onemilegrid
TRAFFIC ENGINEERING

621 Burwood Highway, Knoxfield

Transport Impact Assessment

190752TIA001G-F

19 February 2021

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DOCUMENT INFORMATION

Prepared for	Development Victoria		
File Name	190752TIA001G-F	**Report Date**	19 February 2021

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1 INTRODUCTION

onemile**grid** has been requested by Development Victoria to undertake a Transport Impact Assessment of the proposed residential subdivision at 621 Burwood Highway, Knoxfield.

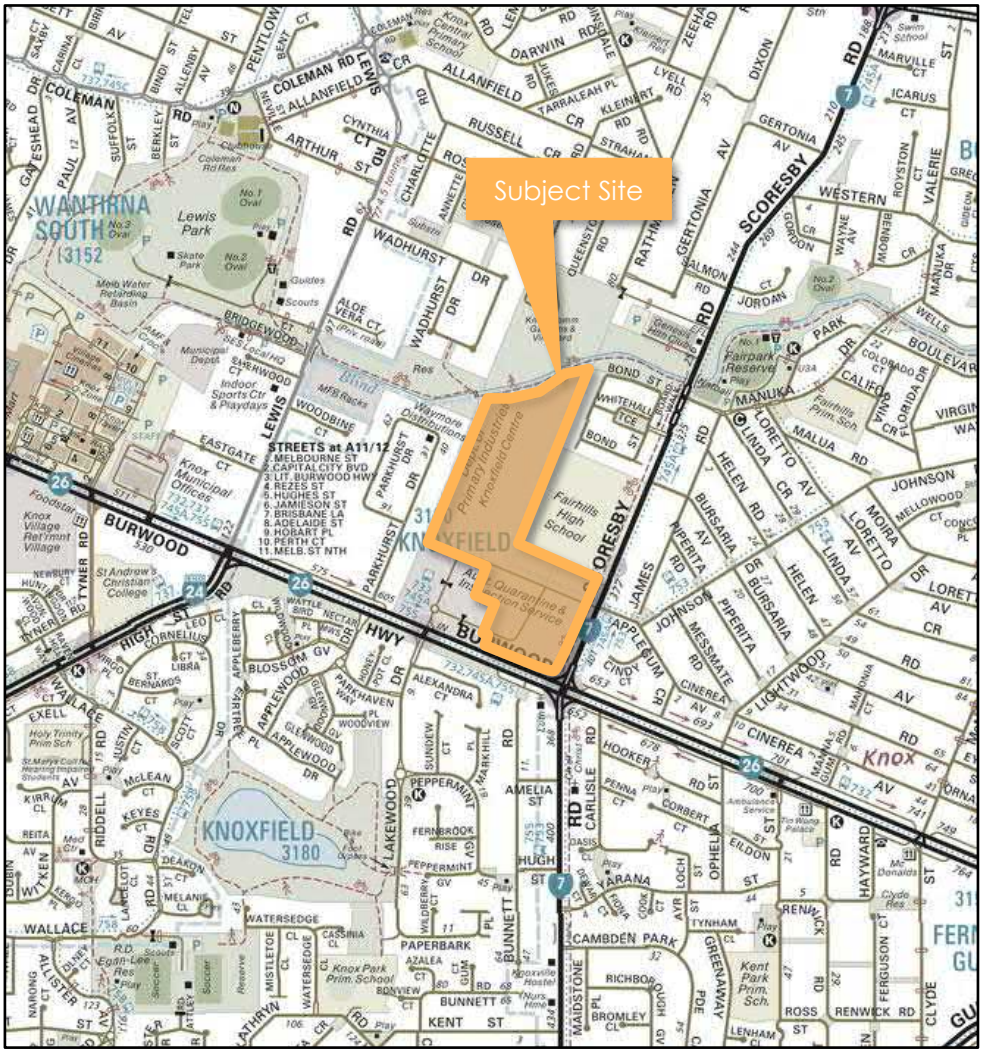
As part of this assessment the subject site has been inspected with due consideration of the development proposal, traffic data has been sourced and relevant background reports have been reviewed.

2 EXISTING CONDITIONS

2.1 Site Location

The subject site is located at the north-east corner of the intersection between Burwood Highway and Scoresby Road, addressed as 621 Burwood Highway, Knoxfield, as shown in Figure 1. The site is irregular in shape with frontages to Burwood Highway and Scoresby Road.

Figure 1 Site Location



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The site is currently largely vacant, occupied by scattered groups of trees, several small buildings and a large dam at the north-west corner

The site is currently accessible via a double-width crossover to Scoresby Road opposite the Applegum Crescent intersection. The accessway is currently gated.

Land use in the immediate vicinity of the site is industrial to the west and generally residential to the south and east. It includes Fairhills High School to the north, a chemist warehouse to the south and the Department of Environment, Land, Water, and Planning in the south-west hollow.

An aerial view of the subject site is provided in Figure 2.

Figure 2 Site Context (19/12/2019)

Copyright Nearmap

2.2 Planning Zones and Overlays

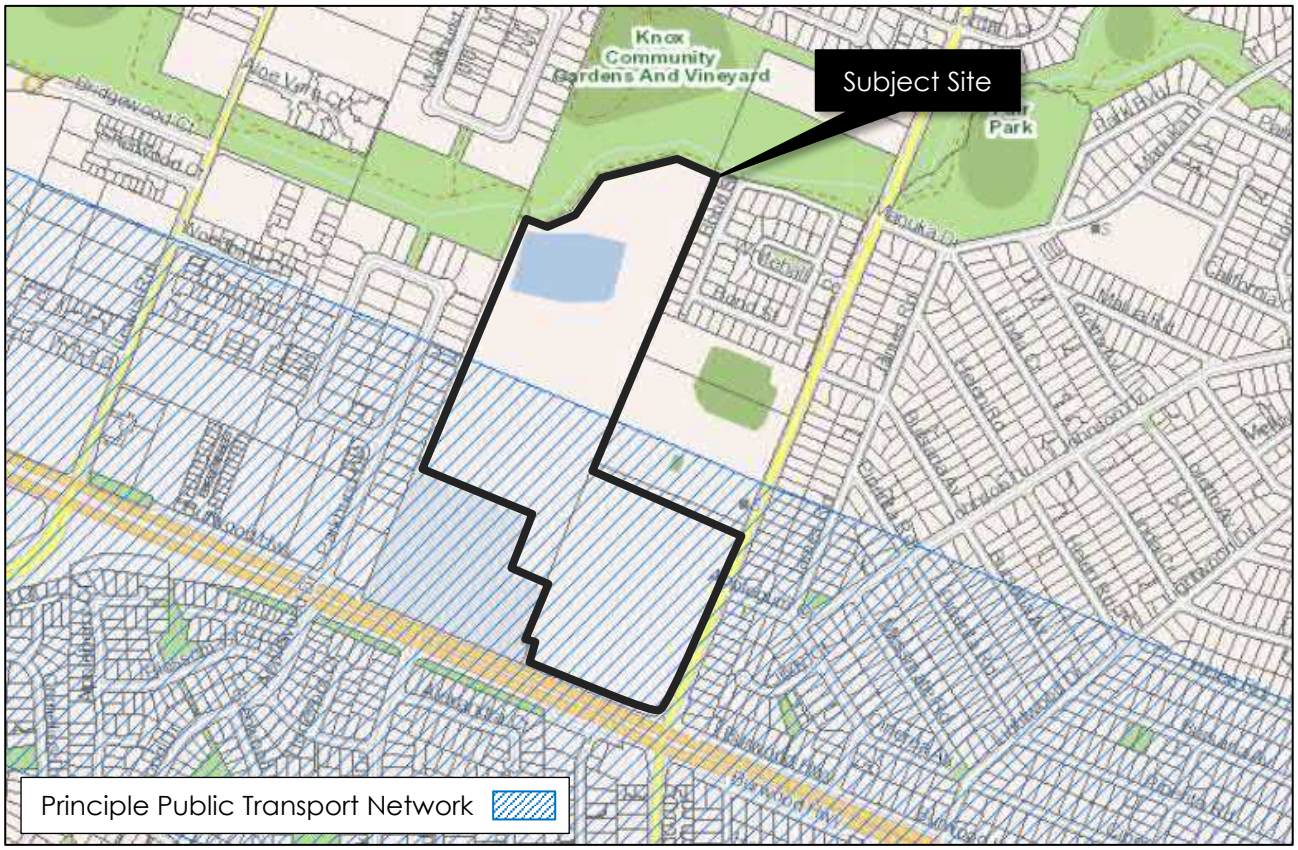
It is shown in Figure 3 that the site is located within a Comprehensive Development Zone (CDZ2). Both Burwood Highway and Scoresby Road are identified as Road Zones (RDZ1).

Additionally, part of the northern portion of the site is subject to an Environmental Significance Overlay (ESO2) and a Land Subject to Inundation Overlay (LSIO).

Figure 3 Planning Scheme Zones

The southern portion of the site is located within the Principle Public Transport Network, as detailed within Figure 4.

Figure 4 Principle Public Transport Network Zone



2.3 Road Network

2.3.1 Burwood Highway

Burwood Highway is an arterial road generally aligned east-west, running between Burwood in the west and Belgrave in the east.

Burwood Highway provides three traffic lanes in each direction adjacent to the site. Additional left and right turning lanes are provided at the Lakewood Drive and Scoresby Road intersections, including left turn slip lanes at the Scoresby Road intersection. The third lanes begin/terminate approximately 100m east of the Scoresby Road intersection. Some unrestricted kerbside parking is provided on a service road on the south side of the road.

Burwood Highway has a signed speed limit of 80 km/h in the vicinity of the site.

The cross-section of Burwood Highway at the frontage of the site is shown in Figure 5.

Figure 5 Burwood Highway, looking east towards the subject site

2.3.2 Scoresby Road

Scoresby Road is an arterial road generally aligned north-south, running between Ferntree Gully Road in the south and transitioning into Bayswater Road in the north.

Scoresby Road provides two traffic lanes in each direction adjacent to the site. Additional exit and turning lanes are formed at the Burwood Highway intersection.

A 60km/h speed limit applies to Scoresby Road in the vicinity of the site with a school zone applicable north of Applegum Crescent between 8:00am-9:30am and 2:30pm-4:00pm on school days.

The cross-section of Scoresby Road at the frontage of the site is shown in Figure 6.

Figure 6 Scoresby Road, looking north from the subject site

2.3.3 Applegum Crescent

Applegum Crescent is a local road running between Scoresby Road in the north-west and the Burwood Highway service road in the south-east.

Applegum Crescent has a carriageway width of approximately 7.5m, catering for traffic movements in each direction and kerbside parking on each side of the road.

A signed speed limit of 50km/h applies to Applegum Crescent.

The existing configuration of the intersection between Scoresby Road and Applegum Crescent is an unsignalised T-intersection, with 'Keep Clear' line marking within the southbound traffic lanes on Scoresby Road.

The cross-section of Applegum Crescent is shown in Figure 7.

Figure 7 Applegum Crescent, looking east from the intersection with Scoresby Road

2.4 Movement & Place

The Movement & Place framework was introduced by the Department of Transport (DoT) in February 2019 and provides a new approach to integrated transport planning in Victoria.

Three main principles underline the DoT's approach to transport planning within the movement and place framework.

1. People First – We put transport users at the centre of everything we do
2. Outcomes Focused – We focus on outcomes that deliver more choice, connections and confidence in our travel
3. One System – We think as one system, not individual projects or modes

The Movement & Place framework recognises that streets perform multiple roles and functions beyond moving people from A to B. It recognises the role of streets as places and destinations in their own right.

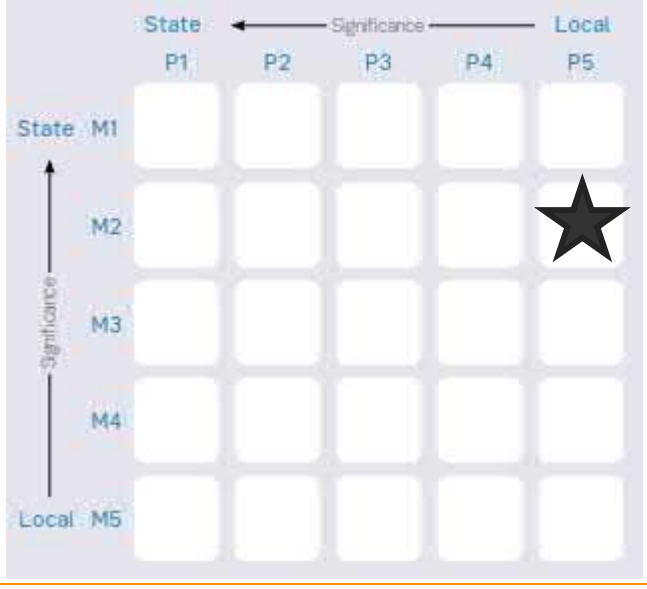
The framework offers a common language to allow the coordination of transport planning between the various stakeholders in the transport planning process.

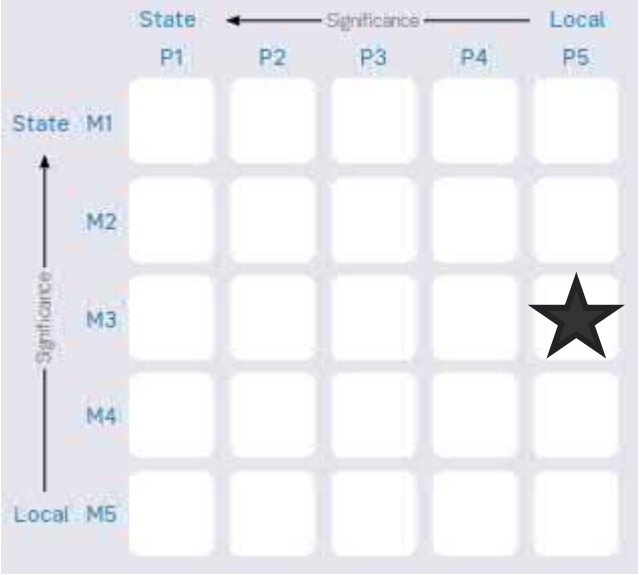
The framework is built on four modules and has been designed to be able to be applied at both the strategic and project level.

The Movement & Place Framework allows the organisation and classification of transport links by their place and movement roles as well as allowing for the development of performance measures and interventions.

Using the Department of Transport overview of Movement and Place document, **one**mile**grid** has reviewed the existing characteristics for both Burwood Highway and Scoresby Road which front the site, as summarised in Table 1.

Table 1 Movement and Place Summary

Road	*Place Significance*	*Movement Significance*	*Network Classifications Matrix*
Burwood Highway	**P5** – Place of local significance	**M2** – Significant movement of people and goods on routes connecting across multiple municipalities or provides primary access to regional-level places	

Road	Place Significance	Movement Significance	Network Classifications Matrix
Scoresby Road	**P5** – Place of local significance	**M3** – Moderate movement of people and/or goods on routes connecting municipalities or provides primary access to municipal-level places	

According to Table 1, both Burwood Highway and Scoresby Road currently serve purposes as Connectors, as shown replicated in Figure 8, which is described as:

> *'Successful Connectors should provide safe, reliable and efficient movement of people and goods between regions and strategic centres and mitigate the impact on adjacent communities.'*

Figure 8 Movement and Place Road Classification

The Movement and Place framework also includes design guides to assist with the evaluation of existing roads to be fit for purpose now and resilient to future use and adaptations.

2.5 Traffic Volumes

Traffic volumes surveys were undertaken by Trans Traffic Solutions at the intersections of Burwood Highway/Scoresby Road, Burwood Highway/Lakewood Drive and Scoresby Road/Applegum Crescent during the following periods:

- Thursday 21st November 2019 – 6am-9:30am
- Thursday 21st November 2019 – 4pm-7:30pm

The peak hour results for the respective traffic volume surveys are provided in Figure 9 and Figure 10 respectively. It is noted that the peak hours shown in the figures are the combined peak hour periods through the three surveyed intersections.

Figure 9 Existing AM Peak Hour Volumes

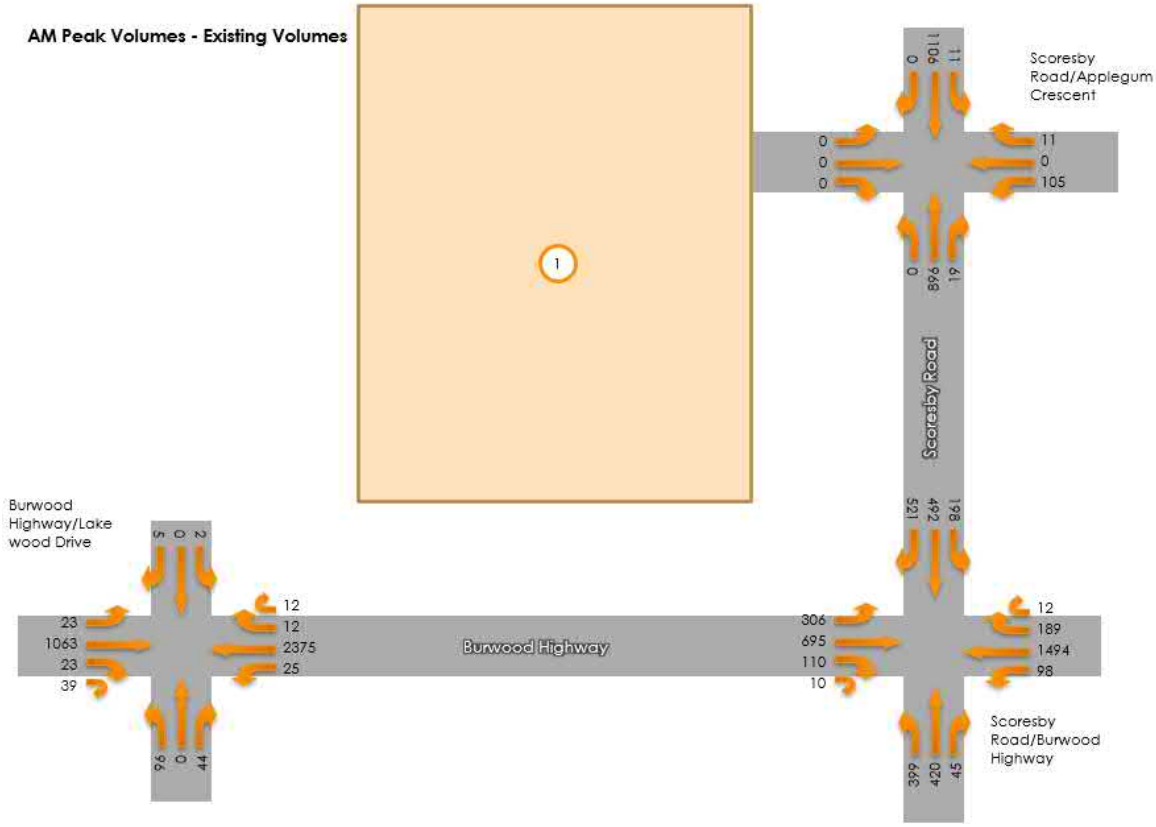
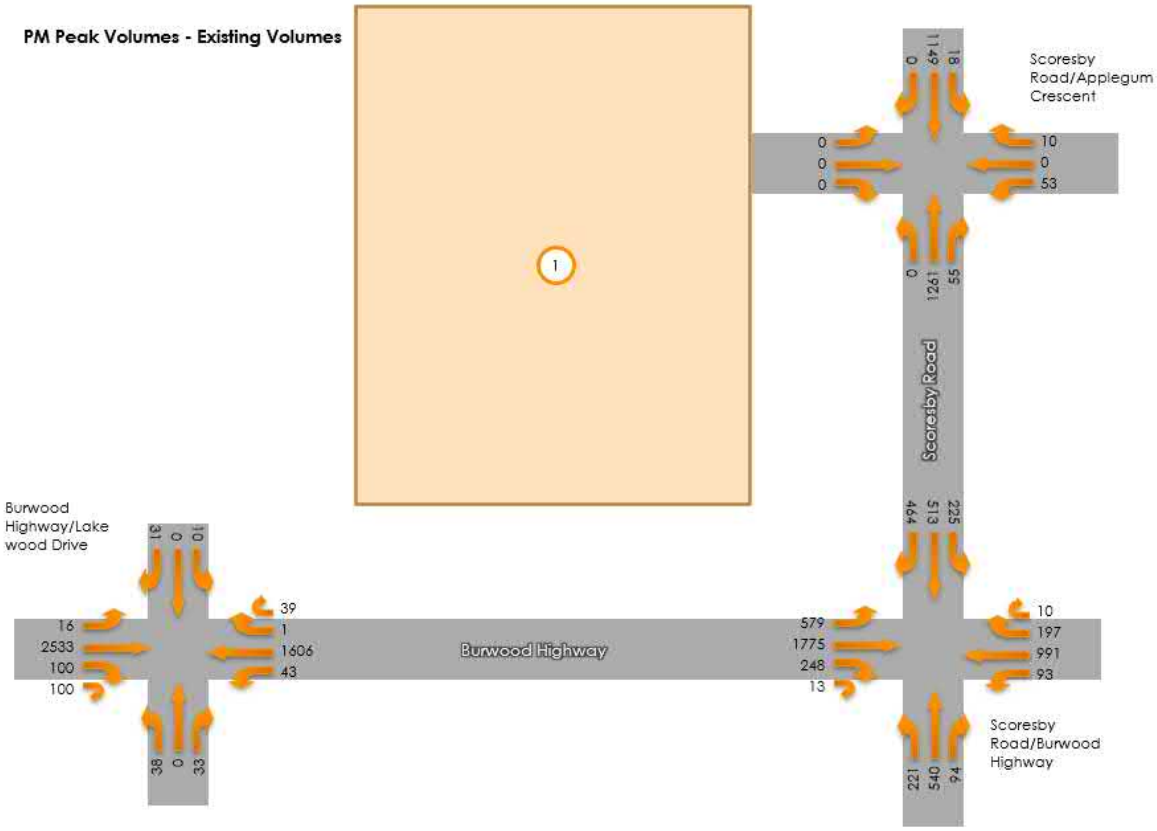


Figure 10 Existing PM Peak Hour Volumes



2.6 Existing Conditions Intersection Analysis

To assess the operation of the intersection the traffic volumes have been input into SIDRA Intersection, a traffic modelling software package. The intersection analysis allows for a baseline to be established for the subject intersections when assessing the traffic impacts of the proposed development.

The SIDRA Intersection software package has been developed to provide information on the capacity of an intersection with regard to a number of parameters. Those parameters considered relevant are, Degree of Saturation (DoS), 95th Percentile Queue, and Average Delay as described below.

Table 2 SIDRA Intersection Parameters

<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td>Degree of Saturation (DoS)</td><td>The DoS represents the ratio of the traffic volume making a particular movement compared to the maximum capacity for that particular movement. The value of the DoS has a corresponding rating depending on the ratio as shown below.
<table>
<tr><th>Degree of Saturation</th><th>Rating</th></tr>
<tr><td>Up to 0.60</td><td>Excellent</td></tr>
<tr><td>0.61 – 0.70</td><td>Very Good</td></tr>
<tr><td>0.71 – 0.80</td><td>Good</td></tr>
<tr><td>0.81 – 0.90</td><td>Fair</td></tr>
<tr><td>0.91 – 1.00</td><td>Poor</td></tr>
<tr><td>Above 1.00</td><td>Very Poor</td></tr>
</table>
It is noted that whilst the range of 0.91 – 1.00 is rated as ‘poor’, it is acceptable for critical movements at an intersection to be operating within this range during high peak periods, reflecting actual conditions in a significant number of suburban signalised intersections.</td></tr>
<tr><td>Average Delay (seconds)</td><td>Average delay is the time delay that can be expected for all vehicles undertaking a particular movement in seconds.</td></tr>
<tr><td>95th Percentile (95%ile) Queue</td><td>95%ile queue represents the maximum queue length in metres that can be expected in 95% of observed queue lengths in the peak hour</td></tr>
</table>

Noting the high traffic volumes on both Burwood Highway and Scoresby Road, the existing intersections have been observed to be operating at or near capacity during the respective peak hour periods. In some instances, the detailed input parameters have been refined within the SIDRA model to ensure that the existing conditions are operating within a Degree of Saturation of 1.0 (demonstrating that the volumes passing through the intersection and equivalent to the capacity of the intersection). The refined parameters include increased basic saturation flows for the through movements at the signalised intersection between Burwood Highway and Scoresby Road, where an iterative approach was adopted to enable the intersection, particularly during the PM peak, to accurately model the existing conditions and result in a Degree of Saturation of approximately 1.0

The results of the intersection analysis using SIDRA for each of the respective intersections are summarised in Table 3, Table 4 and Table 5.

