurpose activity: travel and daily exercise. This plan this creates an opportunity to encourage staff to participate in regular physical activity, which has a range health benefits. Poor employee health can significantly increase employer costs through a reduction in employee performance and productivity, more frequent absenteeism, higher accident and injury rates and associated rehabilitation and compensation costs (Department of Transport TravelSmart Workplace fact sheet, 2013). Increased health will also result from active travel by customers, which can enhance the general wellbeing within the community

An increase in walking and cycling also helps limit fuel emissions that impact on air quality, which can help avoid associated health effects.

7. **Community Liveability**

Physical activity helps expand social connectivity with friends and family, meet new people and have greater involvement with the local community (Department of Transport TravelSmart Workplace fact sheet, 2013). Therefore, encouragement in active travel will help activate the Centre, including the proposed main street.

Additionally, liveability is associated with the amenity of a place. High levels of vehicle traffic are attributed with visual, noise and sound pollution, which affect the amenity of a location. Replacing road traffic with active travel methods will help improve amenity of the Centre.

8. **Corporate Social Responsibility**

The TPMP aligns well with AMP Capital's corporate social responsibility values (i.e. environmental management, community investment, and people and workplace). Initiatives to encourage sustainable transport options is an important opportunity to practise these.

## 4.2 Consideration of Good Practice

As road congestion increases, the importance of providing alternate travel choices and influencing travel habits are becoming key areas of focus for improving the functionality of shopping centres around the world.

### 4.2.1 International Examples

**Bluewater Shopping Centre Travel Plan**

Bluewater Shopping Centre, a London centre, witnessed low levels of staff driving to the centre because of an effective travel plan. It has a floor area of 155,700 $m^2$, with over 13,000 parking spaces. It is located 35 km from London and previously was predominantly accessible by cars only.

**Figure 4-1: Aerial view of Blue Water Shopping Centre, Kent, UK (source alamy.com)**

The main focus of the Travel Plan was to manage parking and increase the use of Public Transport for accessing the centre. Some of the key measures undertaken are listed below:

- Public Transport Investment
  - Bluewater partnered with the bus operator to provide more services to the centre; and
  - A single simplified timetable leaflet was developed that detailed all bus routes with a series of line diagrams and information about “where from, where to, how often and how long it takes”.
- Cycling and Walking Access Improvements
  - Linkages to the cycle network and walking routes were created through all car parks; and
  - Additional cycle parking spaces were introduced, together with lockers, showers and changing facilities. There are two shops on the site that offer repairs.
- Staff Parking Management
  - Staff parking was initially separated from visitors with barriers and electronic tags to permit entry. CCTV and number plate recognition in visitor car parks made it possible to identify offenders; and
  - In 2000, this arrangement was replaced with the ‘red line rule’, whereby all staff are entitled to park, but must be ‘behind the red line’, which is six rows back from spaces closest to the buildings in the multi-storey car parks. This ensures priority for visitors.
- Information
  - A Travel Centre is located on site which provides advice and information on all travel modes; and
  - In December 2001 a ‘TravelSense’ newsletter was distributed to staff that provided information on all staff benefits and information such as the times of all the last buses from the site in the evening.

### 4.2.2 National Examples

**Parking Management**

A range of parking initiatives and new technologies are being implemented within shopping centres around Australia. Some examples of include:

- Chadstone Shopping Centre, Victoria – Variable message signs (VMS) have been introduced to provide guidance for drivers looking for spaces. These include real time information advising vacant spaces in different areas and green and red lights indicating where in rows vacant spaces are located.
- Macquarie Centre, NSW – Licence Plate Recognition (LPR) reads the license plate of each arriving vehicle and logs the time of entry. This is assigned with a parking ticket which is required for exit.
- Ocean Keys, WA – Park assist is used to guide customers to available bays using electronic signage.
- Rouse Hill, NSW – Allocated carpool bays are supplied in the car park. Staff can access information for carpooling via a carpooling database.
- Variable parking limits reflecting different types of customer demands, i.e. shorter time limits for parking closest to supermarkets. For example, Stud Park Shopping Centre in Victoria has branded 'Quikstop' parking allocated outside of the post office entrance, which has a five minute parking limit.
- Valet parking services are in operation at a number of centres (i.e. Macquarie Centre, Warringah Mall) which enhance the user experience, by eliminating the burden of navigating the centre for a carpark.
- Electric car charging stations are located at a number of centres.

**Travel Planning**

There are several examples of travel planning at shopping centres within Australia, with specific examples below.

- Rouse Hill was the first mixed use shopping centre in Australia to establish a comprehensive travel plan (commenced in 2007). Some of the measures implemented include:
  - Development of Walking and Cycling, and Transport Access guides;
  - Information Centre offers bus timetables and brochures and its staff can provide customised information on bus times and trip planning;
  - Marketing of End of Trip Facilities (EOTF) and carpooling spaces;
  - Development of the 'Green Travel Club', a member ship group, which has a focus on educating staff as to the importance and benefits of using alternative modes of transport;
  - Promotion of events for 'healthy living' (i.e. Ride to Work Day); and
  - Advocacy and lobbying for improved sustainable travel options.

**Figure 4-2: Rouse Hill Town Centre Walking and Cycling Guide (source RHTC.com.au)**

- The Knox Shopping Centre Travel Plan aims to encourage a reduction in car trips and support an increase in the use of sustainable travel options to the activity centre, which comprises a shopping centre and entertainment precinct. Measures include:
  - Provision of sustainable transport information
    - Improvements to the shopping centre website;
    - Promotion to a VIP Club email list;
    - Maps and bus timetables and destination-specific information around the shopping centre;
    - Training of customer service staff to respond to travel questions;
    - Local access guides for cycling and walking;
    - Public transport campaign within the centre; and
    - Engagement with larger tenants (i.e. Myer, Coles, Kmart) to distribute information.
  - Development of an employee carpooling program
  - Targeting campaigns direct to households along the SmartBus route;
  - Installing end of trip facilities for employees;
  - Promoting Walk to Work and Ride to Work days;
  - Providing improved pedestrian and cyclist infrastructure and access through the shopping centre car parks; and
  - Partnering with Knox City Council and the Victorian Government. This was fundamental in obtaining funding which enabled the project to be implemented.

## 4.3 TPMP Strategies

A number of strategies are proposed to be adopted to manage the parking within and surrounding the Centre and achieve the proposed objectives of the TPMP. Of these strategies, some are designed to restrict and control where parking is permitted, while others are designed to enhance the user experience. These strategies aim to create an effective parking management system that maximises efficiency whilst promoting a mode shift towards sustainable transport options.

The strategies to be adopted to meet each proposed objective are described in the following tables.

| **Objective 1** | **To increase the travel mode share from single occupancy private vehicles to alternative transport modes leading to a lower demand for parking** |
|---|---|

***Strategy 1 – Modify the balance of parking space numbers***

- Reduce the overall parking rate from the current 5.2 bays per 100m$^2$ to 4.2 per 100m$^2$ of the proposed total floor space of the Centre. A reduction in the overall parking rate provides increased incentive for alternative transport modes.

***Strategy 2 – Increase attractiveness of alternative transport modes***

- Improve pedestrian facilities to and within the Centre to encourage walking as a viable transport option, including the following:
  - Designing the upgraded Centre to incorporate four pedestrian gateways to the retail core of the development that are accessible from the footpath surrounding the Centre, making the Centre easier to reach from the surrounding residential catchment without needing to walk through car parking areas.
  - Upgrading the surrounding footpath on the side adjacent to the Centre to at least 2.0m and strengthening crossing points, to provide safe links to the existing pedestrian network, facilitating walking movements to and from the Centre.
  - Contribute to the City to expand the extent of the wider local path network to provide a footpath on one side of local streets that do not currently have a footpath.
  - Contribute to the City to provide additional street trees to help shade those paths that are devoid of any street trees.
  - Providing appropriately located street furniture and trolley collection points to minimise distance goods need to be carried.
- Improve cycling facilities to and within the Centre to encourage cycling as a viable transport option, including the following:
  - Cycling infrastructure, in the form of on road/ off road cycling facilities and/or development of a Safe Active Streets connecting from the Centre to the wider cycling network. This focuses on creating a legible, connected cycle network to the Centre for inexperienced cyclists who travel at speeds lower than 20km/h.
  - Introducing a large staff end of trip facility catering for 200 bicycle spaces, 200 lockers and showers. This facility will be free to use for all staff at the Centre. An additional 160 public bicycle spaces for visitors will be introduced and conveniently located at the four consolidated entrances to the Centre, including on the new main street.
- Improve public transport access to the Centre to encourage public transport as a viable transport option, including the following:
  - Introducing bus priority infrastructure, in the form of bus lanes along Karrinyup Road to provide improved journey times and reliability for buses accessing the Karrinyup Bus Station. The bus lanes may also provide a visual incentive for general vehicles queued along Karrinyup Road to consider switching modes.

| Objective 1 | To increase the travel mode share from single occupancy private vehicles to alternative transport modes leading to a lower demand for parking |
|---|---|

- Providing an increase in bus frequencies (connecting between Karrinyup Bus Station and Stirling Train Station), specifically during and on the shoulders of Centre open times on weekdays and weekends, to provide staff and visitors with a viable public transport option during peak shopping centre periods for a period of 7 years, starting during the construction stage. This will involve services relating to either or both the 423 and 425 routes with a goal of achieving 10-minute headways in the morning and evening Centre weekday peaks. During the weekends, movements will be on one route (Route 425), which will be more easily identifiable for Centre customers, with 15-minute headways on the shoulders of and during the weekend Centre open hours. The final details of the provision of additional bus kilometres will be agreed with the Transport Portfolio.
- Providing real time information at the bus stops and within the Centre.
- Providing trolley collection points in close proximity to bus stops.

