

Appendix 7

Transport Impact Assessment (Stantec)

Lot 6, Taronga Place, Eglinton

Local Structure Plan
Transport Impact Assessment



Prepared by: GTA Consultants (WA) Pty Ltd for Urban Quarter
on 10/08/2021
Reference: W115946
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Local Structure Plan Transport Impact Assessment

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Quality Record

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1. INTRODUCTION

1.1. Background & Proposal

A Local Structure Plan (LSP) is being prepared for a proposed residential development within the central portion of Lot 6, Taronga Place, Eglinton (East of the Beach) in the City of Wanneroo (City). This is initiated as a result of the approved amendment to the previous Alkimos Eglinton District Structure Plan No.18 (the 'DSP') which received planning approval for the designation of the **Central Precinct** of Lot 6 from **Service Commercial** to **Urban** in 2020.

GTA, now Stantec (GTA) has been commissioned by Urban Quarter to prepare a Transport Assessment Report to support the LSP, covering the lands, as shown in Red in Figure 1.1. The proposed LSP is for the parcel of land bound by the rail reserve to the west, the Shorehaven Estate to the south and Mitchell Freeway to the east. Upon full development, the Central Precinct is expected to accommodate approximately 470 residential dwellings.

1.2. Report Purpose

The objective of this Transport Impact Assessment (TIA) is to support the LSP. It details the methodology and findings, which was prepared in line with the guidelines set out in the Western Australian Planning Commission publication '*Transport Impact Assessment Guidelines, August 2016*' (WAPC Guidelines)¹ and takes account of the City's planning policies. This TIA considers the central precinct's integration with the existing transport networks including walking, cycling, public transport and vehicular travel and considers the potential impact of the proposed development.

In preparing this TIA, reference was made to GTA's traffic report for the adopted DSP as detailed in the next section) to determine if the key assumptions and findings of that transport assessment are changed.

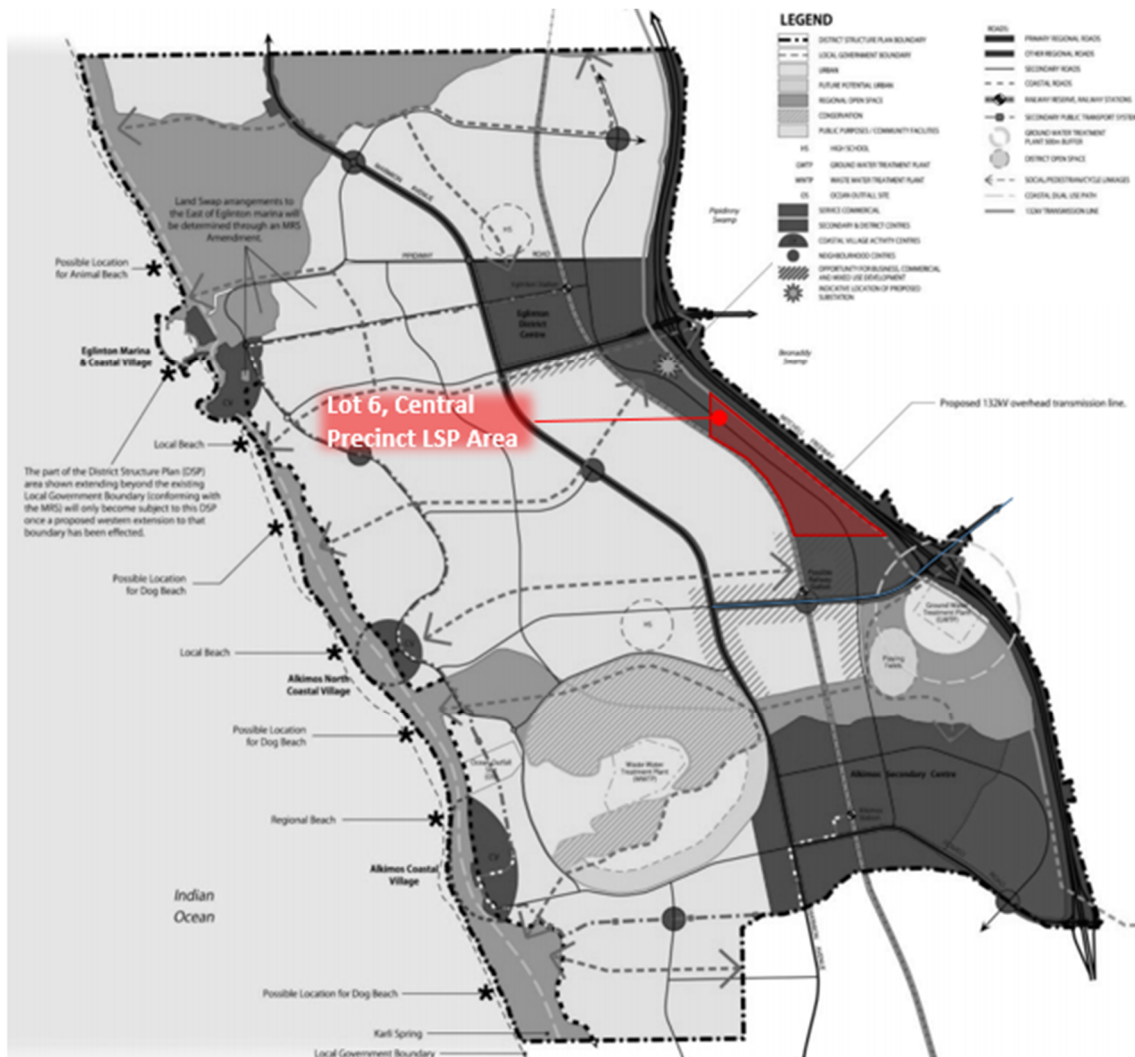
The objectives of this LSP TIA is in line with the WAPC Guidelines, which are:

- to assess the proposed internal transport networks with respect to accessibility and safety for all modes: vehicles, public transport, pedestrians and cyclists;
- to assess the level of transport integration between the LSP area and the surrounding land uses;
- to determine the impacts of the traffic generated by the LSP area on the surrounding land uses; and
- to determine the impacts of the traffic generated by the LSP on the surrounding transport networks.

The information presented in this TIA report supports that the proposed LSP can be supported by the planned future traffic network, as detailed herein.

¹ Transport Impact Assessment Guidelines, Volumes 1 to 5, published by WAPC August 2016.

Figure 1.1: Subject Site Location within Alkimos Eglinton DSP



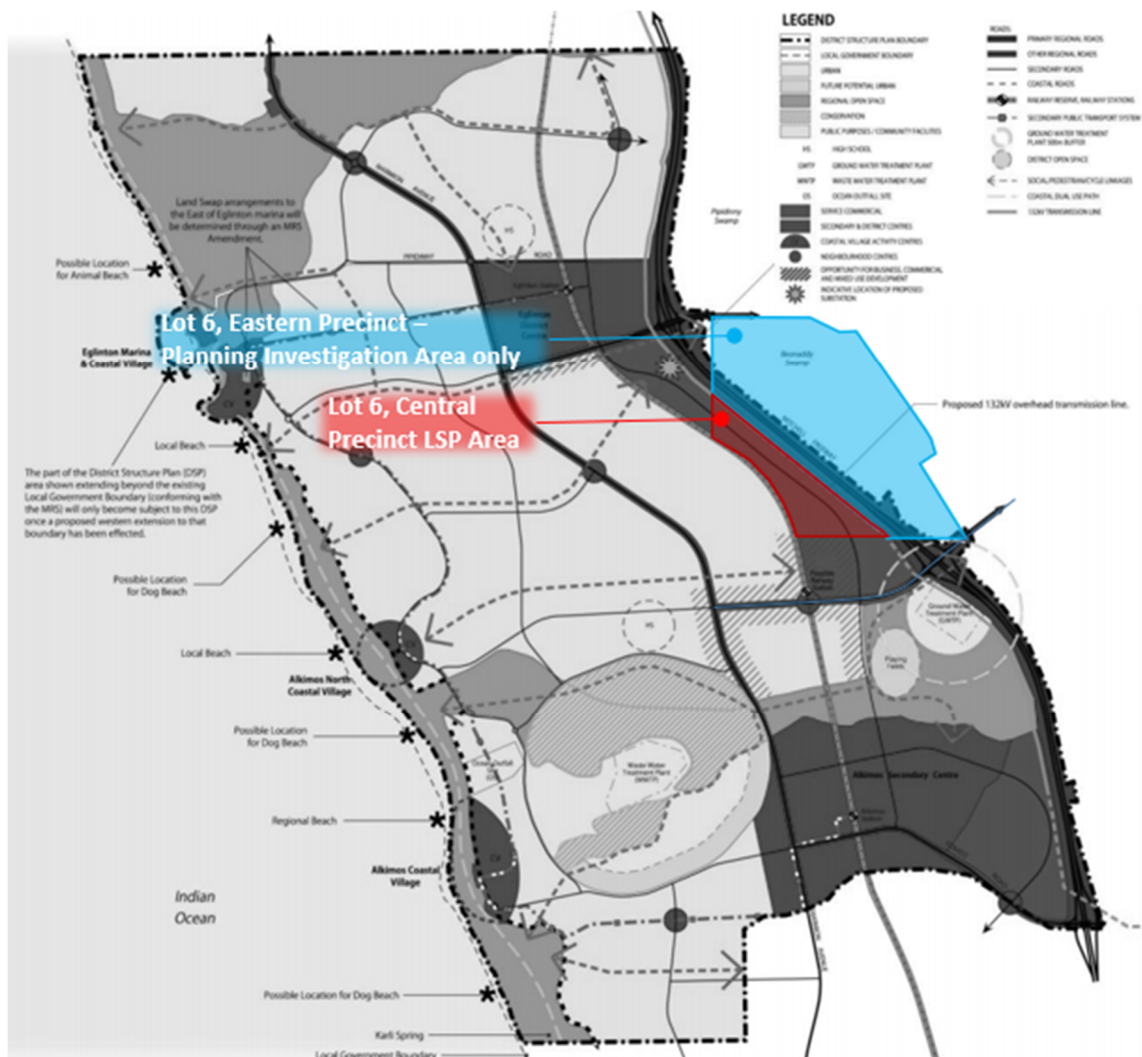
Source: Alkimos Eglinton DSP, dated September 2006

1.3. Alkimos Eglinton District Structure Plan No. 18 Amendment No.2

GTA previously prepared a TIA for an amendment to the Alkimos Eglinton District Structure Plan No.18 (the 'DSP') to a portion of Lot 6, Taronga Place in Eglinton ('Lot 6') back in 2018. The DSP Amendment (the 'Amendment') proposed the following:

- Modify the designation of the **Central Precinct** of Lot 6 from **Service Commercial** to **Urban** (to accommodate Residential development). This was endorsed in 2020 further to the proposal for amendment.
- Extend the AEDSP boundary to include the land within the **Eastern Precinct** (Lot 6 and lots between Lot 6 and Wanneroo Road, as shown in blue in) and designate this land as **Service Commercial**. This is only a **Planning Investigation Area** which cannot realistically fruition until the planned extension of Mitchell Freeway past Alkimos occurs.

Figure 1.2: Planning Investigation Area (conceptual only)



1.4. References and Consultation

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

- City of Wanneroo *District Planning Scheme No. 2* (gazetted 6 July 2001)
- City of Wanneroo *Local Planning Policy 3.8: Marmion Avenue Arterial Road Access* (adopted 7 February 2012, reviewed 2017)
- the Western Australian Planning Commission (WAPC) *Liveable Neighbourhoods – Draft, September 2015*
- WAPC *Transport Impact Assessment Guidelines*, dated August 2016
- *Lot1005/1006 Alkimos, Traffic and Transport Planning, Final Report*, prepared by Bruce Aulabaugh in May 2009
- *Central Alkimos Traffic & Movement Network*, Bruce Aulabaugh, Revision 1, 9 May 2013
- *Alkimos Eglinton Structure Plan, Appendix 4, Transport and Access, Final, SKM, September 2006*
- *Alkimos Eglinton Structure Plan, Transport and Access, Supplementary Report, SKM, January 2008*

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- Cycle Wanneroo, City of Wanneroo Bike Plan
- plans for the proposed development prepared by CLE dated 22 June 2021 and 22 July 2021
- other documents as referenced in this report.

