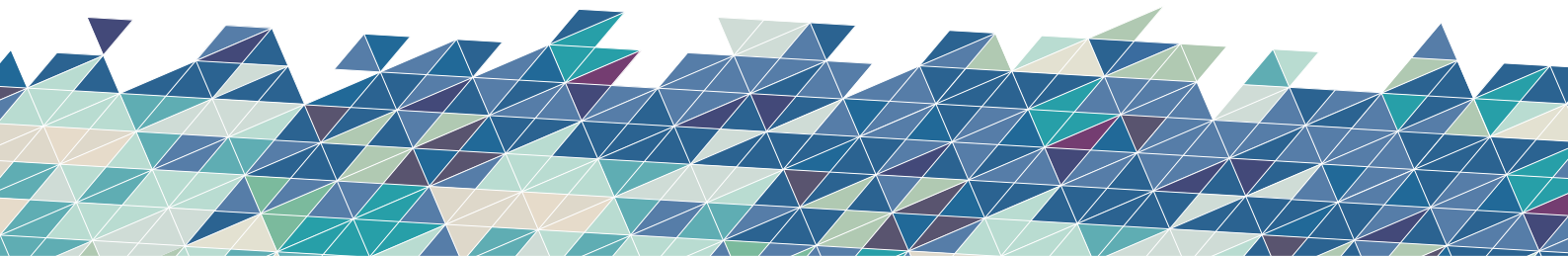


ALKIMOS COASTAL NODE LOCAL STRUCTURE PLAN

Appendix 8

Traffic and Movement Network Report and
Addendum





**ALKIMOS COASTAL NODE LSP:
TRAFFIC & MOVEMENT NETWORK**

CITY OF WANNEROO

Final Report

For

LandCorp Pty Ltd

April 2014

Bruce Aulabaugh

Traffic Engineering & Transport Planning

Integrated Transport Solutions for Sustainable Communities

FINAL REPORT

Alkimos Coastal Node Local Structure Plan

Traffic & Movement Network

For LandCorp
Date: April 2014

Reference: Alkimos Coastal Node

Bruce Aulabaugh

ABN: 36 329 608 551

Traffic Engineering & Transport Planning

Unit 5, 18 Fogerthorpe Crescent
Maylands WA 6051

Telephone: 0402 919 933 / Facsimile: 9370-2432
brucea@iinet.net.au

This report has been prepared in accordance with the scope of services described in the contract or agreement between Bruce Aulabaugh and the Client. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client. Furthermore, the report has been prepared solely for use by the Client and Bruce Aulabaugh accepts no responsibility for its use by other parties.

Approved by: Bruce Aulabaugh (Traffic/ Transport Engineer)

Signed:



Date: April 29 2014

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1	INTRODUCTION	1
2	REGIONAL ROAD NETWORK	1
3	ROAD HIERARCHY & INTERSECTION CONTROL	2
4	STREET CROSS-SECTIONS	5
5	ULTIMATE DEVELOPMENT TRAFFIC FORECASTS	5
6	LOCAL TRAFFIC MANAGEMENT PLAN	11
7	PEDESTRIAN & CYCLIST FACILITIES	14
8	BUS SERVICES	14
9	ACTIVITY CENTRE PARKING & ACCESS PRINCIPLES	17
APPENDIX A:	DISTRICT STRUCTURE PLAN	
APPENDIX B:	LPP 3.8 MARMION AVE ACCESS POLICY	
APPENDIX C:	ADJACENT LSP INFORMATION	
APPENDIX D:	STREET CROSS-SECTIONS	
APPENDIX E:	NW CORRIDOR TRAFFIC MODELLING INFORMATION	
APPENDIX F:	DISTRICT BUS ROUTES PLANS	

EXECUTIVE SUMMARY

Road Network and Road Function

Alkimos Coastal Node Local Structure Plan (LSP) is to be served by the following key roads, as indicated in the Alkimos Eglinton District Structure Plan and the Perth Metropolitan Region Scheme:

- Mitchell Freeway (ultimate 6-lane freeway, Primary Regional Road in MRS with Primary Distributor function).
- Marmion Avenue (ultimate 4-lane divided arterial, Other Regional Road in MRS with District Distributor Type A function).
- Alkimos Drive (ultimate 4-lane divided arterial, Other Regional Road in MRS with District Distributor Type A function).
- Alkimos Drive West (2-lane Neighbourhood Connector linking NS1 to Marmion Avenue and Alkimos Drive).
- Romeo Road (ultimate 4-lane divided arterial, Other Regional Road in MRS with District Distributor Type A function)
- Graceful Boulevard (2-lane divided minor arterial, District Distributor Type B linking Alkimos Coastal Node LSP to Marmion Avenue and Romeo Road)
- NS1 (2-lane boulevard style Neighbourhood Connector providing the main north-south traffic route in the Alkimos Coastal Node LSP. It serves the STS Bus Route and links Alkimos Coastal Node to Graceful Boulevard and to Alkimos Drive West).
- NS2 (2-lane single carriageway, traffic calmed, low order Neighbourhood Connector providing supplementary north-south connectivity in the Alkimos Coastal Node area).

Street Design

The Alkimos Coastal Node LSP street design is in conformance with Liveable Neighbourhoods Policy as applied in the City of Wanneroo. Any variations to Liveable Neighbourhoods Policy are agreed with the City of Wanneroo and sanctioned by WAPC at subdivision approval stage.. The street types and road reserve characteristics are described below:

- Residential Access Streets: reserve width 16m.
- Activity Centre Access & Circulation Streets: reserve width is 18m.
- Neighbourhood Connectors: typical reserve width range is 18-25m. Where a 6m central median is required on road NS1, the road reserve is increased to 28m wide.

Local Traffic Treatments

Intersection controls and local traffic management treatments include:

- 50km/ hr default speed limit in built up areas.
- Traffic signals or roundabouts at high order intersections;
- Sign controlled (stop or give-way) 4-way intersections;
- Speed control device (i.e. intersection plateau treatment)
- Urban Centre Speed Zone
- Roundabouts are identified at the busier 4-way intersections and near schools to assist in slowing traffic and managing U-turn demand.

In the Alkimos Coastal Node there are numerous 4-way intersections that will need to be reviewed at subdivision stage to confirm the appropriate traffic control and design features. These reviews will be done in consultation with the CoW and MRWA.

Pedestrian/ Cyclist Facilities

- Foreshore: A recreational path will be provided as part of the Foreshore facilities.
- Public Open Space: secondary recreation path links are incorporated into POS areas and link to the wider network of paths.
- Activity Centre Access & Circulation Streets: Urban verge footpath both sides with varying width to suit pedestrian needs and street furniture needs.
- Neighbourhood Connectors (traffic > 3000 veh/day): Shared path one side, footpath opposite side, cycle lanes both sides. Neighbourhood Connectors (traffic < 3000 veh/day): Shared path one side and footpath opposite side.
- Residential Access Streets: footpaths typically on both sides but occasionally on only one side when traffic volumes and pedestrian volumes are sufficiently low and traffic speeds are sufficiently low.

Local road crossings will generally be unmarked and will have kerb ramps and pedestrian gaps in medians. There may be a requirement for a zebra pedestrian crossing at the foreshore within the Activity Centre area. The need and location for any such crossing will be determined at subdivision design stage when detailed land use planning and street design are undertaken.

Bus Services

Alkimos Coastal Node LSP will be served by the STS high frequency bus service. The STS will operate between Eglinton Station and Alkimos Station and will use local road NS1 within the Alkimos Coastal Node. The target service frequency is 10 minutes during peak periods and 15minutes during inter-peak periods. Bus stops location and design will be determined at subdivision stage in consultation with Transperth and the City of Wanneroo.

1. INTRODUCTION

This report presents traffic and transport planning information for the *Alkimos Coastal Node LSP Plan* in the City of Wanneroo. The scope of works includes traffic forecasting, road access planning, local street design, local traffic treatments, pedestrian/cyclist facilities and bus services.

Figure 1 (locality plan) shows the Alkimos Coastal Node LSP, located within the Alkimos-Eglinton District Structure Plan area. Please refer to *Appendix A* for a copy of the Alkimos-Eglinton DSP.

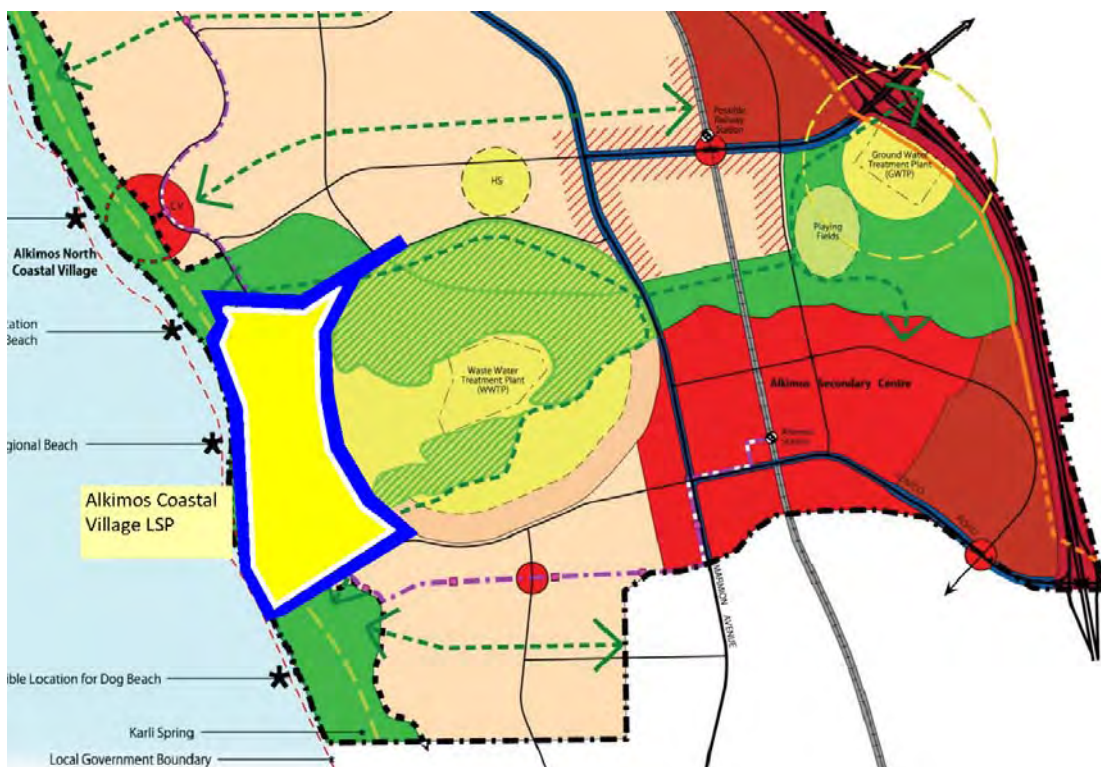


Figure 1: Alkimos Coastal Node LSP Locality Plan (shown in context of Alkimos-Eglinton DSP)

2. REGIONAL TRANSPORT

The future Mitchell Freeway is identified in the Metropolitan Region Scheme (MRS) as a Primary Regional Road. Marmion Avenue, Romeo Road and Alkimos Drive are identified as Other Regional Roads with road reserves designed to accommodate 4-lane divided arterials.

Marmion Avenue is constructed as a 4-lane divided arterial road to Lukin Drive. From Lukin Drive to Benneden Avenue it is constructed as a 2-lane landscaped boulevard. Marmion Avenue, north of Benneden Avenue up to Yanchep Beach Road is constructed to a 2-lane undivided rural road standard. It is expected that Marmion Avenue will require upgrading to 4-lane divided arterial by year 2021 or shortly thereafter.

The Mitchell Freeway is currently constructed to Burns Beach Road. The *Mitchell Freeway Extension Strategic Business Case* (SKM Nov 2012) recommends a series of road improvements in the North West Corridor, including the extension of Mitchell Freeway to Romeo Road by 2021:

<p>Option F: extend Mitchell Freeway to Romeo Road, complete East/West links to Flynn Drive and Hester Avenue and complete duplication of Wanneroo Road</p>	<ul style="list-style-type: none"> • Extend Mitchell Freeway as four lane freeway to Romeo Road as per Option E • Construct new Mitchell Freeway intersections as per Option E • Extend Romeo Road as per Option E • Construct new/upgraded link Neerabup Road from Marmion Avenue to Flynn Drive (4.5km) • Complete duplication of Hester Avenue as per Option A • Complete duplication of Wanneroo Road as per Option C • Duplicate Connolly Drive as per Option D
--	---

The duplication of Marmion Avenue to a 4-lane facility was included in all options considered as part of the Mitchell Freeway Extension Study, so was not listed separately.

The existing Northern Suburbs Rail Line runs to Clarkson. A rail reserve is in place through the northern part of the NW Corridor but the alignment has been reviewed and the rail reservation is subject to change through an amendment to the MRS.

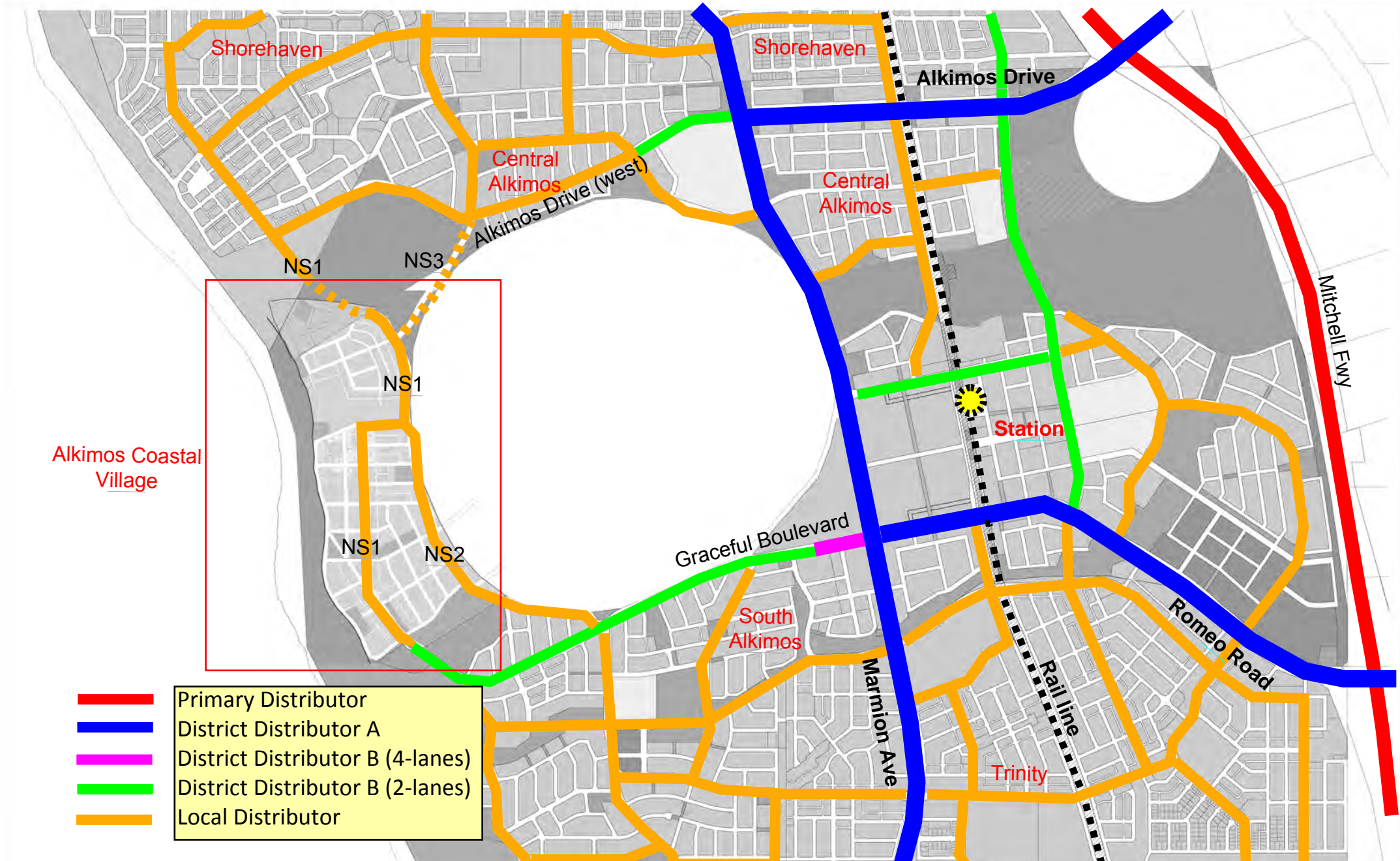
On November 26, 2009 the Minister for Transport announced the rail line extension from Clarkson to the proposed Butler Station (i.e. 7.5km extension). The extension is scheduled to be in operation by the end of year 2014.

There is no firm date for extending rail service to the Alkimos City Centre Station but it is hoped that it can be achieved around year 2021 or shortly thereafter.

3. DISTRICT ROAD HIERARCHY & INTERSECTION CONTROL

3.1 DISTRICT ROAD HIERARCHY AND ROAD ACCESS PLANNING

An overall 'district' level road hierarchy and arterial access plan is presented in *Figure 2* (overleaf) and incorporates the Alkimos Coastal Node LSP neighbourhood connectors, NS1 and NS2. Figure 2 is based on the Alkimos Eglinton District Structure Plan as modified by City of Wanneroo Local Planning Policy 3.8 (LPP 3.8). An excerpt of LPP 3.8 is provided in *Appendix B*.



Alkimos Coastal Node LSP
 Bruce Aulabaugh Traffic Engineering & Transport Planning

Figure 2 District Road Hierarchy

A brief description is provided below of the key roads shown in *Figure 2*:

- Mitchell Freeway (ultimate 6-lane freeway, Primary Regional Road in MRS with Primary Distributor function).
- Marmion Avenue (ultimate 4-lane divided arterial, Other Regional Road in MRS with District Distributor Type A function).
- Alkimos Drive (ultimate 4-lane divided arterial, Other Regional Road in MRS with District Distributor Type A function).
- Alkimos Drive West (2-lane Neighbourhood Connector linking NS1 to Marmion Avenue and Alkimos Drive).
- Romeo Road (ultimate 4-lane divided arterial, Other Regional Road in MRS with District Distributor Type A function)
- Graceful Boulevard (2-lane divided minor arterial, District Distributor Type B linking Alkimos Coastal Node LSP to Marmion Avenue and Romeo Road)
- NS1 (2-lane boulevard style Neighbourhood Connector providing the main north-south traffic route in the Alkimos Coastal Node LSP. It serves the STS Bus Route and links Alkimos Coastal Node to Graceful Boulevard and to Alkimos Drive West).
- NS2 (2-lane single carriageway, traffic calmed, low order Neighbourhood Connector providing supplementary north-south connectivity in the Alkimos Coastal Node area).

3.2 DESIGN COORDINATION WITH CENTRAL ALKIMOS LSP AND SOUTH ALKIMOS LSP

The planning of the Alkimos Coastal Node LSP road network has taken into account the proposed Central Alkimos LSP road network and the approved South Alkimos LSP road networks. Refer to *Appendix C* for transport planning information for the adjacent structure plan areas.

4. STREET CROSS-SECTIONS

Street cross-section drawings (*Appendix D*) have been prepared for the key street types within the Alkimos Coastal Node LSP Plan application area. The medians, travel lanes, cycle lanes and footpath/ shared path provisions are consistent with the forecast vehicle traffic and the functional role specified for each road.

The street types and road reserve characteristics are described below:

- Residential and Mixed Use Laneway: reserve width of 6m plus 1m garage setback.
- Activity Centre Commercial Laneway: reserve width of 7m plus 1m building setback.
- Residential Access Streets: reserve width 16m.
- Activity Centre Access & Circulation Streets: reserve width is 18m.
- Neighbourhood Connectors: typical reserve width range is 18-25m.
- District Distributor Type B (DDB): There is a small section of NS1 (near south boundary) identified as a DDB.

The major implication is that traffic volumes may exceed 7,000 veh/day and a 6m median may be required to accommodate right turning vehicles at full access T-junctions. In this circumstance, a 6m central median is required and the road reserve is increased to 28m wide.

The cross-sections presented in *Appendix D* are in conformance with Liveable Neighbourhoods Policy as applied in the City of Wanneroo.

5. ULTIMATE DEVELOPMENT TRAFFIC FORECAST

5.1 BACKGROUND INFORMATION

Ultimate development stage traffic forecasts have been produced using a PM Peak Hour traffic model for the NW Corridor. The traffic model covers an area from Hester Avenue (south boundary) to Wilbinga Reserve (Two Rocks, north boundary) and from the coast (west boundary) to Old Yanchep Road (east boundary, located east of Wanneroo Road). Refer to *Figure 3* showing the extent of the modelled road network.

The traffic model land use information is taken from district and local structure plans and from information provided by the CoW and MRWA. For the Alkimos Coastal Node LSP Plan, the residential dwelling schedule has been provided by David Lock Associates, the employment information has been provided by RPS and the beach public open space related parking supply estimate has been provided by AECOM.

The MRWA Regional Operation Model (ROM) provided a 24 hour sub-area vehicle trip matrix for this 'ultimate corridor development scenario'. This ROM vehicle trip matrix provided through trip and internal/ external trip pattern information. The Department of Planning Strategic Transport Evaluation Model (STEM) and provided person trip rate information and the Department of Transport provided guidance on mode splits for use in the model. Refer to *Appendix E* for more information on traffic model inputs/ outputs.



Figure 3. NW Corridor Traffic Model Network (Bruce Aulabaugh)

5.2 BASE NETWORK (WITH ROAD LINK NS3 TO CENTRAL ALKIMOS LSP)

NW Corridor Ultimate Development Traffic Model daily traffic forecast for the ultimate development base case network is shown in *Figure 4*. The base case network includes road NS3 linking direct to Central Alkimos through regional open space.

Summary traffic range forecasts are provided below for key roads in the study area:

- NS1 (north section, north of NS3): 3400-3600 veh/day
- NS1 (middle north section, south of NS3): 9000 veh/day
- NS1 (middle section in Activity Centre): 3600-5500 veh/day
- NS1 (south section, north of Graceful Boulevard) : 9550 veh/day
- NS3 (north-east link to Central Alkimos) : 6000 veh/day
- NS2 (water treatment buffer road) : 3000-4150 veh/day
- Beach Foreshore Access Street: 800-2000 veh/day

The forecast traffic levels are generally within design specifications for the road types indicated in *Figure 2* and are adequately catered for by the proposed street cross-sections (*Section 4*) and intersection designs (*Section 6*).

There are two sections of NS1 that are forecast to carry approximately 9000-9500 veh/day. These sections will require a 6m wide median to cater for right turn vehicle storage at full access intersections. These sections of road are highlighted in the Alkimos Coastal Node Traffic Management Plan (*Figure 6*), which is located in *Section 6* of this report. Notes have also been added to the street cross-sections to deal with these special circumstances.

5.3 ALTERNATIVE NETWORK (WITHOUT ROAD LINK NS3 TO CENTRAL ALKIMOS LSP)

Due to the environmental and economic costs associated with NS3 which runs through regional open space, an alternative network was tested. The NW Corridor Ultimate Development Traffic Model daily traffic forecast excluding NS3 is shown in *Figure 5*.

Summary traffic range forecasts are:

- NS1 (north section, link to Shorehaven) : 7700 veh/day
- NS1 (middle north section, south of NS3): 7200 veh/day
- NS1 (middle section in Activity Centre) : 3200-5800 veh/day
- NS1 (south section, north of Graceful Boulevard) : 10150 veh/day
- NS3 (removed)
- NS2 (water treatment buffer road) : 2600-4300 veh/day
- Beach Foreshore Access Street: 700-2000 veh/day

The main effects of removing NS3 are:

- Approximately 3000 veh/day additional traffic on Alkimos Drive West near the coast.
- Approximately 4000 veh/day additional traffic on NS1 north section linking to Alkimos Drive West at the coast.

It also appears that around 500-700 veh/day of Alkimos Coastal Node traffic is redistributed to the south and south-east instead of to the north and north-east.

The overall effects of removing NS3 appear manageable but because the most significant traffic effects are within the Shorehaven LSP and Central Alkimos LSP, consultation with representatives of those areas and with the City of Wanneroo is recommended prior to excluding NS3 from the Alkimos Coastal Node LSP.

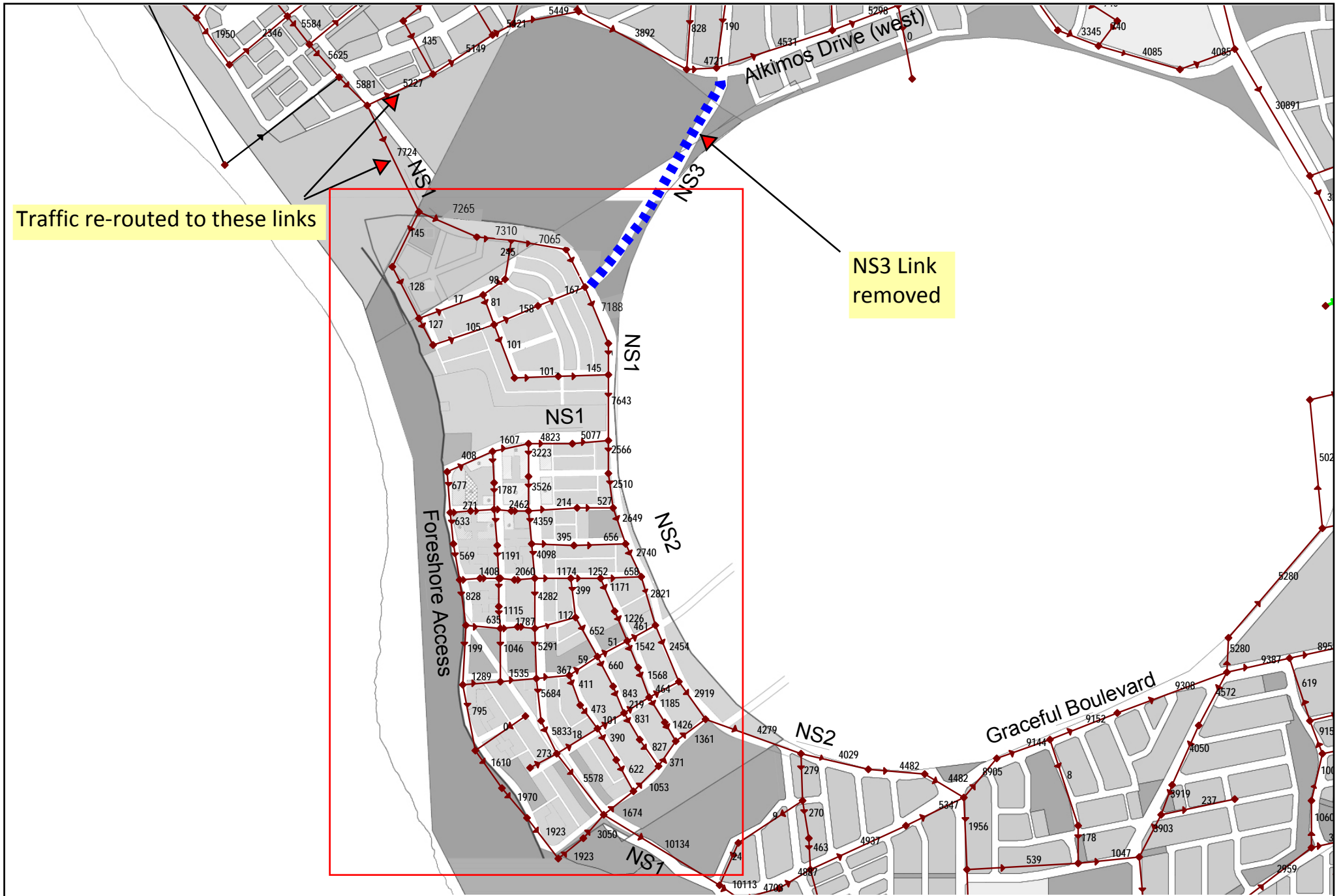
5.4 COMMENTS ON NETWORK ROBUSTNESS IN THE EVENT OF A POSSIBLE FUTURE MARINA

It has not yet been confirmed whether the development of a Marina will be pursued for the Alkimos Coastal Node, and certainly it is not anticipated in the short to medium term of the development. The proposed Alkimos Coastal Node Local Structure Plan is not dependent on the delivery of a marina, nor does it preclude the development of a marina in the future.

The current road network and its associated reserves are robust enough to accommodate access to a Marina should one be approved in the future, though this may result in the requirement for some road pavement widening and intersection modifications near the Marina. The need for and location of any specific modifications can only be determined when the planning and design for the Marina is undertaken.



Alkimos Coastal Node LSP
 Bruce Aulabaugh Traffic Engineering & Transport Planning
 Figure 4 Ultimate Development Traffic Forecast (veh/day)



Traffic re-routed to these links

NS3 Link removed

6. LOCAL TRAFFIC MANAGEMENT

6.1 VEHICLE ACCESS TO DISTRICT DISTRIBUTOR TYPE B (DDB)

There is a general presumption for direct individual (private) property access from District Distributor Type B roads which meet the required combination of land use and access management design measures as set out in *Liveable Neighbourhoods* policy. It is particularly important that 'forward gear vehicle access' is provided along DDB roads.