Table 3 Existing Conditions SIDRA Results – Burwood Highway / Scoresby Road

Approach	Movement	AM Peak Hour			PM Peak Hour		
		D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)
Scoresby Road (South)	Left	0.691	28.4	134.2	0.304	17.9	47.6
	Through	0.824	58.7	100.7	0.981	89.2	166.1
	Right	0.521	70.2	20.9	0.726	69.2	44
Burwood Highway (East)	Left	0.085	11.3	10.9	0.092	14.5	14.1
	Through	0.855	43.9	218.6	0.703	45	135.3
	Right	0.548	53	80.1	0.974	96.5	121.7
Scoresby Road (North)	Left	0.181	9.7	23.1	0.337	23.8	57.3
	Through	0.49	34.5	106.1	0.703	41.9	119.5
	Right	0.838	60.4	119	0.966	90.8	133.8
Burwood Highway (West)	Left	0.266	12.8	43.9	0.515	17.7	109
	Through	0.546	45.3	91.7	0.99	84.7	416
	Right	0.857	75.6	59.3	0.683	54	107.5

Table 4 Existing Conditions SIDRA Results – Scoresby Road / Applegum Crescent

Approach	Movement	AM Peak Hour			PM Peak Hour		
		D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)
Scoresby Road (South)	Through	0.295	0.9	7.7	0.428	2.1	23.3
	Right	0.295	16.4	7.7	0.428	20	23.3
Applegum Crescent	Left	0.429	12.7	14.2	0.808	119	34.8
	Right	0.429	116.3	14.2	0.808	372.6	34.8
Scoresby Road (North)	Left	0.251	5.6	0	0.378	5.6	0
	Through	0.251	0	0	0.378	0.1	0

Table 5 Existing Conditions SIDRA Results – Burwood Highway / Lakewood Drive

Approach	Movement	AM Peak Hour			PM Peak Hour		
		D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)
Lakewood Drive (South)	Left	0.322	13.2	18.9	0.086	11.6	5.6
	Through	0.545	75.6	24.4	0.276	69	17.3
	Right	0.545	81.2	24.4	0.276	74.6	17.3
Burwood Highway (East)	Left	0.02	11.3	3.5	0.041	17.6	8.8
	Through	0.589	8.1	181	0.479	14.4	146.6
	Right	0.206	73.3	12.1	0.179	59.8	17.9
DELWP Access (North)	Left	0.003	6.8	0.1	0.023	20.3	2.3
	Through	0.141	77.9	3.3	0.452	75	17.3
	Right	0.141	83.5	3.3	0.452	80.7	17.3
Burwood Highway (West)	Left	0.018	11.3	3.2	0.015	17.3	3.2
	Through	0.26	5.7	55.2	0.792	19.3	338.5
	Right	0.552	76.2	32.6	0.787	70.7	106.1

The existing conditions intersection analysis consequently shows that the intersection between Burwood Highway and Scoresby Road is at capacity (with a degree of saturation of 0.99 during the PM peak), while the intersection between Scoresby Road and Applegum Crescent is operating with 'fair' conditions and the intersection of Burwood Highway and Lakewood Drive operating with 'good' conditions.

2.7 Crash History

Crash history information in the vicinity of the site was obtained through the Department of Transport (VicRoads) CrashStats (the Victorian accident statistics and mapping program) for the latest 5-year period (2011 – 2016 inclusive). The crash information is summarised below, separated by their locations as shown in Figure 11:

Scoresby Road, between Fairhills High School and Applegum Crescent

- A total of 7 crashes were recorded over the 5-year period, including three at the Applegum Crescent intersection; and
- Of these, none involved a fatality, 1 involved a serious injury.

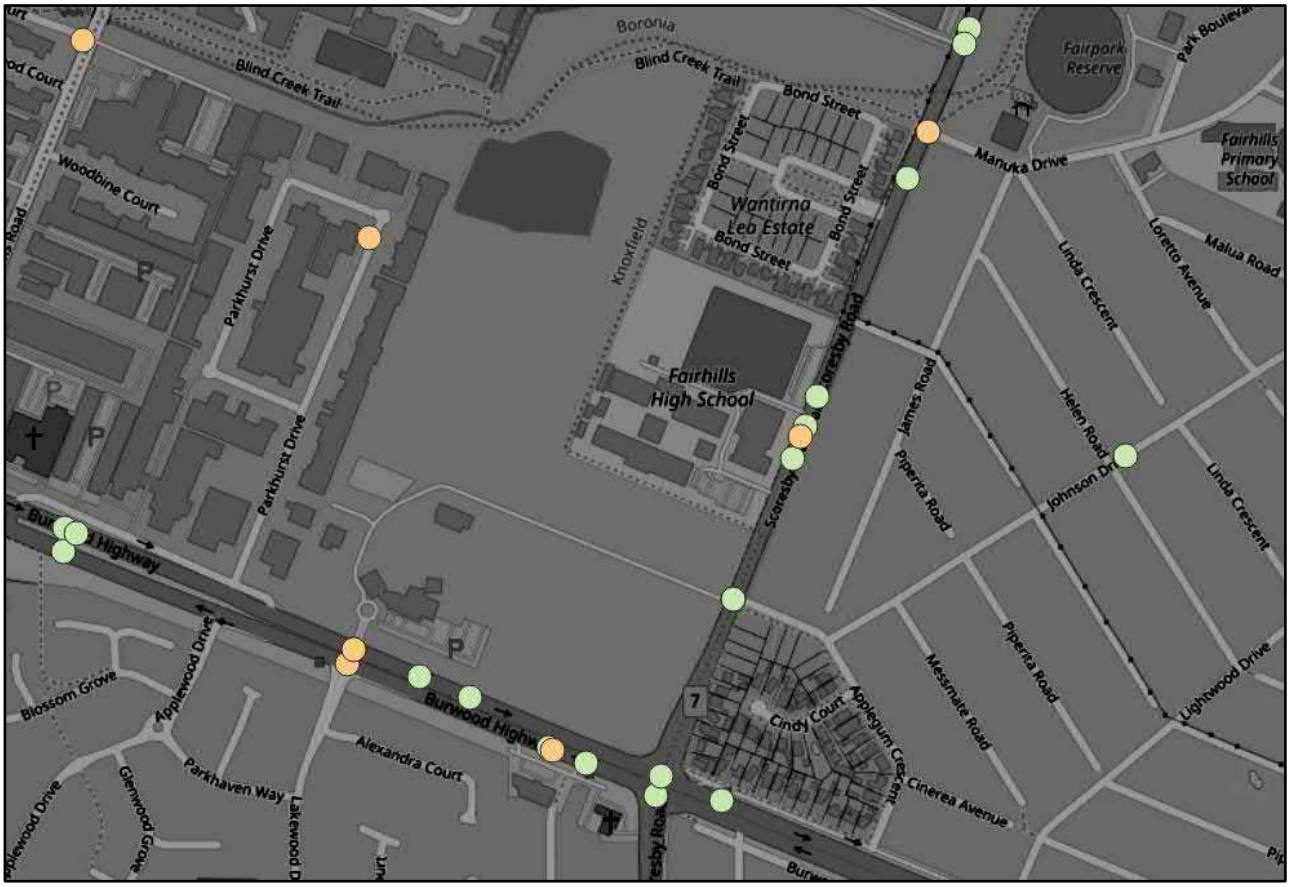
Burwood Highway, between Lakewood Drive and Carlisle Road

- A total of 13 crashes were recorded over the 5-year period, including 4 at the Lakewood Drive intersection and 3 at the Scoresby Road intersection;
- Of these, none involved a fatality, 3 involved a serious injury; and
- 7 accidents were rear-end type accidents, involving vehicles in the same lane.
  - Of these, 5 took place on the straight section between the two intersections.

Parkhurst Drive

- A total of 1 crash was recorded over the 5-year period; and
- It did not involve a fatality but did involve a serious injury.

Figure 11 Crash Stats

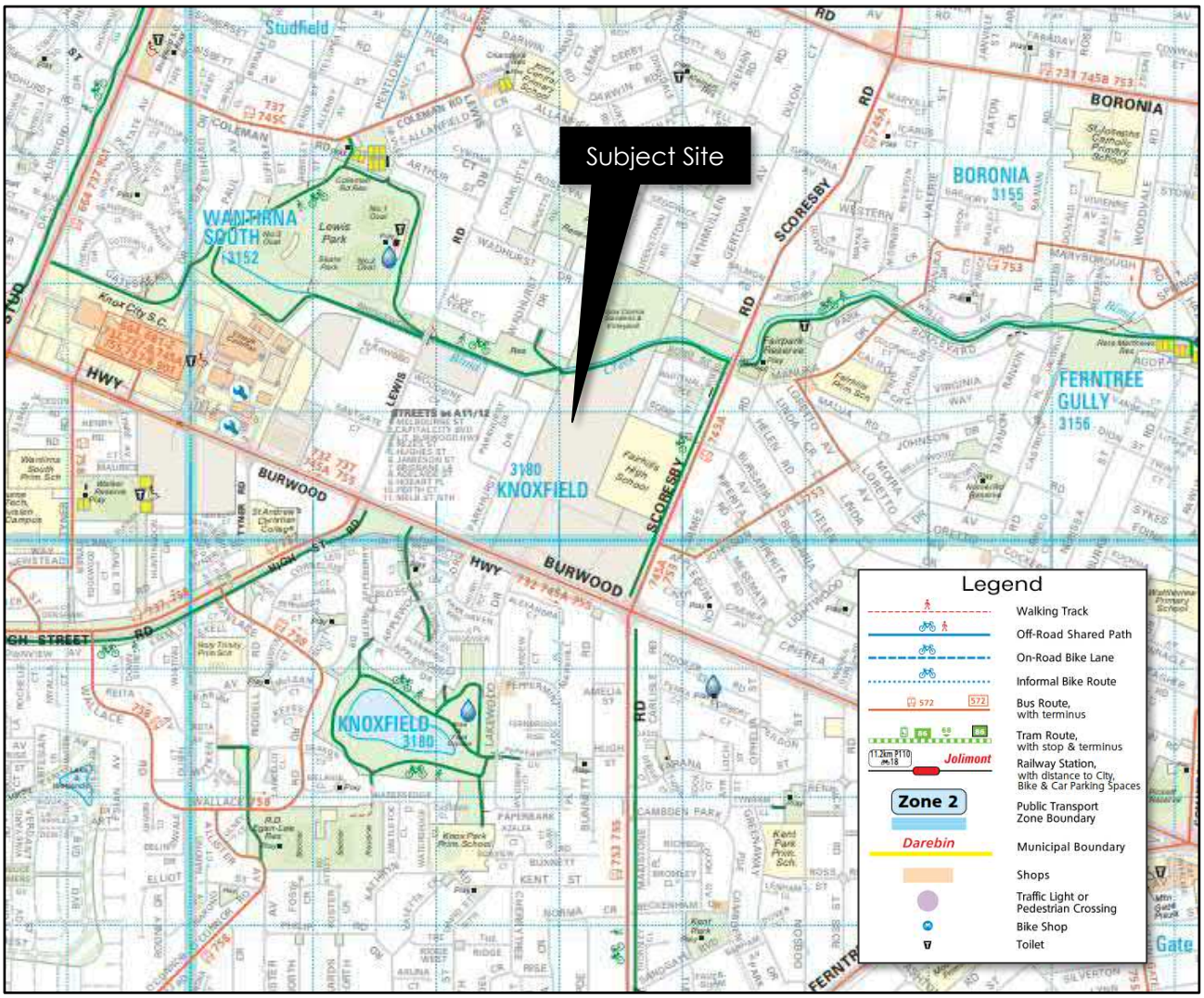


2.8 Sustainable Transport

2.8.1 General

An extract of the TravelSmart Map for the City of Knox is shown in Figure 12, highlighting the public transport, bicycle and pedestrian facilities in the area.

Figure 12 TravelSmart Map



2.8.2 Public Transport

The full public transport provision in the vicinity of the site is shown in Figure 13 and detailed in Table 6 (where the distance in parenthesis indicates the walking distance measured from the closest point at the boundary of the site). The site has excellent public transport accessibility, with a wide variety of transport modes and services servicing the immediate vicinity of the site. Additionally, these have connections to transport hubs at Knox City Shopping Centre and Boronia Station.

Figure 13 Public Transport Provision

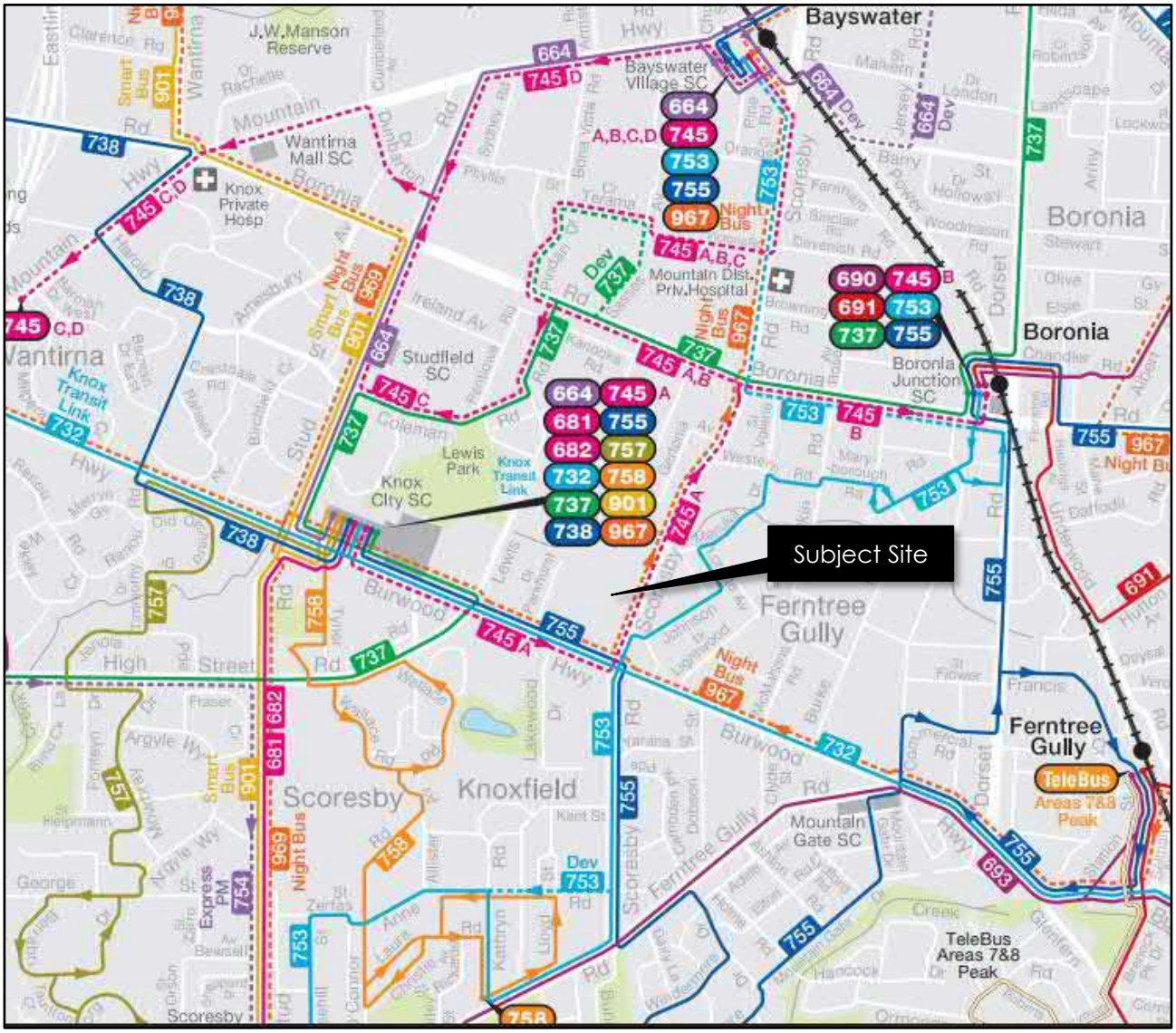


Table 6 Public Transport Provision

Mode	Route No	Route Description	Nearest Stop/Station
Bus	732	Box Hill - Upper Ferntree Gully via Vermont South, Knox City, Mountain Gate	Scoresby Rd (100m)
	745A	Knox City - Bayswater	Fairhills HS (100m)
	753	Glen Waverley - Bayswater via Wheelers Hill, Knoxfield, Boronia	Burwood Hwy (100m)
	755	Bayswater - Knox City via Basin, Boronia, Ferntree Gully	Burwood Hwy (100m), Scoresby Road (100m)
	967	Night Bus - Glen Waverley - Burwood Hwy - Bayswater (returns via Bayswater North - Ferntree Gully)	Applegum Cres / Scoresby Rd (0m)

2.8.3 Bicycle Facilities

2.8.3.1 General

The City of Knox provides low cost bicycle courses and has several active cycling groups. Bike maintenance courses are run to teach basic bike up-keep and repairs. Novice and riding in traffic cycling courses are run for adults with a separate class for 10-13 year old children.

Twelve Bike Repair Stations have been installed throughout the City of Knox with a pump and basic tools to be used by cyclists. The closest repair station to the site is just 400m east via the Blind Creek Trail north of the site. The closest bike shop to the site is Cognition Cycles, located within Knox City Shopping Centre.

2.8.3.2 Bicycle Connections

The path on the west side of Scoresby Road is considered a shared path adjacent to the site, switching sides south of Burwood Highway. The northern boundary of the subject site is adjacent to the Blind Creek Trail. This trail spans between Dandenong Valley Parklands in Wantirna South and Underwood Road in Boronia. The trail connects to other off-road trails including the Dandenong Creek Trail and Eastlink Trail to the west and Ringwood – Belgrave Rail Trail to the east. These provide further connection to a wider bicycle network, providing excellent bicycle access for the subject site.

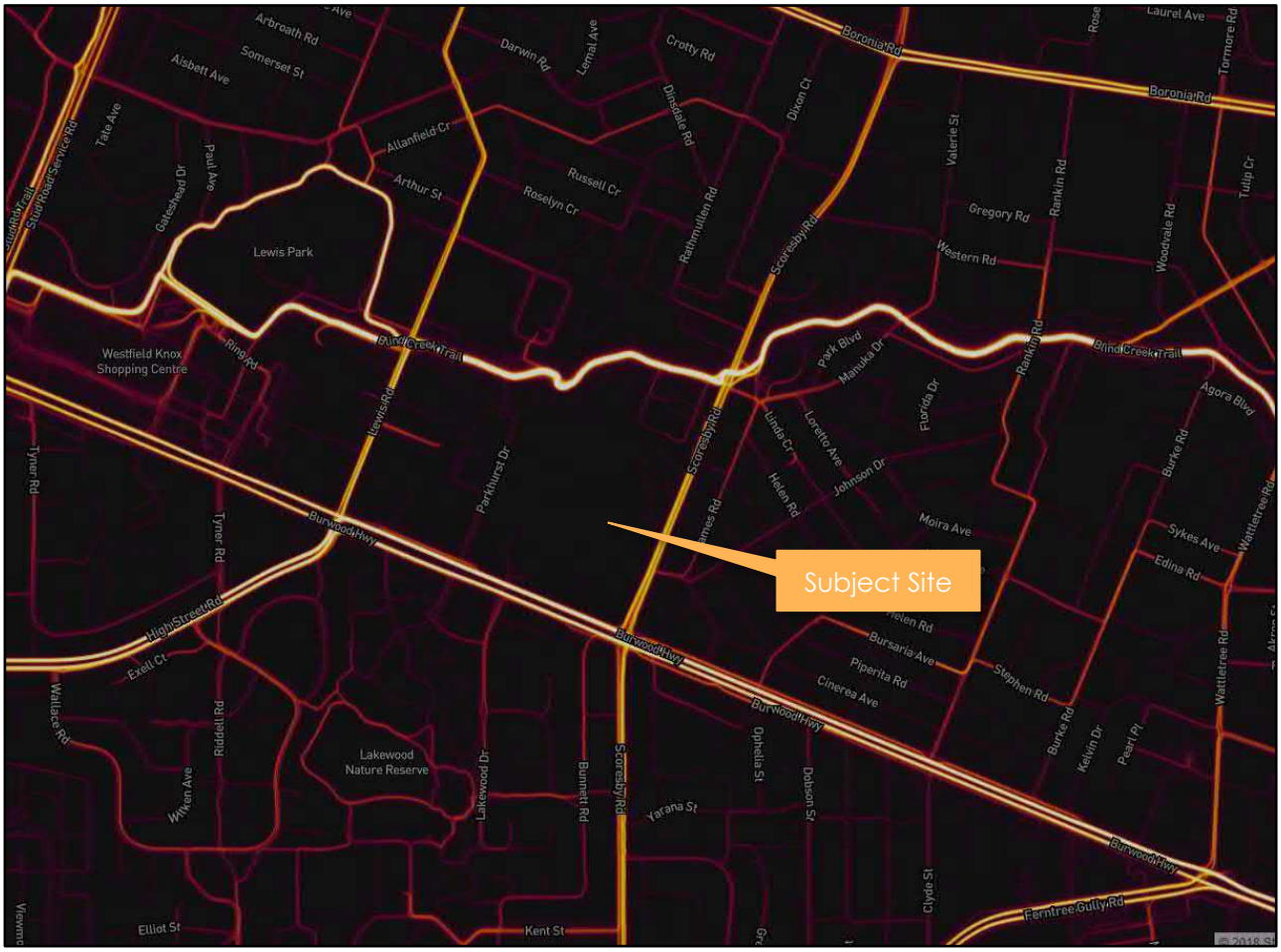
2.8.3.3 Strava

Strava is a social network and training tool for cyclists, runners and swimmers. Users record their physical activity using a dedicated GPS device or utilise the mobile app, and upload the file to their profile.

Strava anonymised this information and makes it available through their "Global Heatmap" tool, showing aggregated all public activities over the last two years across the world.

A view of the cycling heatmap in proximity to the study area is provided below in Figure 14. Routes of higher usage are brighter in colour.

Figure 14 Strava Cycling Heatmap



As shown above, primary routes in and out of the study area comprise:

- Blind Creek Trail
- Burwood Highway; and
- Scoresby Road.

It is noted that this information includes all cycling activities recorded on the platform, inclusive of weekend trips, and all trips throughout the day. Additionally, the data is skewed towards sports cyclists, given that the bulk of commuter and recreational cyclists will not be tracking their rides.

2.8.4 Pedestrian Accessibility

In addition to having excellent access to public transport modes, the site is well-located for pedestrian accessibility, with a number of recreation, education, shopping and employment uses located within 10-15 minutes' walk of the site.

The map below in Figure 15 shows a pedestrian walk time map for the site, with the major facilities in the vicinity of the site identified in Table 7 with walking distances from the nearest boundary of the site.

