



PROPOSED OTR (SERVICE STATION, CAR WASH & DRIVE THRU RETAIL)

---

LOT 1001 (11) GREENWICH PARADE, MERIDIAN PARK, NEERABUP  
(CITY OF WANNEROO)

TRANSPORT IMPACT ASSESSMENT



Final

Prepared by i3 consultants WA for  
PC Infrastructure Pty Ltd

## Proposed OTR (Service Station, Car Wash & Drive Thru Retail) | Lot 1001 (11) Greenwich Parade, Meridian Park, Neerabup (City of Wanneroo) | Transport Impact Assessment

### Prepared by

David Wilkins | Senior Traffic & Road Safety Engineer

### Contact

M 0407 440 327

dwilkins@i3consultants.com

### Published by

i3 consultants WA

PO Box 1638

SUBIACO WA 6904 Australia

T +61 8 9467 7478

www.i3consultants.com



### Description

A Transport Impact Statement for development of a Service Station including 7 fuel bowzers (11 fueling points), automatic car wash, 4 manual car wash bays, 3 vacuum/ chamois cleaning bays, 2 electric vehicle charging bays, 17 car parking bays, 4 heavy vehicle parking bays, 1 Loading Bay and a drive-thru and walk-thru food, drinks, grocery facility on Lot 1001, Street Number 11 Greenwich Parade in Meridian Park within the City of Wanneroo suburb of Neerabup prepared in accordance with the 2016 WAPC Transport Impact Assessment Guidelines.

### Client

PC Infrastructure Pty Ltd

Project ID 31804

Version Final

Publication Date 20 January 2023

Pages 56

File Name 31804-TIA-F1

This is not an approved document unless certified below.

### About the Author

David Wilkins is an RTA NSW Certified Level 3 Lead Auditor (RSA-08-0178) and Main Roads Western Australia (MRWA) accredited Senior Road Safety Auditor (SRSA 0101). In addition to this, David is an MRWA accredited Crash Investigation Team Leader and Roadworks Traffic Manager (MRWA-RTM-10-RTM20). David has undertaken over 500 road safety audits in Australia since 2001 across the full range of stages from feasibility through to pre-opening, including roadworks, existing roads, schools, events & mine sites.

David specialises in undertaking and preparing traffic impact assessments in accordance with either the WAPC *Transport Impact Assessment Guidelines* or Austroads *Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments* (1). David has authored over 200 of these since 2001.

David is a member of Engineers Australia and committee member of Transport Australia society and is guided by its Charter and Code of Ethics which states that its members act in the interest of the community, ahead of sectional or personal interests towards a sustainable future.

### © Copyright, i3 consultants WA, January 2023

This work is copyright. Copyright in all drawings, reports, specifications, calculations, and other documents provided by i3 consultants WA in connection with the Project (as described above) shall remain the property of i3 consultants WA. PC Infrastructure Pty Ltd shall have a license to use these documents for the purpose of completing the Project but shall not use or make copies of such documents in connection with any work not included in the Project, unless written approval is obtained from i3 consultants WA.

Apart from any use as permitted under the *Copyright Amendment Act 2006*, no part may be reproduced without written permission of i3 consultants WA. Nearmap aerial photographs & SIDRA Intersection 9 are used under license.

### Disclaimer

Neither i3 consultants WA nor any member or sub consultants to i3 consultants WA takes responsibility in any way whatsoever to any person or organisation, other than that for which this report has been prepared, in respect of the information set out in this report, including any errors or omissions therein. i3 consultants WA is not liable for errors in plans, specifications, documentation, or other advice not prepared or designed by i3 consultants WA.



## CONTENTS

<b>1</b>	<b>Summary .....</b>	<b>4</b>
<b>2</b>	<b>Introduction.....</b>	<b>5</b>
<b>3</b>	<b>Existing situation.....</b>	<b>9</b>
<b>4</b>	<b>Development proposal.....</b>	<b>15</b>
<b>5</b>	<b>Integration with surrounding area.....</b>	<b>18</b>
<b>6</b>	<b>Analysis of transport networks.....</b>	<b>21</b>
<b>7</b>	<b>Safety .....</b>	<b>36</b>
<b>8</b>	<b>Conclusions.....</b>	<b>37</b>
	<b>References .....</b>	<b>38</b>
<b>APPENDIX A</b>	<b>Swept Path Assessments.....</b>	<b>39</b>
<b>APPENDIX B</b>	<b>SIDRA Intersection 9 Data .....</b>	<b>44</b>
	Existing Peak Hours Without Development.....	46
	Existing Peak Hours With Development .....	50
<b>APPENDIX C</b>	<b>WAPC Transport Impact Assessment Checklist.....</b>	<b>54</b>



# 1 SUMMARY

The key components of a Transport Impact Assessment (*TIA*) for a development proposal are to:

- assess the proposed internal transport networks with respect to accessibility, circulation, and safety for all modes, that is, vehicles, public transport, pedestrians, and cyclists,
- assess the level of transport integration between the development proposal and the surrounding land uses,
- determine the impacts of the traffic generated by the development proposal on the surrounding land uses, and
- determine the impacts of the traffic generated by the development proposal on the surrounding transport networks.

This *TIA* has determined that the redeveloped site is forecast to generate up to 166 trips during the road network morning peak hour and up to 149 trips during the road network afternoon peak hour. The development itself is expected to reach peak trip generation of up to 179 trips between 12 noon and 1 PM. Up to 70% of these trips are expected to be pass-by trips, i.e., trips to and from the development as part of an existing trip along Flynn Drive or Greenwich Pde.

The forecast additional trips, based on 70% pass-by trips is 50 in the morning, 54 at midday and 45 in the afternoon, i.e., less than 1 trip per minute. This is classified as a moderate impact by the WAPC, i.e., between 10 and 100 additional trips in any one hour.

This *TIA* has identified that the proposed development will not result in an adverse impact on the road network. The provision of two access driveways on different frontage roads allows for generated traffic volumes to be reduced at the Flynn Dr/ Greenwich intersection. The provision of a right turn lane into the side from Greenwich Pde eliminates the demand for right turns into Access 1 and reduces the probability of drivers performing U turns at the island referred to below.

**It is recommended** that the island in Flynn Dr on the west side of Greenwich Pde is extended to physically prevent right turns into Access 1 until such time as Flynn Dr is dualled.

## 2 INTRODUCTION

This Transport Impact Assessment (*TIA*) report has been prepared in accordance with the WAPC publication *Transport Impact Assessment Guidelines* (2). These guidelines indicate that a *TIA* is required for a Service Station with 11 fuelling positions, as shown in Table 1 below.

LAND USE	MODERATE IMPACT	HIGH IMPACT
	Transport Impact Statement required	Transport Impact Assessment required
	10 – 100 vehicle trips in the peak hour	> 100 vehicle trips in the peak hour
Residential	10–100 dwellings	> 100 dwellings
Schools	10–100 students	> 100 students
Entertainment venues, restaurants, etc.	100–1000 persons (seats) OR 200–2000 m <sup>2</sup> gross floor area	> 1000 persons (seats) OR > 2000 m <sup>2</sup> gross floor area
Fast food restaurants	50–500 m <sup>2</sup> gross floor area	> 500 m <sup>2</sup> gross floor area
Food retail / Shopping centres with a significant food retail content	100–1000 m <sup>2</sup> gross floor area	> 1000 m <sup>2</sup> gross floor area
Non-food retail	250–2500 m <sup>2</sup> gross floor area	> 2500 m <sup>2</sup> gross floor area
Offices	500–5000 m <sup>2</sup> gross floor area	> 5000 m <sup>2</sup> gross floor area
Service Station	1–7 refuelling positions	> 7 refuelling positions
Industrial/Warehouse	1000–10,000 m <sup>2</sup> gross floor area	> 10,000 m <sup>2</sup> gross floor area
Other Uses	Discuss with approving authority	Discuss with approving authority

Table 1 – Level of assessment required (Source Table 1: WAPC Guidelines Vol 4)

The proposal is for a 7 bowser/ 11 fuelling point ‘On the Run’ (OTR) Service Station with an automatic car wash, 4 manual car wash bays, 3 vacuum/ chamois bays, 2 electric vehicle charging bays, 17 car parking bays, 4 heavy vehicle parking bays, 1 loading bay and a drive-thru and walk-thru food, drinks, grocery facility.

An extract from the Design Drawing for the proposed development, showing the layout, is provided as Figure 1 on the following page.

The preparation of a *TIA* in accordance with the WAPC Guidelines is consistent with, and ensures compliance with, Clause 67(t) of the *Planning and Development (Local Planning Schemes) Regulations 2015* (3) which state “due regard should be given to 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 following sections have been prepared in a format that aligns with the WAPC Guidelines, clearly identifies the items that are required to be assessed in a *TIA* and the responses and/ or assessments relative to these items.



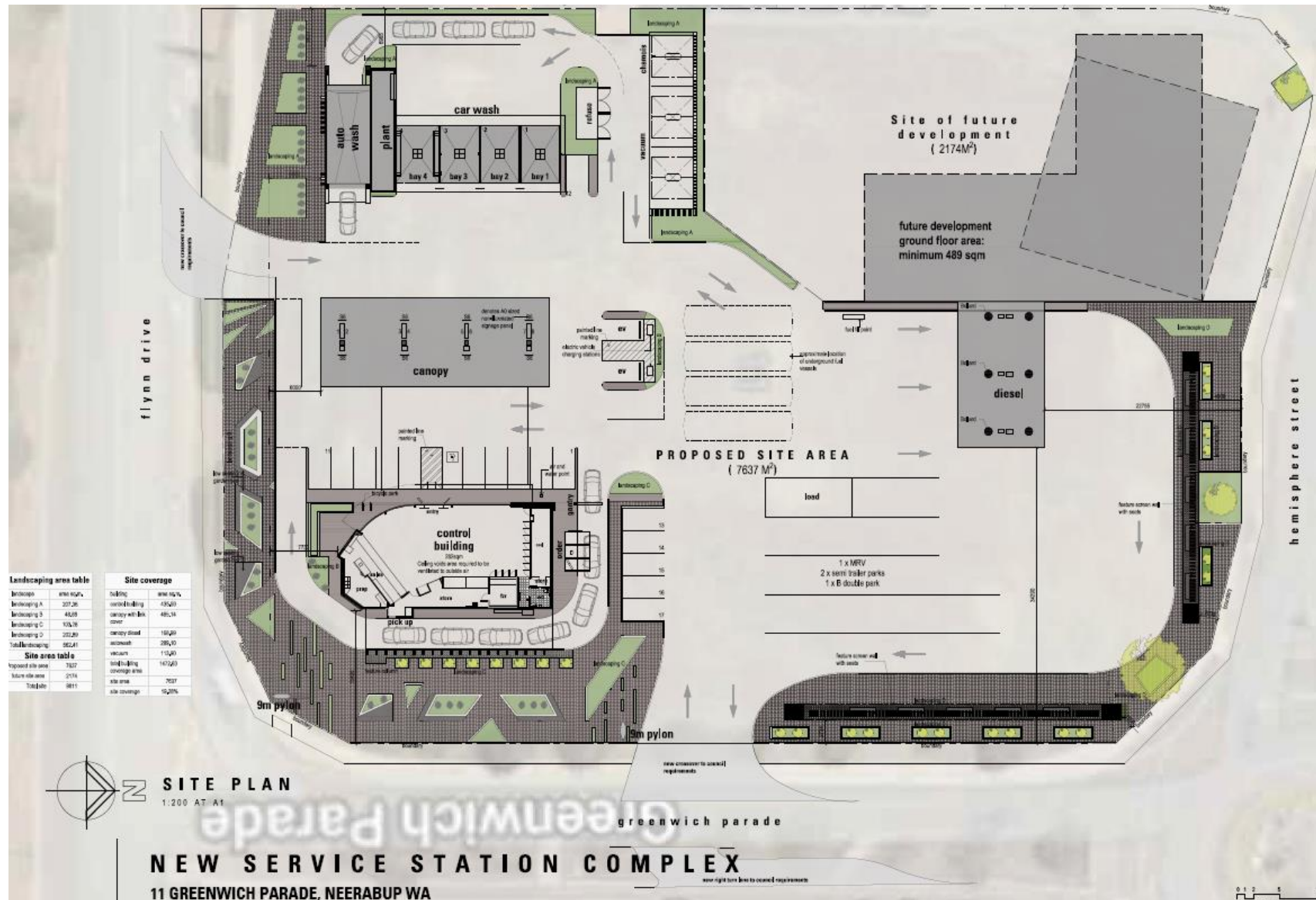


Figure 1 – Extract from Design Drawing 23JN1510sk00f

<b>Name of applicant and consultant.</b>	PC Infrastructure Pty Ltd ( <b>applicant</b> ) and i3 consultants WA ( <b>consultant</b> ).
<b>Development location and context.</b>	<p>Lot 1001 (11) Greenwich Parade, Meridian Park, Neerabup (City of Wanneroo).</p> <p>Located within 'Meridian Park'. Situated in the Neerabup Industrial Area, Meridian Park is positioned to meet the business needs of Perth's fast growing North-West corridor. It includes <a href="#">Global Business Park</a> and the <a href="#">Australian Automation and Robotics Precinct</a>.</p>
<b>Brief description of development proposal.</b>	<p>The proposal is for a 7 bowser/ 11 fuelling point 'On the Run' (OTR) Service Station with an automatic car wash, 4 manual car wash bays, 3 vacuum bays, 2 electric vehicle charging bays, 17 car parking bays, 4 heavy vehicle parking bays, 1 loading bay and a drive-thru and walk-thru food, drinks, grocery facility.</p> <p>An extract from the Design Drawing for the proposed development showing the layout is provided as Figure 1 on the previous page.</p>
<b>Key issues</b>	<p>There are no identified existing issues. The City of Wanneroo has raised concerns with access to and from Flynn Dr and on 'spine roads' in Meridian Park with previous development proposals. The applicant has addressed this by restricting access movements and designing the access driveways and site to accommodate large vehicles, as described below and shown in Figure 3 on page 8:</p> <ul style="list-style-type: none"> <li>• left-in only access is proposed off Flynn Dr to reduce the volumes of left turns into Greenwich Pde from Flynn Dr,</li> <li>• right-in access is proposed off Greenwich Pde to accommodate pass-by southbound traffic, i.e., traffic leaving the precinct,</li> <li>• it is proposed to accommodate and fuel vehicles up to B-Doubles, as permitted on the frontage roads and within the precinct.</li> </ul>
<b>Background information</b>	<p>The <b>applicant</b> is very experienced with developing these types of service stations in South Australia, Northern Territory and Western Australia.</p> <p>The <b>consultant</b> prepared a Transport Impact Assessment for a much larger 'Integrated Service Hub' on the same site for a different applicant in 2018 that did not proceed to development. The <b>consultant</b> also undertook a Detailed Design Road Safety Audit for a proposed Service Station on Lot 9006 (NW cnr Flynn Dr/ Pinnacle Dr) in May 2021 for the City of Wanneroo. In addition to this, the <b>consultant</b> undertook video traffic surveys at the Flynn Dr/ Greenwich Pde Give-way controlled intersection and Greenwich Pde/ Hemisphere St roundabout on the 8<sup>th</sup> and 9<sup>th</sup> June 2019 and on the 21<sup>st</sup> December 2022.</p>



Figure 2 – Development location and context

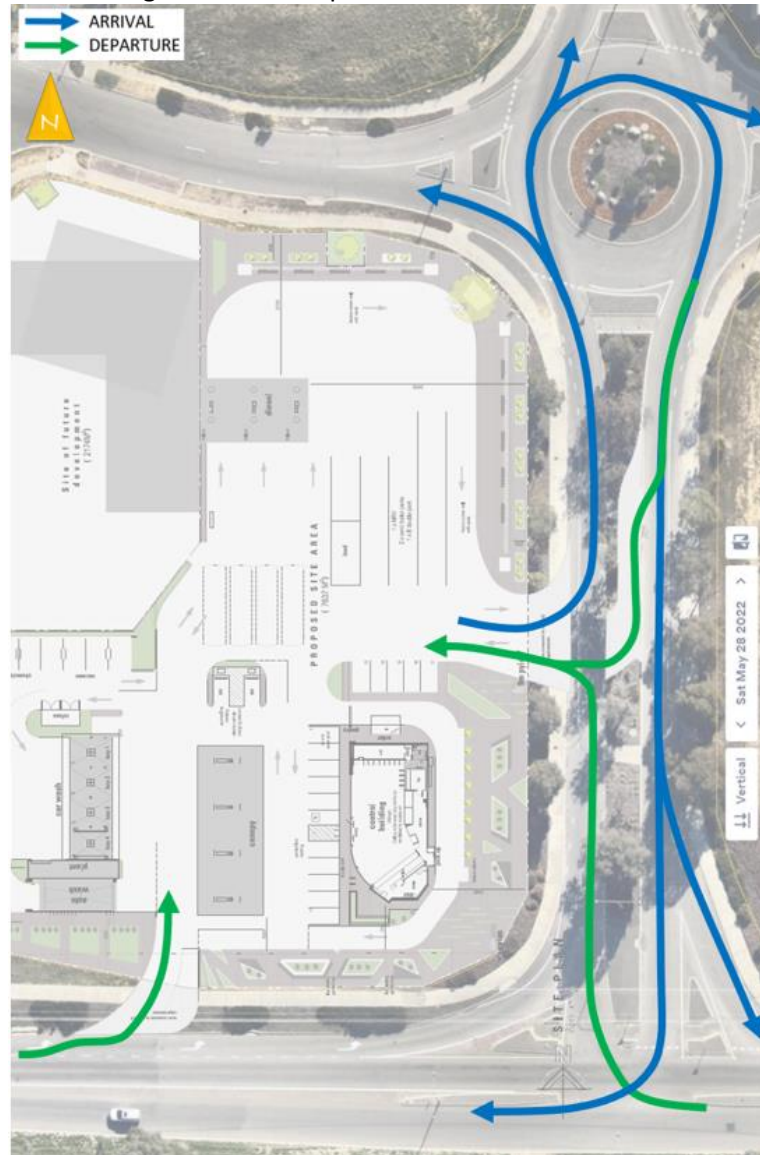


Figure 3 – Arrival & Departure Routes dictated by proposed access restrictions



### 3 EXISTING SITUATION

<b>Existing site uses.</b>	Greenfield site. Vacant since development of Meridian Park.
<b>Existing parking and demand.</b>	Not applicable.
<b>Existing access arrangements</b>	None. Embayed parking on Hemisphere St and Global Rd reduce access options off these roads due to sight line obstructions associated with parked vehicles.
<b>Existing site traffic.</b>	Nil due to vacant status. Forecast trip generation associated with 'industrial' development of the site is included in the <i>Neerabup Industrial Estate Traffic Review</i> <sup>(4)</sup> prepared by SKM in November 2004 to " <i>model the future traffic volumes predicted to be generated by the Neerabup Industrial Estate (fully developed) to determine an appropriate road network and road reserve requirements.</i> "
<b>Surrounding land uses.</b>	Surrounding land use is predominantly light industrial, service industrial and warehouse.
<b>Surrounding road network.</b>	<p>The closest distributor road to the site is the Flynn Dr frontage road (State Road: Regional Distributor). All other roads are classified as 'Local Access Roads' in the Main Roads WA Functional Road Hierarchy <sup>(5)</sup>, as shown in Figure 4 on page 11.</p> <p>Flynn Dr, Greenwich Pde, Hemisphere St and Global Rd are all classified as RAV Network 2, 3 and 4 and connect with other roads classified as RAV Network 2, 3 and 4 including Wanneroo Rd to the west and Old Yanchep Rd to the east. RAV Networks 2, 3 and 4 all permit access by various heavy vehicle combinations up to 27.5m long.</p> <p>The path, cycle path, cycle route and public transport network in the vicinity of the site is shown in Figure 5 on page 12.</p>
<b>Traffic management on frontage roads.</b>	<p>Flynn Dr is described in the <i>Neerabup Industrial Area Structure Plan No 17</i> <sup>(6)</sup> as the key southern east-west arterial road servicing the Neerabup Industrial Estate for the short to medium term. It is acknowledged as the defining edge between the Industrial Estate and Carramar Park and Banksia Grove to the south. It consists of a single sealed and kerbed carriageway with one lane in each direction and is subject to a posted speed limit of 80 km/h. Channelisation of the intersection does not extend to the proposed access driveway off Flynn Pde and hence will require extending to prevent right turns into this access driveway. Right turns from Flynn Dr are not necessary as drivers can access the site by turning right into Greenwich Pde.</p> <p>Greenwich Pde is a dual carriageway between Flynn Dr and the roundabout at Hemisphere St and a single carriageway north of this. It has a single 4.0 m wide lane in each direction with a 2 m wide painted shoulder between Flynn Dr and Hemisphere St and is subject to the default urban speed limit of 50 km/h. It is proposed to provide a break in the median to allow for right turns into the site only.</p>

