



Appendix 5

Revised Transport Impact Assessment



Tamala Park Structure Plan Amendment Catalina Grove

Revised Transport Impact Assessment

**PREPARED FOR:
Tamala Park Regional Council**

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1.0 Introduction

This revised Transport Impact Assessment (TIA) has been prepared by Transcore on behalf of Tamala Park Regional Council. The subject of this report is a proposed amendment to the eastern part of the Tamala Park Structure Plan which is known as Catalina Grove, in Clarkson, City of Wanneroo.

The original TIA report by Transcore in November 2017 indicated a “Neighbourhood Connector” for the “Main Street” which formed the eastern boundary of the proposed local centre. The City of Wanneroo expressed concern that the main street would be very difficult to activate and therefore the City would not support the proposed main street concept. Accordingly CLE updated the development concept plan and Transcore was requested to review the road hierarchy and classification of the road to the east of the local centre and update the original TIA to reflect the latest development concept plan.

Catalina Grove forms the eastern part of the Tamala Park Structure Plan. Tamala Park Structure Plan was approved in March 2012. A copy of the Tamala Park Structure Plan is provided in **Appendix A** of this report. Development of the central section of the Tamala Park Structure Plan, between Marmion Avenue and Connolly Drive, is well progressed and development of the western section has recently commenced. Planning for the eastern section (Catalina Grove), between Connolly Drive and the Mitchell Freeway, has been revised recently and is the subject of this TIA report.

For the purpose of this revised TIA the Transport Assessment Report for the Tamala Park Structure Plan prepared by Uloth and Associates (11 August 2009) was reviewed and acknowledged. Catalina Grove is located at the southwest corner of the Mitchell Freeway and Neerabup interchange (refer **Figure 1**). This Figure also shows the extent of the Tamala Park Structure Plan.

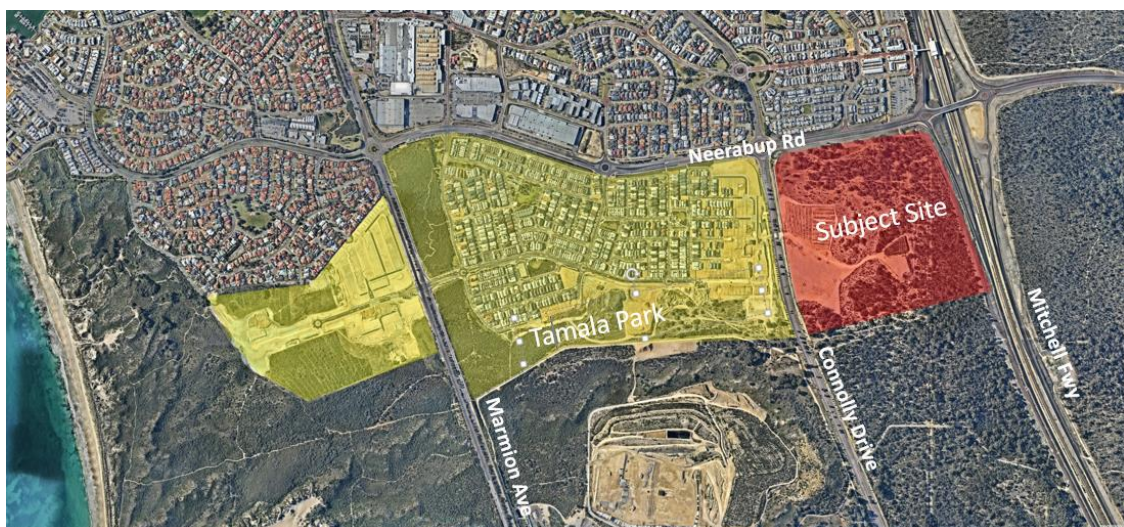


Figure 1: Site location

2.0 Proposed Development

Figure 2 illustrates the proposed Development Concept Plan for the Catalina Grove area. **Appendix A** shows the Development Concept Plan including the legends and titles.



Figure 2: Proposed Development Concept Plan

The proposed land uses for the Catalina Grove area are summarised in **Table 1**.

Table 1: Proposed Land Uses

Zones	Single residential	Apartments	Commercial (m ²)	Retail (m ²)
NW	176	296	1700	3300
NE	81	149		
S	234	10		
Total	491	455		

A Local Centre is proposed along Connolly Drive including 3,300 m² of Shop/ Retail floor space with the potential to accommodate 1,700 m² of other commercial floor space. The northern part of the development area (NW and NE zones in Figure 2) with easy walking distance of the Clarkson railway station is being planned mainly for medium to high density residential development. Catalina Grove is planned for development of approximately 946 dwellings (including apartments and single units).