Figure 15 Pedestrian Walk-Time Map

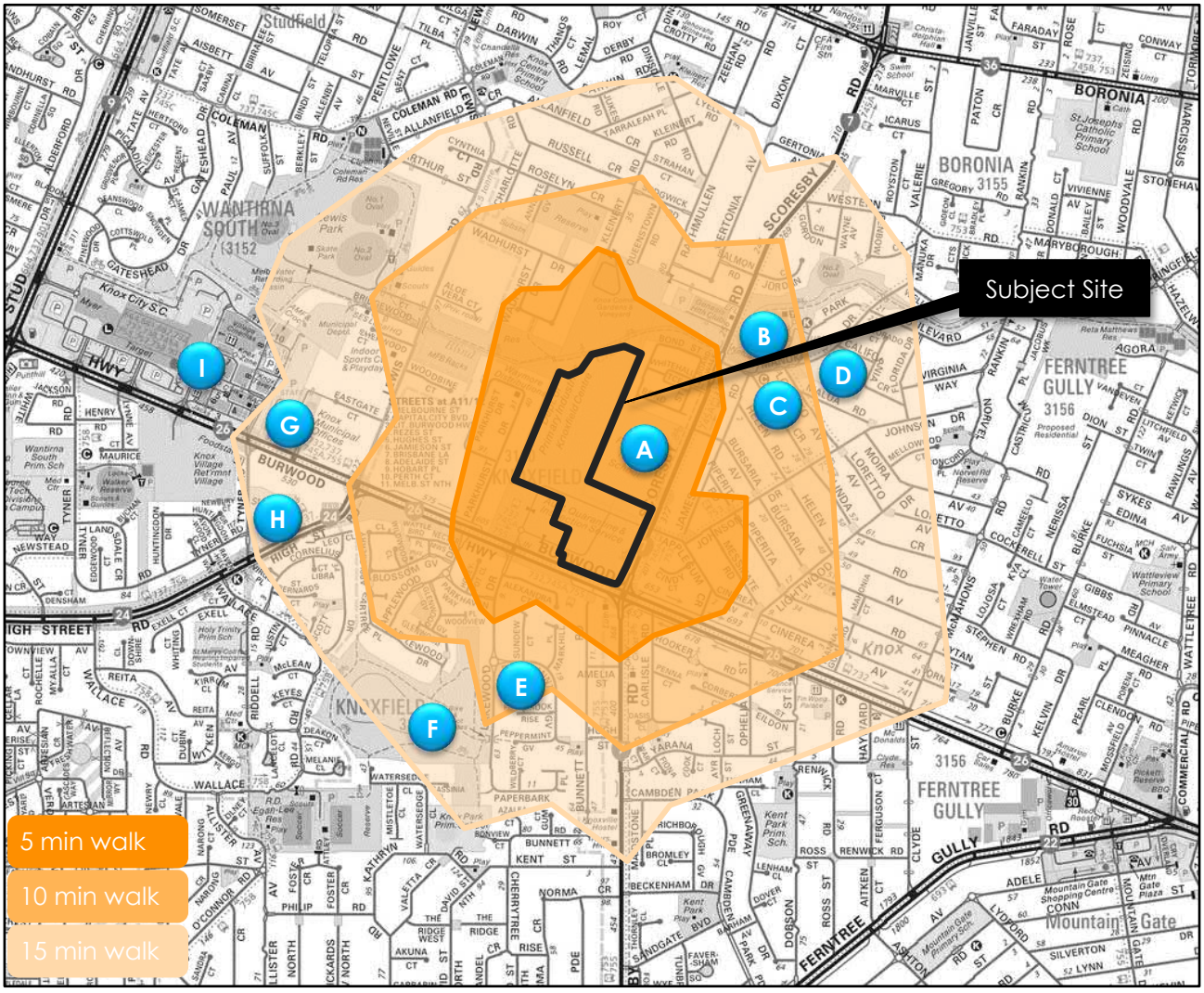


Table 7 Site Facilities

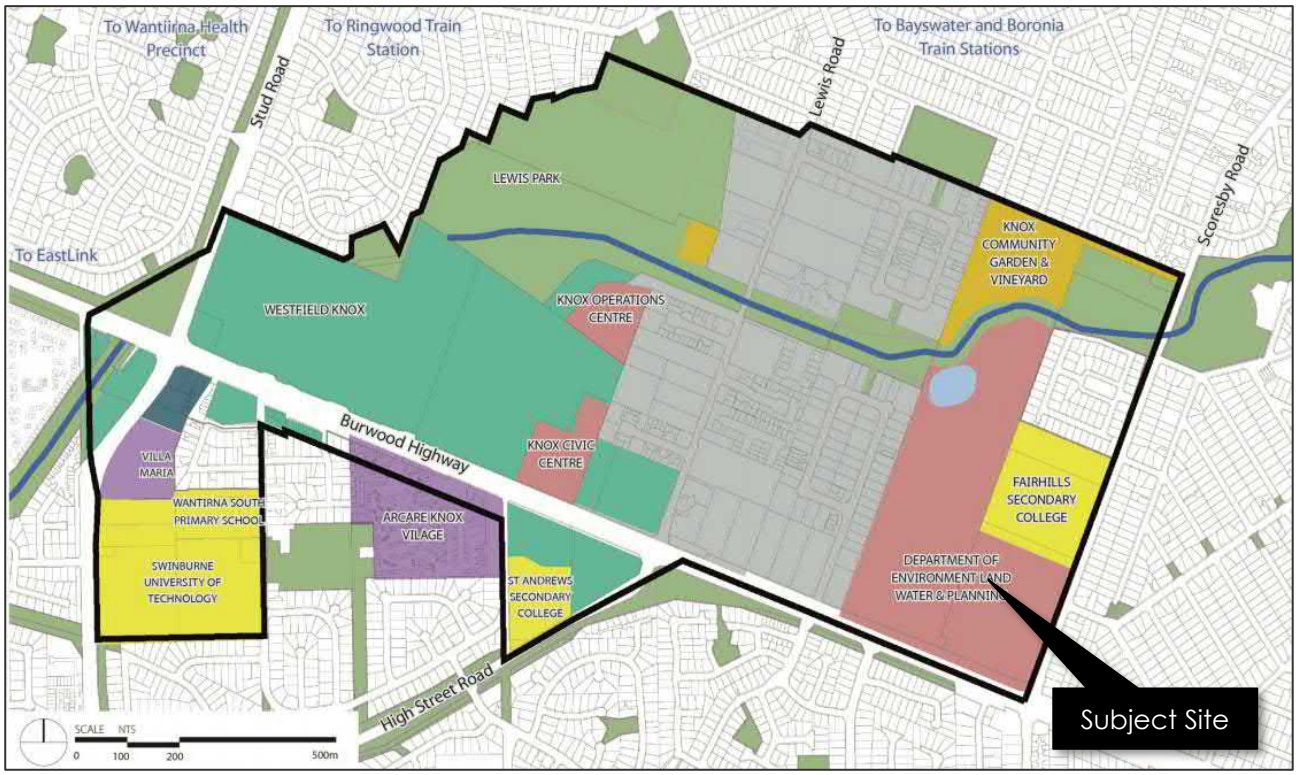
Ref	Facility	Approx. Distance
A	Fairhills High School	Adjacent
B	Fairpark Reserve	350m
C	Magic Garden Childcare Centre	350m
D	Fairhills Primary School	550m
E	Headstart Early Learning Knoxfield	550m
F	RD Egan-Lee Reserve	600m
G	Knox City Council Civic Centre	1.1km
H	St Andrews Christian College	1.2km
I	Knox City Shopping Centre	1.3km

3 KNOX CENTRAL STRUCTURE PLAN

The Knox Central Structure Plan (KCSP) was gazetted by the Minister of Planning in May 2018 and is a reference document in the Knox Planning Scheme.

The Knox Central Area is shown in Figure 16, and incorporates the Department of Environment, Land, Water and Planning and a water body in the north-west corner of the site. The KCSP was prepared to guide the future of the Knox Central Activity Centre, and includes guidance on changes for land use, built form, transport networks and public spaces.

Figure 16 Knox Central Activity Area – Existing Land Uses



The key objectives of the structure plan are:

1. To enhance Knox Central's role as the civic and public heart of the municipality, where communities connect and congregate.
2. To enable the development of high quality medium and higher density housing that responds to the housing needs of the Knox community, and supports the activity of the centre.
3. To establish Knox Central as a focal point of activity including employment, retail, community, entertainment and leisure activity.
4. To capitalise on Knox Central's natural and environmental features to distinguish it from other activity centres.
5. To facilitate an accessible and safe active and public transport network to and within Knox Central
6. To provide an efficient street network that connects key destinations including nodes of activity within Knox Central.
7. To achieve high quality built form and public realm which defines Knox Central as a premier mixed use activity centre.

The structure plan also includes a number of transport specific actions and strategies as follows:

- Improve pedestrian and vehicular links between Westfield Knox, Lewis Road and the balance of Knox Central to the east.
- Facilitate accessible and safe pedestrian links between public transport nodes and civic/community facilities.
- Prioritise pedestrian and cyclist movements and access to public transport.
- Improve pedestrian and cycle access and safety as identified in Figure 6 Active Transport Actions (reproduced in Figure 2 below).
- Improve connectivity, amenity and safety for pedestrians and cyclists particularly to and within the commercial core; and in relation to Burwood Highway and Stud Road.
- Provide safe pedestrian and bicycle connections to and within open space (including Lewis Park, Collier Reserve, Gateshead Reserve and the Blind Creek corridor).
- Support development that enhances pedestrian and bicycle accessibility along the Blind Creek corridor.
- Improve access for people with limited mobility throughout Knox Central.
- Improve the public transport network to and within Knox Central, including service frequency and coverage.
- Support the extension of the route 75 tram along Burwood Highway.

The figures below show plans for active, public transport and road network actions within the Knox Central Activity Area.

Figure 17 Active Transport Actions

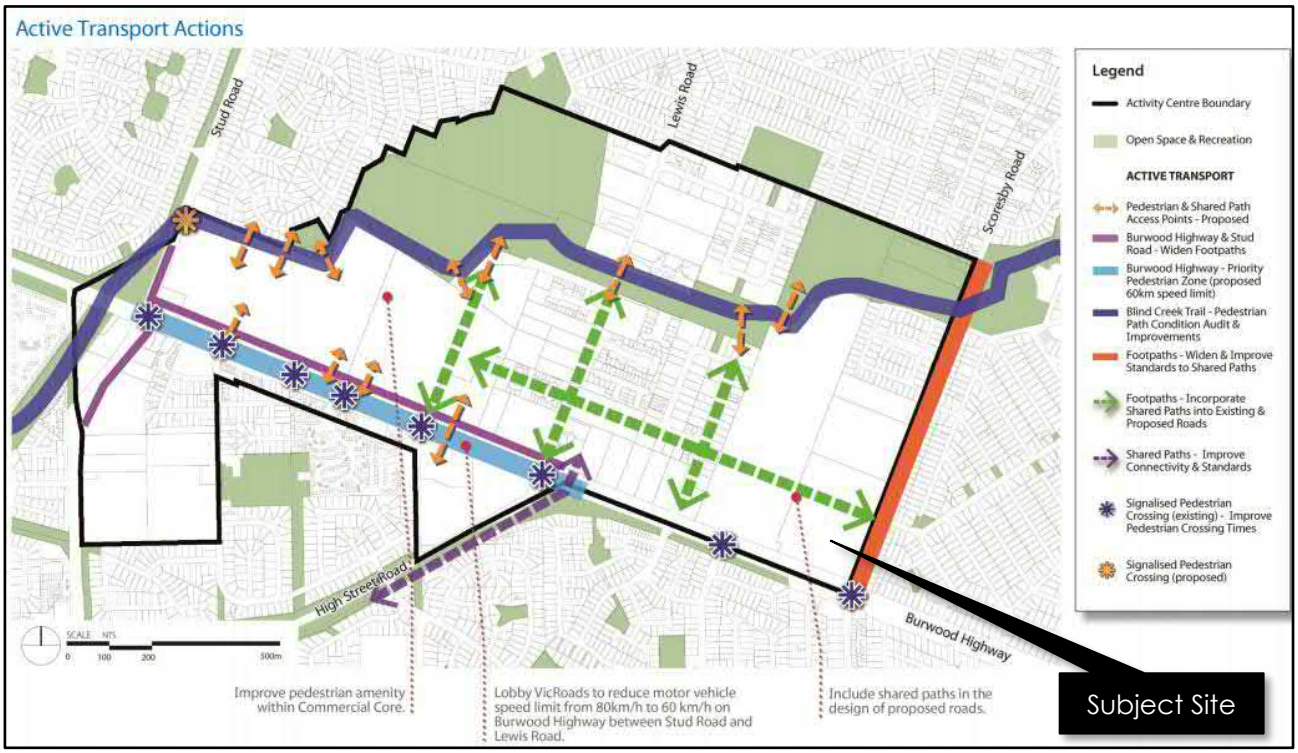
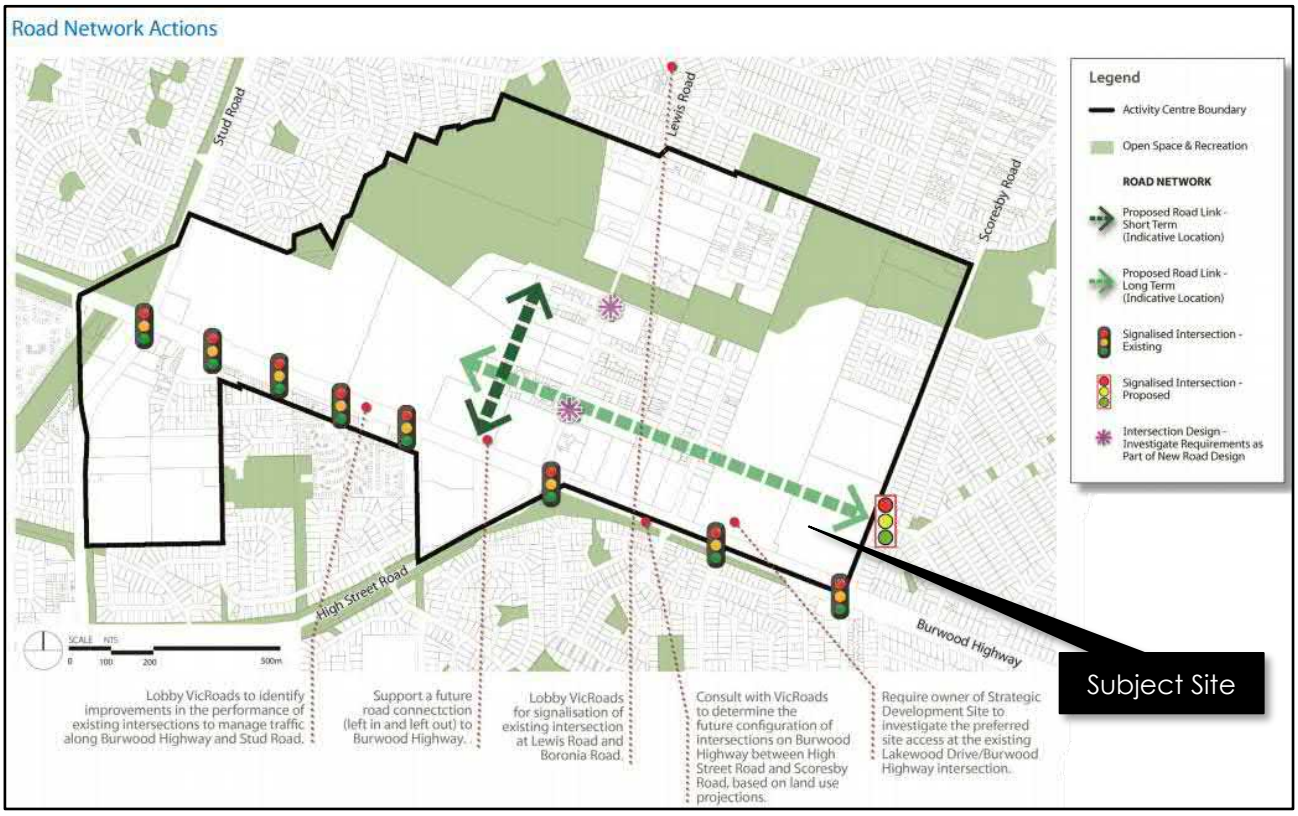


Figure 18 Public Transport Actions

Figure 19 Road Network Actions



The plans indicate a shared path, bus service and road link running east-west through the site, with a signalised intersection on Scoresby Road, and improvements to the existing shared path on Scoresby Road. It also shows a pedestrian and shared path access point at the north-east corner of the site to Blind Creek Trail which is to undergo a pedestrian path condition audit and improvements.

The Burwood Highway intersections with Lakewood Drive and Scoresby Road are to have improved pedestrian crossing times and the latter is identified as a potential tram stop for the extension of the 75 tram route spanning Burwood Road adjacent to the site. Burwood Highway is also set to have improved priority bus measures at intersections.

The above actions are long-term Council aspirations, which are to be considered, but not necessarily provided as part of development in the area.

4 KNOX INTEGRATED TRANSPORT PLAN

The Knox Integrated Transport Plan (ITP) was developed by Knox City Council to provide a framework for the development and management of an integrated transport network to service the needs of the municipality.

The plan has a number of objectives summarised as follows:

- Objective 1 – Social and Economic Inclusion
  - Ensuring the transport network is accessible to all people who wish to use it
- Objective 2 – Economic Prosperity
  - Ensuring the transport network enables efficient and effective access for people and goods.
- Objective 3 – Environmental Sustainability
  - Ensuring the transport network protects the natural environment by reducing transport related emissions and adapting for the challenges of climate change
- Objective 4 – Integration of Transport & Land Use
  - Ensure the transport network maximises access to homes, employment, services and recreation and reduces the need for private motor vehicle travel
- Objective 5 – Efficiency, Coordination and Reliability
  - Optimise the efficiency, coordination and reliability of all modes of transport on the network
- Objective 6 – Safety and Health and Wellbeing
  - Ensure the transport network is safe and promotes forms of transport that support health and wellbeing

5 DEVELOPMENT PROPOSAL

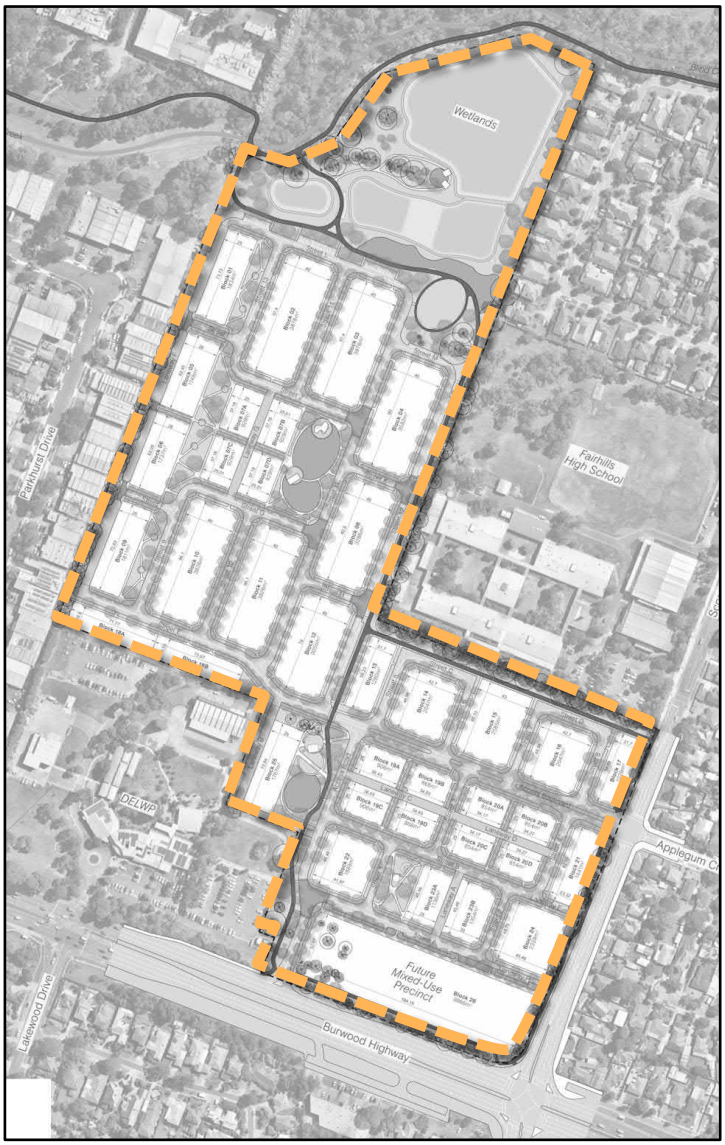
5.1 General

It is proposed to develop the subject site for the purposes of a residential subdivision, with the indicative residential dwelling yield as shown in Table 8. A mixed-used precinct is identified in the south-east of the development at the Burwood Highway frontage. The specific nature of this use is unknown and will not be addressed as part of the current application, with the exception of allowance for traffic generation. The indicative masterplan layout of the subject site is shown in Figure 20.

Table 8 Indicative Development Yield

Component	*No/Area*
One Bedroom Dwellings	10
Two Bedroom Dwellings	93
Three or More Bedroom Dwellings	330
Total Dwellings	**433**

Figure 20 Overall Masterplan



5.2 Vehicle Access and Internal Road Layout

The indicative road network shown in the indicative masterplan includes a mix of Access Streets, Access Places and Access Lanes, with an Entry Boulevard extending from the Scoresby Road access. The road network within the development connects to the broader road network via a signalised four-way intersection with Scoresby Road and Applegum Crescent, and at a left-in\left-out T-intersection with Burwood Highway. The access intersections to Burwood Highway and Scoresby Road are shown in Figure 21.

Figure 21 Proposed Access Intersection Locations

Concept plans have been prepared for both the access intersections and are included in Appendix A.

The typical street characteristics within the proposed development are summarised in Table 9 and shown in Figure 22. Graphical representations of the typical and example street cross-sections are provided in Figure 23 to Figure 28.

Table 9 Typical Street Characteristics

Street Type	*Road Reserve*	*Carriageway Width*	*Verge Width*	*On-Street Parking Provision*	*Daily Volume Capacity*
Entry Boulevard	22m	13.7m (3.5m traffic lanes, 3m median and 2.3m indented parking)	4.15m	Indented parking lane	3000+ vpd
Access Street with Indented Parking	Varies	5.5m plus indented parking	Varies (min. 4.15m)	Indented parking lane	3000 vpd
Access Street	15.6m	7.3m	4.15m	Parking both sides of the carriageway	3000 vpd
Access Place	14m	5.5m	4.25m	One side of the carriageway only	1000vpd
Access Lane	7m min	7m	4.25m	One side of the carriageway only	300vpd
Extended Driveway	Varies	4m plus 2.3m indented parking	Varies (min. 4.15m)	Indented parking lane	300vpd