***Strategy 3 – Employ travel behaviour change initiatives to encourage sustainable transport and discourage private vehicle use***

- Provide sustainable transport information as part of the physical information pack currently provided to new starters (Retail Handbook). This could include the following:
  - Active travel maps;
  - Bus timetable information;
  - Locating of bike parking and end of trip facilities; and
  - Locker application process and end of trip facility conditions of use.
  - Subsidised SmartRider cards to staff before the redeveloped centre opens.
- Organise active transport events to promote cycling and walking to work, such as:
  - Annual ‘bike to work’ and/or ‘walk to work’ days; and
  - Pedometer event or walking challenge.
- Become involved in the DoT’s Your Move program, which includes:
  - Access to information relevant to travel plan initiatives for Centre Management and Tenants; and
  - Access to rewards and prizes to those staff share information regarding participation in sustainable travel related activities and events.
- Promote and advertise sustainable transport options (including walking, cycling and public transport facilities, carpooling) to the Centre via the following channels:
  - Social media and shopping centre website;
  - Live bus timetable stands at the Bus Station;
  - Digital in-centre screens with live bus timetable information and sustainable transport advertising;
  - Flyers at Customer Service desks, Taxi Lounge and free stands;
  - E-newsletters to various online member databases; and
  - Bicycle parking wayfinding signage.
- Promote and advertise sustainable transport options, targeting part time/casual staff via the following methods

| Objective 1 | To increase the travel mode share from single occupancy private vehicles to alternative transport modes leading to a lower demand for parking |
|---|---|

- Actively promoting sustainable transport options for part time/casual staff at tenant retail functions
- Providing specific information useful for part time/casual workers in the Retail Handbook for new starters, i.e. student public transport focus (discount fares, routes to tertiary institutions)

***Strategy 4 – Monitor the staff and customer mode share in relation to mode share targets***

- Continue to monitor customer mode share through the periodic customer surveys currently undertaken
- Periodically undertake a staff modal share survey (every two years for the first four years, and every four years thereafter) to understand change in travel behaviour and track performance against targets. This will also be used to monitor health and wellbeing for the Centre.

***Strategy 5 – Introduce paid parking for staff***

- Introduce paid parking for all staff to assist in managing travel demand and behaviour at the Centre.
- Futureproof the car park design to allow for paid customer parking to be introduced.
  - This includes the allowance for single lane ticketless entry and two-lane boom gate exits

***Strategy 6 – Encourage Carpooling Trips***

- Allocate carpooling bays within the Centre
- Promote carpooling for staff that live in close proximity to each other by providing information for carpooling via the Centre's communication channels

| Objective 2 | To minimise local congestion and associated impacts on the community and the environment, particularly at peak times |
|---|---|

***Strategy 1 – Minimise traffic congestion caused by drivers searching for car parks***

- Introduce a parking detection wayfinding system to direct drivers to empty parking bays, including the following:
  - Wayfinding variable message signs (VMS) both within and surrounding the Centre;
  - Aerial parking detectors on undercover levels;
- Improve the existing shopping centre mobile phone application to provide public transport and parking information.

***Strategy 2 – Increase the attractiveness of alternative transport modes during commuter peak times***

- As per the strategies outlined in Objective 1, Strategy 2, including:
  - Improving pedestrian infrastructure to and within the Centre to encourage walking as a viable transport option;
  - Improving cycling infrastructure to and within the Centre to encourage cycling as a viable transport option; and

| Objective 2 | To minimise local congestion and associated impacts on the community and the environment, particularly at peak times |
|---|---|
| – Improving public transport access to the Centre with the introduction of bus priority infrastructure and increased peak bus frequencies to encourage public transport as a viable transport option. | |
| ***Strategy 3 – Effectively and safely manage demand during peak shopping periods*** | |
| ▪ Provide staff parking at nearby reserves and school ovals during peak shopping periods, in collaboration with City of Stirling and local schools.<br>▪ Provide a shuttle bus to transfer staff to and from the Centre where it is out of walking distance range. | |

| Objective 3 | To optimise the parking operations and make efficient use of parking bays to support access for staff and customer |
|---|---|
| ***Strategy 1 – Maximise flexibility of the use of parking spaces*** | |
| ▪ Retain centre ownership of all car parking spaces to maintain ongoing control.<br>▪ Avoid designating car parks for individual tenants or staff (service delivery or special needs parking excepted)<br>– Where designated office or similar parking is provided, allow public use outside of business hours by specific arrangement. | |
| ***Strategy 2 – Monitor the use of car parking and effectiveness of controls*** | |
| ▪ Periodically review the parking utilisation at the Centre (especially by all-day commuters) using park assist technology to understand user trends.<br>▪ Periodically review the number of parking infringements at the Centre to monitor the success of enforcement procedures for both staff and visitors. | |

| Objective 4 | To manage and prioritise the allocation of more convenient parking spaces to favour higher-priority customers, including people with disabilities, parents with prams and the elderly |
|---|---|
| ***Strategy 1 – Prioritise the most convenient parking for customers rather than staff*** | |
| ▪ Designate parking closer to entrances as customer-only and restrict staff to parking in less central locations.<br>– Disperse staff parking throughout the Centre car parks so that peak commuter traffic is distributed to various access points. This will assist in reducing the traffic impact on the surrounding road network during peak periods.<br>▪ Restrict employees from parking in customer-only spaces using enforcement strategies, such as the following step process:<br>– Compile the number plates of all cars parked in the staff parking bays that stay at the shopping centre for more than four hours. | |

| Objective 4 | To manage and prioritise the allocation of more convenient parking spaces to favour higher-priority customers, including people with disabilities, parents with prams and the elderly |
|---|---|

- Check all areas outside the staff parking area twice a day, once in the morning and again in the afternoon, representing a four hour time frame. If staff cars are found outside the staff parking area they will then receive a breach notice.

***Strategy 2 – Provide convenient access to parking spaces for people with special needs***

- Prioritise and designate the locations closest to entrances for accessible parking, and parking for parents with prams

***Strategy 3 – Provide convenient access to parking spaces for sustainable transport and ride share options***

- Provide conveniently located parking spaces for electric cars with access to charge points
- Provide conveniently located bicycle parking spaces that are weather protected
- Provide conveniently located parking spaces for pick-up/drop-off, including along the Main Street, plus:
  - Futureproofing the car park design to allow retrofitting to include an increased number of pick-up/drop-off spaces (i.e. at valet service locations) recognising the predicted increased in demand for ride sharing services and introduction of autonomous vehicles.
  - Consider the potential increase in larger scale home delivery services, and therefore cater for and encourage retailers to run home delivery services which will make it easier for customers to use sustainable transport options.

***Strategy 4 – Provide improved quality of the parking facilities***

- Provide car and bicycle parking facilities that are secure and accessible, including:
  - Providing increased weather protection for parking spaces
  - Providing increased CCTV coverage within car and bicycle parking areas

| Objective 5 | To enhance staff health, wellbeing and productivity |
|---|---|

***Strategy 1 – Employ travel behaviour change initiatives to encourage sustainable transport and discourage private vehicle use leading to a healthier lifestyle***

- As per the strategies outlined in Objective 1, Strategy 3

***Strategy 2 – Monitor staff and customer health and wellbeing***

- Include health and wellbeing as part of the periodic modal share survey (at least every 2 years for the first 4 years and every 4 years after this) to understand and improve health and wellbeing initiatives

## 4.4 Consultation

### 4.4.1 Centre Users

It is important that the TPMP strategies are discussed with identified and future tenants at the Centre in order to assess the practicalities of implementation.

**Actions:**

The following actions will be applied by the Centre:

1. During negotiations for new tenants or the lease renewal of current tenants, the following strategies will be discussed:
    a. Provision of physical information packs to new starters i.e. travel maps, bus timetable information, bike parking locations, application for lockers.
2. Summary of negotiated outcomes recorded by the Centre and included in TPMP Progress Report (further discussed in Section 7.3.3).

**Responsibility:**

Centre Manager

### 4.4.2 Government Agencies

Consultation with multiple agencies, including the Department of Transport (DoT), Main Roads WA, the Public Transport Authority (PTA) and the City of Stirling has been undertaken as part of the development of the TPMP.

During implementation of the TPMP, should any further discussions occur with government agencies, a summary of these discussions and any negotiated outcomes should be included in the TPMP Progress Report.

**Responsibility:**

Centre Manager

# 5 Decisions Made

This section outlines how the DA conditions have been satisfied, and the decisions made in terms of parking provision, allocation and strategies to be implemented.

## 5.1 Car Parking

### 5.1.1 Provision

The proposed Centre incorporates a total of up to 4,880 public car parking bays which equates to a rate of up to 4.2 bays per 100m$^2$ for the proposed total floor space within the development. This is a reduced rate from the existing 5.2 bays per 100m$^2$, aligning with DA Condition 44 which stipulates a maximum of 4,880 car parking bays shall be provided and reserved as public parking bays.

### 5.1.2 Allocation

Various parking types have been identified for the Centre, along with the expected categories of users that will utilise these bays. The hierarchy of each user category has also been identified.

The approximate allocation of each parking type is shown in the table below.

**Table 5-1: Parking types & hierarchy**

| Parking Type | Hierarchy | User Type | Allocation (% of total spaces) |
|---|---|---|---|
| Accessible Parking | 1 | People with disability | 60 (1.2%) |
| Parents with Prams | 2 | People with children | 60 (1.2%) |
| Taxi Rank | 3 | Taxi | 7 (0.1%) |
| Motorcycle | 4 | Public (retail, cinema, dining) & staff | 50 (1.0%) |
| Short Term | 6 | Public (drop-off, pick-up, post office) | 16 (0.3%) |
| General Patron | 7 | Public (retail, cinema, dining) & staff | 3,687 (75.5%) |
| Staff | 8 | Staff (including staff carpooling) | 1,000 (20.5%) |
| | | | |
| Service Delivery | 5 | Service delivery staff | 9 delivery yards |

**Accessible Parking and Parents with Prams**

Accessible parking will be provided in accordance with the requirements of the Building Code of Australia for a Class 6 facility.

Accessible and pram parking is proposed to be located adjacent to all major visitor entrances on all parking levels of the Centre.

**Taxi Rank**

A taxi rank is proposed along the Main Street immediately adjacent to the town square/ piazza entry to the Centre. This is in a central position allowing convenient access to/ from the Centre.

**Short Term Parking**

The proposed mix of eating/entertainment land uses along the Main Street frontage is intended to provide an area of high activity during and beyond normal trading hours.

It is anticipated that a proportion of public bays along the main street will be allocated as short term time-limited bays.

**General Patron**

All public bays within the multi-storey car parking will have a 4 hour time limit. Long term staff parking will be allocated to specific areas within the general parking bays. Car parking controls are discussed in Section 5.2.

**Service Delivery**

There are nine proposed service delivery yards at the Centre, eight of which are self-contained separate from public parking. A service delivery yard is proposed along the Main Street to service the tenancies along Main Street, and will consist of an on-street parking bay.

Further information regarding all service delivery arrangements will be available in the Freight and Servicing Plan.

### 5.1.3 Circulation

The western car park arrangement has a total of six car park levels including ground level (i.e. L00), three levels above ground (i.e. L01, mezzanine L01a and L02), and two levels below ground (i.e. B01 and B02). Note that the existing ground level car park owned by the City of Stirling remains. The L02 car parking level is adjacent to the proposed Cinema. Two way ramps provide circulation between all levels of the western car park.

The eastern car park has a total of six car park levels including ground level (i.e. L00), three levels above ground (i.e. L01, mezzanine L01a and L02), and two levels below ground (i.e. B01 and B02). Two way ramps provide circulation between all levels of the eastern car park.