### Traffic flows on surrounding roads.

The latest available Average Monday to Friday traffic volumes, including classes of vehicles, have been sourced from a Main Roads WA traffic survey at the Flynn St/ Greenwich Pde intersection in May 2022, supplemented by traffic surveys undertaken at this intersection and the Greenwich Pde/ Hemisphere St roundabout in December 2022 by the author. AM and PM road network peak hour volumes are shown in Figure 6 on page 13. Existing Traffic volumes between 12 noon and 1 PM, the development's peak hour, are shown in Figure 7 on page 14.

A comparison of previous and existing daily volumes on Flynn Dr and Greenwich Pde is shown in Table 2 below.

	2001	2018/19	2019/20	2021/22	May 2022
Flynn Dr East of Wanneroo Road	664	7,685	9,650		
Flynn Dr West of Greenwich Pde					9,021
Greenwich Pde north of Flynn Dr					1,371
Flynn Dr East of Greenwich Pde					8,546
Flynn Dr West of Pinjar Rd*	1,194				
Flynn Dr West of Old Yanchep Rd*	3,237			2,914	

\*Pinjar Rd extended to Flynn Dr October 2018

Table 2 – Existing and previous weekday daily traffic volumes

### Traffic flows at major and/ or impacted intersections.

Shown in Figure 6 on page 13.

### Operation of surrounding intersections.

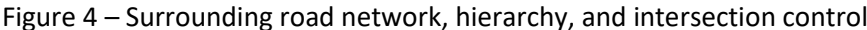
Shown in the analysis of transport networks in **Section 6** of this report.

### Existing pedestrian/ cycle networks.

Shown in Figure 5 on page 12.

### Crash data.

There have not been any reported crashes on Greenwich Pde, the Flynn Dr/ Greenwich Pde intersection or the Greenwich Pde/ Hemisphere St roundabout in the five-year period ending 31<sup>st</sup> December 2021.



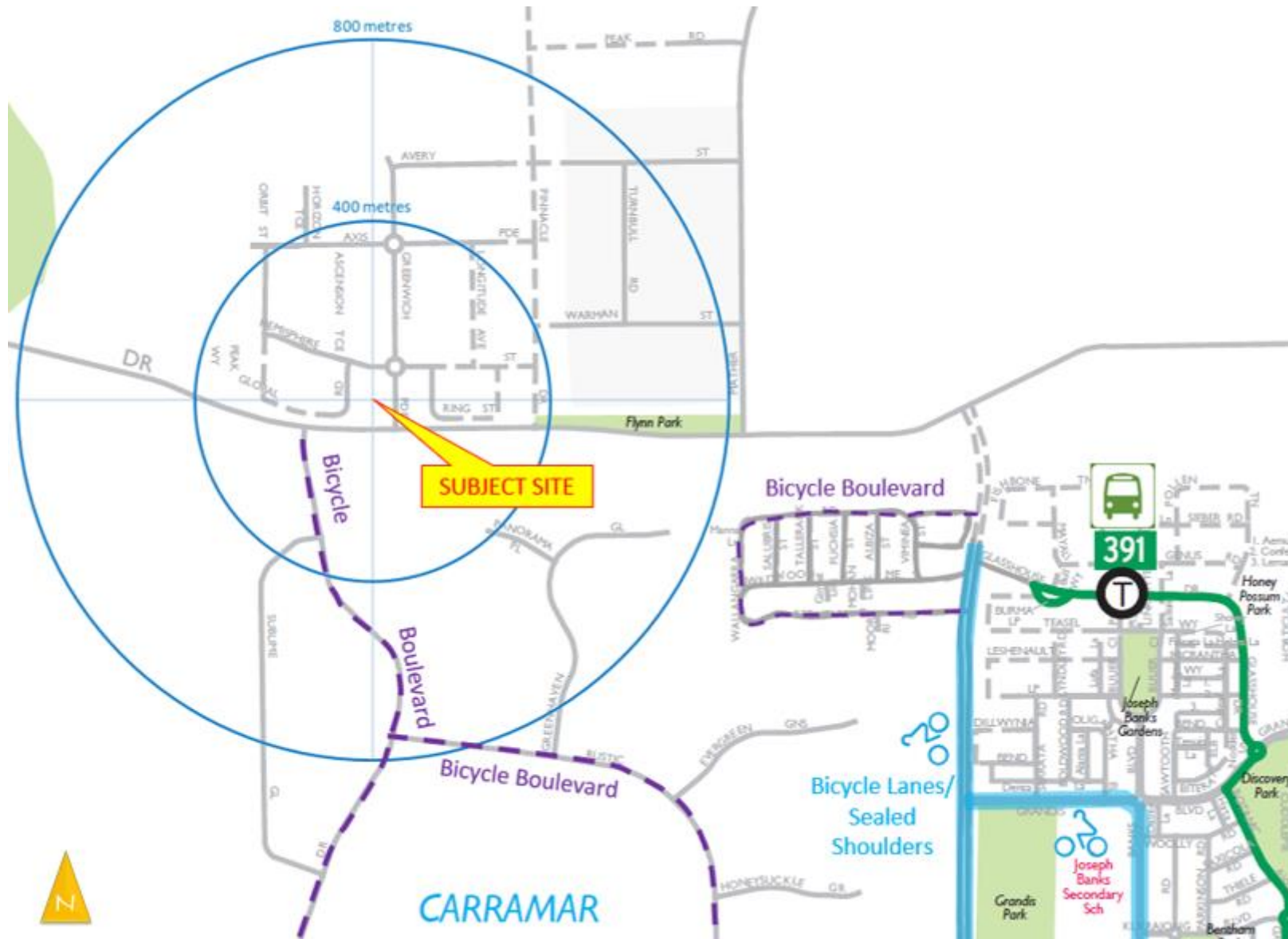
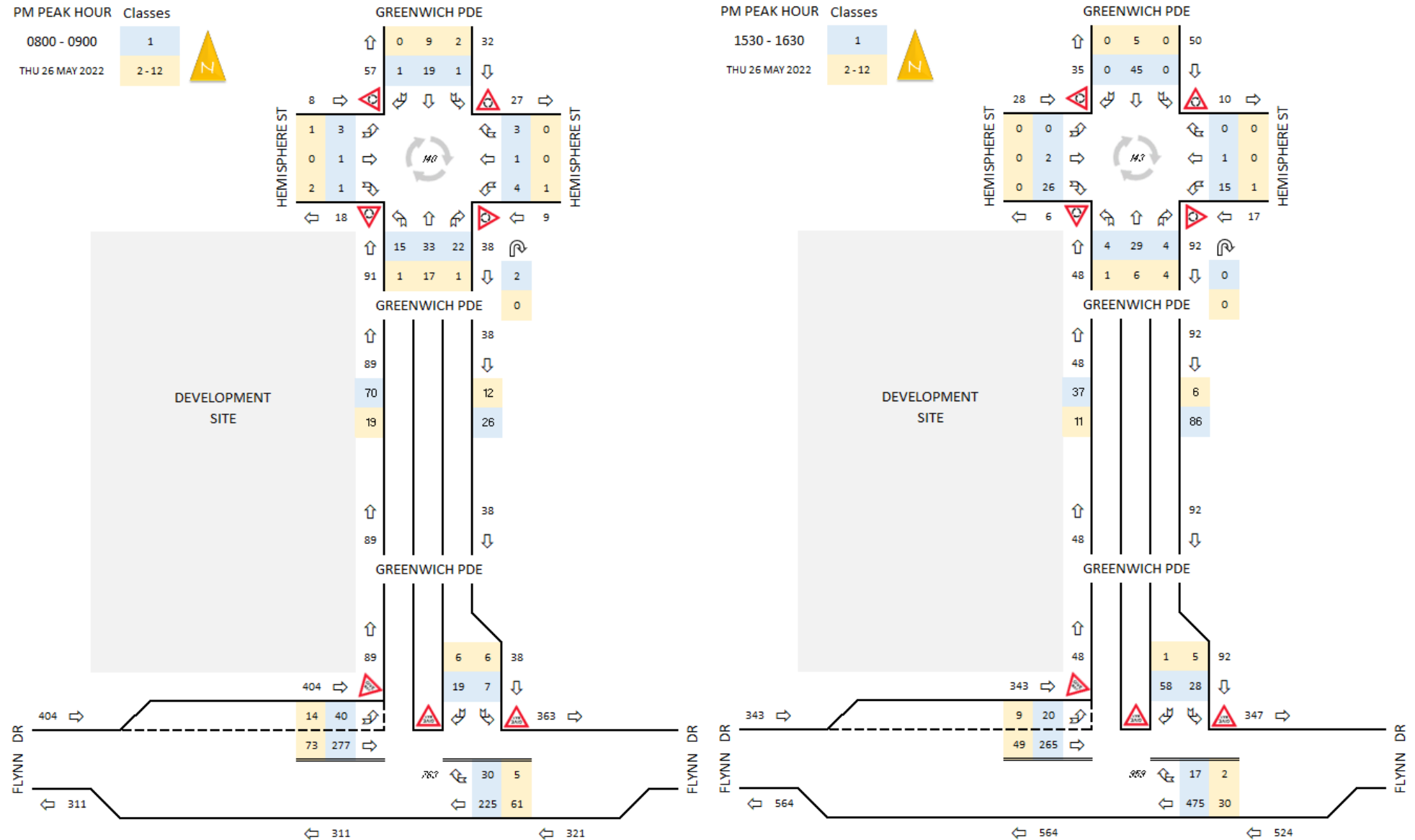


Figure 5 – Path, cycle path, cycle route and public transport in vicinity of the development site





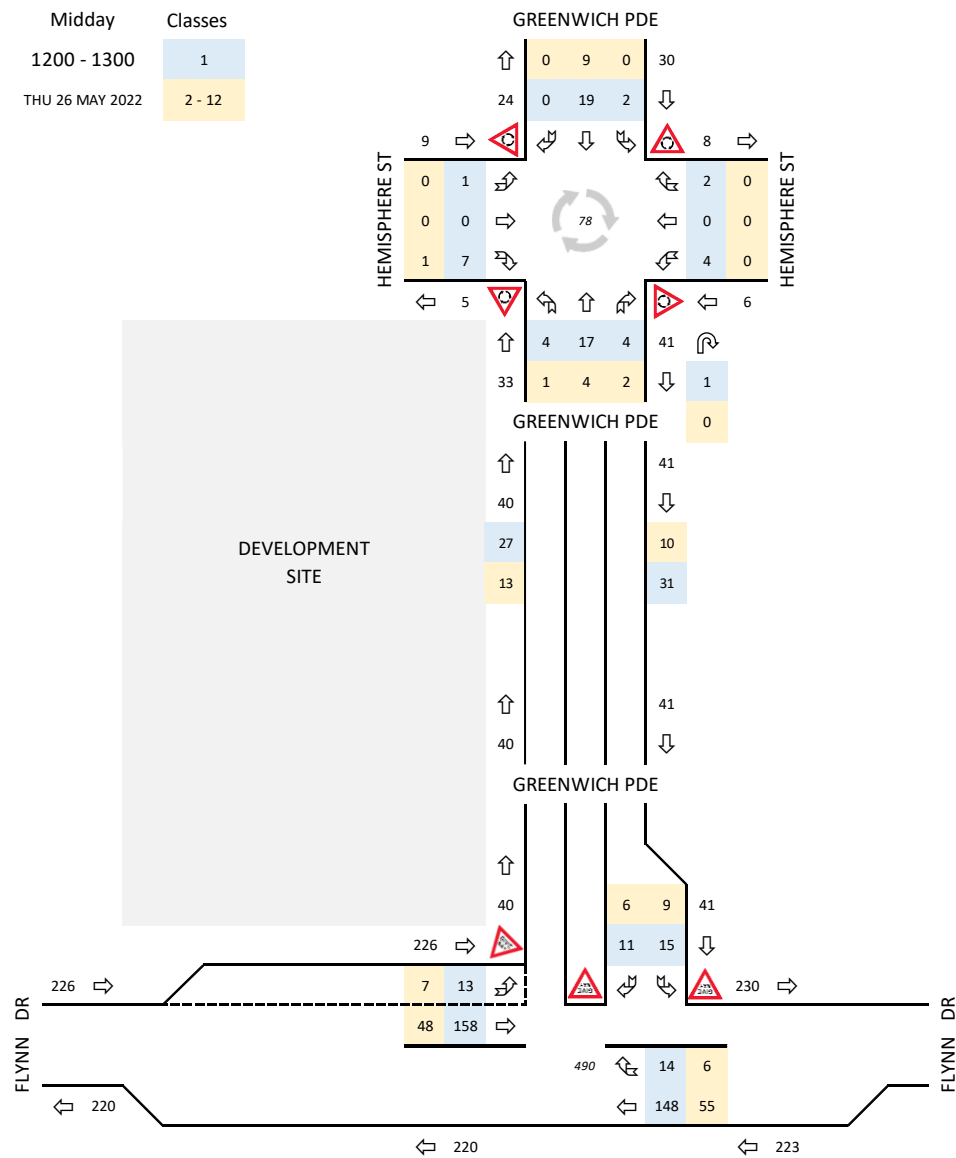


Figure 7 – Existing (May 2022) traffic volumes between 12 noon and 1 PM (Development Peak Hour)

## 4 DEVELOPMENT PROPOSAL

### Regional context.

The Meridian Park development area comprises approximately 400 hectares of industrial land jointly developed by DevelopmentWA and the City of Wanneroo. Meridian Park is situated off Flynn Drive within the 1,000-hectare Neerabup Industrial Area, north of Wanneroo. The Meridian Park development is expected to meet the industrial land needs of Perth's rapidly growing North West Corridor for the next 20 years.

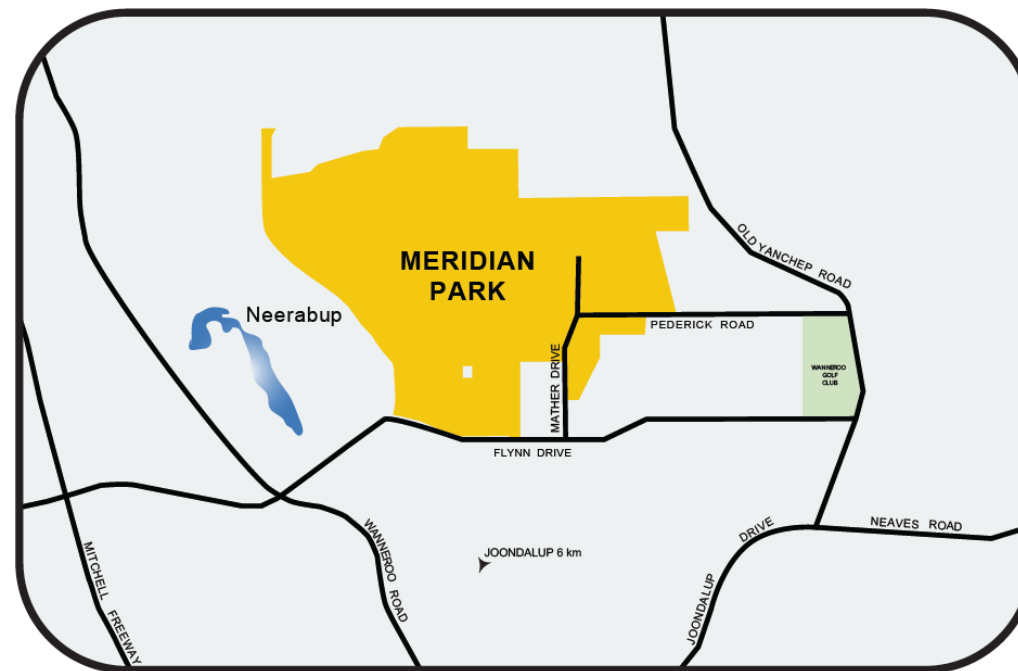


Figure 8 – Meridian Park Regional Context Map

### Proposed land uses.

The proposal is for a for a 7 bowser/ 11 fuelling point 'On the Run' (OTR) Service Station with an automatic car wash, 4 manual car wash bays, 3 vacuum bays, 2 electric vehicle charging bays, 17 car parking bays, 4 heavy vehicle parking bays, 1 loading bay and a drive-thru and walk-thru food, drinks, grocery facility.