2. EXISTING SITUATION

2.1. Subject Site

The LSP area covers approximately 35.48 ha of land within the Alkimos Eglinton area of the City of Wanneroo, as shown (in red) in Figure 2.1. At present the site is vacant land with some earthworks occurring to the north of the site.

The subject site is bounded to the west by the northern suburbs rail line reserve and to the east by the Mitchell Freeway reserve. All other boundaries abut adjacent (current and future) residential subdivisions. To the south the Shorehaven Estate is established, and road infrastructure is in place. To the north-west there is an interface with the Eglinton Estates LSP, which is yet to be developed.

Figure 2.1: Subject Site and its Environs



Source: Nearmap

2.2. Existing Movement Networks

Given the largely undeveloped nature of the subject area and subsequent lack of travel demand, save for Marmion Avenue and Wanneroo Road, current movement infrastructure provisions are limited as it relates for travel to, from and within the LSP area. Notwithstanding, there is some movement network infrastructure developing, which is described below. It is also worth noting that as the area matures, through this and adjacent LSPs, the movement networks will be provided generally in accordance with the amended DSP. Specific future infrastructure relevant to the site is considered in Section 3 of this report.

2.2.1. Walking and Cycling

Pedestrian paths are currently provided on Marmion Avenue where existing development has occurred abutting this road. There also exists terminated paths and crossings on Marmion Avenue which will be connected as part of a wider network as development in the area proceeds.

Shared use paths are currently provided near the southern boundary of the Central Precinct, on the southern side of Bluewater Drive, the western side of Maroon Avenue and Buchanan Avenue, and on both sides of Scotthorn Drive as part of the Shorehaven Estate. These paths connect to a network of further footpaths throughout the Shorehaven Estate.

Formal cycling infrastructure is present along Marmion Avenue with principle shared path (PSP) running between Santorini Promenade to the south of the LSP and Yanchep Beach Road to the north of the LSP. Another PSP is currently established along Maroon Avenue within Shorehaven Estate which will ultimately extend south to the future Alkimos Station and Alkimos Central. Conversely, cycling infrastructure along Wanneroo Road in the close proximity of the LSP is currently limited, with only a wide sealed shoulder provided on both sides of Wanneroo Road to enable cyclists to use the route in the shoulder. Within the Shorehaven Estate on-road cycle lanes are provided on both sides of Bluewater Drive providing an east-west cycle connection. North-south connections are provided by way of on-road cycle lanes on Scotthorn Drive within the Shorehaven Estate. Ultimately these routes will extend south to Alkimos Drive, in line with the DSP.

2.2.2. Public Transport

Two Transperth bus routes currently operate along Marmion Avenue as detailed in Table 2.1.

Table 2.1: Existing Public Transport Provision

Service	Route #	Route Description	Location of / Distance to Nearest Stop	Frequency On/Off Peak
Bus	490	Butler Station – Two Rocks	Marmion Ave before Bluewater Drive (1km from centre of site)	<5 - 20 minutes peak 60 minutes off peak
	491	Butler Station - Yanchep		

These routes run north-south on Marmion Avenue between Yanchep / Two Rocks and Butler Station, stopping on Marmion Avenue, generally adjacent to new residential developments. Whilst the exact location of any future bus stops cannot be determined at this stage, the DSP *Transport and Access* report illustrates an intent to at least maintain the operation of these existing services on Marmion Avenue.

The closest bus stop is located on Bluewater Drive, around 1km from the centre of the subject site. Considering the general 400m catchment for public transport, around one quarter of the site is located within this distance of the existing bus stop which is a strong starting point for development of a currently vacant site.

2.2.3. Vehicular Access

The existing primary vehicle access routes for the LSP are highlighted in Figure 2.1 and discussed below.

There are a number of future connections to be provided and routes to be developed as the area matures, these are discussed relative to the LSP area in Section 3.

Mitchell Freeway

As detailed in the DSP, long-term planning indicates that the Mitchell Freeway is proposed to be extended north from its current terminus at Hester Avenue in Clarkson north to Yanchep. Construction is underway to

extend the freeway to Romeo Road in Alkimos which is approximately 2.5km south of the Central Precinct. This extension is expected for completion in mid-2023. Ultimately the Mitchell Freeway will form the major north-south distributor for the northwest corridor, with the freeway reserve bisecting the central and eastern precincts as shown in Figure 2.1.

It is noted that the subject site abuts the boundary of the planned future Mitchell Freeway Road reserve to the east. Further details on the future road network are provided in Section 3.3 of this report.

Marmion Avenue

Marmion Avenue is a Distributor A road managed by the City of Wanneroo. It is a four-lane, two-way divided road running in a northwest-southeast direction. Marmion Avenue is set within a road reserve of 50m width (minimum) near the subject site and has a speed limit of 80km/h in this area.

Marmion Avenue has a strategic role in the movement of traffic in the northwest development corridor of Perth, beginning north of Karrinyup Road in Stirling, extending north to Yanchep. As per the DSP and City of Wanneroo's *Marmion Avenue Arterial Road Access Policy*, Marmion Avenue has been recently upgraded to become a four-lane divided Integrator Arterial 'A' road with principle shared path between Alkimos and Yanchep.

Marmion Avenue carries approximately 23,000 vehicles per day at present⁽²⁾.

Wanneroo Road

Wanneroo Road is a Primary Regional Road managed by Main Roads WA. It is a four-lane dual carriageway road, narrowing to a two-lane single carriageway heading north along the eastern boundary of the subject site. It is however noted that Wanneroo Road is currently mostly single carriageway south of the site to Nowergup Road. Wanneroo Road is set in an approximately 100m wide road reserve (varies) near the subject site and has a speed limit of 90km/h in this area.

Wanneroo Road carries approximately 11,000 vehicles per day at present⁽³⁾.

Bluewater Drive

Bluewater Drive is a Neighbourhood Connector road running east-west within the northern boundary of the Shorehaven Estate and the southern boundary of the LSP area. It is a two-lane, two-way undivided road with a 6.6m wide vehicle carriageway, and 1.2m wide cycle lanes on both sides of the road. The road reserve is currently 16m wide with section that has been widened to 20m as part of the Western Precinct LSP.

Bluewater Drive has an unposted 50km/h speed limit for its entire length.

It is proposed to access the Lot 6 Central Precinct from Bluewater Drive before the construction of Alkimos Drive.

² Main Roads WA count site 51834 north of Romeo Road 2017/18, 6.8% heavy vehicles.

³ Main Roads WA count site 1091 south of Yanchep Beach Road 2020/21, 14.2% heavy vehicles.

3. DEVELOPMENT PROPOSAL

3.1. Context

The subject site is located in the Alkimos Eglinton DSP area. The DSP covers some 2,600 hectares of land in Perth's northwest and is ultimately envisaged to contain over 22,000 dwellings, as well as schools, shops and commercial uses. The overall DSP is expected to contribute to the increase of housing supply for the City of Wanneroo and Greater Perth over the coming 10-15 years.

The WAPC endorsed the LSP and the Subdivision Application for the Lot 6 Western Precinct in December 2017. To support the LSP for the remaining part of Lot 6, east of the rail reserve and west of the future Mitchell Freeway reserve, is the subject of this TIA as shown in Figure 2.1. The subject site has an area coverage of approximately 35.48 ha.

The site is zoned 'Urban Development' under the *City of Wanneroo District Planning Scheme No. 2* (the Scheme). This LSP intends to fulfil the requirements of the Scheme and the DSP for the preparation and approval of a LSP prior to the subdivision and/or development of land.

The LSP proposes development of the land for:

- Residential purposes comprising a range of residential densities
- Public open space (POS)
- An integrated movement network for pedestrian, cyclist, public transport and vehicular traffic.

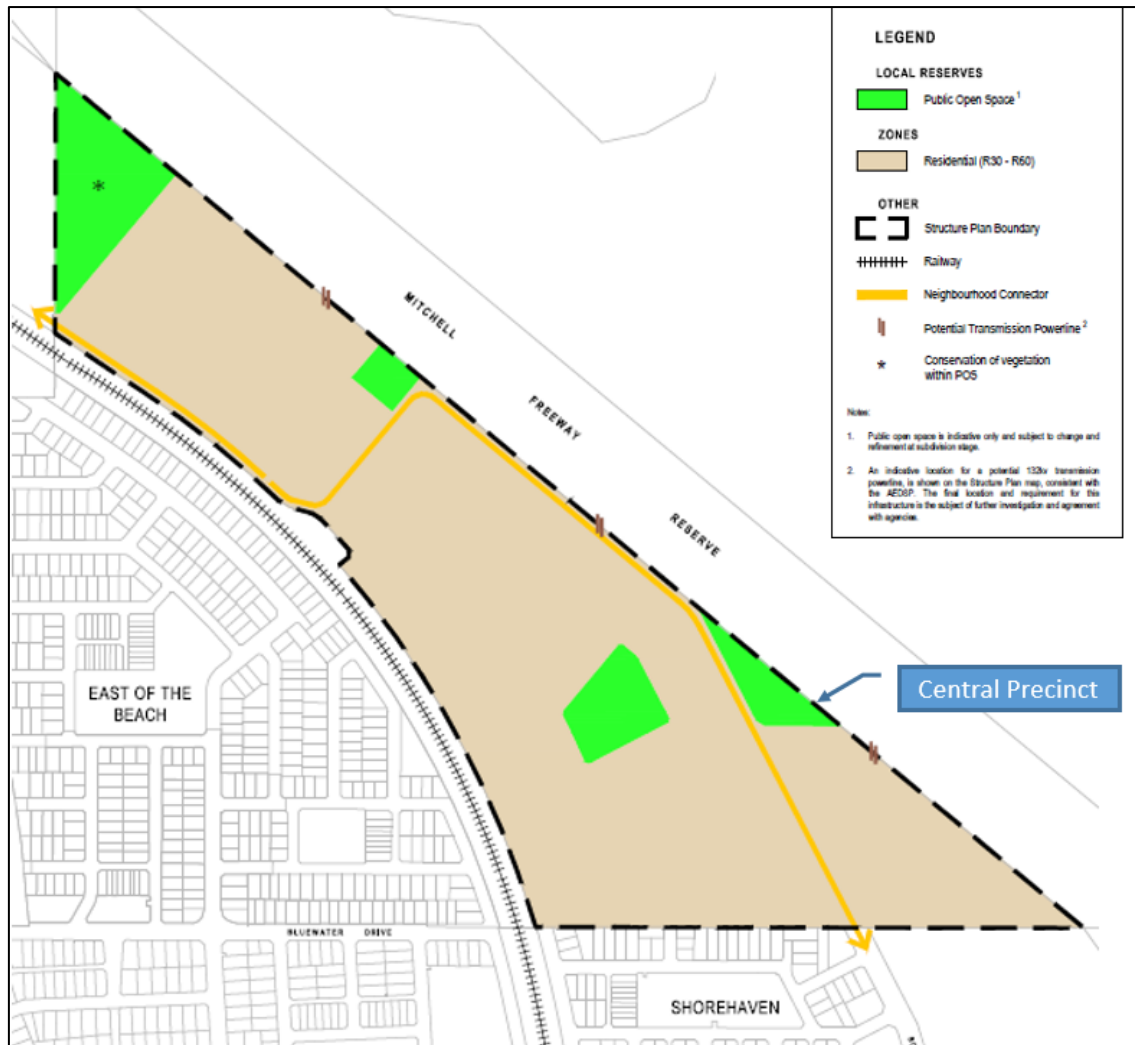
The assessment of the transport characteristics of the LSP is based on the assumptions also adopted for Lot 6 Western Precinct LSP:

- the originally planned rail station at North-Alkimos will no longer proceed and land use immediately to the south of the site is now being progressed as mixed use (with initial development proposed as residential) and not service commercial.
- a bridge will not be provided across the rail reserve to link the Lot 6 Central and Western Precincts. Accordingly, GTA's analysis has assumed that access to the site is via Shorehaven Estate to the south (Bluewater Drive) and the future Alkimos Drive.

3.2. Proposed Land Uses

The proposed subdivision of Lot 6 is shown in Figure 3.1. Upon full development, the Central Precinct is expected to deliver approximately 470 residential lots. The precinct will incorporate open space and supporting infrastructure in accordance with prevailing design guidelines, such as *Liveable Neighbourhoods*.