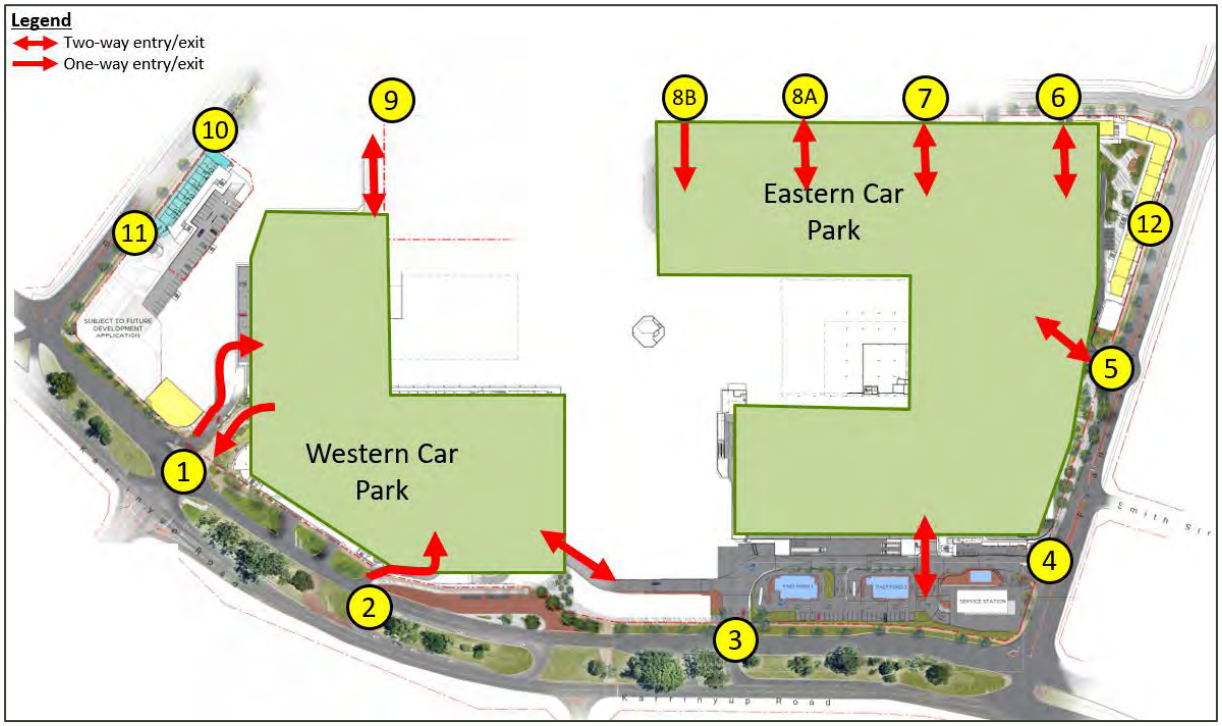



**Figure 5-1: Future car park access to the Development**

The western car park can be accessed and egressed via the following access points:

- Access 1 from Karrinyup Road (traffic signal control) via the Main Street provides direct access to B02 via a ramp to the west, plus an alternative access to B01 via a one-way road at the northern end of Main Street.
- Access 2 from Karrinyup Road (priority T-intersection, entry only) provides direct access to B01
- Access 3 from Karrinyup Road (priority T-intersection) provides direct access to B01
- Access 9 from Davenport Road (priority T-intersection) provides direct access to the existing ground level car park and B01
- Access 10 from Burroughs Road (priority T-intersection) provides direct access to B01

The eastern car park can be accessed and egressed via the following access points:

- Access 3 from Karrinyup Road (priority T-intersection) provides direct access to B01
- Access 4 from Francis Avenue (left in, left out priority) provides direct access to B01
- Access 5 from Francis Avenue (roundabout) provides direct access to B02
- Access 6 from Davenport Street (priority T-intersection) provides direct access to B02
- Access 7 from Davenport Street (priority T-intersection) provides direct access to B01
- Access 8A from Davenport Street (priority T-intersection) provides direct access to L02
- Access 8B from Davenport Street (priority T-intersection) provides one-way access into the existing car park and direct entry only access for service vehicles to Service Delivery Yard 3

Access 11 and 12 provide access to residential car parking only.

A direct linkage between the western and eastern car parks exists on the southern side of the Centre internal to the site.

## 5.2 Car Parking Controls

A number of parking controls are proposed within the Centre, in line with the strategies listed in Section 4.

These include the following:

- Fully managed parking detection system
- Time Limited Parking for Customers
- Paid staff parking
- Travel behaviour change initiatives

### 5.2.1 Fully managed parking detection system

Numerous technologies have been developed to improve parking management. Within the Centre, a key parking management priority is allowing visitors to identify parking availability and being efficiently directed to unused parking areas.

Efficient way-finding will:

- Improve traffic flow as drivers are provided with real time information of the locations of available parking bays
- Direct vehicles to under-utilised areas
- Reduce aisle / roadway congestion and vehicle emissions as drivers are less likely to circulate in the search for an available bay
- Provide increased safety for both pedestrians and other drivers due to less vehicle circulation
- Decreases the time customers spend searching for car bays
- Alleviate driver frustration as drivers are provided with real time information of the locations of the available car parking bays
- Allow a higher practical utilisation to be managed

It is proposed that variable message signs (VMS) are installed to provide information to vehicles upon entry to the car park on the number of car bays available and where available car bays are located. VMS will be provided both internally within the various car parking levels, and externally prior to major access points to the Development.

The locations of external VMS are shown in the following figure.

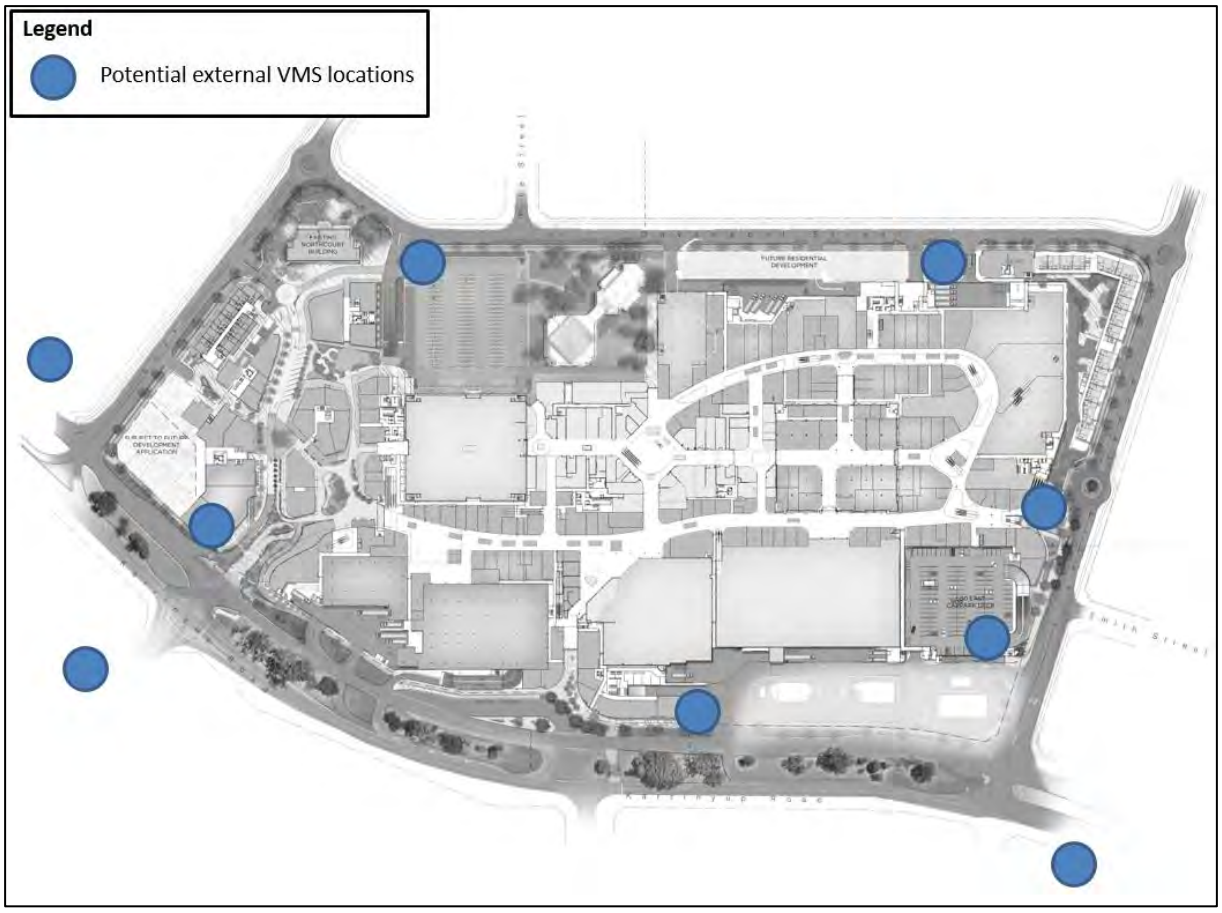



**Figure 5-2 – Potential External VMS locations**

Additionally, aerial parking occupancy detectors will be installed within the Centre, which are used to identify occupied and available car bays within a car park. This is achieved through the use of aerial colour coded sensors where 'red' sensors identify occupied bays, 'green' sensors identify available bays and 'blue' sensors identify disabled bays. Aerial parking occupancy detectors will indicate whether an available bay exists within the surrounding four bays.

### 5.2.2 Visitor parking

Visitor parking at the Centre will be time limited. Short stay planning is based on the idea of giving priority to the provision of short-stay parking that serves the Development as a whole, rather than be dedicated to serving individual developments. As a result, it is proposed that all public car parks within the Centre have a four hour (4P) time limit (including accessible and pram parking spaces). This will be managed and administrated by shopping centre parking rangers who will patrol the car parking areas twice a day issuing fines to cars which exceed the 4P time limit.

From the expected trip generation (shown in Section 2.2.3), the peak demand for the car parking is expected to occur in 2031 during a Saturday midday peak period. Comparing the expected number of vehicle trips to the availability of parking is dependent on the average duration of stay. With an assumed 52% of traffic being arrivals during the Saturday peak period (as per the Transport Plan), this therefore allows a maximum average stay of up to 95 minutes for visitors. It is anticipated that with the variable message boards displaying the parking bay availability prior to vehicles arriving to the centre, if no bays are available then this will help reduce the driver mode split over the long-term period of the centre's operation.