### Table of land uses and quantities.

Land Use	Unit
Fuel Bowsers	4 Light Vehicle Bowsers/ 8 filling bays. 3 Heavy Vehcile Bowsers/ 3 filling bays.
Vacuum/ Chamois Cleaning	3 bays.
Manual Car Wash	4 bays.
Auto Wash	1 Drive-thru facility.
Drive-Thru Retail	282 m <sup>2</sup> .
Control & Retail	
Parking	16 Light Vehilces including 'disabled' with shared space.
	2 Electric Vehcile charging bays.
	4 Heavy Vehciles (1 x MRV, 2 x Semi-trailer & 1 x B-Double).
	2 rails for secure parking of 4 bicyles.
Loading & Waste Collection	1 Waste Collection area & 1 MRV Loading Bay for control building.
Vacant Tenancy	Site: 2,174 m <sup>2</sup> , Minimum GFA 489 m <sup>2</sup> .

Table 3 – Proposed Land Uses

### Access arrangements.

An 11.6-7.1 m wide one-way IN access driveway (A1) off the Flynn Dr left turn lane and a 13.3 m wide two-way left-in/ right-in/ left-out access driveway (A2) off Greenwich Pde with a short (30 m) right turn lane within the Greenwich Pde median. Refer Figure 3 on page 8.

### Parking provision.

Up to 19 cars (including 1 'disabled' and 2 electric charging station bays), 2 Medium Rigid Vehicles (including 1 loading bay for control building), 2 x Semi Trailers and 1 B-Double, as shown in the Development Plan provided as Figure 1 on page 6.

### End of trip facilities.

2 parking rails for secure parking of up to 4 bicycles.

### Any specific issues.

Restricted access movements at both access driveways – refer **Analysis of transport networks** in **Section 6**. The traffic island in Flynn Dr west of Greenwich Pde will require extending to physically prevent right turns into the proposed access driveway off the Flynn Dr left turn lane.

### Road network.

The road network, including classifications (hierarchy), is shown in Figure 4 on page 11. The Path, cycle path, cycle route and public transport network is shown in Figure 5 on page 12.

### Intersection layout and controls.

The layout of the Give-way controlled Flynn Dr/ Greenwich Pde intersection and Greenwich Pde/ Hemisphere St roundabout is shown in Figure 1 on page 6. This shows the existing layout and proposed short (30 m) right turn lane into Access 2 off Greenwich Pde.

**Pedestrian/ cycle  
networks and crossing  
facilities.**

There are no proposals or warrants to improve the existing pedestrian/ cycle networks or crossing facilities. The most recent Main Roads WA traffic survey data (May 2022) indicated no pedestrians crossed Flynn Dr and 1 pedestrian crossed Greenwich Pde during the 24-hour recording period. This also recorded 1 cyclist northbound and 2 cyclists southbound on Greenwich Pde and 4 cyclists eastbound and 9 westbound on Flynn Dr.

**Public transport  
services.**

There are no plans within the *Transport @3.5 Million Public Transport Plan* <sup>(7)</sup> for major public transport facilities to be provided in the vicinity of the Neerabup Industrial Estate.

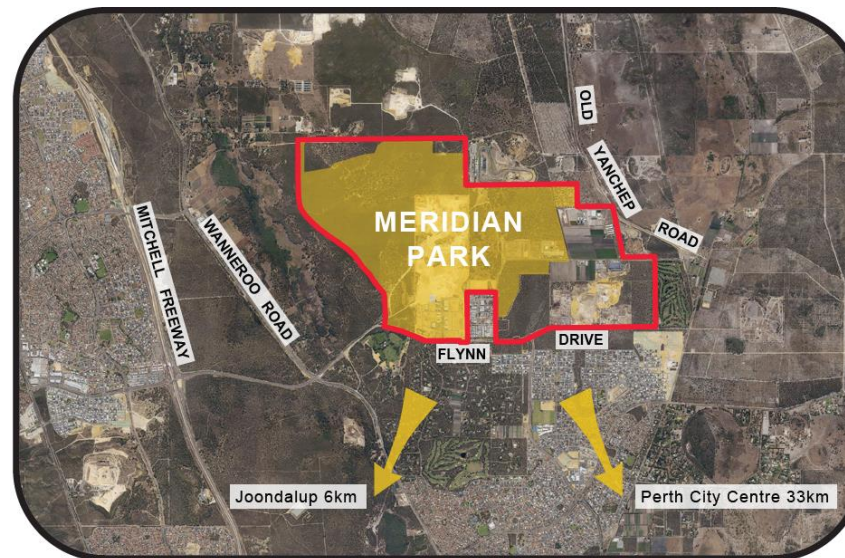
The *SKM report* for the Neerabup Industrial Estate <sup>(4)</sup> indicates that “*At this stage it is understood that there are no planned public transport routes for the area but it is considered that bus services could be developed on the proposed Class 1 and 2 collector roads in the Structure Plan, all of which have sufficient width to carry buses.*”

The nature of the proposed development, i.e., a Service Station, Car Wash and Drive-thru, suggests that public transport, walking and cycling is only likely to be adopted by employees, not patrons.

## 5 INTEGRATION WITH SURROUNDING AREA

### Surrounding major attractors/ generators.

The Neerabup Industrial Area comprises approximately 1,000 ha of predominantly General Industrial land. The subject land is located approximately 30 km north of the Perth City Centre, and 4 kilometres north east of the Joondalup City Centre. Major attractors and generators are the Mitchell Fwy and Wanneroo Rd to the west, Joondalup to the southwest and Old Yanchep Rd to the east, as shown below.



**Figure 9 – Surrounding major attractors and generators**

The development site's attractors and generators is traffic travelling along Flynn Dr and Greenwich Pde to and from various industries within the park.

### Committed developments and transport proposals.

Meridian park is still under development and has a large number of lots available for sale and lease, including the recently released [Stage 7 lots](#) and [Australian Automation and Robotics Precinct](#).



### Proposed changes to land uses within 1.2 kms.

### Travel desire lines from development to these attractors/ generators.

### Adequacy of existing transport networks.

The extension of Pinjar Road to Flynn Dr was completed in October 2018 and has resulted in changes to traffic volumes on Flynn Dr on either side of this (refer Table 2 on page 10).

Shown in Figure 3 on page 8.

Full development of the Neerabup Industrial Estate, including Meridian Park, Global Business Park and Australian Automation and Robotics Precinct has been assessed as likely to generate significant increases in traffic volumes on Flynn Dr with the *SKM report* (4) forecasting volumes in excess of 20,000 vehicles per day, as shown in Figure 10 below. These volumes include assumed traffic generation from all lots, including the subject site and will ultimately require the dualling of Flynn Dr to accommodate this.

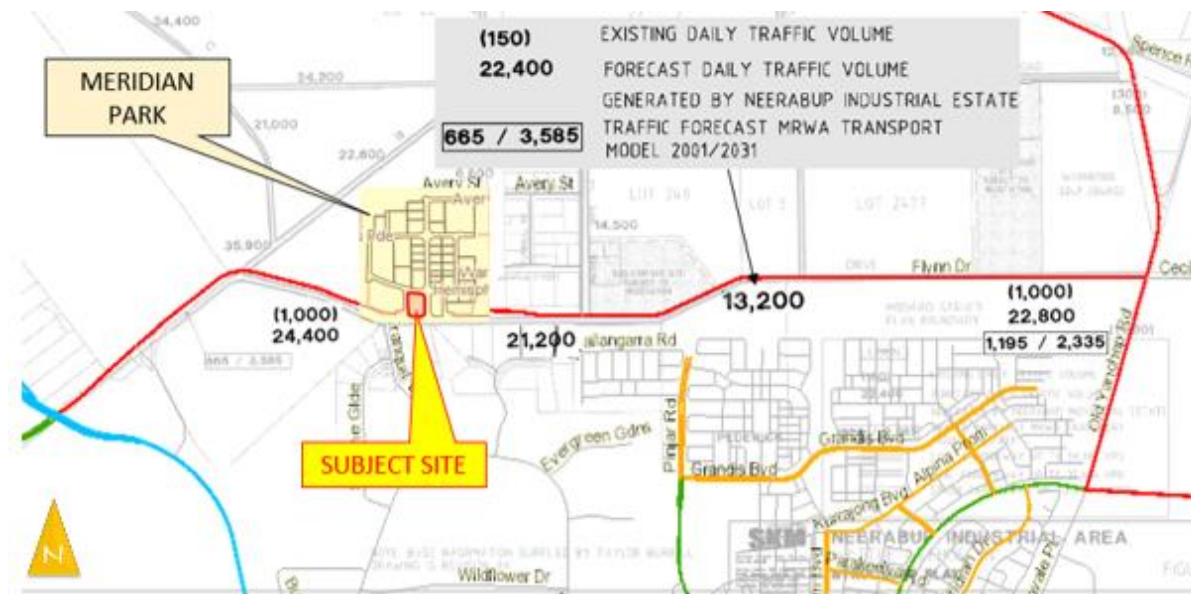


Figure 10 – Forecast Traffic Volumes on Flynn Dr with full development of Neerabup Industrial estate (4)

There is a proposal within the Perth & Peel Transport Plan (7) to construct the [Whiteman-Yanchep Highway](#) which will link Tonkin Highway with Mitchell Freeway with a freeway standard road between Tonkin Highway and Neerabup – by 3.5 million population for Perth and Peel, estimated to be 2050.

**Deficiencies in existing transport networks.**

There are no identified deficiencies with the existing transport network other than the need to accommodate the forecast volumes on Flynn Dr with full development of the Neerabup Industrial Estate, as indicated in the *SKM report* <sup>(4)</sup>.

**Remedial measures to address deficiencies.**

The *SKM report* <sup>(4)</sup> has indicated that dualling of Flynn Drive will be required sometime in the future to accommodate traffic generation associated with full development of the Neerabup Industrial Estate. The assessment within this *TIA* has indicated that this is not necessary for the proposed development.

## 6 ANALYSIS OF TRANSPORT NETWORKS

### Assessment years.

An assessment year has not been selected as traffic volumes on Flynn Dr are expected to significantly increase with full development of the Neerabup Industrial Estate with the forecast volumes including assumed traffic generation for the development site. It is however necessary to model the existing volumes and full development of the proposed site to determine the likely impact on performance of the road network without dualling of Flynn Drive.

### Time periods.

Peak traffic volumes are expected to be generated between 12 noon and 1 PM, based on hourly rates from the *RMS Trip Generation Surveys, Service Stations, Analysis Report* (8). In addition to assessing impacts during the development's peak hour, it is also necessary to assess impacts during the road network AM and PM peak hours. The Main Roads WA video survey of the Flynn Dr/ Greenwich Pde intersection indicates that the peak hours are 8.00 – 9.00 AM and 3.30 – 4.30 PM.

### Development generated traffic.

Peak hour volumes of traffic by class has been undertaken using a combination of data from traffic surveys of similar land uses (i.e., the drive-thru retail facility on the corner of Great Eastern Hwy and Fauntleroy Ave) and published and accepted trip generation databases, as shown in Figure 12 on page 30. In summary this indicates trips into and out of the subject site of up to 166 in the morning peak hour, 179 between 12 noon and 1 PM and 149 in the afternoon peak hour. It should be noted that up to 70% of these trips are likely to be pass-by trips and hence actual increased trips on the external roads will be up to 70% less than the number of trips into and out of the site, i.e., 50 in the morning, 54 at midday and 45 in the afternoon.

### Distribution & assignment of generated traffic.

The distribution (Arrival/ Departure volumes) and assignment of traffic to the road network has been undertaken by allocating 70% of arriving traffic in the morning peak hour to Access 1 (off Flynn Dr) and 50% in the afternoon peak hour. All traffic leaves the site via Access 2 (off Greenwich Pde) and must turn left when doing so due to the median preventing right turns out. Consideration was given to providing a median break to allow right turns out, but this was discarded in favour of providing a break for right turn IN traffic only and reducing conflicts associated with allowing right turns out as well. The existing roundabout 47 m north of Access 2 allows for departing traffic to return to Flynn Dr with relative ease. The model allows for 45% of departing traffic in the morning peak hour to return to Flynn Dr, increasing to 84% in the afternoon peak hour. The distribution and assignment of development generated traffic, including percentages, classes, and volumes, is shown in Figure 13 on page 31 and Figure 14 on page 32.

## Parking supply and demand.

19 parking bays including 1 bay designated for use by a person with a disability with an adjacent shared space and 2 electric vehicle charging bays. The indicated parking demand for various relevant land uses are included in Table 2 (Car Parking Standards) of the City of Wanneroo's District Planning Scheme 2 (DPS2) <sup>(8)</sup>, with relevant requirements reproduced as Table 4 below.

USE CLASS	NUMBER OF ON-SITE CAR PARKING SPACES
Car Wash	Nil if incidental to other development on same site otherwise 1
Convenience Store	7 per 100m <sup>2</sup> NLA. Up to 50% of bays may be located in refuelling positions
Drive –Through Food Outlet	1 per 4 guests in indoor and outdoor seated areas plus 7 per 100m <sup>2</sup> NLA for non seated areas. Up to 50% of non seated area parking may be located in drive through queue
Service Station	5 bays per service bay plus 7 per 100m <sup>2</sup> non service bay NLA. Up to 50% of non service bays may be located in refuelling positions

Table 4 – Relevant land use parking requirements (Table 2: Wanneroo DPS2)

Based on the above, the assessed statutory parking bay requirement is a total of 16 bays, as shown in Table 5 below.

Land Use	Required bays and determination
Car Wash	0 bays (inidental to ther development)
Convenience Store	5 (50% of 7 per 100 m <sup>2</sup> NLA - shared with Drive-Thru non seated below on 50/50 basis)
Drive-Thru Food Outlet	5 (O indoor and outdoor seating, 50% of non-seated area parking in drive-thru-queue)
Service Station	6 (50% of 5 per service bay)
<b>TOTAL</b>	<b>16 bays.</b>

Table 5 – Assessed parking requirements

The development drawings indicate it is proposed to provide 16 light vehicle bays, 2 electric vehicle charging bays and 4 heavy vehicle bays, which exceed the assessed statutory parking provision requirements.

## Base and 'with development' traffic flows.

The assessed Base (2022) and forecast OTR AM, midday, and PM peak hour volumes through each intersection and proposed access driveways off Greenwich Pde are shown in Figure 15 on page 33 and Figure 16 on page 34.

## Analysis of development accesses.

Analysis of the Flynn St access driveway (A1) has not been undertaken as this is a left-in only access. Analysis of the Greenwich Pde access driveway (A2) is included in the SIDRA 9.1 Network Model as an intersection between Flynn St and Hemisphere St.

## Impact on surrounding roads.

The *WAPC Guidelines* indicates that an intersection is generally considered to be materially affected if flows on any leg increase by more than 10% or any individual movement by more than 20%. Analysis of the forecast flow and movement increases has revealed that certain individual turn and approach volumes exceed these thresholds, as shown in Figure 11 below. (red shaded percentages are above the threshold, green shaded percentages are below the threshold).

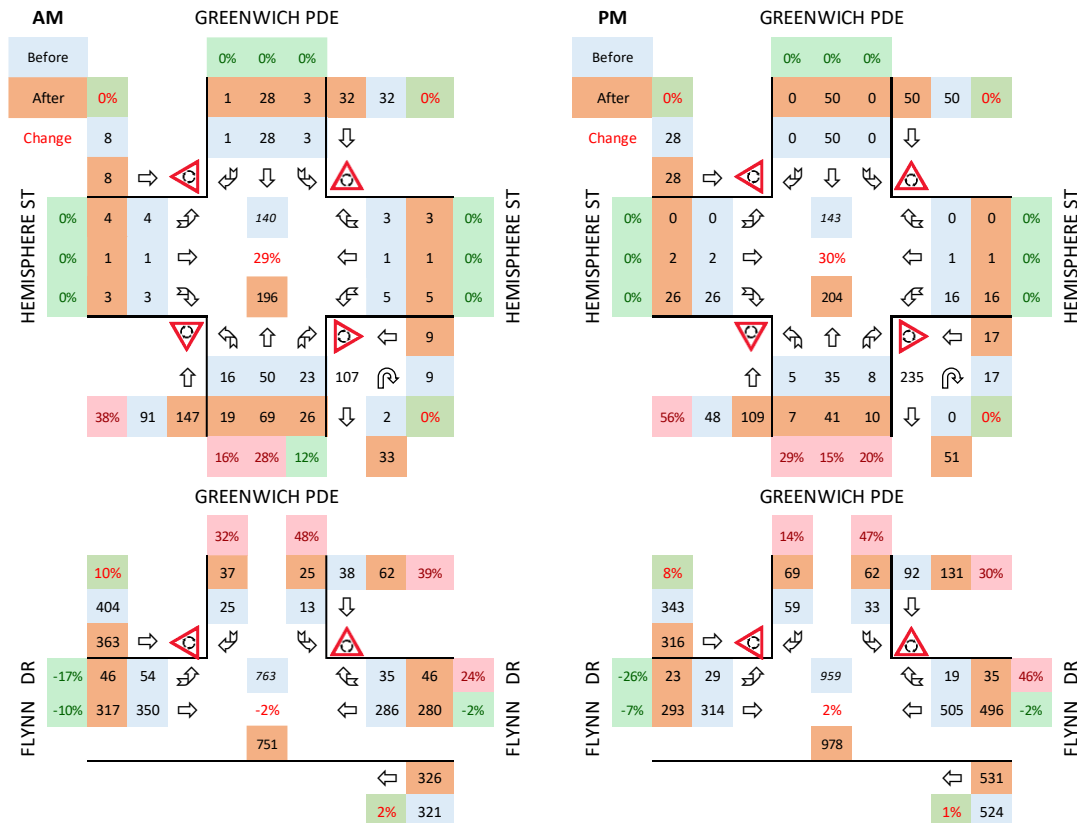


Figure 11 – Assessment of percentage traffic flow increases

Based on the above, the existing and forecast traffic volumes at both intersections and the forecast volumes at Access 2 have been assessed in a SIDRA Intersection 9.1 network model. This has revealed that these intersections currently perform at a good level with spare capacity and will continue to do so with the forecast increased traffic volumes and flows, as shown in the intersection performance criteria assessment, provided as Table 6 and Table 7 on the following pages.