On roads which do not meet the design requirements for direct private property vehicle access, indirect vehicle access via a public street (i.e. a laneway, a side street or a CAP Road) is to be provided. Detailed investigations will be required at subdivision stage to establish the appropriate access design configuration.

There is a small section of NS1 which is shown as a DDB within the Alkimos Coastal Node LSP. This section is at the southern boundary where a number of local roads converge with NS1 leading into the South Alkimos LSP. Traffic volumes on this section of NS1 are forecast to be as high as 9,600 veh/day.

6.2 VEHICLE ACCESS TO NEIGHBOURHOOD CONNECTORS AND ACCESS STREETS

All Neighbourhood Connectors and Access Streets are presumed to be suitable to provide direct vehicle access to fronting properties. Those Neighbourhood Connectors expected to carry traffic exceeding 5,000 veh/day will require a review of access management options at subdivision stage.

6.3 LOCAL TRAFFIC MANAGEMENT AND INTERSECTION TREATMENTS

Figure 6 identifies special traffic management treatments for the Alkimos Coastal Node LSP street layout design. These include:

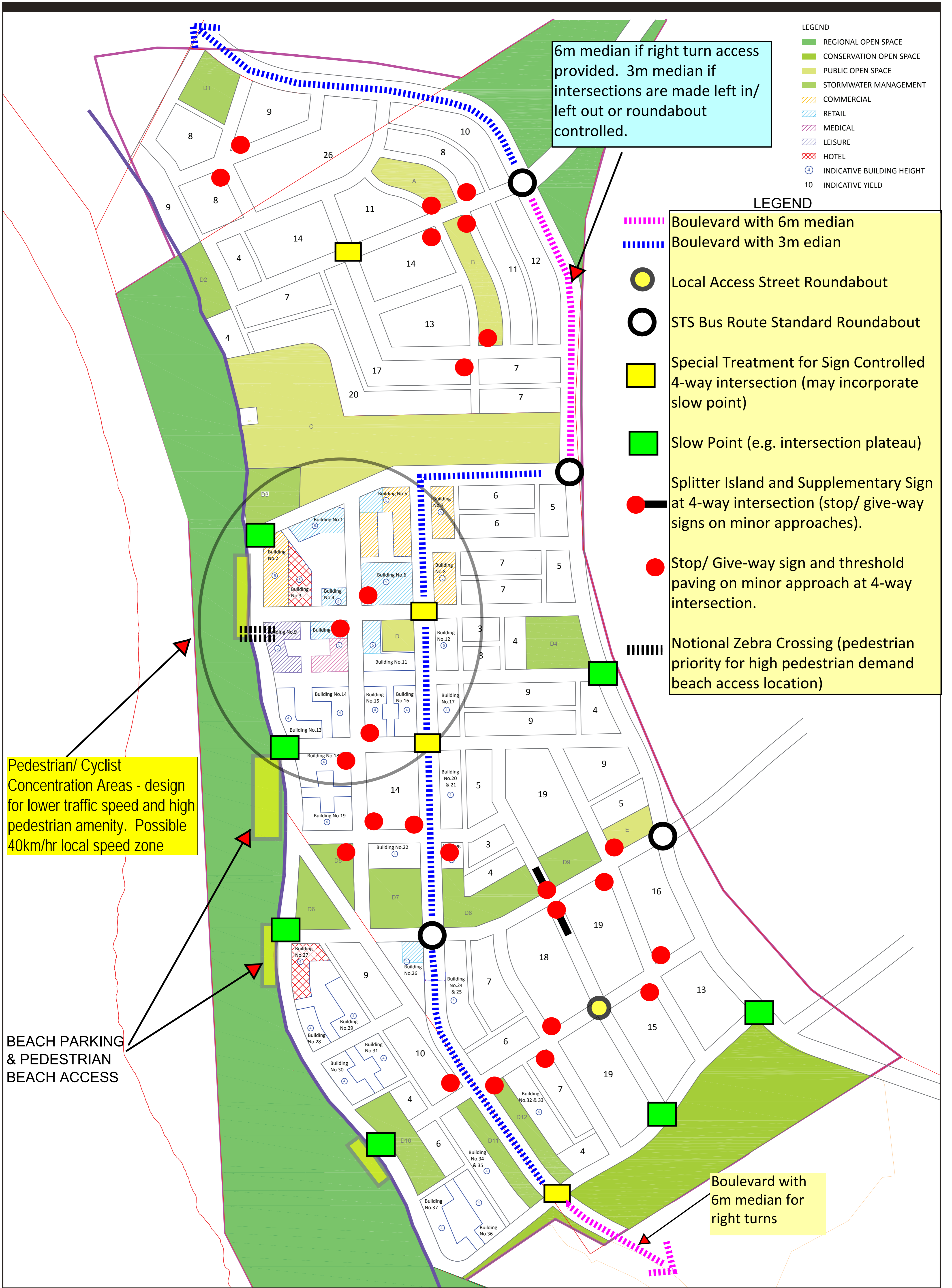
- 50km/hr default speed limit in built up areas (this will apply to local streets).
- Roundabouts;
- Special 4-way intersection treatment;
- Speed control device (i.e. intersection plateau treatment)
- 40km/hr Local Speed Zone at the Activity Centre

Speed limits are determined by MRWA and are reflective of road function, road design, the road side environment and user mix. The default speed limit in 'built up' areas (i.e urban areas) is 50km/hr. This speed limit is considered appropriate for most, if not all, of the Alkimos Coastal Node LSP road network.

Roundabouts are identified in *Figure 6* at the busier 4-way intersections to assist in slowing traffic and managing U-turn demand.

At lower order 4-way junctions (where traffic volumes are light and approach speeds low), stop or give-way signs and brick paved threshold treatment are typically used. Where the 'run up distance' on the minor approach exceeds 200m, a splitter island and second sign are usually recommended. Where appropriate, a raised intersection plateau may be employed to slow traffic and render sign control of the 4-way more effective.

In the Alkimos Coastal Node LSP study area there are numerous 4-way Access Street intersections that will need to be reviewed at subdivision stage to confirm whether they are to be treated with sign control or roundabout control. These reviews will be done in consultation with the CoW.



7. PEDESTRIAN & CYCLIST FACILITIES

The Alkimos Coastal Node shared path and cycle lane networks are shown in *Figure 7*. Refer also to the street cross-sections (*Appendix D*). Path and cycle lanes to be provided within road reserves are determined using the following guidelines:

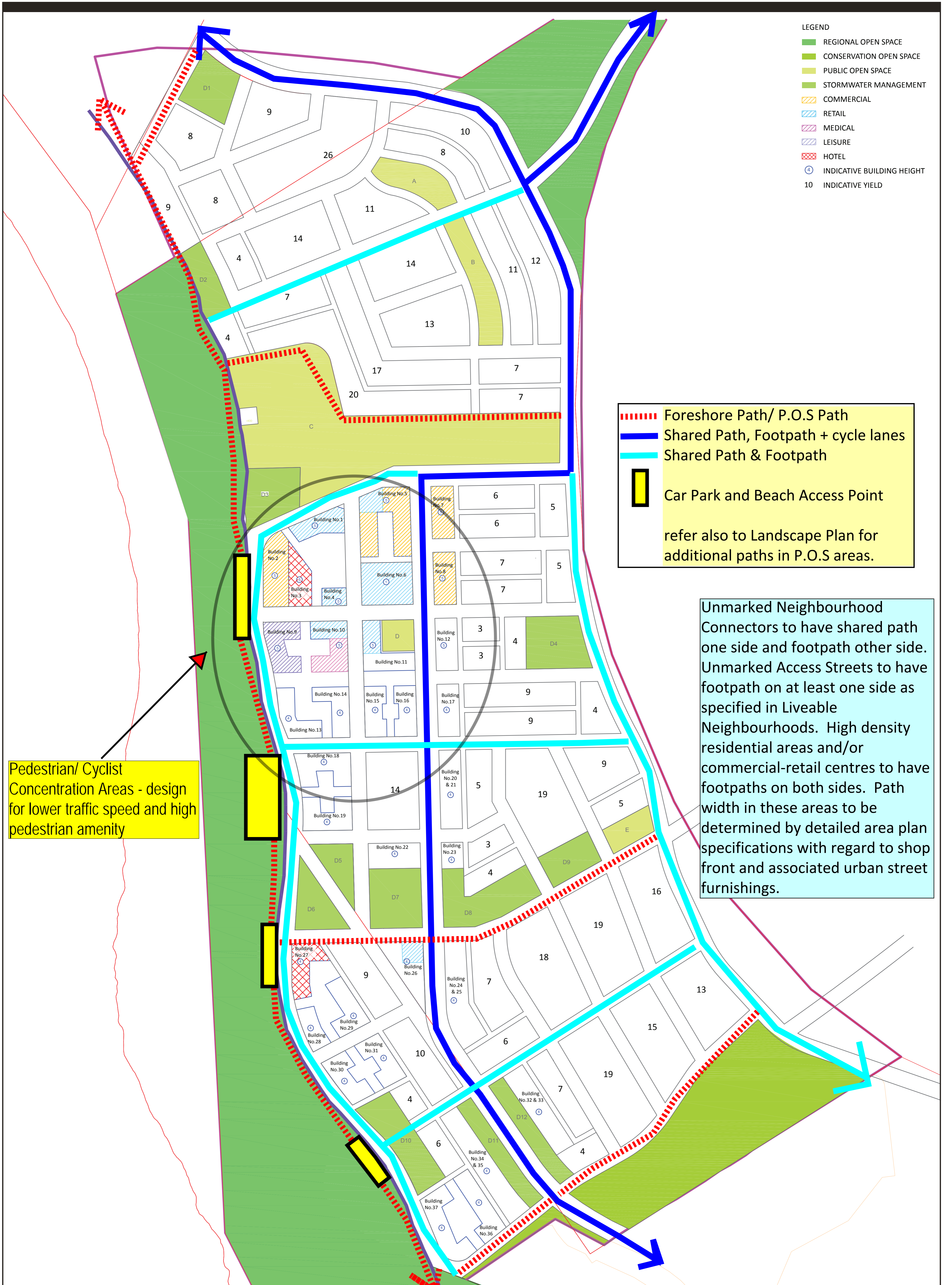
- Foreshore: A recreational path will be provided as part of the Foreshore facilities.
- Public Open Space: secondary recreation path links are incorporated into POS areas and link to the wider network of paths.
- Activity Centre Access & Circulation Streets: Urban verge footpath to be provided on both sides with varying width to suit pedestrian needs and street furniture needs.
- Neighbourhood Connectors (traffic > 3000 veh/day): Shared path one side, footpath opposite side, cycle lanes both sides. Neighbourhood Connectors (traffic < 3000 veh/day): Shared path one side and footpath opposite side.
- Residential Access Streets: footpaths typically on both sides but occasionally on only one side when traffic volumes and pedestrian volumes are sufficiently low and traffic speeds are sufficiently low.

Local road crossings will generally be unmarked and will have kerb ramps and pedestrian gaps in medians. There may be a requirement for a zebra pedestrian crossing at the foreshore within the Activity Centre area. The need and location for any such crossing will be determined at subdivision design stage when detailed land use planning and street design are undertaken.

8. BUS SERVICES

Figure 8 shows the Alkimos Coastal Node Bus Route Plan. Alkimos Coastal Node will be served by the STS high frequency bus service. The STS will operate between Eglinton Station and Alkimos Station and will use local road NS1 within the Alkimos Coastal Node. The eventual target service frequency is 10 minutes during peak periods and 15minutes during inter-peak periods. Bus stops location and design will be determined at subdivision stage in consultation with Transperth and the City of Wanneroo

Initially buses are likely to operate at approximately 20min frequency in peak periods. The initial 'inter-peak' frequency will be in the order of 30min. Evening and weekend frequency is likely to be 60 minutes both initially and in the longer term. Information on district bus services can be found in *Appendix F*



- LEGEND
- REGIONAL OPEN SPACE
 - CONSERVATION OPEN SPACE
 - PUBLIC OPEN SPACE
 - STORMWATER MANAGEMENT
 - COMMERCIAL
 - RETAIL
 - MEDICAL
 - LEISURE
 - HOTEL
 - INDICATIVE BUILDING HEIGHT
 - INDICATIVE YIELD

- - - - - Foreshore Path/ P.O.S Path
 - Shared Path, Footpath + cycle lanes
 - Shared Path & Footpath
 - Car Park and Beach Access Point
- refer also to Landscape Plan for additional paths in P.O.S areas.

Pedestrian/ Cyclist Concentration Areas - design for lower traffic speed and high pedestrian amenity

Unmarked Neighbourhood Connectors to have shared path one side and footpath other side. Unmarked Access Streets to have footpath on at least one side as specified in Liveable Neighbourhoods. High density residential areas and/or commercial-retail centres to have footpaths on both sides. Path width in these areas to be determined by detailed area plan specifications with regard to shop front and associated urban street furnishings.



9. ACTIVITY CENTRE PARKING AND ACCESS PRINCIPLES

9.1 COMMERCIAL PARKING AND DELIVERY VEHICLE ACCESS STUDY

When the Alkimos Coastal Node Activity Centre Plan (or Detailed Area Plan) is prepared, it is recommended that a Commercial Parking and Delivery Vehicle Access Assessment be undertaken. That study should set out the following:

- A floor space schedule for the Centre
- The recommended parking supply to suit the estimated parking demand, bearing in mind that it is necessary to balance vehicle access needs with built form and pedestrian accessibility objectives;
- A street types plan and detailed street cross-sections that are cross-referenced to the plan;
- A foot path/ shared path network plan marked with any special road crossing treatment locations;
- A bus routes plan marked with the proposed bus stop locations in the Centre;
- A delivery vehicle route plan showing access routes and proposed loading areas for larger format commercial/ retail sites, especially those that might be served by Articulate Vehicles;
- A traffic management plan showing traffic calming devices (i.e. splitter islands, medians, raised plateaus, roundabouts, etc.), any marked pedestrian crossing locations (i.e. Zebra priority crossings); any recommended 40km/hr speed zone areas, and any 4-way intersections requiring special design treatment.
- Suggested taxi rank and any on-street loading area for any Main Street sections of the Centre where rear loading is not viable.
- Suggested parking time limits for core and periphery areas (e.g. 1-hour core and 2-3 hours periphery)

9.2 ACTIVITY CENTRE PARKING AND ACCESS PRINCIPLES TO HELP ACHIEVE BALANCED TRANSPORT OUTCOMES

The term 'balanced transport' is used to mean provision for all modes of transport, including private car, public transport, walking and cycling. If access by private car dominates the design of an Activity Centre, then 'ground level' car parking segregates the buildings and public places. When this happens, built form suffers and pedestrian access and amenity are reduced. Some key principles for achieving balanced transport within Activity Centre design are:

- Apply reciprocal parking rights throughout the commercial/ retail area

- Calculate reciprocal parking demand for the proposed land uses and base parking ratios on that level of demand.
- Maximise the supply of on-street parking and credit that supply toward the required parking provision.
- Locate long term public parking at the perimeter of the core retail/ café area so that short term public parking is available for those shorter duration shopping and pickup/ drop off trips.
- Apply perimeter block development principles whereby buildings are located close to the street front and off-street car parking is located to the rear.
- Apply 'grid street layout' principles to ensure multiple access and circulation routes for all modes of transport.
- Use lanes and PAW's to supplement the street network, ensuring that safe design principles are applied.
- Where economically viable, use below grade parking (or multi-story) parking where the required amount of parking placed 'at-grade' would take excessive site foot print.
- Ensure streets, lanes and car parks are well lit, drained, and have shade.
- Ensure slow vehicle operating speeds throughout the Activity Centre through holistic design of the whole road environment, including building frontages, paths and landscaping, on-street parking, lighting, intersection treatments and traffic calming devices.
- Buildings should provide the appropriate type and quantity of pedestrian/ cyclist end of trip facilities (bike racks/ storage, toilets, showers, etc.).
- Beach recreational parking should be provided as recommended in the Foreshore Management Plan which is still to be undertaken. Ideally this beach parking will be located on the 'ocean side' of any foreshore frontage road. That would minimise walking distance for visitors carrying beach related provisions and will reduce pedestrian/ vehicle conflicts on the frontage road.

APPENDICES:

APPENDIX A: DISTRICT STRUCTURE PLAN

APPENDIX B: COW LPP 3.8 MARMION AVE ACCESS POLICY

APPENDIX C: ADJACENT STRUCTURE PLAN INFORMATION

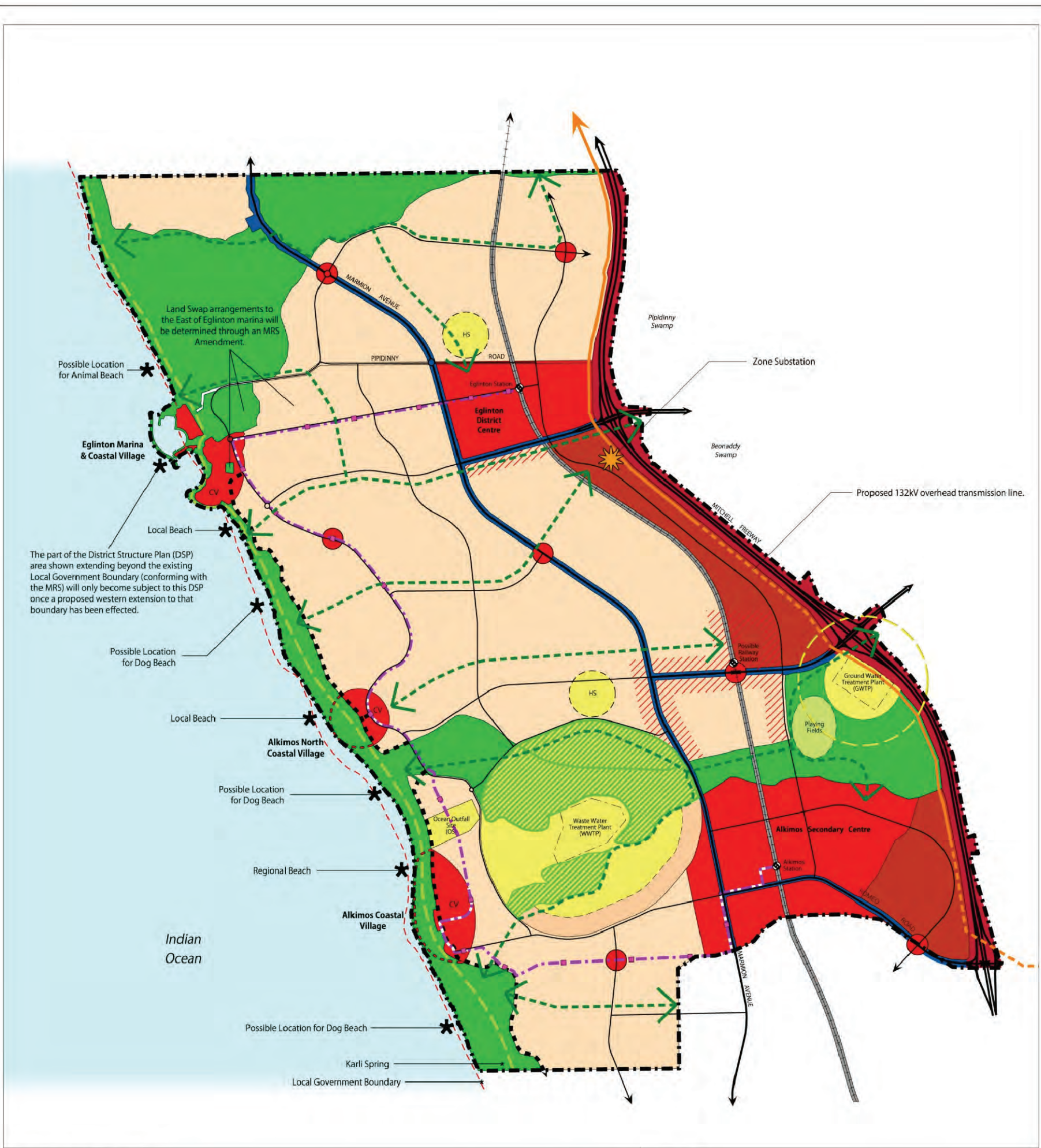
APPENDIX D: STREET CROSS-SECTIONS

APPENDIX E: NW CORRIDOR TRAFFIC MODELLING INFORMATION

APPENDIX F: DISTRICT BUS ROUTES PLANS

APPENDIX A

Alkimos-Eglinton DSP

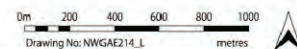


The following notes relate to the Structure Plan:

- i) The final locations and configurations of the government school sites depicted on this Structure Plan will occur at the local structure planning stage through landowner consultation with the Department of Education and Training, the City of Wanneroo and the Department of Planning. Locations depicted are notional and approximate to reflect catchment requirements.
- ii) The coastal setbacks, including any proposed reduction in coastal setback for the coastal activity nodes are to be consistent with State Planning Policy No. 2.6 State Coastal Policy.
- iii) Final location of railway stations and associated pedestrian and vehicular crossings will need to be determined to the satisfaction of the Public Transport Authority, in consultation with the City of Wanneroo and the WAPC.
- iv) The north-south road on the western side of the WWTP which transverses the 'Parks and Recreation' reserve is supported in principle and is subject to further approval from the Environmental Protection Authority.
- v) Retail floorspace allocation for the proposed activity centres as outline in the Structure Plan has not been assessed in terms of its impact upon other proposed and existing centres. Accordingly, the activity centres are notional and will require compliance with any approved State Planning Policy relating to Activity Centres.
- vi) Areas identified as being of National Environmental Significance under the Environmental Protection and Biodiversity Conservation Act 1999 may be subject to assessment by the Federal Department of the Environment, Water, Heritage and the Arts. The outcome of any such assessment may require modification to the DSP.
- vii) District Open Space identified within the Structure Plan does not form part of the public open space allocation.
- viii) Local Open Space will be determined at the time of Local Structure Plan preparation in consultation with the City of Wanneroo and the WAPC. Detail in relation to drainage credits will be assessed at the Local Structure Planning stage, and will need to be consistent with Liveable Neighbourhoods and WAPC Policy DC 2.3 Public Open Space in Residential Areas.
- ix) Activity Centres will be subject to further structure planning, to ensure there is a mix of retail, residential, community and service provision meeting main street design objectives.
- x) Subdivision and/or development within the DSP is required to contribute to infrastructure items as identified in the Developer Contribution Plan to be approved by the City of Wanneroo.
- xi) The Structure Plan is subject to Environmental Conditions, Statement No. 722.
- xii) Final servicing requirements will need to be accommodated within the Structure Plan, and will be determined at the Local Structure Planning Stage.
- xiii) This DSP is subject to monitoring and review commencing in 2017.
- xiv) An easement of up to 32m may be required for the proposed 132kv overhead transmission line. This may have implications on adjacent land uses. Final width of the easement to be determined at LSP stage.

LEGEND

- | | |
|--|--|
| DISTRICT STRUCTURE PLAN BOUNDARY | PRIMARY REGIONAL ROADS |
| LOCAL GOVERNMENT BOUNDARY | OTHER REGIONAL ROADS |
| URBAN | SECONDARY ROADS |
| FUTURE POTENTIAL URBAN | COASTAL ROADS |
| REGIONAL OPEN SPACE | RAILWAY RESERVE, RAILWAY STATIONS |
| CONSERVATION | SECONDARY PUBLIC TRANSPORT SYSTEM |
| PUBLIC PURPOSES / COMMUNITY FACILITIES | GROUND WATER TREATMENT PLANT 500m BUFFER |
| HS HIGH SCHOOL | DISTRICT OPEN SPACE |
| GWTP GROUND WATER TREATMENT PLANT | SOCIAL/PEDESTRIAN/CYCLE LINKAGES |
| WWTP WASTE WATER TREATMENT PLANT | COASTAL DUAL USE PATH |
| OS OCEAN OUTFALL SITE | 132KV TRANSMISSION LINE |
| SERVICE COMMERCIAL | |
| SECONDARY & DISTRICT CENTRES | |
| COASTAL VILLAGE ACTIVITY CENTRES | |
| NEIGHBOURHOOD CENTRES | |
| OPPORTUNITY FOR BUSINESS, COMMERCIAL AND MIXED USE DEVELOPMENT | |
| INDICATIVE LOCATION OF PROPOSED SUBSTATION | |



District Structure Plan

ALKIMOS
EGLINTON

Figure 1: District Structure Plan Map 1

APPENDIX B

City Wanneroo Local Planning Policy 3.8

Owner	Planning and Sustainability
Implementation	2011
Reviewed	Biannual
Next Review	2013

PART 1 – POLICY OPERATION

Policy Development

This Policy has been prepared under the provisions of Section 8.11 of the City of Wanneroo District Planning Scheme No. 2.

Application and Purpose

This Policy prescribes acceptable standards for the type and location of vehicular access points, provisional standards for cycling infrastructure, and operational procedures for all new planning proposals including:

- structure plans and structure plan amendments;
- detailed area plans;
- applications for planning approval; and
- subdivision applications.

The area to which this Policy applies is bordered by, and inclusive of, Toreopango Avenue to the north, the proposed Mitchell Freeway to the east, Kingsbridge Boulevard to the south, and Marmion Avenue to the west. This area is represented graphically in **Figure 1**.

In the event of any inconsistency between the provisions of this Policy and:

- an agreed structure plan; or
- an application for planning approval that accords with an agreed structure plan; or
- a subdivision application that accords with an agreed structure plan;

then the provisions of that structure plan shall prevail, but only to the extent of that inconsistency.

Objectives

The objectives of this Policy are to:

1. Recognise Marmion Avenue is a major north-south transport route serving the north west corridor, but accept it is a lower classification road than the proposed Mitchell Freeway, which will run parallel, approximately two kilometres to the east;
2. Facilitate adequate pedestrian and bicycle movement (within the road reservation) along and across Marmion Avenue;
3. Strike a balance between the safe movement and flow of traffic on Marmion Avenue and the need for traffic to enter, leave and cross Marmion Avenue; and
4. Create sufficient access opportunities to regional and district centres, which include crossing points for all modes of transport (including pedestrians) and safe access for vehicles accessing the centres.

Structure

This Policy consists of three parts:

Part 1 – Policy Operation: This includes the Policy context and objectives.

Part 2 – Policy Provisions: Sets out Policy provisions for:

- Property access;
- Road design requirements;
- Cycle paths;
- Operating speeds and junction spacing; and
- Seeking amendments to the Policy.

Part 3 – Figure 1: A spatial plan that graphically reflects the following:

- The Policy application area
- Road hierarchy and rail network
- Key vehicular access points
- Ultimate target operating speed zones
- Centre locations

PART 2 – POLICY PROVISIONS

1. No direct property access will be permitted to the Integrator Arterial roads (A) & (B) – depicted in **Figure 1** between Marmion Avenue and the proposed Mitchell Freeway – except where the access meets the requirements of this Policy and is for one of the following:
 - a) For the purposes of super lots; or
 - b) Where a commercial development creates rationalised access with the public road with an easement in gross granting reciprocal rights of access.
2. In the event of any inconsistency between the provisions of this Policy and either, relevant Main Roads WA (MRWA) Guidelines, the Austroads Guide to Road Design or Liveable Neighbourhoods then the provision of those documents shall prevail over the conflicting provision of this Policy but only to the extent of any inconsistency.
3. A safe network of pedestrian and bicycle crossing points will be provided to link communities across major roads and provide safe access to regional and district centres. Major pedestrian crossing points will generally be provided under traffic signal control, but grade separated crossings will also be considered where the geometry is supportive and traffic signals are considered to be inappropriate.

4. Clearly defined cycle paths, at the widths specified below, are required for both sides of the following roads in the applicable area. Acceptable designs will include:
- On-road cycle lanes and physically separated dual use paths; or
 - Physically separated dedicated cycle paths and pedestrian paths.

Table 1: Cycle Path Location and Minimum Widths

Road Type	On-road Cycle Lane	Physically Separated Dedicated Cycle Path	Physically Separated Dual Use Path	Pedestrian Path
Integrator Arterial (A)	2.5 m	2.0 m	2.1 m	1.5 m
Integrator Arterial (B) and Neighbourhood Connector (A)	1.5 m	1.5 m		

5. Ultimate target operating speed and minimum junction spacing are specified in **Table 2** for Marmion Avenue and Integrator Arterial (A) and (B) roads, both;
- Within Town Centre Zones; and
 - Roads outside of Town Centre Zones.