### 5.2.3 Staff parking

Whatever support organisations offer for more sustainable travel, the availability of workplace car parking is likely to play a critical role in influencing travel patterns.

The proposed strategies to constrain parking at the Centre include:

- Allocation of staff parking to the least accessible bays.
  - Staff parking will be located in areas such that staff does not occupy more easily accessible car parks.
  - Staff parking will be dispersed throughout the Centre car parks so that peak commuter traffic is distributed to various access points. This will assist in reducing the traffic impact on the surrounding road network during peak periods. It is proposed that staff parking is located on portions of level B02, B01 and L02 (both west and east car parks), Level L01 mezzanine level, and the level L00 adjacent to Davenport Street. These locations are shown in the figures below, however note that these are indicative and subject to change.
  - Upon opening of the redeveloped Centre, a total of 1,000 staff parking bays will be provided to cater for the expected demands described in Section 2.2.3. It is anticipated that the number of allocated staff parking bays can be reduced by 2031 due to decreased car mode share. Allocated bays will be marked by a yellow dot and are not exclusive to staff (i.e. general patrons can use these bays if desired). With reference to Section 2.2.3, the target number of staff arriving by car as the driver to the Centre will match the number of car parking bays available. This will drive the attractiveness to alternative mode options.
  - Within the staff parking allocation, 50 staff carpooling bays will be marked (i.e. by a blue dot). Staff will be required to register to use the carpooling bays.