Intersection	Movement	Existing AM Peak Hour					Forecast AM Peak Hour					Change
		DoS	Ave Delay (s)	LoS	Ave BoQ (m)	Avail Q	DoS	Ave Delay (s)	LoS	Ave BoQ (m)	Avail Q	Ave Delay
	Greenwich NB left into Hemisphere	0.068	3.6	A	0.6	117.0	0.112	2.8	A	0.8	47.0	-0.8
	Greenwich NB straight ahead	0.068	3.6	A	0.6	117.0	0.112	2.8	A	0.8	47.0	-0.8
	Greenwich NB right into Hemisphere	0.068	7.0	A	0.6	117.0	0.112	6.1	A	0.8	47.0	-0.9
	Greenwich NB U turn	0.068	9.9	A	0.6	117.0	0.112	8.1	A	0.8	47.0	-1.8
	Hemisphere WB left into Greenwich	0.008	3.4	A	0.1	60.0	0.008	3.5	A	0.1	60.0	0.1
	Hemisphere WB straight ahead	0.008	3.3	A	0.1	60.0	0.008	3.4	A	0.1	60.0	0.1
	Hemisphere WB right into Greenwich	0.008	6.8	A	0.1	60.0	0.008	6.9	A	0.1	60.0	0.1
	Greenwich SB left into Hemisphere	0.031	4.2	A	0.4	245.0	0.032	4.4	A	0.4	245.0	0.2
	Greenwich SB straight ahead	0.031	3.8	A	0.4	245.0	0.032	3.9	A	0.4	245.0	0.1
	Greenwich SB right into Hemisphere	0.031	7.1	A	0.4	245.0	0.032	7.2	A	0.4	245.0	0.1
	Hemisphere EB left into Greenwich	0.008	4.0	A	0.1	80.0	0.009	4.3	A	0.1	80.0	0.3
	Hemisphere EB straight ahead	0.008	3.7	A	0.1	80.0	0.009	3.9	A	0.1	80.0	0.2
	Hemisphere EB right into Greenwich	0.008	7.9	A	0.1	80.0	0.009	8.2	A	0.1	80.0	0.3
	Greenwich NB left into Access 2	NA	NA	NA	NA	NA	0.053	4.1	A	0.0	54.0	NA
	Greenwich NB straight ahead	NA	NA	NA	NA	NA	0.053	0.0	A	0.0	54.0	NA
	Greenwich SB straight ahead	NA	NA	NA	NA	NA	0.035	0.0	A	0.0	47.0	NA
	Greenwich SB right into Access 2	NA	NA	NA	NA	NA	0.006	5.0	A	0.0	47.0	NA
	Access 2 left into Greenwich	NA	NA	NA	NA	NA	0.061	0.3	A	0.3	40.0	NA
	Flynn WB straight through	0.136	0.2	A	1.2	145.0	0.139	0.2	A	1.5	145.0	0.0
	Flynn WB left into Greenwich	0.136	12.1	B	1.2	145.0	0.139	11.3	B	1.5	145.0	-0.8
	Greenwich SB left into Flynn	0.017	7.2	A	0.2	117.0	0.029	5.8	A	0.7	54.0	-1.4
	Greenwich SB right into Flynn	0.087	15.3	C	0.9	117.0	0.116	13.5	B	2.1	54.0	-1.8
	Flynn EB left into Flynn	0.041	7.9	A	0.6	1600.0	0.036	8.0	A	0.6	1600.0	0.1
	Flynn EB straight through	0.197	0.1	A	0.0	1600.0	0.180	0.1	A	0.0	1600.0	0.0

Table 6 – Intersection performance criteria assessment: Existing and Forecast AM Peak Hour

Refer Table 9 on page 35 for Intersection Performance Criteria descriptions used in the SIDRA Intersection 9.1 modelling software.  
 Refer **Appendix B** for SIDRA Intersection 9.1 figures and data.




Intersection	Movement	Existing PM Peak Hour					Forecast PM Peak Hour					Change
		DoS	Ave Delay (s)	LoS	Ave BoQ (m)	Avail Q	DoS	Ave Delay (s)	LoS	Ave BoQ (m)	Avail Q	Ave Delay
Ki2 	Greenwich NB left into Hemisphere	0.037	3.8	A	0.3	117.0	0.081	2.8	A	0.7	47.0	-1.0
	Greenwich NB straight ahead	0.037	3.5	A	0.3	117.0	0.081	2.7	A	0.7	47.0	-0.8
	Greenwich NB right into Hemisphere	0.037	7.4	A	0.3	117.0	0.081	6.1	A	0.7	47.0	-1.3
	Greenwich NB U turn	0.037	9.9	A	0.3	117.0	0.081	8.1	A	0.7	47.0	-1.8
	Hemisphere WB left into Greenwich	0.023	3.6	A	0.2	60.0	0.016	3.7	A	0.2	60.0	0.1
	Hemisphere WB straight ahead	0.023	3.5	A	0.2	60.0	0.016	3.6	A	0.2	60.0	0.1
	Hemisphere WB right into Greenwich	0.023	7.1	A	0.2	60.0	0.016	7.2	A	0.2	60.0	0.1
	Greenwich SB left into Hemisphere	0.062	3.7	A	0.7	245.0	0.047	3.8	A	0.5	245.0	0.1
	Greenwich SB straight ahead	0.062	3.7	A	0.7	245.0	0.047	3.9	A	0.5	245.0	0.2
	Greenwich SB right into Hemisphere	0.062	7.1	A	0.7	245.0	0.047	7.3	A	0.5	245.0	0.2
	Hemisphere EB left into Greenwich	0.035	3.7	A	0.3	80.0	0.025	3.9	A	0.3	80.0	0.2
	Hemisphere EB straight ahead	0.035	3.6	A	0.3	80.0	0.025	3.8	A	0.3	80.0	0.2
	Hemisphere EB right into Greenwich	0.035	7.1	A	0.3	80.0	0.025	7.4	A	0.3	80.0	0.3
A2 	Greenwich NB left into Access 2	NA	NA	NA	NA	NA	0.034	4.1	A	0.0	54.0	NA
	Greenwich NB straight ahead	NA	NA	NA	NA	NA	0.034	0.0	A	0.0	54.0	NA
	Greenwich SB straight ahead	NA	NA	NA	NA	NA	0.070	0.0	A	0.0	47.0	NA
	Greenwich SB right into Access 2	NA	NA	NA	NA	NA	0.009	4.9	A	0.1	47.0	NA
	Access 2 left into Greenwich	NA	NA	NA	NA	NA	0.057	0.1	A	0.7	40.0	NA
Ki1 	Flynn WB straight through	0.193	0.4	A	0.6	145.0	0.200	0.3	A	1.1	145.0	-0.1
	Flynn WB left into Greenwich	0.193	11.7	B	0.6	145.0	0.200	11.2	B	1.1	145.0	-0.5
	Greenwich SB left into Flynn	0.048	6.1	A	0.6	117.0	0.061	5.3	A	0.7	54.0	-0.8
	Greenwich SB right into Flynn	0.262	15.4	C	2.9	117.0	0.216	14.5	B	2.3	54.0	-0.9
	Flynn EB left into Flynn	0.022	7.9	A	0.3	1600.0	0.018	8.0	A	0.3	1600.0	0.1
	Flynn EB straight through	0.172	0.1	A	0.0	1600.0	0.159	0.1	A	0.0	1600.0	0.0

Table 7 – Intersection performance criteria assessment: Existing and Forecast PM Peak Hour

Refer Table 9 on page 35 for Intersection Performance Criteria descriptions used in the SIDRA Intersection 9.1 modelling software.  
 Refer **Appendix B** for SIDRA Intersection 9.1 figures and data.




Intersection	Movement	Existing 12 noon - 1 PM					Forecast 12 noon - 1 PM					Change
		DoS	Ave Delay (s)	LoS	Ave BoQ (m)	Avail Q	DoS	Ave Delay (s)	LoS	Ave BoQ (m)	Avail Q	Ave Delay
	Greenwich NB left into Hemisphere	0.026	3.8	A	0.2	117.0	0.115	2.8	A	1.1	47.0	-1.0
	Greenwich NB straight ahead	0.026	3.6	A	0.2	117.0	0.115	2.8	A	1.1	47.0	-0.8
	Greenwich NB right into Hemisphere	0.026	7.3	A	0.2	117.0	0.115	6.1	A	1.1	47.0	-1.2
	Greenwich NB U turn	0.026	9.9	A	0.2	117.0	0.115	8.1	A	1.1	47.0	-1.8
	Hemisphere WB left into Greenwich	0.006	3.3	A	0.1	60.0	0.008	3.5	A	0.1	60.0	0.2
	Hemisphere WB straight ahead	0.006	3.3	A	0.1	60.0	0.008	3.4	A	0.1	60.0	0.1
	Hemisphere WB right into Greenwich	0.006	6.8	A	0.1	60.0	0.008	6.9	A	0.1	60.0	0.1
	Greenwich SB left into Hemisphere	0.028	3.5	A	0.3	245.0	0.032	4.5	A	0.4	245.0	1.0
	Greenwich SB straight ahead	0.028	3.7	A	0.3	245.0	0.032	4.0	A	0.4	245.0	0.3
	Greenwich SB right into Hemisphere	0.028	7.0	A	0.3	245.0	0.032	7.2	A	0.4	245.0	0.2
	Hemisphere EB left into Greenwich	0.010	3.9	A	0.1	80.0	0.009	4.3	A	0.1	80.0	0.4
	Hemisphere EB straight ahead	0.010	3.5	A	0.1	80.0	0.009	3.9	A	0.1	80.0	0.4
	Hemisphere EB right into Greenwich	0.010	7.2	A	0.1	80.0	0.009	8.3	A	0.1	80.0	1.1
	Greenwich NB left into Access 2	NA	NA	NA	NA	NA	0.053	4.1	A	0.0	54.0	NA
	Greenwich NB straight ahead	NA	NA	NA	NA	NA	0.053	0.0	A	0.0	54.0	NA
	Greenwich SB straight ahead	NA	NA	NA	NA	NA	0.036	0.0	A	0.0	47.0	NA
	Greenwich SB right into Access 2	NA	NA	NA	NA	NA	0.006	5.0	A	0.1	47.0	NA
	Access 2 left into Greenwich	NA	NA	NA	NA	NA	0.066	0.3	A	0.8	40.0	NA
	Flynn WB straight through	0.095	0.1	A	0.7	145.0	0.139	0.2	A	1.4	145.0	0.1
	Flynn WB left into Greenwich	0.095	10.1	B	0.7	145.0	0.139	11.2	B	1.4	145.0	1.1
	Greenwich SB left into Flynn	0.024	5.9	A	0.3	117.0	0.029	5.8	A	0.4	54.0	-0.1
	Greenwich SB right into Flynn	0.038	10.2	B	0.5	117.0	0.117	13.3	B	1.3	54.0	3.1
	Flynn EB left into Flynn	0.015	8.0	A	0.2	1600.0	0.035	8.0	A	0.5	1600.0	0.0
	Flynn EB straight through	0.118	0.1	A	0.0	1600.0	0.178	0.1	A	0.0	1600.0	0.0

Table 8 – Intersection performance criteria assessment : Development's Peak Hour: 12 noon – 1PM

Refer Table 9 on page 35 for Intersection Performance Criteria descriptions used in the SIDRA Intersection 9.1 modelling software.  
 Refer **Appendix B** for SIDRA Intersection 9.1 figures and data.

### Impact on intersections.

The assessed impact of the forecast development generated traffic on each intersection for each peak hour is negligible, with the greatest assessed change during the road network peak hours being an increase of 0.3 seconds in average delay for the Hemisphere EB right turn into Greenwich Pde during the afternoon peak hour. The greatest change during the development's peak hour, i.e., 12 noon to 1 PM is an extra 3.1 seconds for the Greenwich Pde right turn movement into Flynn Dr.

The assessed low changes are due to the existing good performance of both intersections with spare capacity (as would be expected for a partially developed precinct) and the fact that up to 70% of the forecast volumes into and out of the site will be from pass-by traffic, i.e., traffic that is already in the area travelling along the frontage roads to or from different origin and destination locations.

### Impact on neighbouring areas.

There are no residential properties or accesses in the vicinity of the proposed development.

### Road Safety.

Refer **Section 7**. It will be necessary to extend the traffic island in Flynn St on the west side of Greenwich Pde to physically prevent right turns into the site.

### Public transport access.

Refer **Section 4**.

### Pedestrian access/amenity.

Pedestrian access to the site is via paths on all frontage roads and informal pedestrian crossing facilities within the intersections.

### Traffic Management Plan.

Not applicable.

### Site specific issues.

The traffic modelling has indicated that the proposal for IN only access off Flynn Dr and the provision of a right IN turning bay on Greenwich Pde with all departures via a left turn onto Greenwich Pde does not result in any noticeable impacts on existing performance of these roads.

The proposed access off Flynn Pde is off the existing left turn lane into Greenwich Pde. This restricts access to IN only as any vehicle turning left out of this access would be required by law to remain in the left turn lane. It will be necessary to extend the traffic island in Flynn St on the west side of Greenwich Pde to physically prevent right turns into the site.

Whilst providing an access off a left turn lane is generally not desirable, this arrangement is quite common, as shown in Photograph 1 and Photograph 2 on the following page (examples on Wanneroo Rd just north of Clarkson Ave and just south of Victoria Rd).

Each access has been assessed for sight distance on site. These are no identified issues with these although trimming of vegetation of the north verge on Flynn Dr just west of the start of the left turn lane would assist in driver recognition of this facility and the proposed left-in only access. This vegetation is shown in Photograph 3 on page 29.



Photograph 1 – Example of access driveway off left turn lane on Wanneroo Rd north of Clarkson Ave



Photograph 2 – Example of access driveway off left turn lane on Wanneroo Rd south of Victoria Rd





Photograph 3 – Existing vegetation on the Flynn Dr eastbound approach to the existing left turn lane and proposed access driveway



Land Use	Source	Adopted Trip Generation Rate		Units	Land Use's Peak	AM Distribution		PM Distribution		Pass-By
						IN	OUT	IN	OUT	
Service Station + Convenience Store + Car Wash	ITE	13.86	per 1 Fuel Point	11	152	50%	50%	51%	49%	70%
Proposed Drive-thru Drinks, Food, Small Grocery	i3 surveys	54	per 1 Drive-thru facility	1	54	50%	50%	50%	50%	70%
206										

Time of Day	Midweek Hourly Profile (Trips)																	
	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10		
SS+ Car Wash + Store	128	113	123	133	136	149	152	128	120	130	139	134	114	77	83	88		
Proposed Drive-thru	43	54	43	36	32	27	27	27	14	11	11	14	11	5	5	5		
TOTAL	171	167	166	169	169	176	179	155	134	141	149	148	125	82	89	94		
			AM						Dev									PM

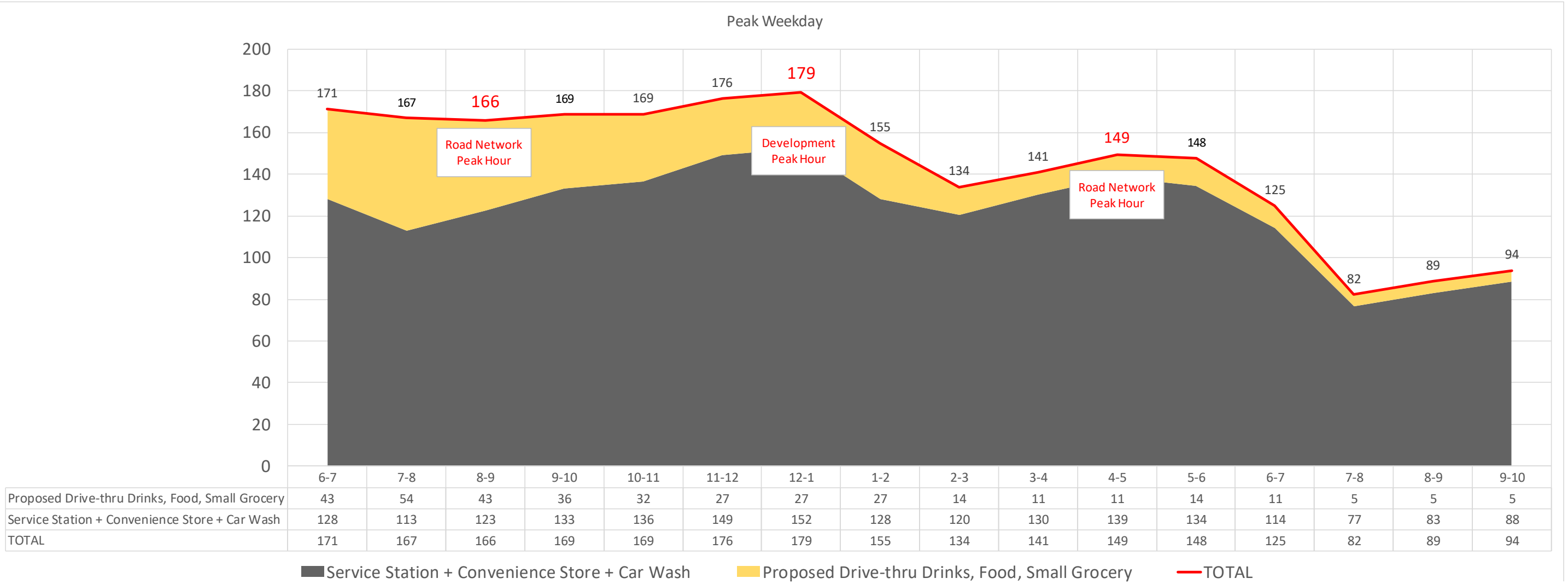
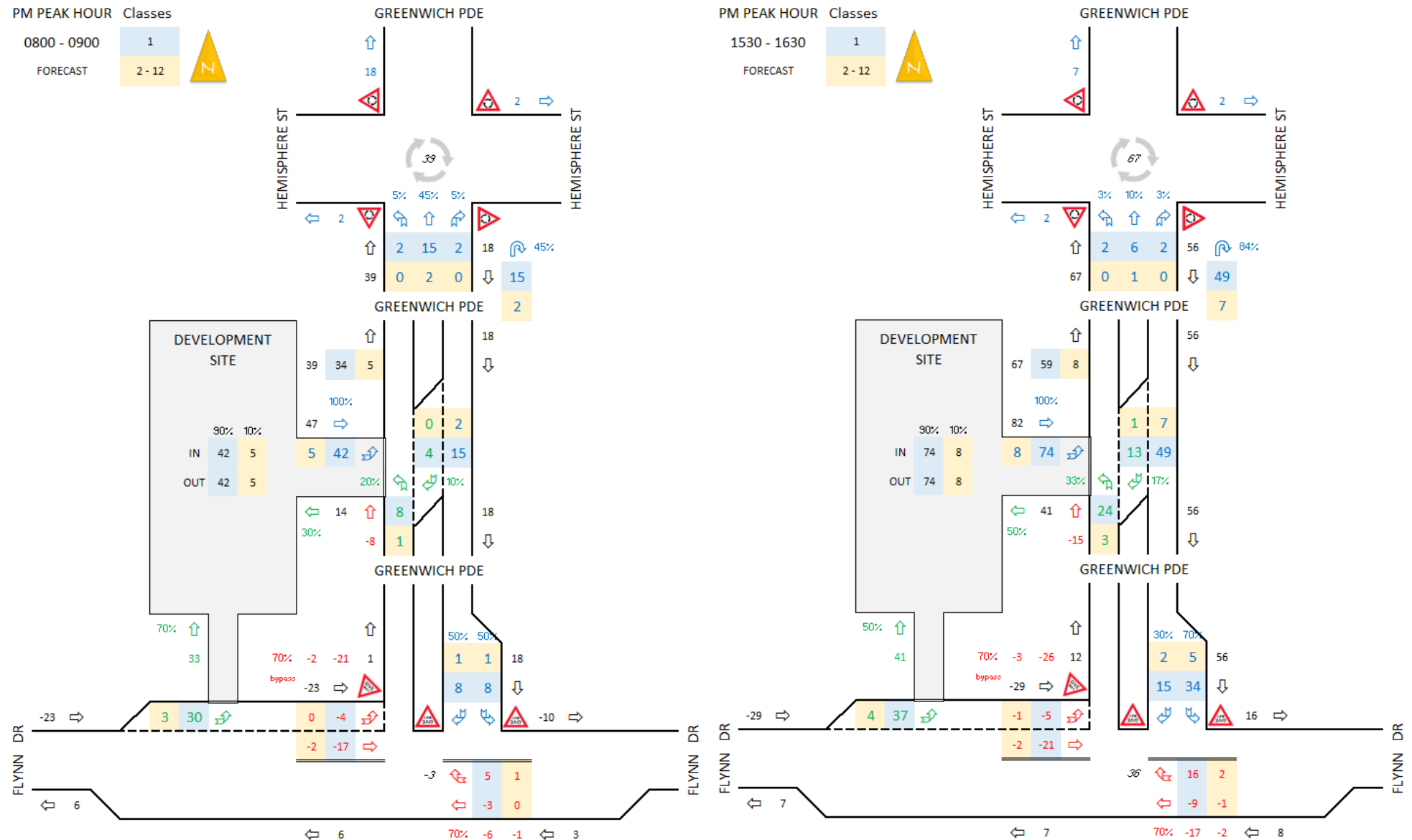