The main access to the development area is from the roundabout intersection on Connolly Drive. This roundabout is already approved via the Tamala Park LSP. Two separate left in/ left out (LILO) crossovers are proposed on Connolly Drive both sides of the main roundabout intersection. The proposed development concept plan also shows the approved left in/ left out crossover on Neerabup Road.

The proposed LILO crossovers on Connolly Drive would improve accessibility and permeability of Catalina Grove and would reduce the projected traffic volumes at the roundabout intersection of Connolly Dr/ Green Link which in turn would improve the traffic operation of this roundabout.

There is an existing underpass to the northern corner of the Catalina Grove under Neerabup Road which is planned for bus services along the Green Link corridor to connect to the existing Clarkson train station. The northern part of the Green Link including the underpass is designated as Busway and will be used by buses. Cars would not use the underpass however pedestrians and cyclists would be able to use the underpass.

3.0 Existing Situation

3.1 Existing Land Use

The development area is currently vacant land. Residential subdivision development has already progressed to the west of Connolly Drive.

3.2 Existing Road Network

Figure 3 illustrates the road hierarchy of the existing road network surrounding the Catalina Grove area (sourced from Main Roads WA road hierarchy interactive map).

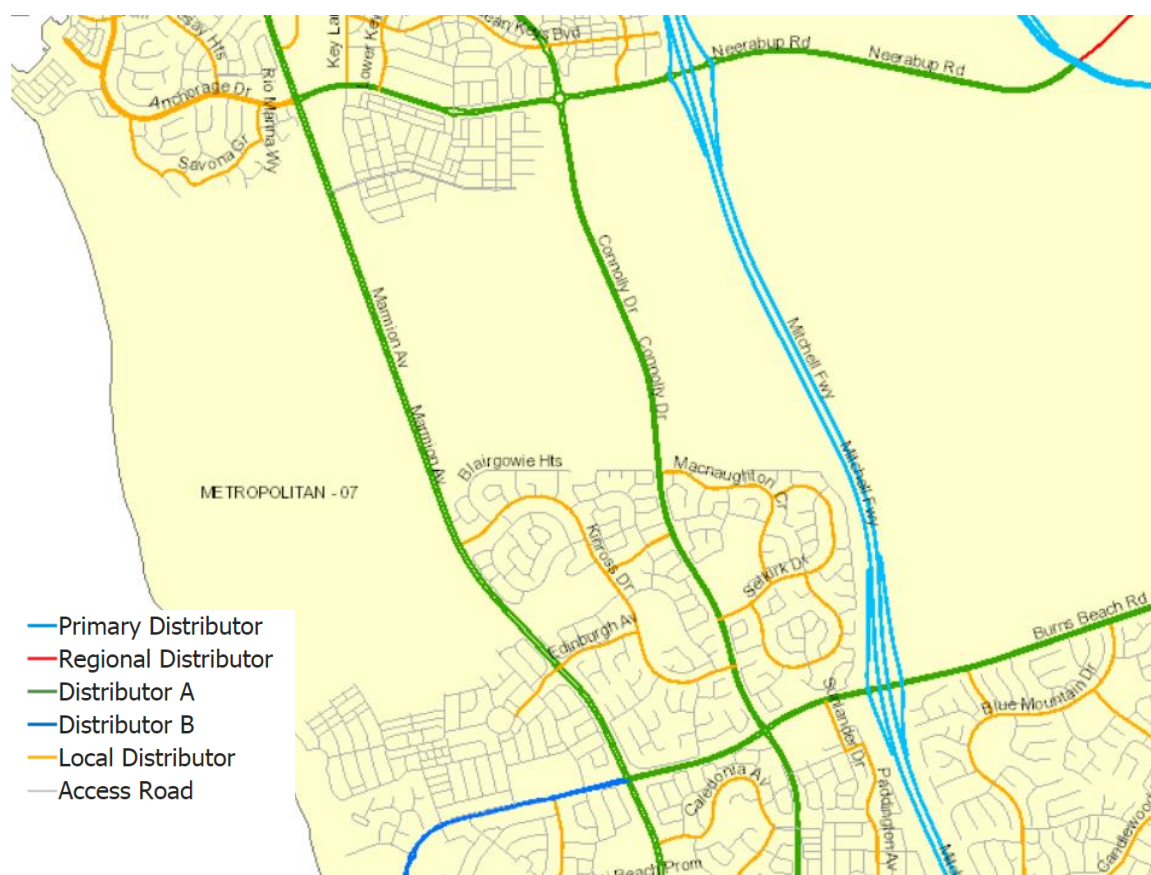


Figure 3: Existing Road Hierarchy

Neerabup Road is currently constructed to dual carriageway standard with a solid median. It has a posted speed limit of 70km/h. Neerabup Road is classified as a District Distributor A in the Main Roads WA functional road hierarchy.