Figure 22 Internal Street Network

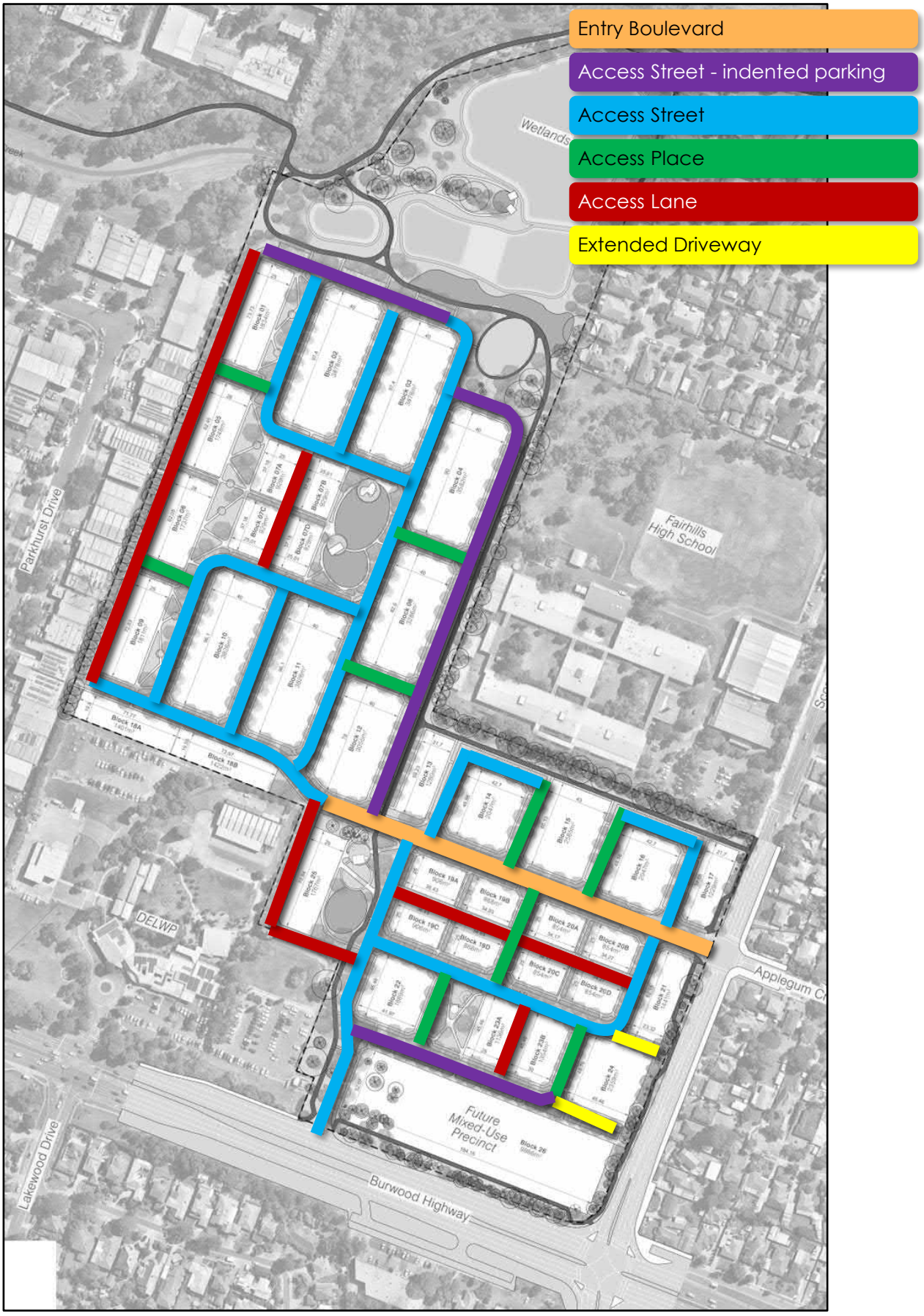


Figure 23 Entry Boulevard

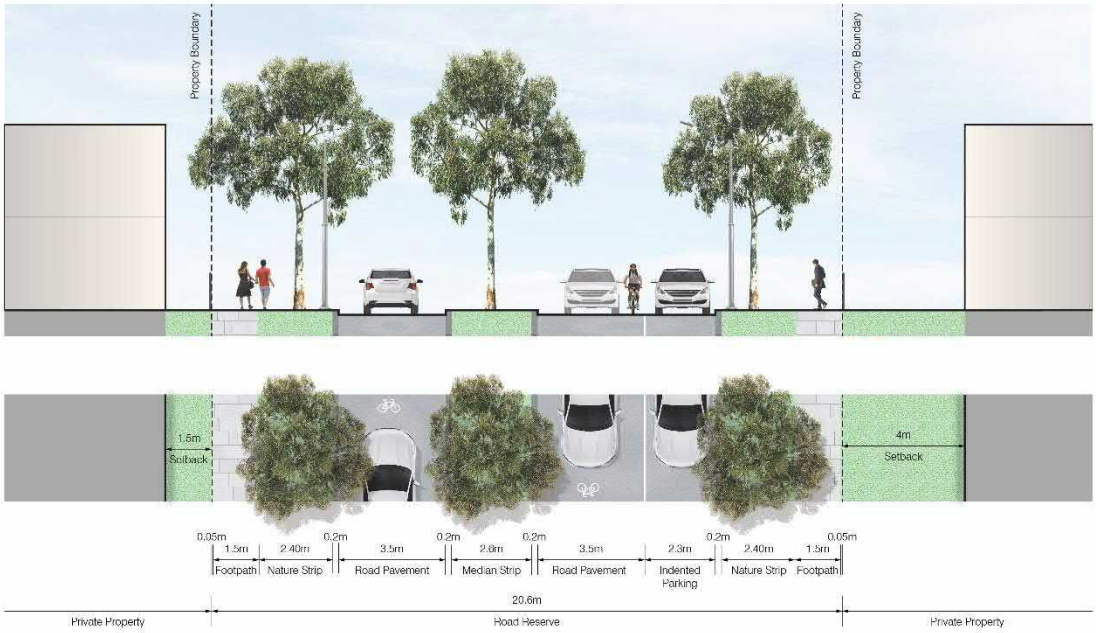


Figure 24 Example Access Street with Indented Parking

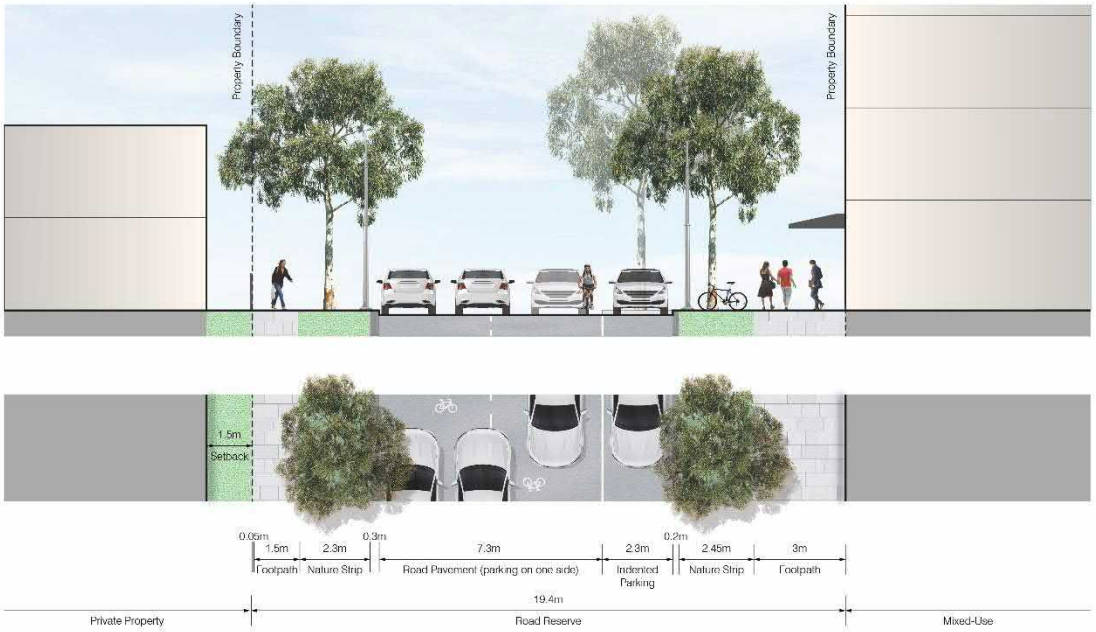


Figure 25 Typical Access Street – 15.6m

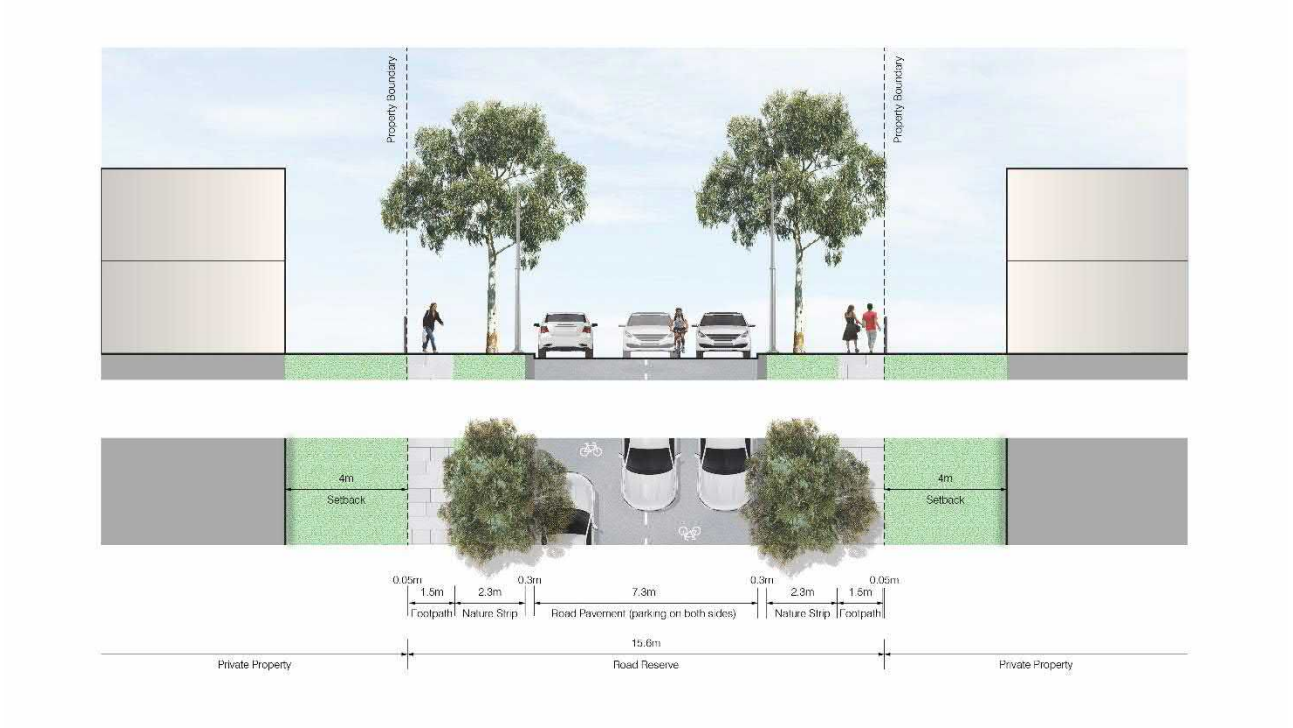


Figure 26 Typical Access Place – 14m

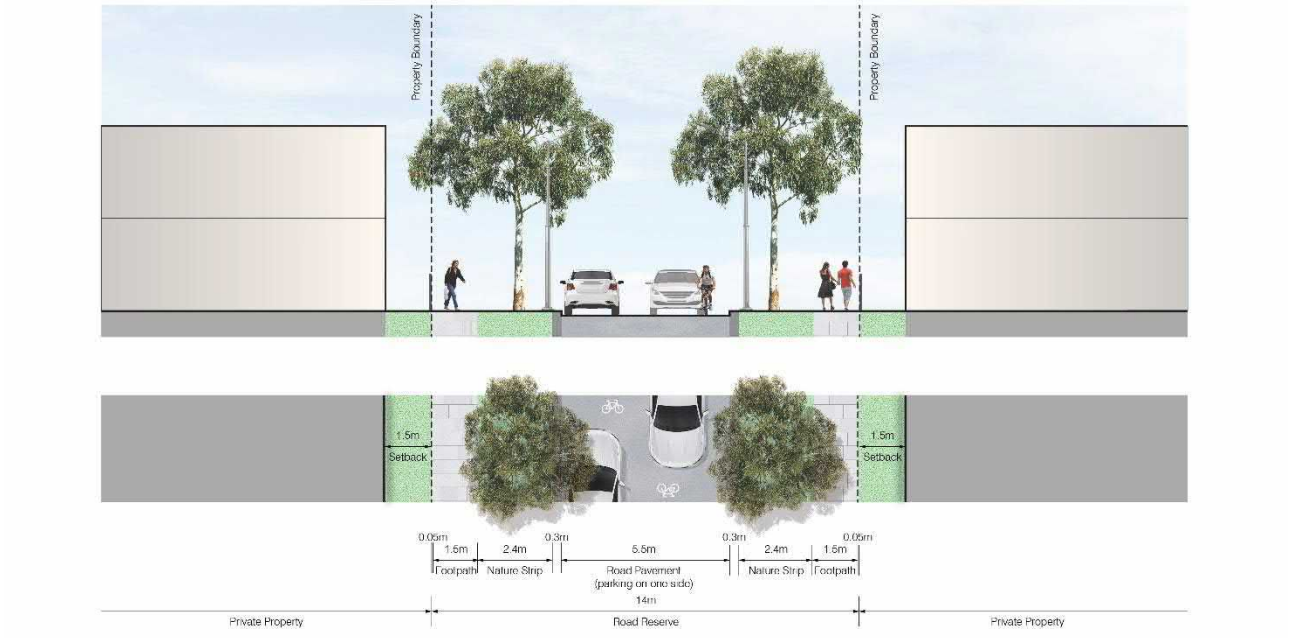


Figure 27 Typical Access Lane – 7m

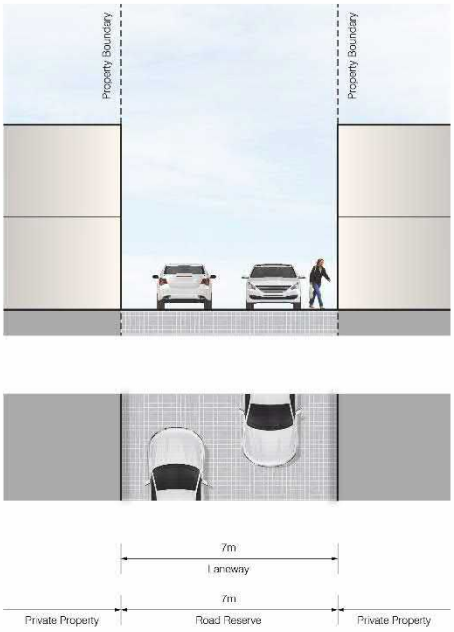
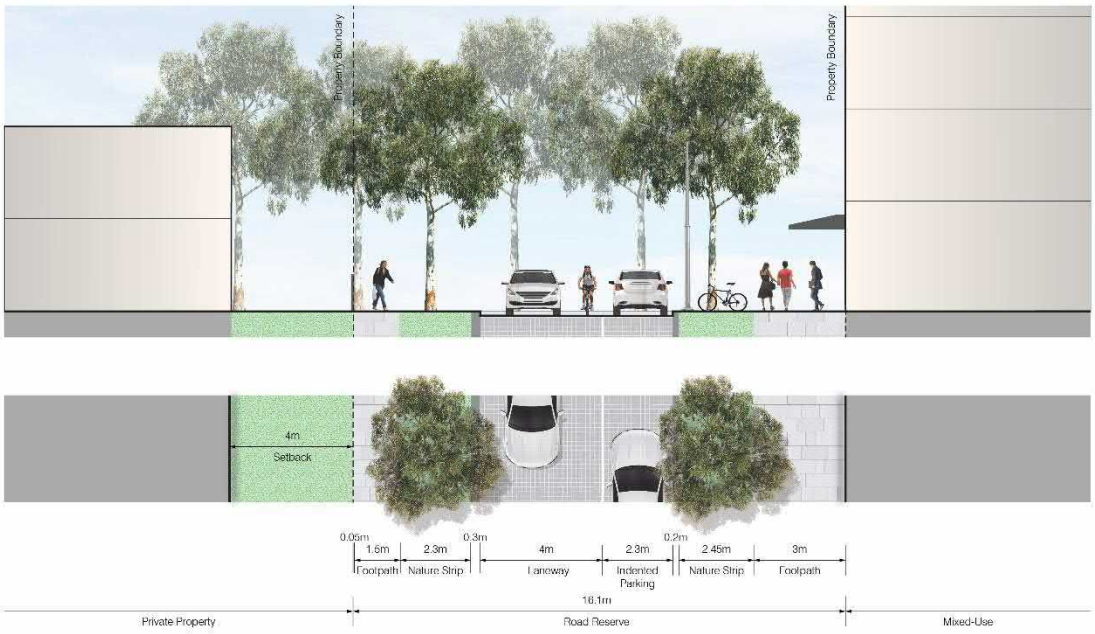


Figure 28 Example Extended Driveway



5.3 Pedestrian and Bicycle Network

Pedestrian movements are facilitated through the proposed development via an extensive network of footpaths and shared paths. The paths are located within road reserves, parks and other spaces, as required. Each of the proposed roads, with the exception of the laneways, include footpath provisions within each verge.

Cycling provision is accommodated via the shared path network through the site and the lower order streets which will have low vehicle speeds and volumes. The shared path network includes 3m wide paths and connections to Burwood Highway, Scoresby Road and the existing trail connections to the north of the site. The proposed works along the Burwood Highway and Scoresby Road frontages will include allowances for shared path upgrades.

The proposed share path network within the site is detailed in Figure 29.

Figure 29 Share Path Network

6 DESIGN ASSESSMENT

6.1 Clause 52.29 – Land Adjacent to a Road Zone, Category 1

The development proposal is subject to the requirements of Clause 52.29 of the Knox Planning Scheme which applies to land adjacent to a Road Zone Category 1 (Burwood Highway and Scoresby Road) and aims to ensure appropriate access is provided to identified roads.

Relevant to the proposed development, the Clause states that a permit is required to create or alter access to a road in a Road Zone, Category 1, and that the proposal is to be referred to the relevant referral authority (in this case the Department of Transport (VicRoads)).

Before deciding on the appropriateness or otherwise of an application to alter access to the Road Zone, the responsible authority must consider the following:

- The Municipal Planning Strategy and the Planning Policy Framework.
- The views of the relevant road authority.
- The effect of the proposal on the operation of the road and on public safety.
- Any policy made by the relevant road authority pursuant to Schedule 2, Clause 3 of the Road Management Act 2004 regarding access between a controlled access road and adjacent land.

The proposed development proposes a physical alteration of the existing Scoresby Road access, and a new access location on Burwood Highway.

The proposal seeks to provide 433 dwellings. As discussed in Section 7, the traffic impacts of the development will require changes to be made to the existing road network. However, with these changes, the traffic can be suitably accommodated.

The proposed changes include:

- A signalised intersection between the site, Scoresby Road, and Applegum Crescent;
- A left-in, left-out T-intersection between the site and Burwood Highway; and
- An upgrade to the existing Burwood Highway / Scoresby Road intersection.

The proposal will provide adequate sight distance at the property boundary to pedestrians along the frontages. As such, the development is not expected to have any impacts on public safety.

In light of the above, it is considered that the proposed development will satisfy the requirements of Clause 52.29.

6.2 Knox Planning Scheme – Clause 56

Clause 56.06 identifies Access and Mobility Management requirements for residential subdivisions such as proposed at the site. The following Clauses are applicable.

6.2.1 Clause 56.06-2, Walking and cycling network objectives

Standard C15

The walking and cycling network should be designed to:

- *Implement any relevant regional and local walking and cycling strategy, plan or policy for the area set out in this scheme.*
- *Link to any existing pedestrian and cycling networks.*
- *Provide safe walkable distances to activity centres, community facilities, public transport stops and public open spaces.*
- *Provide an interconnected and continuous network of safe, efficient and convenient footpaths, shared paths, cycle paths and cycle lanes based primarily on the network of arterial roads, neighbourhood streets and regional public open spaces.*
- *Provide direct cycling routes for regional journeys to major activity centres, community facilities, public transport and other regional activities and for regional recreational cycling.*
- *Ensure safe street and road crossings including the provision of traffic controls where required.*
- *Provide an appropriate level of priority for pedestrians and cyclists.*
- *Have natural surveillance along streets and from abutting dwellings and be designed for personal safety and security particularly at night.*
- *Be accessible to people with disabilities.*

The proposed development includes footpaths within the road reserves of the street network and an extensive shared path network throughout the site.

Internal roads are expected to have minimal traffic volumes and low speeds and are considered suitable for cyclists. As discussed later, the longer access streets are proposed to include traffic speed calming measures where their lengths exceed 240m.

All roads and paths are provided with natural passive surveillance.

The internal intersections are staggered and planned to eliminate any cross intersections.

The development site includes shared paths between the existing shared trail at the north of the site and the two site access locations. The alignment of the proposed shared path has limited the number of street crossings, and where these are required, a raised path crossing is provided to prioritise and allow cyclists and pedestrians to cross safely.

It is therefore considered that the subdivision satisfies the objectives of Clause 56.06-2.

6.2.2 Clause 56.06-3, Public transport network objectives

Standard C16

The public transport network should be designed to:

- *Implement any relevant public transport strategy, plan or policy for the area set out in this scheme.*
- *Connect new public transport routes to existing and proposed routes to the satisfaction of the relevant public transport authority.*

- *Provide for public transport links between activity centres and other locations that attract people using the Principal Public Transport Network in Metropolitan Melbourne and the regional public transport network outside Metropolitan Melbourne.*
- *Locate regional bus routes principally on arterial roads and locate local bus services principally on connector streets to provide:*
  - *Safe and direct movement between activity centres without complicated turning manoeuvres.*
  - *Direct travel between neighbourhoods and neighbourhood activity centres.*
  - *A short and safe walk to a public transport stop from most dwellings.*

Roads to the east (Scoresby Road) and south (Burwood Highway) of the proposed development accommodate existing public transport routes, ensuring that the entire development is situated within close proximity to public transport.

It is acknowledged that the Knox Central Structure Plan includes reference to a possible future bus link extending east-west through the site, from the proposed signalised intersection between Scoresby Road and Applegum Crescent, and the industrial area on the western side of the site. While the implementation of a bus route east-west through the site would require the redevelopment of the industrial land to the west, which is likely considerable time away, the Entry Boulevard and Access Street along this alignment both have carriageways capable of future conversion to a bus route. In this regard, it is considered that the proposed development will not preclude the future implementation of an east-west bus route.

It is therefore considered that the subdivision satisfies the objectives of Clause 56.06-3.

6.2.3 Clause 56.06-4, Neighbourhood street network objective

Standard C17

The neighbourhood street network must:

- *Take account of the existing mobility network of arterial roads, neighbourhood streets, cycle paths, cycle paths, footpaths and public transport routes.*
- *Provide clear physical distinctions between arterial roads and neighbourhood street types.*
- *Comply with the Roads Corporation's arterial road access management policies.*
- *Provide an appropriate speed environment and movement priority for the safe and easy movement of pedestrians and cyclists and for accessing public transport.*
- *Provide safe and efficient access to activity centres for commercial and freight vehicles.*
- *Provide safe and efficient access to all lots for service and emergency vehicles.*
- *Provide safe movement for all vehicles.*
- *Incorporate any necessary traffic control measures and traffic management infrastructure.*

The neighbourhood street network should be designed to:

- *Implement any relevant transport strategy, plan or policy for the area set out in this scheme.*
- *Include arterial roads at intervals of approximately 1.6 kilometres that have adequate reservation widths to accommodate long term movement demand.*
- *Include connector streets approximately halfway between arterial roads and provide adequate reservation widths to accommodate long term movement demand.*
- *Ensure connector streets align between neighbourhoods for direct and efficient movement of pedestrians, cyclists, public transport and other motor vehicles.*

- *Provide an interconnected and continuous network of streets within and between neighbourhoods for use by pedestrians, cyclists, public transport and other vehicles.*
- *Provide an appropriate level of local traffic dispersal.*
- *Indicate the appropriate street type.*
- *Provide a speed environment that is appropriate to the street type.*
- *Provide a street environment that appropriately manages movement demand (volume, type and mix of pedestrians, cyclists, public transport and other motor vehicles).*
- *Encourage appropriate and safe pedestrian, cyclist and driver behaviour.*
- *Provide safe sharing of access lanes and access places by pedestrians, cyclists and vehicles.*
- *Minimise the provision of culs-de-sac.*
- *Provide for service and emergency vehicles to safely turn at the end of a dead-end street.*
- *Facilitate solar orientation of lots.*
- *Facilitate the provision of the walking and cycling network, integrated water management systems, utilities and planting of trees.*
- *Contribute to the area's character and identity.*
- *Take account of any identified significant features.*

The surrounding road network and access to the site are considered to provide appropriate site access. The two intersections providing vehicle access to the site provide clear distinction between the surrounding arterial road network and the internal local street network.

The internal street network within the proposed development provides connectivity to each of the lots and efficient vehicle access throughout the site. Dead end streets have been minimised to allow for emergency and waste collection vehicle circulation. There are two short driveway extensions south of the Scoresby Road / Applegum Crescent intersection which will require bins to be transferred to the north-south access street connecting them, or an alternative suitable location, for collection by the waste vehicle.

The Access Streets and Access Places are typically designed with lengths and intersections with other streets to minimise vehicle speeds within the site. As detailed below, traffic management devices are proposed in appropriate locations to further assist with vehicle speed control.

The Entry Boulevard, which extends from the proposed new signalised intersection, includes a 3m wide median separating the eastbound and westbound traffic lanes. The 3m wide median strip allows for pedestrian crossings to be implemented which include allowance for pedestrian refuges. Breaks are included within the median to facilitate right turn movements at the intersections with local streets, with the exception of the eastern most streets due to their proximity to the proposed signalised intersection, and to avoid a cross-intersection.

It is therefore considered that the subdivision generally satisfies the objectives of Clause 56.06-4.

6.2.4 Clause 56.06-5, Walking and cycling detail network objectives

Standard C18

Footpaths, shared paths, cycle paths and cycle lanes should be designed to:

- *Be part of a comprehensive design of the road or street reservation.*
- *Be continuous and connect.*
- *Provide for public transport stops, street crossings for pedestrians and cyclists and kerb crossovers for access to lots.*
- *Accommodate projected user volumes and mix.*
- *Meet the requirements of Table C1.*
- *Provide pavement edge, kerb, channel and crossover details that support safe travel for pedestrians, footpath bound vehicles and cyclists, perform required drainage functions and are structurally sound.*
- *Provide appropriate signage.*
- *Be constructed to allow access to lots without damage to the footpath or shared path surfaces.*
- *Be constructed with a durable, non-skid surface.*
- *Be of a quality and durability to ensure:*
  - *Safe passage for pedestrians, cyclists, footpath bound vehicles and vehicles.*
  - *Discharge of urban run-off.*
  - *Preservation of all-weather access.*
  - *Maintenance of a reasonable, comfortable riding quality.*
  - *A minimum 20 year life span.*
- *Be accessible to people with disabilities and include tactile ground surface indicators, audible signals and kerb ramps required for the movement of people with disabilities.*

All of the internal streets include footpaths, with the provision of shared paths providing connection between the site access intersections and the shared trail north of the site.