Figure 12 – Assessed trip generation by land use



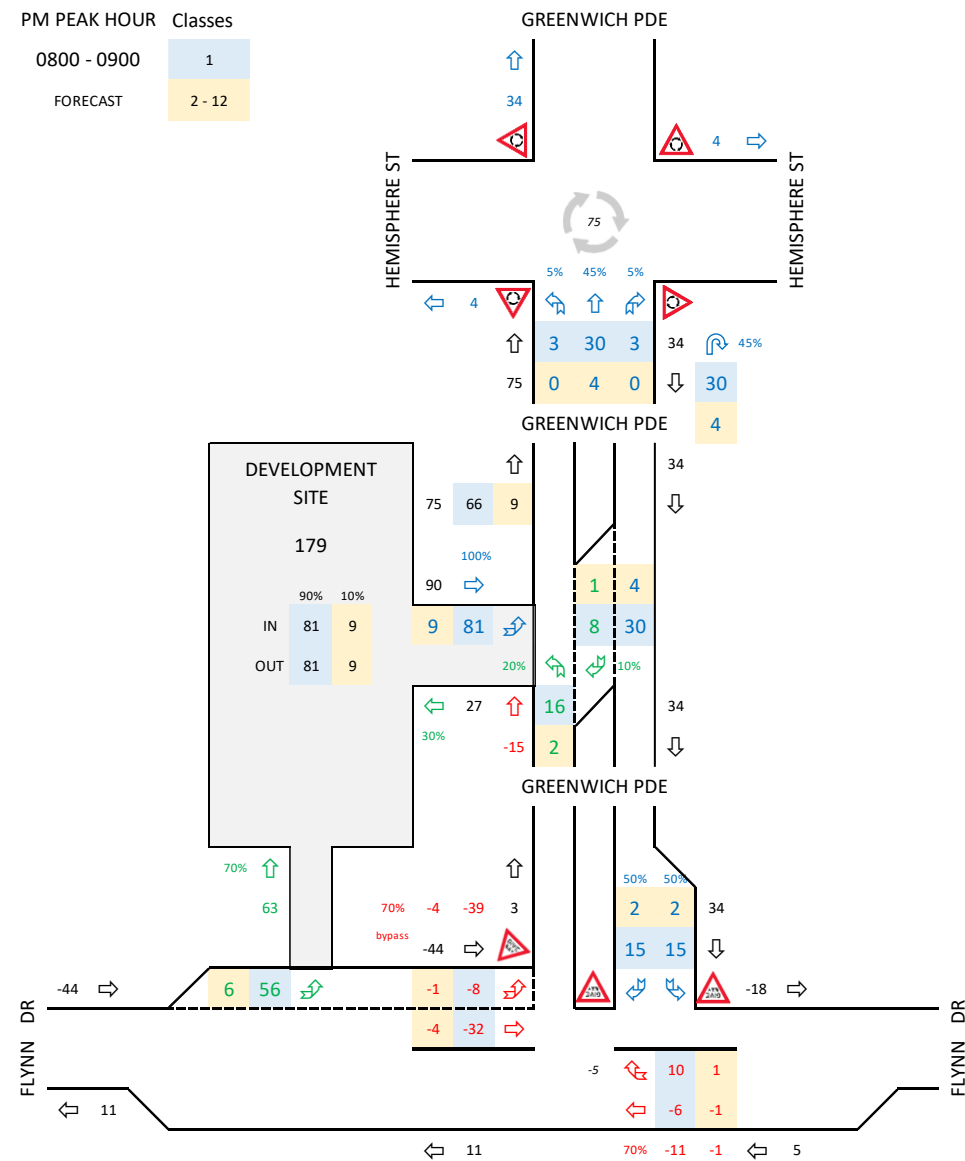


Figure 14 – Trip Distribution (IN/ OUT) and Trip Assignment: Development's Peak Hour: 12 noon to 1 PM

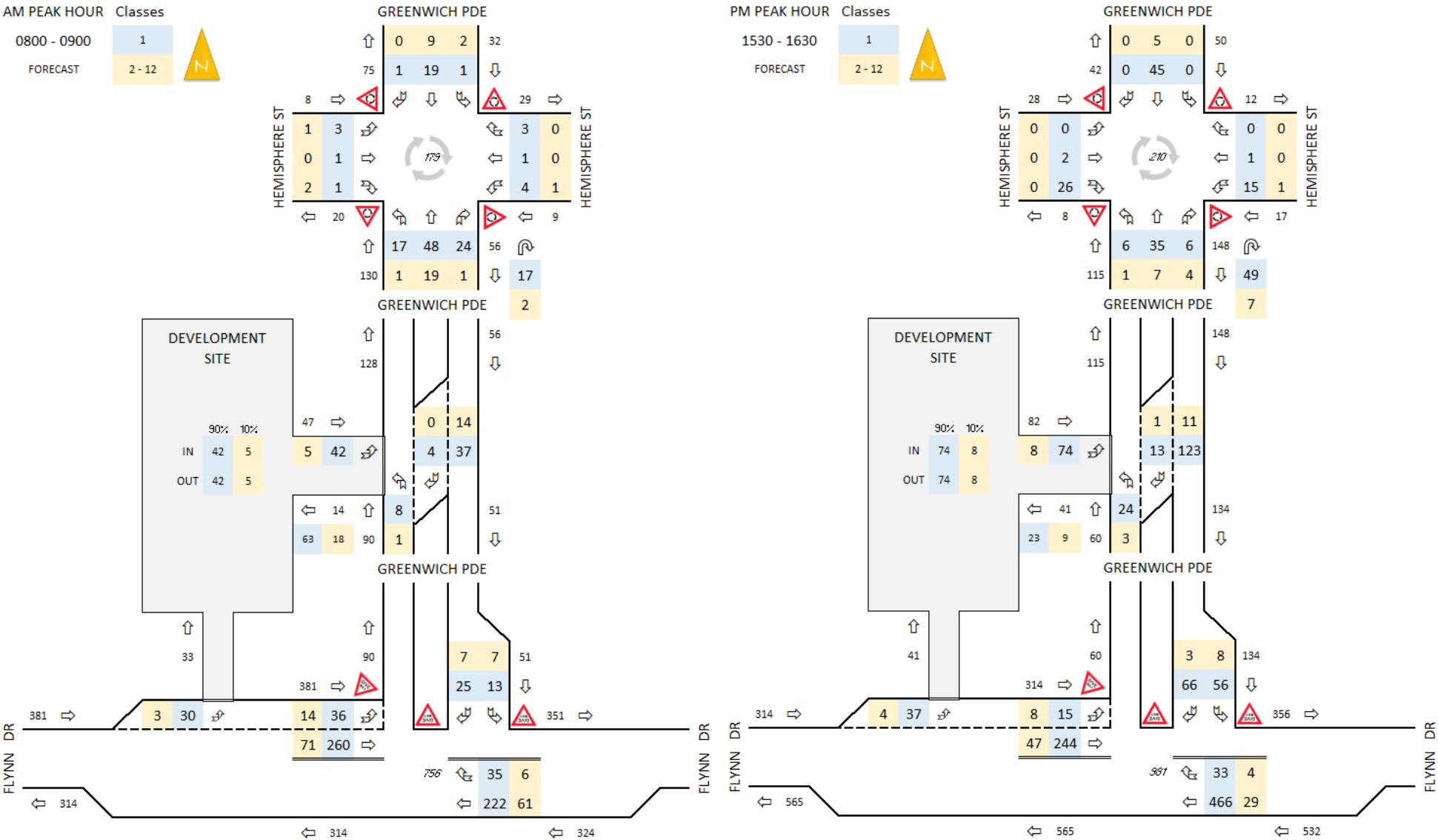
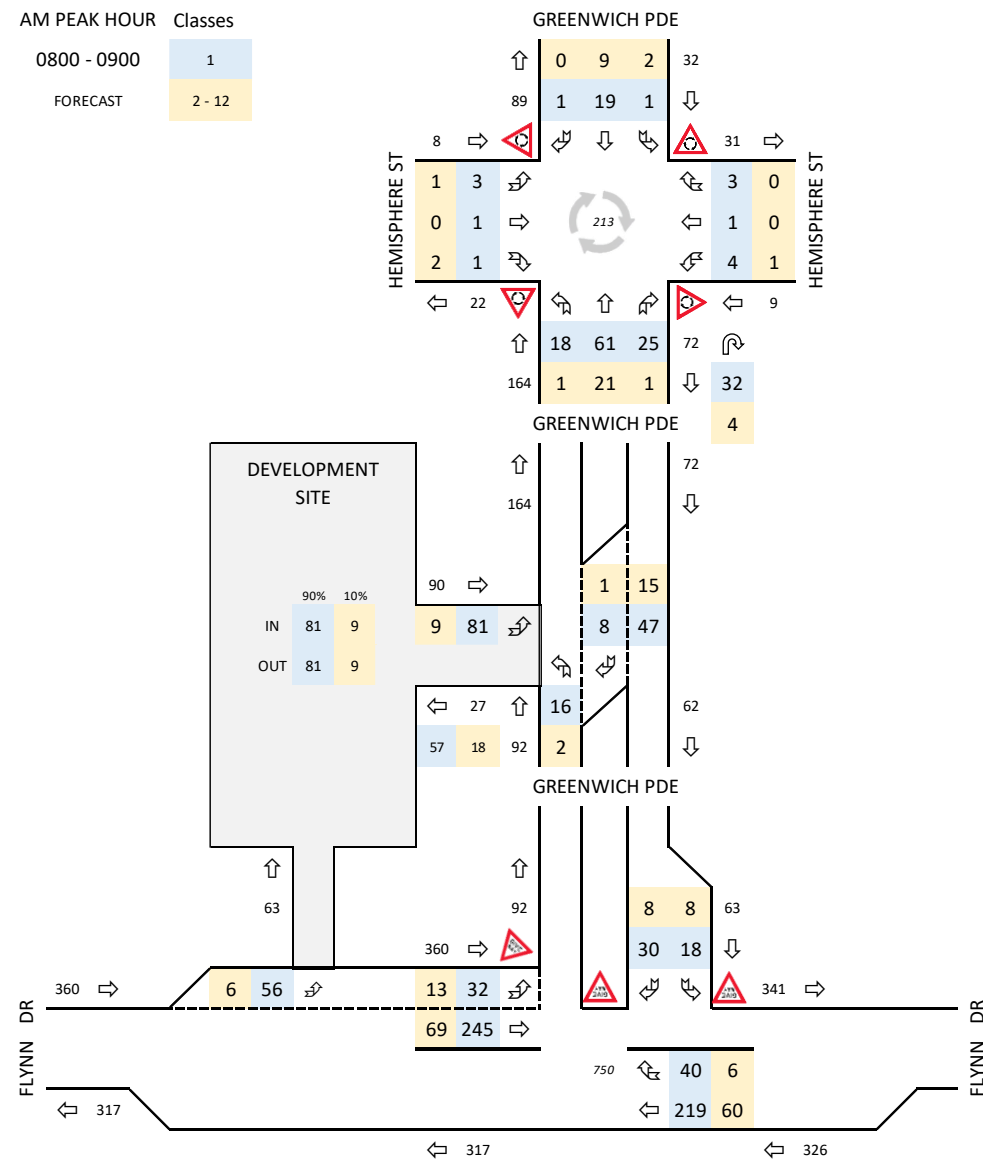


Figure 15 – Existing + Development AM and PM Peak Hour Volumes



Degree of Saturation (DoS) Volume/ Capacity Ratio (v/c)	LoS	Average Delay per vehicle (d) in seconds				v/c Range	Performance Comments
		Unsignalised Intersections	Roundabouts	Signalised Intersections	All (RTA)		
< 0.6	A	$d \leq 10$	$d \leq 10$	$d \leq 10$	$d \leq 14.5$	$\leq 0.44$	<b>Good operation and plenty of spare capacity</b> Stable free flow conditions where drivers are able to select desired speeds and to easily manoeuvre within the traffic stream.
	B	$10 < d \leq 15$	$10 < d \leq 20$	$10 < d \leq 20$	$14.5 < d \leq 28.5$		
	C	$15 < d \leq 25$	$20 < d \leq 35$	$20 < d \leq 35$	$28.5 < d \leq 42.5$	$0.45 - 0.64$	<b>Acceptable delays and spare capacity</b> Stable flow but most drivers are restricted to some extent in their ability to select their desired speed and to manoeuvre within the traffic stream.
0.6 - 0.7							
0.7 - 0.8	D	$25 < d \leq 35$	$35 < d \leq 50$	$35 < d \leq 55$	$42.5 < d \leq 56.5$	$0.65 - 0.84$	<b>Acceptable delays</b> (Expected typical peak hour conditions) Close to the limit of stable flow. All drivers are restricted in their ability to select their desired speed and to manoeuvre within the traffic stream. Small increases in traffic flow may cause operational problems.
0.8 - 0.9							
0.9 - 1.0	E	$35 < d \leq 50$	$50 < d \leq 70$	$55 < d \leq 80$	$56.5 < d \leq 70.5$	$0.85 - 1.04$	<b>Near capacity and sensitive to disturbances in flows</b> Traffic volumes are close to capacity and there is virtually no freedom to select desired speeds. Flow is unstable and minor disturbances within the traffic stream will cause breakdown leading to long queues and delays.
> 1.0	F	$50 < d$	$70 < d$	$80 < d$	$70.5 < d$	$> 1.25$	<b>At Capacity</b> - Requires other control mode and/ or additional lanes In the zone of forced flow where the amount of traffic approaching the point under consideration exceeds that which can pass. Flow breakdown occurs and extensive queues and delays result.

Table 9 – SIDRA Intersection performance criteria and descriptions



## 7 SAFETY

As indicated in **Section 3**, there have not been any reported crashes on Flynn Dr or Greenwich Pde or the intersections of Flynn Pde/ Greenwich Pde or Greenwich Pde/ Hemisphere St in the last five-year reporting period.

A review of the 12-hour video survey recordings of the two intersections did not result in the identification of any safety concerns.

Based on the above, and the assessed impact of the proposed development in terms of increased volumes and performance within the SIDRA Intersection 9.1 Network Model, there are no identified safety concerns with the proposed development apart from that associated with attempted right turns into Access 1 off Flynn Dr.

The demand and attractiveness of right turns into Access 1 of Flynn Dr is low as westbound drivers on Flynn Dr can access the site by turning right into Greenwich Pde. Some drivers may however prefer to turn right into Access 1 as it is closer to the light vehicle fuel bowzers and car wash area than the access off Greenwich Pde. Any vehicle slowing or stopping on the Flynn Dr westbound lanes immediately after the Greenwich Pde intersection introduce a rear-end crash hazard, particularly for drivers that are turning right into Flynn Dr from Greenwich Pde and accelerating to the higher operating speed of this road. Based on this, it is considered necessary to extend the island in Flynn Dr on the west side of Greenwich Pde to physically prevent right turns into Access 1.

## 8 CONCLUSIONS

Key component	Assessment
The proposed internal transport networks with respect to accessibility, circulation, and safety for all modes, i.e., vehicles, public transport, pedestrians, and cyclists,	All assessed as suitable.
The level of transport integration between the development proposal and the surrounding land uses,	Assessed as appropriate.
The impacts of the traffic generated by the development proposal on the surrounding land uses, and	The vast majority of generated trips will be to and from Flynn Dr, a Regional Distributor Rd. Up to 70% of trips are expected to be pass-by trips, significantly reducing impacts on Flynn Dr and Greenwich Pde.
The impacts of the traffic generated by the development proposal on the surrounding transport networks.	Assessed as 'Moderate', i.e., forecast additional trips are 50 in the morning, 54 at midday and 45 in the afternoon, i.e., less than 1 trip per minute.

**It is recommended** that the island in Flynn Dr on the west side of Greenwich Pde is extended to physically prevent right turns into Access 1 until such time as Flynn Dr is dualled.