The latest traffic counts sourced from Main Roads WA indicate that Neerabup Road east of Marmion Avenue carried about 16,000vpd in 2017/2018.

Connolly Drive is currently constructed to dual carriageway standard with a 4-8m solid median. It has a posted speed limit of 70km/h. Connolly Drive is classified as a District Distributor A in the Main Roads WA functional road hierarchy.

The latest traffic counts sourced from Main Roads WA indicate that Connolly Drive south of Neerabup Road carried about 6,100vpd in 2017/2018. The existing intersection of Connolly Drive and Neerabup Road is a dual lane roundabout intersection.

3.3 Public Transport

The subject site is located within walking distance to the Clarkson train station as shown in **Figure 4**.



Figure 4: Existing public transport

3.4 Pedestrian and Cyclist Facilities

The Department of Transport's Perth Bike Maps (see Figure 5) indicate a high quality shared path along Neerabup Road and Connolly Drive. There is a Principal Shared Path along Mitchel Freeway to the east of the subject site which connects to the Clarkson train station via an existing underpass on Neerabup Road, immediately west of the freeway.



Figure 5: Bicycle facilities

3.5 Changes to Surrounding Transport Network

The proposed changes to the surrounding road network as a result of the proposed development area would be two left in/ left out crossovers on both sides of the approved roundabout intersection at Connolly Drive.

3.6 Public Transport Network Planning

The Tamala Park Structure Plan includes a central east-west Green Link which is proposed to operate as a public transport corridor linking the entire structure plan area including Catalina Grove to the existing Clarkson train station.

4.0 Proposed Transport Network

4.1 Road Hierarchy

The proposed hierarchy of roads within the development area is illustrated in Figure 6 using the road hierarchy classification from Liveable Neighbourhoods (2007).



Figure 6: Proposed road hierarchy

Some key characteristics of the relevant road classifications have been summarised in in

Table 2 below. These are generally based on Liveable Neighbourhoods guidelines although the proposed widths do vary slightly from the standard Liveable Neighbourhoods cross-section diagrams.

It should be noted that these reserve widths are indicative only and are subject to further adjustment in consultation with the Department of Planning, Lands and Heritage (DoPLH) and City of Wanneroo during detailed subdivision design.

Table 2: Key Characteristics for the Proposed LSP Road Classifications

Road Classification	Indicative upper volume (vpd)	Indicative road reserve width (m)	Indicative road pavement width (m)
Integrator A	35,000	40m	2 x 8.5m (incl. cycle lanes) + 6m median
Neighbourhood Connector A	7,000	22m	2 x 5m (incl. cycle lanes), 2m median and embayed parking
Access Street C	3,000	16m	6m (plus embayed parking) or 7.2m (with no embayed parking)
Access Street B	3,000	18m	9.7m (with on-street parking) or 6m (plus embayed parking)
Access Street D	1,000	15m	6m

Integrator A

Connolly Drive and Neerabup Road are classified as Integrator A Roads and are constructed as dual carriageway standard roads.

Neighbourhood Connectors

The continuation of the central east west Green Link from the west through the development area is expected to carry traffic volumes of about 3,000vpd to 7,000vpd and therefore is classified as Neighbourhood Connector A, which facilitates the future bus movements, pedestrians and cyclists along the Green Link. The small section of the internal road immediately south of the Neerabup Road LILLO intersection is also classified as Neighbourhood Connector A.

Access Streets

The road to the east of the proposed local centre would carry traffic between 1,000vpd to 3,000vpd and can be classified as "Access Street B" with 18.0m road reserve and embayed parking bays on both sides of the road.

The basic standard of Access Street D proposed in the development area is a 6m wide carriageway in a 15m road reserve. This *Access Street D* results in 4.5m verges on both sides, with embayed parking accommodated in the verges where required,

such as to provide visitor parking for lots serviced by rear laneways. This road standard is proposed where the future total traffic volumes are less than 1000 vpd.

