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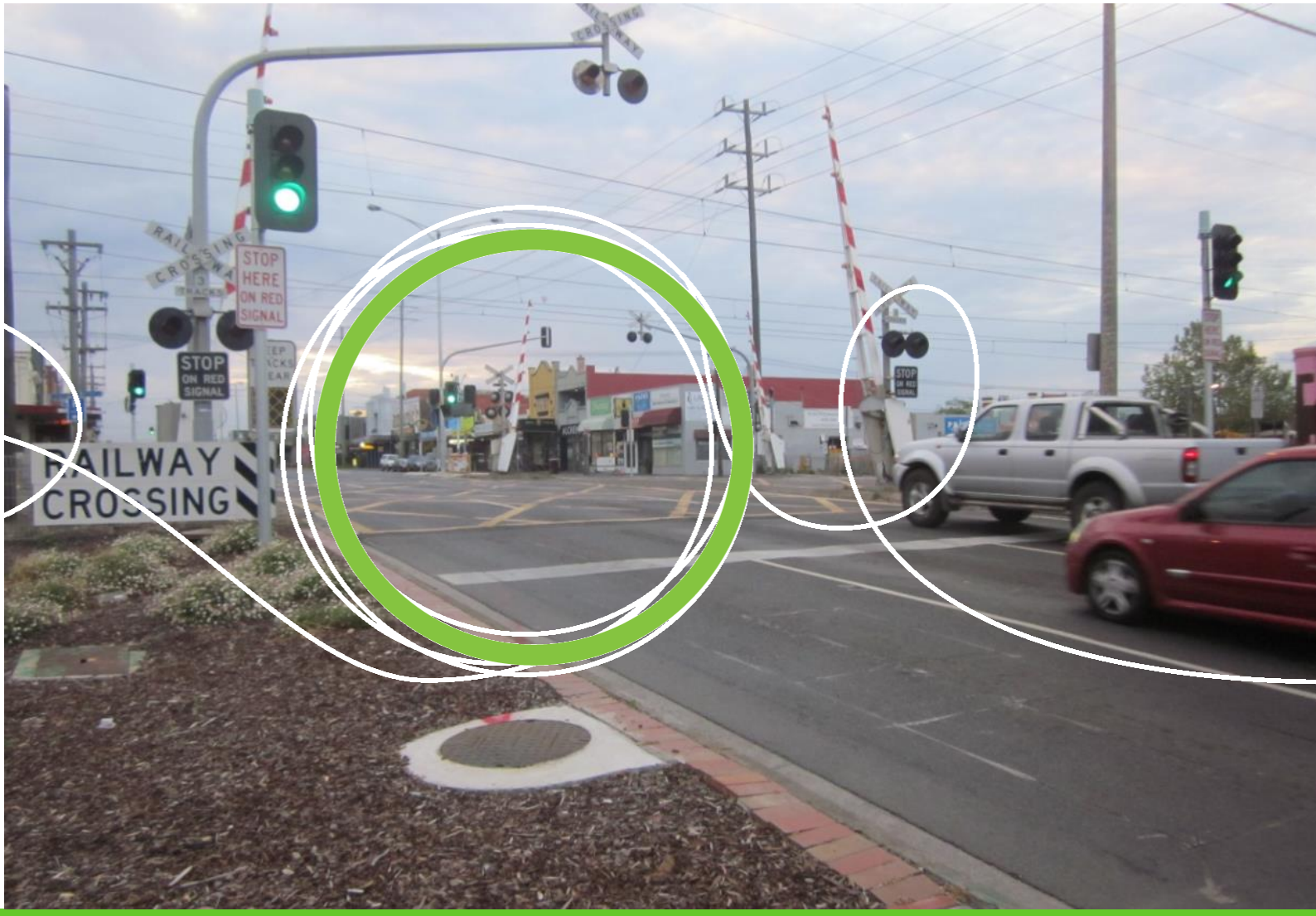

Ormond Station Urban Renewal Opportunity Transport Impact Assessment

Client // Deal Corporation Pty Ltd
Office // VIC
Reference // V103830
Date // 05/08/16

Ormond Station

Urban Renewal Opportunity

Transport Impact Assessment

Issue: E 05/08/16

Client: Deal Corporation Pty Ltd
Reference: V103830
GTA Consultants Office: VIC

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
E	05/08/16	Final (Revised)	Nicholas Brown	Andrew Farran	Jason Sellars	

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Table of Contents

Appendices

Figures

Tables

1. Introduction

1.1 Background

As part of the railway level crossing removal program (being led by the Level Crossing Removal Authority) that is presently being rolled out across Melbourne, development opportunities have been identified for a number of sites. One such opportunity exists at the Ormond train station. A draft Planning Scheme Amendment is being prepared that will provide controls for the future development of the opportunity site.

GTA Consultants (GTA) was commissioned by Deal Corporation Pty Ltd in September 2015 to undertake traffic and transport works to inform the preparation of a Comprehensive Development Zone (CDZ1) and Comprehensive Development Plan (CDP) for the development opportunity site.

1.2 Purpose of this Report

This report provides guidance on the following traffic and transport related matters:

i Appropriate bicycle parking arrangements for the development opportunity site in terms of parking rates and layout.
ii Appropriate car parking arrangements for the development opportunity site in terms of parking rates and layout.
iii Appropriate loading and waste collection arrangements.
iv The anticipated traffic impacts of an indicative development that could be delivered once the Planning Scheme Amendment has been introduced, with particular consideration to mitigating road works and an appropriate vehicle access strategy.

1.3 Indicative Project

For traffic impact assessment purposes, an indicative development yield (subject to change), as summarised in Table 1.1, has been adopted.

Table 1.1: Indicative Development Schedule [1]

Use	Size
Residential	220 dwellings
Retail [2]	6,900sqm
Office	500sqm
Restricted Recreation Facility	500sqm

[1] The indicative development land uses and yields have been derived from the as of right uses contained in the CDZ1 and the building envelope plan contained in the CDP.
[2] For the purposes of this report, it is assumed that the retail description covers supermarket, shop, food & drink premises and take away food premises.

Current planning suggests that an indicative provision of 650 car parking spaces could be provided in four levels of car parking plus some ground level car parking. The provision comprises 120 commuter car parking spaces.

Vehicle access to the indicative development would likely comprise the following:

- Access to the multi-levels of car parking on Katandra Road.
- Access to on-site loading facilities on Newham Grove.
- Minor access to some small scale residential use on Newham Grove.

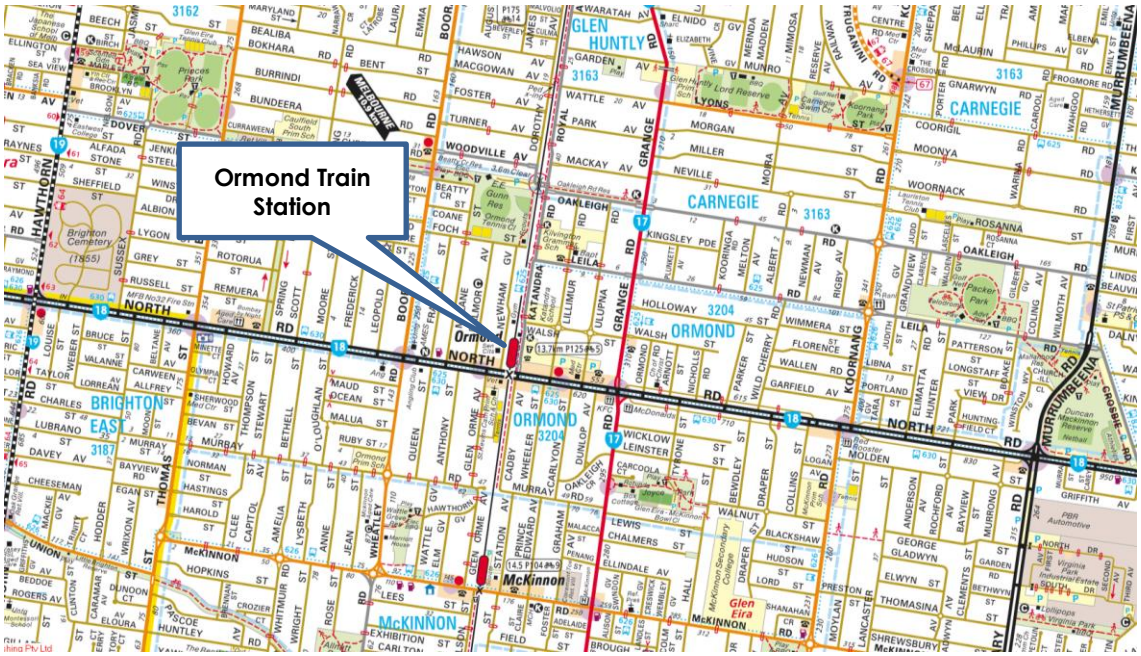
1.4 Subject Site Location

The subject site is located at the Ormond train station on North Road in Ormond. The site has frontages of 45m to North Road, 180m to Newham Grove and 180m to Katandra Road.

The surrounding properties include a mix of residential and commercial land uses. In addition, Katandra School is located to the northeast of the site.

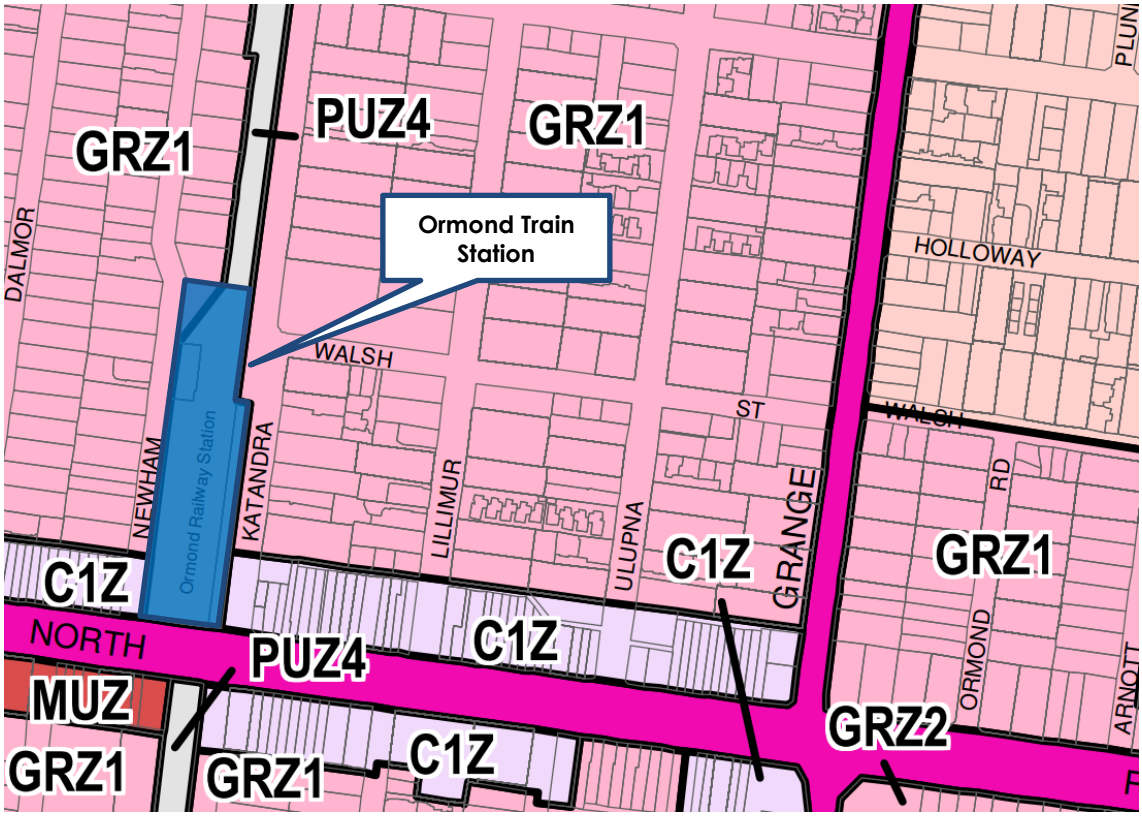
The location of the subject site and the surrounding environs is shown in Figure 1.1, and the land zoning is shown in Figure 1.2.