## References

1. **Austroads.** *Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments.* Austroads. Sydney, NSW : Austroads Ltd, April 2020. p. 113, Guide to Traffic Management. ISBN 978-1-925854-86-2.
2. **Western Australian Planning Commission.** *Transport Impact Assessment Guidelines.* Department of Planning, Government of Western Australia. Perth, Western Australia : Western Australian Planning Commission, August 2016. p. 182, Revised August 2016. The current version of the TIA guidelines (August 2016) has been endorsed by the WAPC.
3. **Government of Western Australia.** *Planning and Development (Local Planning Schemes) Regulations 2015.* Perth : Government of Western Australia, As at 01 Jul 2016. p. 205. Version 00-d0-02.
4. **Sinclair Knight Merz.** *Neerabup Industrial Estate Traffic Review (Appendix 6 of Flynn Drive Traffic Assessment).* Perth : Sinclair Knight Merz, 2004. p. 15, Technical Report. W:\00-047 NIA Report Inserts - 19.11.04\Appendix 6 Replacements\Finaltechnical note04.11.19.doc.
5. **Main Roads Western Australia.** Perth Metropolitan Area Functional Road Hierarchy. [ed.] Asset & Network Information. Perth, WA, Australia : Main Roads Western Australia, August 1997.
6. **City of Wanneroo & LandCorp.** *Neerabup Industrial Area Structure Plan No. 17.* Subiaco : Taylor Burrell Barnett, September 2017. p. 183, Includes Amendment No 4. Rev 12. WAPC Reference: SPN/0813M-1.
7. **Department of Transport | Public Transport Authority | Main Roads WA.** *Transport @ 3.5 Million | Perth & Peel Transport Plan for 3.5 Million People and Beyond.* Department of Transport, Government of Western Australia. Perth : Department of Transport - Integrated Transport Planning, 2016. p. 56, Final.
8. **City of Wanneroo.** *District Planning Scheme No.2.* Wanneroo : City of Wanneroo, 6 July 2001  
Incorporating all amendments gazetted to 20 September 2019. p. 245.
9. **Standards Australia.** *AS 2890.2-2002 Parking facilities Part 2: Off-street commercial vehicle facilities.* Second. Sydney : Standards Australia International, 2002. p. 49. Vol. 2. ISBN 0 7337 4870 8.
10. **Roads and Traffic Authority NSW.** *Guide to Traffic Generating Developments.* Transport Planning Section. Sydney : Roads and Traffic Authority NSW, October 2002. p. 174. Version 2.2. ISBN 0 7305 9080 1.

## APPENDIX A SWEPT PATH ASSESSMENTS

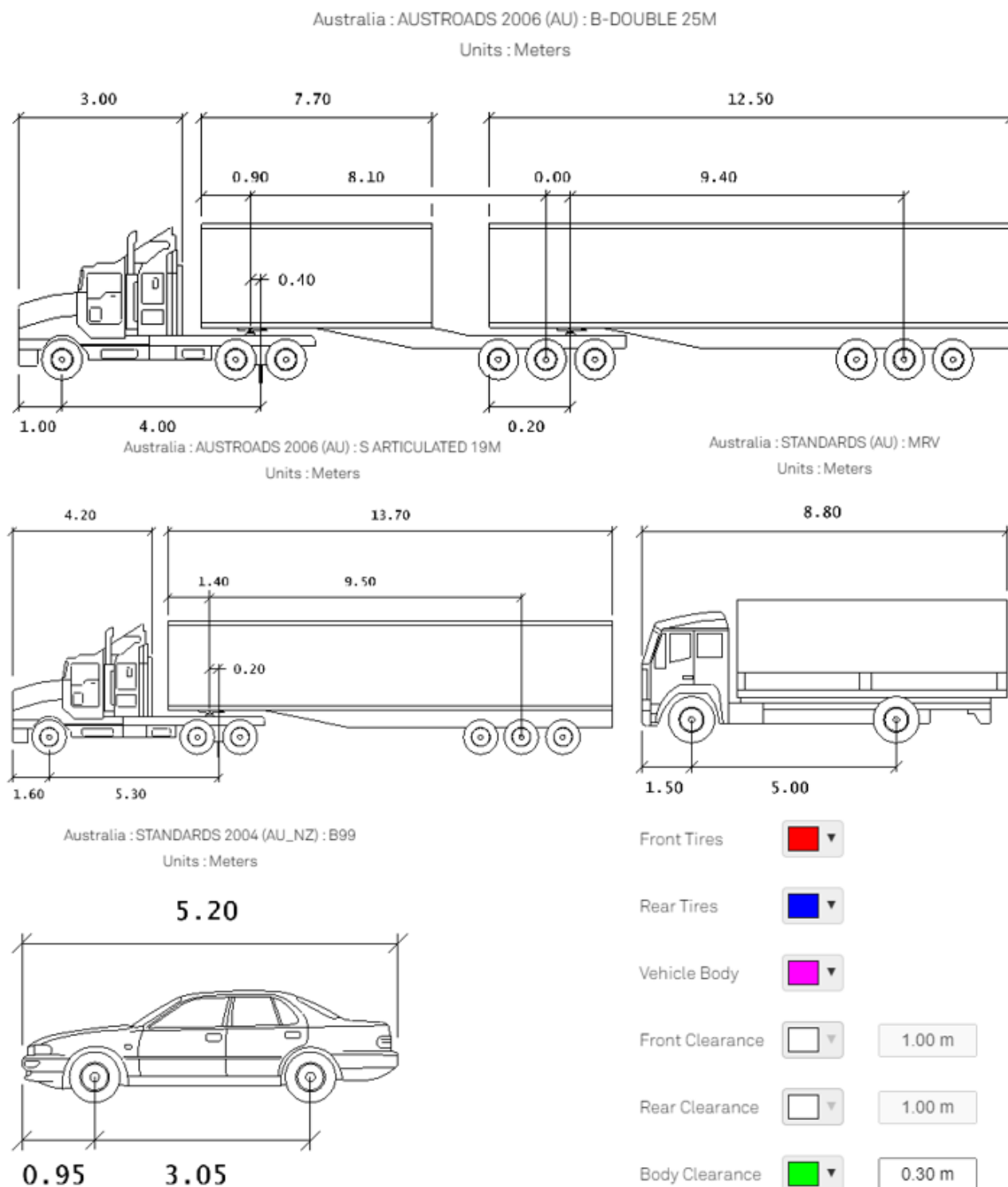


Figure 17 – Assessed Design Vehicles

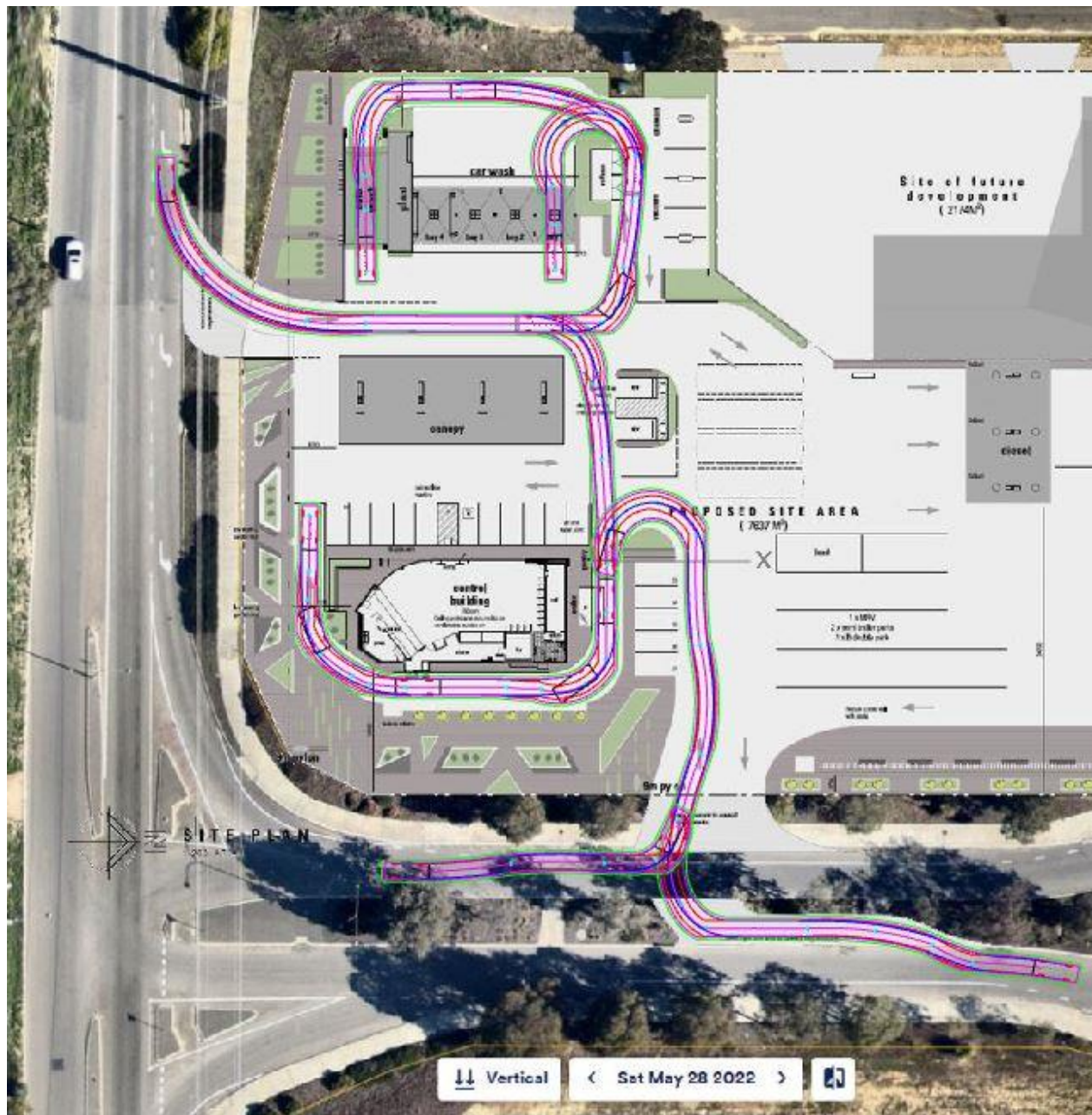


Figure 18 – Swept path assessment of B99 (Large Car) movements (refuelling, car was, drive-thru and parking)



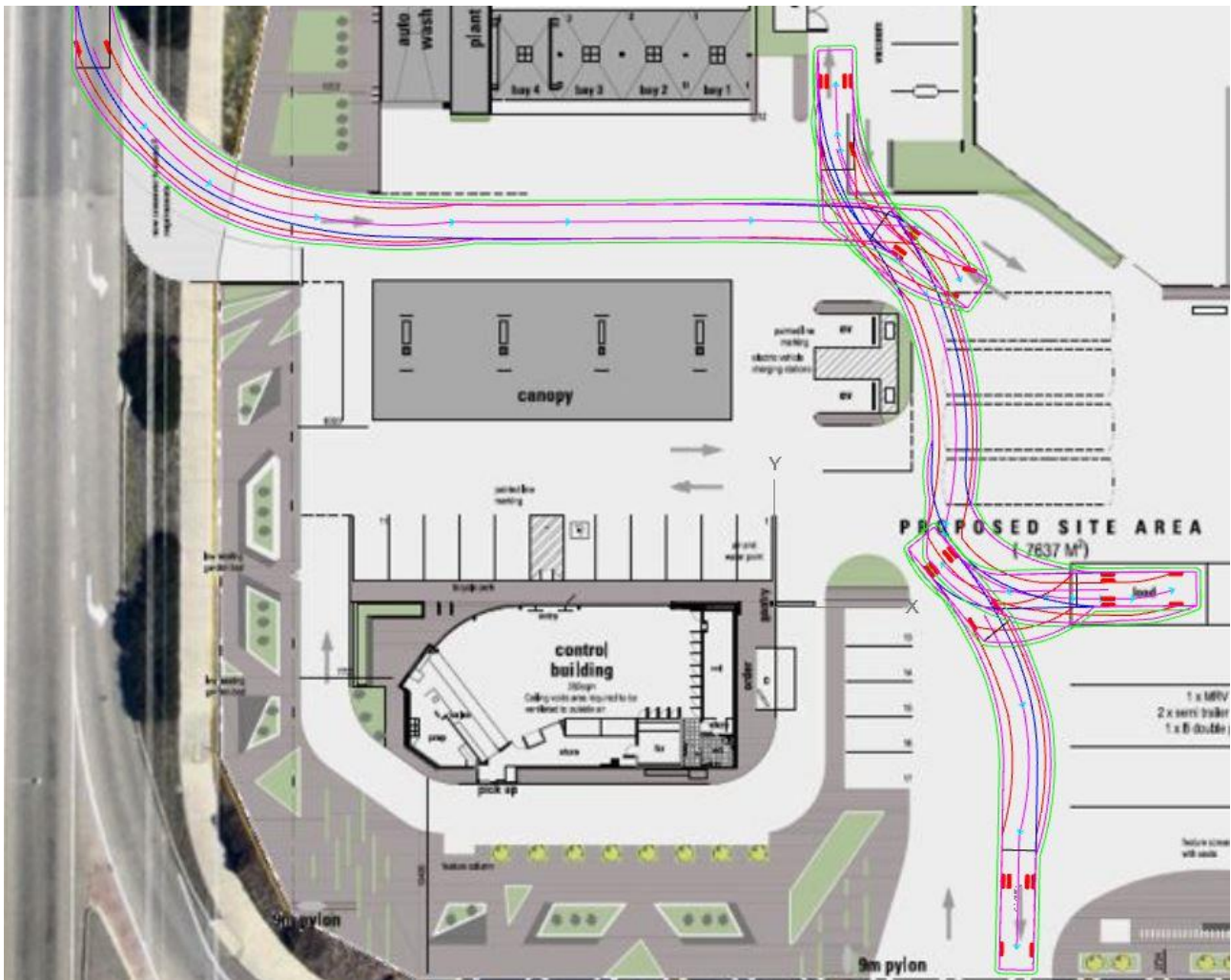


Figure 19 – Swept path assessment of MRV (Service & Waste Collection Vehicle) and refuelling and parking movements



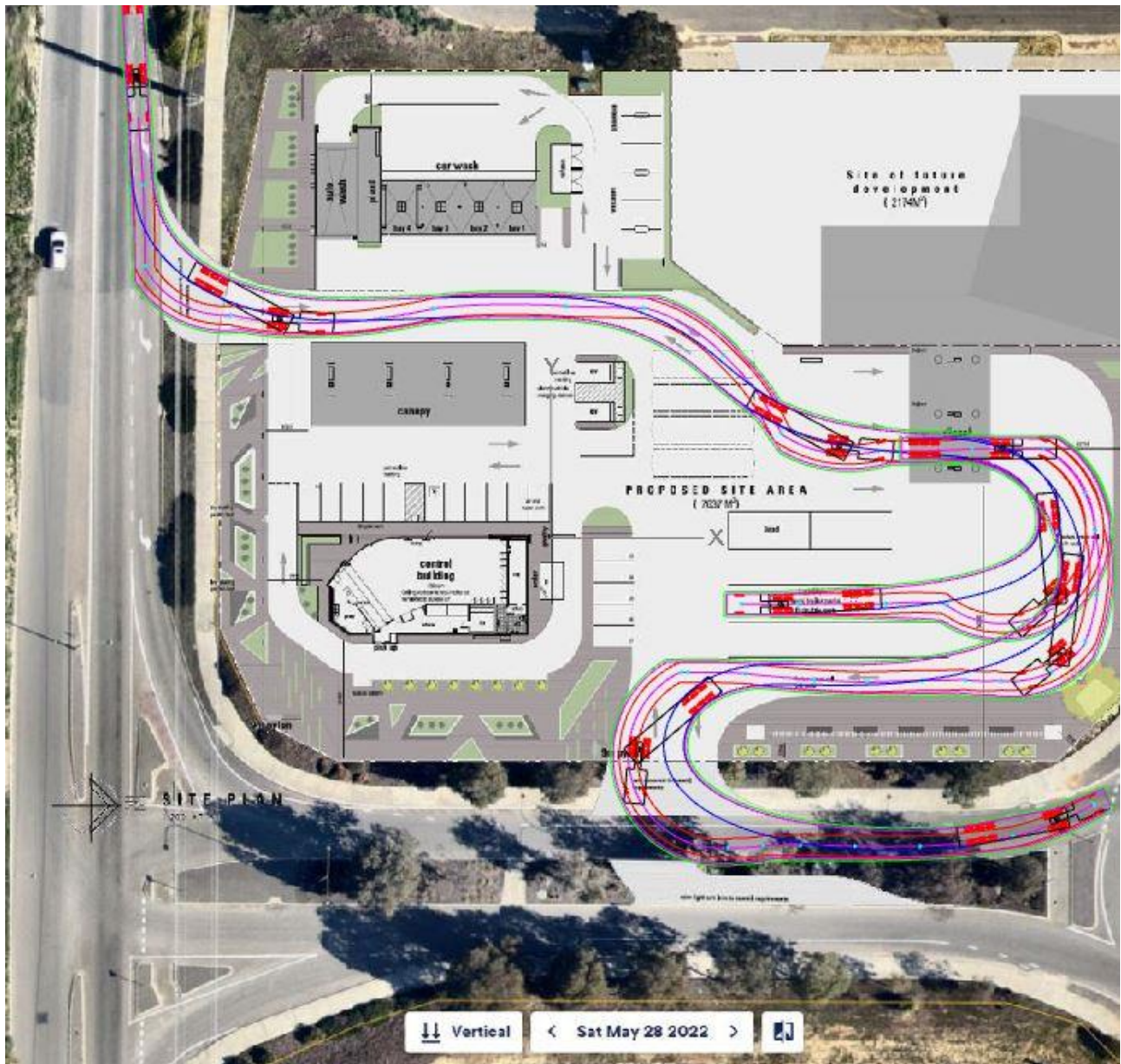


Figure 20 – Swept path assessment of 19 m Semi Trailer (Fuel Tanker) and refuelling and parking movements