The other Access Streets with a future traffic volume over 1000 vpd would be designed as an Access Street C. This is based on a 16m road reserve width and a 7.2m carriageway width or 6m plus embayed parking where required.

4.2 Public Transport

Existing bus services in this area are described in section 3.3 of this report and current planning for the central Green Link to accommodate buses is discussed in section 3.6.

4.3 Pedestrian and Cyclist Facilities

Figure 7 outlines the proposed pedestrian and cyclist network for the development area. The proposed pedestrian and cyclist facilities aim to provide a permeable road network within the development area and create excellent opportunities for the provision of good pedestrian and cyclist facilities that maximise the use of non-motorised transport modes considering the close proximity to the Clarkson train station.

In accordance with the Liveable Neighbourhoods Guidelines, shared paths are proposed on one side of the central Green Link with a footpath on the other side. Figure 7 also shows the existing Principal Shared Path along the Mitchel Freeway and the existing on-road cycle lanes and shared paths on Neerabup Road and Connolly Drive.



Figure 7: Proposed pedestrian and cyclist facilities

4.4 Integration with Surrounding Area

The proposed development area will be connected to surrounding areas through a number of connections on Connolly Drive and Neerabup Road.

The proposed pedestrian and cyclist facilities proposed for the development area provide excellent opportunities for the provision of good pedestrian and cyclist connectivity for accessing the Clarkson train station and the other parts of the Tamala Park Structure Plan.

5.0 Analysis of the Transport Network

5.1 Assessment Period

The assessment year that has been adopted for this analysis is 2031, with full development of the Tamala Park Structure Plan and Catalina Grove subdivision area.

5.2 Traffic Generation and distribution

In order to establish the net traffic change (increase/ decrease) for the Catalina Grove development area, the traffic generation of the proposed land uses in the recent development area was compared with the traffic generation estimation for the original plan based on the Uloth modelling and analysis for the Tamala Park Structure Plan (2009 TIA report). The following trip rates (consistent with the Uloth 2009 TIA report) were used for the trip generation estimation of the Catalina Grove development plan:

- 7 trips per day per dwelling for single dwellings and 5 trips per day per dwelling for flats and apartments;
- 20 trips per day for 100m² GFA of commercial developments; and,
- 121 trips per day for 100m² NLA of the retail;

The original plan for the Catalina Grove included some 1,047 dwellings, 1,196m² GFA of Commercial and 5,445m² NLA of retail. Accordingly, the trip generation of the Catalina Grove based on the original plan was estimated to be approximately 13,000vpd.

Trip generation of the recent development plan for Catalina Grove based on the proposed land uses outlined in **Table 1** in section 2 of this TIA report is estimated to be about 10,245vpd which is about 2,755vpd lower than the original plan. Therefore the net traffic decrease due to the proposed land uses for the recent development plan is about 2,755vpd.

5.3 Traffic Flow Forecasts

The projected daily traffic volumes are shown in **Figure 8**. This Figure also shows the projected traffic volumes based on the original plan (in brackets).

Legend

23,000
Projected daily traffic volume
based on the Subdivision Plan
(21,000)
Projected daily traffic volume
based on the Original Plan

*The rest of the roads carry less
than 1,000vpd*



Figure 8: 2031 daily total traffic flows

5.4 Roads and Intersections

The proposed road network to accommodate these traffic volumes has been detailed in section 4 of this transport assessment, including the details of the proposed road hierarchy in section 4.1.

Figure 9 details the proposed intersection controls for key intersections within the development area. The main access to the development area is from the approved roundabout intersection on Connolly Drive. Two separate left in/ left out intersections are proposed on Connolly Drive both sides of the main roundabout intersection.

The northern LILO intersection would provide a separate connection for the service vehicles to access the retail area which in turn would improve safety of the other road users and traffic circulation of service vehicles. The proposed southern LILO intersection on Connolly Dr would improve connectivity and accessibility of the residential development to the south of the development area and would provide an alternative access for the residential developments during the emergency situations.

The proposed LILO intersections on Connolly Drive would reduce the projected traffic volumes at the Connolly Dr/ Green Link roundabout and therefore would improve the traffic operation of this roundabout. Appropriate left turn lanes of about 70m will be provided on Connolly Drive for these LILO intersections to improve safety and satisfy Austroads requirements.

Two roundabouts are proposed for the main internal intersections within the LSP area. These roundabouts would improve traffic circulation and operation of the internal road network.