It is therefore considered that the subdivision satisfies the objectives of Clause 56.06-5.

6.2.5 Clause 56.06-6, Public transport network detail objectives

Standard C19

Bus priority measures must be provided along arterial roads forming part of the existing or proposed Principal Public Transport Network in Metropolitan Melbourne and the regional public transport network outside Metropolitan Melbourne to the requirements of the relevant roads authority.

Road alignment and geometry along bus routes should provide for the efficient, unimpeded movement of buses and the safety and comfort of passengers.

The design of public transport stops should not impede the movement of pedestrians.

Bus and tram stops should have:

- *Surveillance from streets and adjacent lots.*
- *Safe street crossing conditions for pedestrians and cyclists.*
- *Safe pedestrian crossings on arterial roads and at schools including the provision of traffic controls as required by the roads authority.*
- *Continuous hard pavement from the footpath to the kerb.*
- *Sufficient lighting and paved, sheltered waiting areas for forecast user volume at neighbourhood centres, schools and other locations with expected high patronage.*

- *Appropriate signage.*

As detailed above, the east-west road through the site has been designed for potential future implementation as a bus route.

It is therefore considered that the subdivision satisfies the objectives of Clause 56.06-6.

6.2.6 Clause 56.06-7, Neighbourhood street network detail objective

Standard C20

The design of streets and roads should:

- *Meet the requirements of Table C1. Where the widths of access lanes, access places, and access streets do not comply with the requirements of Table C1, the requirements of the relevant fire authority and roads authority must be met.*
- *Provide street blocks that are generally between 120 metres and 240 metres in length and generally between 60 metres to 120 metres in width to facilitate pedestrian movement and control traffic speed.*
- *Have verges of sufficient width to accommodate footpaths, shared paths, cycle paths, integrated water management, street tree planting, lighting and utility needs.*
- *Have street geometry appropriate to the street type and function, the physical land characteristics and achieve a safe environment for all users.*
- *Provide a low-speed environment while allowing all road users to proceed without unreasonable inconvenience or delay.*
- *Provide a safe environment for all street users applying speed control measures where appropriate.*
- *Ensure intersection layouts clearly indicate the travel path and priority of movement for pedestrians, cyclists and vehicles.*
- *Provide a minimum 5 metre by 5 metre corner splay at junctions with arterial roads and a minimum 3 metre by 3 metre corner splay at other junctions unless site conditions justify a variation to achieve safe sight lines across corners.*
- *Ensure streets are of sufficient strength to:*
  - Enable the carriage of vehicles.
  - Avoid damage by construction vehicles and equipment.
- *Ensure street pavements are of sufficient quality and durability for the:*
  - Safe passage of pedestrians, cyclists and vehicles.
  - Discharge of urban run-off.
  - Preservation of all-weather access and maintenance of a reasonable, comfortable riding quality.
- *Ensure carriageways of planned arterial roads are designed to the requirements of the relevant road authority.*
- *Ensure carriageways of neighbourhood streets are designed for a minimum 20 year life span.*
- *Provide pavement edges, kerbs, channel and crossover details designed to:*
  - Perform the required integrated water management functions.
  - Delineate the edge of the carriageway for all street users.
  - Provide efficient and comfortable access to abutting lots at appropriate locations.
  - Contribute to streetscape design.
- *Provide for the safe and efficient collection of waste and recycling materials from lots.*
- *Be accessible to people with disabilities.*

- *Meet the requirements of Table C1. Where the widths of access lanes, access places, and access streets do not comply with the requirements of Table C1, the requirements of the relevant fire authority and roads authority must be met. Where the widths of connector streets do not comply with the requirements of Table C1, the requirements of the relevant public transport authority must be met.*

A street detail plan should be prepared that shows, as appropriate:

- *The street hierarchy and typical cross-sections for all street types.*
- *Location of carriageway pavement, parking, bus stops, kerbs, crossovers, footpaths, tactile surface indicators, cycle paths and speed control and traffic management devices.*
- *Water sensitive urban design features.*
- *Location and species of proposed street trees and other vegetation.*
- *Location of existing vegetation to be retained and proposed treatment to ensure its health.*
- *Any relevant details for the design and location of street furniture, lighting, seats, bus stops, telephone boxes and mailboxes.*

Table C1 Design of roads and neighbourhood streets

Element	*Access Lane*	*Access Place*	*Access Street – Level 1*	*Access Street – Level 2*	*Connector Street – Level 1*	*Connector Street – Level 2*
Traffic Volume	300 vpd	300-1000 vpd	1000-2000 vpd	2000-3000 vpd	3000 vpd	3000-7000 vpd
Target Speed	10 km/h	15 km/h	30 km/h	40 km/h	50 km/h (40 km/h at schools, 20km/h at crossing points)	60 km/h or 50 km/h (40 km/h at schools)
Carriageway Width	5.5m	5.5m	5.5m	7 – 7.5m	3.5m per lane (4.0m at intersections)	3.5m per lane (4.0m at intersections)
Parking Within Street	None	1 verge space per 2 lots, or one-side on carriageway	1 verge space per 2 lots	Both sides	Dedicated lane 2.3m where required	Dedicated lane 2.3m where required
Verge Width	Not required	7.5m (3.5m / 2.5m min)	4.0 / 4.0m	4.5 / 4.5m	4.5 / 4.5m	6.0 / 6.0m
Footpath Provision	Shared Zone	1.5m (Not required if < 5 dwellings)	2 x 1.5m (2.0m at schools, shop, activity centre)	2 x 1.5m (2.0m at schools, shop, activity centre)	2 x 1.5m (2.0m at schools, shop, activity centre)	2 x 1.5m (2.0m at schools, shop, activity centre)
Cycle Path Provision	None	None	Shared Zone	Shared Zone	0.7 - 1.7m	0.7 - 1.7m or shared path

The street characteristics detailed in Table 9 are generally consistent with the dimensions detailed above, particularly with regards to the carriageway widths and the provision of footpaths.

The Entry Boulevard has similar dimensions to a Connector Street however does not include the designated cycle paths. It is not considered necessary to provide the on-road cycle paths in this instance due to the presence of the alternative east-west cycling connection via the shared path to the north and considering that the on-road cycle paths would not connect to other on-road cycling facilities.

Access Streets, which make up the majority of the internal roads, are provided generally in accordance with the Access Street – Level 2 cross-section, whilst lower order and lower volume Access Places are provided in accordance with the Access Place cross-section indicated.

Variations to the Access Street cross-section are also proposed where widening occurs due to the provision of indented parking on one-side, which is considered to be appropriate.

Two driveway extensions are provided with carriageways of 4m with an additional 2.3m wide indented parking lane on one side. The verges on these driveways provide adequate setback for vehicles to be able to turn into and out of driveways. Furthermore, as there are only 5 dwellings accessed from each laneway, it is not expected that vehicles travelling in different directions will meet. Waste collection vehicles will not use these driveways.

Intersections within the site have been positioned and designed to eliminate cross intersections, with sufficient separation between T-intersections to avoid direct through movements between minor legs.

The Access Streets within the site have typically been designed with road lengths not in excess of 240m to minimise vehicle speeds. There are however exceptions to this. To ensure low vehicle speeds are encouraged, it is proposed to install speed control measures in the vicinity of the locations identified in Figure 30.

The speed control measures include:

- **Raised T-Intersections** – Localised raising of the road pavement in the vicinity of the intersection, with associated alternative pavement and linemarking. The raised intersections also allow for pedestrian crossings to be included within the raised pavement sections. An example layout for the raised T-intersection speed control treatment is shown in Figure 31.
- **Localised Road Narrowing** – The laneways along the western side of the site include localised road narrowing at the intersections with the Access Streets, where the pavement width is reduced to approximately 3.6m and raised. The reduced pavement width in these locations will restrict the carriageway to a single vehicle wide.
- **Raised Shared Path Crossing** – The shared path crossing on the main east-west street will be raised and signed for priority for pedestrians/cyclists.

Figure 30 Speed Control Locations

Figure 31 Example Raised T-Intersection Speed Treatment

It is therefore considered that the subdivision satisfies the objectives of Clause 56.06-7.

6.2.7 Clause 56.06-8, Lot access objective

Standard C21

Vehicle access to lots abutting arterial roads should be provided from service roads, side or rear access lanes, access places or access streets where appropriate and in accordance with the access management requirements of the relevant roads authority.

Vehicle access to lots of 300 square metres or less in area and lots with a frontage of 7.5 metres or less should be provided via rear or side access lanes, places or streets.

The design and construction of a crossover should meet the requirements of the relevant road authority.

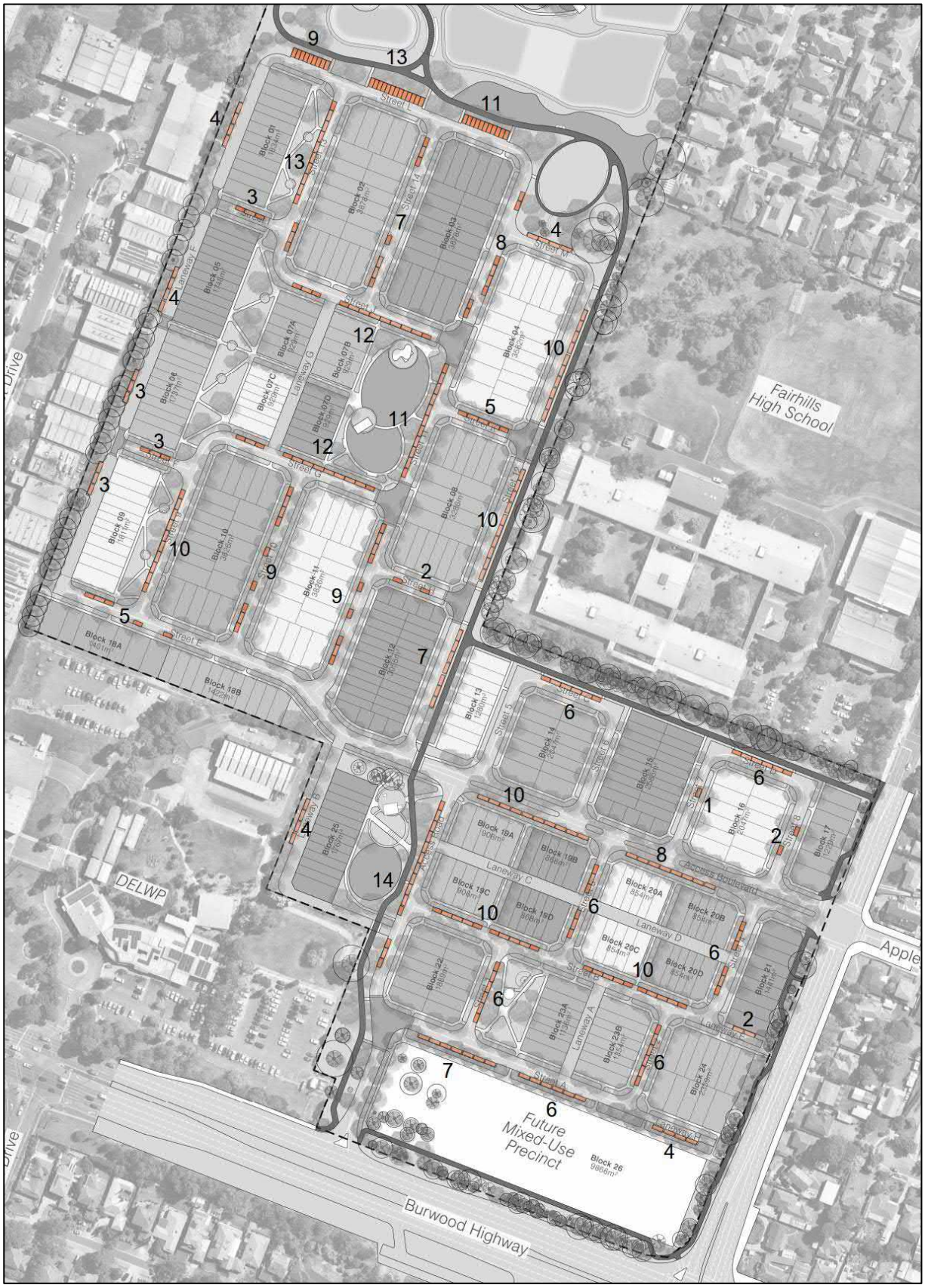
The Connector Street will include residential lot access. The intended function of connector streets is to distribute traffic between the arterial roads and the local road system and to provide access to abutting properties. A reasonable level of amenity is maintained for these roads by restricting traffic volumes and vehicle speeds. The presence of kerbside parking and lot access crossovers is an important part in managing vehicle speeds (through the friction caused by the moving around of vehicles) for these roads and should be allowed.

The proposed development contemplates medium density residential uses which include lots with frontages of less than 7.5m. A majority of these dwellings include vehicle access to the street frontage and therefore does not strictly meet the guidelines of Standard 21. It is acknowledged that the intention of this design standard is to minimise the amount of verge space which is occupied by crossovers and therefore limiting the potential for on-street parking and other services. The provision of on-street parking has been a key consideration through the development of the site and has been achieved through streets with limited site access or streets with additional provision of on-street parking.

As medium density dwellings, Clause 52.06 of the Planning Scheme identifies a visitor parking rate of one space to every five dwellings, though noting that no visitor parking is required due to being located within the Principal Public Transport Network area. Regardless, a plan has been prepared which demonstrates the potential provision for on-street parking, in consideration of vehicle crossovers, and is included within Figure 32. It is expected that kerbside or indented parking for well in excess of 1 space per 2 dwellings can be provided, with a relatively even distribution of car parking across the site.

It is therefore considered that the subdivision satisfies the objectives of Clause 56.06-8.

Figure 32 Indicative On-Street Parking Provision



7 TRAFFIC CONSIDERATIONS

7.1 Traffic Generation

Surveys undertaken by other traffic engineering firms at residential dwellings have shown that the daily traffic generation rates vary depending on the size, location and type of the dwelling, the parking provision and proximity to local facilities and public transport.

Medium to high density dwellings in inner areas generate traffic with rates between 3.0 and 6.0 movements per dwelling.

Considering the size of the dwellings proposed, the proximity of the site to public transport, and the provision of parking proposed, it is anticipated that the proposed medium density dwellings may generate up to 7 vehicle trips per dwelling per day, or 0.7 trips per dwelling during the peak periods.

Furthermore, the peak hour vehicle movements are further distributed as:

- 30% inbound and 70% outbound in the AM peak
- 60% inbound and 40% outbound in the PM peak

Whilst the superlot located in the south-east corner of the site has not been included within this planning application, allowance has been made for an additional 80 residential dwellings to be included within the following traffic analysis. The traffic analysis undertaken below is therefore based on 513 residential dwellings (433 as part of the subject application and 80 within the super lot that will form a future application).

Table 10 Anticipated Development Traffic Generation

Component	*Area/No*	*Traffic Volumes - Total Vehicles*								
		AM Peak			*PM Peak*			*Daily*		
		In	*Out*	*Total*	*In*	*Out*	*Total*	*In*	*Out*	*Total*
Residential	433 Lots	91	212	303	182	121	303	1516	1516	3032
Mixed-Use Precinct	80 Lots	17	39	56	34	22	56	280	280	560
Total		***108***	***251***	***359***	***216***	***143***	***359***	***1796***	***1796***	***3592***

7.2 Traffic Distribution

The proposed development of the site is to include two vehicle access points to the surrounding road network, being a signalised fully-directional intersection with Scoresby Road and a left-in/left-out intersection with Burwood Highway. The traffic generated by the proposed development will be distributed to Burwood Highway and Scoresby Road via these two intersections and then further distributed to the broader arterial road network.

Based on the location of the site in the context of the broader road network, it has been adopted that the traffic generated to and from the site will be via the following external destinations:

- Burwood Highway (West) – 45%
- Burwood Highway (East) – 20%
- Scoresby Road (North) – 20%
- Scoresby Road (South) – 8%
- Applegum Crescent (East) – 5%
- Lakewood Drive (South) – 2%

Furthermore, the distribution for vehicle movements to use either of the access intersections to the site has been determined with percentages based on the practicality for using each access and dependent on the movements allowed in each instance.

Based on the preceding peak hour traffic generation and the above traffic distribution assumptions, it is projected that the proposed development of the site will generate the AM peak hour movements shown in Figure 33 and the PM peak hour movements shown in Figure 34.

Figure 33 AM Peak Hour Traffic Generation

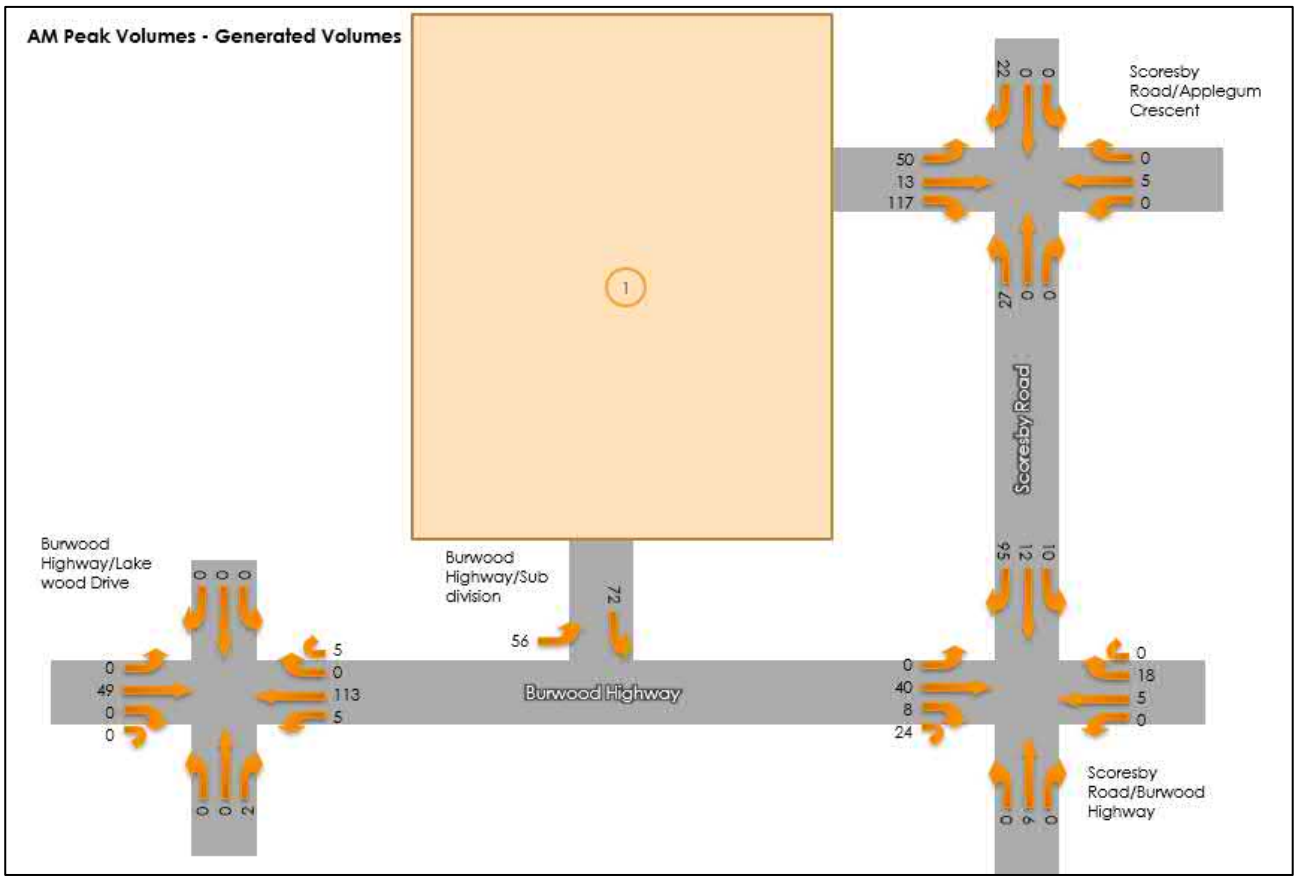
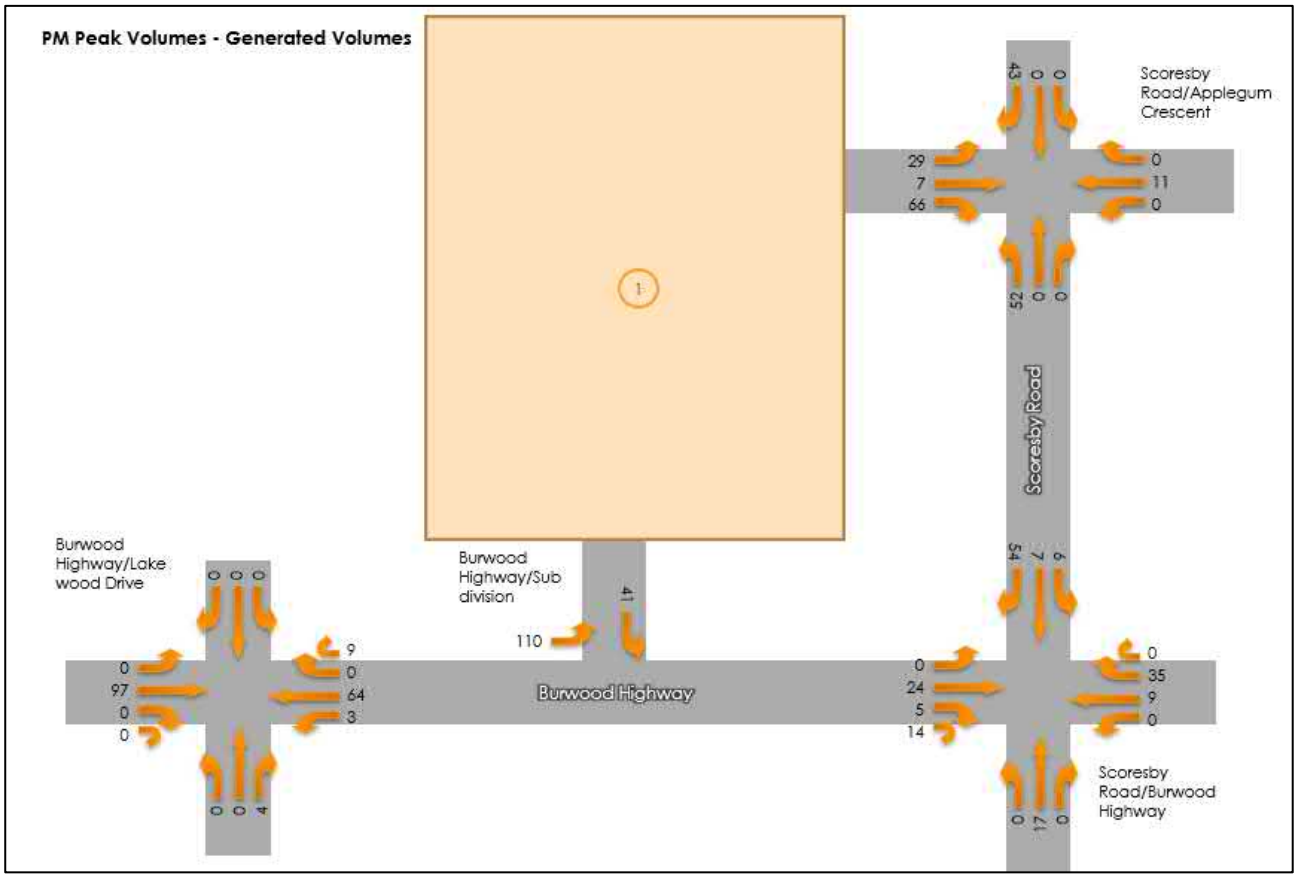


Figure 34 PM Peak Hour Traffic Generation



7.3 Future Traffic Volumes

The subject site is located within a well-established area to which there are minimal locations for anticipated major development in the near future. As such there is not projected to be a substantial growth in traffic on Burwood Highway or Scoresby Road. Noting this, a traffic growth rate has not been applied to the existing traffic collected as part of the surveys.

Application of the projected traffic volumes, shown in Figure 33 and Figure 34, to the existing traffic volumes sourced from the traffic surveys, results in the future traffic volumes shown in Figure 35 and Figure 36.