Figure 1.1: Subject Site and its Environs



(Reproduced with Permission from Melway Publishing Pty Ltd)

Figure 1.2: Land Zoning Map



(Reproduced from Land Channel web site)

Details regarding the subject site and the surrounding transport network are provided in Appendix A.

1.5 References

In preparing this report, reference has been made to the following:

- Glen Eira Planning Scheme.
- Draft Schedule 1 to the Comprehensive Development Zone of the Glen Eira Planning Scheme.
- Draft Incorporated Document 'North Road, Ormond, Comprehensive Development Plan, dated July 2016 of the Glen Eira Planning Scheme.
- Australian/New Zealand Standard, Parking Facilities Part 1: Off-Street Car Parking (AS/NZS2890.1:2004).
- Australian/New Zealand Standard, Parking Facilities Part 6: Off Street Parking for People with Disabilities (AS/NZS2890.6:2009).
- Traffic surveys undertaken by GTA as referenced in the context of this report.
- An inspection of the site and its surrounds.
- Other documents as nominated.

2. Transport Policy

2.1 Strategic Context

There are a number of key State Government policy documents applicable to the subject land which provide guidance on appropriate land use and development. Those that are relevant in the context of transport planning are as follows:

- Plan Melbourne
- Transport Integration Act 2010
- SmartRoads Policy
- Glen Eira Planning Scheme – Clause 18.

These documents are discussed in more detail in the following sections.

2.2 Plan Melbourne

The Victorian Government released the Metropolitan Planning Strategy, Plan Melbourne (The Plan) in May 2014. The Plan is intended to guide Melbourne's housing, commercial and industrial development through to 2050.

The Plan includes the following key concepts to cater for the anticipated population growth:

- Delivering a new 'integrated economic triangle', connecting key employment clusters, industrial precincts and economic gateways.
- Protecting the suburbs by delivering density in defined locations.
- Delivering a pipeline of large scale, city shaping infrastructure and urban renewal projects (i.e. level crossing removal).
- Better use of existing assets, including increasing efficiency of road based transport and transport – land use integration.
- 20 minute neighbourhoods – places where people have access to local shops, schools, parks, jobs and a range of community services within 20 minutes of their home.

The Plan is underpinned by seven objectives and a range of supporting actions.

2.3 Transport Integration Act 2010

The Transport Integration Act is the primary transport statute for Victoria, and has generated significant change to the way transport and land use authorities make decisions and work together. The Act enshrines a triple bottom line approach to decision making about transport and land use.

The Act requires that all transport agencies work together to achieve an integrated and sustainable transport system, and that land use agencies such as the Department of Economic Development, Jobs, Transport and Resources take account of transport issues in land use decisions. The Act has been effective to date in changing the focus of organisations that traditionally only considered a single transport mode.

The Act:

- Unifies all elements of the transport portfolio to ensure that transport agencies work together towards the common goal of an integrated transport system.
- Provides a framework for integrated and sustainable transport policy and operations.

- Recognises that the transport system should be conceived and planned as a single system performing multiple tasks rather than separate transport modes.
- Integrates land use and transport planning and decision-making by extending the framework to land use agencies whose decisions can significantly impact on transport ("interface bodies").
- Re-constitutes transport agencies and aligns their charters to make them consistent with the framework.

The Transport Integration Act forms an overarching legislative framework for transport related state planning policies and has been integrated within the Victorian Planning Provisions (VPP).

2.4 Glen Eira Planning Scheme – Clause 18

Clause 18 of the Planning Scheme is designed to reflect the intent of State Government guidance and contains objectives and strategies in relation to Transport which are relevant to this development, including, but not limited to:

- Create a safe and sustainable transport system by integrating land-use and transport.
- Plan or regulate new uses or development of land near an existing or proposed transport route to avoid detriment to, and where possible enhance the service, safety and amenity desirable for that transport route in the short and long terms.
- Encourage higher land use densities and mixed use developments near railway stations, major bus terminals, transport interchanges, tramways and principal bus routes.
- Pedestrian and cyclist access to public transport should be facilitated and safeguarded.
- Promote the use of sustainable personal transport.
- Integrate planning for cycling with land use and development planning and encourage as an alternative mode of travel.
- Achieve greater use of public transport by increasing densities, maximising the use of existing infrastructure and improving the viability of the public transport operation.

2.5 VicRoads SmartRoads Policy

SmartRoads is a VicRoads policy which sets 'modal' priorities on the road network and underpins many of the strategies significant to the operational directions that support broader strategies around land use and transport. Underpinning the policy is the following principle:

"There is no single solution to managing congestion on our roads. Sustainable management of congestion will require an integrated approach involving better management of the existing network, building new infrastructure, visionary land use planning, encouraging sustainable transport modes, and changes in behaviour by individuals, businesses and a level of government." [1]

All road users will continue to have access to all roads. However, certain routes will be managed to work better for cars while others for public transport, cyclists and pedestrians during the various peak and off-peak periods. In this regard, the following is noted by VicRoads for the various modes assigned to arterial roads across the network that form part of the Network Operating Plans:

- *"Facilitate good pedestrian access into and within activity centres in periods of high demand.*

[1] Sourced from VicRoads

- *Prioritise trams and buses on key public transport routes that link activity centres during morning and afternoon peak periods.*
- *Encourage cars to use alternative routes around activity centres to reduce the level of 'through' traffic.*
- *Encourage bicycles through further developing the bicycle network.*
- *Prioritise trucks on important transport routes that link freight hubs and at times that reduce conflict with other transport modes."*

The VicRoads SmartRoads Network Operating Plan for the area surrounding the subject site has been reproduced in Figure 2.1.

Figure 2.1: VicRoads SmartRoads Network Operating Plan – Glen Eira

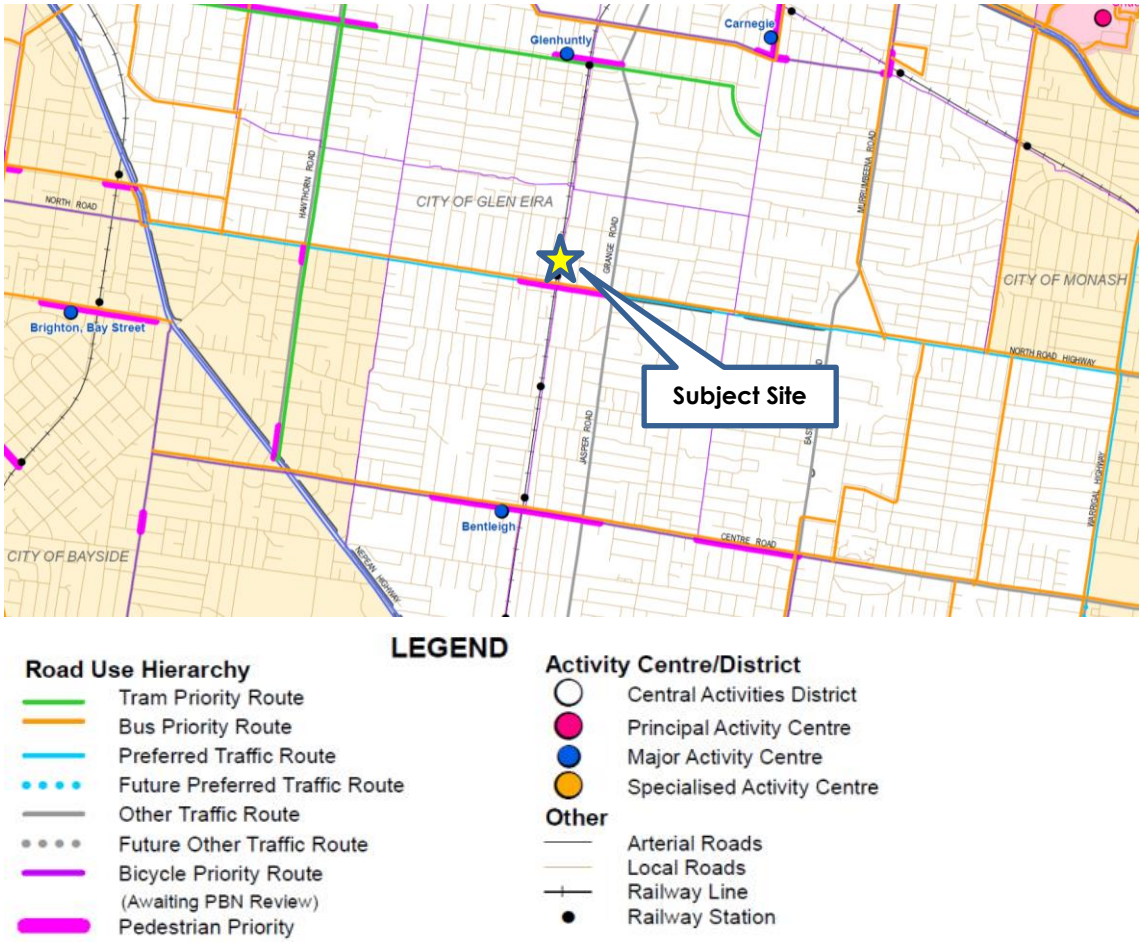


Figure 2.1 illustrates that North Road is a nominated bus priority route and preferred traffic route, while Katandra Road is a nominated bicycle priority route.

3. Sustainable Transport Considerations

3.1 Bicycle Parking & Associated Facilities

Bicycle parking and end of trip facilities for land uses on the subject site should be delivered in accordance with the requirements of Clause 52.34 of the Planning Scheme.

3.1.1 Bicycle Parking Layout & Access

The bicycle parking layout should be designed in accordance with the following standard dimensions:

- Vertically stored bicycle parking spaces for residents and staff shall be 1.2m long and 0.5m wide, with access via a 1.5m wide aisle.
- Horizontally stored bicycle parking spaces for visitors shall be 1.8m long and 0.5m wide (with a minimum offset of 0.7 to any wall) and with access via a 1.5m wide aisle.
- Bicycle parking for residents and staff shall be located in conveniently accessible secure locations.
- Bicycle parking for visitors and customers shall be located in conveniently accessible locations close to building entrances and with good passive surveillance.

4. Car Parking Provision

4.1 Statutory Car Parking Requirements

Given its locational characteristics and proximity to public transport opportunities, the development opportunity site is one where there should be consideration to car parking rates lower than the standard requirements.

Table 4.1 identifies the recommended maximum and minimum car parking rates for the various land uses identified in Section 1.3 of this report. The rates have been derived from the following sources:

- Car parking surveys of existing similar developments.
- The RMSNSW 'Guide to Traffic Generating Developments'.
- Clause 52.06 of the Planning Scheme.
- Australian Bureau of Statistics (ABS) 2011 Census car ownership data.
- Sustainable transport design principles.