Table 2: Ultimate Target Operating Speeds and Minimum Junction Spacing

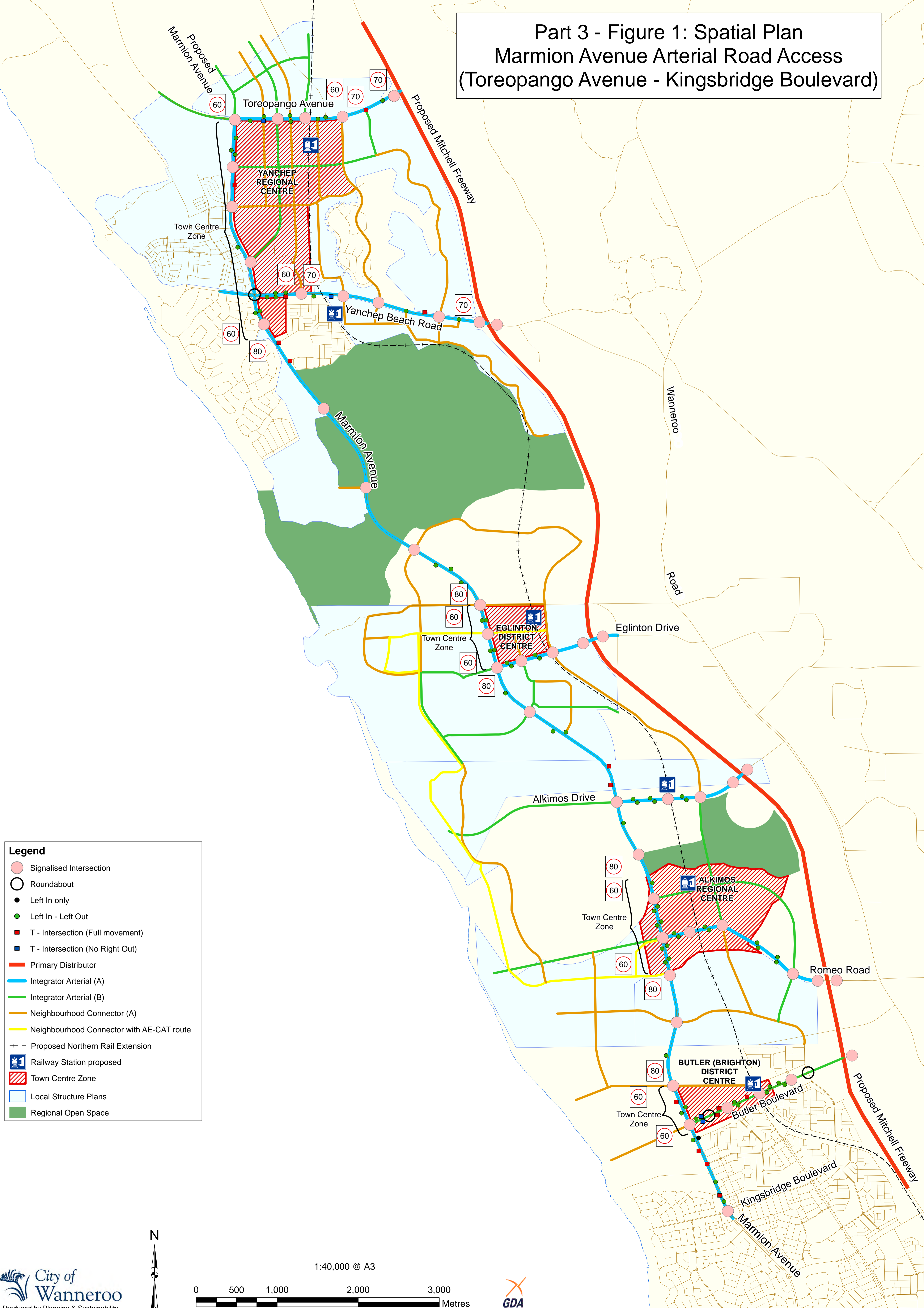
Roads within Town Centre Zones		
Affected Road	Ultimate Target Operating Speed*	Minimum Junction Spacing**
Marmion Avenue	60 km/h	Major: 350 m Minor: 165 m
Other Integrator (A) Roads	60 km/h	Spacing according to Table 5 of Liveable Neighbourhoods
Integrator (B) Roads	60 km/h	
Roads outside of Town Centre Zones		
Affected Road	Ultimate Target Operating Speed*	Minimum Junction Spacing**
Marmion Avenue	80 km/h	Major: 1 km Minor: 500 m
Other Integrator (A) Roads	70 km/h	Spacing according to Table 5 of Liveable Neighbourhoods
Integrator (B) Roads	60 km/h	

*Ultimate target operating speeds are a forecasted requirement only. Future urban growth will dictate whether these speeds are needed or if they require review. Until then, interim speeds will be in effect. Existing roads already have these interim speeds applied by Main Roads WA policy. Future roads' interim speed zoning will be decided by Main Roads WA when required.

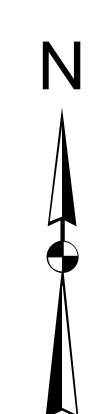
**For Marmion Avenue only, 'Major' junctions involve more than two intersecting roads and are controlled by either signals or a roundabout. 'Minor' junctions are T intersections that involve two intersecting roads, controlled by either a 'Stop' or 'Give Way' sign. Within Town Centre Zones, the City may allow right turn manoeuvres. Outside of Town Centre Zones, only left-in left-out intersections will be accepted.

6. Where applications are made to Council seeking to depart from the intersection location, design or any other provision of this Policy, an application must first be made to seek an amendment of this Policy. The application must be supported by a Traffic Assessment, which needs to;
 - be undertaken by a sufficiently qualified and experienced traffic engineer;
 - clearly justify the necessity of the amendment including how it will benefit the road network and address the effect on traffic flow and safety; and
 - be approved by the City of Wanneroo in consultation with MRWA.

Part 3 - Figure 1: Spatial Plan Marmion Avenue Arterial Road Access (Toreopango Avenue - Kingsbridge Boulevard)



- Legend**
- Signalised Intersection
 - Roundabout
 - Left In only
 - Left In - Left Out
 - T - Intersection (Full movement)
 - T - Intersection (No Right Out)
 - Primary Distributor
 - Integrator Arterial (A)
 - Integrator Arterial (B)
 - Neighbourhood Connector (A)
 - Neighbourhood Connector with AE-CAT route
 - Proposed Northern Rail Extension
 - Railway Station proposed
 - ▨ Town Centre Zone
 - Local Structure Plans
 - Regional Open Space



1:40,000 @ A3



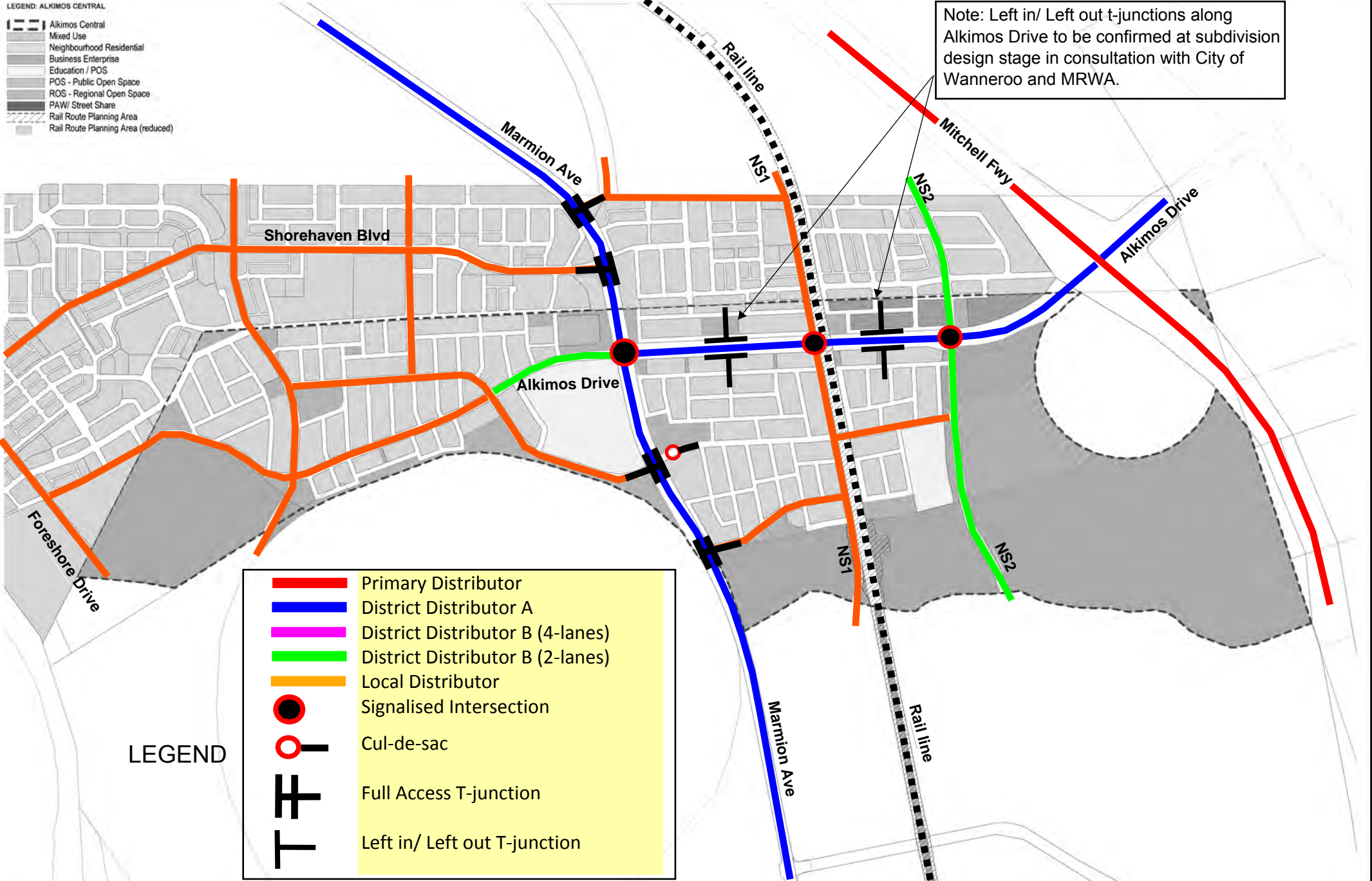
APPENDIX C

Adjacent Structure Plan Info

LEGEND: ALKIMOS CENTRAL

- Alkimos Central
- Mixed Use
- Neighbourhood Residential
- Business Enterprise
- Education / POS
- POS - Public Open Space
- ROS - Regional Open Space
- PAW/ Street Share
- Rail Route Planning Area
- Rail Route Planning Area (reduced)

Note: Left in/ Left out t-junctions along Alkimos Drive to be confirmed at subdivision design stage in consultation with City of Wanneroo and MRWA.



- Primary Distributor
- District Distributor A
- District Distributor B (4-lanes)
- District Distributor B (2-lanes)
- Local Distributor
- Signalised Intersection
- Cul-de-sac
- Full Access T-junction
- Left in/ Left out T-junction

LEGEND

Central Alkimos Local Structure Plan

Bruce Aulabaugh Traffic Engineering & Transport Planning

Figure 3 Road Hierarchy & Arterial Access

Base Plan: Roberts Day

Note: MRWA set speed zones and CoW LPP 3.8 currently indicates 80km/hr speed zone along this portion of Marmion Ave.








It is recommended that this be reviewed with a view to applying 70km/hr speed zone when urban development occurs.

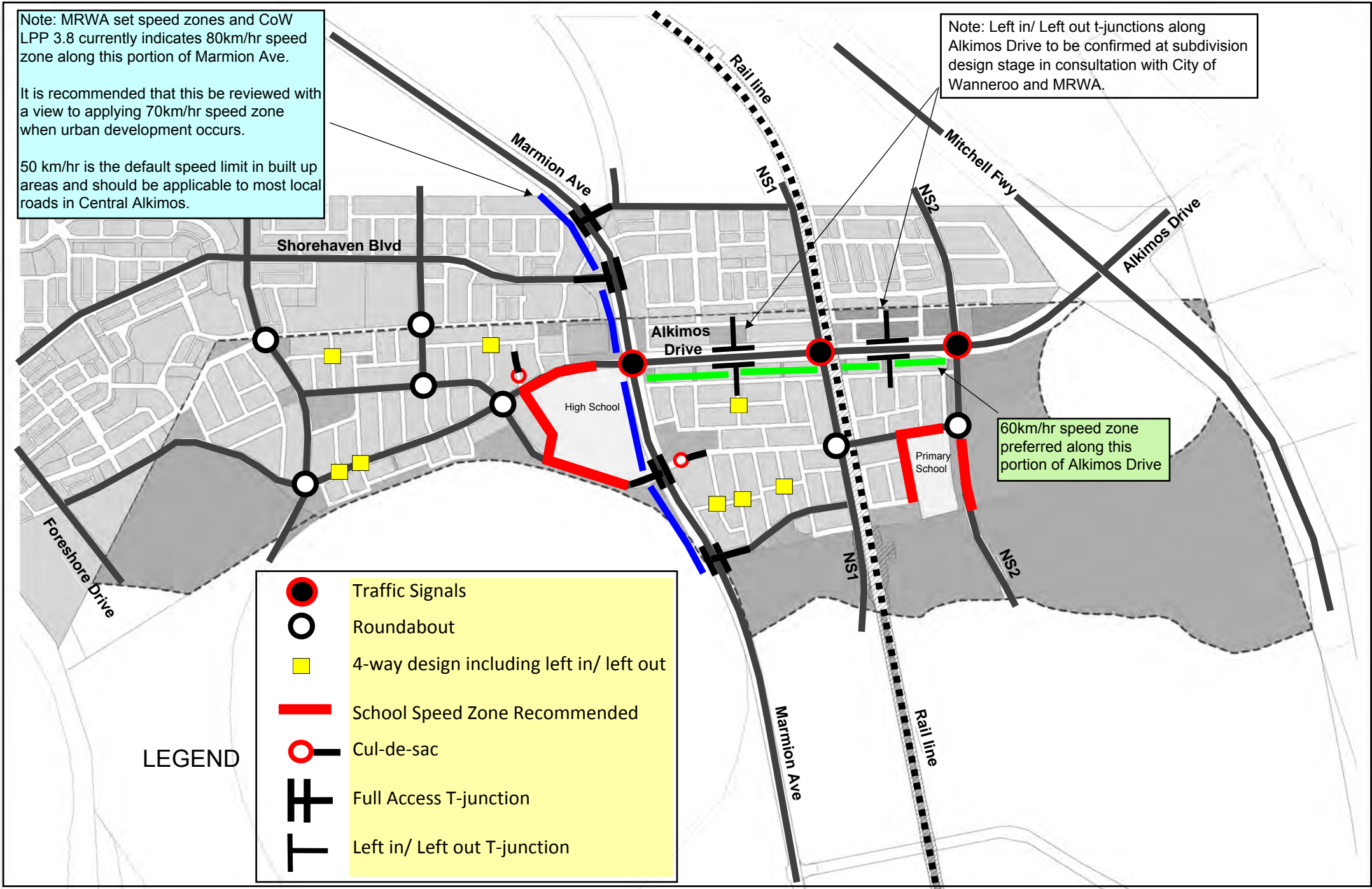
50 km/hr is the default speed limit in built up areas and should be applicable to most local roads in Central Alkimos.

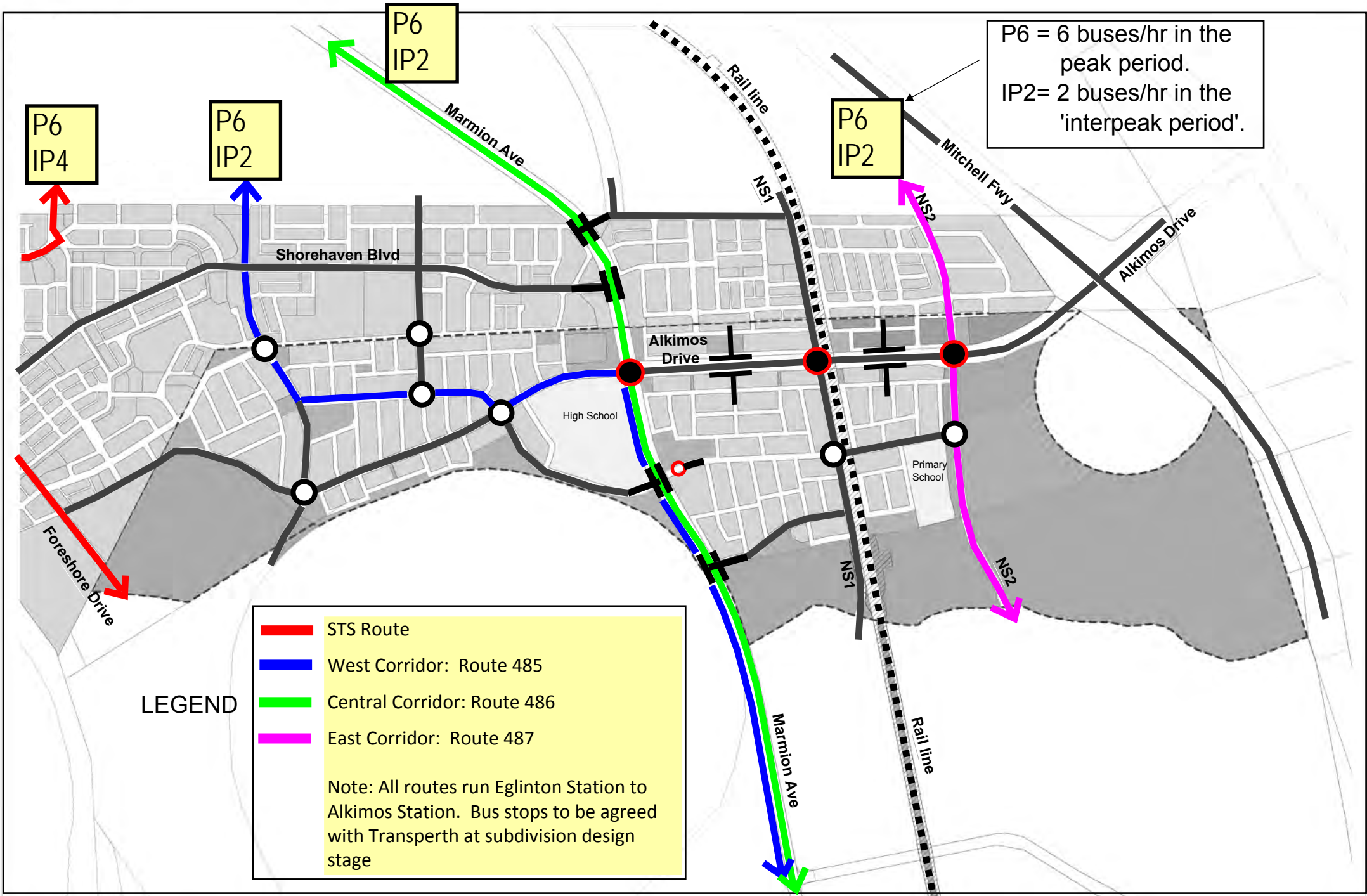
Note: Left in/ Left out t-junctions along Alkimos Drive to be confirmed at subdivision design stage in consultation with City of Wanneroo and MRWA.

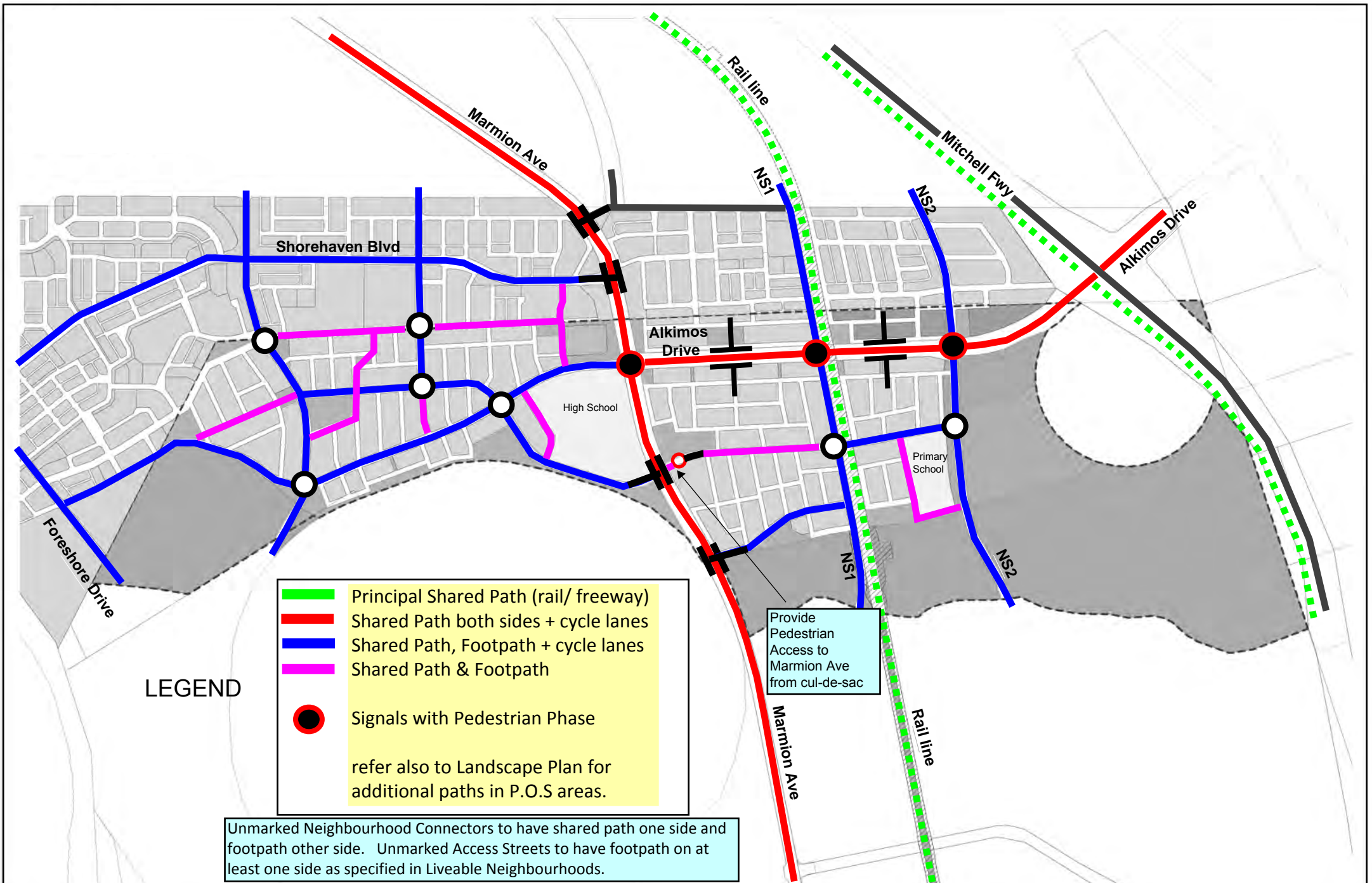
60km/hr speed zone preferred along this portion of Alkimos Drive

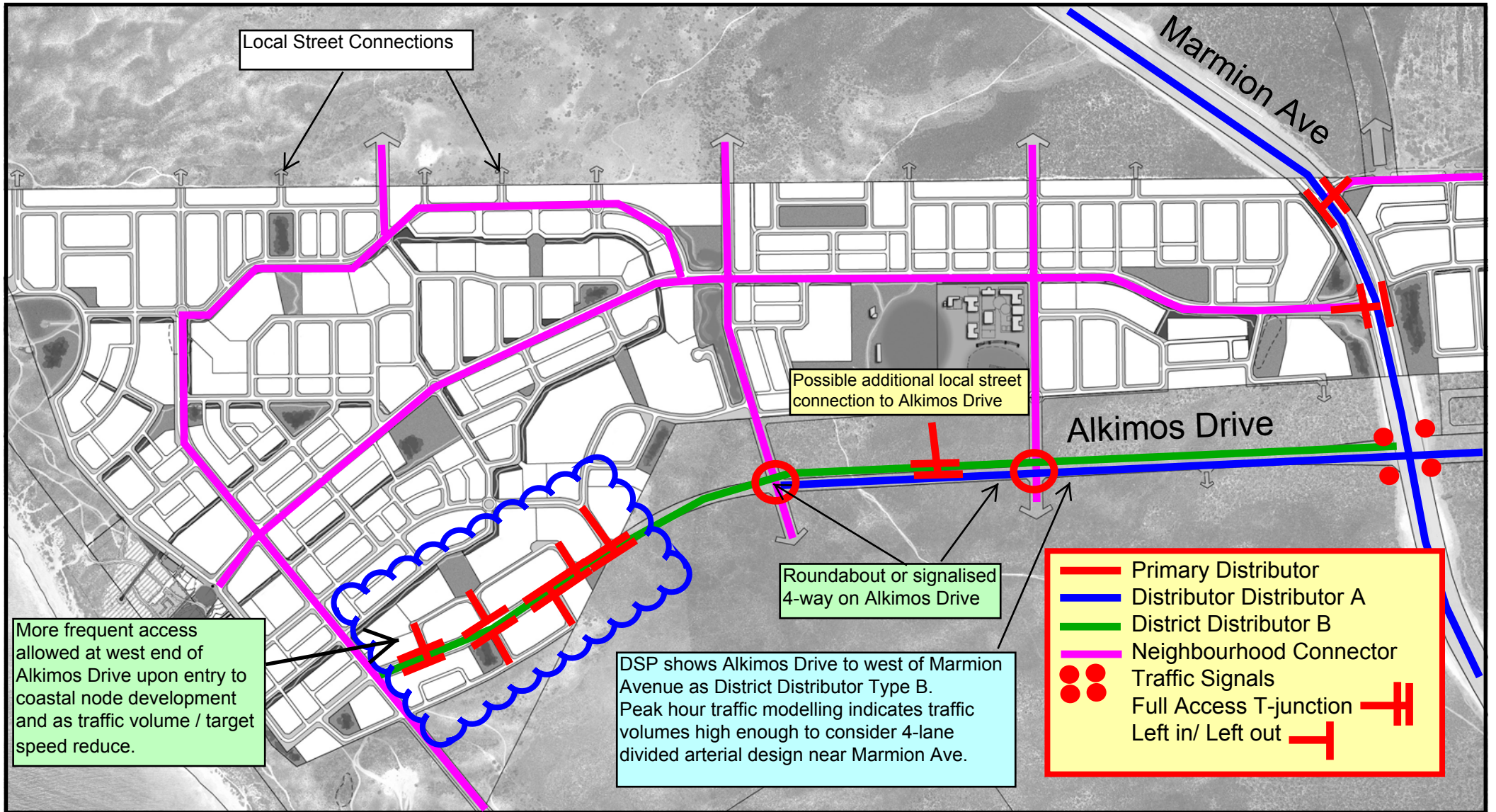
LEGEND

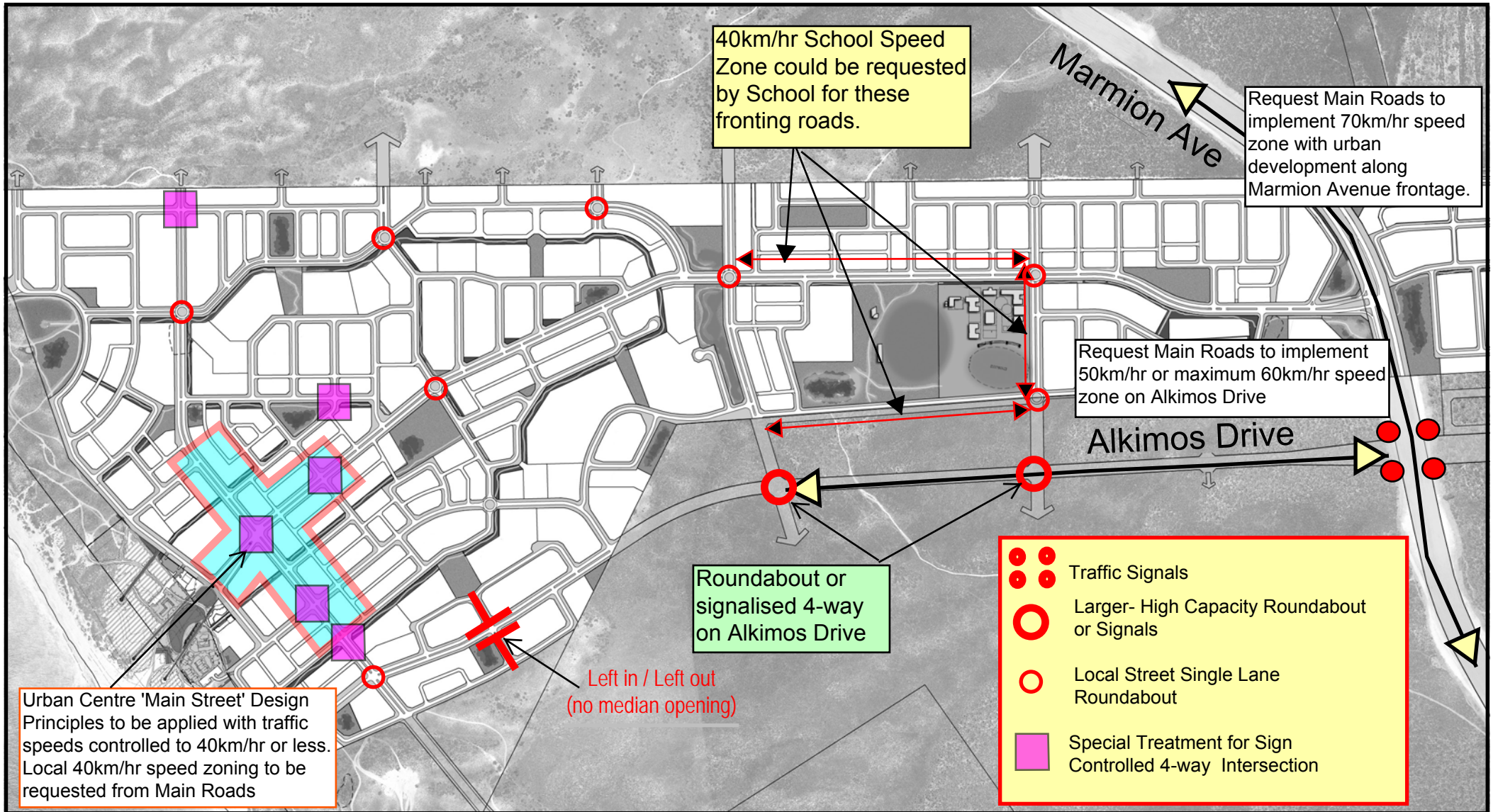
-  Traffic Signals
-  Roundabout
-  4-way design including left in/ left out
-  School Speed Zone Recommended
-  Cul-de-sac
-  Full Access T-junction
-  Left in/ Left out T-junction