Figure 3.1: Central Precinct, Lot 6 Taronga Place



Source: CLE

3.3. Future External Road Network

Main Roads WA had previously extended the Mitchell Freeway to Hester Avenue, Clarkson in August 2017. As part of the State Government’s commitment to METRONET, extension of the Mitchell Freeway from Hester Avenue to Romeo Road is currently under way. The contract to design and construct on the extension has been awarded and major works are planned to start in April 2021. It is unlikely, without Government intervention, this state infrastructure will be extended adjacent to the subject site in the foreseeable future.

On this basis, Marmion Avenue will be required to provide a regional road access function for the development until the freeway is further extended in the longer term and access to the freeway via east-west Alkimos Drive (to the south) will become the second region linkage. Therefore in the interim, Marmion Avenue provides the only direct primary distributor function in the absence of the freeway.

Road access to Marmion Ave would currently occur via connection to Scotthorn Drive to the south, and then connection to Bainbridge Avenue, Maroon Avenue and Bluewater Drive, which connects onto Marmion Avenue west of the subject site. The intersection of Bluewater Drive with Marmion Ave has been constructed

as a full movement T-intersection, consistent with the City of Wanneroo's *Marmion Ave Access Policy*. In order for the Lot 6 Central Precinct Area to connect to Marmion Avenue, road connections will need to be provided to the south to the Shorehaven development or via future Alkimos Drive.

Mitchell Freeway

The extension of Mitchell Freeway to Romeo Road (next major east-west road south of Alkimos Drive) is currently under way, with an expected completion date of mid-2023. It is not clear when the further stages of freeway extension to Alkimos Drive and Eglinton Drive would also be delivered.

Ultimately, Mitchell Freeway is planned to extend north of Two Rocks into the Shire of Gingin. Traffic modelling conducted for the Alkimos Central LSP indicates that Mitchell Freeway is expected to carry approximately 70,000 vehicles per day upon completion of the Alkimos Eglinton DSP (notionally 2031)⁽⁴⁾. Currently, Mitchell Freeway is carrying about 60,000 vehicles per day north of Burns Beach Road and about 41,000 vehicles per day south of Hester Avenue (both 2018/19 weekday averages).

Wanneroo Road

It is conceivable that within the lifetime of the DSP, Wanneroo Road would be upgraded to a full dual-carriageway road from Joondalup Drive to the subject site. Previous traffic modelling undertaken for the Alkimos Central LSP indicates Wanneroo Road is expected to carry approximately 14,300 vehicles per day⁽⁵⁾ upon full build-out of the DSP. It is expected that Wanneroo Road would have a speed limit of 80km/h the medium to long-term, perhaps lower still, as frontage development is constructed and the number of major intersections increases.

Alkimos Drive and Eglinton Drive (Pipidinny Road)

These are major east-west aligned sub-arterial (Distributor A/B) roads connecting the DSP area to Mitchell Freeway and further east to Wanneroo Road.

Alkimos Drive is planned as the next freeway interchange cross-street north of Romeo Road, with an alignment south of the existing Shorehaven subdivision. Eglinton Drive is proposed to partially follow the existing alignment of Pipidinny Road west of Wanneroo Road for a short distance before departing on a new road alignment further west into the DSP area via an interchange with Mitchell Freeway, north of the subject site.

Both Alkimos Drive and Eglinton Drive are expected to be 4-lane dual carriageway roads with speeds limits of 60 to 80km/h. According to previous traffic modelling, these roads are expected to carry the following traffic volumes:

- Alkimos Drive
 - 32,000 vehicles per day west of Mitchell Freeway
 - 17,500 vehicles per day east of Marmion Avenue
- Eglinton Drive
 - 19,000 vehicles per day west of Mitchell Freeway
 - (Pipidinny Road) up to 7,000 vehicles per day east of Mitchell Freeway.

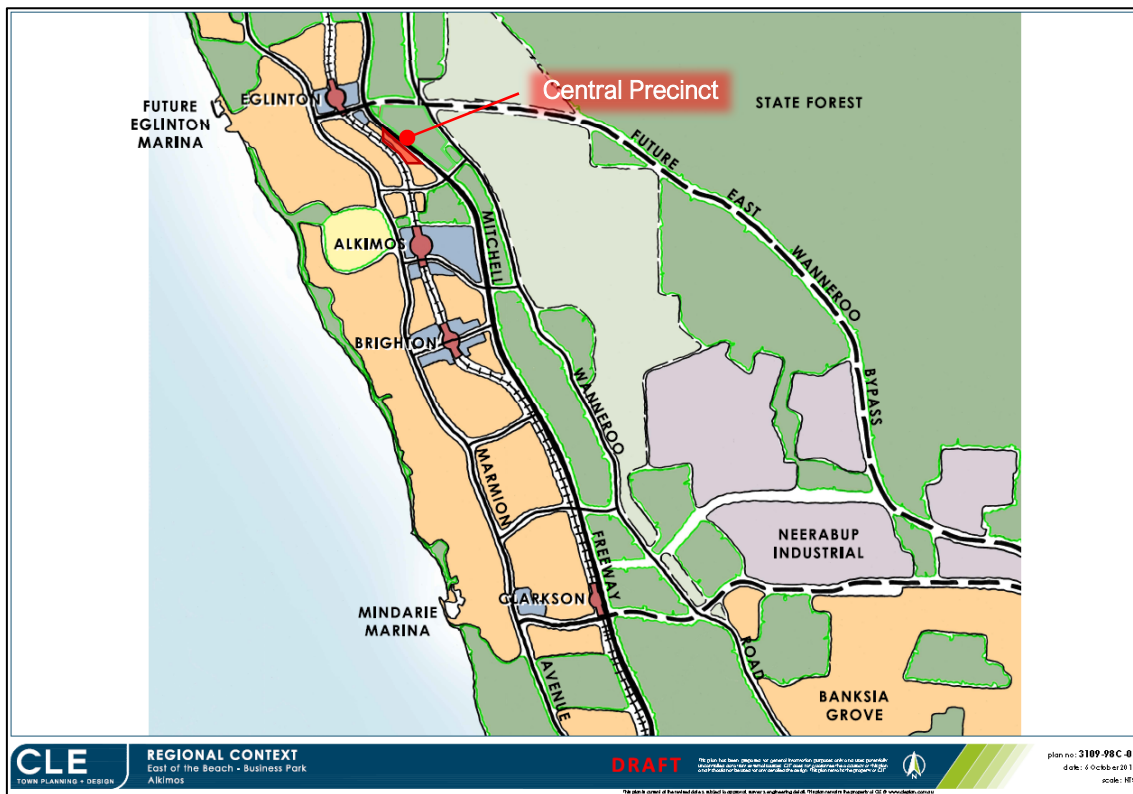
⁴ Central Alkimos Traffic & Movement Network, Bruce Aulabaugh, Revision 1, 9 May 2013.

⁵ Central Alkimos Traffic & Movement Network, Bruce Aulabaugh, Revision 1, 9 May 2013.

Whiteman–Yanchep Highway (Future E-W Wanneroo Bypass)

The Whiteman-Yanchep Highway is a new north-south primary distributor road that will connect the North-West sub-region to the North-East and Central sub-regions and broader regional road network. The planning for this road is not yet complete; however, it does however form part of the transport plan for *Perth and Peel @ 3.5 Million*. GTA is aware that this road does not form part of the current Main Roads WA Regional Operations Model (ROM) at the 2031 future year; however, it is planned for the longer term as shown conceptually in Figure 3.2.

Figure 3.2: Future East Wanneroo Bypass



Source: CLE

3.4. Central Precinct

The internal layout has been developed to provide an integrated movement network which is legible and useable by all modes of transport for travel, to, from and within the area. As the Central Precinct is bound to the east by the rail reserve, access and movement related to the LSP is generally focussed to the north and south. As noted in the context Section 3.1, there will be no bridge over the rail corridor in this area to connect the Central Precinct to the adjacent Western Precinct LSP and ultimately Marmion Avenue.

Further, given the relatively small scale of the Central Precinct within the wider DSP, it is not possible to necessarily provide new key long distance links for travel through the DSP area but a key principle in developing the networks was to ensure consistency and contribute to adjacent LSP and DSP area planning.

3.4.1. Future External Movement Network and Land Development

The wider DSP area is largely undeveloped at present and therefore there will be a number of changes to the movement networks around the Central Precinct. The provision of infrastructure within the site contributes to legible, district-wide networks that do not compromise the intent of the wider network planning.

Walking and Cycling

In order to determine the wider proposed networks, reference was made to the LSP documents for Shorehaven and Eglinton Estates, together with the Transport Impact Assessments completed by GTA for the Lot 6 Western Precinct. These illustrate a proposed network of shared paths and on-road cycle lanes (relative to road type), which can be continued into and through the Central Precinct.

The external routes identified are provided graphically in Section 3.4.2 relative to the proposed networks within the site.

Public Transport

In terms of future public transport provisions, the State Government's long-term plan for the public transport system in Perth includes extending the existing northern suburbs rail corridor from Butler to Yanchep, via Alkimos and Eglinton, by 2031. The delivery of the extended rail line is being managed by MetroNet and it has been awarded to the NEWest Alliance in December 2019 which consists of CPB Contractors and the Downer Group.

The DSP includes the abovementioned railway extension, with rail stations proposed at Eglinton approximately 1.5km north of the subject site, and another at Alkimos City Centre, approximately 2.5km to the south. The DSP also shows a station at North-Alkimos immediately south of the site within the Shorehaven Estate; however, this station will no longer be progressed. Assumptions associated with this traffic impact assessment presented in this report reflect the removal of this station.

Locally, the operation of bus services on Marmion Avenue in the vicinity of the subject site will continue as demonstrated within the DSP, with further stops added as the area develops.

Vehicular Travel

Similar to the walking and cycling networks, the road network layout within the subject site Central Precinct is influenced by the established Shorehaven Estate and the adjacent Eglinton Estates LSP proposal. These external connections are denoted on the proposed LSP layout shown in Figure 3.1. Key links for the Central Precinct include the Scotthorn Drive connection to Alkimos Drive, other southern connections through Shorehaven Estate and the connection north to the Eglinton district centre.

3.4.2. Central Precinct Movement Network

The Central Precinct layout has been developed such that access to and from it is easily achievable without compromising the intent of the movement networks in the DSP and negatively impacting the amenity of the residential areas of the subject site. In general, there will be limited 'through' trips in the Central Precinct i.e. the significant majority of movement within the site will originate and terminate here.

Pedestrian and Cycle Networks

The Central Precinct is approximately 1.3km long north-south and approximately 650m wide at its widest point on the southern boundary. At its widest point (in an east/west direction) along the southern boundary. The distances from one area of the development to another are therefore relatively small and comfortably

accessible by either walking or cycling. This is also relevant for access to the local schools and retail offerings provided in the adjacent Shorehaven development to the south.

The internal movement networks have been developed in a way which provides greater amenity for pedestrians and cyclists through the provision of indirect through vehicle routes and landscaped environments. This type of environment reduces vehicle speeds by design, thus creating a safer environment which encourages active travel modes for local trips to recreation areas, local schools and retail. Furthermore, there are a large number of pedestrian and cycle routes proposed in the DSP which provide area wide linkages and networks for these modes. In this respect, the intent and principles of the wider movement networks within the DSP have also been maintained, and it is expected that any through vehicles will remain on the higher order roads within the precinct.

To further improve pedestrian amenity, footpaths shall be provided at a minimum on one side of all streets, and where appropriate and reflecting the type and location of the road, a footpath on both sides shall be provided.