Table 4.1: Recommended Minimum and Maximum Car Parking Rates

Land Use	Description	Minimum Rate	Maximum Rate
Dwelling	Residents	0.6 spaces per 1-bedoom unit 0.8 spaces per 2-bedroom unit 1.2 spaces per 3-bedroom unit	0.8 spaces per 1-bedroom unit 1.0 spaces per 2-bedroom unit 1.4 spaces per 3-bedroom unit
	Visitors	0	0.04 spaces per unit
Supermarket		3.5 spaces per 100sqm LFA	4.0 spaces per 100sqm LFA
Shop		2.5 spaces per 100sqm LFA	2.5 spaces per 100sqm LFA
Food & Drink Premises		2.5 spaces per 100sqm LFA	4.0 spaces per 100sqm LFA
Take Away Food Premises		2.5 spaces per 100sqm LFA	4.0 spaces per 100sqm LFA
Office		2.5 spaces per 100sqm NFA	2.5 spaces per 100sqm NFA
Restricted Recreation Facility		2.5 spaces per 100sqm NFA	5.0 spaces per 100sqm NFA
Commuter Car Park		120 car parking spaces	120 car parking spaces

LFA denotes leasable floor area.
NFA denotes net floor area.

Where a car parking provision lower than the minimum or greater than the maximum is sought, an assessment of the appropriateness of the provision should be undertaken. The assessment should have regard to various factors, such as:

- Any effect on vehicle and pedestrian movements in the area.
- Any empirical analysis which supports a variation in the number of car parking spaces that should be provided.
- The likelihood of multi-purpose trips within the locality which are likely to be combined with a trip to the land in connection with the proposed use.
- The variation of car parking demand likely to be generated by the proposed use over time.
- The short-term and long-term car parking demand likely to be generated by the proposed use.
- The availability of public transport in the locality of the land.
- The anticipated car ownership rates of occupants (residents or employees) of the land.
- Whether design or other constraints warrant reducing the car parking requirement.
- Any other relevant consideration.

4.2 Disabled Car Parking Requirement

Disabled car parking should be provided in accordance with the Building Code of Australia (BCA) requirements. These requirements are presented in Table 4.2.

Table 4.2: BCA Car Parking Requirements for People with Disabilities

Description	BCA Class	BCA Disabled Parking Requirement
Dwellings	Class 2	None
Retail	Class 6	1 space for every 50 car parking spaces or part thereof
Office	Class 5	1 space for every 100 car parking spaces or part thereof

4.3 Motorcycle Parking

Motorcycle parking should be provided for all land uses on the subject site at a minimum rate of one motorcycle parking space for every 100 car spaces unless the responsible authority is satisfied that a lesser number is sufficient.

5. Car Parking and Vehicle Access Layout

5.1 Car Parking Layout

The on-site car parking layout should be designed in accordance with the requirements of Clause 52.06 of the Planning Scheme, and where appropriate, the relevant Australian Standards. In addition, supermarket operators typically have their own design requirements which deliver more generous car space dimensions than those required by the Planning Scheme and Australian Standard.

Typical car parking design requirements are summarised as follows:

Supermarket Use

- Car spaces should be 5.5m long and 2.6m wide, with access via a 6.5m wide aisle.
- Car spaces located adjacent to obstructions to car door openings should be widened to 2.9m.
- A height clearance of 2.4m, measured from the ground to the underside of any overhead obstruction, should be provided.
- Columns should be located to avoid impacting on car door openings. Columns should therefore be located a minimum of 0.75m and no more than 1.75m along the length of the car space measured from the car park aisle.

All Other Uses (Including Commuter Car Park)

- Car spaces should be 4.9m long and 2.6m wide, with access via a 6.4m wide aisle.
- Car spaces allocated to residents and staff that are located adjacent to obstructions to car door openings should be widened to 2.7m.
- Car spaces allocated to visitors and customers that are located adjacent to obstructions to car door openings should be widened to 2.9m.
- Disabled car parking spaces should be 5.4m long and 2.4m wide, with a 2.4m wide shared area adjacent to the space. Access to the car spaces should be via a 5.8m wide aisle.
- A height clearance of 2.2m, measured from the ground to the underside of any overhead obstruction, should be provided, with the exception of above the disabled car spaces, where a height clearance of 2.5m is required.
- Columns should be located to avoid impacting on car door openings and should therefore be located a minimum of 0.25m and no more than 1.25m along the length of the car space measured from the car park aisle.

5.2 Vehicle Access Layout

The vehicle access layout should be designed in accordance with the requirements of Clause 52.06 of the Planning Scheme, and where appropriate, the relevant Australian Standards.

The following design principles should be adopted:

- The vehicle access to the residential, commercial and commuter car park should be designed to meet expected peak hour traffic volumes. It is desirable to provide separate left and right turn exit lanes (both 3.0m wide) from the potential development, separated from a single entry lane (4.0m wide) by a 2.5m wide island. Clearances of 0.3m should be provided for each of the lanes.

- Any vehicle access to small scale residential use on Newham Road should have a minimum trafficable width of 5.5m with 0.3m wide clearances on either side of the access (i.e. presenting a total width between walls of 6.1m).
- The vehicle accesses should be separated from any adjacent access by a 2.5m wide island.
- A maximum grade of 1:10 for a distance of 5.0m measured from the property boundary should be provided on the vehicle accesses.
- A maximum ramp grade of 1:6 should be provided for the residential, commercial and commuter car park access, with transition grades not exceeding 1:8 provided at each end of the main ramp grade. It would be desirable to provide as soft a main ramp grade as possible to assist with exiting vehicles queuing on the ramp.
- A maximum ramp grade of 1:5 should be provided for the small scale residential access, with transition grades not exceeding 1:8 provided at each end of the main ramp grade.
- Any increase in the size of vehicle using the vehicle accesses to the car parking areas will necessitate an appropriate review using the relevant design standards.
- 2.5m x 2.0m pedestrian visibility triangles that are at least 50% clear of visual obstructions should be provided on the exit side of the vehicle accesses.

6. Loading & Waste Collection

6.1 Loading Area

The on-site loading arrangements should be designed in accordance with the requirements of Clause 52.07 of the Planning Scheme, and where appropriate, the relevant Australian Standards.

Typical loading design requirements are summarised as follows:

- Loading areas should be a minimum 7.6m long and 3.6m wide, with access via a minimum 3.6m wide roadway.
- A minimum height clearance of 4.0m, measured from the ground to the underside of any overhead obstruction, should be provided.

The design requirements presented above are consistent with the Planning Scheme requirements and will satisfactorily accommodate smaller rigid type vehicles. Where larger vehicles are expected, the on-site loading area should be designed in accordance with the relevant Australian Standard, with the following typical loading design requirements:

- Loading areas should be a minimum 3.5m wide, with the length being dependent on the size of the vehicle that the loading area will cater for (i.e. a 12.5m long vehicle will require the loading area to be the same length).
- A minimum height clearance of 4.5m, measured from the ground to the underside of any overhead obstruction, should be provided.
- Appropriate ramp grades will be required with suitable lengths to accommodate the longest wheel base of vehicles accessing the loading areas.

Vehicle access to on-site loading areas should be via Newham Grove. The vehicle accesses to the loading areas should be deigned in accordance with the Planning Scheme and relevant Australian Standard requirements, having regard to the largest design vehicle expected to access the loading areas, and should be supported by electronic swept path assessment where appropriate.

6.2 Waste Collection

All waste should be collected on-site by a private contractor. The waste collection should be controlled by a Waste Management Plan (WMP) which should define the locations of the bin storage areas, the collection arrangements and the size of vehicle to be used for collection. The waste collection arrangements should be supported by electronic swept path assessment where appropriate.

7. Traffic Impact

7.1 Traffic Generation

7.1.1 Residential Use

Guidance on the traffic generation rates for residential use on the development opportunity site has been sought from surveys of other similar residential uses located close to public transport opportunities. These surveys suggest that a peak hour traffic generation rate of 0.25 vehicle movements per dwelling would be appropriate.

Application of this rate to an indicative 220 dwellings results in a weekday PM and Saturday midday peak hour traffic generation of 55 vehicle movements.

7.1.2 Supermarket Use

Guidance on traffic generation rates for a supermarket use has been sought from traffic surveys of an existing supermarket in Ivanhoe. The results of the surveys are summarised in Table 7.1. The Ivanhoe development is also located on the edge of an existing activity centre.

Table 7.1: Summary of Traffic Survey Results

Description	Size	Surveyed Traffic Volumes and Associated Generation Rates			
		Friday PM		Saturday Midday	
		Vehicle Movements	Traffic Generation Rate	Vehicle Movements	Traffic Generation Rate
Supermarket, Ivanhoe	3,655sqm	220 vehicle movements	6.02 movements per 100sqm	248 vehicle movements	6.79 movements per 100sqm

Information provided for the supermarket in Ivanhoe at the time of the surveys indicated that it is a mid-level trader. Industry guidance suggests that a mid-level trader has an annual turnover of approximately $25 million per annum. It is anticipated that the proposed supermarket in Ormond is likely be a higher-level trader, with industry guidance indicating that these stores generate an annual turnover of approximately $40 million per annum. Using these revenue values as a guide to store activity, the traffic generation values from the Ivanhoe supermarket have been factored up by 1.6 ($40M divided by $25M) to obtain traffic generation rates for the supermarket in Ormond.

In order to account for mode share differences between the LGA of the Ivanhoe supermarket (i.e. Banyule) and the LGA of the proposed supermarket (i.e. Glen Eira), GTA has undertaken a review of the VISTA09 mode share data. This is summarised in Table 7.2.

Table 7.2: Mode Share Comparison between Supermarkets

Time Period	Factored Ivanhoe Rates [1]	Private Motor Vehicle Mode Share [2]			Resultant Traffic Rate
		Banyule	Glen Eira	Comparison	
Weekday PM Peak Hour	9.63 movements per 100sqm	71%	66%	93%	8.96 movements per 100sqm
Saturday Midday Peak Hour	10.86 movements per 100sqm	71%	64%	90%	9.77 movements per 100sqm

[1] Includes staff and customer traffic generation.
[2] Based on total trips for the identified local government areas for weekday and weekend days.

Application of these rates to a supermarket use of 4,100sqm results in the following traffic generation values:

- Weekday PM Peak Hour – 367 vehicle movements
- Saturday MID Peak hour – 401 vehicle movements.

In deriving the supermarket traffic generation rates, the coarseness of the mode share conversion is acknowledged. The conversion calculation is based on data available at a local government area level and does not distinguish between those sites that have high levels of public and active transport accessibility and likely higher public and active transport mode share, from those that are more distant from these opportunities, likely resulting in a higher mode share by car. The traffic generation rates adopted for the proposed supermarket are therefore considered conservative on the high side.

7.1.3 Other Retail Use

Guidance on the traffic generation for retail use on the development opportunity site has been sought from the RMS 'Guide to Traffic Generating Developments'. The guide suggests a weekday PM peak hour traffic generation rate of 5.6 vehicle movements per 100sqm and a Saturday midday peak hour rate of 10.7 vehicle movements per 100sqm.

Application of these rates to retail uses with a combined floor area of 2,800sqm results in the following traffic generation values:

- Weekday PM Peak Hour – 157 vehicle movements
- Saturday MID Peak hour – 300 vehicle movements.

The retail use traffic generation rate is considered conservative on the high side for the reasons set-out with the supermarket use.

7.1.4 Office Use

Guidance on an appropriate traffic generation rate for office use on the development opportunity site has been sought from surveys undertaken by GTA and other traffic engineering consultants, as well as from data contained within the Inner Municipalities Parking Study (IMPS). Based on this empirical data, a traffic generation rate of 0.57 vehicle movements per staff car parking space has been adopted for the weekday PM peak hour.

Application of this rate to an anticipated 13 office car parking spaces[2] results in seven peak hour vehicle movements during the weekday PM peak hour.

7.1.5 Gymnasium Use

Guidance on the traffic generation for gymnasium use on the development opportunity site has been sought from the RMSNSW 'Guide to Traffic Generating Developments'. The guide suggests a weekday PM and Saturday midday peak hour traffic generation rate of 3.0 vehicle movements per 100sqm.