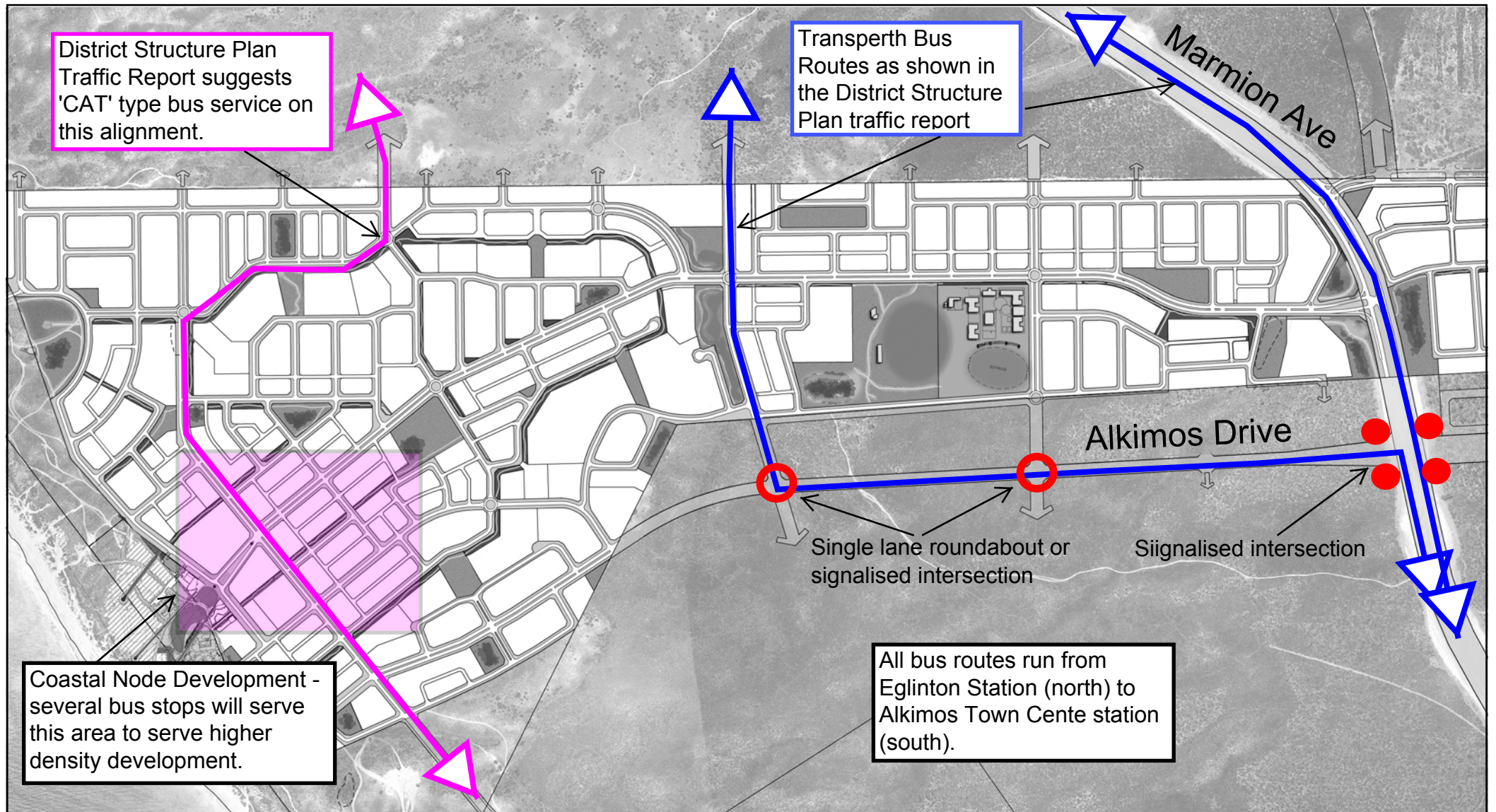


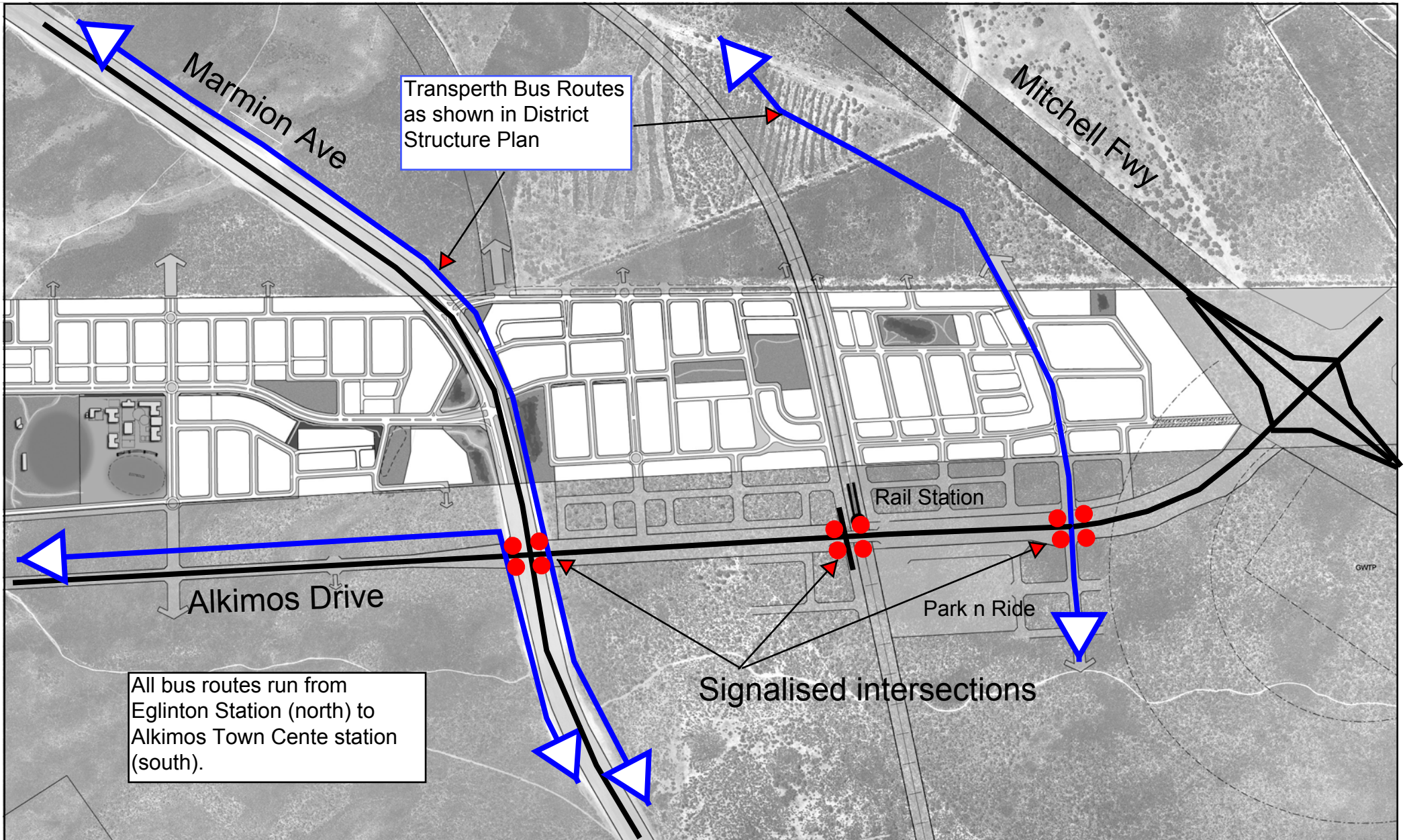






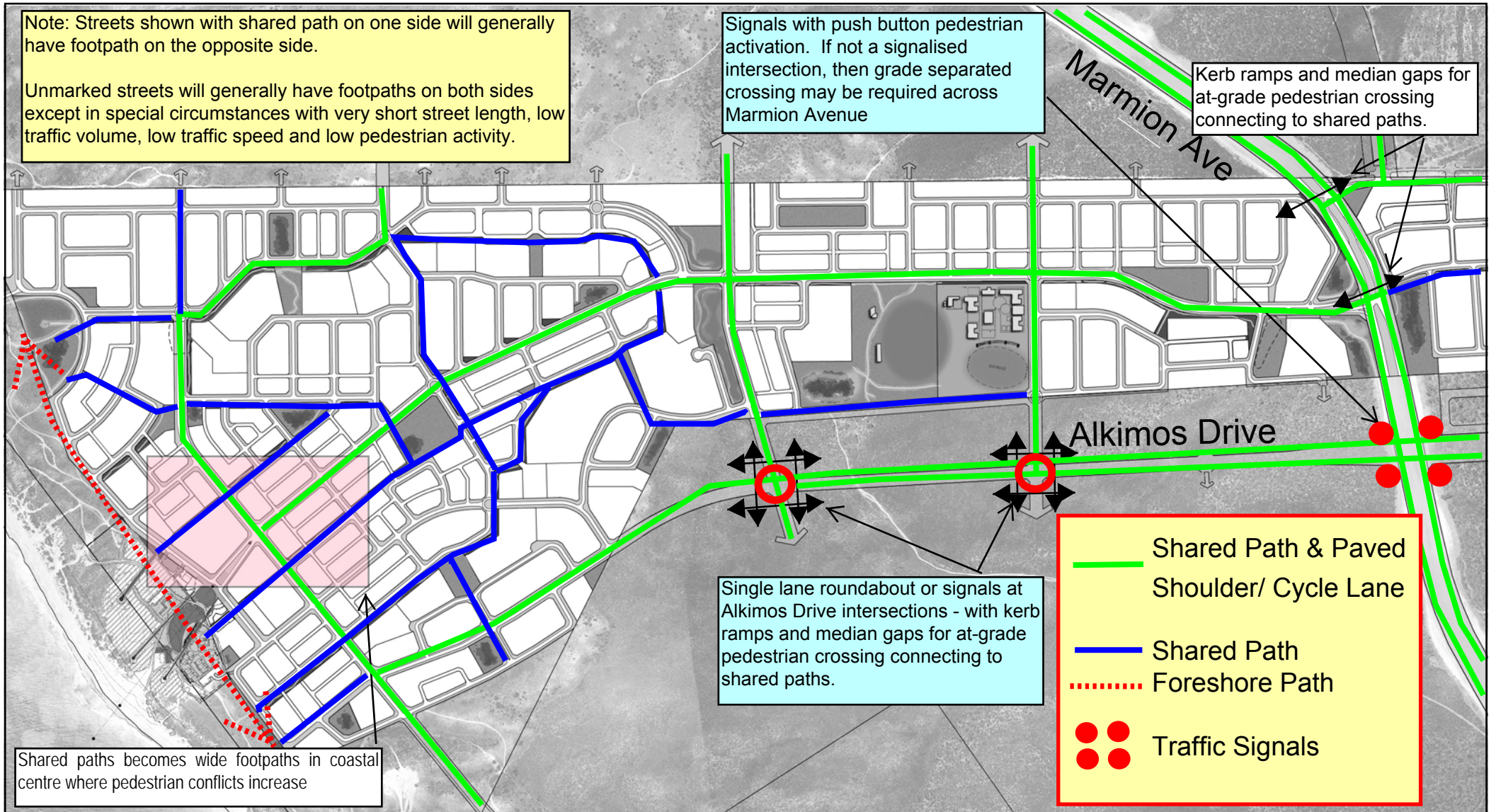


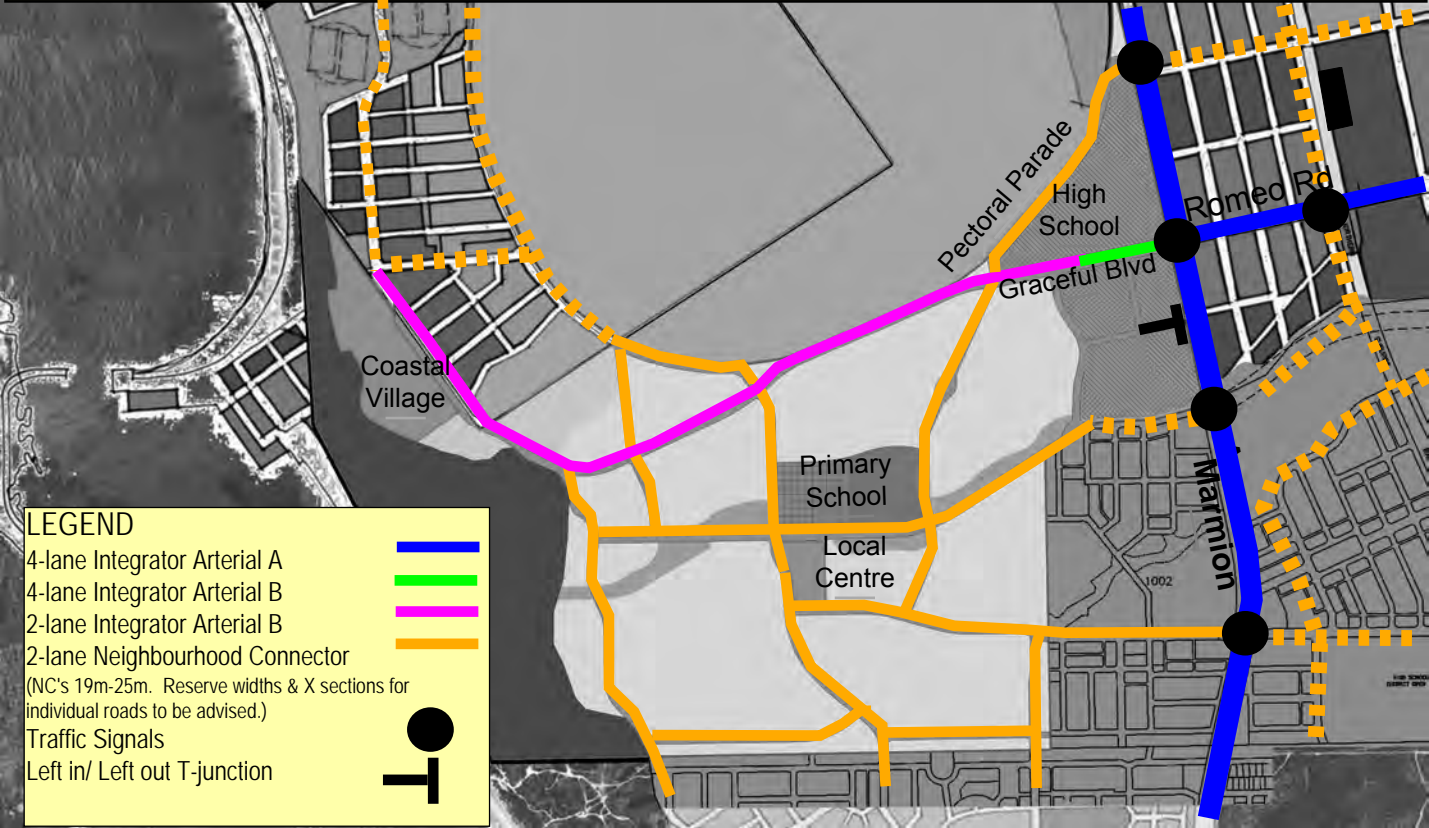




Alkimos Lot 1005/1006 Local Structure Plan
 Bruce Aulabaugh Traffic Engineering & Transport Planning

Figure 25b: Bus Route Plan (east)





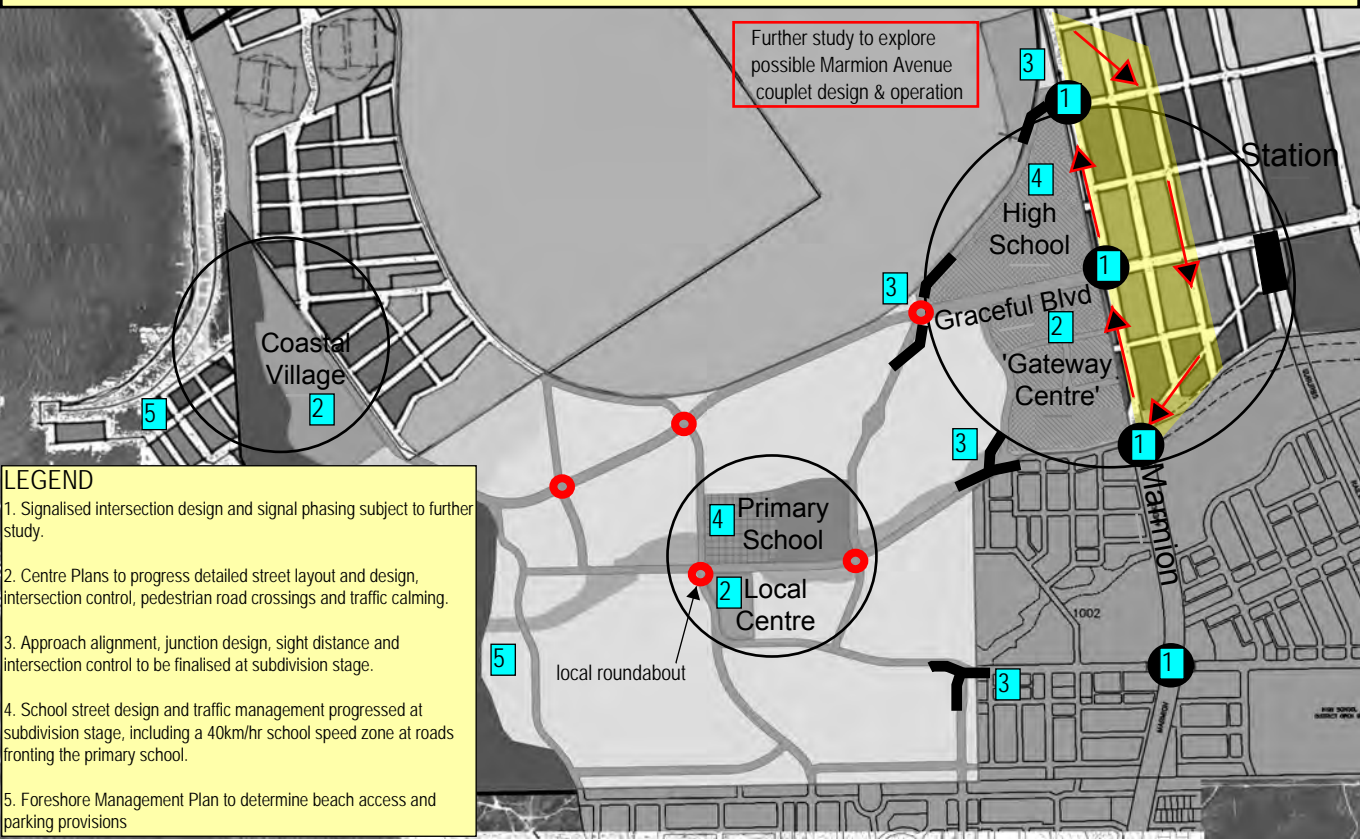
LEGEND

- 4-lane Integrator Arterial A (Blue line)
- 4-lane Integrator Arterial B (Green line)
- 2-lane Integrator Arterial B (Magenta line)
- 2-lane Neighbourhood Connector (Orange line)

(NC's 19m-25m. Reserve widths & X sections for individual roads to be advised.)

Traffic Signals (Black circle)

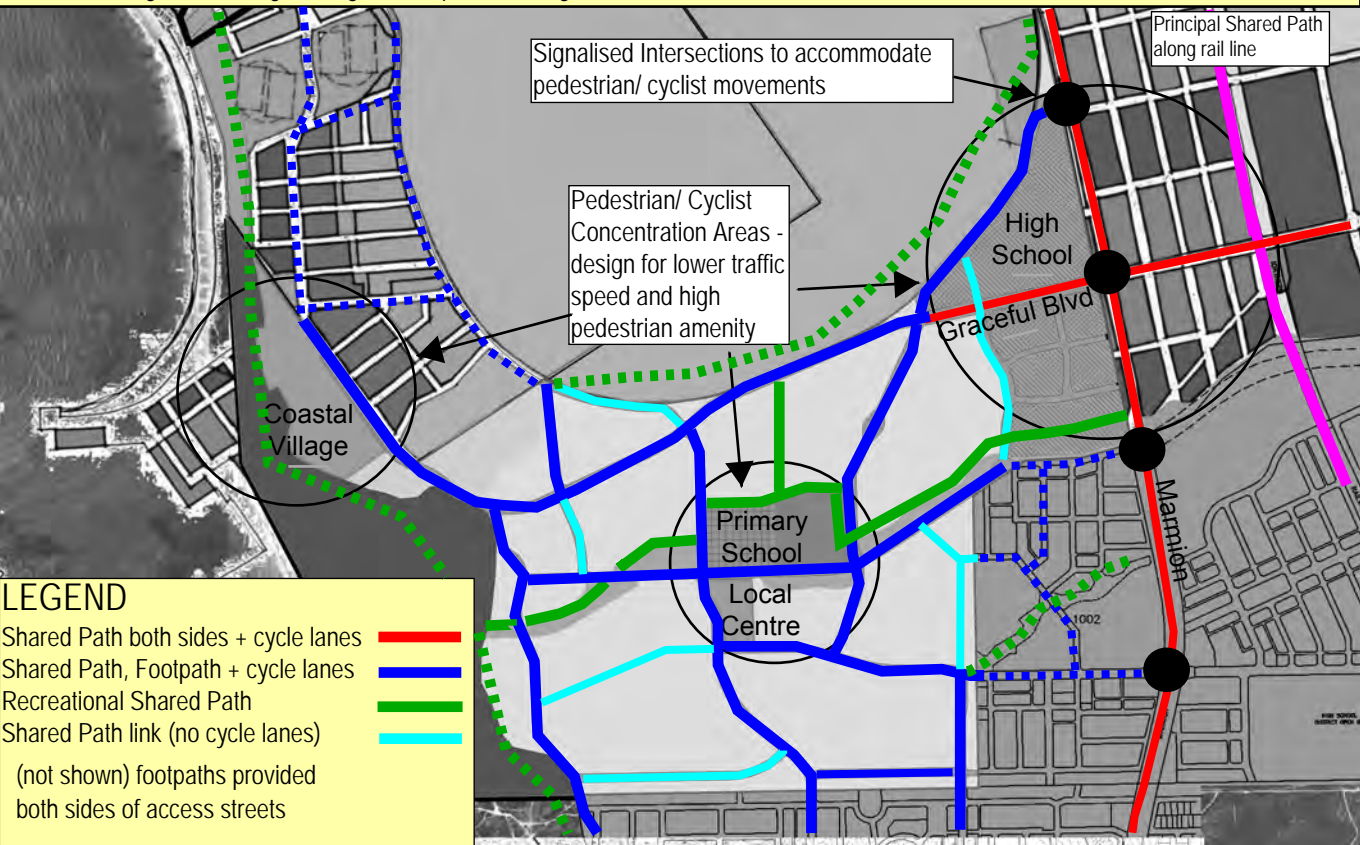
Left in/ Left out T-junction (T-junction symbol)



Further study to explore possible Marmon Avenue couplet design & operation

LEGEND

1. Signalised intersection design and signal phasing subject to further study.
2. Centre Plans to progress detailed street layout and design, intersection control, pedestrian road crossings and traffic calming.
3. Approach alignment, junction design, sight distance and intersection control to be finalised at subdivision stage.
4. School street design and traffic management progressed at subdivision stage, including a 40km/hr school speed zone at roads fronting the primary school.
5. Foreshore Management Plan to determine beach access and parking provisions



Signalised Intersections to accommodate pedestrian/ cyclist movements

Pedestrian/ Cyclist Concentration Areas - design for lower traffic speed and high pedestrian amenity

Principal Shared Path along rail line

Coastal Village

High School

Graceful Blvd

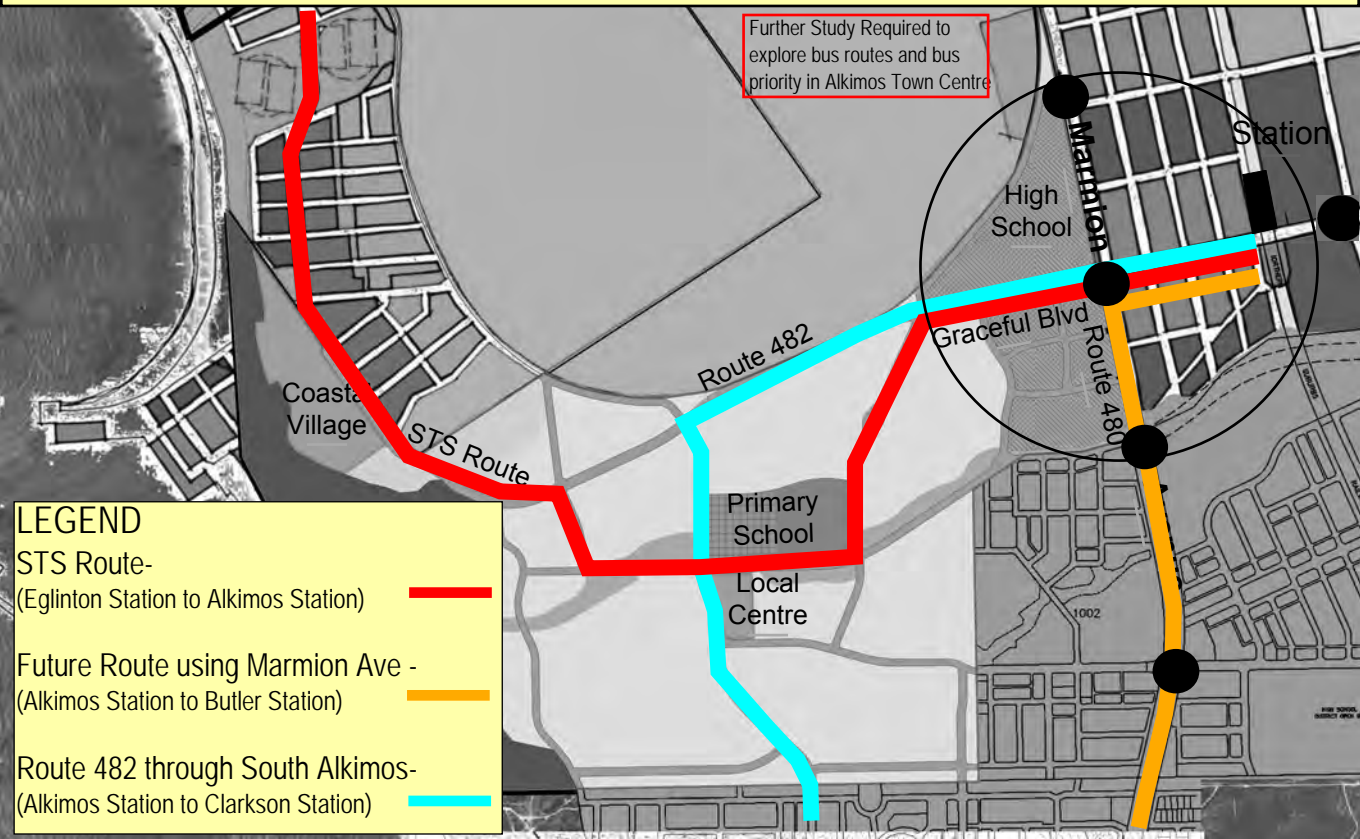
Primary School

Local Centre

Marmion

LEGEND

- Shared Path both sides + cycle lanes —
- Shared Path, Footpath + cycle lanes —
- Recreational Shared Path —
- Shared Path link (no cycle lanes) —
- (not shown) footpaths provided both sides of access streets - - -



Further Study Required to explore bus routes and bus priority in Alkimos Town Centre