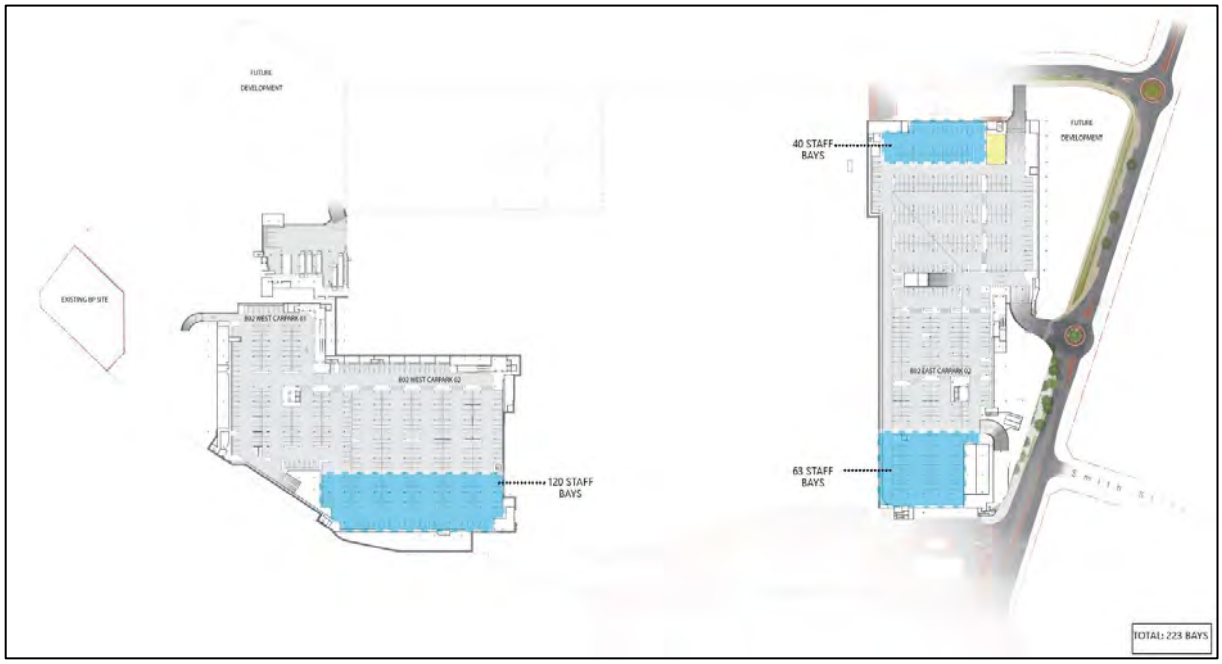



**Figure 5-3: Staff Parking Allocation – B02 Level**

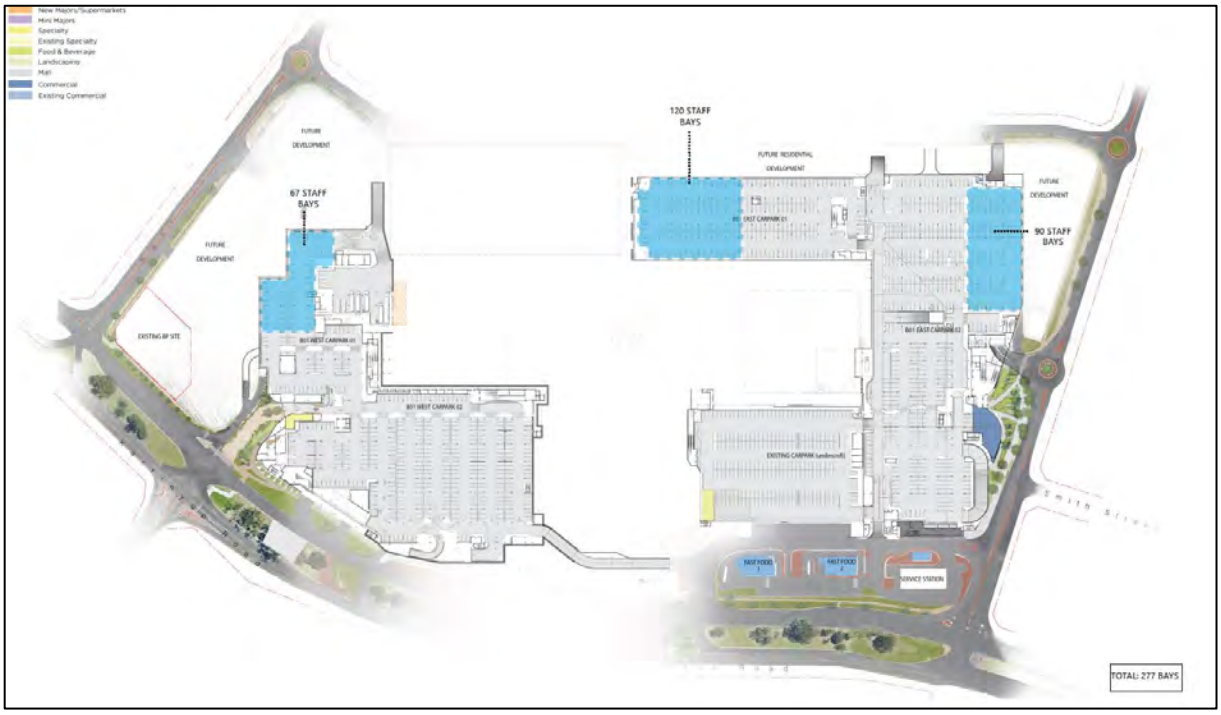



**Figure 5-4: Staff Parking Allocation – B01 Level**

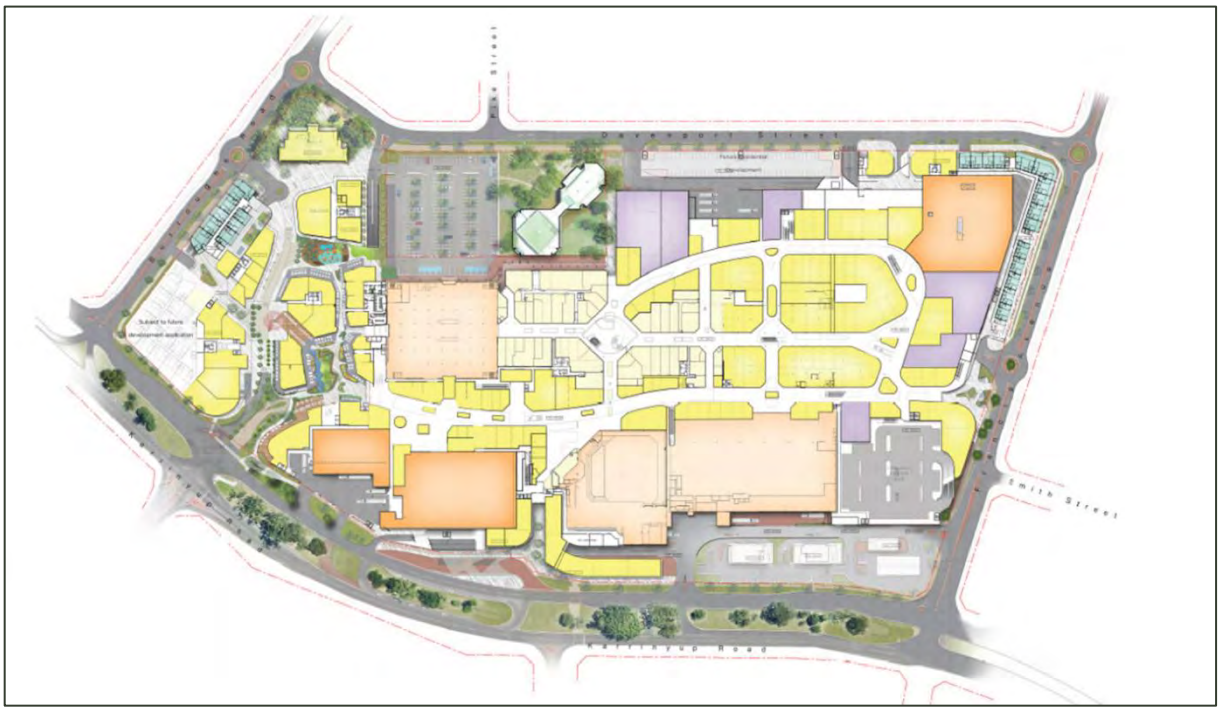



**Figure 5-5: Staff Parking Allocation – Ground level (L00)**

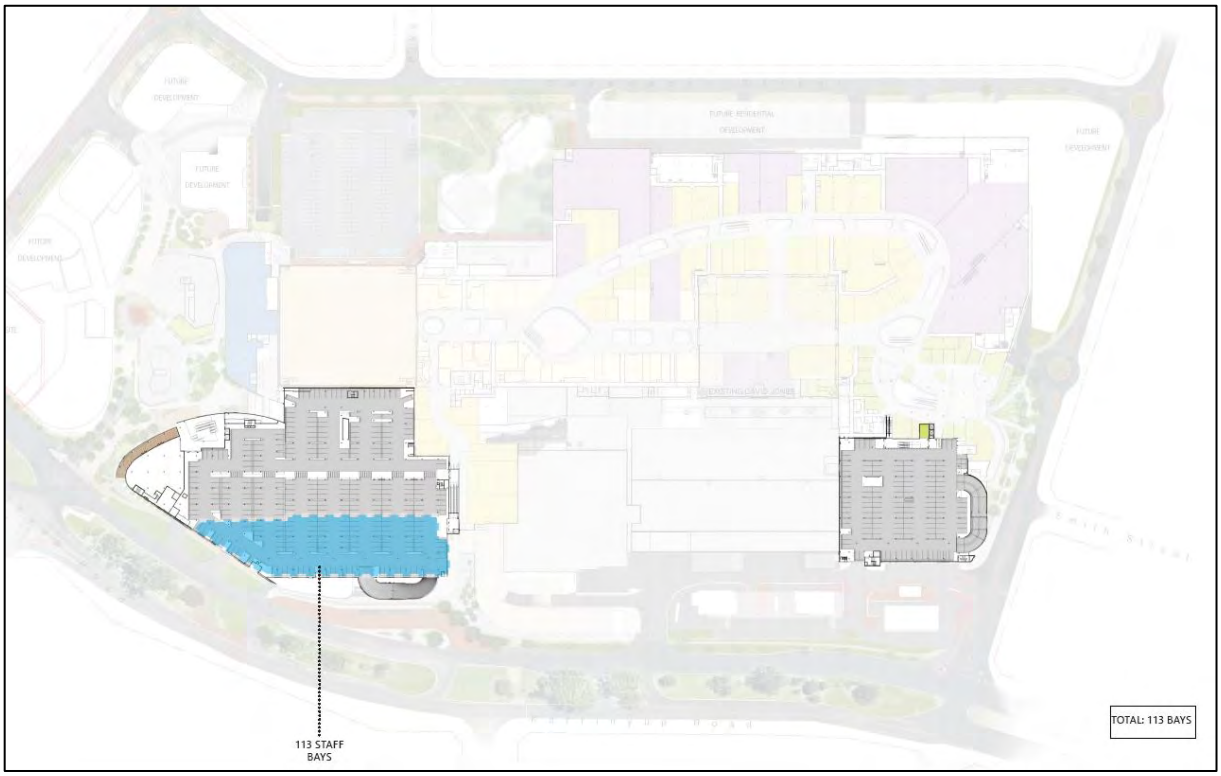



**Figure 5-6: Staff Parking Allocation – Level 01 Upper Mezzanine**

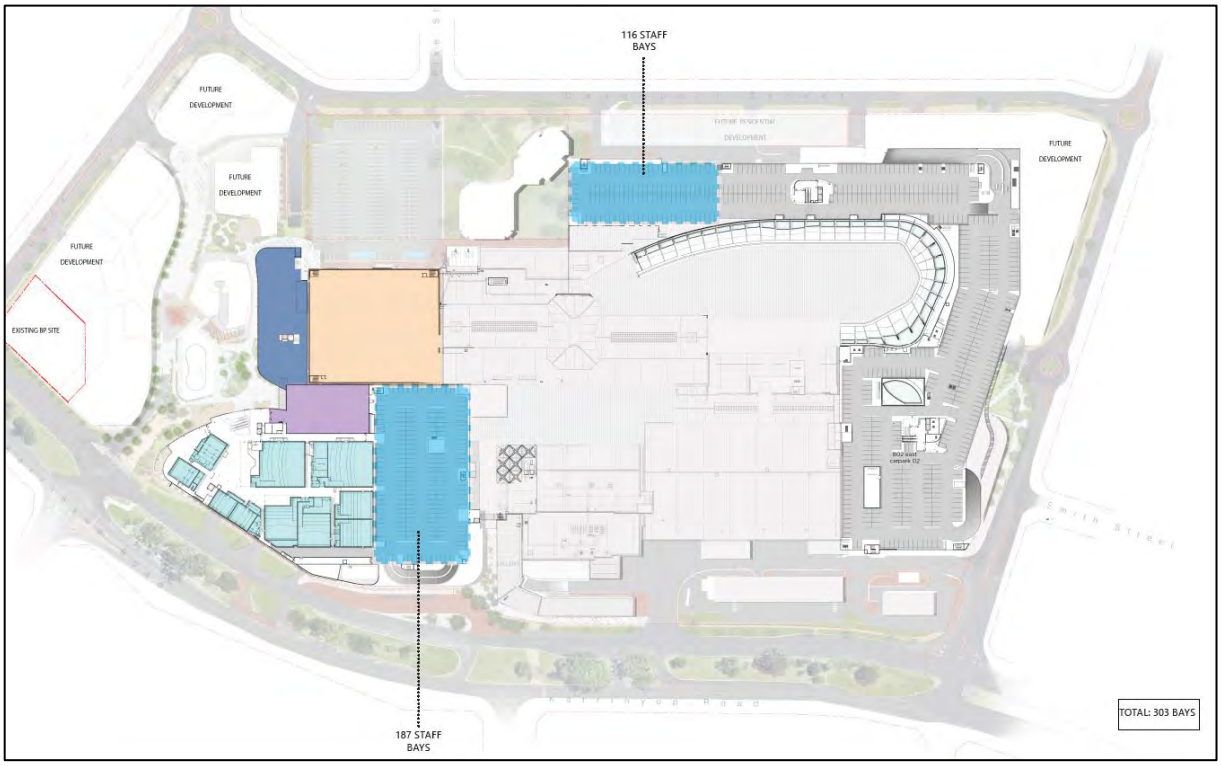



**Figure 5-7: Staff Parking Allocation – L02 Level**

- Paid Parking
  - It is proposed that staff will be required to pay for a parking permit to park at the developed Centre (noting this is currently not the case). This will provide incentive for staff not to drive to the Centre, and encourage sustainable modes of transport.
- Enforcement of staff parking
  - Staff parking is proposed to be enforced using car number plate recognition, as per the existing situation. The number plates of all staff car parking bays are compiled from all cars parked in the staff parking bays that stay at the shopping centre for more than four hours. All areas outside the staff parking area are checked twice a day, once in the morning and again in the afternoon, representing a four hour time frame. If staff cars are found outside the staff parking area they receive a breach notice. This program has been found to be a great success to date with the prime parking bays remaining free for customer use.

### 5.2.4 Other approaches such as travel behaviour change initiatives or reciprocal use

In order to improve the flexibility of use of parking bays, there is an opportunity to allow use of specified parking bays, such as office bays, to customers outside of business hours. It is anticipated that a small portion of office bays will be located near to the Main Street on the Basement levels.

Travel behaviour change initiatives to support mode shift from private vehicle use to public transport or active transport. Travel behaviour change is considered one of the most important tools in order to help curb the car-centric nature of Karrinyup users, to not only encourage mode shift to public transport, but also to walking and cycling. The principles of behaviour change include **Inspiration**, **Enablement**, **Invitation** and **Trial and Satisfaction**, as identified by the Department of Transport (DoT) and should be considered in the introduction of behaviour change programmes.

## 5.3 Bicycle Parking

### 5.3.1 Bicycle Parking Provision and Allocation

In accordance with the DA conditions, the following bicycle parking will be provided at the Centre:

- 160 customer bicycle spaces dispersed amongst the four major entrances to the shopping centre and along the Main Street. This will include the provision for parking for at least 30 bikes at each major ground floor entrance and at least an additional 20 on the main street.
- Secure, enclosed end of trip facility for staff located at the southern major entrance to the shopping centre, near the Karrinyup Bus Station (as indicated on Figure 5-8), consisting of:
  - 200 bicycle spaces
  - 200 lockers
  - Separate female and male change rooms incorporating 5 showers and 1 toilet in each

By 2031 it is anticipated that the Centre will have approximately 1500 employees. Taking into consideration the proposed mode share target of 6% for cycling in 2031, it can therefore be assumed that at least 90 employees will use the end of trip facilities. The size of the facility is therefore considered to be more than sufficient.

Whilst 160 customer bicycle parking spaces are being provided, there is capacity within the Centre to allow for the provision of extra bicycle parking spaces if there is the demand. The landowner will monitor the usage of the bike racks.

It can be noted that the State Planning Policy 4.2 states that the typical supply of motorcycles and bicycles for an activity centre is 5-10% of all bays. For this Development, 360 bicycle bays and 50 motorcycle bays in total are intended, equating to 8.3% of the total number of bays.

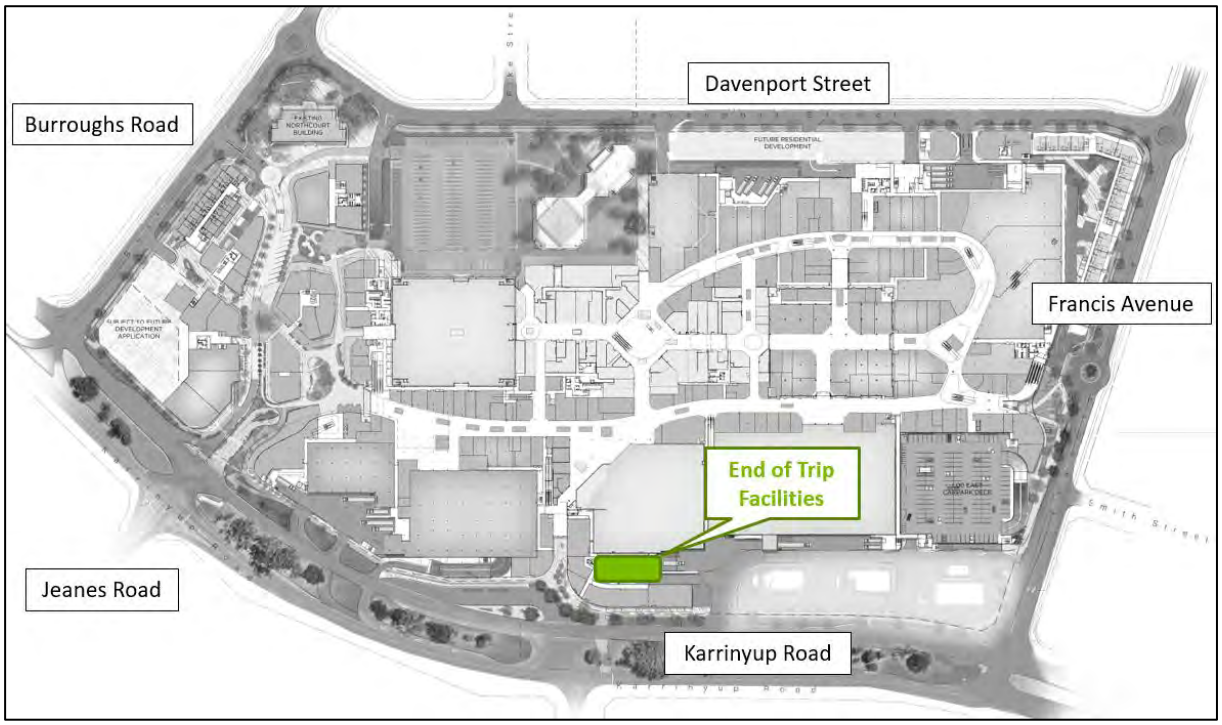



**Figure 5-8: Proposed location of bicycle end of trip facilities**

### 5.3.2 Bicycle Parking Access

As part of the expansion of the Centre, a number of new and upgraded cycle paths are proposed in order to increase the effectiveness of the surrounding cycle network, with the aim of tying in to the Perth Bicycle Network (PBN) routes particularly from the east and south. Access to the proposed bicycle parking facilities within the Centre has been carefully considered in the design, with the inclusion of four consolidated gateways providing direct entrance from the external road network into the retail core of the Centre. Bicycle parking will be available at these gateways which can be accessed from the proposed surrounding cycle network. The proposed network aims to provide cyclists with safe, direct and connected access to the parking facilities, removing the need to cycle through car parks as is currently the case.