Application of this rate to a gymnasium with a floor area of 500sqm results in a weekday PM and Saturday midday peak hour traffic generation of 15 vehicle movements.

[2] Calculated by applying the recommended office car parking rate of 2.5 spaces per 100sqm to an office use of 500sqm.

7.1.6 Commuter Car Park

Guidance on the traffic generation of the proposed commuter car park has been based on surveys of the existing commuter car parks at the Ormond train station. These surveys suggest a weekday PM peak hour traffic generation rate of 0.55 vehicle movements per car space and a Saturday midday peak hour rate of 0.26 vehicle movements per car space.

Application of these rates to the proposed 120 space commuter car park results in the following traffic generation values:

- Weekday PM Peak Hour – 66 vehicle movements
- Saturday MID Peak hour – 31 vehicle movements.

7.1.7 Summary

The estimated traffic volumes of the indicative development adopting the aforementioned rates are summarised in Table 7.3.

Table 7.3: Estimated Development Traffic Volume by Peak Hour

Description	Estimated Development Traffic Volumes	
	Weekday PM Peak Hour	Saturday MID Peak Hour
Residential	55vph	55vph
Supermarket	367vph	401vph
Other Retail	157vph	300vph
Office	7vph	0vph
Gymnasium	15vph	15vph
Commuter Car Park	66vph	31vph
Total	**667vph**	**802vph**

7.2 Traffic Distribution and Assignment

The directional distribution and assignment of traffic generated by the indicative development will be influenced by a number of factors, including the following:

i configuration of the arterial road network in the immediate vicinity of the site
ii existing operation of intersections providing access between the local and arterial road network
iii distribution of households in the vicinity of the site
iv surrounding employment centres, retail centres and schools in relation to the site
v likely distribution of employee's residences in relation to the site
vi forecast sales data for the retail uses
vii configuration of vehicle access points to the site.

Having consideration to the above and for the purposes of estimating vehicle movements, the following directional distribution methodology by use has been adopted:

Supermarket and Retail Use

Based on trade catchment data provided to GTA, the following distribution of the supermarket and retail traffic has been adopted for the weekday PM and Saturday midday peak hours:

- North Road (to/from the east): 44%
- North Road (to/from the west): 47%
- Katandra Road (to/from the north): 6%
- Cadby Avenue (to/from the south): 3%.

In addition, the directional splits of traffic (i.e. the ratio between the inbound and outbound traffic movements) has been assumed to be 50% inbound and 50% outbound movements in any peak hour.

All Other Uses

The distribution of the traffic generated by the residential, office and gymnasium uses, plus the traffic from the commuter car park, has been broadly based on existing traffic proportions observed on the surrounding road network. The following traffic distribution has been adopted for the weekday PM and Saturday midday peak hours:

- Katandra Road (to/from the north): 10%
- Katandra Road (to/from the south): 90%
- North Road (to/from the east): 50%
- North Road (to/from the west): 50%.

In addition, the directional splits of traffic (i.e. the ratio between the inbound and outbound traffic movements) has been assumed to be as follows for the various uses:

- Residential: 60% inbound/40% outbound during the weekday PM peak hour and 50% inbound/50% outbound during the Saturday midday peak hour.
- Office: 10% inbound/90% outbound during the weekday PM peak hour.
- Gymnasium: 50% inbound/50% outbound during both the weekday PM and Saturday midday peak hour.

7.3 Indicative Development Generated Traffic

Based on the above discussion and analysis, Figure 7.1 and Figure 7.2 have been prepared to show the indicative development generated traffic on the road network surrounding the subject site.

Figure 7.1: Weekday PM Peak Hour Indicative Development Traffic Volumes

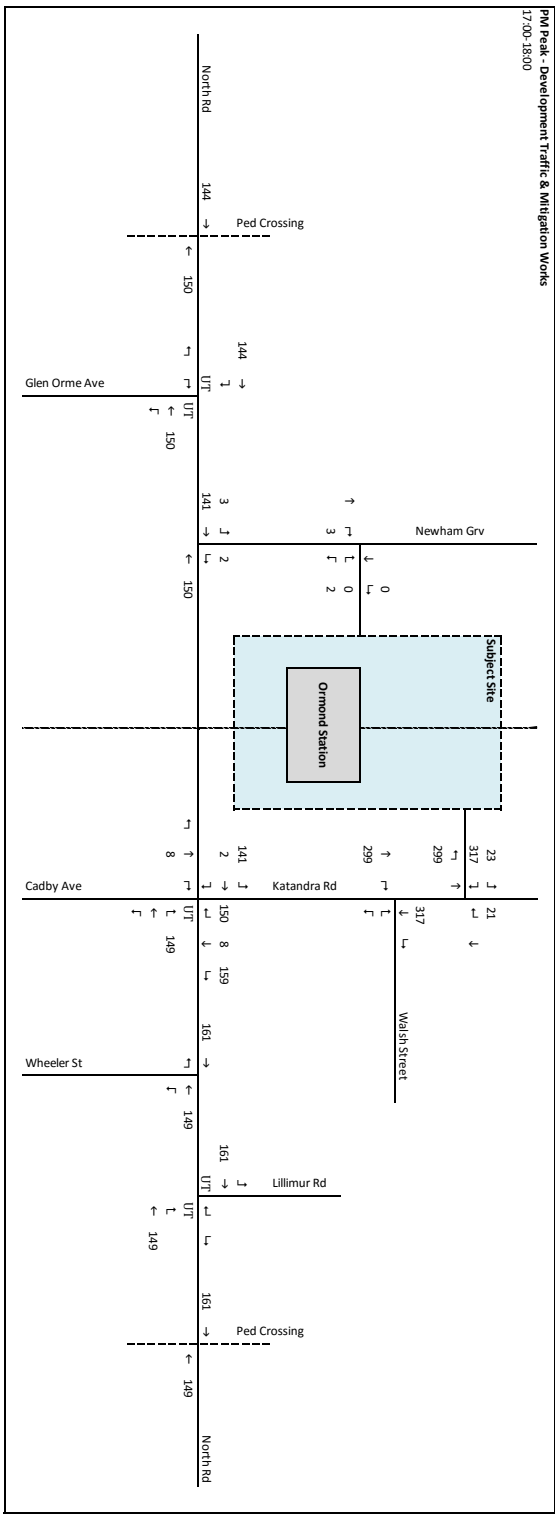
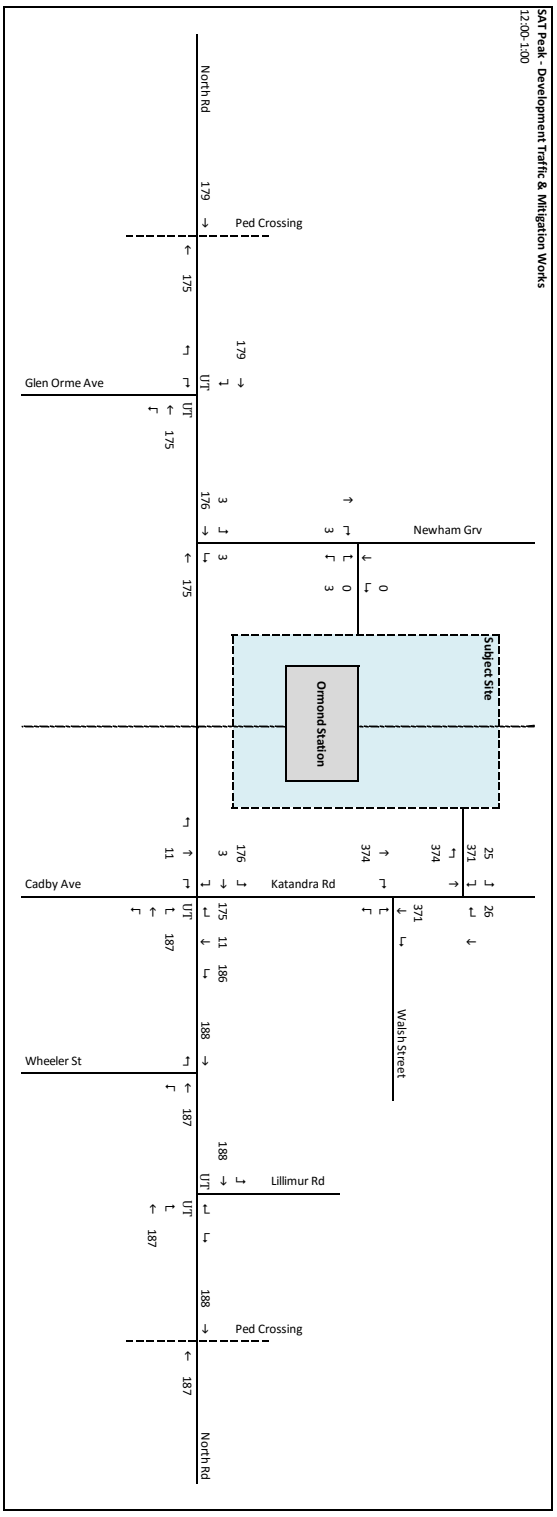


Figure 7.2: Saturday MID Peak Hour Indicative Development Traffic Volumes



7.4 Base Traffic Volumes

As a result of the improved travel times along the North Road corridor following the removal of the existing level crossing, it is anticipated that the through traffic volumes on North Road will increase. In order to determine the level of traffic volume growth, reference has been made to the Victorian Integrated Transport Model (VITM). This is a tool developed by the Department of Transport (DoT) to assist in the planning of road and public transport infrastructure in Victoria. VITM is a multimodal strategic model that uses future population, employment and land use data projections to forecast future impacts of changes to the road and public transport networks.

The existing level crossing is represented in VITM as a time delay for vehicles using North Road. In order to assess the impact of the level crossing removal (plus the removal of the McKinnon Road, Centre Road, Grange Road, Koornang Road, Murrumbeena Road and Poath Road level crossings), the time delays have been removed from the model.

The predicted traffic volumes have been extracted from the 2016 model, with the traffic volume differences used to determine the percentage growth on North Road. These are presented in Table 7.4.

Table 7.4: North Road Induced Traffic Volumes from Level Crossing Removal

Direction of Travel	Forecast Traffic Growth		
	AM Peak Hour [1]	PM Peak Hour [1]	Saturday [2]
Eastbound	+16.2%	+5.5%	+10.9%
Westbound	+12.4%	+16.1%	+14.3%

[1] Based on VITM model outputs.
[2] Determined based on the average of the weekday peak hour VITM outputs.

In order to derive appropriate base case traffic volumes, the existing through traffic volumes surveyed on North Road have been factored up by the values presented in Table 7.4. The resulting base case traffic volumes are presented in Figure 7.3 and Figure 7.4.