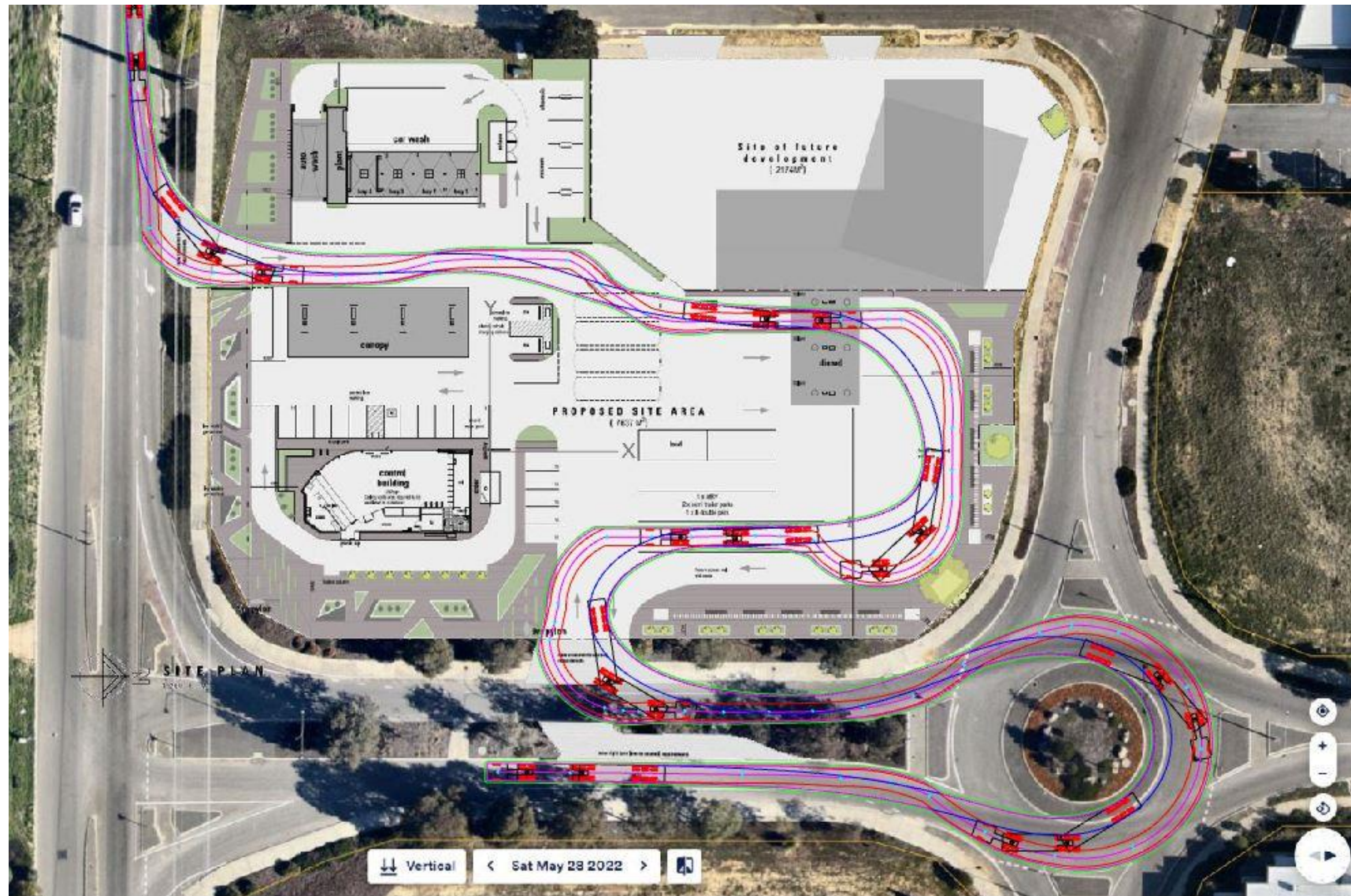


Figure 21 – Swept path assessment of 26 m B-Double refuelling and parking movements

Figure 22 – Existing SIDRA Intersection 9.1 Network Model layout

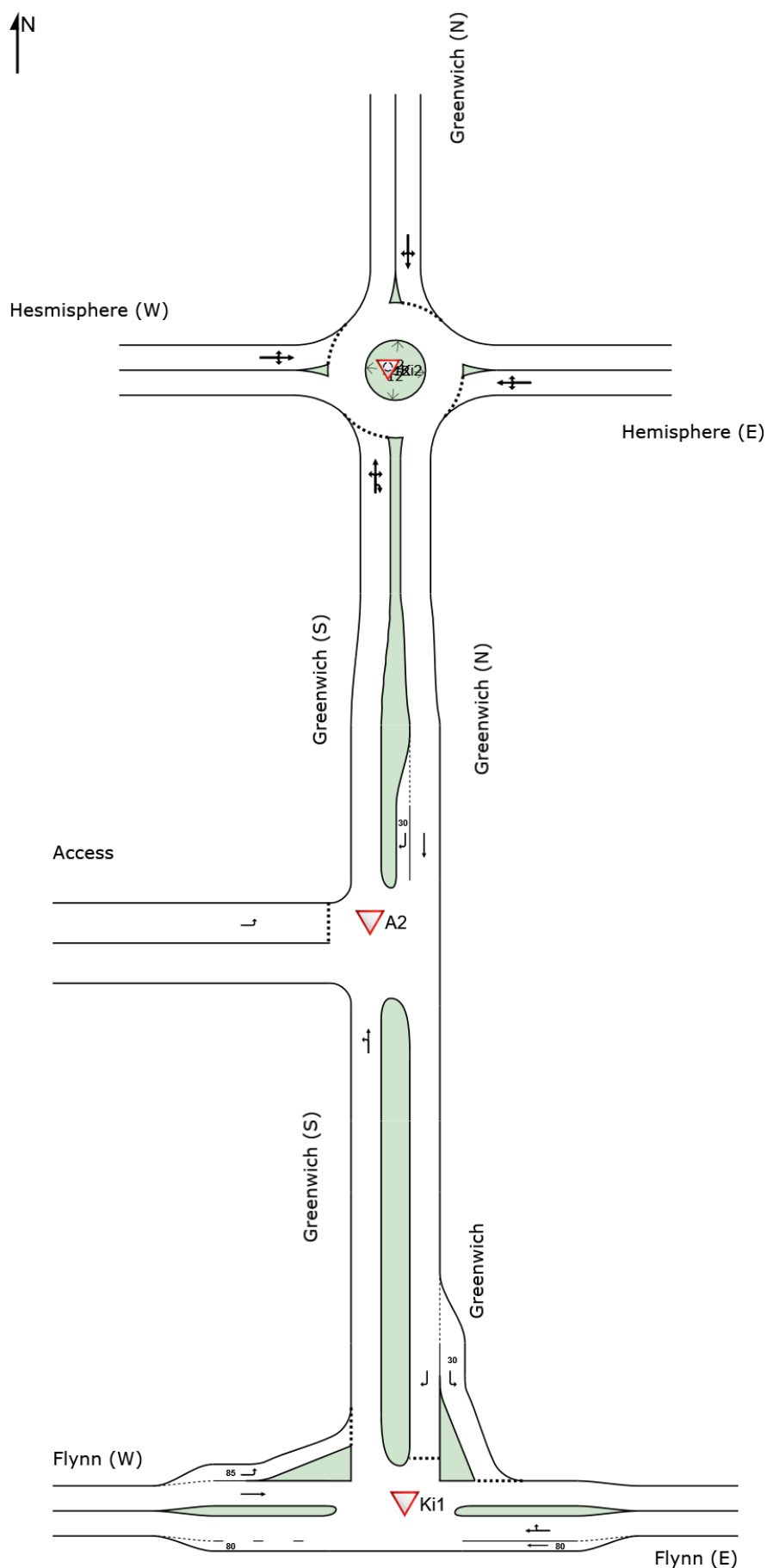


Figure 23 – Proposed Development SIDRA Intersection 9.1 Network Model layout

## EXISTING PEAK HOURS WITHOUT DEVELOPMENT

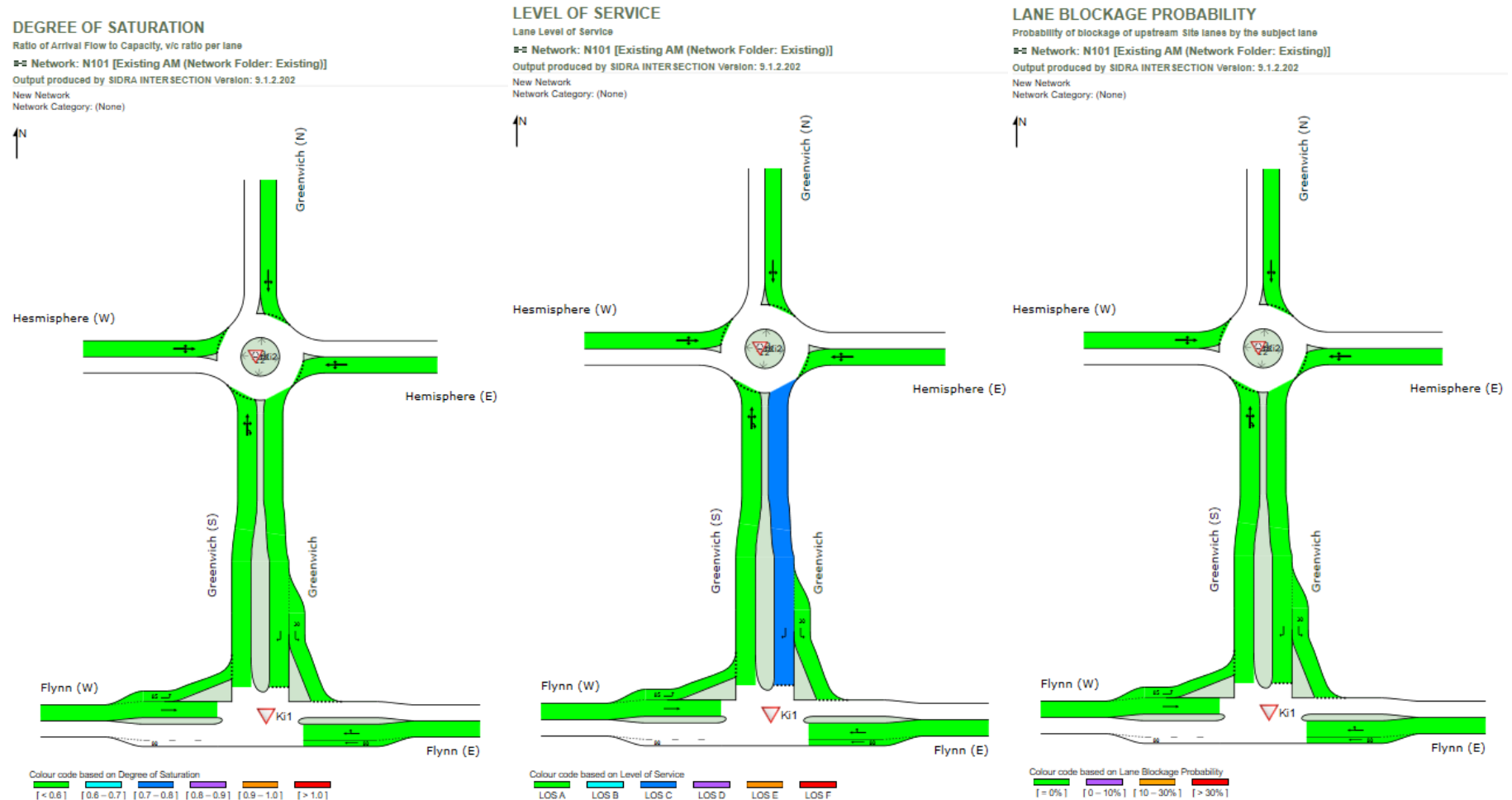


Figure 24 – Existing AM Peak Hour Network Performance



### DEGREE OF SATURATION

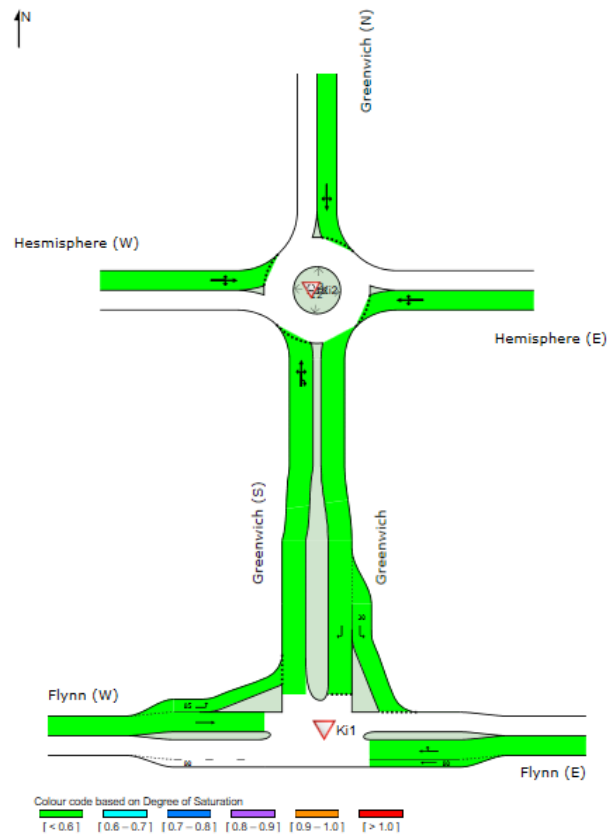
Ratio of Arrival Flow to Capacity, v/c ratio per lane

Network: N101 [Existing 12-1 (Network Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

New Network

Network Category: (None)



### LEVEL OF SERVICE

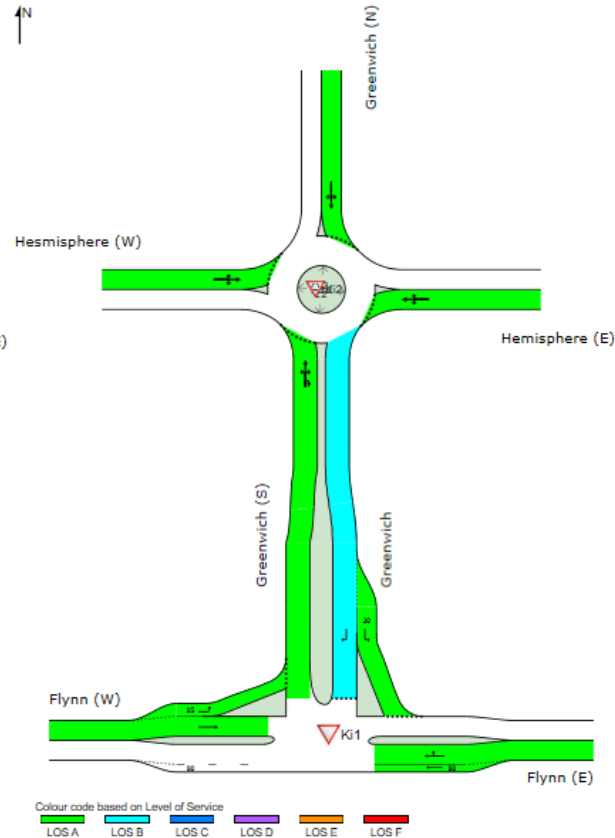
Lane Level of Service

Network: N101 [Existing 12-1 (Network Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

New Network

Network Category: (None)



### LANE BLOCKAGE PROBABILITY

Probability of blockage of upstream site lanes by the subject lane

Network: N101 [Existing 12-1 (Network Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

New Network

Network Category: (None)

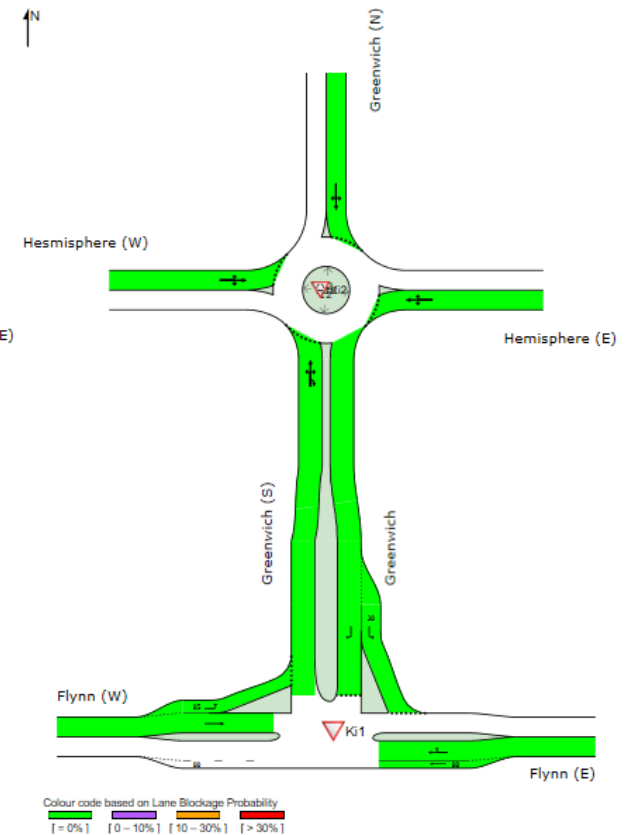


Figure 25 – Existing 12 noon to 1 PM Network Performance

### DEGREE OF SATURATION

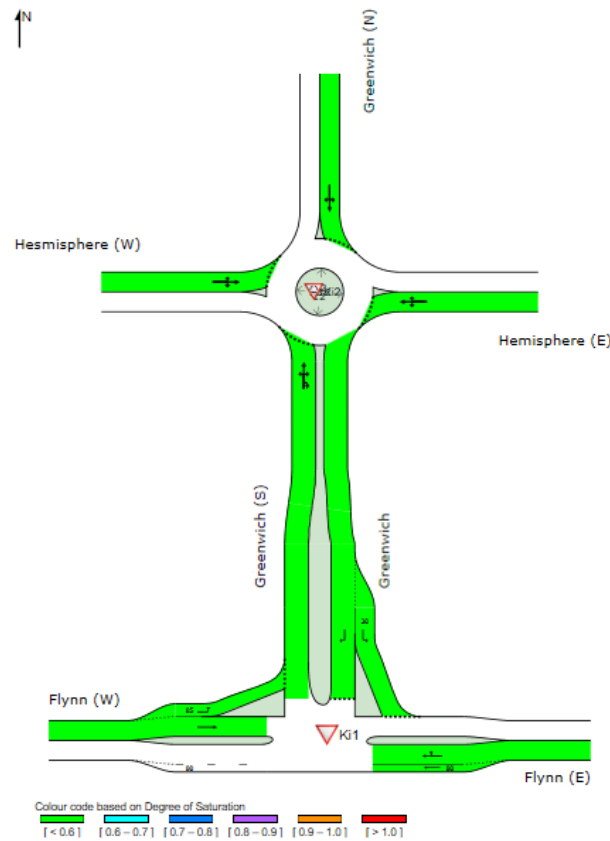
Ratio of Arrival Flow to Capacity, v/c ratio per lane

Network: N101 [Existing PM (Network Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

New Network

Network Category: (None)