A key attribute of the proposed design is the development of the 'southern' gateway as an enhanced active transport entrance to the Centre. The proposed end of trip facility will be located here, along with proposed enhancements to the existing Karrinyup Bus Station and signalised crossing on Karrinyup Road to improve general amenity and legibility.

### 5.3.3 Bicycle Parking Controls

Public bicycle parking spaces will be in the form of racks and rails located at the four main entrances to the Centre. No controls are proposed, with users to store and secure their bike by means of their own locking mechanisms.

The staff end of trip facilities will be secured by swipe card access which will be controlled and maintained by the building management group. It is recommended that security cameras also be fitted (where appropriate) to discourage users from misusing these facilities. Lockers may be leased by individuals or employers who will receive a locker key for the duration of their lease. Access to the locker room will also require swipe card access. Male and female change rooms will again require separate swipe card access specific to their requirements.

# 6 Implementation Framework

## 6.1 Steering Group

The implementation of the initiatives will be driven by the Centre Manager, in close consultation with AMP Centre management team and representatives, including the AMP marketing team.

## 6.2 Promotion and Communication Strategies

### 6.2.1 Prior to Opening

Prior to the opening of the redeveloped Centre, a number of communication strategies will be implemented, including:

- Online advertising through the Centre's website; and
- Hard copy advertising through posters and signs throughout the Centre.

The advertisements will highlight the key improvements to sustainable transport options to the Centre to create awareness to customers, including:

- Public transport infrastructure improvements and increase in frequency.
- Pedestrian and cycling infrastructure improvements.

### 6.2.2 Post Opening

Advertising within the shopping centre and in parking areas will be installed, which will provide ongoing promotion of the use of sustainable transport modes to both customers and staff, including the following:

- Conveniently located interactive information points throughout the Centre
  - These information points will outline information to customers relating to parking and sustainable transport options, such as bus timetables, pedestrian and cyclist routes and the location of bicycle parking facilities. The information points will be interactive and user friendly to cater for all types of customers.
- Live bus timetable signage at Karrinyup Bus Station and Stirling Station
  - It is proposed that live bus digital timetable signage is installed at Karrinyup Bus Station and Stirling Station to provide convenient, real time information to customers and staff.
- Bicycle wayfinding signage
  - Static bicycle wayfinding signage will be installed in strategic locations surrounding the Centre. There is an opportunity to provide branded wayfinding signage to the Centre, as part of the overall wayfinding signage.

Additionally, a key aspect in the promotion of the redeveloped Centre will be the communication of the various travel behaviour change initiatives to staff to encourage sustainable transport options with the aim of reducing private vehicle use and local congestion, as described in Section 4.3.

## 6.3 Measure of Outcomes

The outcomes of the TPMP will be measured against the objectives, as outlined in the following table.

The measures include the collection of various sources of data as well as other customer related information and feedback available to Centre management. The data will be used by the Centre management team to understand whether the strategies put forward have been successful.

| # | Objective | Measure | Responsibility |
|---|---|---|---|
| **1** | To increase the mode share from single occupancy private vehicles to alternative transport modes leading to a lower demand for parking | 1. Modal share surveys<br>2. General and staff parking utilisation statistics<br>3. Public transport patronage statistics<br>4. End of trip facility usage statistics<br>5. Rating of the effectiveness of travel behaviour change initiatives | Centre Manager |
| **2** | To minimise local congestion and associated impacts on the community and the environment, particularly at peak times | 1. Rating of the effectiveness of parking detection system<br>2. Customer complaints received regarding ease of access to the Centre<br>3. Rating of the effectiveness of peak shopping period strategies | Centre Manager |
| **3** | To optimise the parking operations and make efficient use of parking bays to support access for staff and customer | 1. Parking utilisation statistics (to understand parking by user type)<br>2. Staff and customer parking infringement statistics | Centre Manager |
| **4** | To manage and prioritise the allocation of more convenient parking spaces to favour higher-priority customers, including people with disabilities, parents with prams and the elderly | 1. Staff and customer parking infringement statistics<br>2. Customer complaints received regarding ease of access to the Centre for people with special needs<br>3. Customer complaints received regarding quality of parking facilities<br>4. Rating of the effectiveness of end of trip facilities | Centre Manager |
| **5** | To enhance staff health, wellbeing and productivity | 1. Rating of the effectiveness of travel behaviour change initiatives | Centre Manager |

# 7 Monitoring, Review and Rectification

## 7.1 Usage Monitoring Regime

Monitoring the use of parking and the travel mode share at the Centre will be beneficial in understanding the effectiveness of the adopted parking management and travel planning strategies.

The data sources described below will be utilised by Centre Management to measure the success of the proposed strategies, and will be captured in the TPMP Progress Report (refer to Section 7.3.3).

### 7.1.1 Modal Share Survey

The share of trips to the Centre by different modes of transport (mode share) can be measured by a modal share survey to understand the current travel behaviour of staff and visitors.

A travel survey involves participation from staff and visitors to the Centre and can be undertaken in a number of ways, including:

- Customer exit/intercept surveys – where staff and visitors are asked a number of questions in-person when located at the Centre. The survey can be undertaken across a range of times to sample a broad selection of people.
- Questionnaires – where staff and visitors are directed to complete a number of questions and submit it. This can take a number of forms including online surveys and hard copy surveys.
- Phone surveys – where staff and visitors are contacted by phone and are asked a number of questions. This is reliant on the availability of contact details.
- Focus groups – Discussions with particular groups are undertaken i.e. full-time staff, weekend staff, and casual staff.

The Centre currently undertakes periodic visitors insight surveys (every 3-4 years), which incorporate questions relating to transport mode and access. These surveys will continue to be undertaken and the results monitored.

A modal share survey, specifically targeted to tenants and staff is proposed to be undertaken every two years for the first four years, and every four years thereafter in order to allow Centre Management to compare trends against the baseline travel mode shares. The survey results will provide an opportunity to understand shifts in travel behaviour and measure the success of the initiatives implemented.

### 7.1.2 Parking Detection System

The introduction of the fully managed parking detection system at the Centre has the capability to provide useful information to shopping centre management regarding parking usage.

The detection system uses a cloud-based platform for data storage, reporting and basic operational control, and can provide the following information:

- Occupancy reporting
  - Example output: the average occupancy measured by Day of the Week, Zone and/or by Bay Type.
- Dwell reporting
  - Example output: the average dwell time measured by Day, Zone and/or Bay Type.
- Turnover reporting (i.e. number of times a bay has been parked in)

- Example output: the average turnover by Day of the Week, Zone and/or Bay Type.

- Visitor Movement reporting (utilising licence plate recognition)
  - Example output: the frequency in which visitors are using the parking facilities (i.e. how many visitors are visiting weekly, fortnightly, monthly, etc.).
- Visits reporting includes the following outputs (utilising licence plate recognition)
  - Example output: Log of visits recorded in particular date ranges, zones, bay types, licence plate etc.

Review of the use of allocated staff parking and visitor bays can be used to understand staff and visitor usage trends, particularly during peak hour periods, and will ultimately allow for proactive actions for efficiency improvements, for example further reductions in staff parking allocation for visitors if the staff bays are regularly not being fully utilised. The above data will be obtained on a regular basis and assessed by the Centre Manager for any potential actions. Any identified actions will be included in the TPMP Progress Report.

## 7.2 Maintenance

### 7.2.1 Car Parking

The car parking infrastructure at the Centre will be maintained in accordance with the Centre's current overall scheduled maintenance procedures. The proposed managed parking detection system will be maintained in line with manufacturer's specifications.

It is recommended that the Centre's maintenance procedures be updated to consider the different requirements of any new technology that is implemented, including the parking system, so that only one schedule needs to be referred to.

### 7.2.2 Bicycle Parking

The proposed end of trip facility (including bicycle storage, showers, and lockers) will be maintained in accordance with the Centre's current general maintenance policy. This includes tie in with the regular cleaning and security schedules of the Centre.

## 7.3 Procedures and Responsibilities

### 7.3.1 TPMP Implementation and Review

The initial TPMP implementation will be a combined approach between the development primary Contractor and the Centre Manager. The Contractor and their sub-contractors will implement the "hard" infrastructure aspects such as marking of designated parking areas and the parking management systems. The Centre Manager will be responsible for ensuring that the "soft" aspects such as procedures for parking operations, monitoring, and maintenance are in place before the redeveloped Centre is opened.

The Centre Manager will then have ongoing responsibility for the TPMP. This includes the collection of available information/data, review of this information to understand parking utilisation and trends over time, evaluation against desired outcomes, and then establishment of any actions if required.

The role of Centre Manager is considered appropriate to also be the Travel Plan Coordinator for the implementation and monitoring of the TPMP.

**Tenant Engagement**

In order to improve outcomes for staff, engagement with tenant representatives is needed. Periodic retail functions are held between Centre management and tenant representatives, and as such it is proposed that the key conclusions of the TPMP Progress Report (discussed in Section 7.3.3) are communicated at these functions.

### 7.3.2 Tenant/Staff/Customer Dissatisfaction

The Centre currently implements a customer complaint process where any issues by tenants, staff or customers can be reported. It is proposed that this process is maintained with the upgraded Centre.

Complaints are reviewed by the Centre Manager to determine whether they should be actioned or not. Complaints regarding safety will be prioritised over those regarding convenience and will be actioned as soon as possible if proved valid.

It should be noted that ideally the maintenance, monitoring, and security schedules are frequent enough to resolve issues before a complaint is lodged.

### 7.3.3 Reporting Schedule

It is proposed that a TPMP Progress Report is submitted to the City of Stirling on an annual basis. The intention of the report is to summarise the measures used to assess the success of the implementation of the TPMP strategies. The report should include a summary of any data/information collected and key actions implemented with the aim of achieving the TPMP objectives.