Figure 9: Intersection treatments

5.5 Intersection Analysis

The key intersections which will be affected by the development area traffic is the approved roundabout intersection on Connolly Drive/ Green Link.

Capacity analysis of this intersection has been undertaken using the SIDRA computer software package. SIDRA is an intersection modelling tool commonly used by traffic engineers for all types of intersections. SIDRA outputs are presented in the form of Degree of Saturation, Level of Service, Average Delay and 95% Queue. These characteristics are defined as follows:

- + Degree of Saturation is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The Degree of Saturation ranges from close to zero for infrequent traffic flow up to one for saturated flow or capacity.
- + Level of Service is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. In general, there are 6 levels of service, designated from A to F, with Level of Service A representing the best operating condition (i.e. free flow) and Level of Service F the worst (i.e. forced or breakdown flow).
- + Average Delay is the average of all travel time delays for vehicles through the intersection.
- + 95% Queue is the queue length below which 95% of all observed queue lengths fall.

Figure 10 shows the projected traffic volumes during the critical PM peak hour at the approved roundabout intersection of Connolly Drive/ Green Link. Considering that the projected traffic volumes along the Green Link would not change significantly from the original plan the same traffic volumes from Uloth 2009 TIA Report for the critical PM peak hour were used for the purpose of intersection analysis.

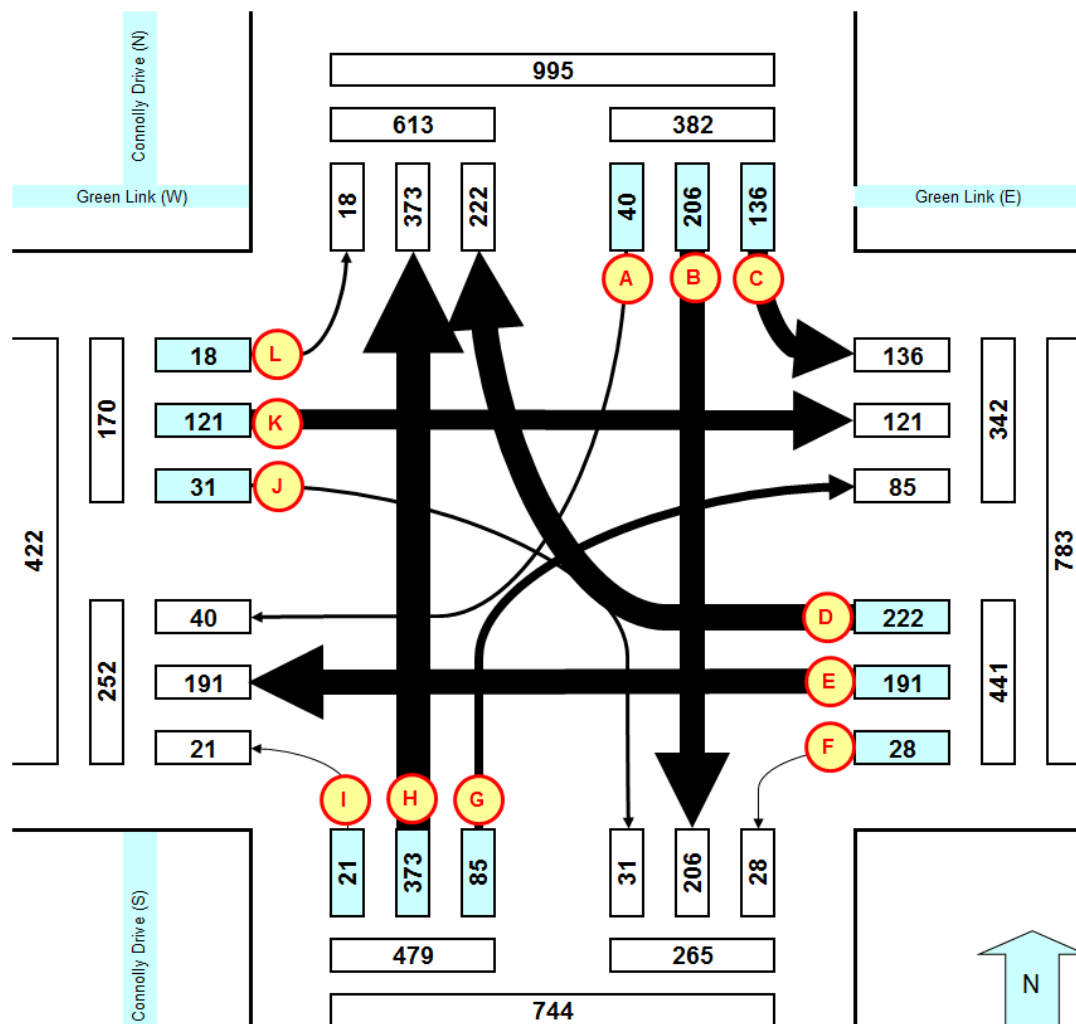


Figure 10: Projected traffic volumes at the proposed Connolly Drive/ Green Link roundabout

The results of the 2031 SIDRA analysis are summarised in **Appendix C**.