Figure 7.3: Weekday PM Peak Hour Base Case Traffic Volumes

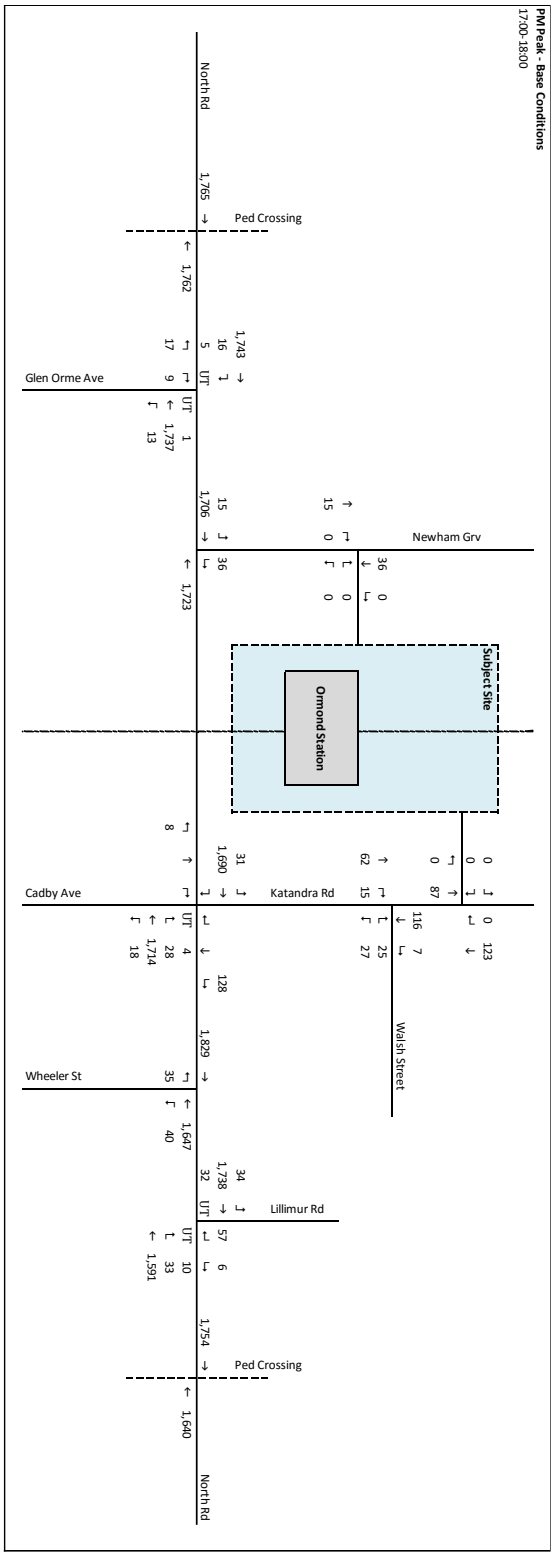
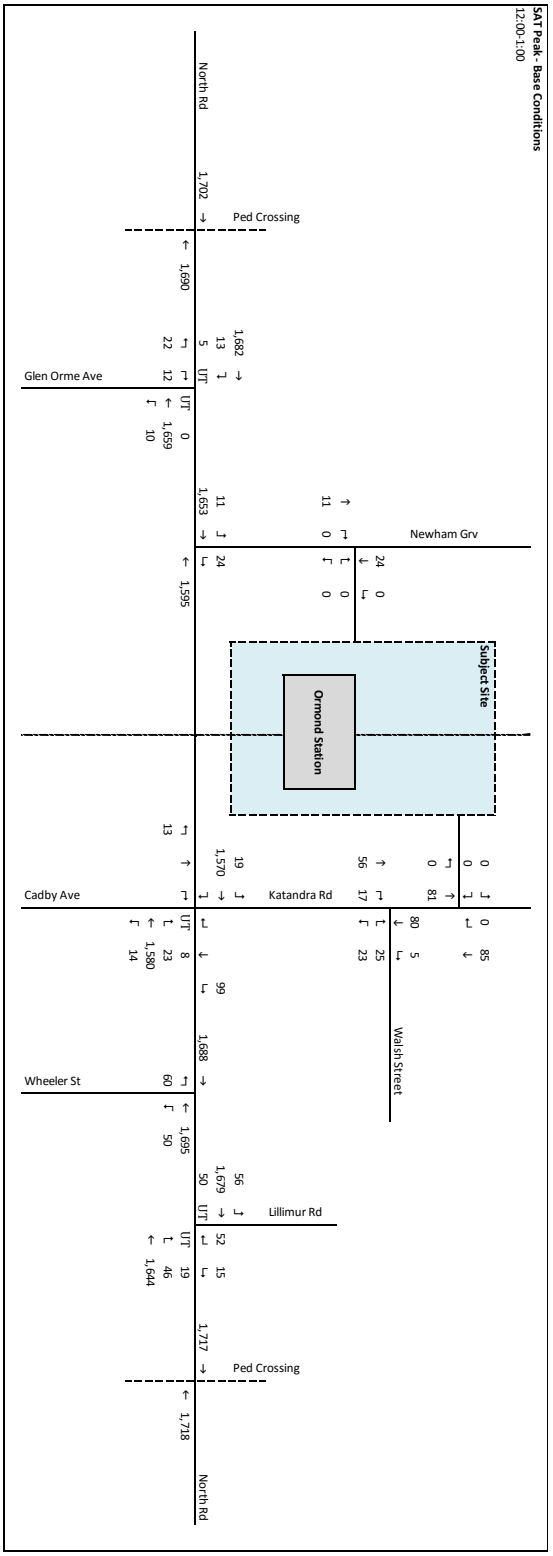


Figure 7.4: Saturday MID Peak Hour Base Case Traffic Volumes



7.5 Passer-By Trip Discounts

It is expected that a proportion of the traffic movements generated by any supermarket and retail uses will be from 'passer-by' trips. For the purpose of any assessment, a passer-by trip percentage of 28%[3] is considered appropriate. The post development traffic volumes presented later in this report account for 'passer-by' trips.

7.6 Post Development Traffic Volumes

Post development traffic volumes are derived by adding the proposed development traffic volumes (with an allowance for the passer-by discounts) to the base case traffic volumes.

The post development traffic volumes are presented in Figure 7.5 and Figure 7.6. In preparing the post development traffic volumes, consideration has been given to the likely impact of providing traffic signals at the North Road/Katandra Road intersection, with the intersection delivering controlled full turning movements. It is considered likely that the signalised intersection will 'draw' some of the existing right turn movements exiting from Lillimur Road onto North Road, and the U-turn movements on North Road at the Lillimur Road intersection.

[3] Guide to Traffic Management –Part 12: Traffic Impacts of Developments, Austroads.

Figure 7.5: Weekday PM Peak Hour Post Development Traffic Volumes

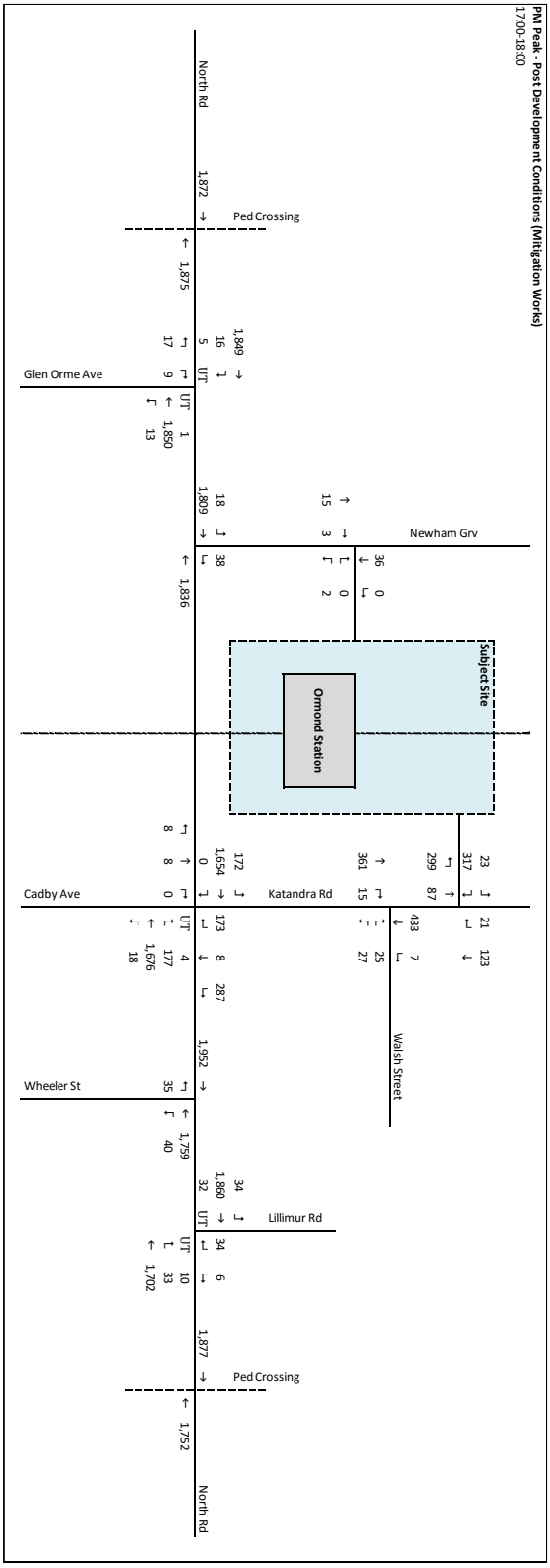
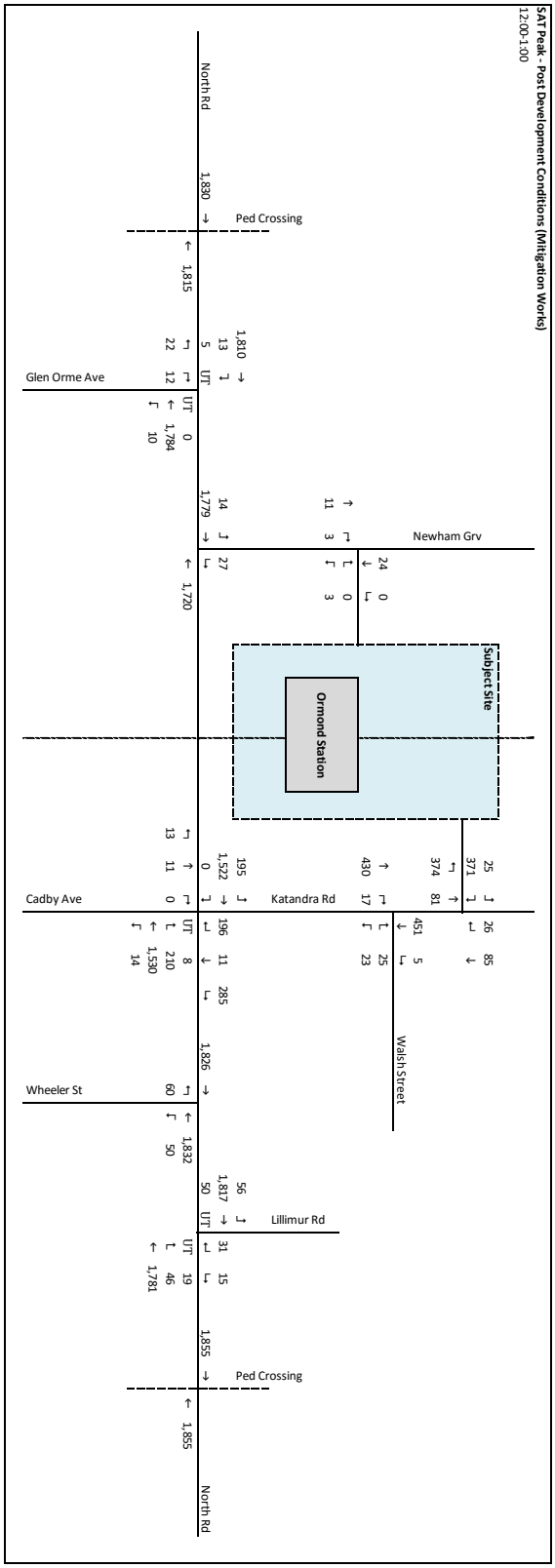


Figure 7.6: Saturday MID Peak Hour Post Development Traffic Volumes



7.7 Traffic Impact Analysis – Peak Hour

7.7.1 Intersection Signalisation

The development of the development opportunity site for the scale and type of uses considered, together with a review of the existing adjacent road network, has culminated in a recommendation to introduce traffic signals at the existing unsignalised North Road/Katandra Road intersection, with some widening of Katandra Road on its approach to North Road.

The proposed concept layout of the signalised intersection (GTA drawing number 16M1141000-01-01, Issue P1) is provided in Appendix B.