It is intended that this report is as concise and relevant as possible so that it can provide value for maintaining an optimal parking solution whilst not being a burden to collate and write.

The report will include the following as a base template:

- Review of modal survey data (if applicable) and any notable issues, opportunities and trends;
- Review of available parking data highlighting any notable issues, opportunities and trends;
- Review of available public transport and end of trip facility usage statistics highlighting any notable issues, opportunities and trends;
- Review of the strategies and achievements made regarding their success. This includes reviewing if each strategy is still relevant or if it needs to be revised, removed, or additional strategies added.
- A summary of tenant or customer complaints covering complaints reported frequently or complaints considered major for either safety, efficiency, or satisfaction reasons and the proposed or undertaken response;
- A review of the manufacture supplied equipment to check that it is performing as per the provided equipment specifications and guarantee; and
- A summary of actions or changes undertaken since the last progress report and a statement on why the action was required. Note that any major changes should be discussed with the City prior to being implemented.

## 7.4 Operational Commitments

Compliance of this TPMP is required by the Planning and Development Act 2005 as per all other conditions of the development approval. However this is also a live document and the requirements contained within it will always be subject to change, after agreement. Any penalties relating to non-compliance are to be related to the scale of the non-conformance with a pragmatic view of the actual impact of the non-conformance and factors that may have made the requirements difficult need to also be considered.

**Aurecon Australasia Pty Ltd**
ABN 54 005 139 873
Level 5, 863 Hay Street
Perth WA 6000
Australia

**T** +61 8 6145 9300
**F** +61 8 6145 5020
**E** perth@aurecongroup.com
**W** aurecongroup.com

**Aurecon offices are located in:**
Angola, Australia, Botswana, China,
Ghana, Hong Kong, Indonesia, Kenya,
Lesotho, Macau, Mozambique,
Namibia, New Zealand, Nigeria,
Philippines, Qatar, Singapore, South Africa,
Swaziland, Tanzania, Thailand, Uganda,
United Arab Emirates, Vietnam.

**Aurecon Australasia Pty Ltd**
ABN 54 005 139 873
Level 5, 863 Hay Street
Perth WA 6000
Australia

T +61 8 6145 9300
F +61 8 6145 5020
E perth@aurecongroup.com
W aurecongroup.com

aurecon

Attachment 6d

# Technical Note

| | | | |
|---|---|---|---|
| To | **City of Stirling** | From | **Antony Johnstone** |
| Copy | **Sean Fairfoul** | Reference | **249825** |
| Date | **27 February 2019** | Pages (including this page) | **4** |
| Subject | **Karrinyup Revised Transport Plan Mode Splits** | | |

## Introduction

The current proposal and approval for the re-development of Karrinyup Shopping includes a number of transport / movement related provisions, including:

- Bus Funding – additional services for 5 years;
- Footpath Construction (within 400m – 50% of cost and Jeanes Road – 100% of cost);
- Francis Ave, Davenport Street & Burroughs Road upgrades;
- Karrinyup Road upgrades (including bus lanes, intersection upgrades & paths);
- Bike, motorcycle and taxi parking facilities;
- EOT facilities;
- Parking limitations; and
- Behaviour Change Plans.

AMP Capital have also sought to maximise the number of residential dwellings on the site.

Through discussions with various agencies relating to the approved Karrinyup Centre Transport Plan, it has become evident that a more effective Transport Plan can be achieved through a re-alignment of priorities. Of key importance is prioritising efforts for a transport mode shift to occur for staff as early as possible.

As noted above the funding of additional bus services is one of the measures included in the approval. AMP Capital and the consultant team held a number of discussions with the PTA and presented a number of options to maximise the benefit in relation to the expenditure. Discussions with the PTA failed to reach an agreed outcome. The PTA sought to increase bus frequencies at all times, but limited to one bus route. Currently there are two main routes that operate between Karrinyup Centre and Stirling Station, being the 423 (via Huntriss Road) and 425 (Karrinyup Road). The PTA insisted on the following:

- AM / PM weekday peaks with 10 minute frequencies on the 425 route only.
- Weekday midday off-Peak and weekends with 15 minute frequencies on the 425 route only.

This proposal does have the following advantages:

- It provides a dedicated bus route;
- It provides high frequencies at all times for the 425 route; and
- Maximised benefit of portion of bus lane located on Karrinyup Road east of Huntriss Road.

However there are a number of issues with this proposal:

- It is very expensive and is not sustainable for the landowner and the PTA after the landowner funding period ceases;
- It requires the transport planning for the centre to be solely bus focused (due to costs);
- It does not make use of the 423 bus route, which does not receive any frequency benefit;
- Staff do not require a dedicated bus route as digital signage can provide information on the next bus for both routes; and
- Centre customers are not high users of public transport and this is more difficult to change.

**Alternate Proposal**

AMP Capital and the consultant team have subsequently undertaken a review of the Transport Strategy for the centre and have formed the view that an alternative strategy, including during construction, would provide the most benefit. As such a revised strategy is proposed:

- Additional footpath construction/funding (an additional $200,000);
- Additional Street Tree planting contribution ($50,000);
- Targeted increased bus frequencies funding
  - AM / PM weekday peaks with 10 minute frequencies using a combination of the 423 and 425 routes;
  - Weekends with 15 minute frequencies using the 425 route;
- Extended landowner funding for increased bus frequencies (increased from 5 to 7 years);
- Public transport use promotion during construction (approximately 3 years);
- Reduction of the bus lane (east of Huntriss Road to a new length of 460m); and
- Wayfinding / route guidance signage (provision or funding) at Stirling Bus Station .

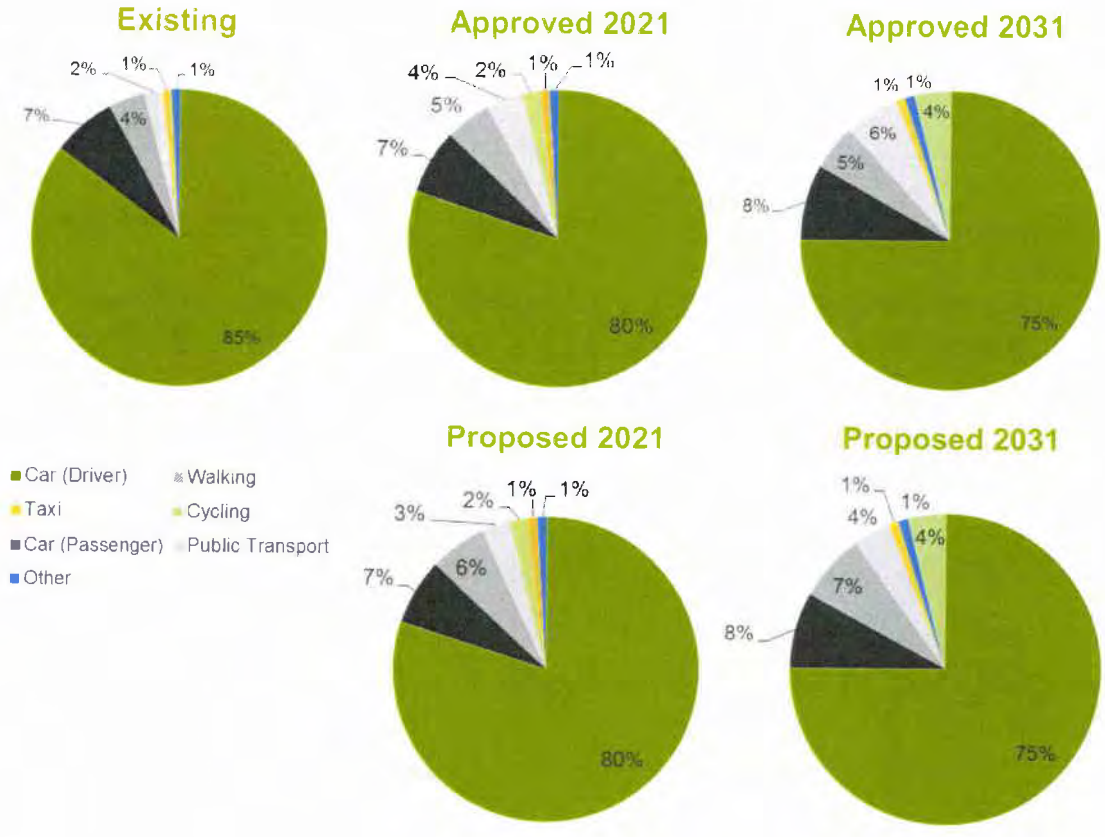
All the other road upgrades, parking restrictions and facilities, EOT facilities and behaviour change plans remain unchanged.

While this proposal does not provide additional bus services during the weekday off-peak periods and does not concentrate bus services on one route only during the peak periods, this proposal does include the following benefits:

- Increased amenity for the surrounding area due to additional street trees and paths so that pedestrian movements can be safer, easier and more attractive;
- Does not waste money on underutilised section of the westbound bus lane;
- Reduces the removal of vegetation within the Karrinyup Road median;
- Increases focus on staff by encouraging a mode shift earlier during the construction period, which is then also supported for longer; and
- The primary customer demand occurs on the weekend and the proposal is tailored so that this is still supported.

It is envisaged that the revised transport plan would result in the following changes to the customer mode share targets:

- An increase in Walking trips from an existing 4% to 7% in 2031 (was 5% in the previous plan)
- An increase in Public Transport trips from an existing 2% to 4% in 2031 (was 6% in the previous plan)




Note that as there are no changes to the Car (Driver) and Car (Passenger) splits, and therefore no changes to the approved intersection upgrades for private vehicles.

The below summarises the proposed changes and why they will improve the Transport Plan outcomes.

### External Footpaths and Tree Planting

The current DA conditions requires a contribution of 50% to provide a footpath on one side of every street that does not have a footpath within 400m of the subject site. The current estimate of the cost of this work is approximately $200,000.

To make it more attractive to walk to the Centre through improved connectivity, it is proposed to increase the contribution to expand the extent of additional path construction.

In addition, there is likely to be a greater likelihood of pedestrian use of the paths if the amenity for users is improved. As such it is also proposed to make a contribution to the City to provide additional street trees to help shade those paths that are devoid of any street trees.

It is believed that the improved infrastructure for pedestrians, combined with the increase in residential density surrounding the Centre, will increase the pedestrian mode split, particularly for customers.

**Karrinyup Road Westbound Bus Lane**

The approved Karrinyup Road westbound bus lane is currently proposed to start from after North Beach Road as a third lane until after Huntriss Road, with a total length of 800m plus tapers. This length was originally agreed upon based on the Saturday midday peak period queuing that is estimated to occur in 2031 in the westbound direction from the Huntriss Road intersection.