Figure C1 shows the intersection layout for the intersection of Connolly Drive/ Green Link which is a dual lane roundabout. The SIDRA results are documented in Table C1 for the PM peak hour. The intersection analysis undertaken indicates that the Connolly Drive/ Green Link roundabout will operate at overall level of service A with no movement worse than level of service B during the 2031 PM peak periods. The degree of saturation is indicated as 0.428 in the 2031 PM peak indicating sufficient spare capacity for potential future traffic growth in this area.

5.6 Access to Frontage Properties

The WAPC *Liveable Neighbourhoods* policy requires that “Development along integrator B and neighbourhood connector streets with ultimate vehicle volumes over 5,000 vehicles per day should be designed either so vehicles entering the street can do so travelling forward, or are provided with alternative forms of vehicle

access. Wider lots with paired driveways and protected reversing areas in the parking lane may be used on streets with up to 7,000 vehicles per day.”

All of the roads within the development area are expected to carry less than 5,000vpd, so no restriction on vehicular access is required on the proposed subdivision roads.

The section of Green Link immediately east of the roundabout intersection on Connelly Drive would carry traffic between 5,000vpd and 7,000vpd. Residential dwellings along this section of Green Link do not have direct access to the Green Link.

5.7 Pedestrian / Cycle Networks

The proposed network of shared paths for pedestrians and cyclists is described in section 4.3 of this transport assessment. This network of paths will provide an excellent level of accessibility and permeability for pedestrians and cyclists within the development area, and connections to the existing Clarkson train station.

5.8 Access to Public Transport

WAPC Transport Impact Assessment Guidelines (2016) suggest that it is desirable for at least 90 per cent of dwellings to be within 400m straight line distance of a bus route.

The proposed PTA bus routes along the Green Link as proposed in the Tamala Park Structure Plan would cover the proposed residential dwellings within the development area.

6.0 Conclusions

The development plan for Catalina Grove includes a Neighbourhood Activity Centre including 3,300 sqm of Shop/ Retail floor space with the potential to accommodate 1,700 sqm of other commercial floor space. Catalina Grove is also planned for development of approximately 946 dwelling (including apartments and single units).

The proposed development area is anticipated to generate traffic flows of approximately 10,245vpd which is about 2,755vpd lower than the original plan. Therefore the net traffic decrease due to the proposed land uses for the recent development plan is about 2,755vpd.

Transport modelling and analysis undertaken indicate that the proposed changes to the original plan would not significantly change the road hierarchy of the internal and external road network of the original Structure Plan area and in particular the road hierarchy of the central east-west corridor (Green Link).

Intersection analysis undertaken for the approved dual-lane roundabout at the Connolly Drive/ Green Link intersection indicate that this roundabout would operate satisfactorily and well within capacity in 2031 peak hours.

The proposed key road network of the development area has been planned based on WAPC Liveable Neighbourhoods guidelines to accommodate the future traffic flows that will be generated in this area.