Various factors have contributed to this design including:

- A need to balance the operational performance of North Road and the movement of arterial road transport with local access requirements on the side roads of Katandra Road and Cadby Avenue, including:
  - The current level of traffic activity into and out of Katandra Road.
  - The level of additional traffic demand forecast to be generated by the indicative development.
- Existing safety issues between vehicles turning right into Katandra Road from North Road.
- The precinct crossing benefits (for pedestrians) delivered by traffic signals for a new major attractor (supermarket).

7.7.2 SIDRA Network Modelling

A SIDRA Network model (included within the SIDRA Intersection 6 package) has been prepared, which is a computer software package that has the ability to model individual intersections within a network, as well as the overall performance of the network.

7.7.3 Modelling Scenarios

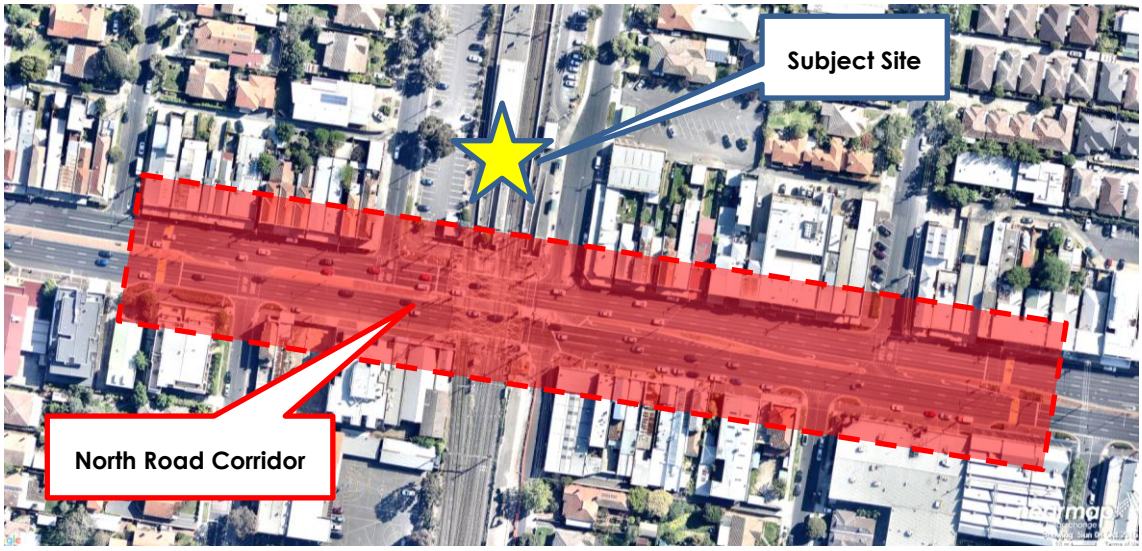
Detailed traffic analysis has been undertaken using the SIDRA Network model.

GTA has developed weekday PM peak and Saturday midday peak models for the nominated study area (corridor) in the immediate vicinity of the subject site. The modelled corridor is identified in Figure 7.7. The base case (with the removal of the level crossing) and post development (with the inclusion of the North Road/Katandra Road signalised intersection) scenarios have been modelled for the two time periods.

In preparing the post development model, the following assumptions have been made:

- The North Road/Katandra Road signalised intersection will operate with a cycle time of 120 seconds in both modelled periods.
- The pedestrian phases are called in every cycle (a conservative on the high side assumption).
- The distance between the North Road/Glen Orme Road intersection and the signalised pedestrian crossing located to its west has been increased in the SIDRA model beyond what is presently available to account for the limitations of the SIDRA network modelling tool and to better calibrate the model.

Figure 7.7: Extent of SIDRA Network Model



7.7.4 External Road Network Modelling Results

The performance of the North Road corridor as well as individual intersections within the corridor under base case and post development conditions has been assessed.

Individual Intersection Performance

In assessing the individual intersection performance, the commonly used measure of performance is referred to as the *Degree of Saturation (DOS)*. The DOS represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. For signalised intersections, a DOS of around 0.95 (0.90 for unsignalised intersections) has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately[4].

Table 7.5 presents a summary of the performance of the various intersections in the North Road corridor.

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

Level of Service		Intersection Degree of Saturation (DOS)		
		Unsignalised Intersection	Signalised Intersection	Roundabout
A	Excellent	<=0.60	<=0.60	<=0.60
B	Very Good	0.60-0.70	0.60-0.70	0.60-0.70
C	Good	0.70-0.80	0.70-0.90	0.70-0.85
D	Acceptable	0.80-0.90	0.90-0.95	0.85-0.95
E	Poor	0.90-1.00	0.95-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0	>=1.0

Table 7.5: North Road Corridor Intersection Performance

Assessment Scenario	Intersection	Peak Hour	Intersection DOS	Intersection Average Delays (secs)	Intersection 95th Percentile Queue (m)
Base Case	North Road/Glen Orme Avenue intersection	Weekday PM	0.62	0.6	11
		Sat MID	0.59	0.8	6
	North Road/Newham Grove intersection	Weekday PM	0.62	0.3	14
		Sat MID	0.59	0.2	3
	North Road/Cadby Avenue/Katandra Road intersection	Weekday PM	0.41	5.8	87
		Sat MID	0.38	5.7	78
	North Road/Wheeler Street intersection	Weekday PM	0.66	0.1	30
		Sat MID	0.61	0.2	25
	North Road/Lillimur Road intersection	Weekday PM	1.84	32	173
		Sat MID	1.98	39	197
Post Development (with Signalised Intersection)	North Road/Glen Orme Avenue intersection	Weekday PM	0.67	0.3	85
		Sat MID	0.65	0.4	74
	North Road/Newham Grove intersection	Weekday PM	0.66	0.3	94
		Sat MID	0.64	0.2	94
	North Road/Cadby Avenue/Katandra Road intersection	Weekday PM	0.73	25	147
		Sat MID	0.82	27	117
	North Road/Wheeler Street intersection	Weekday PM	0.70	0.2	45
		Sat MID	0.66	0.3	41
	North Road/Lillimur Road intersection	Weekday PM	1.56	16	100
		Sat MID	1.80	24	134

Table 7.5 indicates that under the base case scenario all of the intersections in the modelled North Road corridor are expected to operate satisfactorily, with the exception of the North Road/Lillimur Road intersection which is expected to operate above its theoretical capacity. A review of the modelled outputs indicates that the existing right turn movement from Lillimur Road into North Road plus the U-turn movement on North Road are constrained. In response to this perceived existing constraint, the traffic signals at the North Road/Katandra Road intersection will likely draw traffic away from these constrained movements, thereby providing overall road network performance benefits.

Under the post development scenario, all of the intersections in the modelled North Road corridor are expected to operate satisfactorily, with the exception of the North Road/Lillimur Road intersection. However, the performance of this intersection will be improved under the post development conditions compared to the base case conditions. It is also proposed to remove the U-turn slot at the North Road/Lillimur Road intersection, with the existing U-turn movements relocated to the right turn lane on the west approach of the North Road/Katandra Road signalised intersection.

North Road Corridor Performance

Table 7.6 presents the overall performance of the North Road corridor network for the base case and post development scenarios.

Table 7.6: North Road Corridor Performance

Peak Hour	Assessment Scenario	Average Travel Speed (km/h)	Total Travel Time (veh-h/h)	Network Level of Service (LOS)
Weekday PM	Base Case	41.6	124.1	LOS D
	Post Development (with mitigation works)	37.9	154.2	LOS D
Sat MID	Base Case	40.3	125.7	LOS D
	Post Development (with mitigation works)	36.7	160.0	LOS D

Table 7.6 indicates that the post development performance of the North Road corridor with the inclusion of the traffic signals at the North Road/Katandra Road intersection is comparable to the base case performance with the removal of the level crossing, noting:

- The average travel speed through the corridor is expected to decrease marginally by approximately 4km/h.
- The total travel time through the corridor is expected to increase by approximately 34 seconds. Contextually, this equates to an additional delay or change of approximately nine seconds for every 100m travelled along the modelled corridor.

7.7.5 Katandra Road/Proposed Site Access Intersection

The post development performance of a site access intersection on Katandra Road has been assessed using the SIDRA Intersection program. The anticipated performance of the intersection is presented in Table 7.7.

Table 7.7: Katandra Road/Indicative Site Access Intersection

Peak Hour	Intersection DOS	Intersection Average Delays (secs)	Intersection 95th Percentile Queue (m)
Weekday PM	0.43	4.3	16.5
Sat MID	0.55	5.0	25.1

As presented in Table 7.7, the indicative site access on Katandra Road is expected to operate satisfactorily post development.

7.8 Traffic Impact Analysis – Daily

Table 7.8 has been prepared to summarise the anticipated increase in daily traffic volumes on the local road most proximate to the subject site as a result of the indicative development.

Table 7.8: Weekday Daily Traffic Volumes

Location	Existing Average Weekday Daily Flow	Indicative Development Weekday Daily Flow	Post Development Weekday Daily Flow
Katandra Road to south of Walsh Street	2,218vpd [1]	5,907vpd	8,125vpd
Katandra Road to north of Walsh Street	2,020vpd [1]	493vpd	2,513vpd
Newham Grove	620vpd [2]	50vpd	670vpd
Walsh Street	1,661vpd [1]	120vpd	1,781vpd

vpd denotes vehicles per day.

[1] Based on 24-hour pneumatic tube count surveys undertaken in October 2015.

[2] Estimated daily traffic volume based on peak hour traffic counts undertaken at the North Road/Newham Grove intersection in October 2015 and adopting a peak-to-daily ratio of 10%.

Reference is made to Clause 56.06 of the Glen Eira Planning Scheme, with the following considered:

- Katandra Road between North Road and Walsh Street presently exhibits characteristics suitably similar to a 'Connector Street – Level 2' which has an indicative maximum daily traffic volume of 3,000 to 7,000 vehicles per day. However, post development this section of the road will be widened as part of the traffic signal works at the intersection with North Road. It is expected that these works will increase the indicative maximum daily traffic volume capacity of the road beyond the upper threshold of a 'Connector Street – Level 2'.
- Katandra Road to the north of Walsh Street exhibits characteristics suitably similar to a 'Connector Street – Level 2' which has an indicative maximum daily traffic volume of 3,000 to 7,000 vehicles per day. The anticipated post development daily traffic volume on Katandra Road to the north of Walsh Street is less than the indicative maximum daily traffic volume for a 'Connector Street – Level 2'.
- Newham Grove exhibits characteristics suitably similar to an 'Access Street – Level 2' which has an indicative maximum daily traffic volume of 2,000 to 3,000 vehicles per day. The anticipated post development daily traffic volume on Newham Grove is less than the indicative maximum daily traffic volume for an 'Access Street – Level 2'.
- Walsh Street exhibits characteristics suitably similar to an 'Access Street – Level 2' which has an indicative maximum daily traffic volume of 2,000 to 3,000 vehicles per day. The anticipated post development daily traffic volume on Walsh Street is less than the indicative maximum daily traffic volume for an 'Access Street – Level 2'.

7.9 Traffic Impact Analysis – Summary

Against existing traffic volumes in the vicinity of the subject site, the additional traffic generated by the indicative development could not be expected to compromise the safety or function of the surrounding road network.