LEGEND

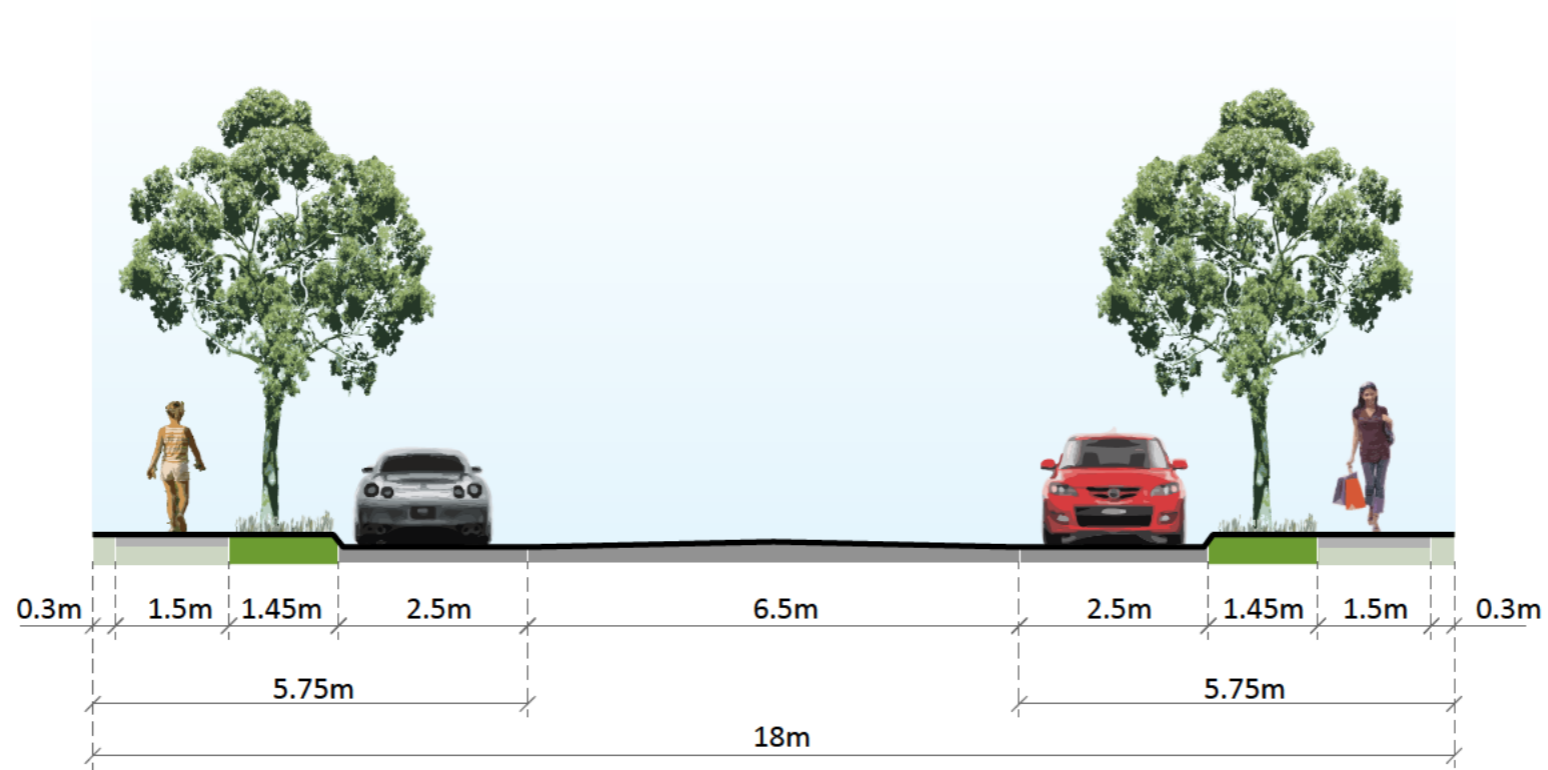
STS Route-
(Eglinton Station to Alkimos Station) —

Future Route using Marmion Ave -
(Alkimos Station to Butler Station) —

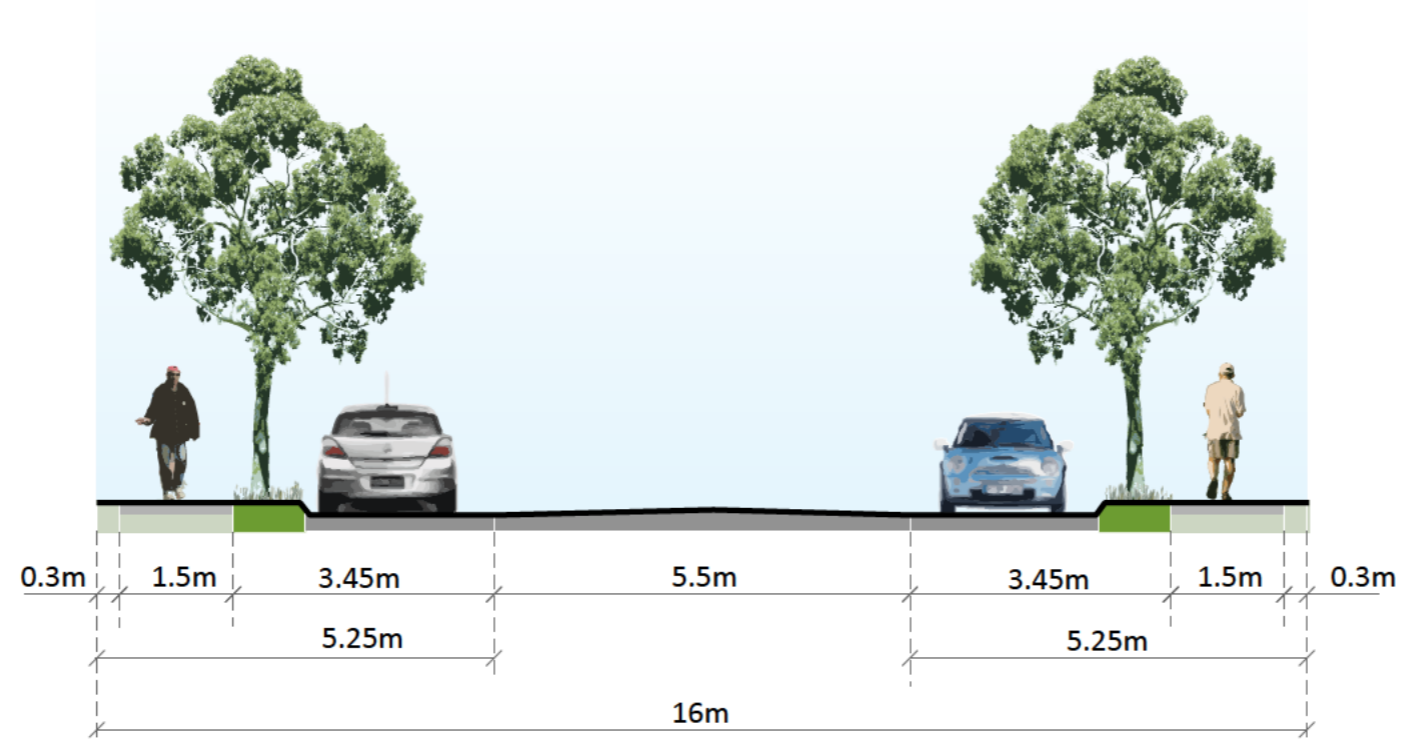
Route 482 through South Alkimos-
(Alkimos Station to Clarkson Station) —

APPENDIX D

STREET CROSS SECTIONS
(SOURCE: DLA)



MIXED USE / COMMERCIAL STREET WITH SERVICE VEHICLE TRAFFIC



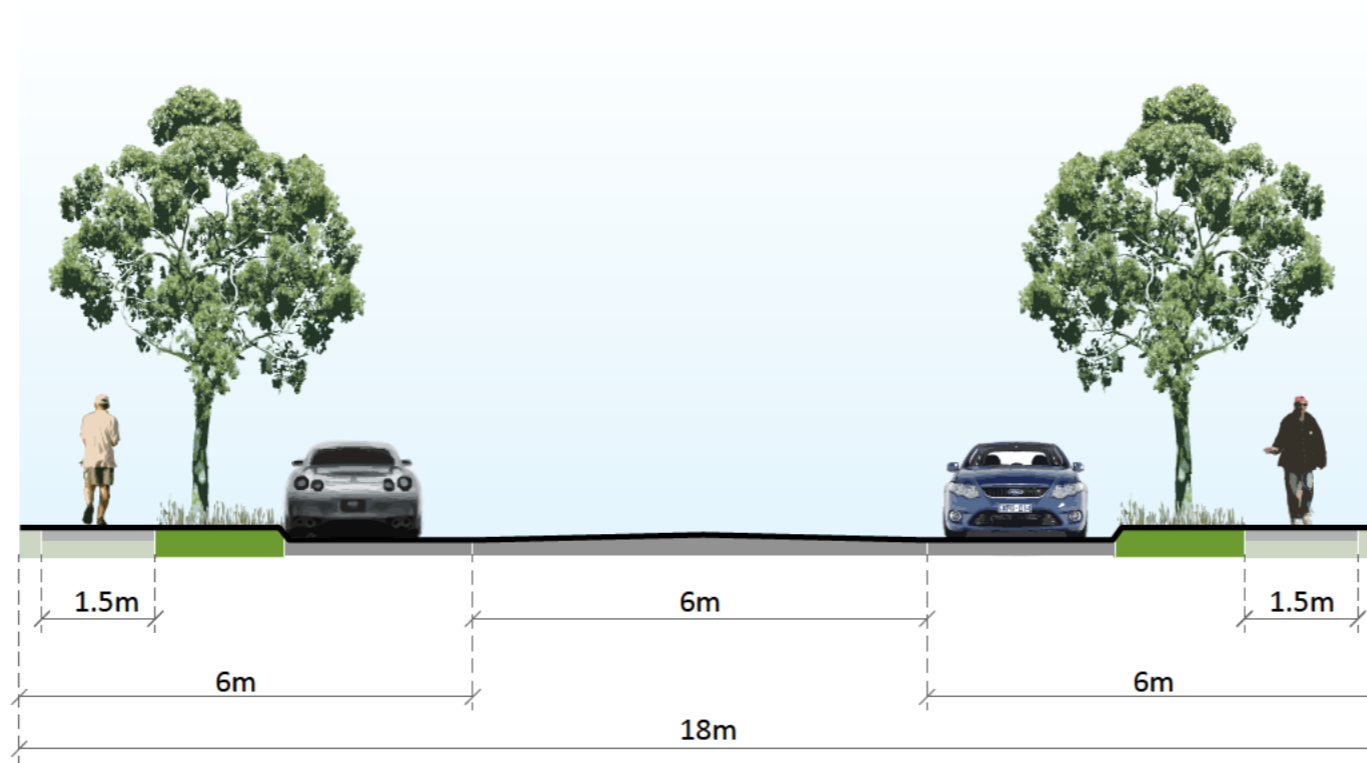
LOW SPEED RESIDENTIAL STREET - TRAFFIC VOLUME < 1,000 VPD WITH LANEWAY ON BOTH SIDES

STREET CROSS-SECTIONS

JOB : WSM008 ALKIMOS COASTAL VILLAGE MASTER PLAN
 DATE : 28 MARCH 2014
 SCALE : 1:100 @ A3

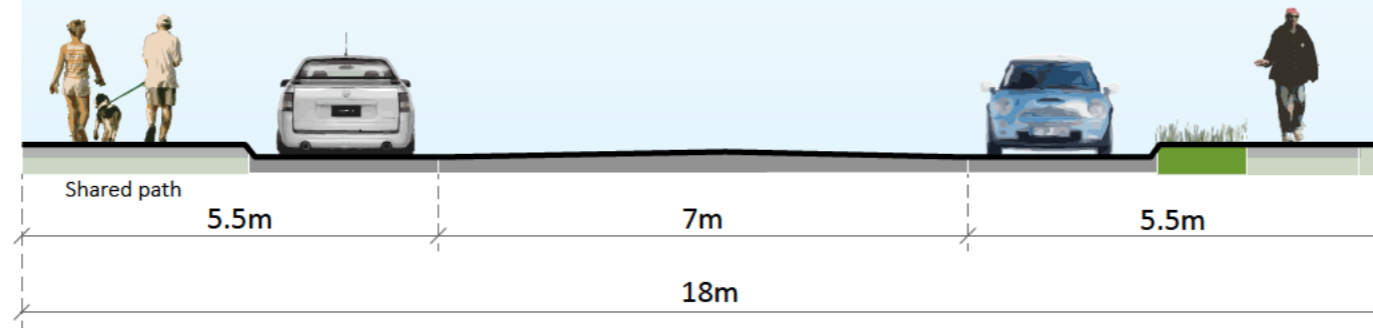


LEVEL 2 166 ALBERT ROAD
 SOUTH MELBOURNE VIC 3205
 +03 9682 8568
 +03 9682 1221
 www.dlasuzt.com

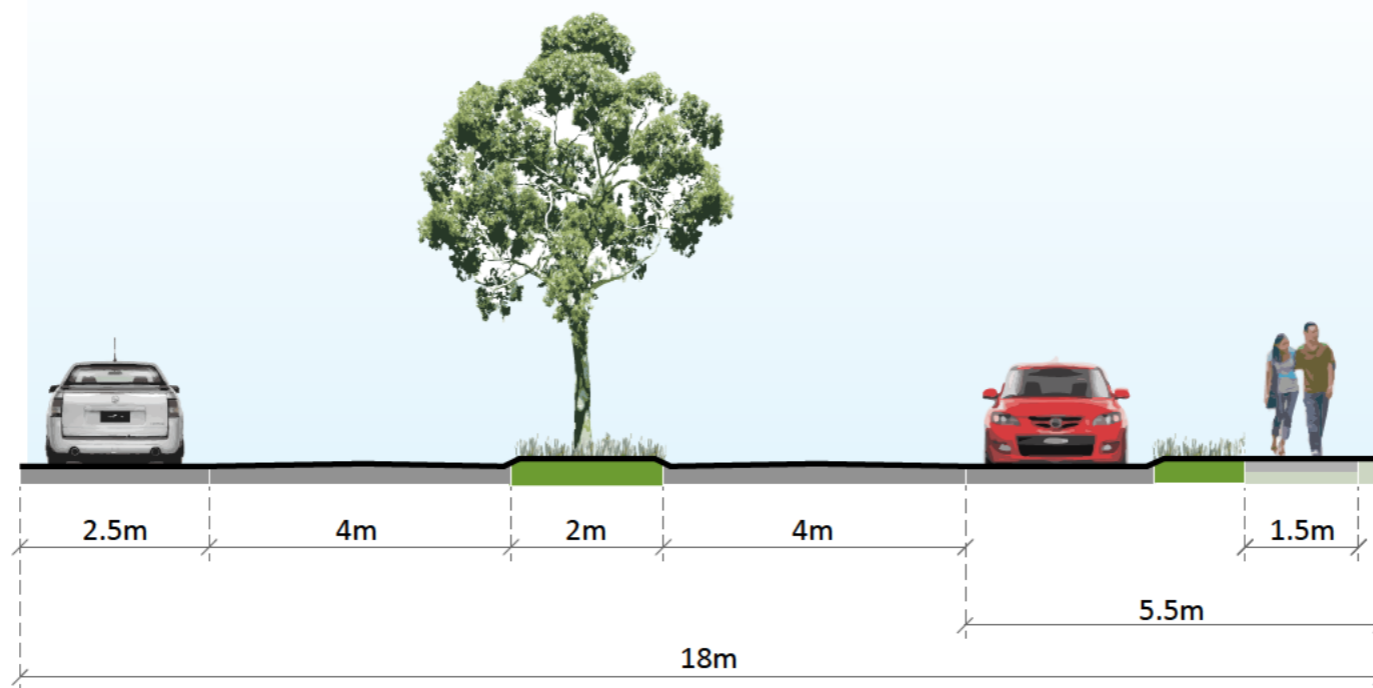


MIXED USE / COMMERCIAL STREET WITH HIGH PARKING DEMAND





FORESHORE RESERVE OPTION 1



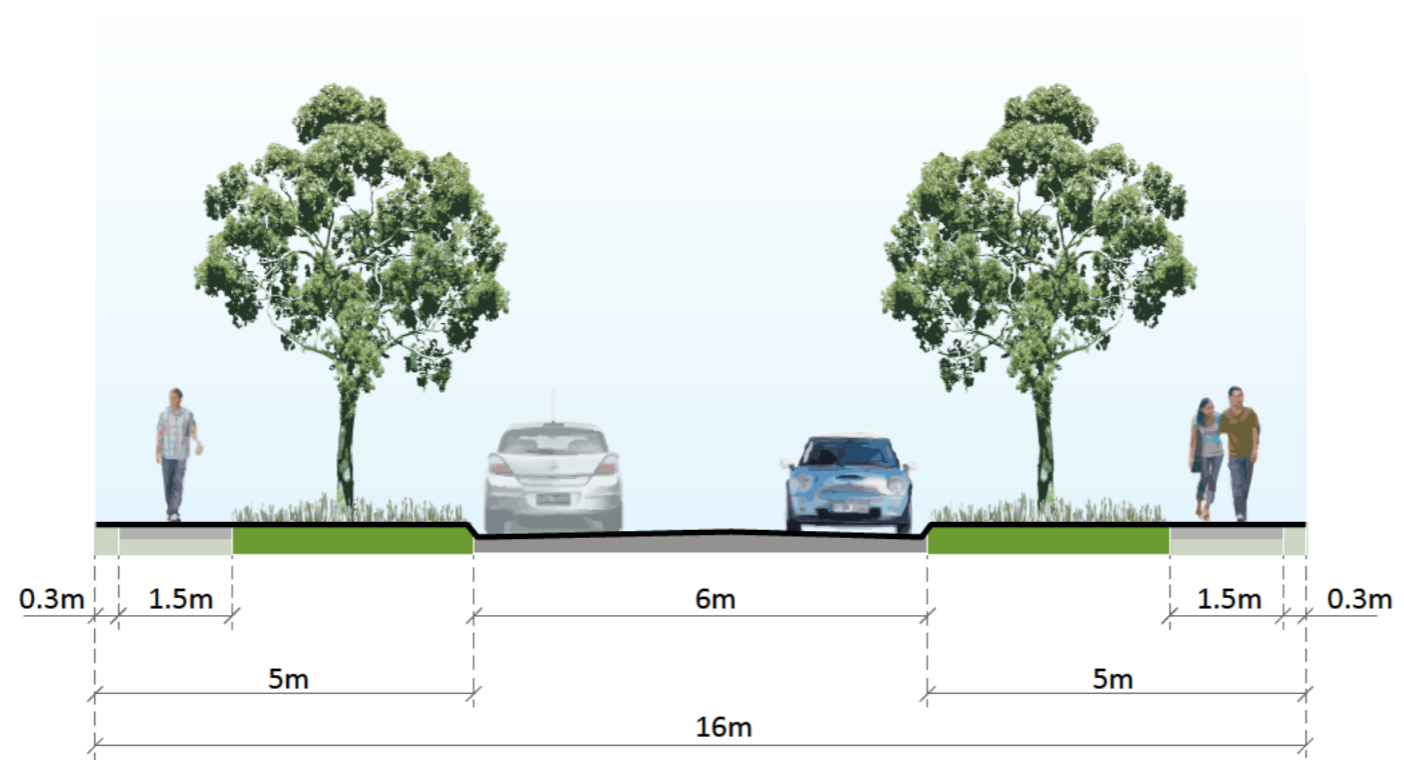
FORESHORE RESERVE OPTION 2 - WEST END FOOTPATH TO BE LOCATED IN FORESHORE RESERVE

STREET CROSS-SECTIONS

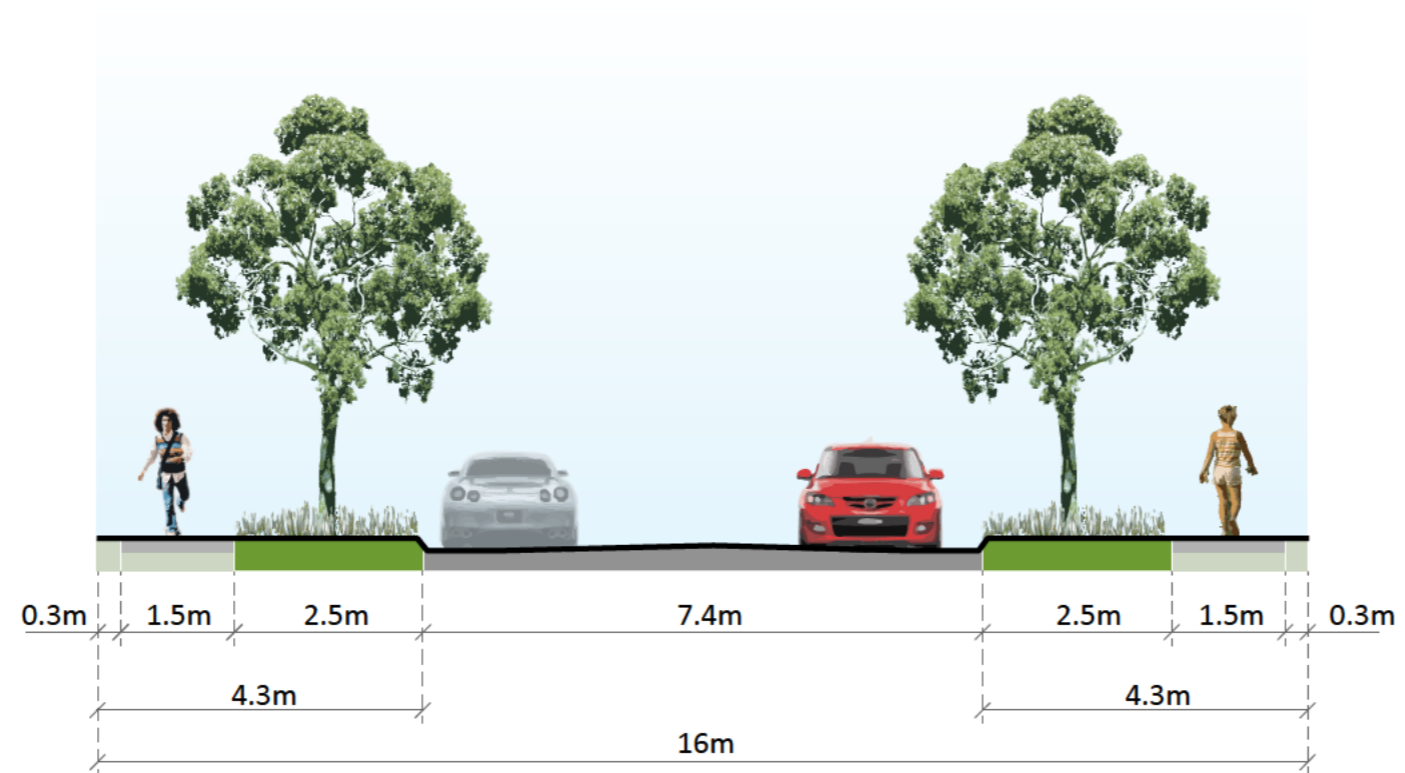
JOB : WSM008 ALKIMOS COASTAL VILLAGE MASTER PLAN
 DATE : 28 MARCH 2014
 SCALE : 1:100 @ A3



LEVEL 2, 166 ALBERT ROAD
 SOUTH MELBOURNE VIC 3205
 +03 9682 8568
 +03 9682 1221
 www.dlasuzt.com



RESIDENTIAL STREETS WITH DRIVEWAY ACCESS AND TRAFFIC <1,000 VPD



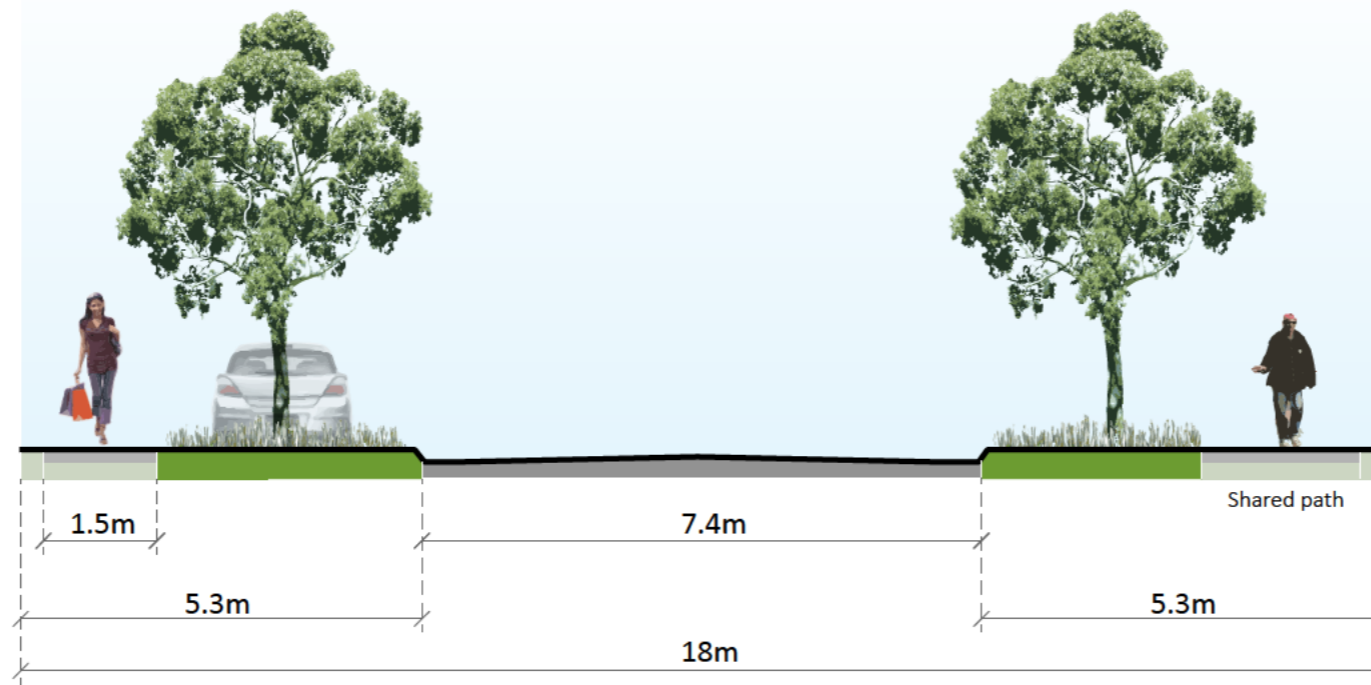
RESIDENTIAL / MIXED USE STREET WITH DRIVEWAY ACCESS AND TRAFFIC <3,000 VPD

STREET CROSS-SECTIONS

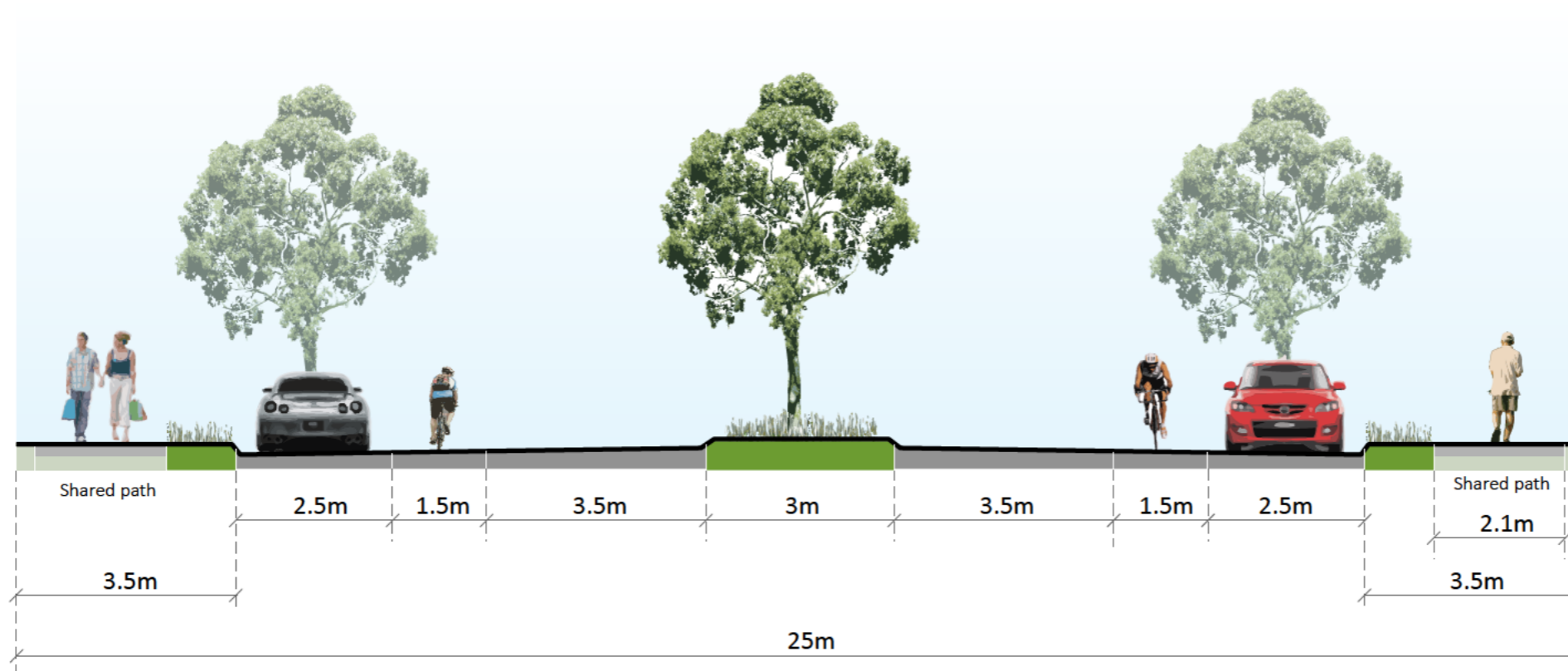
JOB : WSM008 ALKIMOS COASTAL VILLAGE MASTER PLAN
 DATE : 28 MARCH 2014
 SCALE : 1:100 @ A3