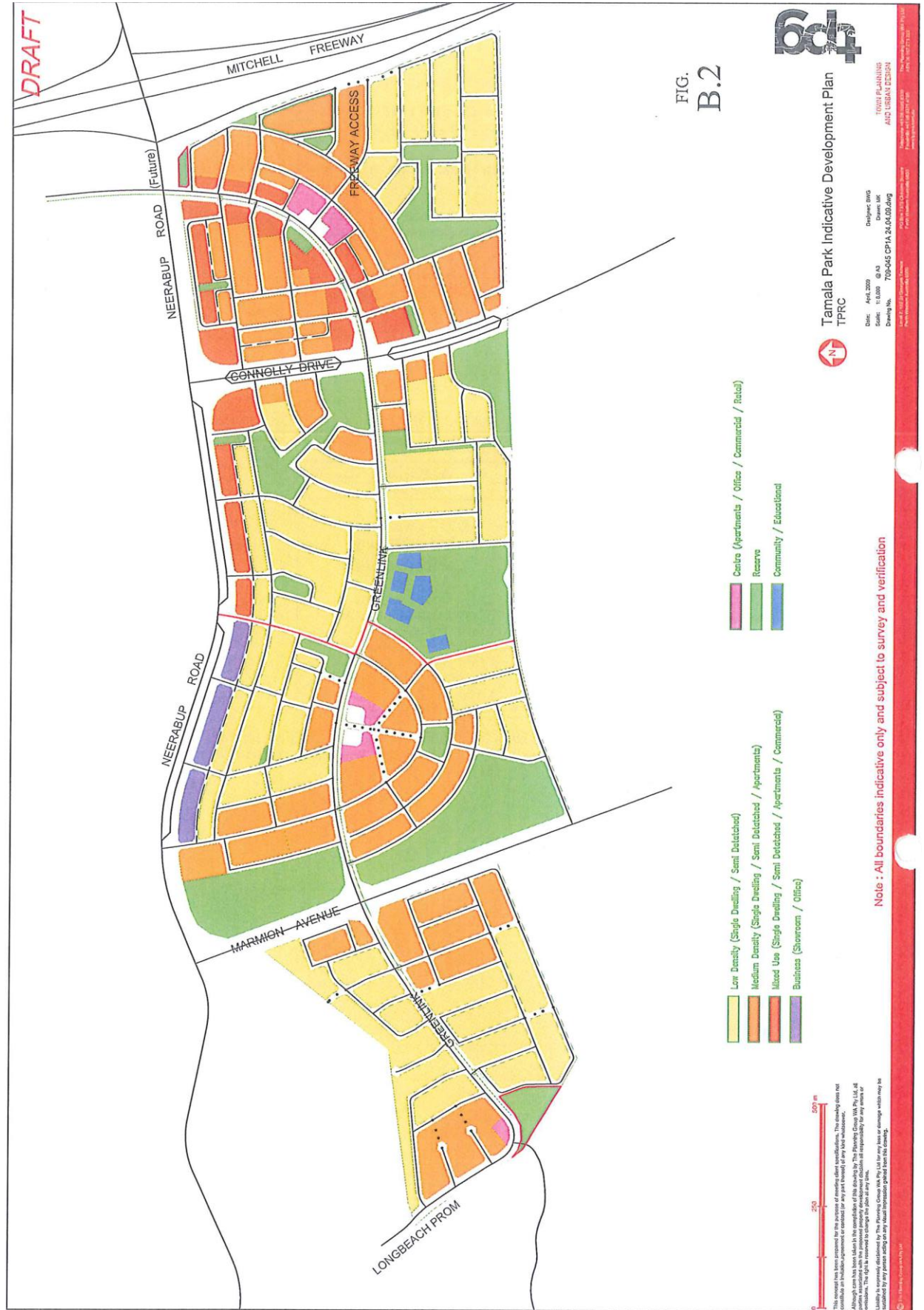
Transport modelling and analysis undertaken indicates that the road to the east of the proposed local centre would carry traffic between 1,000vpd to 3,000vpd and can be classified as "Access Street B" with 18.0m road reserve and embayed parking bays on both sides of the road.

The proposed development area provides for a comprehensive network of shared paths and footpaths to encourage and facilitate non-motorised travel with good connection to the existing Clarkson train station.

The proposed PTA bus route along the Green Link as proposed in the Tamala Park Structure Plan would cover the proposed residential dwellings within the development area.