8. Conclusion

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

i Given its locational characteristics and proximity to public transport opportunities, the development opportunity site is one where there should be consideration to car parking rates lower than the standard requirements. Recommended minimum and maximum car parking rates for various land uses have been identified in this report.

ii The car parking layout should be designed in accordance with the Planning Scheme, and where appropriate, the relevant Australian Standard requirements. The exception to this is the car parking layout for a supermarket use, which should be designed in accordance with the supermarket operator's requirements. These typically provide more generous car parking spaces than the Planning Scheme and the relevant Australian Standard.

iii Bicycle parking for the land uses on the subject site should be delivered in accordance with the standard requirements of Clause 52.34 of the Planning Scheme.

iv Loading for the supermarket and retail uses should occur on-site. The loading areas should be designed in accordance with the Planning Scheme and relevant Australian Standard requirements.

v Waste collection should occur on-site. The waste collection should be controlled by a Waste Management Plan.

vi The indicative development considered in this report is expected to generate up to 667 vehicle movements in the weekday PM peak hour and 802 vehicle movements in the Saturday midday peak hour.

vii It is proposed to mitigate the impact of the indicative development traffic on the performance of the surrounding road network with the provision of traffic signals at the North Road/Katandra Road intersection, with some widening of Katandra Road on its approach to North Road.

viii Against existing traffic volumes in the vicinity of the subject site, and with the delivery of road infrastructure improvements, the additional traffic generated by the indicative development could not be expected to compromise the safety or function of the surrounding road network.

Appendix A

Existing Conditions

A.1 Road Network

A.1.1 Adjoining Roads

North Road

North Road functions as a primary state arterial road (VicRoads controlled). It is a two-way road aligned in an east-west direction and configured with a six-lane, 18m wide carriageway (approximately) set within a 30m wide road reserve (approximately).

Adjacent to the subject site, North Road carries approximately 38,675 vehicles per weekday[5].

Katandra Road

Katandra Road functions as a local road (Council controlled). It is a two-way road aligned in a north-south direction and configured with a two-lane, 8m wide carriageway (approximately) set within a 13m wide road reserve (approximately). There is presently a bus zone and taxi zone on the west side of the road close to the intersection with North Road.

Katandra Road carries approximately 2,218 vehicles per weekday[6].

Newham Grove

Newham Grove functions as a local road (Council controlled) and is a two-way road aligned in a north-south direction and configured with a two-lane, 7m wide carriageway (approximately) set within a 15m wide road reserve (approximately). Kerbside car parking is permitted.

Newham Grove carries approximately 620 vehicles per weekday[7].

Traffic Volumes

GTA undertook traffic movement counts on the road network surrounding the subject site in October 2015.

The weekday PM, and Saturday midday peak hour traffic volumes are shown in Figure A.1 and Figure A.2.

[5] Based on the peak hour traffic counts undertaken by GTA in October 2015 and assuming a peak-to-daily ratio of 8% for an arterial road and 10% for local roads.

[6] Based on 24-hour pneumatic tube count surveys commissioned by GTA in October 2015.

[7] Based on the peak hour traffic counts undertaken by GTA in October 2015 and assuming a peak-to-daily ratio of 8% for an arterial road and 10% for local roads.

Figure A.1: Existing Weekday PM Peak Hour Traffic Volumes

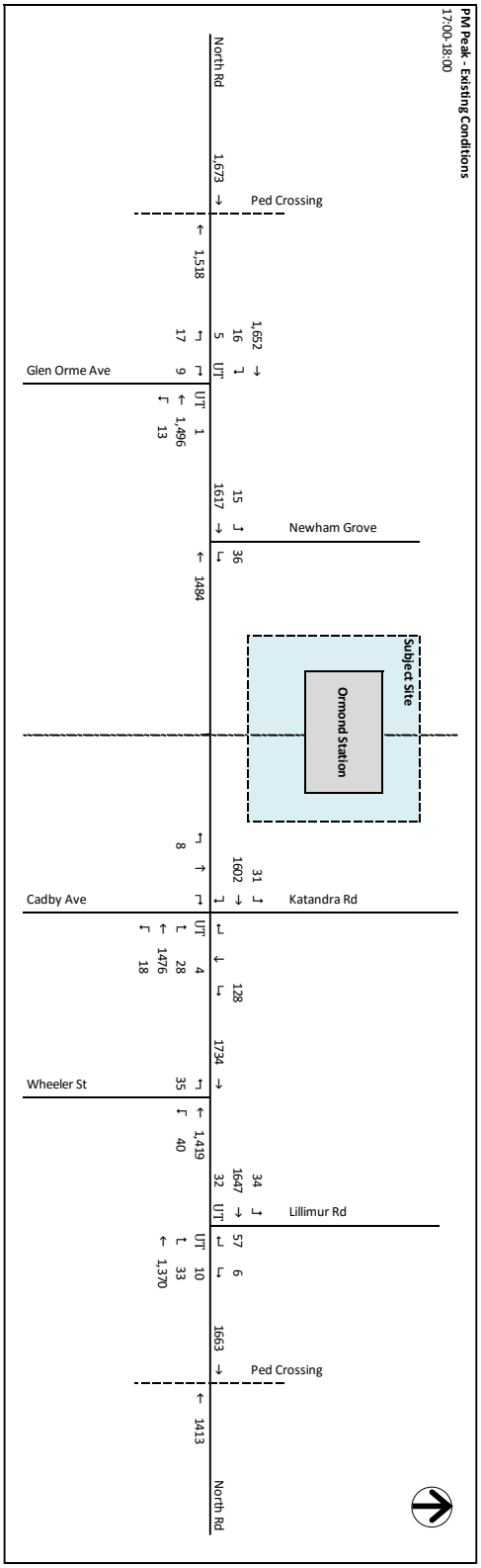
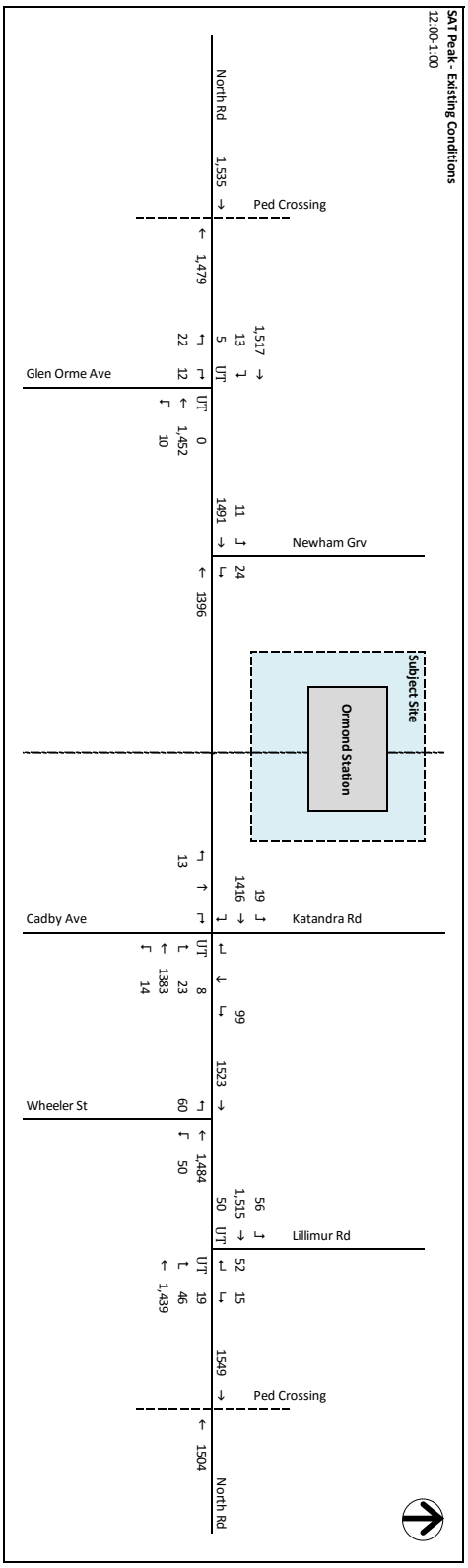


Figure A.2: Existing Saturday MID Peak Hour Traffic Volumes

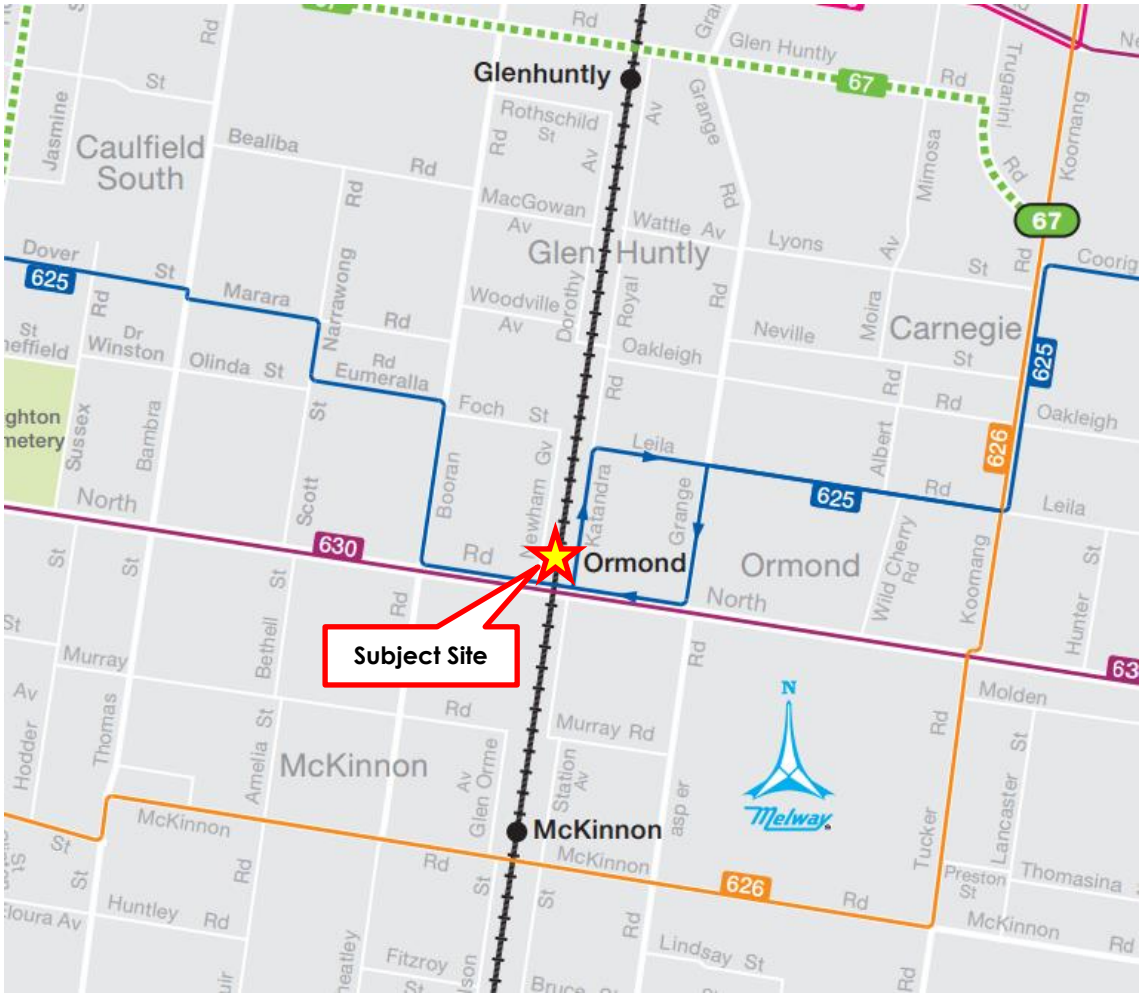


A.1.2 Sustainable Transport Infrastructure

Public Transport

Figure A.3 shows the subject site in relation to existing public transport routes within its vicinity whilst Table A.1 summarises the road based routes and major destinations that can be reached using these services.