Figure 35 AM Peak Hour Future Traffic Volumes

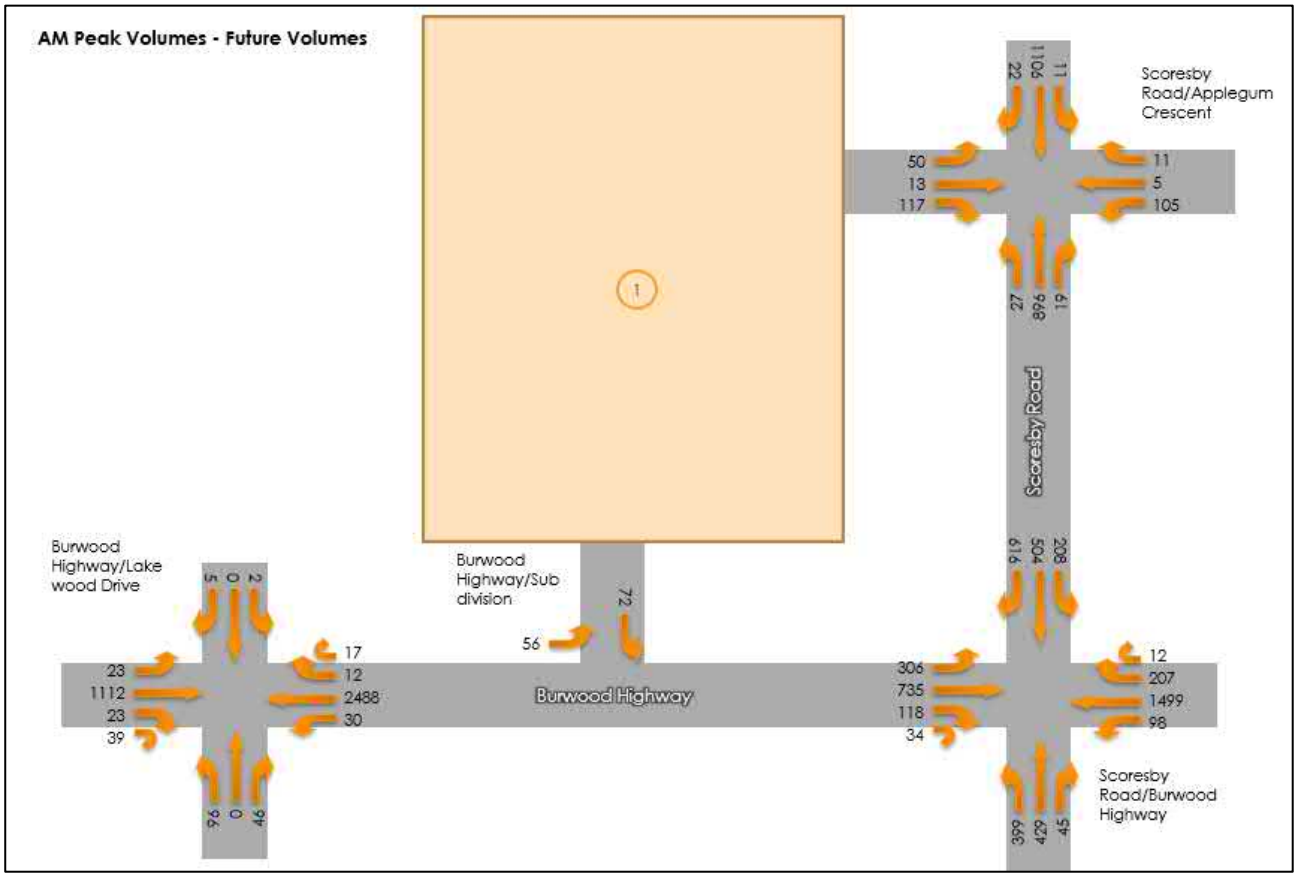
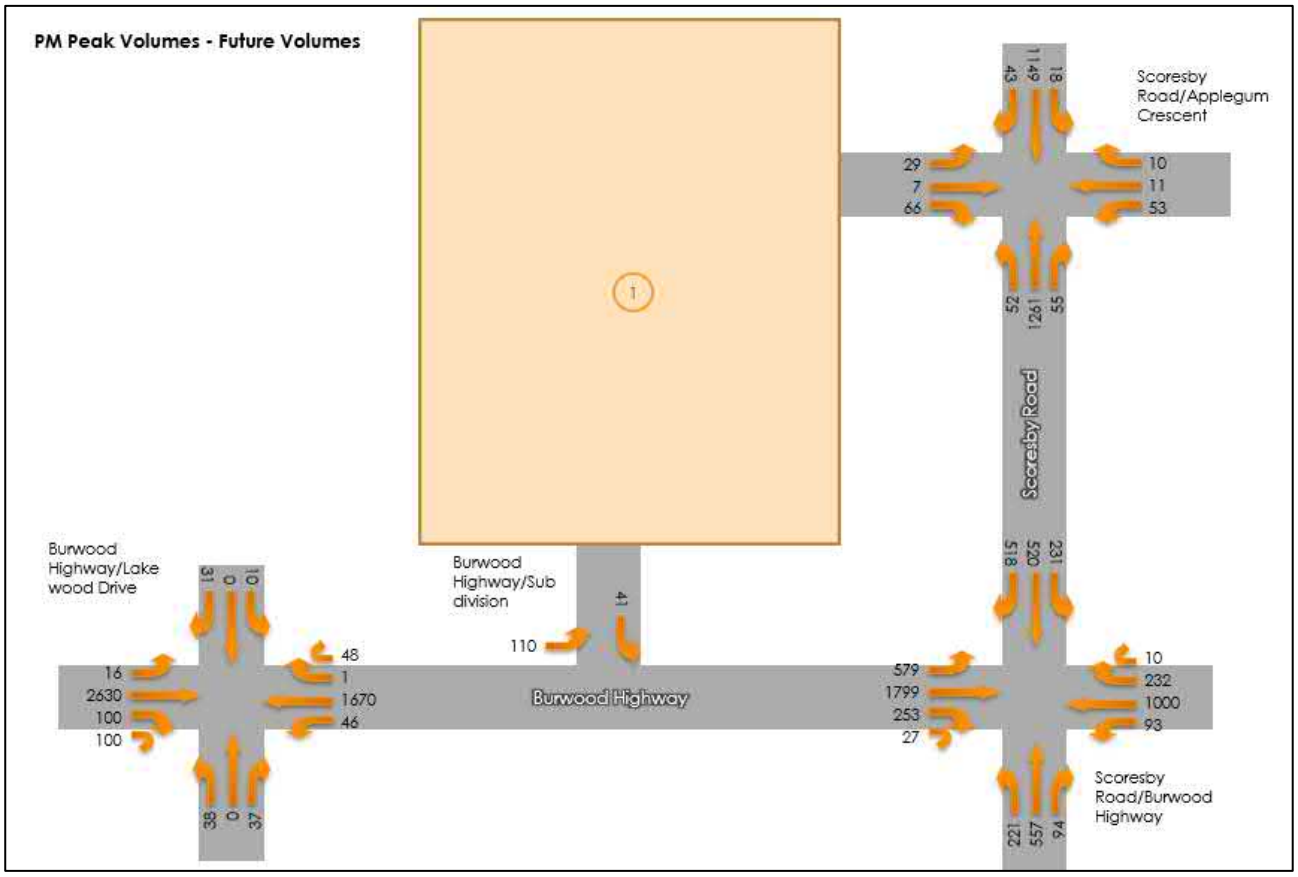


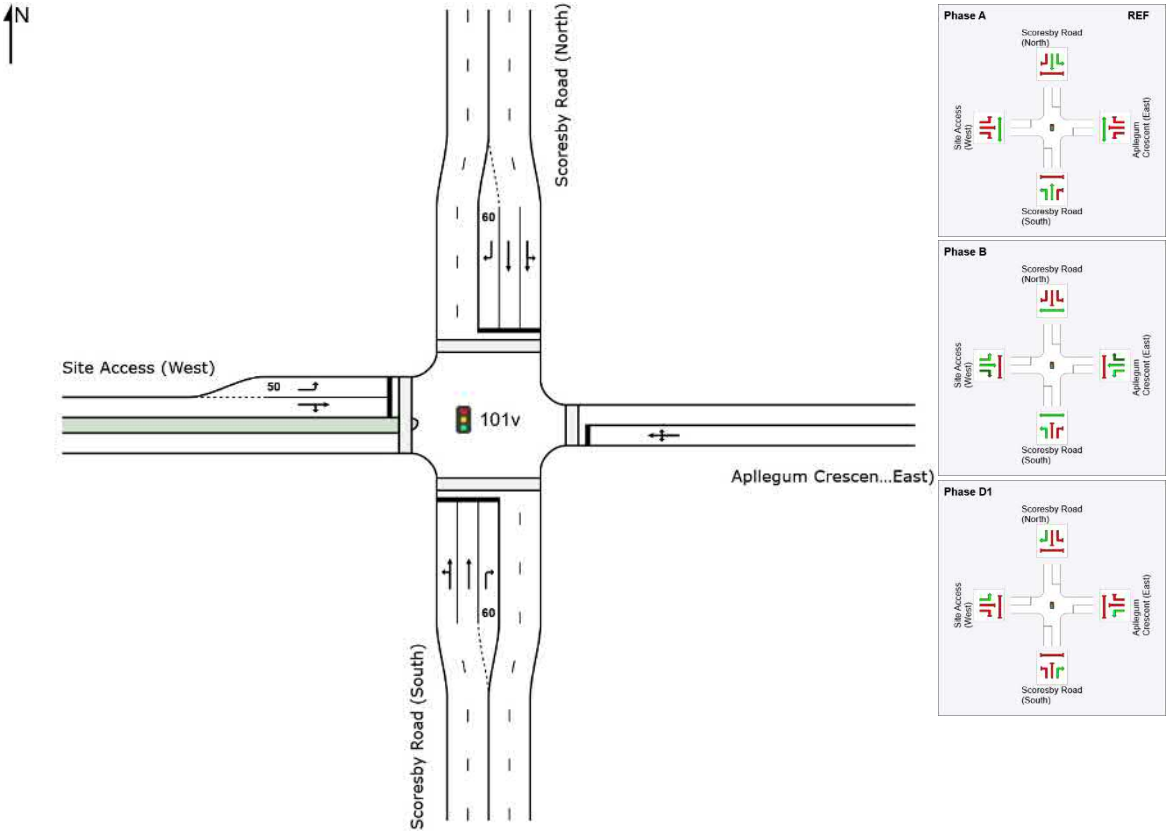
Figure 36 PM Peak Hour Future Traffic Volumes



7.4 Future Conditions Intersection Analysis

In order to assess the impacts of the proposed development to the surrounding intersections, a future conditions SIDRA analysis has been undertaken. The future conditions analysis includes the proposed upgrade of the intersection between Scoresby Road, Applegum Crescent and the site access as a four-way signalised intersection. The layout of the intersection and phasing, as adopted within the SIDRA analysis, is provided in Figure 37.

Figure 37 Proposed Signalised Intersection – Scoresby Road/Site Access



The proposed works associated with the new signalised intersection on Scoresby Road will also allow for modification works to the northern leg of the existing intersection between Burwood Highway and Scoresby Road, including extending the length of the right turn lanes (120m for the first right turn lane and 60m for the second right turn lane).

The results of the future conditions intersection analysis are shown in Table 11, Table 12 and Table 13, respectively.

Table 11 Future Conditions SIDRA Results – Burwood Highway / Scoresby Road

Approach	Movement	AM Peak Hour			PM Peak Hour		
		D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)
Scoresby Road (South)	Left	0.772	37.4	155.9	0.326	21.9	57.5
	Through	0.954	80	125.7	1.02	116.7	210.3
	Right	0.521	70.2	20.9	0.643	71.1	46
Burwood Highway (East)	Left	0.086	11.6	11.3	0.094	15.8	15.9
	Through	0.917	56.8	249.9	0.706	48	149.1
	Right	0.596	53.6	88.3	1.026	127.3	174
Scoresby Road (North)	Left	0.192	10	25.4	0.339	24.7	62.7
	Through	0.501	34.7	111	0.672	45.8	144
	Right	0.924	73.3	160.7	1.038	133.9	194.7
Burwood Highway (West)	Left	0.269	13.5	46.9	0.547	22.9	122.9
	Through	0.578	45.6	97.8	1.025	110.9	499.4
	Right	0.945	88.1	83.8	0.725	58.5	127

Table 12 Future Conditions SIDRA Results – Scoresby Road / Applegum Crescent

Approach	Movement	AM Peak Hour			PM Peak Hour		
		D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)
Scoresby Road (South)	Left	0.484	20.9	105.6	0.548	16.8	169.2
	Through	0.484	15.5	105.6	0.548	11.2	169.2
	Right	0.183	55.8	7.1	0.495	76.3	28.9
Applegum Crescent (East)	Left	0.25	33.3	34	0.311	62.6	34.6
	Through	0.25	28.7	34	0.311	58.1	34.6
	Right	0.25	33.3	34	0.311	62.6	34.6
Scoresby Road (North)	Left	0.492	20.5	109.6	0.484	15.5	142.5
	Through	0.492	15.7	146.8	0.484	10.7	142.5
	Right	0.152	55.6	8	0.387	76.6	22.4
Site Access (West)	Left	0.09	31	12.8	0.084	54.4	12.1
	Through	0.502	40.4	44.5	0.527	67.3	37.4
	Right	0.502	46	44.5	0.527	72.9	37.4

Table 13 Future Conditions SIDRA Results – Burwood Highway / Lakewood Drive

Approach	Movement	AM Peak Hour			PM Peak Hour		
		D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)
Lakewood Drive (South)	Left	0.339	14.7	21	0.088	12.1	5.8
	Through	0.569	75.8	25.5	0.302	67.5	19
	Right	0.569	81.4	25.5	0.302	73.1	19
Burwood Highway (East)	Left	0.024	11	4.1	0.044	17.4	9.3
	Through	0.613	8	192.4	0.502	14.4	153.9
	Right	0.281	75.3	14.9	0.224	59.7	21.8
DELWP Access (North)	Left	0.003	6.9	0.1	0.023	22.1	2.4
	Through	0.141	77.9	3.3	0.442	73.3	16.9
	Right	0.141	83.5	3.3	0.442	78.9	16.9
Burwood Highway (West)	Left	0.018	11	3.1	0.015	17.2	3.2
	Through	0.269	5.4	56.7	0.821	19.6	356.6
	Right	0.607	78.2	33.2	0.804	71	105.4

The future conditions analysis for the new signalised intersection between Scoresby Road, Applegum Crescent and the Site Access detailed a maximum movement Degree of Saturation of 0.502 in the AM peak and 0.548 in the PM peak, reflective of 'excellent' conditions. The phasing for this intersection has been adopted to maximise the amount of green time for the through movements on Scoresby Road, to assist with reducing delays and reducing queues.

The future operation of the intersection between Burwood Highway and Lakewood Drive is shown to continue to operate within capacity following the additional traffic projected to be generated by the proposed development.

Noting that the intersection between Burwood Highway and Scoresby Road was determined to be at capacity as part of the existing conditions analysis, the additional vehicle movements associated with the proposed development are shown to push the intersection to operate with a Degree of Saturation of over 1.0, in the PM peak hour. The proposed increase to the right turn lane lengths on the northern leg of the intersection, associated with the works for the new signalised intersection for access to the site, does provide for some improved capacity for the intersection. A comparison between the existing and future conditions of the intersection between Burwood Highway and Scoresby Road is provided in Table 14. Note that red reflects an increase and green reflects a decrease.

Table 14 Intersection Analysis Comparison (Burwood Highway / Scoresby Road)

Approach	Existing Conditions			Future Conditions			Net Change		
	D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)
AM Peak Hour									
Scoresby Road (South)	0.824	45.3	134.2	0.954	60	155.9	0.13	14.7	21.7
Burwood Highway (East)	0.855	43.2	218.6	0.917	53.9	249.9	0.062	10.7	31.3
Scoresby Road (North)	0.838	41.6	119	0.924	48.7	160.7	0.086	7.1	41.7
Burwood Highway (West)	0.857	39.7	91.7	0.945	42.8	97.8	0.088	3.1	6.1
Intersection	**0.857**	**42.4**	**218.6**	**0.954**	**51.1**	**249.9**	**0.097**	**8.7**	**31.3**
PM Peak Hour									
Scoresby Road (South)	0.981	68.6	166.1	1.02	87.8	210.3	0.039	19.2	44.2
Burwood Highway (East)	0.974	51.1	135.3	1.026	60.1	174	0.052	9	38.7
Scoresby Road (North)	0.966	57.4	133.8	1.038	77.9	194.7	0.072	20.5	60.9
Burwood Highway (West)	0.99	66.8	416	1.025	86.3	499.4	0.035	19.5	83.4
Intersection	**0.99**	**61.7**	**416**	**1.038**	**79.1**	**499.4**	**0.048**	**17.4**	**83.4**

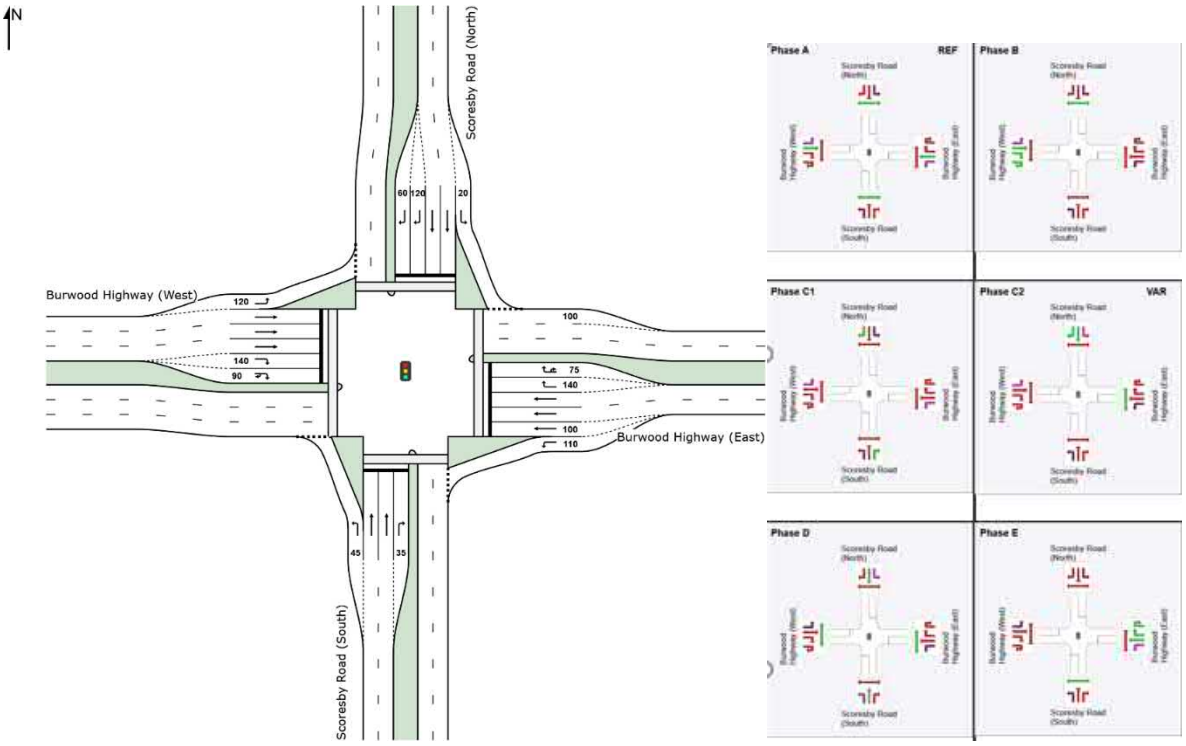
7.5 Recommended Intersection Upgrade

Preliminary advice provided by the Department of Transport recommended that consideration be given to upgrading the existing signalised intersection between Burwood Highway and Scoresby Road, to include additional right turn lanes from each of the Burwood Highway legs. It was advised that this could be achieved within the existing road reserve by reducing the width of existing traffic lanes and making minor modifications to the median between carriageways.

onemile**grid** has prepared a preliminary concept plan for this modified intersection, which is included within Appendix B, detailing the potential upgraded intersection configuration. A swept path assessment has also been undertaken, also within Appendix B, which confirms that the turning movements can be undertaken however the future operation of the intersection will not be able to operate concurrent right turn movements from the respective Burwood Highway legs of the intersection.

The revised future conditions SIDRA analysis adopted the intersection configuration and phasing as shown in Figure 38.

Figure 38 Proposed Upgraded Intersection – Burwood Highway/Scoresby Road



The results of the upgraded intersection future conditions SIDRA are provided in Table 15, whilst a comparison summary, similar to the previous comparison, is provided in Table 16.

Table 15 Future Conditions SIDRA Results – Burwood Highway / Scoresby Road (Upgraded)

Approach	Movement	AM Peak Hour			PM Peak Hour		
		D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)
Scoresby Road (South)	Left	0.816	48.8	160.6	0.302	18.9	49.4
	Through	0.803	56.6	101.7	0.922	68.2	149.7
	Right	0.447	68.3	20.5	0.311	52.8	36.8
Burwood Highway (East)	Left	0.089	10.5	9.7	0.083	13.5	13.1
	Through	0.844	45.2	237.8	0.584	39	125.8
	Right	0.484	60.8	47	0.852	75.3	60.3
Scoresby Road (North)	Left	0.192	9.8	25	0.409	26.8	65.2
	Through	0.438	30.5	102.6	0.89	62.4	165.3
	Right	0.812	54.5	133.9	0.911	74	134
Burwood Highway (West)	Left	0.246	11.4	37.4	0.498	14.3	103.1
	Through	0.501	41.6	93.1	0.927	58	330.6
	Right	0.81	75.7	39.8	0.59	60.8	61.6

Table 16 Intersection Analysis Comparison (Burwood Highway / Scoresby Road)

Approach	Existing Conditions			Future Conditions			Net Change		
	D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)	D.o.S.	Avg Delay	Queue (m)
AM Peak Hour									
Scoresby Road (South)	0.824	45.3	134.2	0.816	53.7	160.6	-0.008	8.4	26.4
Burwood Highway (East)	0.855	43.2	218.6	0.844	45.2	237.8	-0.011	2	19.2
Scoresby Road (North)	0.838	41.6	119	0.812	38.4	133.9	-0.026	-3.2	14.9
Burwood Highway (West)	0.857	39.7	91.7	0.81	38.3	93.1	-0.047	-1.4	1.4
Intersection	**0.857**	**42.4**	**218.6**	**0.844**	**43.3**	**237.8**	**-0.013**	**0.9**	**19.2**
PM Peak Hour									
Scoresby Road (South)	0.981	68.6	166.1	0.922	54.1	149.7	-0.059	-14.5	-16.4
Burwood Highway (East)	0.974	51.1	135.3	0.852	43.8	125.8	-0.122	-7.3	-9.5
Scoresby Road (North)	0.966	57.4	133.8	0.911	60.7	165.3	-0.055	3.3	31.5
Burwood Highway (West)	0.99	66.8	416	0.927	48.8	330.6	-0.063	-18	-85.4
Intersection	0.99	61.7	416	0.927	50.9	330.6	-0.063	-10.8	-85.4

Noting the above comparison between the existing conditions and the future conditions (with the proposed additional right turn lanes on Burwood Highway), it is demonstrated that the intersection will operate with improved conditions, even when including the additional traffic generated by the site. Whilst there are minor increases to the queues and delays during the AM peak period, these are not observed to extend into any of the nearby intersections.

The detailed SIDRA outputs for all of the above analysis are included within Appendix C.