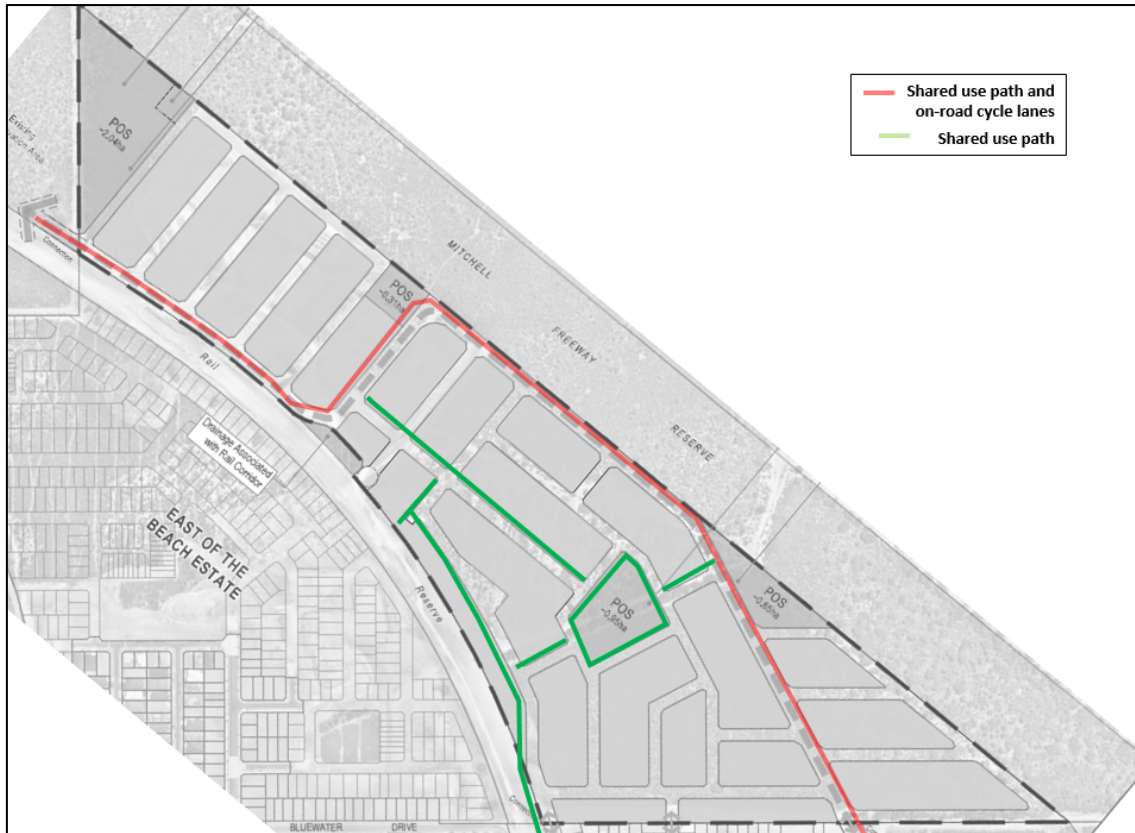
Future pedestrian and cycle infrastructure requirements for the wider area are set out in the DSP. The provision of infrastructure within the Central Precinct will contribute to completing these networks with local infrastructure to be provided as per the requirements of *Liveable Neighbourhoods* for each level of the road hierarchy. As a minimum, these would therefore include:

- a minimum of a shared path on all Neighbourhood Connector roads
- a minimum of one pedestrian path on all Access Streets

The introduction of these facilities within the LSP will support the City of Wanneroo's Bike Plan document, "*Cycle Wanneroo*". This document aims to establish cycling in the City of Wanneroo by providing infrastructure, legible routes and policy to support its growth with a focus on infrastructure and path provision in public open spaces.

The proposed key cycle routes through the Central Precinct, relative to the existing cycle routes at Shorehaven to the south, is illustrated in Figure 3.3.

Figure 3.3: Central Precinct Proposed Key Cycle Routes



Source: CLE

3.4.3. Proposed Vehicular Access

Given the sites' location in relation to the surrounding LSPs, it does not have direct frontage to strategic roads in the area, nor is it required or intended to. Rather secondary access to the Central Precinct is gained via the higher order road network developed within the DSP, together with connections to and through the adjacent LSP areas. The Lot 6 Central DSP area comprises a network of development roads including a Neighbourhood Connector running south-east to north-west, and local access roads and laneways.

In this regard, the Shorehaven Estate has been used to guide the key routes to and from the Central Precinct and the key access points. The Central Precinct road network therefore has been designed with regard to the adjoining structure plans in the area which are currently under construction.

Overall, there are a total of 4 points at which access can be gained to/from adjacent development areas, as shown on Figure 3.4.

Figure 3.4: Central Precinct Vehicle Access Points



The key proposed access points to the central precinct are all through-roads to the Shorehaven development to the south. These roads, particularly Scotthorn Drive, provide good connections to the future planned Alkimos Drive which will provide the required east-west link on the strategic road network, which in turn will provide access to Marmion Avenue and Mitchell Freeway (once extended). This level of access to the strategic road network is of great benefit for both private vehicle and public transport access. It is expected that a minor amount of development traffic will be drawn north towards the Eglinton district centre; therefore, access to the wider road network will largely be focused south at the Alkimos Drive / Scotthorn Drive intersection.

3.4.4. Neighbourhood Connector

The Central Precinct will link to Shorehaven at three locations, at Scotthorn Drive and Buchanan Avenue, and at another minor road between the two. At present Scotthorn Drive has a 25m road reserve, but as part of the Central Precinct development, this will be reduced to 18m in accordance with its typology as a neighbourhood connector without on-street parking and a central median. *Liveable Neighbourhoods* supports reduction in verge widths, depending on the infrastructure provisions needed, and so a 3.5m verge on one side and a 4.5m wide verge on the other side is suggested here which is still wide enough to fit in 2.5m shared paths.

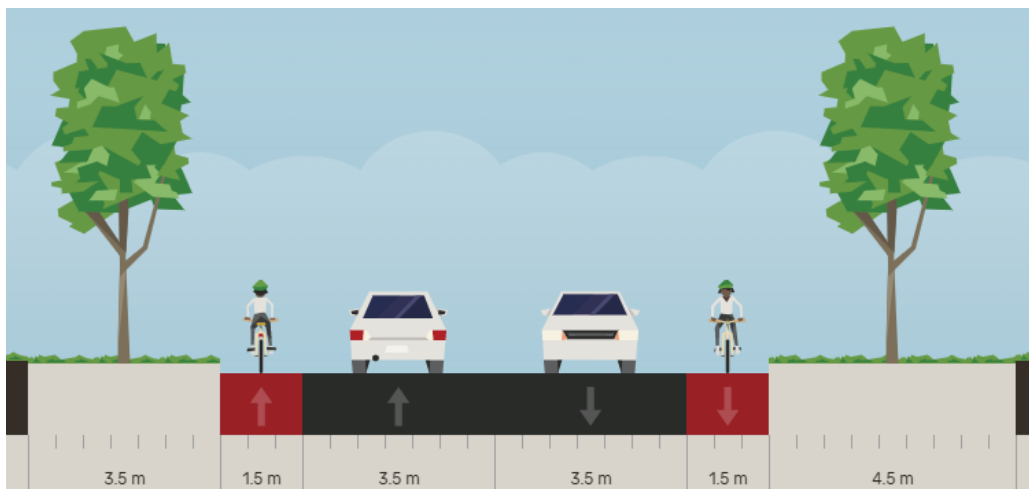
The 3.5m verge is proposed to be located on the side where it generally abuts a public opening space, the Mitchell Freeway reserve or the railway reserve, while the 4.5m verge is proposed to be on the side of the road fronting residential dwellings, as generally shown in Figure 3.5.

Figure 3.5: Location of 3.5m and 4.5m Verges



The general 18m wide cross section is illustrated indicatively on Figure 3.6, and should be adapted to suit the City of Wanneroo sight distance requirements and the *Liveable Neighbourhoods* guidelines. In particular, it is proposed that the development roads be designed to suit lower vehicle operating speeds to ensure safer operation and improved pedestrian movement.

Figure 3.6: Indicative Neighbourhood Connector Road Typology in section not abutting Mitchell Freeway reserve (18m Wide Reserve)

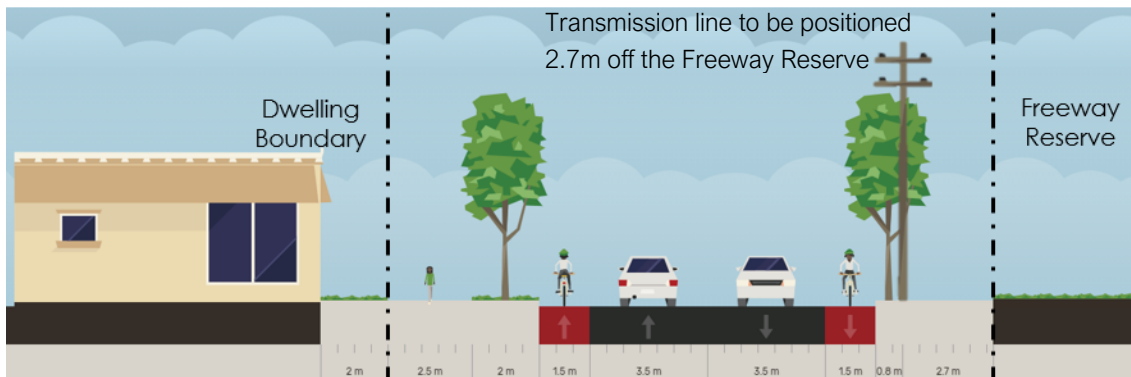


Cross-section consists of the following widths: 3.5m verge on one side and 4.5m verge on the other side which is still wide enough to fit in a 2.5m shared lane, 3.5m vehicle lanes, and 1.5m on-street bike lanes on both sides, proposed along green streets to encourage low speeds.
Source: Streetmix

Neighbourhood Connector Adjacent to Mitchell Freeway Reserve

As shown in Figure 3.5, there is a section of the proposed neighbourhood connector that is abutting the Freeway reserve. The arrangement of this section is slightly different to the other sections within the central precinct due to the presence/need for a 132kV high voltage transmission line along the Freeway reserve. As such, the cross section design solution that is workable is proposed in Figure 3.7. A 2.5m shared path is proposed to be located on the dwelling boundary, to be consistent with the existing arrangement along Scotthorn Drive to the south of the structure plan.

Figure 3.7: Neighbourhood Connector Road Typologies Adjacent to Freeway Reserve



4. TRAFFIC IMPACT ASSESSMENT

4.1. Overview

The process for identifying, assessing and quantifying the potential traffic related implications of the proposed LSP is described in this section of the TIA.

Significant major infrastructure improvements to roads and rail around the subject site are already planned as noted in the previous sections of this report. The intention of this section of the report is to identify the degree to which the Central Precinct development relies on the delivery of this infrastructure and/or if any interim arrangements could support the development of the site.

The assessment methodology is as follows:

- Ascertain the required performance objectives
- Establish the appropriate future design year
- Determine the baseline volumes (existing background traffic growth)
- Estimate the quantum of traffic generated by the development proposal
- Assign the traffic to the future transport network
- Assess the performance of key intersections connecting to the site accounting for changes to the external road network, to be delivered by the project site and in future by authorities
- Assess the mid-block capacity of key roads in the area in the post-development scenario.

4.2. Threshold Criteria

TIA guidelines indicate a traffic analysis is required when a proposed development adds 100 vehicles per hour or more to a particular lane mid-block, based on this increase approximating 10% capacity of an urban road lane.

4.3. Assessment Context

The traffic impact assessment for the subject site has been completed for the 2031 design year, consistent with the planning and transport modelling completed by Main Roads WA for the Perth metropolitan area, as well as being consistent the design year adopted in the transport study for the DSP.

4.4. Land Use Traffic Generation Rates

The vehicle trip generation rates adopted in this assessment are based on the principles set out in the WAPC Guidelines.

A single house on a standard lot in an outer metropolitan area will typically generate up to 0.8 to 1.0 trips in the peak hour and 8 to 10 trips per day. Medium density dwellings generally exhibit a lower traffic generation rate. In outer metropolitan areas, where public transport accessibility is relatively low, the rate for medium

density units is typically in the order of 6 to 8 trips per day. Closer to an inner metropolitan area the rate reduces to in the order of 3 to 6 trips per day depending on dwelling size, socioeconomic demographic, parking provisions and accessibility to public transport and local amenities, among other things. The location of the subject site, within the catchment of future rail stations, is likely to further reduce car-based trips made during peak hours. Peak hour rates are typically 10–12% of daily rates.

It is noted that transport modelling completed for the Shorehaven LSP, immediately south of the Central Precinct, identified a vehicle trip rate of 6.35 vehicle movements per day per dwelling, with 10% occurring in peak hours. In the interests of remaining conservative (on the high) side for this stage of planning, the WAPC high-level trip rate of 8 vehicles per dwelling per day is adopted within this assessment, with 10% assumed to occur in peak hours.