Figure A.3: Public Transport Map



(Reproduced from PTV Website)

Table A.1: Road Based Public Transport Provision

Service	Route Nos	Route Description	Distance to Nearest Stop (m)	Significant Destinations On Route	Frequency On/Off Peak
Bus	200	City (Queen St) - Bulleen	700m	Kew Junction, Melbourne Central, Melbourne CBD	20mins/30mins
	207	City – Doncaster SC via Kew Junction	700m	Doncaster Shopping Centre, Willsmere Shopping Centre, Melbourne CBD	20mins/30mins
	609	Hawthorn to Fairfield via Kew	400m	Fairfield Railway Station, Trinity Grammar School, Hawthorn Railway Station	Limited Services
Tram	16	Monash University – Kew via St Kilda Beach	450m	Melbourne University, Melbourne CBD, Melbourne Central Station, Malvern Railway Station.	10mins/20mins
	48	North Balwyn – Victoria Harbour Docklands	150m	Kew Junction, Melbourne CBD	10mins/15mins
	109	Box Hill – Port Melbourne	430m	Balwyn Shopping Centre, Parliament Railway Station, Melbourne CBD	8 mins/20mins

Pedestrian Infrastructure

Sealed pedestrian footpaths are provided on all streets in the vicinity of the subject site. In addition, the nearest signalised pedestrian crossing of North Road is provided at the intersection with Katandra Road.

Bicycle Infrastructure

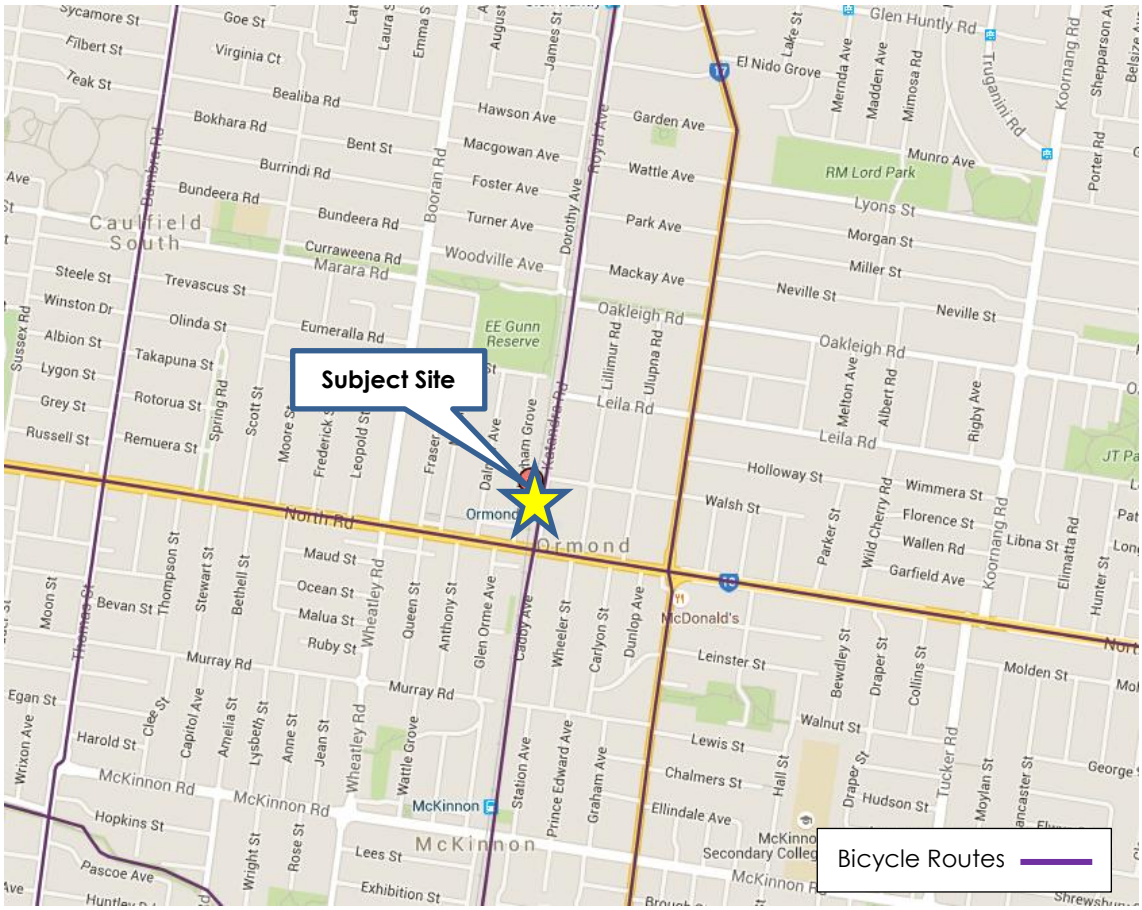
The Principal Bicycle Network (PBN) is a network of on and off-road cycling corridors that have been identified to support cycling for transport and access to major destinations in metropolitan Melbourne. The PBN was reviewed and updated in 2012 by VicRoads and all local Councils.

The PBN is also a 'bicycle infrastructure planning tool' to guide State investment in the planning and development of the future metropolitan Melbourne bicycle network. In this regard, a subset of the PBN has been identified and elevated to a higher level of priority, mainly on the basis of potential for separation from motorised traffic, making these routes more attractive to less experienced bike riders. These cycling corridors are referred to as Bicycle Priority Routes (BPRs) and form part of the modal priorities for the road network set out in the VicRoads SmartRoads framework. Strategic Cycle Corridors (SCC) form another subset of the PBN, and represent an initiative outlined in Plan Melbourne to support walking and cycling in Central Melbourne. SCCs are intended to be corridors designed to provide high quality bicycle infrastructure to, and around, major activity areas in metropolitan Melbourne. Plan Melbourne outlines a subset of the SCCs for the proposed expanded central city area.

It is noted that the type of bicycle facility (i.e. on or off-road and separated or shared) has not been indicated as part of the PBN and BPRs. Rather, the PBN and BPRs show the proposed cycling network. The associated facilities should be delivered in accordance with the relevant standards and guidelines, such as the Australian Standards, Austroads Guides and VicRoads' Cycle Notes.

The PBN and BPRs in the vicinity of the subject site are shown in Figure A.4.

Figure A.4: VicRoads Principal Bicycle Network and Bicycle Priority Routes



(Reproduced from TransMaps Website)

Safety Assessment

A review of the reported casualty accident history for the roads and intersections adjoining the subject site has been sourced from VicRoads CrashStats accident database. This database records all accidents causing injury that have occurred in Victoria since 1987 (as recorded by Victorian Police) and categorises these accidents as follows:

- Fatal injury: at least one person was killed in the accident or died within 30 days as a result of the accident.
- Serious injury: at least one person was sent to hospital as a result of the accident.
- Other injury: at least one person required medical treatment as a result of the accident.

A summary of the accidents in the vicinity of the site for the five-year period 1 January 2009 to 31 December 2012 is presented in Table A.2.

Table A.2: Casualty Accident History

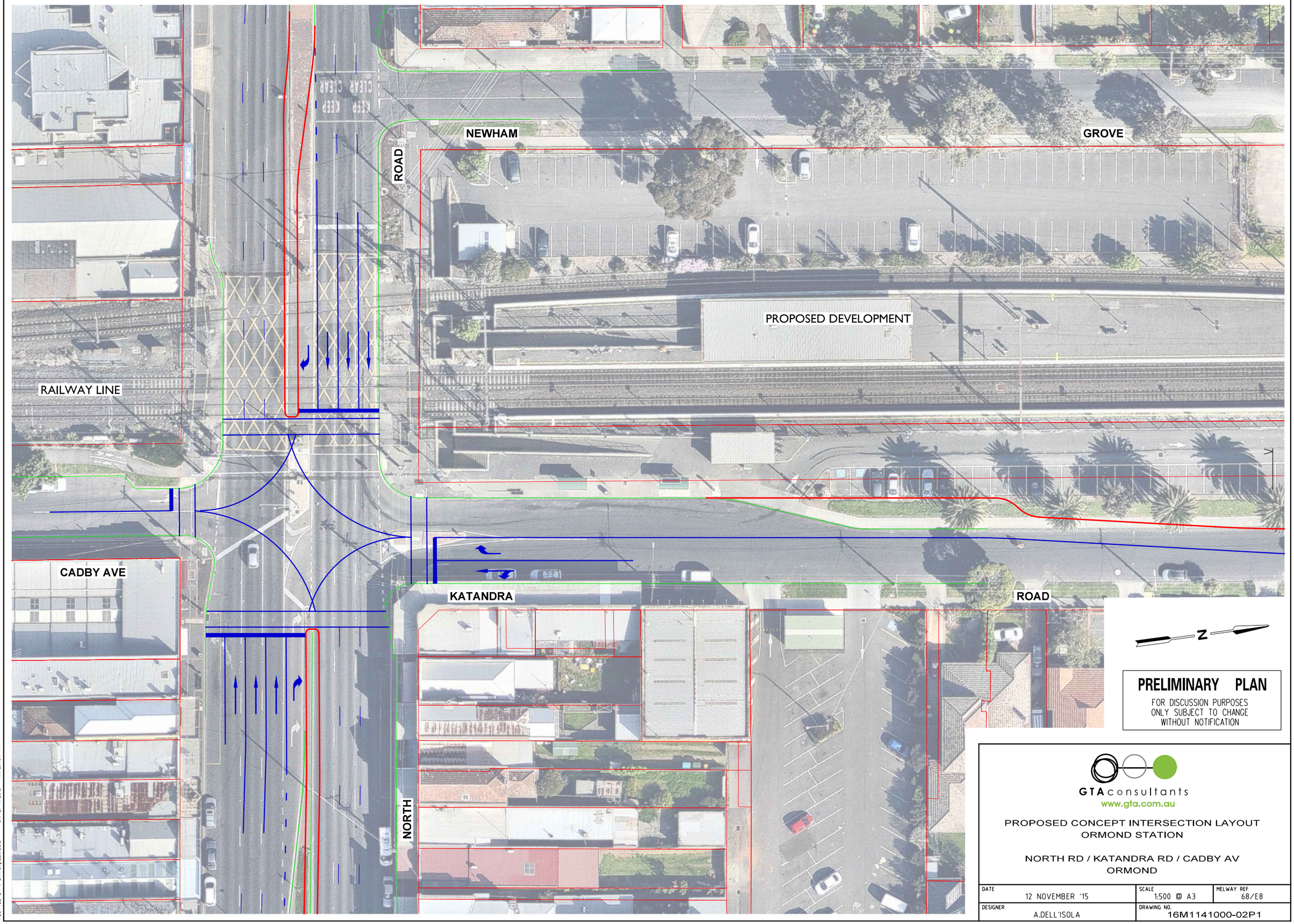
Location	Accident No.		
	Fatality	Serious Injury	Other Injury
Roads Fronting Site			
North Road	-	1	2
Nearby Intersections			
North Road/Newham Grove	-	1	1
North Road/Katandra Road/Cadby Avenue	-	1	2
Katandra Road/Walsh Street	-	-	1

Source: VicRoads

Table A.2 indicates that no significant accident history or accident pattern exists on the road network surrounding the subject site.

Appendix B

North Road/Katandra Road/Cadby Avenue Signalised Intersection Concept Layout



N

PRELIMINARY PLAN

FOR DISCUSSION PURPOSES
ONLY SUBJECT TO CHANGE
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PROPOSED CONCEPT INTERSECTION LAYOUT
ORMOND STATION

NORTH RD / KATANDRA RD / CADBY AV
ORMOND

DATE	SCALE	MELWAY REF
12 NOVEMBER '15	1:500 @ A3	68/E8
DESIGNER: A.DELL'ISOLA	DRAWING NO.: 16M1141000-02P1	

PLOTTED BY : anthony.dellisola ON 12/11/2015 AT 3:14:11 PM

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