### LEVEL OF SERVICE

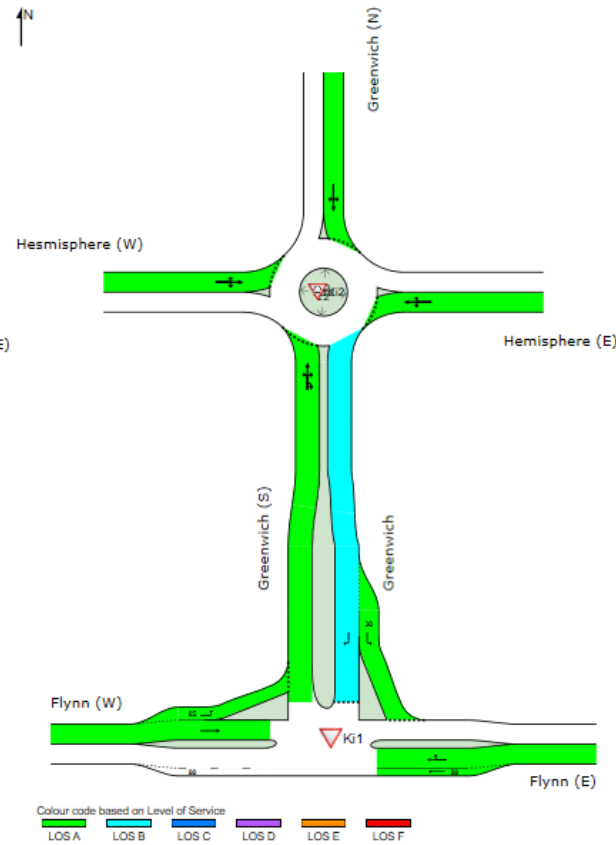
Lane Level of Service

Network: N101 [Existing PM (Network Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

New Network

Network Category: (None)



### LANE BLOCKAGE PROBABILITY

Probability of blockage of upstream site lanes by the subject lane

Network: N101 [Existing PM (Network Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.2.202

New Network

Network Category: (None)

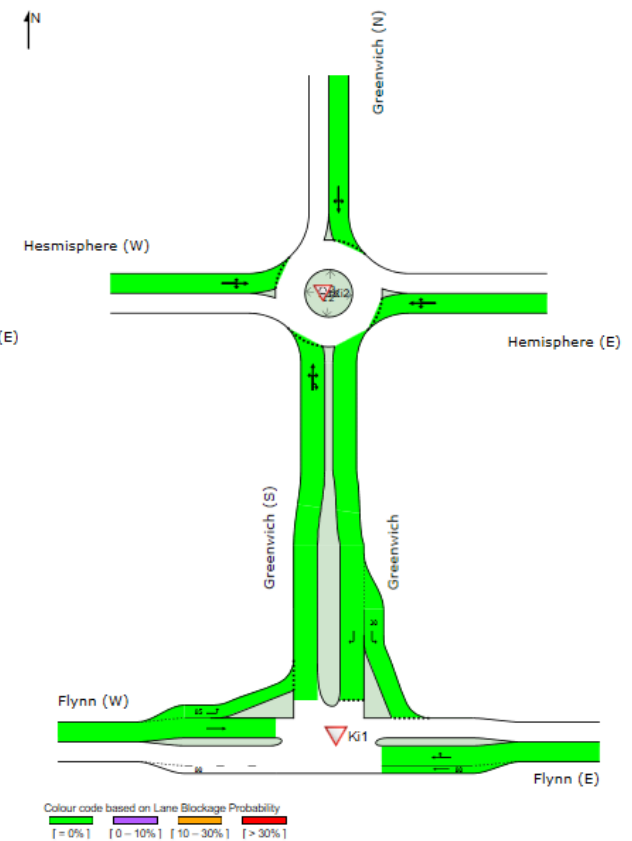


Figure 26 – Existing PM Peak Hour Network Performance

## EXISTING PEAK HOURS WITH DEVELOPMENT

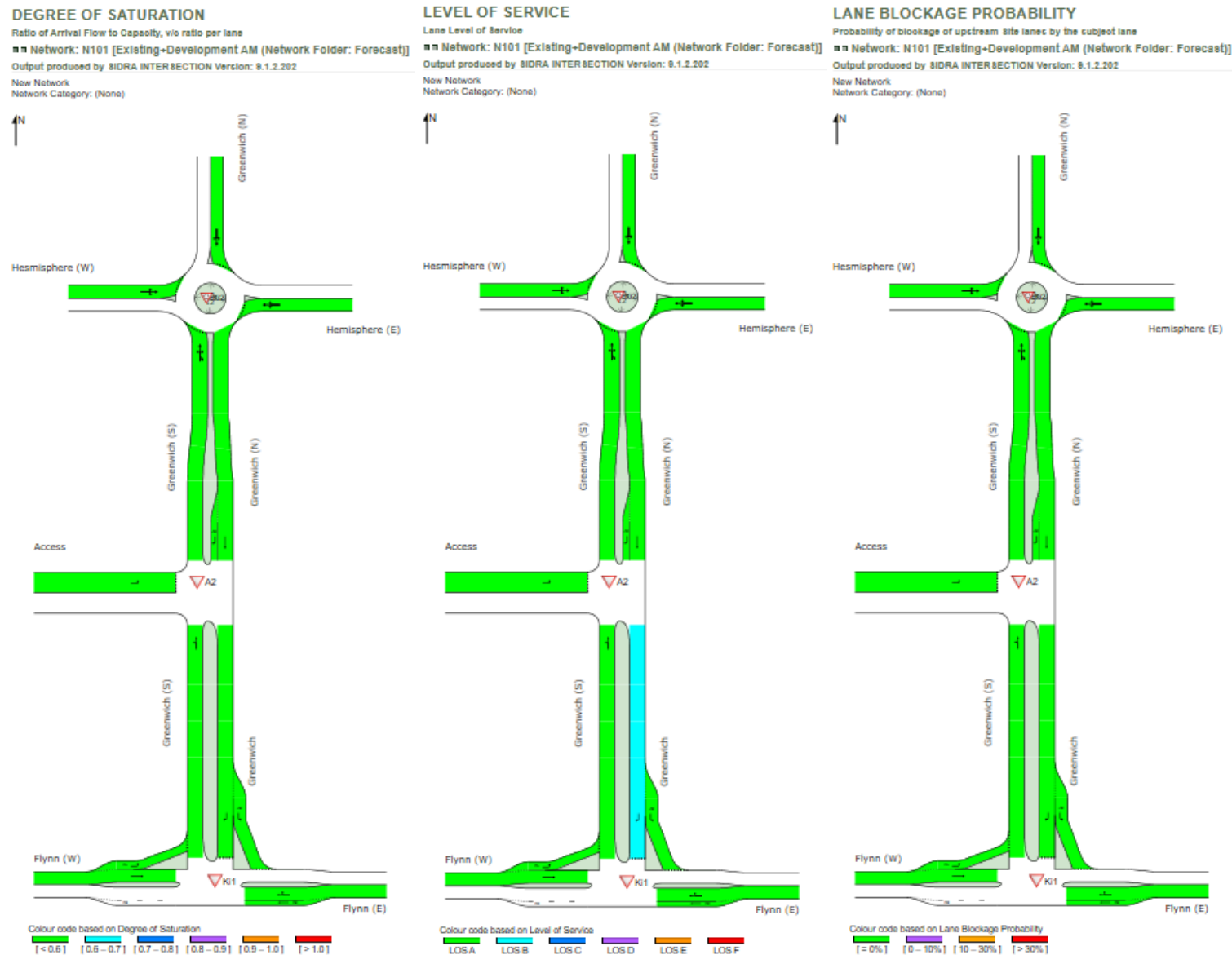


Figure 27 – Forecast AM Peak Hour Network Performance

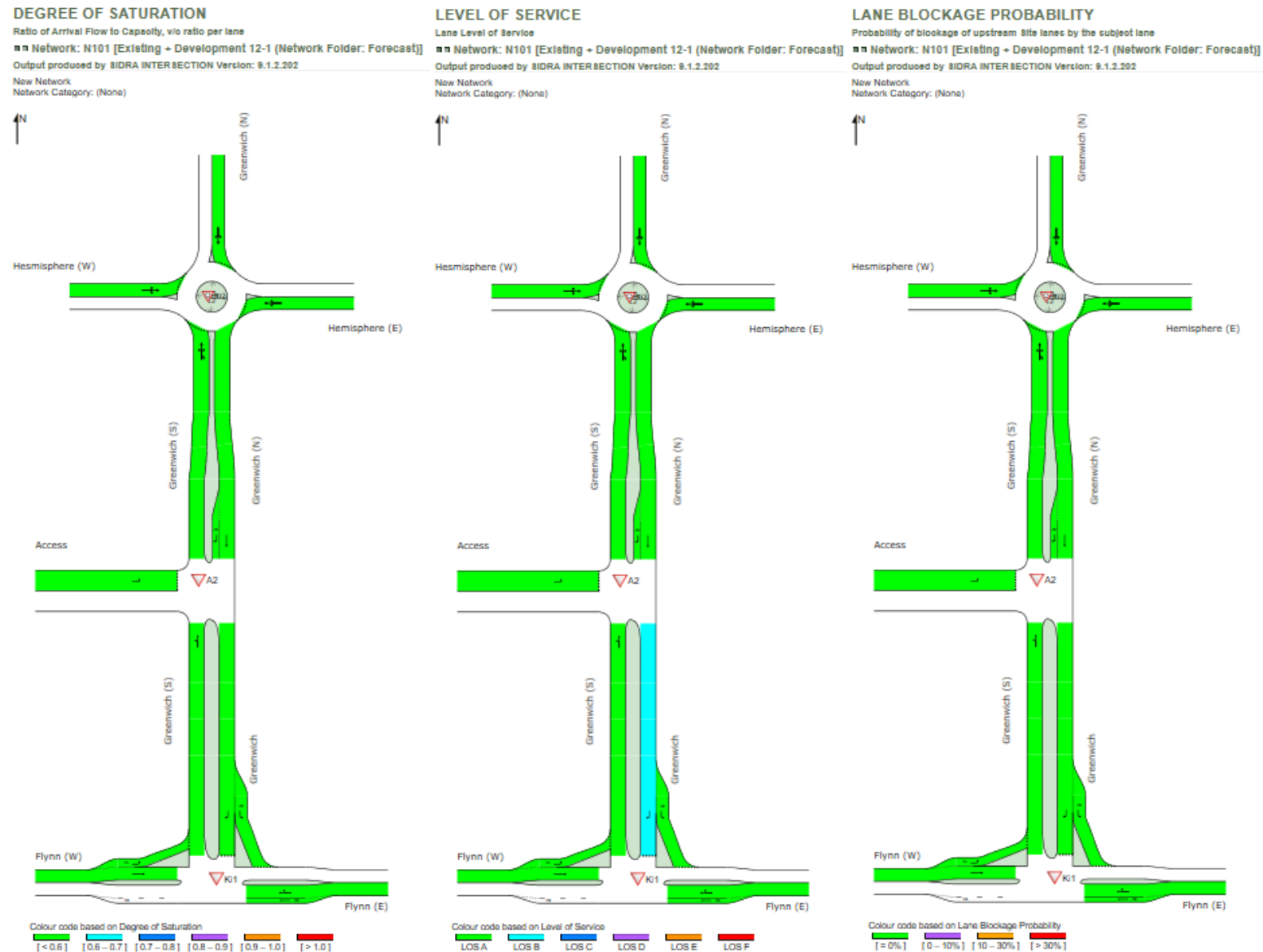


Figure 28 – Forecast 12 noon to 1 PM Network Performance

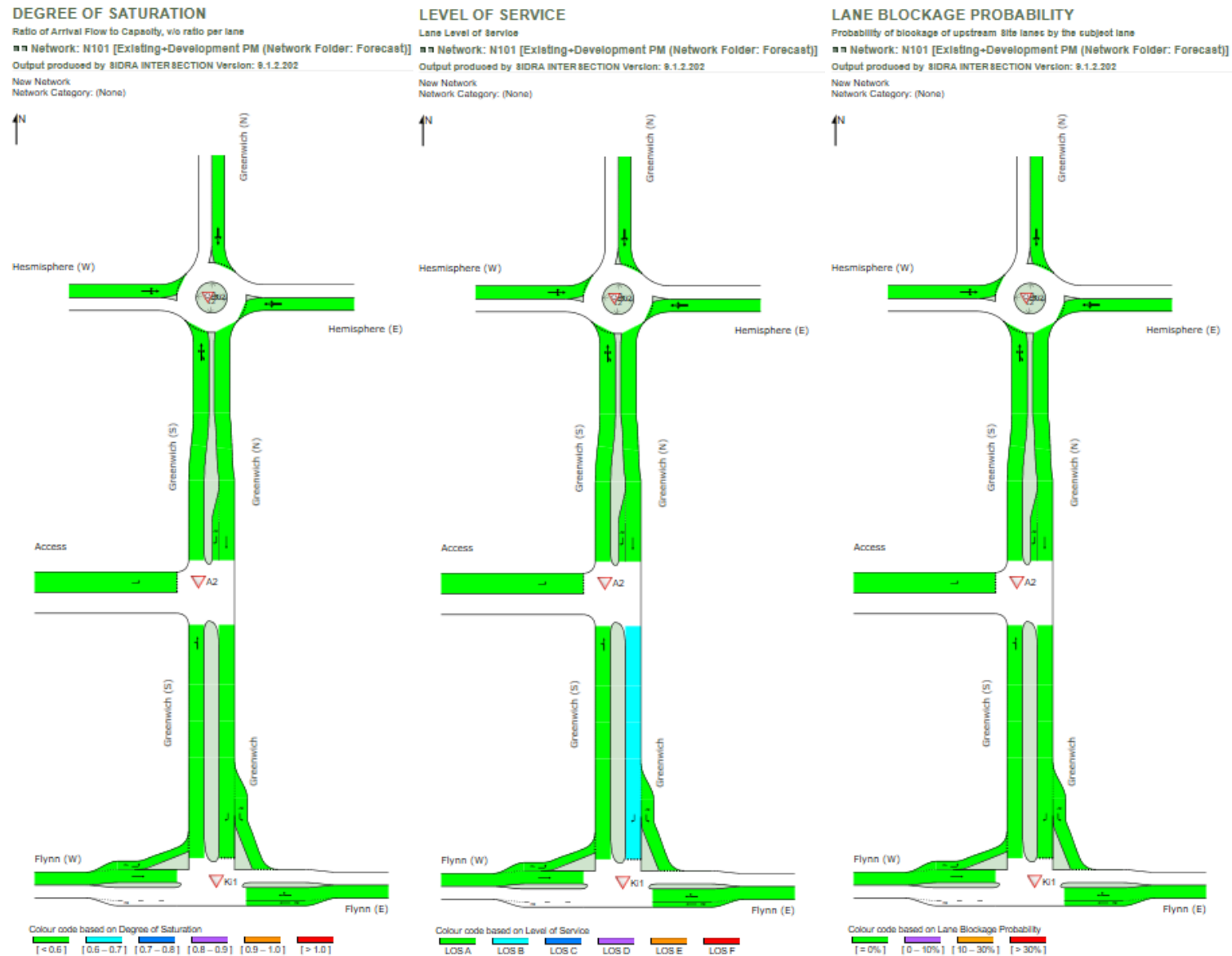


Figure 29 – Forecast PM Peak Hour Network Performance



## APPENDIX C WAPC TRANSPORT IMPACT ASSESSMENT CHECKLIST

(Checklist for a transport impact assessment of a planning scheme, structure plan or activity centre plan)

- Tick the 'provided' column for items for which information is provided.
- Enter N/A in the 'provided' column if the item is not appropriate and enter the reason in the Comments/ Proposals column.
- Provide brief comments on any relevant issues.
- Provide brief description of any proposed transport improvements, for example, new bus routes or new traffic signals or extending existing footpath to the site.

ITEM	PROVIDED	COMMENTS/ PROPOSALS
<b>Summary</b>	✓	
<b>Introduction/Background</b>	✓	
name of applicant and consultant	✓	
development location and context	✓	
brief description of development proposal	✓	
key issues	✓	
background information	✓	
<b>Existing situation</b>	✓	
existing site uses (if any)	✓	
existing parking and demand (if appropriate)	✓	
existing access arrangements	✓	
existing site traffic	✓	
surrounding land uses	✓	
surrounding road network	✓	
traffic management on frontage roads	✓	
traffic flows on surrounding roads (usually AM and PM peak hours)	✓	
traffic flows at major intersections (usually AM and PM peak hours)	✓	
operation of surrounding intersections	✓	
existing pedestrian/cycle networks	✓	
existing public transport services surrounding the development	✓	
crash data	✓	

ITEM	PROVIDED	COMMENTS/ PROPOSALS
<b>Development proposal</b>	✓	
regional context	✓	
proposed land uses	✓	
table of land uses and quantities	✓	
access arrangements	✓	
parking provision	✓	
end of trip facilities	✓	
any specific issues	✓	
road network	✓	
intersection layouts and controls	✓	
pedestrian/cycle networks and crossing facilities	✓	
public transport services	✓	
<b>Integration with surrounding area</b>	✓	
surrounding major attractors/ generators	✓	
committed developments and transport proposals	✓	
proposed changes to land uses within 1200 metres	✓	
travel desire lines from development to these attractors/ generators	✓	
adequacy of existing transport networks	✓	
deficiencies in existing transport networks	✓	
remedial measures to address deficiencies	✓	
<b>Analysis of transport networks</b>	✓	
assessment years	✓	
time periods	✓	
development generated traffic	✓	
distribution of generated traffic	✓	
parking supply and demand	✓	
base and 'with development' traffic flows	✓	
analysis of development accesses	✓	Recommend extend island on Flynn Dr west of Greenwich Pde west to physically prevent right turns into Access 1.
impact on surrounding roads	✓	



ITEM	PROVIDED	COMMENTS/ PROPOSALS
impact on intersections	✓	
impact on neighbouring areas	✓	
road safety	✓	Recommend extend island on Flynn Dr west of Greenwich Pde west to physically prevent right turns into Access 1.
public transport access	✓	
pedestrian access/amenity	✓	
cycle access/amenity	✓	
analysis of pedestrian/cycle networks	✓	
safe walk/cycle to school (for residential and school site developments only)	x	Not applicable.
traffic management plan (where appropriate)	x	Not applicable.
<b>Conclusions</b>	✓	

#### Proponent's name

**Company** PC Infrastructure Pty Ltd **Date** 20 January 2023

**Transport assessor's name** David Wilkins

**Company** i3 consultants WA **Date** 20 January 2023