7.6 Intersection Analysis Summary

Based on the preceding analysis, the level of traffic anticipated to be generated by the proposed development of the site is demonstrated to be accommodated within the surrounding key intersections, noting the following upgrades to the road network:

- A new left-in/left-out intersection to Burwood Highway, providing access to the site
- Upgrading the intersection between Scoresby Road and Applegum Crescent to a four-way signalised intersection providing access to the site
- Upgrading the existing signalised intersection between Burwood Highway and Scoresby Road to include additional right turn lanes from Burwood Highway (within the existing carriageway widths)

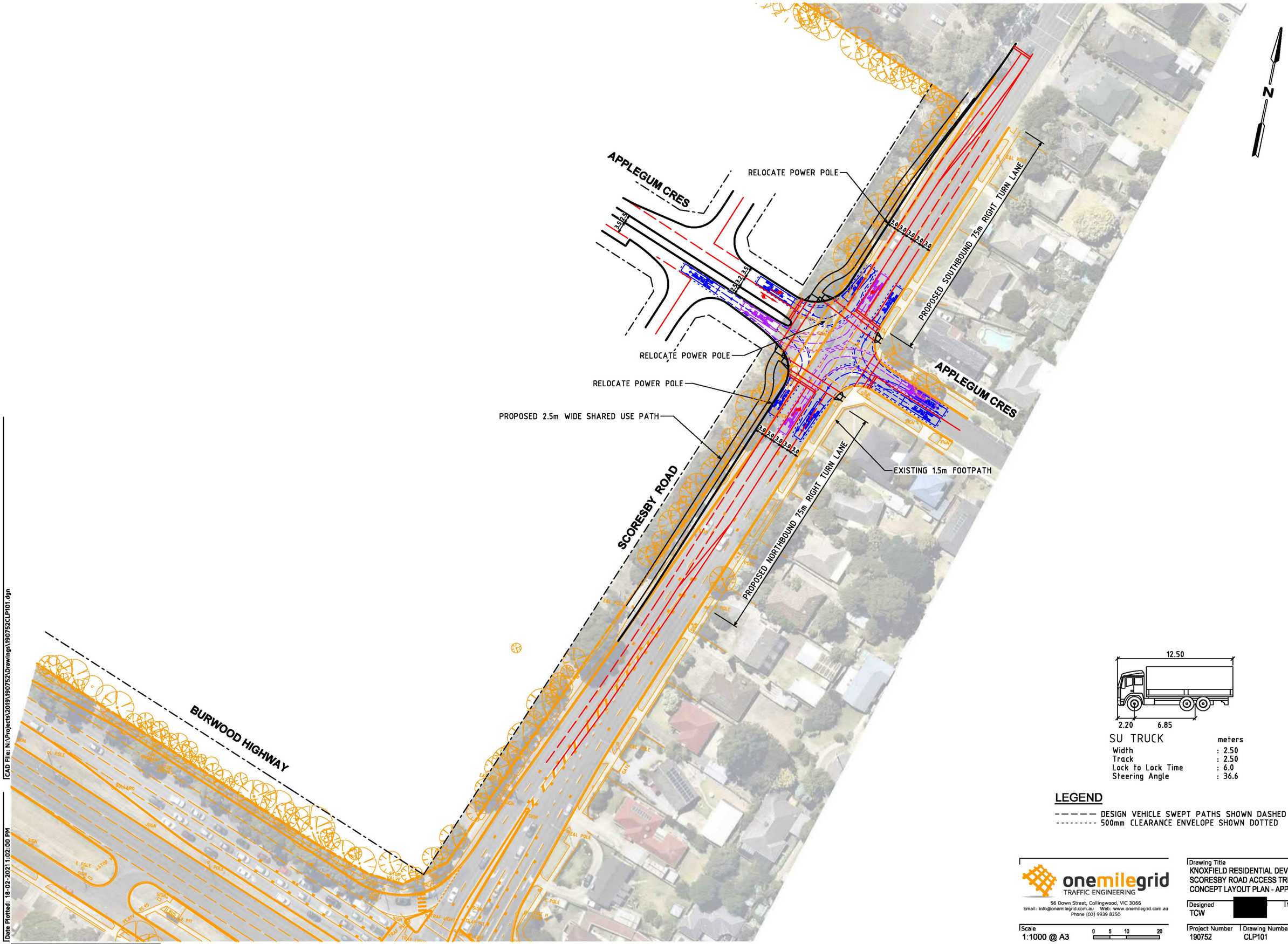
8 CONCLUSIONS

It is proposed to develop the subject site for the purposes of a residential development comprising 433 dwellings plus a mixed-use area.

Considering the analysis presented above, it is concluded that:

- The road layout and access are generally in accordance with the indicative masterplan and are considered appropriate in catering for access and circulation of the site;
- The indicative masterplan road network has been designed generally in accordance with Clause 56 requirements of the Knox Planning Scheme;
- The layout of access streets throughout the development provides for on-street parking for use by visitors to the area;
- The development (with allowance for the future superlot) is projected to generate 3,592 daily vehicle movements and up to 359 vehicle movements during the peak hour periods; and
- The level of traffic generated by the proposed development will be accommodated by the proposed changes to the road network including:
  - Signalised intersection between the site, Scoresby Road and Applegum Crescent;
  - Left-in, left-out intersection between the site and Burwood Highway; and
  - Upgraded intersection between Burwood Highway and Scoresby Road.

Appendix A Site Access Intersections Concept Plans



SU TRUCK

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Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.6

LEGEND

– – – – – DESIGN VEHICLE SWEPT PATHS SHOWN DASHED
--------- 500mm CLEARANCE ENVELOPE SHOWN DOTTED

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Drawing Title
KNOXFIELD RESIDENTIAL DEVELOPMENT
SCORESBY ROAD ACCESS TREATMENT
CONCEPT LAYOUT PLAN - APPLEGUM CRES

Designed	Melway Ref
TCW	73 D1

Scale	Project Number	Drawing Number	Revision
1:1000 @ A3	190752	CLP101	C

0 5 10 20

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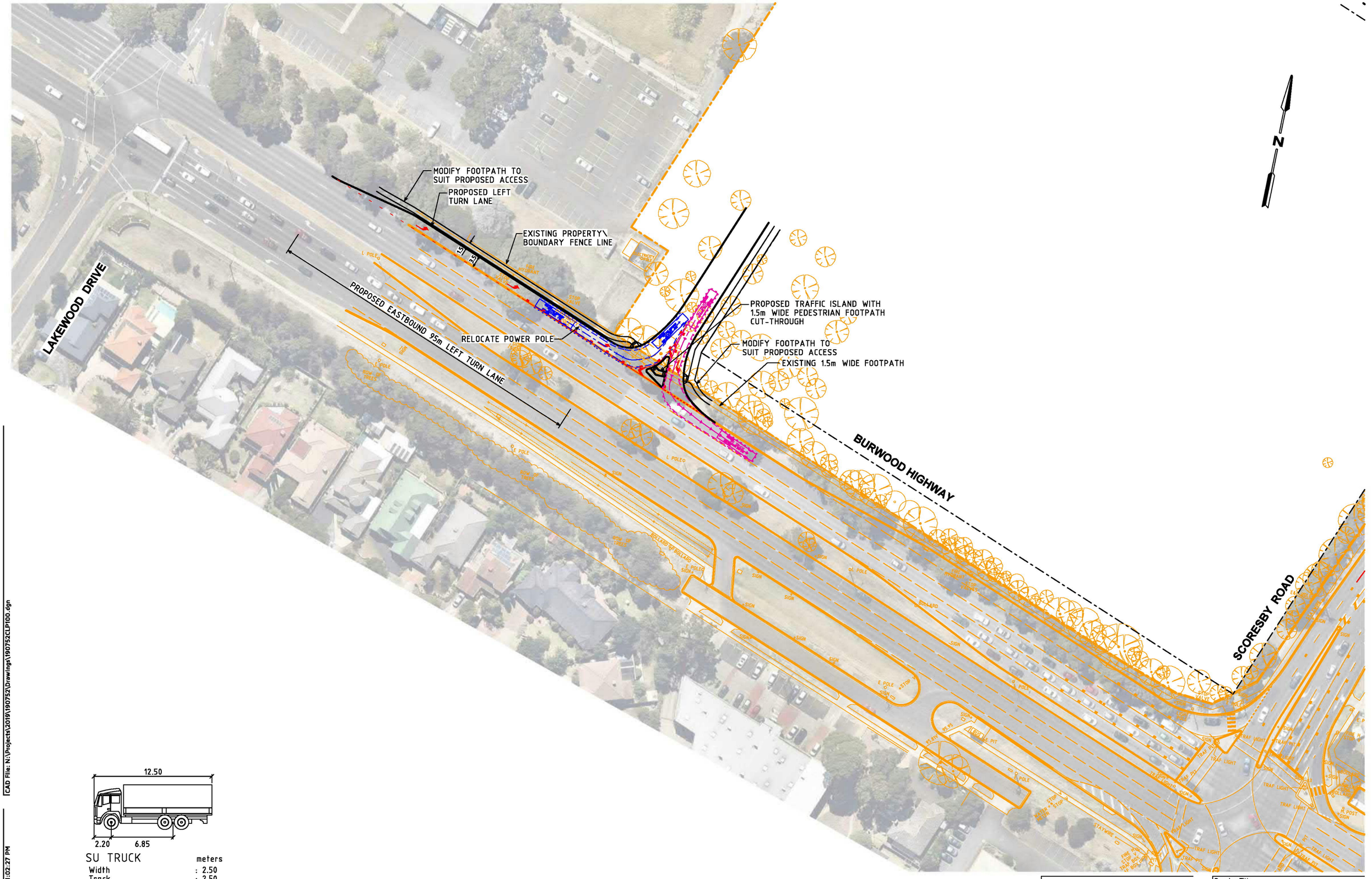

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Lock to Lock Time	: 6.0
Steering Angle	: 36.6

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Scale: 1:1000 @ A3 (0 5 10 20)

Drawing Title: KNOXFIELD RESIDENTIAL DEVELOPMENT
BURWOOD HIGHWAY ACCESS TREATMENT
CONCEPT LAYOUT PLAN

Designed	Approved	Melway Ref
TCW	[redacted]	73 D1

Project Number	Drawing Number	Revision
190752	CLP100	D

Appendix B Burwood Hwy / Scoresby Rd Concept Layout Plan

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Scale
1:1250@ A3
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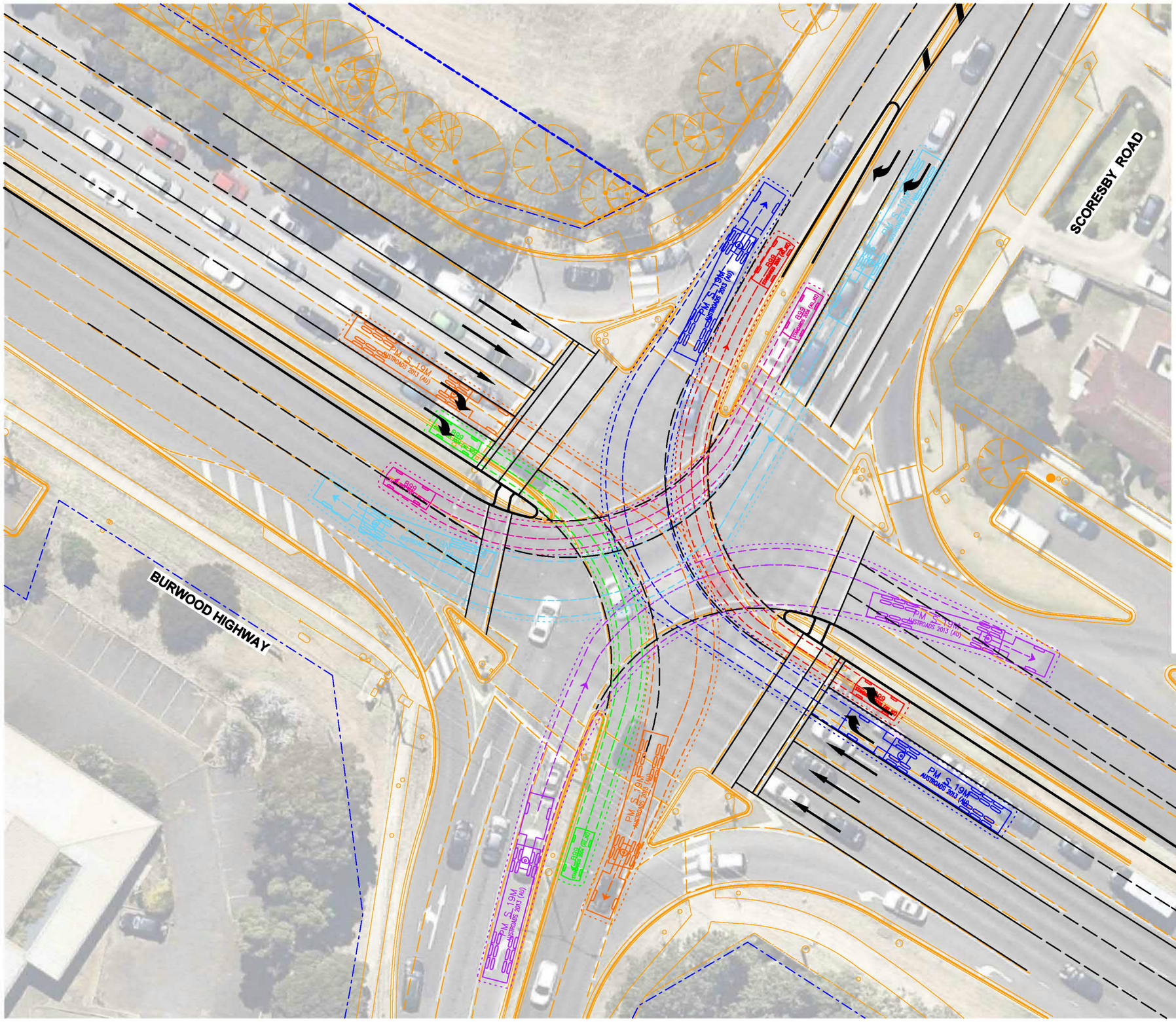
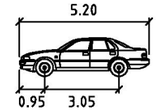
Drawing Title
KNOXFIELD RESIDENTIAL DEVELOPMENT
BURWOOD HWY / SCORESBY ROAD
CONCEPT LAYOUT PLAN

Designed	[redacted]	Melway Ref
TCW		73 D1

Project Number	Drawing Number	Revision
190752	CLP201	A





B99

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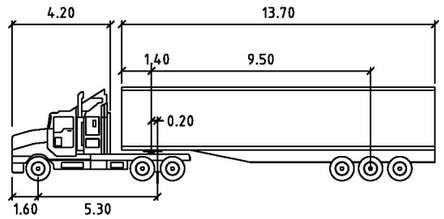

PM S 19M

	meters		meters
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Trailer Track	: 2.50		

LEGEND

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- --------- 500mm CLEARANCE ENVELOPE SHOWN DOTTED

CAD File: N:\Projects\2019\190752\Drawings\190752SPA201.dgn

Date Plotted: 25-06-202012:50:53

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Phone (03) 9939 8250

Drawing Title
KNOXFIELD RESIDENTIAL DEVELOPMENT
BURWOOD HWY / SCORESBY ROAD
SWEPT PATH ANALYSIS

Designed	Melway Ref
TCW	73 D1

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Project Number	Drawing Number	Revision
190752	SPA201	A

Appendix C Detailed SIDRA Output

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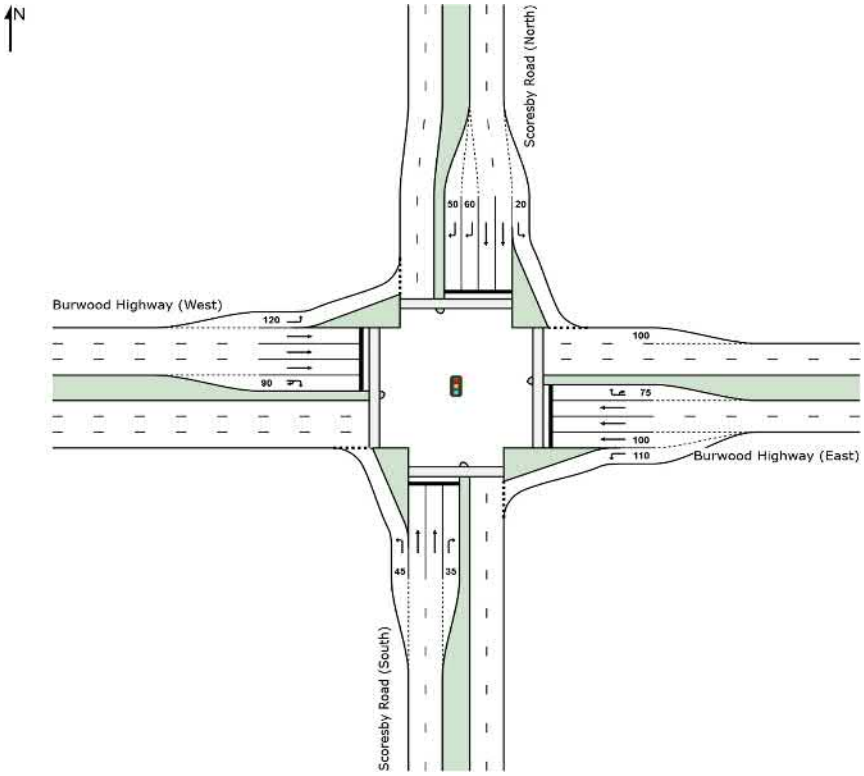
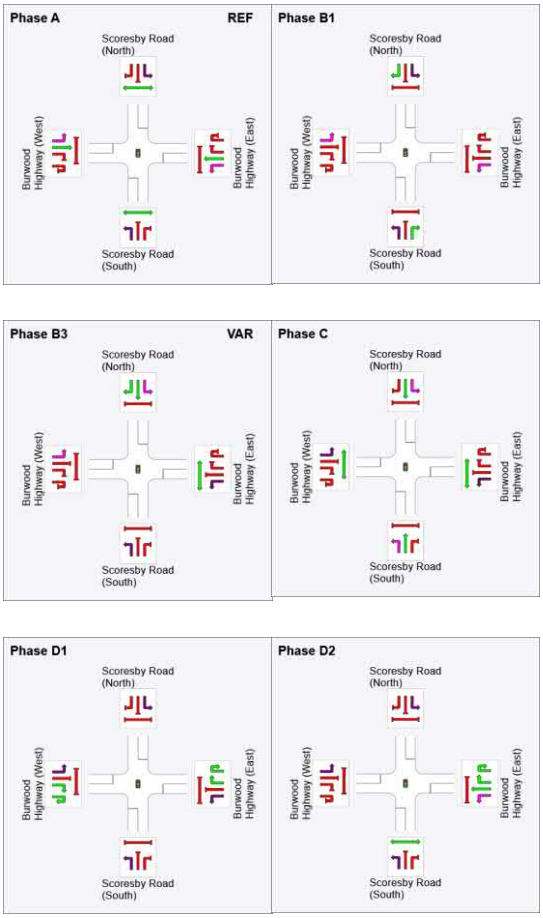




Phase	Grn	Yel	Red	Total	%
A	26	4	2	32	26.67
B1	6	4	2	12	10
B3	14	4	2	20	16.67
C	18	4	2	24	20
D1	10	4	2	16	13.33
D2	10	4	2	16	13.33
				120	

Scoresby Road (North)

	App	R	T	L
	41.6	60.4	34.5	9.7
	119	119	106.1	23.1
	0.838	0.838	0.49	0.181
	1275	548	518	208
	38	16	16	6
	1237	532	502	202

Burwood Highway (West)

L	12.8	43.9	0.266	322	10	312	1830	57	1887	0.855	218.6	43.2	**App**
T	45.3	91.7	0.546	732	22	710	193	6	199	0.548	80.1	53	**R**
R	75.6	59.3	0.857	116	3	113	1526	47	1573	0.855	218.6	43.9	**T**
App	39.7	91.7	0.857	1180	35	1145	100	3	103	0.085	10.9	11.3	**L**

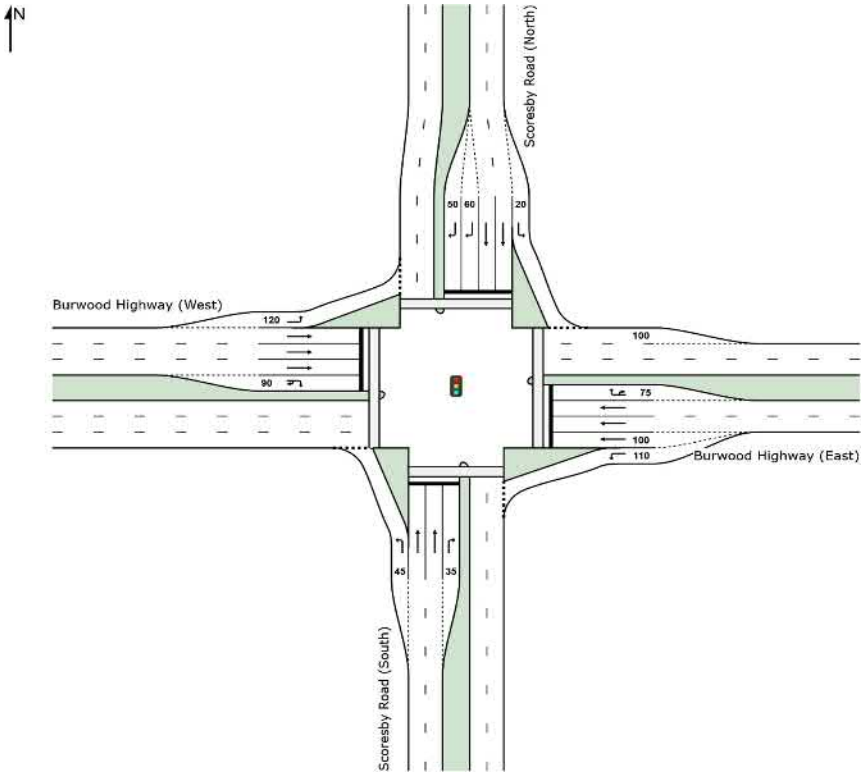
Burwood Highway (East)

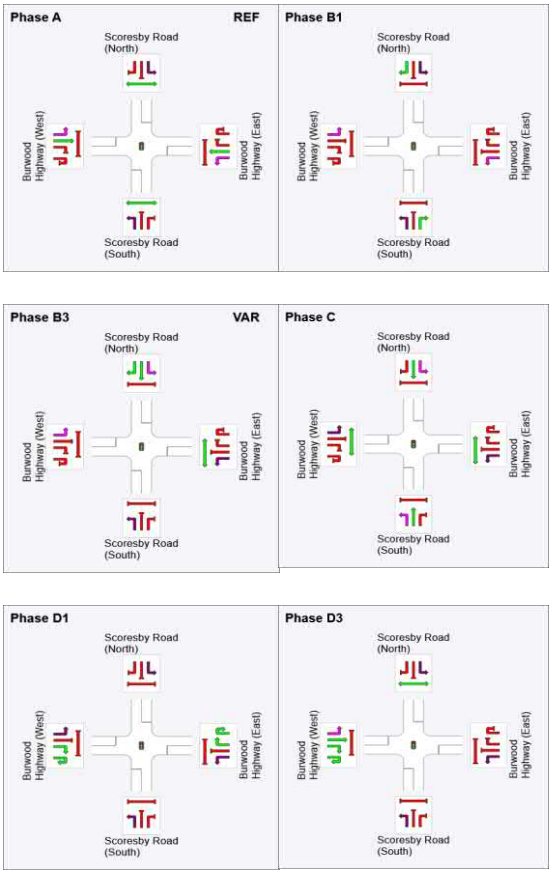
5094	407	429	46	882	**LV***
158	13	13	1	27	**HV***
5252	420	442	47	909	**Total Vol***
0.857	0.691	0.824	0.521	0.824	**D.o.S.**
218.6	134.2	100.7	20.9	134.2	**95th %ile Back of Queue (m)**
42.4	28.4	58.7	70.2	45.3	**Average Delay (sec)**
Intersection	**L**	**T**	**R**	**App**	

*Output Volumes

Scoresby Road (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[BurwScorPMExEx]*





Phase	Grn	Yel	Red	Total	%
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B1	9	4	2	15	12.5
B3	4	4	2	10	8.333
C	21	4	2	27	22.5
D1	15	4	2	21	17.5
D3	6	4	2	12	10
				120	

Scoresby Road (North)

	App	R	T	L
	57.4	90.8	41.9	23.8
	133.8	133.8	119.5	57.3
	0.966	0.966	0.703	0.337
	1265	488	540	237
	38	15	16	7
	1227	473	524	230

Burwood Highway (West)

L	17.7	109	0.515	609	18	591	1318	41	1359	0.974	135.3	51.1	**App**
T	84.7	416	0.99	1868	56	1812	201	6	207	0.974	121.7	96.5	**R**
R	54	107.5	0.683	261	8	253	1012	31	1043	0.703	135.3	45	**T**
App	66.8	416	0.99	2753	83	2670	95	3	98	0.092	14.1	14.5	**L**