LEVEL 2 166 ALBERT ROAD
 SOUTH MELBOURNE VIC 3205
 +03 9682 8568
 +03 9682 1221
 www.dlasuzt.com



WATER TREATMENT BUFFER ROAD



NEIGHBOURHOOD CONNECTOR (SERVING STS BUS ROUTE)

STREET CROSS-SECTIONS

JOB : WSM008 ALKIMOS COASTAL VILLAGE MASTER PLAN
 DATE : 28 MARCH 2014
 SCALE : 1:100 @ A3



LEVEL 2, 166 ALBERT ROAD
 SOUTH MELBOURNE VIC 3205
 +03 9682 8568
 +03 9682 1221
 www.dlasuzt.com

APPENDIX E

NW CORRIDOR TRAFFIC MODELLING INFORMATION

- LEGEND
- REGIONAL OPEN SPACE
 - CONSERVATION OPEN SPACE
 - PUBLIC OPEN SPACE
 - STORMWATER MANAGEMENT
 - COMMERCIAL
 - RETAIL
 - MEDICAL
 - LEISURE
 - HOTEL
 - 10 INDICATIVE BUILDING HEIGHT
 - 10 INDICATIVE YIELD



MASTERPLAN

JOB : ALKIMOS COASTAL VILLAGE
 DATE : 25 FEBRUARY 2013
 SCALE : 1:2000 @ A1



LEVEL 2, 166 ALBERT ROAD
 SOUTH MELBOURNE VIC 3205
 t 03 9682 8568 f 03 9682 1221
 www.dlaust.com

ALKIMOS COASTAL VILLAGE MASTERPLAN - LAND USE YIELD ESTIMATES

PROJECT NUMBER : WSM008

JOB : ALKIMOS COASTAL VILLAGE

DATE : 25 FEBRUARY 2014

Building Numbers	Building footprint	Number of Storeys	Total Envelope	Less 20% of Land of Total envelope	Retail Floorspace (sqm)	Commercial Floorspace (sqm)	Medical Facilities Floorspace (sqm)	Leisure Floorspace (sqm)	Hotel Floorspace (sqm)	Residential Floorspace (sqm)	Average site area per dwelling	No. of dwellings	Notes
1	1512	5	7560	6048	700					6860	120	57	
2	2490	5	12450	9960		960				11490	120	96	
3	1623	5	8115	6492					6492				
4	608	5	3040	2432	486					2554	120	21	
5	3817	5	19085	15268	524	1440				17121	120	143	
6	3027	1	3027	2422	2422								Supermarket
7	1419	5	7095	5676		640				6455	120	54	
8	1299	5	6495	5196		640				5855	120	49	
9	1997	5	9985	7988				1598		8387	120	70	incl. Gym
10	2163	5	10815	8652	730		1000			9085	120	76	
11	2098	5	10490	8392	400					10090	120	84	
12	1297	4	5188	4150						5188	120	43	
13	1702	4	6808	5446						6808	120	57	
14	1642	4	6568	5254						6568	120	55	
15	1460	4	5840	4672						5840	120	49	
16	1486	4	5944	4755						5944	120	50	
17	1295	4	5180	4144						5180	120	43	
18	2153	4	8612	6890						8612	120	72	
19	2004	4	8016	6413						8016	120	67	
20	850	4	3400	2720						3400	120	28	
21	848	4	3392	2714						3392	120	28	
22	1288	4	5152	4122						5152	120	43	
23	648	4	2592	2074						2592	120	22	
24	1313	4	5252	4202						5252	120	44	
25	1396	4	5584	4467						5584	120	47	
26	2397	4	9588	7670	400					9188	120	77	
27	1736	4	6944	5555					5555				
28	1103	4	4412	3530						4412	120	37	
29	1758	4	7032	5626						7032	120	59	
30	1727	4	6908	5526						6908	120	58	
31	1715	4	6860	5488						6860	120	57	
32	1052	4	4208	3366						4208	120	35	
33	1049	4	4196	3357						4196	121	35	
34	1454	4	5816	4653						5816	120	48	
35	1436	4	5744	4595						5744	120	48	
36	2002	4	8008	6406						8008	120	67	
37	2404	4	9616	7693						9616	120	80	
TOTAL			255017	204014	5662	3680	1000	1598	12047	227413		1895	
Percentage (%)					2.2%	1.4%	0.4%	0.6%	4.7%	89.2%			

Data from RPS

Retail 5500 sqm
 Commercial/Office 3500 sqm
 Lifestyle gym 1600 sqm
 Medical 1000 sqm

ALKIMOS COASTAL VILLAGE MASTERPLAN - LAND USE YIELD ESTIMATES

PROJECT NUMBER : WSM008
 JOB : ALKIMOS COASTAL VILLAGE
 DATE : 25 FEBRUARY 2014

R-code	Precinct Area	Street Area	Open Space and Drainage Area	Residential Area	Average lot area (sq m)	Minimum lot area (sq m)	Housing Type	Maximum dwellings excluding apartments (as per minimum lot area)
R20-100	34896	10469	2858	21569	380-450	380	Single house	24
R25-40	245719	73716	25218	146785	380-425	380	Single house	355
R30-80	9282	2785	2939	3558	380-410	380	Single house	See Apartment Building No. 33 and 34
R40	15704	4711	0	10993	380	380	Single house	27
R60-100	29595	8879	4595	16122	380	380	Single house	10
R80-100	100654	30196	11612	58846	380	380	Single house (rear loaded)	83
Total				257873				499

Summary of Areas by Land Use

LAND USE	AREA (sq m)
Regional Open Space	201851
Public Open Space	44988
Storm Water Management	41937
Conservation Area	32198
Retail	5662
Commercial / Office	3680
Medical Facilities	1000
Leisure (lifestyle Gym)	1598
Hotel	12047
Residential	485286
Road	210089
Total	855880

Total Dwelling Numbers

Dwelling Type	Indicative Dwelling Yield	Percentage of Dwelling Type
Apartment Unit	1895	79%
Houses	499	21%
Total	2394	100%



- LEGEND**
- REGIONAL OPEN SPACE
 - CONSERVATION OPEN SPACE
 - PUBLIC OPEN SPACE
 - STORMWATER MANAGEMENT
 - COMMERCIAL
 - ▨ RETAIL
 - ▨ MEDICAL
 - ▨ LEISURE
 - ▨ HOTEL
 - INDICATIVE BUILDING HEIGHT
 - 10 INDICATIVE YIELD

MASTERPLAN

JOB: ALKIMOS COASTAL VILLAGE
 DATE: 25 FEBRUARY 2013
 SCALE: 1:2000 @ A1



LEVEL 2, 186 ALBERT ROAD
 SOUTH MELBOURNE VIC 3205
 T 03 9682 8568 F 03 9682 1221
 www.dlaust.com

ALKIMOS COASTAL VILLAGE MASTERPLAN - OPEN SPACE SCHEDULE

PROJECT NUMBER : WSM008
 JOB : ALKIMOS COASTAL VILLAGE
 DATE : 25 FEBRUARY 2014

	Sqm	Sqm	Percentage of GSA
Site Area		855880	
Less			
Regional Open Space (including Road Connection to Central Alkimos)	47043		
	154808		
Total	201851		
Total Net Site Area		654029	
Deductions			
STS Route	40392		
Activity Centre	49217		
Total	89609		
Gross Subdivisible Area (GSA)		564420	
Public Open Space requirement @10% of GSA		56442	
Public Open Space Contribution			
	A	3217	
	B	4163	
	C	34398	
	D	1399	
	E	1811	
Total		44988	8.0%
Storm Water Management			
	D1	3518	
	D2	2581	
	D3	3906	
	D4	4324	
	D5	2085	
	D6	2903	
	D7	4343	
	D8	5281	
	D9	2604	
	D10	4595	
	D11	2939	
	D12	2858	
Total		41937	7.4%
Conservation Area			
		32198	5.7%

ALKIMOS COASTAL NODE LSP: LAND USE DATA

Transport Zone	Dwellings		Floorspace (SQM)				
	Detached	Attached	Retail	Commercial	Medical	Leisure	Hotel
Zone 1	219	0					
Zone 2	113	0					
Zone 3	0	693	5262	3680	1000	1598	6492
Zone 4	14	514					
Zone 5	124	161					
Zone 6	29	531	400				5555

Transport Zone	Population	
	Detached	Attached
Zone 1	690	0
Zone 2	356	0
Zone 3	0	1403
Zone 4	44	1041
Zone 5	391	326
Zone 6	91	1075

Transport Zone	HBB		Jobs				
	Detached	Attached	Retail	Commercial	Medical	Leisure	Hotel
Zone 1	26	0	0	0	0	0	0
Zone 2	13	0	0	0	0	0	0
Zone 3	0	55	150	147	40	36	87
Zone 4	2	41	0	0	0	0	0
Zone 5	15	13	0	0	0	0	0
Zone 6	3	42	11	0	0	0	74

Bruce Aulabaugh

From: Piotrowski, Steven [Steven.Piotrowski@transport.wa.gov.au]
Sent: 21 March 2012 11:32
To: Richardson, Emmerson (SKM); Bruce Aulabaugh
Cc: Beyer, Steve; Han, Renlong
Subject: FW: Mode share and STEM - NW Corridor

Emmerson & Bruce,

After a considerable amount of investigation and discussion, we suggest using mode splits somewhere within the following ranges for the Alkimos zones in 2031 for Bruce's modelling:

Car Driver 54-56%
Car Pass 20-22%
PT 7-9%
Cyc 2-4%
Walk 12-14%

Kind regards,

Steven Piotrowski

Consultant | Integrated Transport Planning | Department of Transport

Level 8, 140 William St, Perth, WA 6000

Tel: 6551 6270 Fax: (08) 6552 4417 Mob: 0402 222 611| Steven.Piotrowski@transport.wa.gov.au



From: Richardson, Emmerson (SKM)
Sent: Sunday, 26 February 2012 3:21 PM
To: 'Beyer, Steve'
Cc: 'Bruce Aulabaugh'
Subject: FW: Mode share and STEM - NW Corridor

Steve,

Further to the email I sent you last week, Lend lease are keen to have DOT express a position on this which can be the basis for transport planning in the corridor and in Alkimos more particularly. There are a number of people who would be interested in attending any meeting that is held.

Would you be interested in convening a meeting with the following people attending:

- Steve Beyer (convenor)
- Renlong Han –DOP
- Chris Watts – PTA
- Bruce Aulabaugh
- Emmerson Richardson.

Regards, Emmerson.

Regards

Emmerson Richardson

Senior Executive Transport Planning

Sinclair Knight Merz

Level 10, 263 Adelaide Terrace, Perth, WA 6000

T +61 8 9469 4682 F +61 8 9469 4488 E ERichardson@globalskm.com

www.globalskm.com

From: Richardson, Emmerson (SKM)
Sent: Wednesday, 22 February 2012 8:46 AM
To: 'Beyer, Steve'
Cc: Bruce Aulabaugh
Subject: Mode share and STEM - NW Corridor

Steve,

I refer to our brief telephone discussion yesterday. As I mentioned Bruce Aulabaugh and I are involved in various strategic transport planning studies for Alkimos, Yanchep and Two Rocks. We are finding that some of the STEM outputs being provided by the DOP do not seem to be consistent with the STEM modelling being undertaken as part of the long term PT study. Our suspicion is that these outputs may predate the long term PT plan STEM outputs. As discussed there is a need for consistent modelling outputs to be used for development planning.

The car driver mode share for the entire NW corridor from the PARTS study 1n 2005/ 06 was 59%. This includes the area east of the freeway where car driver mode share is likely to be slightly greater than to the west of the freeway, which is closer to the railway. The 2002, TravelSmart survey for the City of Joondalup showed a 57% car driver mode share.

As the railway is constructed northwards in accordance with the long term PT plan recommendations and congestion on the freeway increases it is likely that car driver mode share will decrease by 2031. My recollection is that we were looking at about 51% car driver mode share across Perth and Peel on average in 2031 in the modelling undertaken as part of the long term PT planning. It may be slightly higher in the NW corridor, but would most likely be in the range 51% to 53% range. Your thoughts on this would be appreciated.

We are currently undertaking detailed traffic modelling for a number of areas and the car driver mode share is of critical importance in getting the quantum right. I am going to suggest that we use 52% car driver mode share for Alkimos, Yanchep, and Two Rocks for 2031 as being broadly consistent with the latest STEM modelling. I would appreciate it if you could liaise with the DOP and agree on a single latest series of STEM modelling outputs for the area.

Regards, Emmerson.

Regards

Emmerson Richardson

Senior Executive Transport Planning

Sinclair Knight Merz

Level 10, 263 Adelaide Terrace, Perth, WA 6000

T +61 8 9469 4682 F +61 8 9469 4488 E ERichardson@globalskm.com

www.globalskm.com

SKM is committed to working with its clients to deliver a sustainable future for all. Please consider the environment before printing this e-mail. Notice - This message contains confidential information intended only for the exclusive use of the addressee named above. No confidentiality is waived or lost by any mistaken transmission to you. If you have received this message in error please delete the document and notify us immediately. Any opinion, text, documentation or attachment received is valid as at the date of issue only. The recipient is responsible for reviewing the status of the transferred information and should advise us immediately upon receipt of any discrepancy. All email sent to SKM will be intercepted, screened and filtered by SKM or its approved Service Providers.

DISCLAIMER

This email and any attachments are confidential and may contain legally privileged and/or copyright material. You should not read, copy, use or disclose any of the information contained in this email without authorisation. If you have received it in error please contact us at once by return email and then delete both emails. There is no warranty that this email is error or virus free.

TRAFFIC MODEL LAND USE ASSUMPTIONS

The land use data provided by David Lock Associates (residential data) and RPS (jobs data) for the portion of the NW Corridor Model covering the Alkimos Coastal Node LSP includes:

- Approximately 2400 residential dwellings comprised of 1899 attached dwellings and 499 single residential dwellings (approximately 5420 persons);
- Approximately 162 retail jobs (including café, restaurant and other food/beverage)
- Approximately 383 commercial, service commercial and education jobs, plus 210 home based jobs;

The land use data in the NW Corridor Model includes:

DWELLINGS	POPULATION	PERS/ DWELL	P&S ENROL+ TAFE	RETAIL JOBS	NON RETAIL JOBS
114882	275716	2.4	61434	21888	57757

TRAFFIC MODEL TRIP GENERATION

Trip Productions

The Department of Transport provided guidance on mode share assumptions for use in this Ultimate Development NW Corridor traffic model. The guidance takes account of current travel behaviour and expected changes over time. The email from Department of Transport dated 21 March 2012 is attached at the end of this Appendix.

Table 1A compares the NW Corridor Traffic Model average daily person trip production rates and vehicle trip rates (after applying the DoT suggested mode split %) with the 2006 STEM Model.

	Home Based	Non-home based	HB + NHB	Car Driver Mode Split	Daily Veh-trip/person
NW Corridor Model	2.92	0.69	3.61	0.55	1.98
*STEM 2006 calibration	2.86	0.67	3.53	0.568	2.02

**Strategic Transport Evaluation Model 2006 calibration metro average person trip rates and car driver mode split. (Peter Lawrence of DoP, August 2010).*

Trip Attractions

Vehicle trip attractions were calculated using the following rates:

- *Retail: 14.4 veh-trips/day per employee. Café’s and restaurants are included in this category. This rate is slightly higher than the 13 veh-trips/ day per employee derived using the STEM model attraction coefficients and 70% car driver mode share.
- *Non retail: 3.1 veh-trips/day per employee. This rate is slightly higher than the weighted average of 2.53 veh-trips/ day per non-retail employee derived using Perth Commercial Complex and Industrial Complex employee data and STEM model attraction coefficients. Commercial vehicle fleet trips are accounted separately in the STEM model and are not included in this rate.
- Education: 1.2 veh-trips/ day per student
- Dwelling: 1.2 veh-trips/ day per dwelling

**The NW Corridor traffic model rates listed above include commercial vehicle trips, whereas the STEM model rates quoted for comparison do not. The STEM commercial fleet trips are accounted for through a separate commercial vehicle sub-model.*

For further comparative purposes the following STEM car drive trip attraction rates are provided for dwellings and enrolments:

Table 1B: Future Perth STEM Car Driver Trip Attractions Daily (Source Peter Lawrence, DoP)	
Landuse	Car Driver Trip Attr
dwellings	1.263529
PS + HS enrolments	0.632466
Tafe + Uni	1.018284

The resulting PM Peak Hour vehicle attraction rates are shown in Table 1C.

Table 1C: NW Corridor Peak Hour Veh Attraction Rates				
	HBW	HBO	HBS	NHB
Retail job	0.31848	0.11828	0.6368	0.2949
N.Retail job	0.19181	0.05718	0.00646	0.0726
Dwelling	0	0.074771	0	0.0311
Enrolment	0	0.10962	0	0.0085
CBD Retail job	0.2275	0.0845	0.4549	0.2106

Total PM Peak Hour trip productions/ attractions from the model are given in Table 2, below:

<i>Table 2: PM Peak Hour: Vehicle Trip Productions/ Attractions by Trip Purpose</i>			
Productions		Attractions	
HBW (home based work):	21146	HBW (home based work):	21147
HBO (home based other):	23869	HBO (home based other):	23869
HBS (home based shopping):	13808	HBS (home based shopping):	13808
NHB (non home based):	17692	NHB (non home based):	17692
TOTAL	76516	TOTAL	76516

VEHICLE TRIP PRODUCTIONS & ATTRACTIONS (INTERNAL & EXTERNAL)

Table 3 shows that 'Internal-Internal' trips constitute approximately 77% of the forecast vehicle trips in the NW Corridor Model, excluding through trips (i.e. excluding external-external trips). 'Internal-External/ External-Internal' trips make up the remaining 23% of the forecast traffic generated in the model area. This corresponds well with the ROM model outputs for this ultimate development scenario (i.e. 78% ii and 23% ie+ei).

<i>Table 3: PM Peak Hour Prod/ Attraction Trip Distribution Table (Internal & External)</i>		
Distribution Category	Vehicle Trips	Percentage
Internal - Internal	58923	77%
Internal – External/ External - Internal	17592(i.e. 7708 +9884)	23%
Total	76515	100%

INTERNAL – EXTERNAL TRIP PATTERN AND EXTERNAL-EXTERNAL TRIP PATTERN

The ROM traffic model data, referred to in Section 5, was used to guide the directional distribution of internal-external and external-external trips (Table 4A,4B and Table 5, respectively).

STEP 1: The ROM 24-hour vehicle trip sub-area matrix was divided into the following sub-sections:

- I-I (internal-internal)
- I-E (internal-external)
- E-I (external-internal)
- E-E (external-external)

STEP 2: The ROM I-I trips were compared to the total ROM 24-hour vehicle trip sub-area matrix and a percentage was determined. This percentage of I-I trips became a control factor for the PM Peak Hour Model. In effect, the percentage of I-I trips for the PM Peak Model was kept the same as for the ROM 24-hour model. With no other information to go by, this was the only reasonable thing to do. The I-I trips are distributed within the study area according to the QRSII gravity model. Information on the friction factors and speed volume functions used in the NW Corridor PM Peak Hour Model is provided below.

STEP3: The I-E and E-I sub-sections of the ROM 24-hour sub-area vehicle trip matrix were analysed to give % breakdowns for the trips to/ from the 'External Stations' (i.e. Marmion Ave, Mitchell Freeway, Wanneroo Road). In the NWC Ultimate Development Model, these ROM %'s were used for the PM Peak distribution of trips to/from the study area. For example 43.2% of External Station Attractions are distributed to Mitchell Fwy (south) and 31.2% are distributed jointly to Marmion Ave, Connolly Drive and other local roads (located to the west of the freeway) at the south cordon line.

In the NWC model, the PM Peak Hour trips that aren't I-I (see STEP 2) are the PM Peak Hour I-E and E-I trips to be distributed to the External Stations. The amount of trips to any particular External Station is done by 'distributing' vehicle trip production and attraction values in the proportions (%'s) derived from the ROM 24-hour sub-area matrix.

<i>Table 4A: EXTERNAL STATION ATTRACTIONS</i>	
External Station Name/ Direction	External Attraction %
Mitchell Fwy/ Wanneroo Road (North)	0.6%
Old Yanchep Road and local roads (south)	10.1%
Wanneroo Road (south)	14.9%
Mitchell Fwy (South)	43.2%
Connolly Drive and local roads (south)	8.7%
Marmion Avenue and local roads (South)	22.5%
TOTAL	100%

<i>Table 4B: EXTERNAL STATION PRODUCTIONS</i>	
External Station Name/ Direction	External Productions %
Mitchell Fwy/ Wanneroo Road (North)	0.8%
Old Yanchep Road and local roads (south)	10.1%
Wanneroo Road (south)	16.7%
Mitchell Fwy (South)	52.9%
Connolly Drive and local roads (south)	4.8%
Marmion Avenue and local roads (South)	14.7%
TOTAL	100%

STEP4: The E-E portion of the ROM 24-hour sub-area matrix was first multiplied by the PM Peak Hour Factor referred to above in 'Derivation of Peak Hour Vehicle Trip Productions from Daily Vehicle Trip Productions'. There was no other PM factor to reference for this purpose so this seemed the best course of action. Then the resulting matrix was transposed and added to itself. The resulting matrix cell values were multiplied by PM Peak Direction Factors as given below:

- 65% northbound/ 35% southbound for through trips to/from Mitchell Freeway North and Wanneroo Road North
- 50% north/50 south%, for most other through trips.

The resulting final 'E-E' PM Peak Hour Vehicle Trip Matrix is shown in Table 5.

The row and column numbers are from the ROM sub-area plot for the particular External Stations. The major road names are cross-referenced to these numbers below.

E1	0	0	0	0	0	0	3	142	0	0	0	0	1
E2	0	0	20	0	0	0	16	54	0	0	0	0	1
E3	0	38	0	0	0	0	0	0	0	0	0	0	0
E4	0	0	0	0	0	0	0	0	1	0	2	0	2
E5	0	0	0	0	0	0	0	0	0	0	0	0	0
E6	0	0	0	0	0	0	2	0	4	3	8	6	14
E7	5	29	0	0	0	2	0	20	8	2	21	6	53
	26	10											
E8	3	0	0	0	0	0	20	0	0	0	0	0	41
MRWA85	0	0	0	1	0	4	8	0	0	0	7	7	17
E9	0	0	0	0	0	3	2	0	0	0	12	0	47
MRWA86	0	0	0	2	0	8	21	0	7	12	0	0	60
E10	1	1	0	0	0	6	6	0	7	0	0	0	158
E11	1	1	0	2	0	14	53	41	17	47	60	85	0

E1=Mitchell Freeway North

E2=Wanneroo Road North

E3=Old Yanchep Road South

E4, E5, E6 = Neerabup Local Roads

E7=Wanneroo Road South

E8=Mitchell Freeway South

MRWA85 = Local Road South (between Fwy & Connolly)

E9= Connolly Road South

E10=Marmion Ave South

E11= Local Road West of Marmion Ave

VEHICLE TRIPS – FRICTION FACTOR

The NW Corridor Model uses an Exponential Friction Factor Function in its vehicle trip distribution step (where origins and destinations are paired).

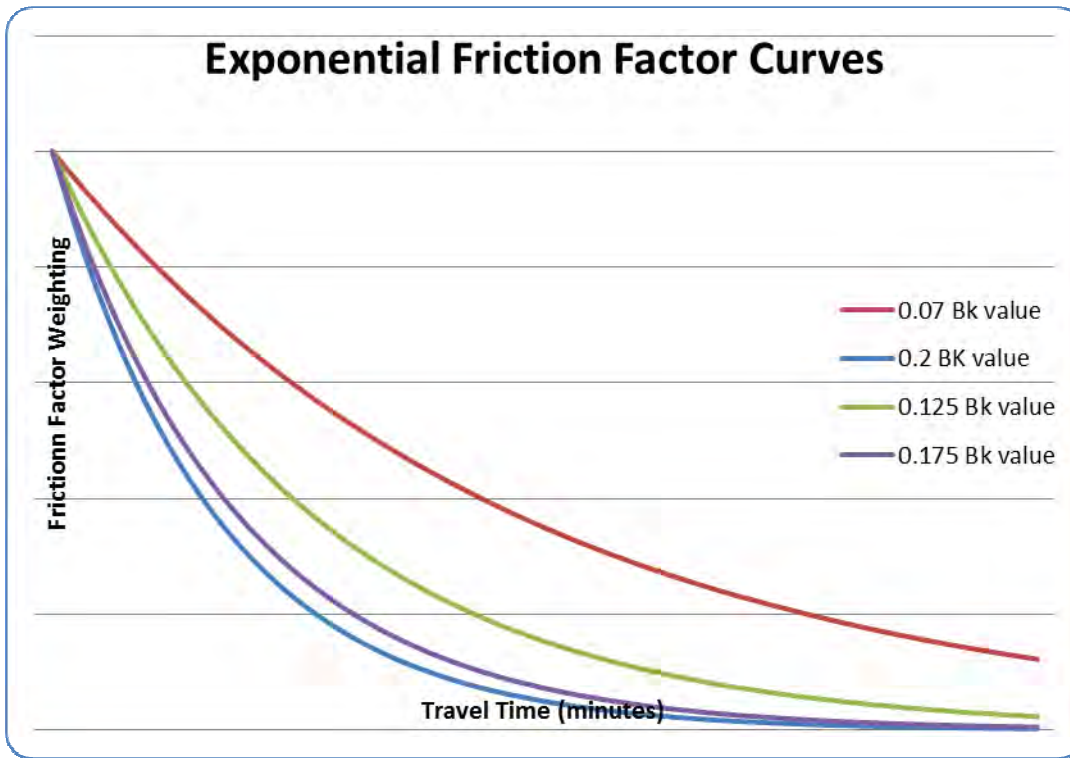


Figure 1: Exponential Friction Factor Curves

The Exponential function is given below:

$$F_k(t_{ij}) = \exp(-B_k \cdot t_{ij})$$

Where:

- k = trip purpose
- B_k = exponential parameter for purpose k
- t_{ij} = travel time between zone i and j in minutes

The chart above (Figure 1) shows the friction factor weighting curves resulting from the Exponential Function with a range of B_k values.

In the NW Corridor Model the exponential parameters (B_k) are as follows:

- B_k for HBW = 0.1
- B_k for HBO, HBS, & NHB = 0.2

The relatively 'higher value' of 0.2 for HBO, HBS & NHB based trips means that origin-destination pairing is more sensitive to travel time than for HBW trips.

Special Note: Friction Factor curves are not the same as modeled travel time distribution curves. Travel time distribution curves show the effects of the friction factor equations as applied to the model's origin and destination opportunities. As a result, travel time distribution curves may show an increase in trips with increasing travel time as more destinations are within reach (before dropping off due to time cost effects).

BPR SPEED VOLUME FUNCTIONS

The NW Corridor Model calculates travel times with the BPR speed/ volume function:

$$t = t_0 + t_0A(V/C)^N$$

Where:

- O = step size parameter
- A = volume/ capacity multiplier, can vary by functional class
- N = Volume/ capacity exponent, can vary by functional class
- t = travel time on a link
- t₀ = free travel time on a link
- V = sum of the base volume (times the base traffic multiplier) and the calculated volume
- C = 'capacity' for one hour on a link

The NW Corridor Traffic Model's BPR function parameter values are given in Table 6 (overleaf).

Table 6: NW Corridor BPR V/C Multiplier and Exponent Values			
Link Type	Capacity	V/C multiplier	V/C exponent
Freeway/ Expressway	2000 vph per lane	1.2	5.5
Major Arterial (DDA)	875 vph per lane	1.3	5.0
Minor Arterial (DDB)	750 vph per lane	1.35	4.25
Collector (N.Connector)	400 vph per lane	1.5	3.5
Local (Access Streets)	250 vph per lane	1.6	3.5

OTHER INFORMATION

QRSII is the modelling software used for the NW Corridor Ultimate Development Traffic Model. Refer to <http://my.execpc.com/~ajh/intro.htm> for further information and below for a brief description of QRSII:

Quick Response System II runs the four-step planning process – trip generation, trip distribution, mode split, traffic/transit assignment – for highway and transit forecasting. Networks and data are entered and edited graphically using the powerful General Network Editor. Please note that for the NW Corridor Model, there is only vehicle trip generation, distribution and assignment (i.e. no mode split step in the model).

The PM Peak Period was chosen for the modelling in the NW Corridor because there is substantial retail, bulk retail, showroom, and related shopping land use which are active in the PM Peak when other work trips are also occurring. This was agreed with the City of Wanneroo to be the critical demand period, particularly around the commercial/ retail centres such as Butler District Centre.