4.5. Background Traffic Volumes

As previously discussed, a TIA has been previously prepared by GTA for an amendment to the DSP. The background traffic across key intersection(s) in 2031 was determined by taking out the traffic generated by the previous employment land use from the traffic and movement network study for Alkimos Vista (then Central Alkimos)⁽⁶⁾. This methodology is determined to be still valid and applicable for the purpose of this assessment. The background traffic for the intersection of Alkimos Drive and Scotthorn Drive in 2031 without the LSP traffic is shown in Figure 4.1 and Figure 4.2.

Figure 4.1: Alkimos Drive / Scotthorn Drive Background Traffic AM Peak 2031

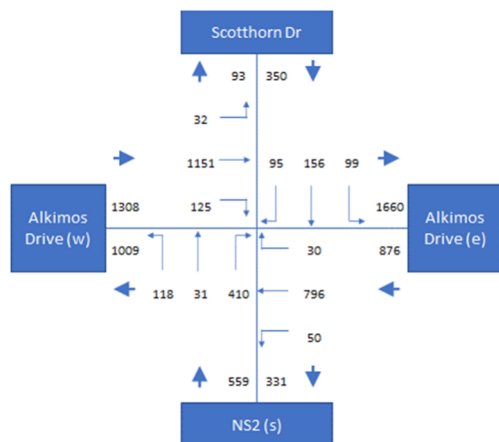
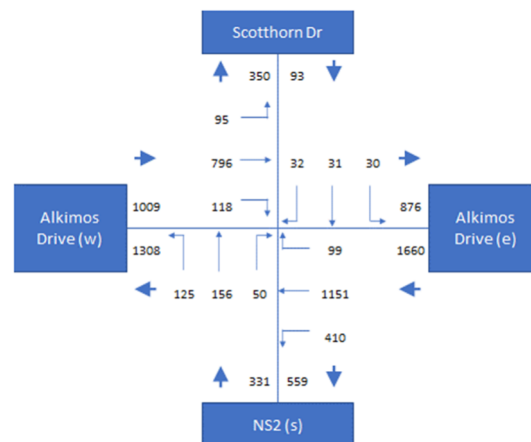


Figure 4.2: Alkimos Drive / Scotthorn Drive Background Traffic PM Peak 2031



4.6. Traffic Impact

4.6.1. Traffic Generation

Based on discussions in Section 4.4, Table 4.1 sets out traffic generation estimates for both peak hour and daily periods based on the above, using the broad directional split of in/out vehicle traffic noted in the WAPC Guidelines.

⁶ Central Alkimos Traffic & Movement Network, Bruce Aulabaugh, Revision 1, 9 May 2013.

Table 4.1: Adopted Residential Trip Generation Rates and Traffic Generation Estimates

Dwellings	Peak Hour Assessment						Daily Traffic
	AM			PM			
	In	Out	Total	In	Out	Total	
1 Dwelling	0.2	0.6	0.8	0.5	0.3	0.8	8
470 Dwellings	94	282	376	235	141	376	3,760

4.6.2. Distribution and Assignment

Methodology

The directional distribution and assignment of traffic generated by the LSP is influenced by a number of key factors, including:

- configuration of the surrounding road network, intersection locations and permitted movements at intersections
- anticipated future operations of roads and intersections in the area
- surrounding land uses, employment and commercial centres in relation to the site
- the proposed site access arrangements and turning movements permitted at these access locations.

Having consideration for these factors, the external traffic distribution proportions between the four key access intersections have been assumed as shown in Figure 4.3.

Figure 4.3: Estimated Distribution of Traffic at Site Access Points



Source: Background plan by CLE, July 2021

In order to determine traffic distribution on individual roads, a series of traffic generating zones were devised within the precinct, as illustrated in Figure 4.4.

Figure 4.4: Traffic Generation Zones



Source: Background plan by CLE

Daily Traffic

Traffic from these zones were then assigned onto the internal road network based on their attraction to the key access points shown in Figure 4.3. The daily demands expected on the proposed road network, including background traffic, are set out in Figure 4.5.

Figure 4.5: Estimated daily vehicle demands (2031)



Source: Background plan by CLE

Peak Hour Traffic at External Intersections

The Central Precinct residential development traffic is shown at the key external intersection (Alkimos Drive / Scotthorn Drive) on Figure 4.6 and Figure 4.7. The distribution of traffic attracted to this intersection is based on the methodology noted above (80% of development traffic) with traffic assigned to individual movements based on the proportions identified in the traffic and movement study for Alkimos Vista.

Figure 4.6: Alkimos Drive/Scotthorn Drive Development Traffic AM Peak

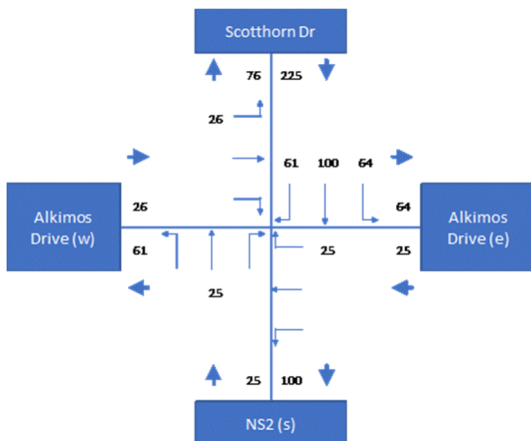
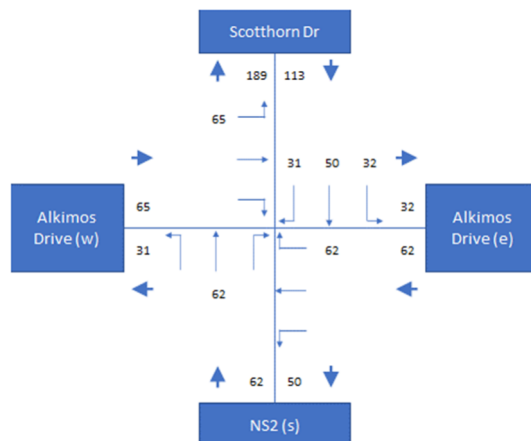


Figure 4.7: Alkimos Drive/Scotthorn Drive Development Traffic PM Peak



TRAFFIC IMPACT ASSESSMENT

It is noted that 20% of development traffic is estimated to be distributed to the north to/from Eglinton Drive, representing approximately 76 two-way vehicle movements per hour. At most this is expected to result in maximum of 57 vehicle movements in any one-direction, in this case leaving the development in the AM peak hour. This does not exceed the thresholds for further assessment as set out in WAPC Guidelines; GTA consider it a suitable position to adopt at this stage of planning and no further assessment is required for the intersection at Eglinton Drive.

The overall post-development traffic at the design year 2031 i.e. background traffic plus development traffic, is shown on Figure 4.8 and Figure 4.9.

Figure 4.8: Alkimos Drive/Scotthorn Drive Post Development Traffic AM Peak 2031

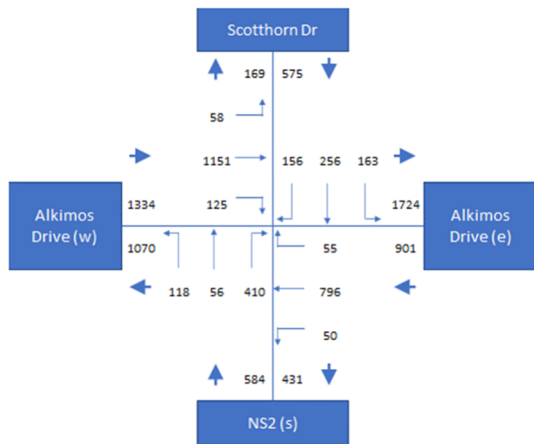
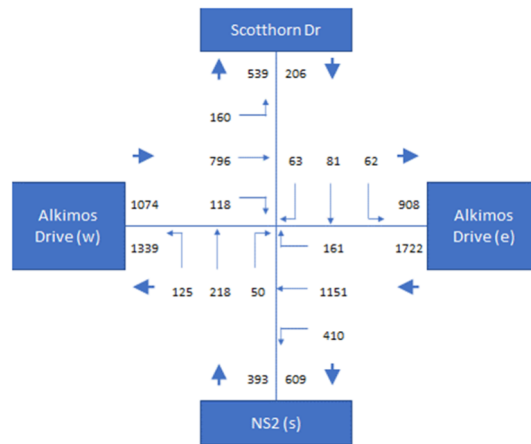


Figure 4.9: Alkimos Drive/Scotthorn Drive Post Development Traffic PM Peak 2031



Total Traffic Flow

All roads near the proposed site are expected to have traffic volumes typically less than the maximum traffic flows for similar roads of their type. The mid-block comparisons to maximum flows that these roads should carry are shown in Table 4.2.

Table 4.2: Expected Total Daily Traffic Flows

Road	Indicative Maximum Daily Flow (two-way vpd)	Expected Future Background Daily Flow ⁷ (two-way vpd)	Expected Daily Flow after LSP (two-way vpd)	Proportion due to LSP
Alkimos Drive	35,000	26,500	30,050	14%

⁷ Estimated based on background traffic in Figure 4.1 and Figure 4.2. Averaged of AM & PM x 10 (Peak hour flows = 10% of Daily flow)

External Intersection Performance

The assessment of the future base versus proposed intersection operational performance has been conducted using *SIDRA INTERSECTION*⁸.

The commonly used measure of intersection performance in Western Australia is referred to as the *Level of Service (LOS)*⁹. The LOS is banded measure of delay for the most critical movement on each leg of the intersection. WAPC guidelines indicates that LOS D is the acceptable maximum for all vehicles passing through an intersection, while a threshold indicative of a mid-LOS E is the acceptable maximum for individual movements.

While LOS is a useful guide to intersection performance, it often masks underlying performance characteristics. There are instances whereby a particular movement would report a very low LOS, but the vehicle demand may also quite low. It is improbable that a development application would be refused on the basis of low LOS for a minor traffic movement. For this reason, and many other others, a fuller appreciation of intersection performance is required, including review of the physical capacity (Degree of Saturation, DOS) and the queueing characteristics.

For signalised intersections, a DOS of around 0.95 has been typically considered the practical limit, beyond which queuing, and delay increase disproportionately. It is also important to review queuing to ensure that the reported queues remain within the available auxiliary lane length and do not spill back into adjacent lanes.

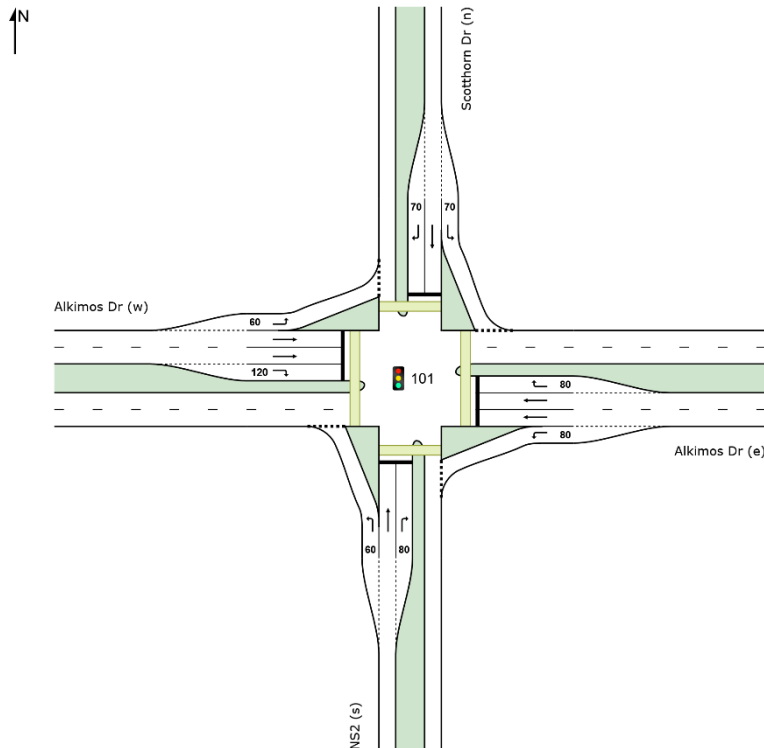
The general layout of the site access for the purposes of this assessment is shown in Figure 4.10. Outputs of the intersection performance assessment are summarised in Table 4.3 with full results presented at Appendix B of this report.