As this length of congestion does not occur during the weekday peaks, it is estimated that the 800m queue length would only be required for a period of 2 hours, on Saturday. With the improved bus frequency headways of every 15 minutes, only 8 buses on a Saturday would benefit from the 800m length.

As the focus of the bus lanes and frequency provisions is to primarily improve the bus service for Karrinyup staff in the morning and evening peaks, it is proposed to move the start point of the westbound bus lane to after the Muir Street intersection, reducing the length to 460m plus tapers. This length still allows buses to jump past the estimated 2031 morning and evening peak queues that extend from the Huntriss Road intersection.

**Bus Service Provisions**

As noted previously the movement of staff from vehicles to public transport is likely have greater success and will provide the greatest benefit to both the centre and surrounding roads. The proposed changes to bus headways between the Stirling Station and Karrinyup Bus Station consist of increasing the frequency to 10 minute intervals during the morning and evening peak periods to service the staff movements during the peak times. The increase will be spread between the 423 and 425 routes providing not only a benefit to the centre, but also to the residents along both routes.

It is also proposed to fund the installation of digital wayfinding signage within the bus station to direct staff and customers to the next bus to and from the Centre, regardless of the route.

A slightly different approach is proposed for the weekends, whereby it is proposed to prioritise movements on one route, which will be more easily identifiable for Centre customers. It is proposed to increase frequencies to 15 minute intervals just outside of and during the primary trading hours on Saturday and Sunday to cater for the higher Centre visitors during this time. Similarly, this will reduce delays on the road network during the weekend midday peak.

Currently the planning condition requires the landowner to fund additional services for a 5 year period. It is proposed to extend the period of funding for a further 2 years.

This behavioural shift to public transport will also occur before the redeveloped Centre opens, with the Centre providing subsidised SmartRider cards to staff. The Centre will also promote travel behaviour change during this period. Additional bus frequencies will also be provided during construction for staff and construction employees.

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Transport**
**Main Roads** Western Australia
**Public Transport** Authority

Attachment 7

Your ref: DA19/1909
Our ref: DT/15/05098
Enquiries: Yohan Nugraha (6551 6453)

Senior Planning Officer
City of Stirling
25 Cedric Street
Stirling
WA 6021

Attention: Dean Williams

Dear Sir,

**DAP APPLICATION - KARRINYUP SHOPPING CENTRE - HN 200 KARRINYUP ROAD, KARRINYUP**

Thank you for your email dated 19 August 2018 requesting comment in relation to the proposed amendment to the conditions of the above application. Thanks for meeting with us and PTA on the 18th September 2019 to help clarify the matters. The Department of Transport (DoT) consulted with the Public Transport Authority (PTA) and Main Roads Western Australia (MRWA) and provides the following comments on behalf of the Transport Portfolio Agencies.

I have met with the applicant's representatives to discuss these issues and while I gained an appreciation of their position, the opportunity to provide requested backup statistics and figures was not taken up consequently my understanding of their issues remains subjective.

Bus service proposals

The Portfolio position remains that Route 425 alone (rather than the combined 425 and 423 service frequencies) is to be reinforced to provide a single, legible, high frequency and direct alignment, especially once the bus lanes are constructed.

Leaving the weekday bus service provision at the status quo will not be sufficient to drive public transport mode shift outcomes required as committed to and approved as part of the development. The focus of public transport provision is to be concentrated on Route 425 (planned 10-minute frequency at peak periods and 15 minutes off peak). This will establish a strong and legible primary link between the shopping centre and Stirling Station. The service is the most direct route and with the construction of bus lanes on Karrinyup Road, the service will have reliable trip times despite congestion on the network increasing over tiem.

Investigation into providing bus priority on Huntriss Road for Route 423, deemed that option unviable therefore there would be a diverging level of service reliability between Routes 423 and 425 as congestion increases.

Reduction in the length of the bus lanes included in the application is not justified or supported.

Public transport service contribution

I appreciate that the applicant is seeking to reduce the costs as a consequence of other matters that do not relate to public transport. These other costs however do not negate the need to achieve mode shifts to ensure that Karrinyup can operate with an acceptable level of access and road congestion for the community.

The Portfolio does not support the applicant's proposal to co-fund a modified public transport service for seven years as the proposed contributions represent less than half of the cost of the planned services. The service kilometre requirement to be paid by the applicant is 105,500 km per annum together with the cost to grow the fleet by 2 buses in the peak period ($120,000 per annum).

The Applicant's proposes to drop its contribution to an estimated 32,000 – 38,000km per annum and to grow the fleet by 1 bus in the peak period ($60,000 per annum).

It should be noted that in the JDAP Metro NW 144 meeting (15 August 2016), the bus service contribution period was reduced to 5 years from the originally approval condition that required contributions in perpetuity.

Without a contribution from the applicant, the PTA is not resourced to increased bus services to Karrinyup from its own budget. There are numerous demands in the network that would be prioritised if and when funding is available. Long term funding requirements have been applied in other circumstances including at Midland Gate Shopping Centre and at most universities.

Construction Staff Travel arrangements

The proposal to include the construction period costs of transporting construction workers as part of the developer contribution in the Transport Plan is not acceptable.

The funding of additional bus services during the construction period has been paid directly to the to the bus operator by the construction company, as a separate arrangement. Transport of construction staff is the responsibility of the contractor and it was the decision of the contractor to stage their workforce from Stirling Station because land was available for parking adjacent to the station. This was driven by the fact that their staff were unable to park on site and therefore the choice to transport construction staff in early mornings via additional Transperth buses (which were of negligible benefit to the wider community operating so early in the non-peak direction) and subsequent cost is not for consideration in the context of the DA conditions. This also applies to the subsidisation Smart riders and directional signage at Stirling Station and Karrinyup Bus Station – essentially these costs relate to mitigating disruption during construction.

Amendment to Condition 2

It is noted that the submitted Transport Plan proposes modifications to the road network. Such works require an approval from Main Roads to modify the network. This approval is a separate and distinct approval from a development approval issued under the Planning and Development Act 2005.

Due to the above, I request that condition 2 should be revised to state "... to the satisfaction of the City of Stirling upon the advice of the MRWA and PTA."

Conclusion

In view of the above, DoT recommend that City of Stirling take the above comments into consideration. I request advice if the above cannot be included into the City's final RAR.

If you require any further clarification on the above comments, please contact myself on 65516886 or Yohan Nugraha on 65516103.

Yours sincerely

**David Igglesden**
**Manager Transport and Land Use Integration**

20 / 09 / 2019

140 William Street Perth Western Australia 6000
Telephone (08) 6551 6000 Facsimile (08) 6551 6001
www.transport.wa.gov.au ABN 27 285 643 255

Attachment 8

**KARRINYUP SHOPPING CENTRE – SUMMARY OF DAP APPLICATIONS**

| # | City's Reference No. | DAP Reference No. | Application Type | Development Description | Summary of Development | Date Lodged | Decision Date |
|---|---|---|---|---|---|---|---|
| 1 | DA15/0460 | DAP/15/00741 | Form 1 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre | Major Expansion of Karrinyup Shopping Centre | 5 March 2015 | JDAP approved at its meeting on 14 August 2015 |
| 2 | DA15/2334 | DAP/15/00741 | Form 2.1 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | Modification to Conditions and Advice Notes | 11 November 2015 | JDAP approved at its meeting on 21 January 2016 |
| 3 | DA16/1233 | DAP/15/00741 | Form 2.2 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | Extension of time to the term of approval | 16 June 2016 | JDAP approved at its meeting on 15 August 2016 |
| 4 | DA16/1046 | DAP/15/00741 | Form 2.3 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | Internal and external modifications | 20 May 2016 | JDAP approved at its meeting on 7 September 2016 |
| 5 | DA16/2419 | DAP/16/01140 | Form 1 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre | Cinema addition and Bankwest site | 10 November 2016 | JDAP approved at its meeting on 13 April 2016 |
| 6 | DA16/2761 | DAP/15/00741 | Form 2.4 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | Modifications to the facade treatments, updates to East Gate, West Gate, the main street and the internal built form and to amend Conditions 11, 12 and 13 | 23 December 2016 | JDAP approved at its meeting on 6 July 2017 |
| 7 | DA17/1432 | DAP/15/00741 | Form 2.5 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | Modification to Conditions | 27 July 2017 | Withdrawn on 11 August 2017 |
| 8 | DA17/1435 | DAP/16/01140 | Form 2.1 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA16/2419) | Modification to Conditions | 27 July 2017 | Withdrawn on 11 August 2017 |
| 9 | DA17/1652 | DAP/16/01140 | Form 2.2 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA16/2419) | Modifications to the façade treatments, internal tenancies and car parking configurations and amendments to 9 of the 33 Local Planning Scheme No. 3 conditions | 30 August 2017 | JDAP approved at its meeting on 19 December 2017 |
| 10 | DA17/1653 | DAP/15/00741 | Form 2.6 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | Modifications to the façade treatments, internal tenancies and car parking configurations and amendments to 35 of the 70 Local Planning Scheme No. 3 conditions | 30 August 2017 | JDAP approved at its meeting on 19 December 2017 |
| 11 | DA18/0493 | DAP/15/00741 | LG Form 2.7 | Development Assessment Panel (LG Form 2) - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | Internal and external modifications to a fast food tenancy | 19 April 2018 | City approved on 3 July 2018 |
| 12 | DA18/0791 | DAP/18/01418 | Form 1 | Development Assessment Panel - Seven Storey Mixed Use Development | Seven storey mixed use development on the corner of Davenport Street and Francis Avenue | 15 May 2018 | JDAP approved at its meeting on 19 October 2018 |
| 13 | DA18/2212 | DAP/16/01140 | LG Form 2.3 | Development Assessment Panel (LG Form 2) - Major Expansion of Karrinyup Shopping Centre (Amendment to DA16/2419) | Internal and external modifications | 31 December 2018 | City approved on 17 May 2019 |
| 14 | DA18/2213 | DAP/15/00741 | LG Form 2.8 | Development Assessment Panel (LG Form 2) - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | Internal and external modifications | 31 December 2018 | City approved on 17 May 2019 |
| 15 | DA19/0909 | DAP/15/00741 | Form 2.9 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | Modification to Condition 2 | 14 June 2019 | **Current Application –** JDAP to consider the application at its meeting on 16 October 2019 |
| 16 | DA19/1023 | DAP/15/00741 | Form 2.10 | Development Assessment Panel - Major Expansion of Karrinyup Shopping Centre (Amendment to DA15/0460) | External modifications | 2 July 2019 | Withdrawn on 16 July 2019 |