In 2011, the City of Wanneroo and Bruce Aulabaugh worked together to compile 'NW Corridor Ultimate Development' Land Use and Road Network Scenario for the area between Hester Ave (in Ridgewood) and the north end of Two Rocks (i.e. the Wilbinga Reserve boundary). The City and I worked with Main Roads ROM department to establish a special ROM Scenario for this 'NW Corridor Ultimate Development Scenario'. As a base, it used a 2031 ROM scenario from the NW Corridor Review Study undertaken by ARRB in 2009 (*The NW Corridor Structure Plan Review – Strategic Assessment of Regional Transport Requirements report, ARRB, Oct 2009*). The STEM model mode shares were taken from that same 2031 NW Corridor study.

There were several land use/ network scenarios considered in that ARRB study. Discussions with (DoP) Mohsin Muttaqui and Ian Barker/ Phil Thomspson (City of Wanneroo) determined that the '65% employment self-sufficiency scenario with modelling scenario 4 should be used as the ROM base upon which the NW Corridor Ultimate Development network/ land use would be overlaid. Scenario 4 comprised ROM Network 2 and employment self- sufficiency of 65%. Some information on ROM Network 2 (and ROM Network 1) is provided below:

Network 1 was as per the MRS for which the starting point was the 2031 network already coded in the ROM. This already reflects the Neerabup Structure Plan requirements, but not the East Wanneroo Structure Plan requirements for which some additional links, lanes and interchanges were added to service the proposed development in the East Wanneroo area.

Network 2 was Network 1 plus some additional transport links to improve the service to the Neerabup industrial estate and the East Wanneroo area and the connectivity to the rest of the Region.

In Network 2, a new north-south road east of East Wanneroo connects the east end of Flynn Drive across Neaves Road, thence southward past the east side of Gnangara Lake to Gnangara Road. From here the road parallels Alexander Drive to Hepburn Avenue, then parallels Hepburn Avenue until it turns south, connecting into Tonkin Highway at the interchange with Reid Highway. This road would be 'controlled access' with grade separation at Gnangara Road. Alexander Drive would terminate into the new north-south road south of the interchange with Gnangara Road and be retained as a primary road servicing the development along the west side. Hepburn Avenue would connect into the new north-south road where it turns from Alexander Drive to parallel Hepburn Avenue and again where Hepburn Avenue turns south.

At this point a connection is also made from the new north-south road across to Beechboro Road. Beechboro Road would fly-over Reid Highway (no connection) as it is too close to the Tonkin Highway interchange. Similarly Marshall Road would fly-over the new north-south road (no connection). It is intended that as well as providing access to the north, the new north-south road would provide a high quality freight route to connect the Neerabup Industrial Area to Malaga, Kewdale / Welshpool, Canning Vale and other destinations further south via Tonkin and Roe Highways. In addition Cooper Road / Stock Road was upgraded to provide a good connection from Neaves Road to the Perth Darwin National Highway and to Great Northern Highway.

An excerpt is also provided below of the title block from the ROM subarea network provided by Main Roads when the ROM NW Corridor Ultimate Development sub-area matrix output was provided in October 2011. The ROM Volume Plot References are:

Thu 13 Oct 2011 Trips Project: T:\Voyager\Jobs\26418\26418.cat

T:\Voyager\Jobs\26418\Base\NWC1\26418_Final_Loaded_NWC1_2031.Net

T:\Voyager\Jobs\26418\Reports\26418_LVP_NWC Traffic Study_North_2031.VPR

<ul style="list-style-type: none">• Thu 13 Oct 2011 TRIPS Project:T:\VOYAGER\JOBS\26418\26418.cat• T:\VOYAGER\JOBS\26418\Base\NWC1\26418_SubAreaNet_NWC1.net• T:\VOYAGER\JOBS\26418\Reports\26418_SubAreaNet_NWC TS_2031.VPR	
--	---

MRWA Updated Base Network - Version 2011

There is no calibration report for the NW Corridor Ultimate Development model comparing model volumes to traffic counts. This is because this is a 'green fields development area' with the land use and road/ rail infrastructure still to be established. Rather, the modelling relies on best estimates of land use, road network, vehicle trip generation rates, trip distribution and vehicle assignment.

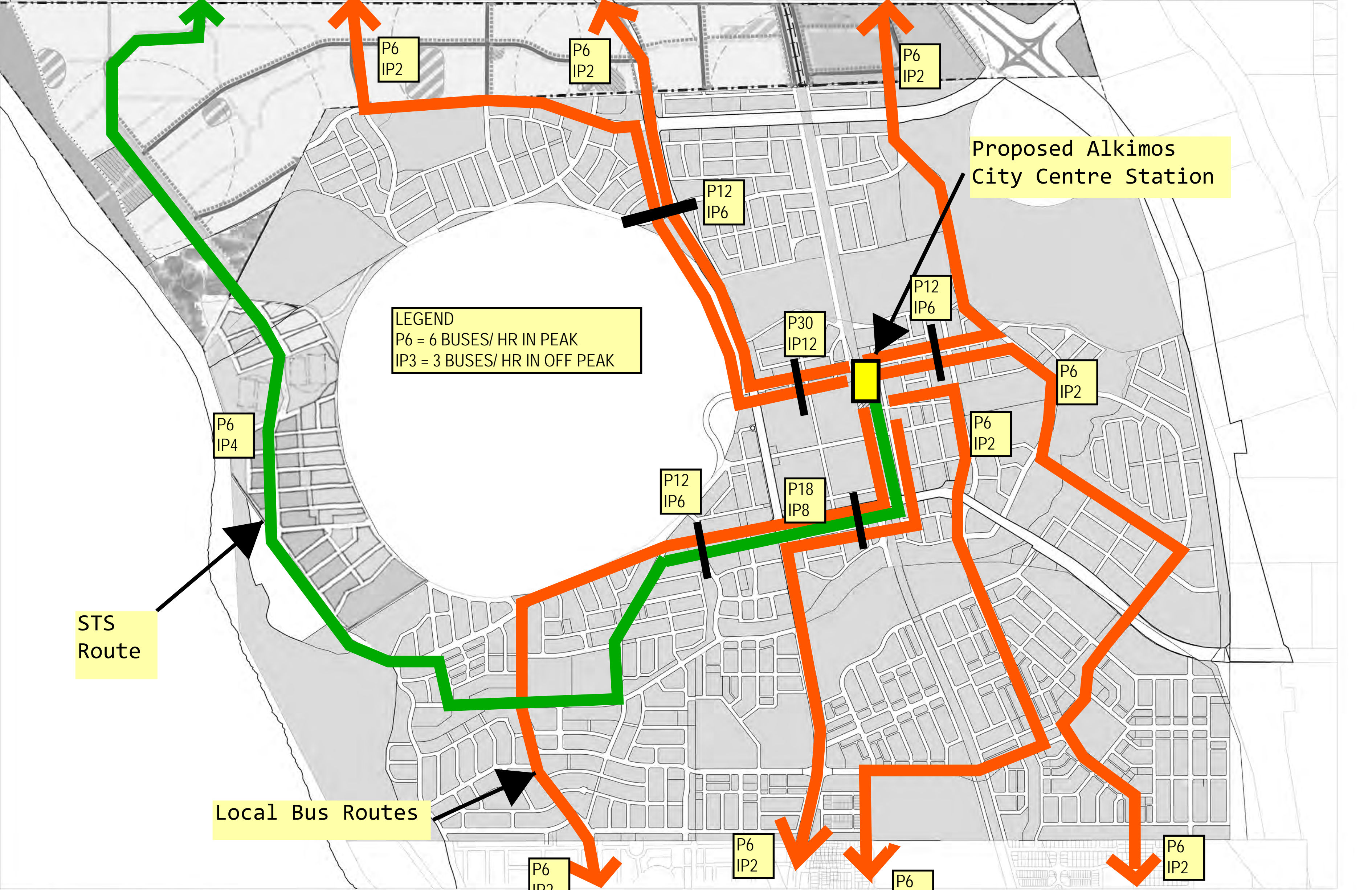
A type of informal 'calibration to ROM' was undertaken by taking the PM Peak Hour model outputs and converting them to 24hour outputs, then comparing them to the ROM volume plot provided by Main Roads. The outputs were compared on a 'screen line basis' and a minor adjustment was then made to the trip distribution friction factors.

This type of 'calibration' process is difficult given that Peak Hour and 24 Hour model have very different trip purpose compositions and using a 'daily/ peak' scale factor on the PM model to achieve '24 hour volumes' is likely to introduce distortions in relation to trip length and link volumes. There is work underway with the City of Wanneroo to produce an updated ultimate development land use forecast and road network for use by Main Roads

so that AM and PM peak hour ROM outputs are produced for the NW Corridor Ultimate Development Traffic Model sub-area.

APPENDIX F

DISTRICT BUS ROUTE PLAN



Proposed Alkimos City Centre Station

LEGEND
 P6 = 6 BUSES/ HR IN PEAK
 IP3 = 3 BUSES/ HR IN OFF PEAK

STS Route

Local Bus Routes

P6
IP4

P6
IP2

P6
IP2

P6
IP2

P12
IP6

P12
IP6

P30
IP12

P6
IP2

P6
IP2

P12
IP6

P18
IP8

P6
IP2

P6
IP2

P6
IP2

P6
IP2

Bruce Aulabaugh

Subject: FW: Alkimos Coastal Node composite plan

From: Pacy, Thomas [<mailto:Thomas.Pacy@pta.wa.gov.au>]
Sent: Thursday, 17 October 2013 11:03 AM
To: 'Bruce Aulabaugh'; Cox, Simon; Piggott, Lom
Cc: 'megan@woodsme.com.au'; 'David Klingberg'; 'mark.pawluk@landcorp.com.au'
Subject: RE: Alkimos Coastal Node composite plan

Hi Bruce,

The comments you've made below are correct, in line with our current policy and planning.

Thanks,
Thomas Pacy | Network and System Planner | Transperth Regional and School Bus Services
Public Transport Authority of Western Australia

Public Transport Centre, West Parade, Perth, WA, 6000
PO Box 8125, Perth Business Centre, WA, 6849

T: (08) 9326 2590 | F: (08) 9326 2487

thomas.pacy@pta.wa.gov.au | www.pta.wa.gov.au

Creating the best passenger transport service for Western Australians

The Public Transport Authority of Western Australia cannot accept any liability for any loss or damage sustained as a result of software viruses. You must carry out such virus checking as is necessary before opening any attachment to this message. The information in this email and any files transmitted with it may be of a privileged and/or confidential nature and is intended solely for the addressee(s). If you are not an intended addressee please notify the sender immediately, and note that any disclosure, copying or distribution by you is prohibited and may be unlawful. The views expressed in this email are not necessarily the views of the Public Transport Authority.

From: Bruce Aulabaugh [<mailto:brucea@inet.net.au>]
Sent: Monday, October 14, 2013 12:27 PM
To: Pacy, Thomas; Cox, Simon; Piggott, Lom
Cc: megan@woodsme.com.au; David Klingberg; mark.pawluk@landcorp.com.au
Subject: RE: Alkimos Coastal Node composite plan

Thomas/ Lom,

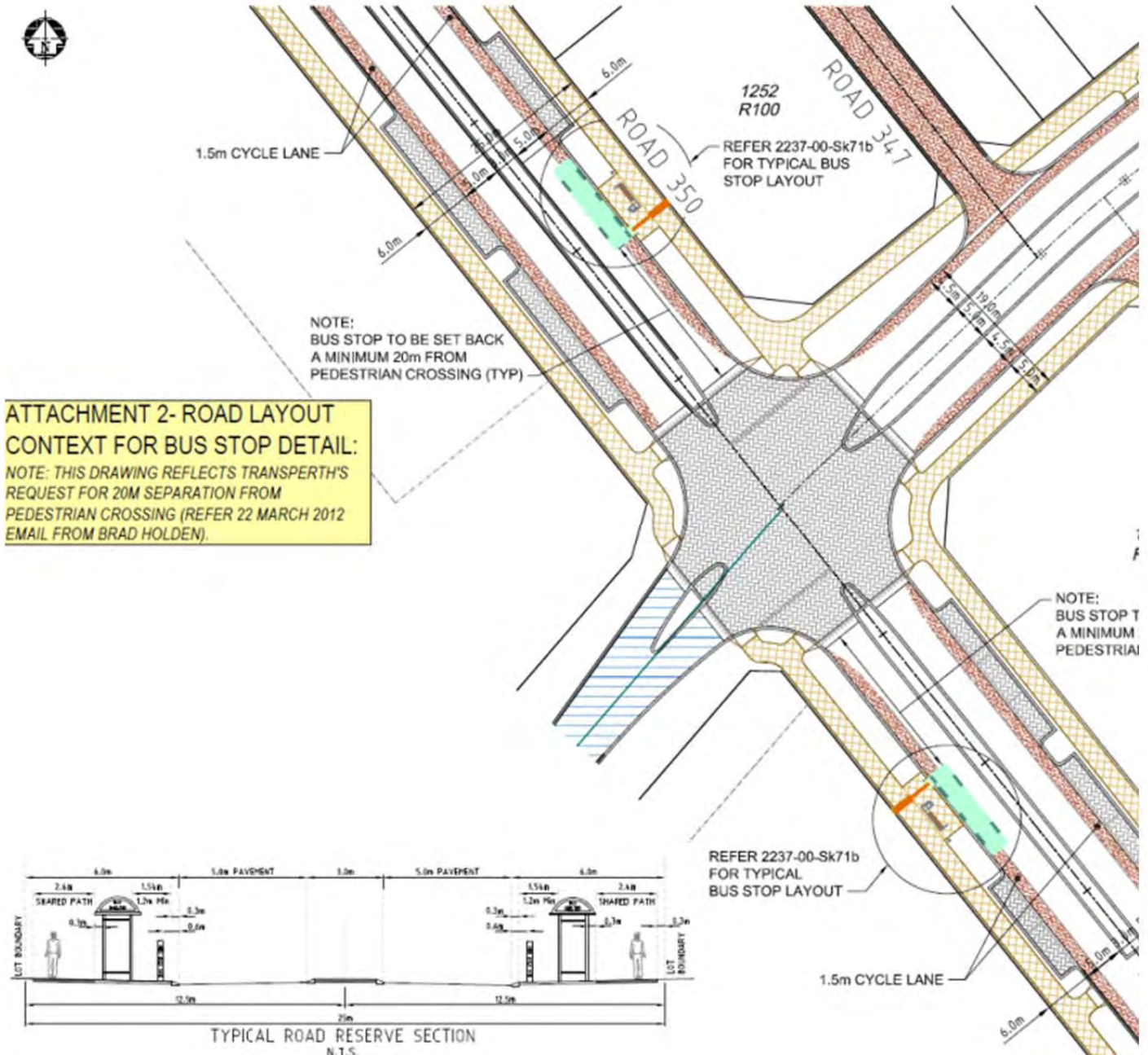
Thanks for the meeting at your office today. As discussed, I understand the following criteria in relation to 'standard' local bus route planning:

1. Preferred minimum travel lane dimensions for standard bus route operation in local streets are:
 - a. 3.5m lane for an undivided road (i.e. no median)
 - b. 3.3m lane for a divided road (i.e. central median in place, either kerbed or flush)
2. Traffic calming and intersection design (including roundabouts) need to satisfy Transperth design specifications along bus routes.

In relation to special STS bus route requirements:

1. Transperth are willing for the STS to operate in a 40km/hr urban centre speed environment for a limited distance. Limited distance would imply something in the order of 400-500m or less.
2. STS bus route will operate on the 'central' road through the Alkimos Coastal Node LSP (i.e. not on the road adjacent the Wastewater Treatment Buffer, nor on the 'foreshore' road). Refer to attached plan showing blue dotted line indicating route of STS through Alkimos Coastal Node
3. The STS route design standards as documented in the Alkimos-Eglinton DSP, the Shorehaven LSP and the South Alkimos LSP, provide 3.5m travel lanes and 1.5m cycle lanes (parking embayments are additional where on-street parking is allowed).
4. STS bus stop design requirements will need to be agreed with Transperth at subdivision stage and engineering design drawings for bus stops will need to be submitted to Transperth for approval. An example

design drawing for the STS, (from a nearby project) is provided below. I note that the road reserve is 25m to provide 6m wide verges (including 2.5m parking embayment, 5m road carriageways, and 3.0m median.)



Please review this information and reply with any comments or clarifications as necessary.

Thanks and regards

Bruce Aulabaugh

From: Bruce Aulabaugh [<mailto:brucea@iinet.net.au>]

Sent: Friday, 11 October 2013 10:39 AM

To: Thomas.Pacy@pta.wa.gov.au; Cox, Simon

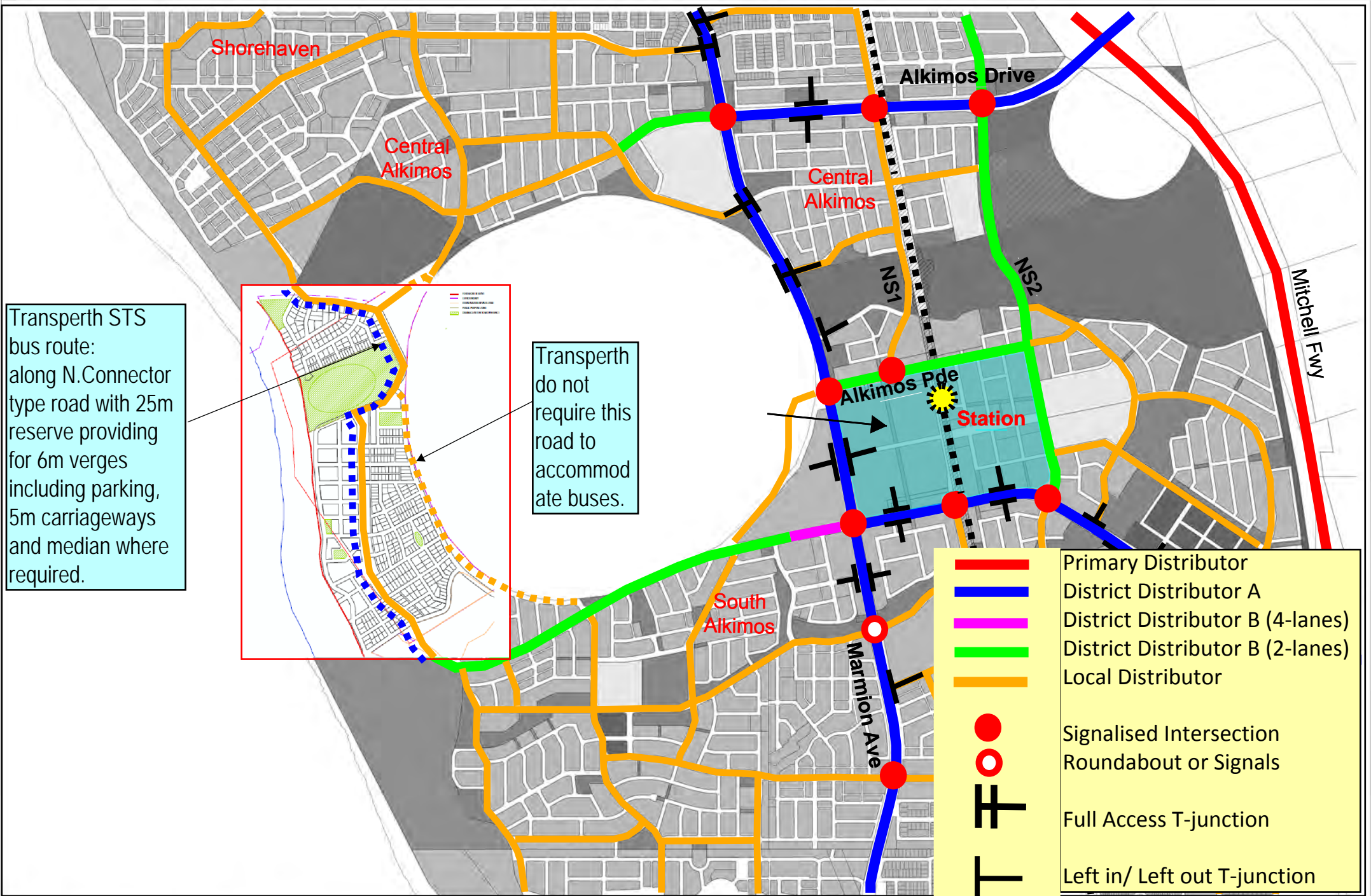
Subject: Alkimos Coastal Node composite plan

Thomas,

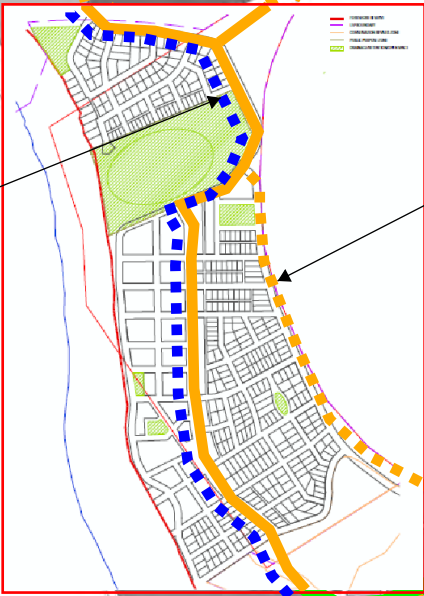
As promised here is a 'composite' plan (of sorts), showing Alkimos Coastal Node draft plan overlaid on the district road hierarchy plan I prepared for the Alkimos City/ Central/ South LSP's. The 'golden' lines through Alk Coastal Node are the 'through' routes being considered to serve N.Connector/ Local Distributor function and are candidates to serve the STS route (or whatever that coastal bus route ends up being). We can talk about continuity and directness and intersection layout at the meeting on Monday.

Regards

Bruce



Transperth STS bus route: along N.Connector type road with 25m reserve providing for 6m verges including parking, 5m carriageways and median where required.



Transperth do not require this road to accommodate buses.

Alkimos District Road Hierarchy & Arterial Access: Markup with Alkimos Coastal Node STS Bus Route
 Bruce Aulabaugh Traffic Engineering & Transport Planning

Reference: #15P1014100

18 February 2016

LandCorp
Level 6, Wesfarmers House, 40 The Esplanade
PERTH WA 6000

Attention: Ms. Naomi Lawrance (Development Manager)

Dear Naomi

ALKIMOS COASTAL NODE LOCAL STRUCTURE PLAN ADDENDUM TO TRAFFIC AND MOVEMENT NETWORK REPORT

A Local Structure Plan (LSP) has been prepared for the Alkimos Coastal Node within the Alkimos-Eglinton District Structure Plan (DSP) located in the City of Wanneroo. As part of the initial works completed with the LSP preparation, a traffic report was prepared by Bruce Aulabaugh in April 2014 (referred herein as the Aulabaugh Report). Since the completion of the Aulabaugh Report, the proposed land uses and road network layout have been revised within the LSP. Accordingly, GTA Consultants (GTA) has been engaged by LandCorp to prepare an addendum to the Aulabaugh Report to address the revised LSP, and in particular, define any impacts to the proposed local road hierarchy and movement network.

This addendum refers to the original land use yields/dwelling numbers from the 2014 LSP that included the Public Purpose area (particularly in Zone 1, refer Figure 1). The currently proposed yields/dwellings reflect the new Public Purpose area in Zone 1 as required by the Water Corporation.

It is noted that this addendum refers to and supersedes only the sections of the Aulabaugh Report where outcomes have changed as a result of the revised LSP. The remainder of the Aulabaugh Report remains relevant and applicable to the LSP, and as such it is recommended that this addendum be read in conjunction with the Aulabaugh Report.

A summary of the impact of the revised LSP as it related to the Aulabaugh Report and this addendum is presented in Table 1.

Table 1: Changes from Aulabaugh Report resulting from Yield Changes

Section within Aulabaugh Report	Outcome Affected by Modified LSP?	Section in this Addendum Addressing Changes
1. Introduction	No	-
2. Regional Transport	No	-
3. District Road Hierarchy and Intersection Control	Yes	Section 3 – District Road Hierarchy and Intersection Control
4. Street Cross-Sections	Yes	Section 4 – Street Cross-Sections
5. Ultimate Development Traffic Forecast	Yes	Section 5 – Ultimate Development Traffic Forecast
6. Local Traffic Management	Yes	Section 6 – Traffic Management

25 YEARS

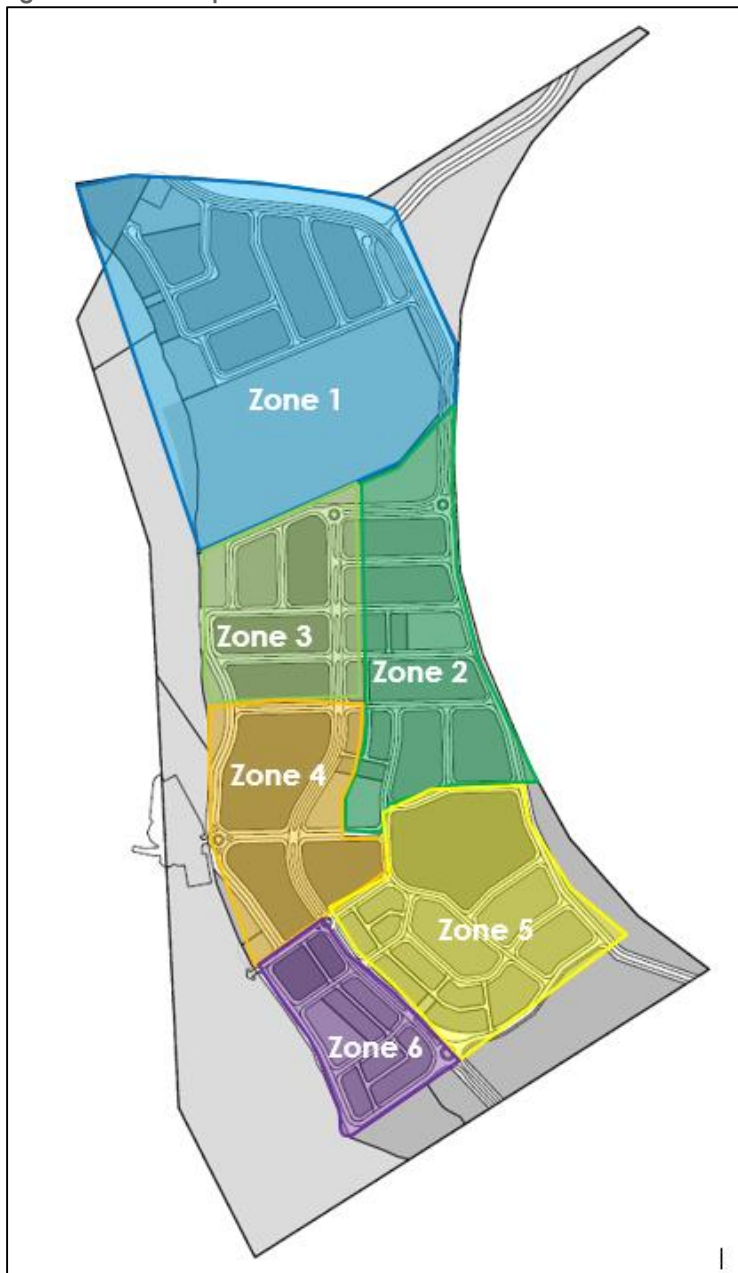
melbourne
sydney
brisbane
canberra
adelaide
gold coast
townsville
perth

Level 27,
44 St Georges Terrace
PERTH WA 6000
t// +618 6316 4634

Revised Land Use Schedule

The anticipated land uses and lot yields in the LSP have changed since the Aulabaugh Report was prepared in April 2014. In order to estimate traffic generation of the revised LSP, the previous yields have been compared to the currently proposed yields using the six geographic zones as adopted in the analysis referenced in Appendix E of the Aulabaugh Report. These zones are reproduced in Figure 1 below and superimposed on the revised LSP.

Figure 1: Zone Map



The differences in land use yields between the previous and revised LSPs for each zone are detailed in Table 2.

Table 2 indicates that the revised LSP represents an overall decrease in dwelling numbers, retail and commercial floor area, leisure and hotel floor area.

Further details of the previous and revised LSP land use yields are provided in the schedules at Attachment 1.

Table 2: Changes in Land Use Yields from Previous to Revised LSP

Zone	Detached Dwellings	Attached Dwellings	Retail (sq.m)	Commercial (sq.m)	Medical (sq.m)	Leisure (sq.m)	Hotel (sq.m)
Zone 1	-111	+31	0	0	0	0	0
Zone 2	+1	0	0	0	0	0	0
Zone 3	+37	-119	-4462	-1680	-1000	-1048	-6492
Zone 4	-6	+128	+4462	+580	+1000	+650	+11000
Zone 5	-4	+139	0	0	0	0	0
Zone 6	+28	-486	-400	0	0	0	-5555
TOTAL	-55	-307	-400	-1100	0	-398	-1047

Note: "Previous" refers to the original land use yields/dwelling numbers from the 2014 LSP that included the proposed Public Purpose area in Zone 1.

Section 3 – District Road Hierarchy and Intersection Control

Based on the revised yields and road network layout, an updated road hierarchy has been prepared, and is provided in Figure 2.

It is noted that the district road hierarchy also shown as Figure 2 in the Aulabaugh Report was prepared in accordance with Main Roads WA Metropolitan Functional Road Hierarchy. In this respect, the "Local Distributors" presented in the LSP were considered as neighbourhood connector type roads.