⁸ Program used under license from Akcelik & Associates Pty Ltd.

⁹ *SIDRA INTERSECTION* adopts the following criteria for Level of Service assessment:

Level of Service		Intersection Delay (seconds)	
		Signalised Intersection	Unsignalised Intersection
A	Excellent	<=0.10	<=10
B	Very Good	10-20	10-15
C	Good	20-35	15-25
D	Acceptable	35-55	25-35
E	Poor	55-80	35-50
F	Very Poor	>=80	>=50

Figure 4.10: Alkimos Drive/Scotthorn Drive – Assumed Lane Layout



Source: Modified from Central Alkimos Traffic & Movement Network, Bruce Aulabaugh, Revision 1, 9 May 2013.

Table 4.3: Alkimos Drive/Scotthorn Drive Base and Proposed Intersection Performance

Scenario	Arm	DOS	LOS	Avg Delay	95th %ile Q
2031 AM Peak	NS2 (s)	0.96	E	65s	239m
	Alkimos Dr (e)	0.76	D	42s	168m
	Scotthorn Dr (n)	0.94	E	57s	142m
	Alkimos Dr (w)	0.98	E	77s	360m
	Intersection	0.98	E	62s	360m
2031 PM Peak	NS2 (s)	0.90	D	38s	80m
	Alkimos Dr (e)	0.87	C	27s	186m
	Scotthorn Dr (n)	0.49	C	31s	23m
	Alkimos Dr (w)	0.78	C	25s	103m
	Intersection	0.90	C	28s	186m

The results in Table 4.3 demonstrates that following the completion of the Central Precinct LSP in 2031, the Alkimos Drive/Scotthorn Drive intersection is able to accommodate the development demand as well as the background traffic growth and operate efficiently. Besides that, as the proposed LSP is expected to develop approximately 470 residential dwellings, this being slightly lower than the originally assumed 507 residential dwellings under the DSP Amendment, the intersection performance is expected to be performing better.

Internal Intersection Types

Given the sole residential land use within the Central Precinct, and the expected weighted one-directional peak hour flows within the internal road network, it is not expected any capacity issues will occur and that uncontrolled priority and roundabout intersections will be sufficient to accommodate expected demand.

4.6.3. Central Precinct Internal Road Hierarchy

The proposed internal road hierarchy for the Central Precinct was developed on the basis of the assigned daily traffic volumes, which is shown in Figure 4.11. This road hierarchy has been developed using the guidelines and indicative daily traffic volume limits set out in *Liveable Neighbourhoods*, together with the overall design principles and aims for the Central Precinct.

Figure 4.11: Proposed Central Precinct Road Hierarchy



Source: Background plan by CLE

The road reserve widths proposed for each class of road are in line with the guidance set out in *Liveable Neighbourhoods*, as set out below:

- Neighbourhood Connector = 18m – 24.4m.
- Access Street D = 14.2 - 15m.
- Laneway = 6 – 6.4m.

5. CONCLUSION

This Transport Impact Assessment Report has been prepared in support of the Central Precinct of Lot 6 Taronga Place, Eglinton (East of the Beach). Based on the analysis and discussions presented within this report, the following conclusions are made:

- The proposed site area covers approximately 35 ha and located immediately east of the railway reserve. The LSP includes the following:
 - approximately 470 residential dwellings
 - associated open space.
- This site is located in the Alkimos Eglinton District Structure Plan for which the future transport networks have been mapped out. The site layout has been developed in this regard and intends to enhance the movement networks in the area.
 - It is proposed to provide shared use path along the Neighbourhood Connector and a minimum of footpath on one side of all streets.
 - These link to already established shared use paths and on-road cycle lanes on key nearby links.
- Vehicular access to/from the LSP has regard for the adjacent developments. In total four access points are proposed, with three of these expected to be key.
- The Central Precinct is expected to generate up to 3,760 vehicle trips per day.
- The road network within the LSP has been determined on the basis of daily flows and in accordance with *Liveable Neighbourhoods*.
- It is expected the external traffic generation associated with the Central Precinct can be accommodated on the future planned external road network.

A. LOCAL STRUCTURE PLAN & CONCEPT PLAN



This plan has been prepared for general information purposes only and uses potentially uncontrolled data from external sources. CLE does not guarantee the accuracy of this plan and it should not be used for any detailed site design. This plan remains the property of CLE.

Consolidate Very Good - Excellent Vegetation Type with Adjacent Conservation Area

Sewer Pump Station Required in this Location

Managed Interface in Accordance with Bushfire Guidelines

Central POS
(Potential retention of existing trees within POS subject to detailed engineering design.)

Consolidated Drainage

MITCHELL FREEWAY RESERVE

POS
~2.04ha

POS
~0.31ha

POS
~0.65ha

POS
~0.95ha

Existing Conservation Area

North Shore Christian Grammar

Connection

Rail

Drainage Associated with Rail Corridor

Reserve



Connection

EAST OF THE BEACH ESTATE

SHOREHAVEN

Future Urban by Others

LEGEND

-  Subject Site (35.48ha)
-  Neighbourhood Connector
- NDA - 21.1ha**



This plan has been prepared for general information purposes only and uses potentially uncontrolled data from external sources. CLE does not guarantee the accuracy of this plan and it should not be used for any detailed site design. This plan remains the property of CLE.

LEGEND


LOCAL RESERVES


 Public Open Space¹

ZONES

 Residential (R30 - R60)

OTHER

 Structure Plan Boundary

 Railway

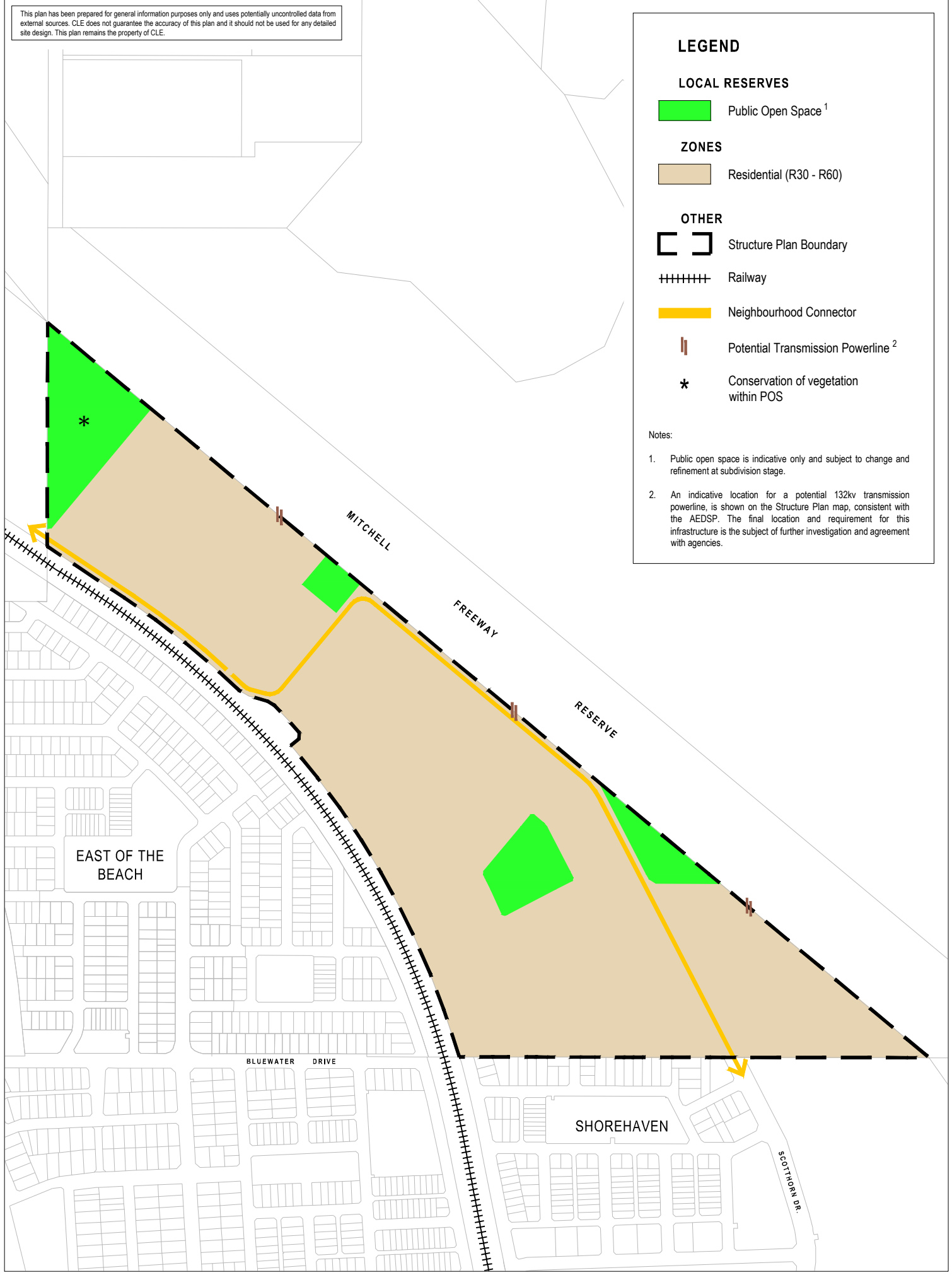
 Neighbourhood Connector

 Potential Transmission Powerline²

 Conservation of vegetation within POS

Notes:

- Public open space is indicative only and subject to change and refinement at subdivision stage.
- An indicative location for a potential 132kv transmission powerline, is shown on the Structure Plan map, consistent with the AEDSP. The final location and requirement for this infrastructure is the subject of further investigation and agreement with agencies.



B.SIDRA MODELLING OUTPUTS

B

USER REPORT FOR SITE

All Movement Classes

 Project: 210521sid-W115946 Lot 6 Taronga Place

Template: Default Site User Report

Site: 101 [Alkimos Dr/Scotthorn Dr/NS2 2031 AM (Site Folder: General)]

Signals

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing

Reference Phase: Phase A

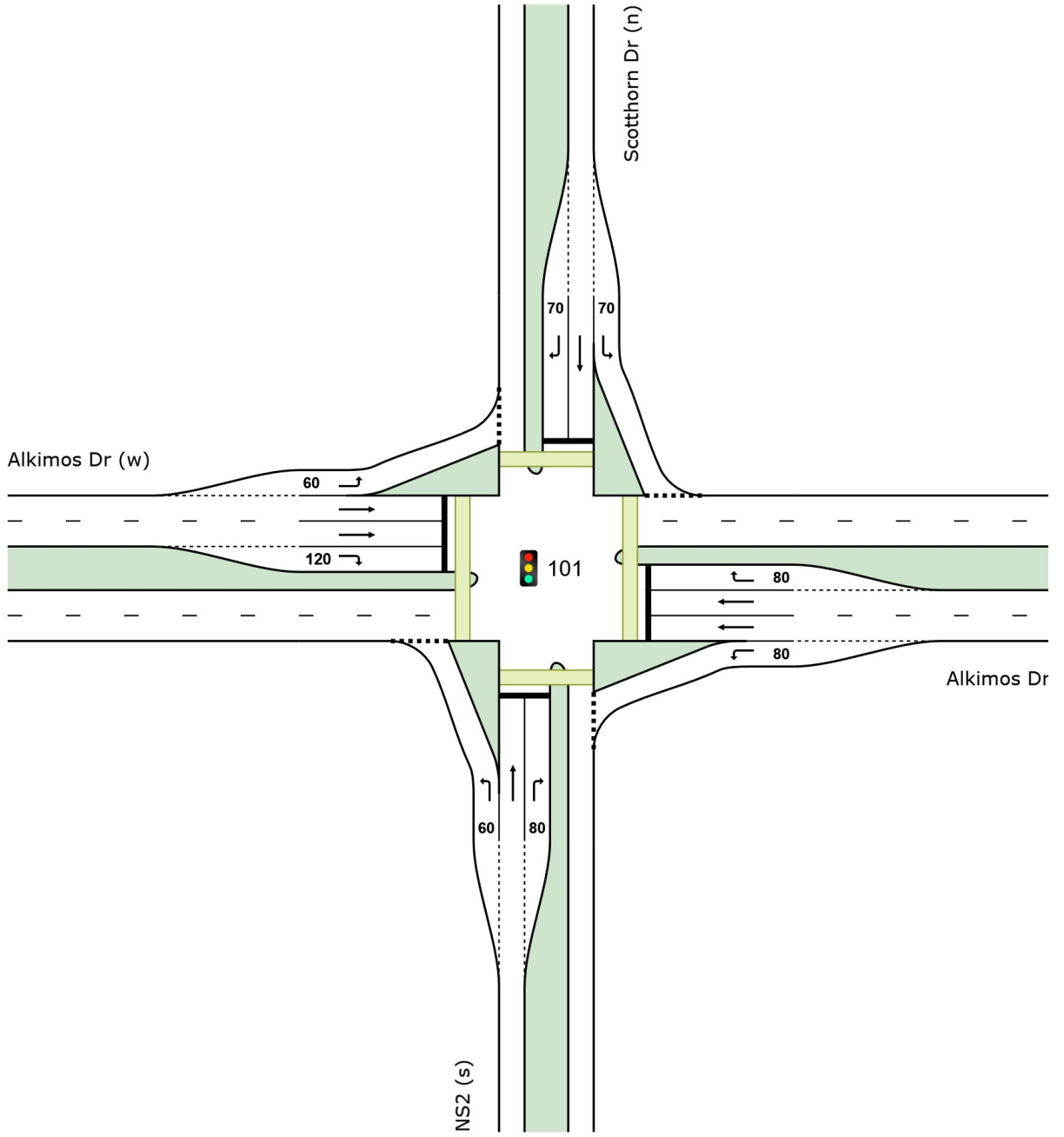
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*