Appendix A

TAMALA PARK STRUCTURE PLAN



Appendix B

DEVELOPMENT CONCEPT PLAN



Appendix C

2031 SIDRA ANALYSIS

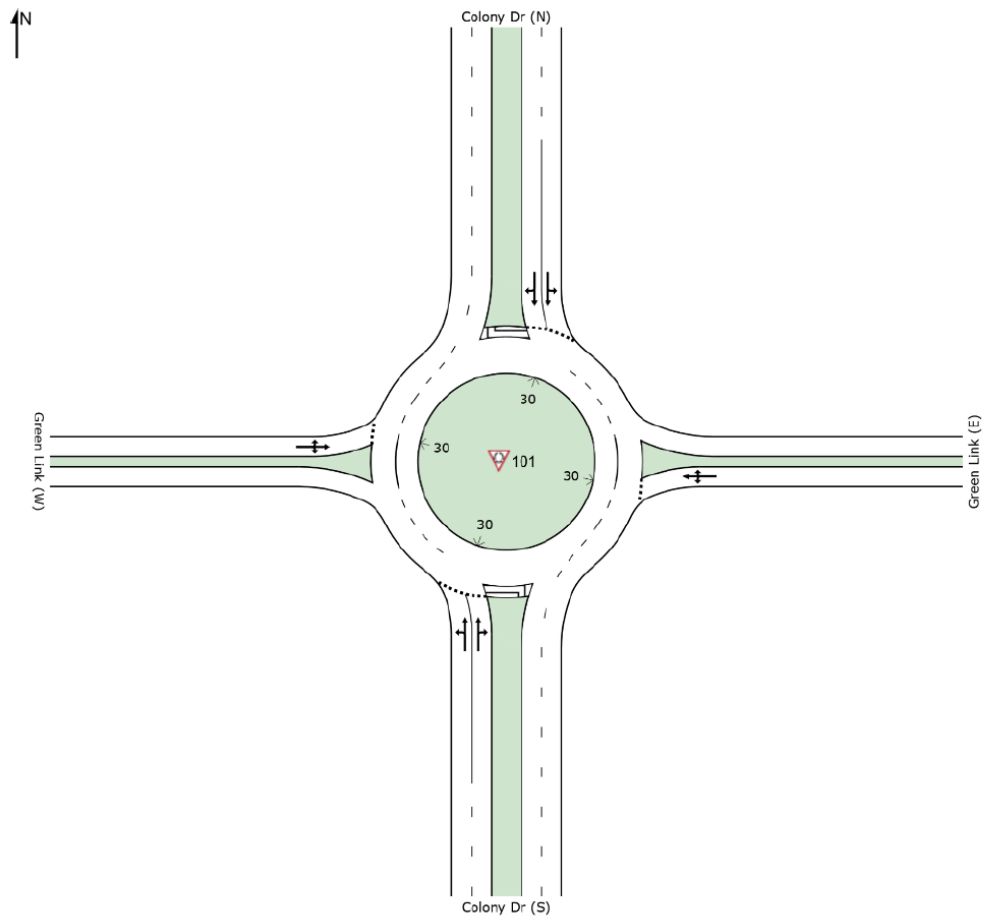


Figure C1: Proposed roundabout layout of Connolly Drive/ Green Link analysed in SIDRA

Table C1: SIDRA results: proposed roundabout on Connolly Drive/ Green Link (2031 PM peak hour with full development of the Structure Plan)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Colony Dr (S)											
1	L2	22	0.0	0.219	5.4	LOS A	1.5	10.4	0.61	0.53	53.5
2	T1	393	0.0	0.219	5.5	LOS A	1.5	10.4	0.61	0.57	54.7
3	R2	89	0.0	0.219	11.6	LOS B	1.4	9.5	0.62	0.66	54.2
Approach		504	0.0	0.219	6.6	LOS A	1.5	10.4	0.61	0.59	54.6
East: Green Link (E)											
4	L2	29	0.0	0.428	4.8	LOS A	2.4	16.6	0.49	0.63	52.7
5	T1	201	0.0	0.428	5.0	LOS A	2.4	16.6	0.49	0.63	54.2
6	R2	234	0.0	0.428	10.6	LOS B	2.4	16.6	0.49	0.63	54.6
Approach		464	0.0	0.428	7.8	LOS A	2.4	16.6	0.49	0.63	54.3
North: Colony Dr (N)											
7	L2	143	0.0	0.147	4.4	LOS A	0.9	6.0	0.40	0.47	54.7
8	T1	217	0.0	0.147	4.5	LOS A	0.9	6.0	0.42	0.50	55.8
9	R2	42	0.0	0.147	10.3	LOS B	0.8	5.8	0.43	0.51	55.8
Approach		402	0.0	0.147	5.1	LOS A	0.9	6.0	0.41	0.49	55.4
West: Green Link (W)											
10	L2	19	0.0	0.213	5.8	LOS A	0.9	6.6	0.58	0.65	53.2
11	T1	127	0.0	0.213	5.9	LOS A	0.9	6.6	0.58	0.65	54.8
12	R2	33	0.0	0.213	11.6	LOS B	0.9	6.6	0.58	0.65	55.1
Approach		179	0.0	0.213	7.0	LOS A	0.9	6.6	0.58	0.65	54.7
All Vehicles		1549	0.0	0.428	6.6	LOS A	2.4	16.6	0.52	0.58	54.7