This addendum considers the LSP road network in accordance with Liveable Neighbourhoods. Whilst different terminology is therefore used, the conclusions are the same for the LSP roads which contribute to the district road hierarchy.

Section 4 – Street Cross-Sections

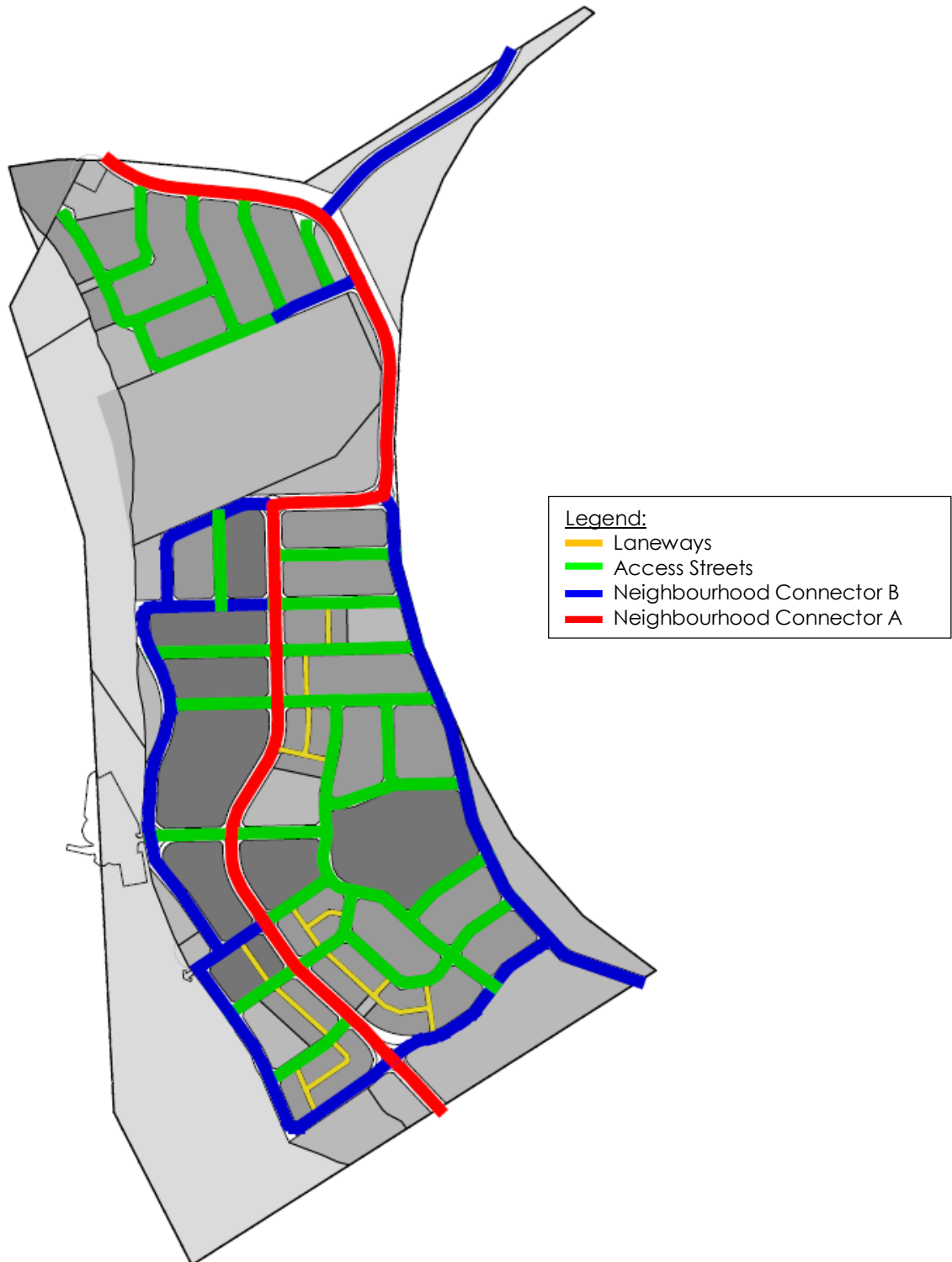
The following cross-sections are proposed on roads within the LSP:

- Residential and Mixed-Use Laneways: 6m reserve width with 1m setback for garages
- Residential Access Streets: 16m reserve width
- Neighbourhood Connectors: reserve widths in the range of 18-25m.

The proposed road reserve widths, carriageway formations and provision of footpaths / shared paths are expected to adequately cater for the anticipated future traffic volumes and the intended function of the roads within the LSP.

The cross-section provisions for laneways, access streets and neighbourhood connectors are consistent with the guidance provided in Liveable Neighbourhoods.

Figure 2: Proposed Road Hierarchy within the revised Local Structure Plan



(Base Map supplied by Creative Design + Planning)

Section 5 – Ultimate Development Traffic Forecast

Background

The area modelled within the Aulabaugh Report covered the Alkimos Eglinton DSP, inclusive of the coastal node LSP. The revised model prepared for this addendum covers the impact of the changes to the land use yields on the road network within, and in the immediate vicinity, of the LSP. It is anticipated that the wider traffic volume impacts would be largely consistent with the outcomes determined in the previous modelling work reported within the Aulabaugh Report.

It is noted that a detailed assessment of the base scenario (i.e. inclusive of road NS3) has been the focus of this addendum. Whilst the specific impacts of 'no NS3' connection has not been calculated in this addendum, comment on the potential implications has been provided in the event that a NS3 connection is not constructed.

Trip Generation Rates

It is noted that the traffic generation and distribution estimates contained within the Aulabaugh Report were produced using the EMME modelling software package. Access to this model was not provided for the preparation of this addendum, and as such GTA has estimated traffic generation impacts using conventional methods and standard trip generation rates.

With respect to these trip generation rates, it is noted that the WAPC's *Transport Assessment Guidelines for Developments* provide peak hour trip generation rates but not daily trip generation rates. As such, reference has been made to the NSW RTA *Guide to Traffic Generating Developments* (RTA Guide) to determine appropriate daily trip generation rates for the LSP. The rates adopted for the proposed land uses within the development as sourced from the RTA Guide are detailed in Table 3.

It is noted that the WAPC's *Transport Assessment Guidelines for Developments* also reference the RTA Guide in absence of WA specific data and therefore the application of these daily rates are considered suitable.

Table 3: Adopted Trip Generation Rates

Proposed Land Use	RTA Guide Land Use Definition	Daily Trip Generation Rate
Detached Dwelling	Residential – Dwelling House	9 trips / dwelling
Attached Dwelling	Medium Density Residential (Larger Units)	6 trips / dwelling
Retail	Retail – Shopping Centre	121 trips / 100sq.m GLFA
Commercial	Office and Commercial	10 trips / 100sq.m GFA
Medical	Office and Commercial[1]	10 trips / 100sq.m GFA
Leisure	Gymnasium – Metro Sub-Regional Areas	45 trips / 100sq.m GFA
Hotel	Office and Commercial[2]	10 trips / 100sq.m GFA

[1] The RTA Guide does not provide rates for medical centres, so a standard commercial trip generation rate has been adopted

[2] The RTA Guide does not provide rates for hotels, so a standard commercial trip generation rate has been adopted

Traffic Generation Comparison

Based on the information presented in Table 3, the traffic generation for the previous and currently proposed LSP has been compared. This information is detailed in Table 4.

Table 4: Change in Traffic Generation from Previous to Current LSP (vehicles per day)

Zone	Detached Dwellings	Attached Dwellings	Retail	Commercial	Medical	Leisure	Hotel	Total for Zone
Zone 1	-999	+186	-	-	-	-	-	-813
Zone 2	+9	-	-	-	-	-	-	+9
Zone 3	+333	-714	-5399	-168	-100	-472	-649	-7169
Zone 4	-54	+768	+5399	+58	+100	+293	+1100	+7664
Zone 5	-36	+834	-	-	-	-	-	+798
Zone 6	+252	-2916	-484	-	-	-	-556	-3704
TOTAL	-495	-1842	-484	-110	0	-179	-105	-3215

Table 4 indicates that the modified LSP is expected to generate in the order of 3,200 fewer vehicle movements over a typical day. It is noted that the changes in traffic generation vary considerably by Zone, with Zones 2, 4 and 5 generating an increased volume of traffic from the previous LSP, while Zones 1, 3 and 6 generate a lower volume of traffic when compared against the previous LSP.

Internal Trips

The WAPC *Transport Assessment Guidelines for Development* notes that the proportion of trips internal to a structure plan varies by development, as the trip distribution is shaped by a number of factors including the presence of retail, medical and commercial land uses within the structure plan. As such, the Guidelines do not provide firm guidance on what proportion of trips should be assumed to be internal to the structure plan. Accordingly, reference has again been made to the RTA Guide, which suggests that up to 25% of trips within subdivisions are internal. As per the WAPC Guidelines, the RTA Guide also notes that this figure may require adjustment based upon the composition of internal land uses likely to generate internal trips within the subdivision.

On this basis, the following points are noted:

- the revised LSP incorporates a significant mixed-use precinct including a mix of retail, commercial, medical, leisure and hotel land uses
- recreational / open space areas are provided within the LSP
- the revised LSP has been generally designed in accordance with *Liveable Neighbourhoods* principles.

Based on the above, it could be reasonably expected that the proposed mix of land uses within the LSP would generate a large proportion of internal trips. As such, some 15% of trips generated by the LSP have been assumed to be internal trips, in accordance with the guidance provided by the RTA Guide.

Traffic Distribution & Assignment

Internal Trips

Internal trips generated within the development have been distributed as per the following rationale:

- all internal trips generated in Zones 1, 2, 5 and 6 have been assumed to travel to Zones 3 and 4 (i.e. the retail/commercial precinct)

- all internal trips generated in Zones 3 and 4 have been proportionally split between all other Zones within the LSP based on the proposed yields of each Zone
- trips have been assigned to the most direct and practical path between the origin and destination as per the proposed road hierarchy.

External Trips

External trips within the development have been assumed to be assigned to each of the four external roads as per the modelling outputs provided in the Aulabaugh Report. The previously adopted assignments as determined from the modelling outputs are as follows:

- 16% of traffic travels northwest (via NS1)
- 25% of traffic travels northeast (via NS3)
- 18% of traffic travels southeast (via NS2)
- 41% of traffic travels south (via NS1).

These traffic assignments have been applied to the modified land use yields and traffic generation as detailed earlier in this report.

Changes to Road Network Volumes

Based on the information and analysis detailed above, the changes to the traffic generation characteristics of the LSP have been evaluated and are shown in Figure 3. Accordingly, the revised future traffic volumes based on these changes are presented in Figure 4 and summarised in Table 5.

Figure 3: Forecast Traffic Volumes Differences from Modified LSP

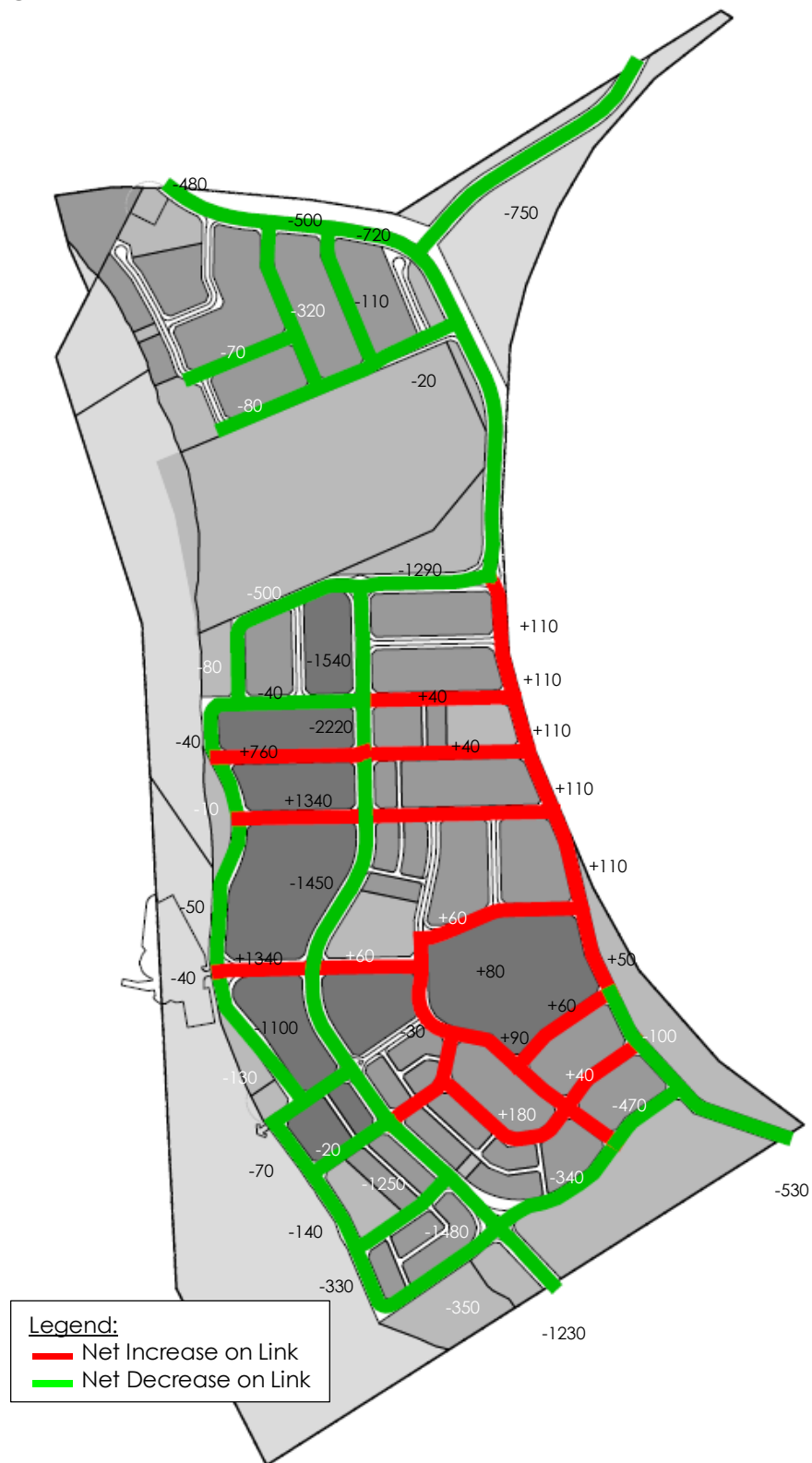
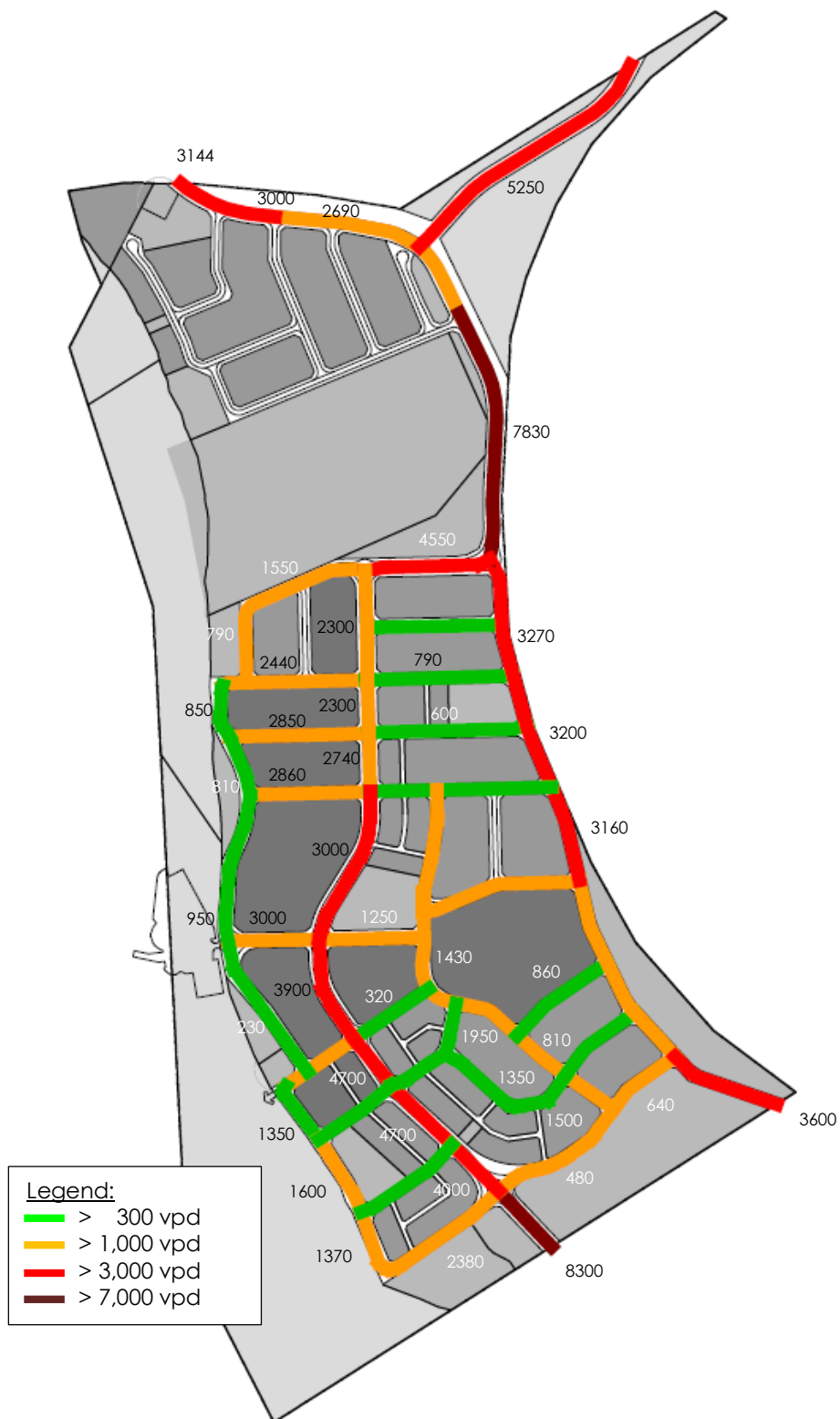


Figure 4: Ultimate LSP Traffic Volumes (Revised Yields)



(Base Map supplied by Creative Design + Planning)

Table 5: Comparison of Ultimate Road Link Volumes within LSP

Road Name	Road Section	Previous Volume Range (vpd)	Modified Volume Range (vpd)
NS1	North Section, North of NS3	3,400-3,600	2,700-3,150
	Middle-North Section, South of NS3	9,000	7,800
	Middle Section in Activity Centre	3,600-5,900	2,200-4,600
	South Section, north of Graceful Boulevard	9,550	8,300
NS3	North-East Link to Central Alkimos	6,000	5,250
NS2	Water Treatment Buffer Road	3,000-4,150	2,950-3,600
	Beach Foreshore Access Street	800-2,000	900-1,600

It is noted that a section of the NS1 road is expected to cater for some 7,800 vehicles per day. As stated in the Aulabaugh Report, should full turning movement access be provided on these segments of road, medians will need to be widened to 6m to accommodate right turn bays, resulting in a 28m road reserve. This would not be required should access on these sections of road be limited to left-in / left-out only.

The outcomes of the revised modelling otherwise do not indicate that significant changes are required to the formation of roads or traffic management within the LSP.

Alternative Network Arrangement

Consideration has also been given to an alternative network arrangement in which the north-eastern external link road (NS3) to Central Alkimos LSP is not constructed. The absence of this road would be expected to affect the traffic volumes in the area, particularly at the alternate external connections to the adjacent LSPs.

While the traffic implications of the alternative network have not specifically been modelled with the revised land use schedule, reference is made to the findings in the Aulabaugh Report with respect to the implications of this change. It notes that the main effects of this change are the increase in traffic of some 3,000 vpd on Alkimos Drive West, and approximately 4,000 vpd on the northern section of NS1 linking to Alkimos Drive West. It also notes that the effects were considered manageable under the previous land uses proposed within the LSP.

As noted earlier in this addendum, the net external traffic impacts of the modified LSP are lower than those of the previous yield. As such, under the alternative network layout, it would be expected that the impacts of the revised yield would be lesser than those previously reported in the Aulabaugh Report. As the previous yield was considered to have manageable impacts on the road network, it is therefore concluded that the revised yield would not further impact the internal or external proposed road network in a way not already envisaged by the previous analysis.

Suitability of Road Network for a Possible Future Marina

It is understood that previous planning documents have identified the potential for a marina to be included within the LSP. However, it is noted that a marina is not currently being considered within the LSP as the full potential for a marina has not been confirmed at this time. Notwithstanding and as noted in the Aulabaugh Report, the suitability of

the proposed road network has been considered with the potential for a marina to be constructed within the LSP area should this occur at a future point in time.

Given that the volumes on the road network are not observed to have increased significantly from the previously conducted modelling, and that the road network is to be designed in accordance with *Liveable Neighbourhoods* guidelines, it is expected that the proposed road network design would not preclude the possible future development of a marina within the LSP. However, it is noted that the impacts of any such proposal would need to be fully explored and assessed upon the development of a design proposal for the marina.

Section 6 – Local Traffic Management

Access to Internal Roads

It is noted that the proposed road network and lot layout prevents any requirement for direct vehicular reverse access to the proposed section of the Neighbourhood Connector A road within the LSP (NS1, south of NS3). Vehicular access to properties fronting this road is able to be provided via laneways to the rear or adjacent lower order roads.

Direct vehicular access to access streets and neighbourhood connectors is expected to be suitable, as no roads with traffic volumes over 5,000 vehicles per day are expected to be required for direct access by individual lots. This is subject to confirmation and further evaluation during the subdivision process.

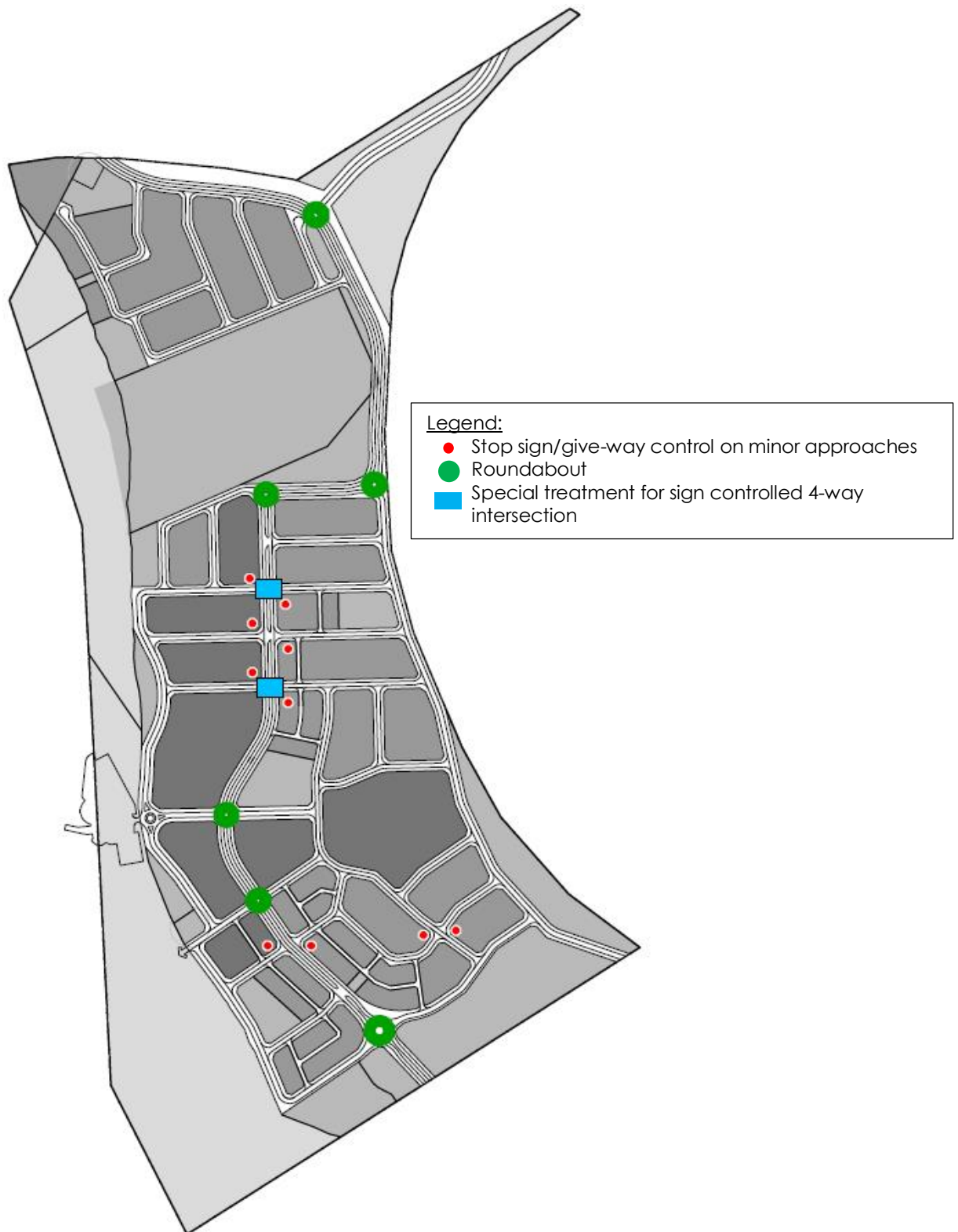
Intersection Treatments

It is expected that roundabouts will be required to be provided at critical four-way junctions, particularly along the internal distributor roads, where traffic volumes are higher and speeds are required to be managed. These locations are shown in Figure 5.

Further four-way intersections on roads where traffic volumes are lower may be able to be managed by Stop or Give-Way signage on the minor approaches, and appropriate pavement treatment.

It is noted that, as per the conclusions of the Aulabaugh Report, a number of the proposed intersections may require further review of the control measures at the subdivision stage. These reviews would be expected to be conducted in consultation with the City of Wanneroo.

Figure 5: Proposed Intersection Management Measures



Conclusion

Based on the findings presented within this addendum, the following conclusions are made:

- i The revised land use schedule represents an overall decrease in the residential, retail, commercial, leisure and hotel floor area yields from the previously assessed LSP.
- ii The proposed internal road network layout has been designed in accordance with *Liveable Neighbourhoods* design principles.
- iii The proposed road hierarchy generally complies with the road hierarchy set out by *Liveable Neighbourhoods* and *Main Roads WA Metropolitan Functional Road Hierarchy*.
- iv The revised land use schedule represents a net reduction in traffic generated (approximately 3,200 vehicles per day less) from the previous proposal.
- v Estimated future traffic volumes on individual road links within the LSP are expected to be able to be accommodated within the proposed road reserves and cross-sections.
- vi The wider traffic volume impacts would be largely consistent with the outcomes determined in the previous modelling work reported within the Aulabaugh Report.
- vii The road network layout is not expected to preclude the future construction of a marina within the LSP.
- viii Direct vehicular access is proposed to be provided only to access streets and neighbourhood connector roads where traffic volumes do not exceed 5,000 vehicles per day.
- ix Intersection treatments at key intersections have been considered and are expected to be reviewed and agreed upon during the subdivision phase of development.

Naturally, should you have any questions or require any further information, please do not hesitate to contact me in our Perth office on (08) 6316 4634.

Yours sincerely

GTA CONSULTANTS



Tanya Moran
Director

encl.

Attachment 1 – Current and Previous Land Use Schedules

Attachment 1

Current and Proposed Land Use Schedules

Attachment 1: Current and Proposed Land Use Schedules

Original Proposal

Transport Zone	Dwellings		Floorspace (SQM)				
	Detached	Attached	Retail	Commercial	Medical	Leisure	Hotel
Zone 1	219	0	0	0	0	0	0
Zone 2	113	0	0	0	0	0	0
Zone 3	0	693	5262	3680	1000	1598	6492
Zone 4	14	514	0	0	0	0	0
Zone 5	124	161	0	0	0	0	0
Zone 6	29	531	400	0	0	0	5555
Total	499	1899	5662	3680	1000	1598	12047

New Proposal (Feb 2016)

Transport Zone	Dwellings		Floorspace (SQM)				
	Detached	Attached	Retail	Commercial	Medical	Leisure	Hotel
Zone 1	108	31	0	0	0	0	0
Zone 2	114	0	0	0	0	0	0
Zone 3	37	574	800	2000	0	550	0
Zone 4	8	642	4462	580	1000	650	11000
Zone 5	120	300	0	0	0	0	0
Zone 6	57	45	0	0	0	0	0
Total	444	1592	5262	2580	1000	1200	11000

Net Yield Difference (= new - original)

Transport Zone	Dwellings		Floorspace (SQM)				
	Detached	Attached	Retail	Commercial	Medical	Leisure	Hotel
Zone 1	-111	31	0	0	0	0	0
Zone 2	1	0	0	0	0	0	0
Zone 3	37	-119	-4462	-1680	-1000	-1048	-6492
Zone 4	-6	128	4462	580	1000	650	11000
Zone 5	-4	139	0	0	0	0	0
Zone 6	28	-486	-400	0	0	0	-5555
Total	-55	-307	-400	-1100	0	-398	-1047