Output Phase Sequence: A, D, D2*, E, G, G1*

(* Variable Phase)

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Lane Use and Performance													
	DEMAND FLOWS		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	[Total veh/h	[HV %						[Veh	[Dist m				
South: NS2 (s)													
Lane 1	124	5.0	981	0.127	100	13.0	LOS B	2.5	18.5	Short	60	0.0	NA
Lane 2	61	5.0	239	0.256	100	52.2	LOS D	3.3	24.1	Full	500	0.0	0.0
Lane 3	432	5.0	452 ¹	0.956	100	81.7	LOS F	32.7	238.7	Short	80	0.0	NA
Approach	617	5.0		0.956		65.0	LOS E	32.7	238.7				
East: Alkimos Dr (e)													
Lane 1	53	5.0	1268	0.042	100	10.4	LOS B	0.8	6.2	Short	80	0.0	NA
Lane 2	426	5.0	560 ¹	0.761	100	42.1	LOS D	23.0	168.3	Full	500	0.0	0.0
Lane 3	412	5.0	541 ¹	0.761	100	41.9	LOS D	22.1	161.3	Full	500	0.0	0.0
Lane 4	58	5.0	91	0.639	100	71.3	LOS E	3.6	26.5	Short	80	0.0	NA
Approach	948	5.0		0.761		42.0	LOS D	23.0	168.3				
North: Scotthorn Dr (n)													
Lane 1	172	5.0	543	0.316	100	39.7	LOS D	7.8	56.6	Short	70	0.0	NA
Lane 2	269	5.0	286	0.941	100	76.3	LOS E	19.5	142.3	Full	500	0.0	0.0
Lane 3	164	5.0	513	0.320	100	42.1	LOS D	7.6	55.3	Short	70	0.0	NA
Approach	605	5.0		0.941		56.6	LOS E	19.5	142.3				
West: Alkimos Dr (w)													
Lane 1	61	5.0	1516	0.040	100	6.6	LOS A	0.4	3.0	Short	60	0.0	NA
Lane 2	601	5.0	613 ¹	0.981	100	81.3	LOS F	48.4	353.4	Full	500	0.0	0.0
Lane 3	611	5.0	623 ¹	0.981	100	81.3	LOS F	49.3	360.2	Full	500	0.0	0.0
Lane 4	132	5.0	166	0.792	100	69.4	LOS E	8.3	60.3	Short	120	0.0	NA
Approach	1404	5.0		0.981		76.9	LOS E	49.3	360.2				
Intersection	3575	5.0		0.981		62.2	LOS E	49.3	360.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

Delay Model: SIDRA Standard (Geometric Delay is included).

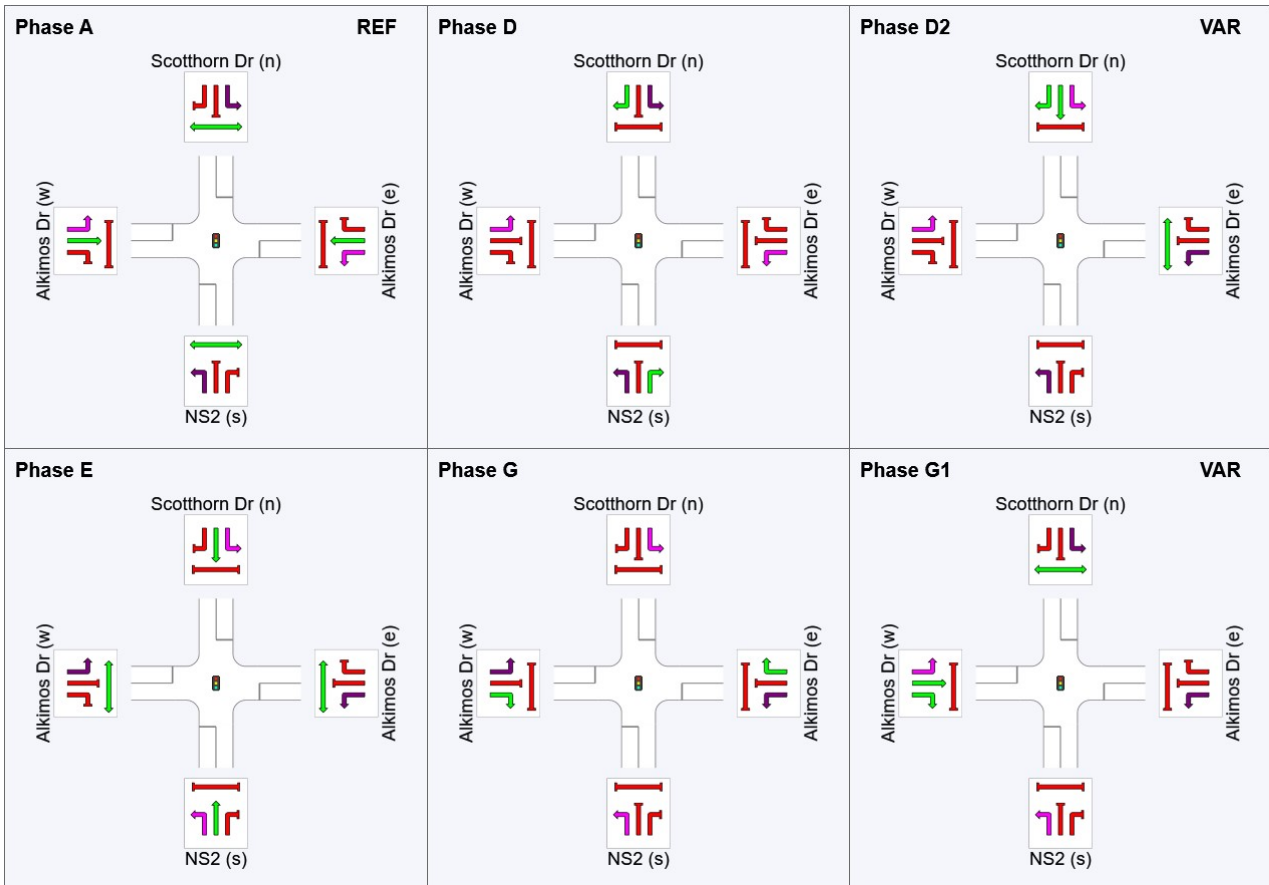
Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

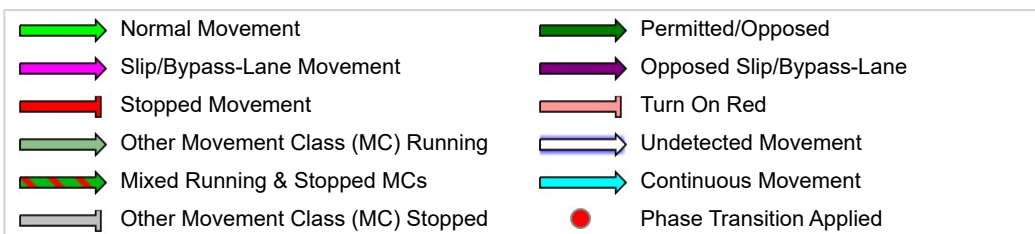
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	D2	E	G	G1
Phase Change Time (sec)	0	42	79	82	103	115
Green Time (sec)	36	31	***	15	6	***
Phase Time (sec)	42	37	3	21	12	5
Phase Split	35%	31%	3%	18%	10%	4%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

*** No green time has been calculated for this phase because the next phase starts during its intergreen time. This occurs with overlap phasing where there is no single movement connecting this phase to the next, or where the only such movement is a dummy movement with zero minimum green time specified. If a green time is required for this phase, specify a dummy movement with a non-zero minimum green time.

Site: 101 [Alkimos Dr/Scotthorn Dr/NS2 2031 PM (Site Folder: General)]

Signals

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Variable Phasing - Import

Reference Phase: Phase A

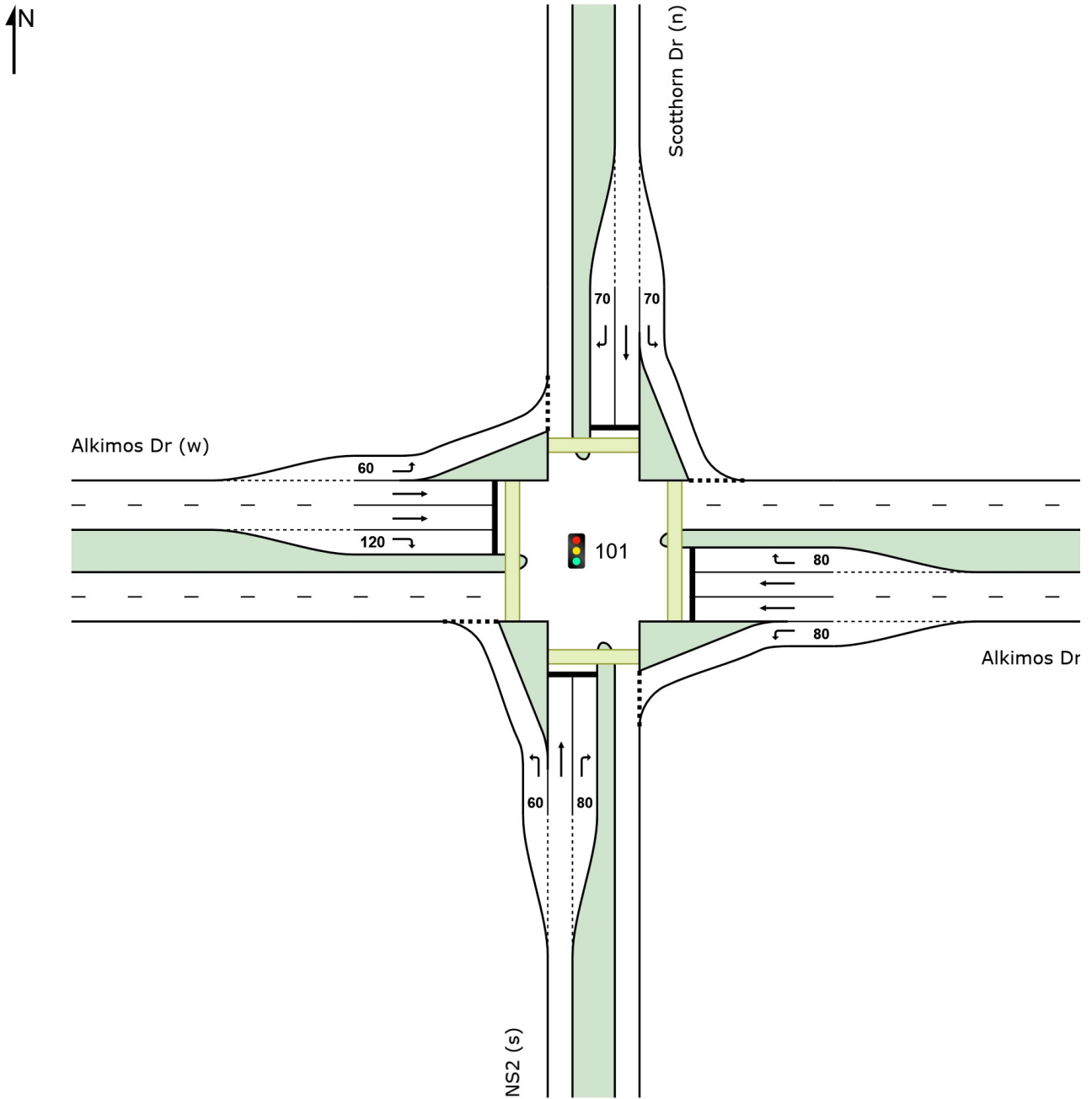
Input Phase Sequence: A, D, D1*, D2*, E, G, G1*, G2*

Output Phase Sequence: A, D, E, G, G2*

(* Variable Phase)

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Lane Use and Performance													
	DEMAND FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total veh/h	HV %						[Veh	Dist]				
	veh/h	%	veh/h	v/c	%	sec			m		%	%	
South: NS2 (s)													
Lane 1	132	5.0	770	0.171	100	16.2	LOS B	2.7	19.9	Short	60	0.0	NA
Lane 2	235	5.0	262	0.895	100	48.2	LOS D	11.0	80.1	Full	500	0.0	0.0
Lane 3	53	5.0	136	0.387	100	46.6	LOS D	2.1	15.4	Short	80	0.0	NA
Approach	419	5.0		0.895		38.0	LOS D	11.0	80.1				
East: Alkimos Dr (e)													
Lane 1	432	5.0	1354	0.319	100	7.8	LOS A	4.1	29.6	Short	80	0.0	NA
Lane 2	603	5.0	695 ¹	0.867	100	32.3	LOS C	25.2	183.7	Full	500	0.0	0.0
Lane 3	609	5.0	702 ¹	0.867	100	32.3	LOS C	25.5	186.1	Full	500	0.0	0.0
Lane 4	169	5.0	272	0.624	100	42.0	LOS D	6.6	47.9	Short	80	0.0	NA
Approach	1813	5.0		0.867		27.4	LOS C	25.5	186.1				
North: Scotthorn Dr (n)													
Lane 1	65	5.0	1018	0.064	100	9.8	LOS A	0.8	5.8	Short	70	0.0	NA
Lane 2	85	5.0	262	0.325	100	34.9	LOS C	3.1	22.9	Full	500	0.0	0.0
Lane 3	66	5.0	136	0.488	100	47.0	LOS D	2.7	19.6	Short	70	0.0	NA
Approach	217	5.0		0.488		31.1	LOS C	3.1	22.9				
West: Alkimos Dr (w)													
Lane 1	168	5.0	1175	0.143	100	9.7	LOS A	2.1	15.2	Short	60	0.0	NA
Lane 2	419	5.0	644	0.651	100	24.5	LOS C	14.1	102.7	Full	500	0.0	0.0
Lane 3	419	5.0	644	0.651	100	24.5	LOS C	14.1	102.7	Full	500	0.0	0.0
Lane 4	124	5.0	159	0.783	100	49.9	LOS D	5.4	39.2	Short	120	0.0	NA
Approach	1131	5.0		0.783		25.1	LOS C	14.1	102.7				
Intersection	3579	5.0		0.895		28.1	LOS C	25.5	186.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

Delay Model: SIDRA Standard (Geometric Delay is included).

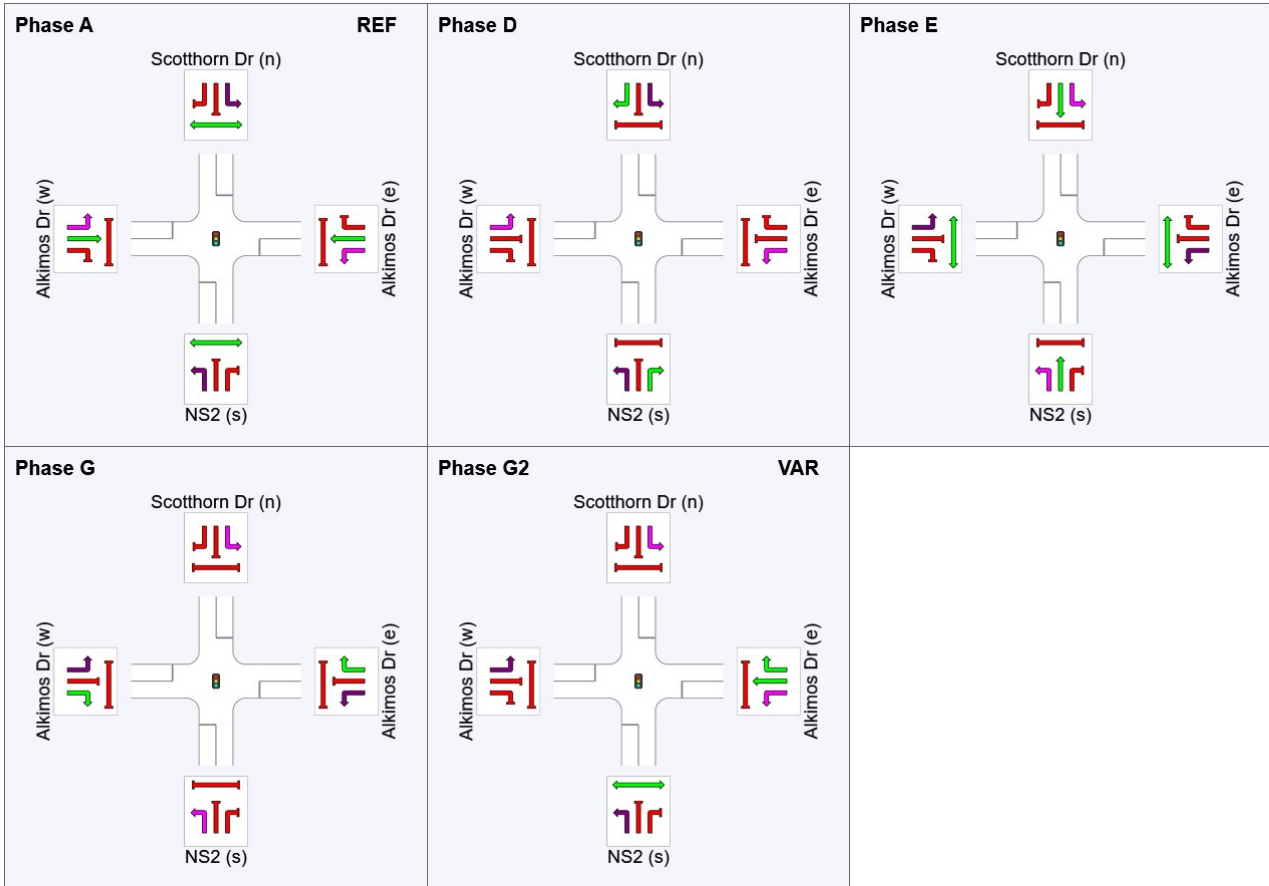
Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

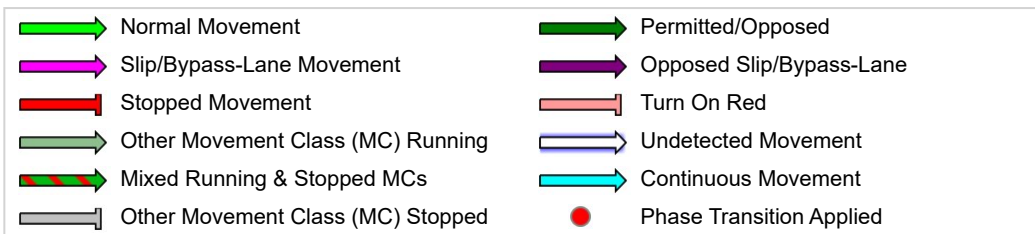
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

- ¹ Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Phase Timing Summary

Phase	A	D	E	G	G2
Phase Change Time (sec)	0	33	45	62	75
Green Time (sec)	27	6	11	7	***
Phase Time (sec)	33	12	17	13	5
Phase Split	41%	15%	21%	16%	6%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

*** No green time has been calculated for this phase because the next phase starts during its intergreen time. This occurs with overlap phasing where there is no single movement connecting this phase to the next, or where the only such movement is a dummy movement with zero minimum green time specified. If a green time is required for this phase, specify a dummy movement with a non-zero minimum green time.

C. WAPC GUIDELINES CHECKLIST



APPENDIX: WAPC GUIDELINES CHECKLIST

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Item	Provided	Comments/Proposals
Summary	✓	
Introduction/Background	✓	
Structure plan proposal	✓	
regional context	✓	Section 1.1
proposed land uses	✓	Section 1.1
table of land uses and quantities	✓	Section 1.1
major attractors/generators	✓	Section 2.1
specific issues	-	No specific issue
Existing situation	✓	
existing land uses within structure plan	✓	Section 2.1
existing land uses within 800 metres of structure plan area	✓	Section 2.1
existing road network within structure plan area	✓	Section 2.1
existing pedestrian/cycle networks within structure plan area	✓	Section 2.1
existing public transport services within structure plan area	✓	Section 2.1
existing road network within 2 (or 5) km of structure plan area	✓	Section 2.2.3
traffic flows on roads within structure plan area (PM and/or AM peak hours)	✓	Section 2.2.3
traffic flows on roads within 2 (or 5) km of structure plan area (AM and/or PM peak hours)	✓	Section 2.2.3
existing pedestrian/cycle networks within 800m of structure plan area	✓	Section 2.2.1
existing public transport services within 800m of structure plan area	✓	Section 2.2.2
Proposed internal transport networks	✓	
changes/additions to existing road network or proposed new road network	✓	Section 3.4.1
road reservation widths	✓	Section 4.6.3
road cross-sections & speed limits	✓	Section 3.4.3
intersection controls	✓	Section 4.6
pedestrian/cycle networks and crossing facilities	✓	Section 3.4.2
public transport routes	✓	Section 3.4.1
Changes to external transport networks	✓	
road network	✓	Section 3.3
intersection controls	✓	Section 4.6
pedestrian/cycle networks and crossing facilities	✓	Section 3.4.1
public transport services	✓	Section 3.4.1

APPENDIX: WAPC GUIDELINES CHECKLIST

DRAFT

Integration with surrounding area	✓	
trip attractors/generators within 800 metres	✓	Section 3.4.1
proposed changes to land uses within 800 metres	✓	Section 3.4.1
travel desire lines from structure plan to these attractors/generators	✓	Section 3.4.1
adequacy of external transport networks	✓	Section 3.4.1
deficiencies in external transport networks	✓	Section 3.4.1
remedial measures to address deficiencies	✓	Section 3.4.1
Analysis of internal transport networks	✓	
assessment year(s) and time period(s)	✓	Section 4.6
structure plan generated traffic	✓	Section 4.6
extraneous (through) traffic	✓	Section 4.6
design traffic flows (that is, total traffic)	✓	Section 4.6
road cross-sections	✓	Section 3.4.3
intersection controls	✓	Section 3.4.2
access strategy	✓	Section 3.4.3
pedestrian/cycle networks	✓	Section 3.4.2
safe routes to schools	✓	Section 3.4.2
pedestrian permeability & efficiency	✓	Section 3.4.2
access to public transport	✓	Section 3.4.2
Analysis of external transport networks	✓	
extent of analysis	✓	Section 4.6
base flows for assessment year(s)	✓	Section 4.6
total traffic flows	✓	Section 4.6
road cross-sections	✓	Section 4.6
intersection layouts & controls	✓	Section 4.6
pedestrian/cycle networks	✓	Section 4.6
Conclusions	✓	

Proponent's Name: Eleni Thorman

Company: CLE Town Planning + Design

Date: 10/08/2021

Transport Assessor's Name: Gary Soo

Company: GTA Consultants now Stantec

Date: 10/08/2021



now



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