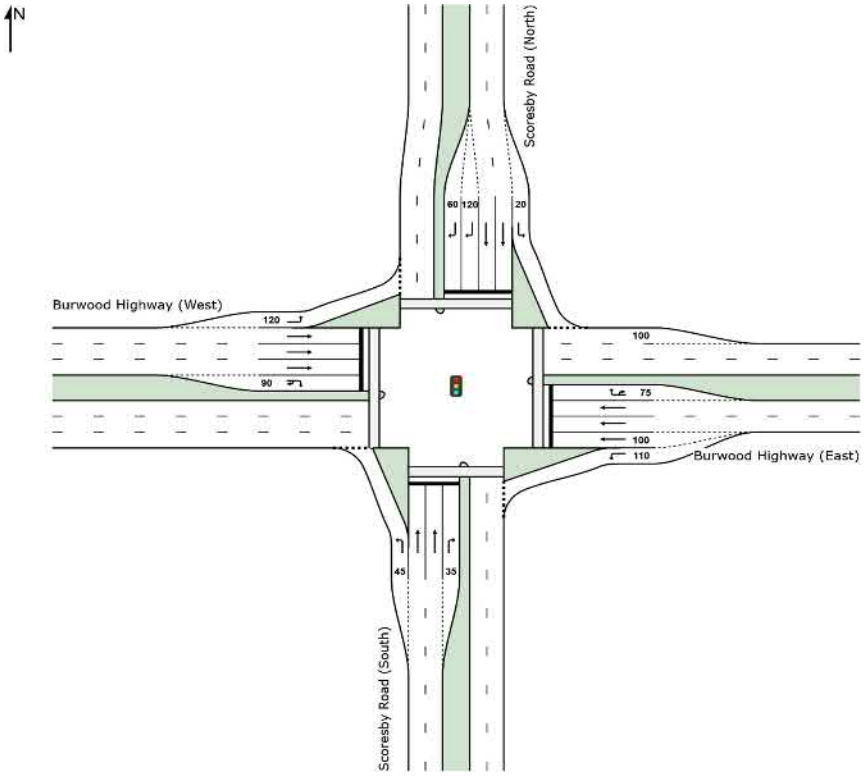
Burwood Highway (East)

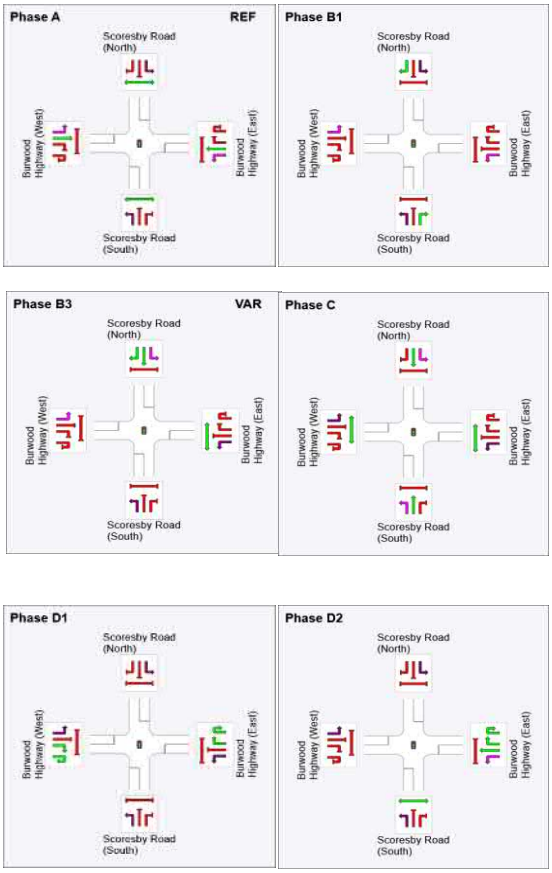
6089	226	551	96	873	**LV***
188	7	17	3	27	**HV***
6277	233	568	99	900	**Total Vol***
0.99	0.304	0.981	0.726	0.981	**D.o.S.**
416	47.6	166.1	44	166.1	**95th %ile Back of Queue (m)**
61.7	17.9	89.2	69.2	68.6	**Average Delay (sec)**
Intersection	**L**	**T**	**R**	**App**	

*Output Volumes

Scoresby Road (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[BurwScorAMF1Fu]*





Phase	Grn	Yel	Red	Total	%
A	26	4	2	32	26.67
B1	6	4	2	12	10
B3	16	4	2	22	18.33
C	16	4	2	22	18.33
D1	12	4	2	18	15
D2	8	4	2	14	11.67
				120	

Scoresby Road (North)

	App	R	T	L
	48.7	73.3	34.7	10
	160.7	160.7	111	25.4
	0.924	0.924	0.501	0.192
	1398	648	531	219
	42	19	16	7
	1356	629	515	212

Burwood Highway (West)

L	13.5	46.9	0.269	322	10	312	1855	57	1912	0.917	249.9	53.9	**App**
T	45.6	97.8	0.578	774	23	751	211	7	218	0.596	88.3	53.6	**R**
R	88.1	83.8	0.945	124	4	120	1531	47	1578	0.917	249.9	56.8	**T**
App	42.8	97.8	0.945	1256	38	1218	100	3	103	0.086	11.3	11.6	**L**

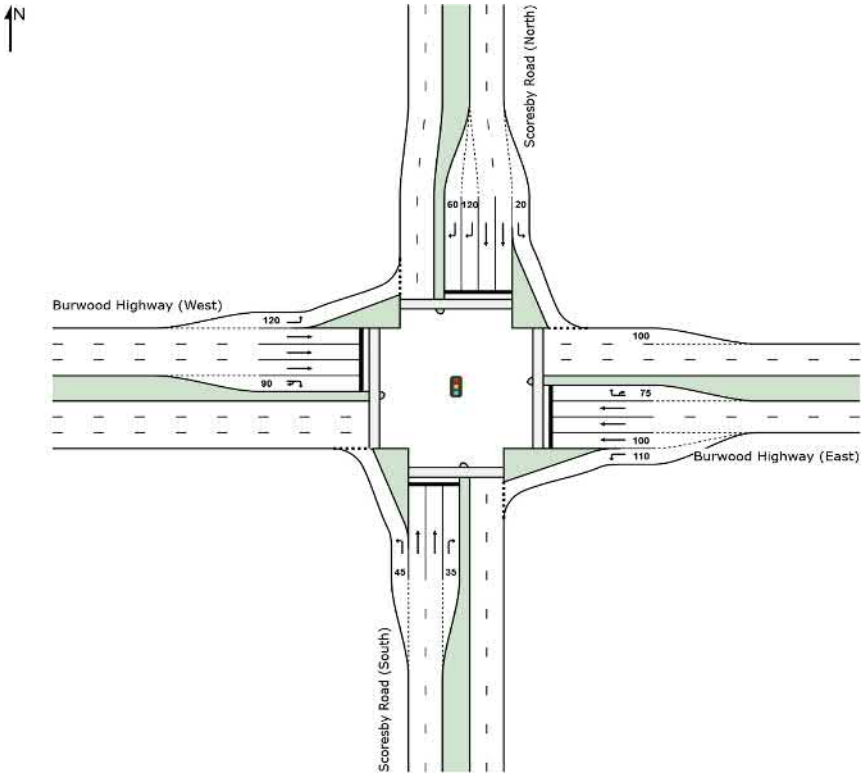
Burwood Highway (East)

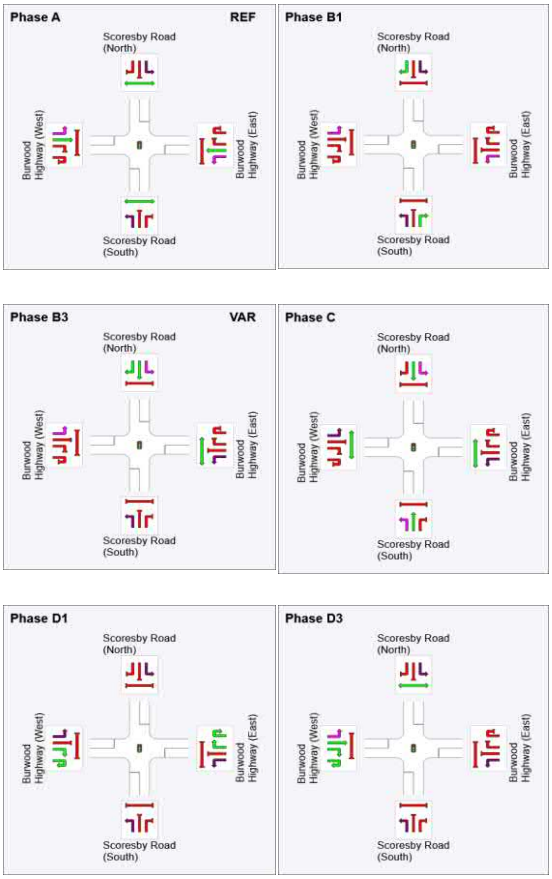
5319	407	438	46	891	**LV***
165	13	14	1	28	**HV***
5484	420	452	47	919	**Total Vol***
0.954	0.772	0.954	0.521	0.954	**D.o.S.**
249.9	155.9	125.7	20.9	155.9	**95th %ile Back of Queue (m)**
51.1	37.4	80	70.2	60	**Average Delay (sec)**
Intersection	**L**	**T**	**R**	**App**	

*Output Volumes

Scoresby Road (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[BurwScorPMF1Fu]*





Phase	Grn	Yel	Red	Total	%
A	32	4	2	38	29.23
B1	11	4	2	17	13.08
B3	4	4	2	10	7.692
C	23	4	2	29	22.31
D1	18	4	2	24	18.46
D3	6	4	2	12	9.231
				130	

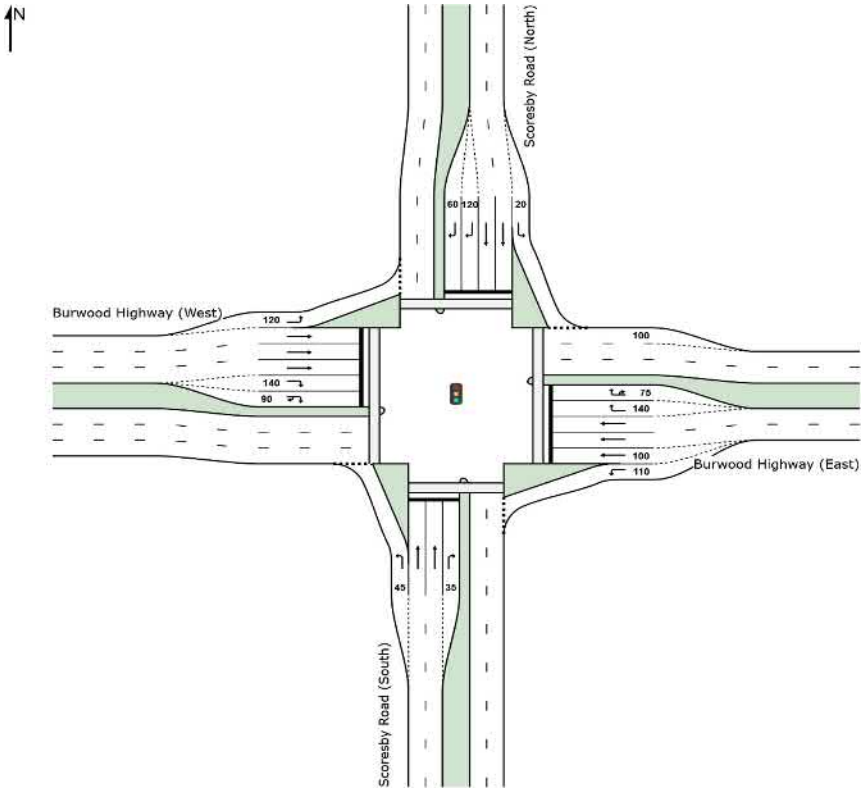
Scoresby Road (North)

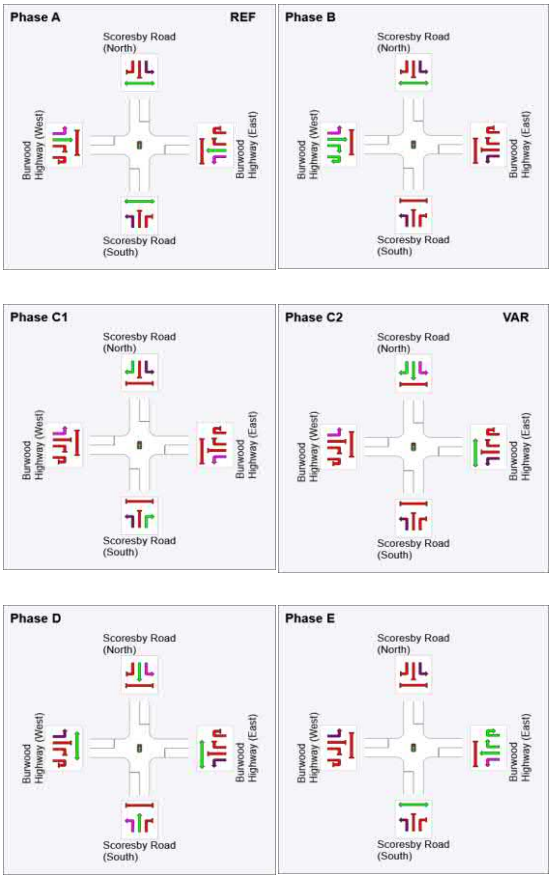
					App	**R**	**T**	**L**						
					77.9	133.9	45.8	24.7						
					194.7	194.7	144	62.7						
					1.038	1.038	0.672	0.339						
					1336	545	547	243						
					40	16	16	7						
					1296	529	531	236						
Burwood Highway (West)													**Burwood Highway (East)**	
L	22.9	122.9	0.547	609	18	591			1363	42	1405	1.026	174	60.1	**App**
T	110.9	499.4	1.025	1894	57	1837			237	7	244	1.026	174	127.3	**R**
R	58.5	127	0.725	266	8	258			1021	32	1053	0.706	149.1	48	**T**
App	86.3	499.4	1.025	2798	84	2714			95	3	98	0.094	15.9	15.8	**L**
					6263		226	568	96	890		**LV***			
					194		7	18	3	28		**HV***			
					6457		233	586	99	918		**Total Vol***			
					1.038		0.326	1.02	0.643	1.02		**D.o.S.**			
					499.4		57.5	210.3	46	210.3		**95th %ile Back of Queue (m)**			
					79.1		21.9	116.7	71.1	87.8		**Average Delay (sec)**			
					Intersection		**L**	**T**	**R**	**App**					

*Output Volumes

Scoresby Road (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[BurwScorAMF2Fu]*





Phase	Grn	Yel	Red	Total	%
A	17	4	2	23	19.17
B	7	4	2	13	10.83
C1	7	4	2	13	10.83
C2	18	4	2	24	20
D	19	4	2	25	20.83
E	16	4	2	22	18.33
				120	

Scoresby Road (North)

	App	R	T	L
	38.4	54.5	30.5	9.8
	133.9	133.9	102.6	25
	0.812	0.812	0.438	0.192
	1398	648	531	219
	42	19	16	7
	1356	629	515	212

Burwood Highway (West)

L	11.4	37.4	0.246	322	10	312	1855	57	1912	0.844	237.8	45.2	**App**
T	41.6	93.1	0.501	774	23	751	211	7	218	0.484	47	60.8	**R**
R	75.7	39.8	0.81	124	4	120	1531	47	1578	0.844	237.8	45.2	**T**
App	38.3	93.1	0.81	1256	38	1218	100	3	103	0.089	9.7	10.5	**L**

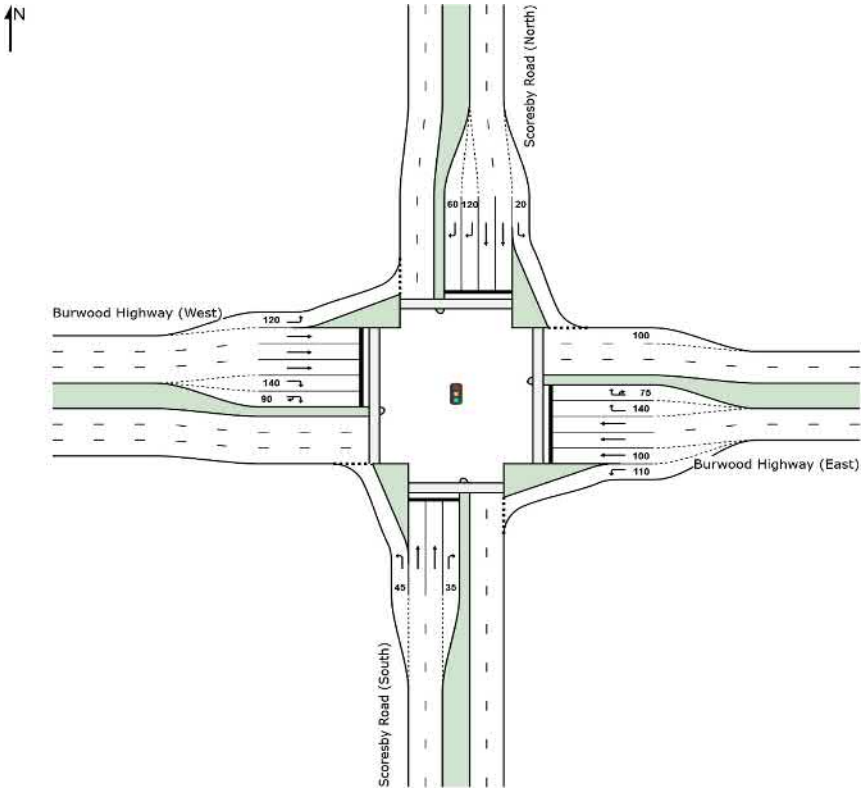
Burwood Highway (East)

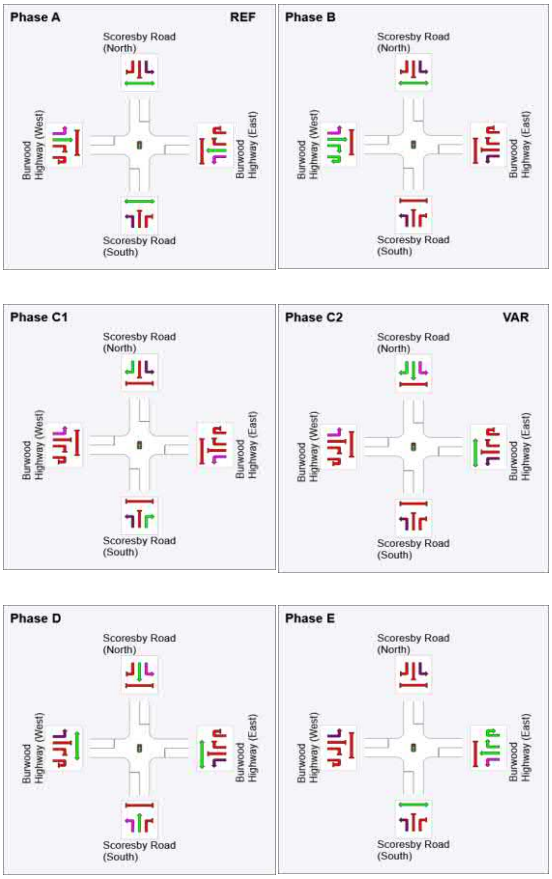
5319	407	438	46	891	**LV***
165	13	14	1	28	**HV***
5484	420	452	47	919	**Total Vol***
0.844	0.816	0.803	0.447	0.816	**D.o.S.**
237.8	160.6	101.7	20.5	160.6	**95th %ile Back of Queue (m)**
43.3	48.8	56.6	68.3	53.7	**Average Delay (sec)**
Intersection	**L**	**T**	**R**	**App**	

*Output Volumes

Scoresby Road (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[BurwScorPMF2Fu]*





Phase	Grn	Yel	Red	Total	%
A	19	4	2	25	20.83
B	10	4	2	16	13.33
C1	21	4	2	27	22.5
D	23	4	2	29	24.17
E	17	4	2	23	19.17

Scoresby Road (North)

	App	R	T	L
	60.7	74	62.4	26.8
	165.3	134	165.3	65.2
	0.911	0.911	0.89	0.409
	1336	545	547	243
	40	16	16	7
	1296	529	531	236

120

Burwood Highway (West)

L	14.3	103.1	0.498	609	18	591	1363	42	1405	0.852	125.8	43.8	**App**
T	58	330.6	0.927	1894	57	1837	237	7	244	0.852	60.3	75.3	**R**
R	60.8	61.6	0.59	266	8	258	1021	32	1053	0.584	125.8	39	**T**
App	48.8	330.6	0.927	2798	84	2714	95	3	98	0.083	13.1	13.5	**L**

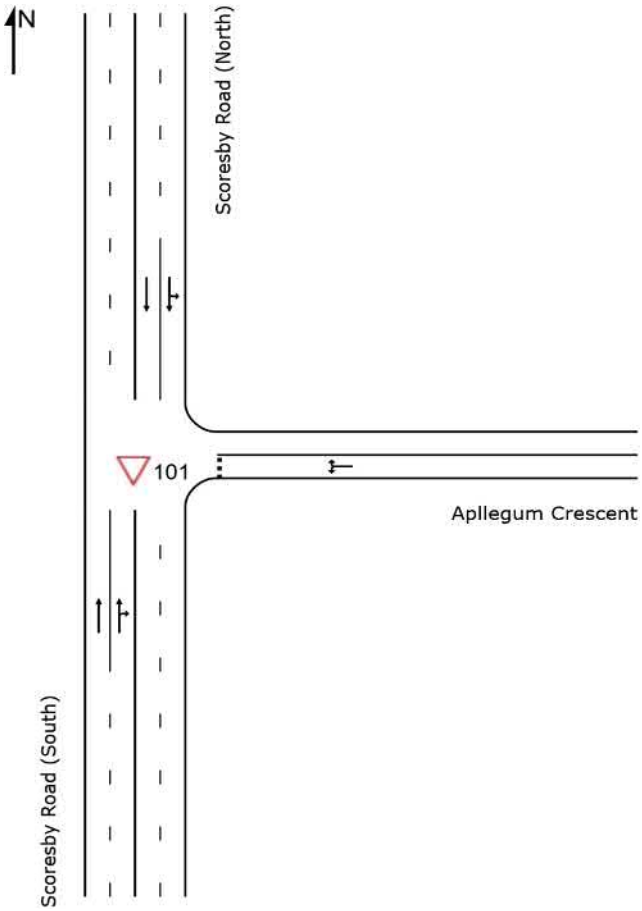
Burwood Highway (East)

6263	226	568	96	890	**LV***
194	7	18	3	28	**HV***
6457	233	586	99	918	**Total Vol***
0.927	0.302	0.922	0.311	0.922	**D.o.S.**
330.6	49.4	149.7	36.8	149.7	**95th %ile Back of Queue (m)**
50.9	18.9	68.2	52.8	54.1	**Average Delay (sec)**
Intersection	**L**	**T**	**R**	**App**	

*Output Volumes

Scoresby Road (South)

Give-Way/Yield *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[ScorApplAMExEx]*



Scoresby Road (North)

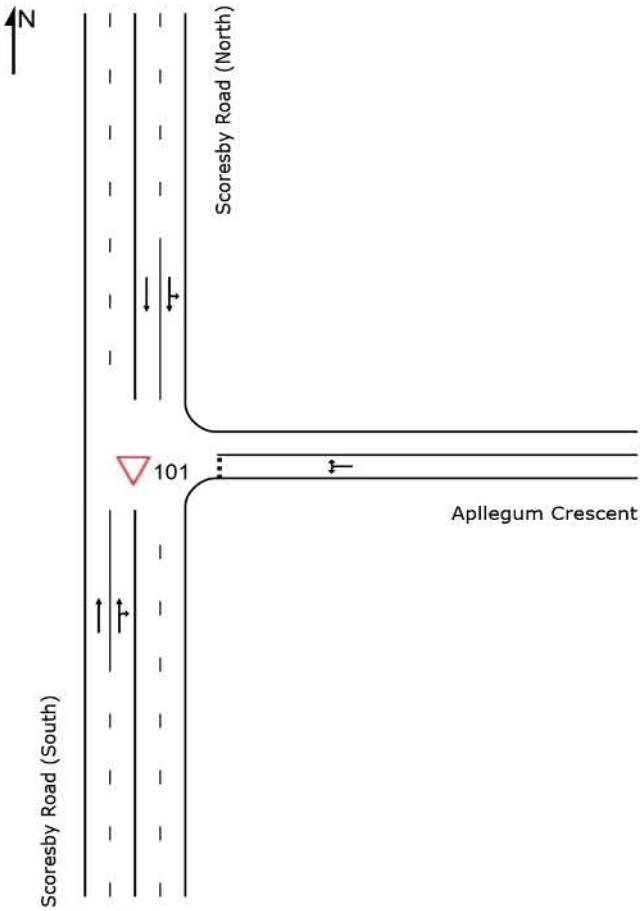
	App	R	T	L							
	0.1		0	5.6							
	0		0	0							
	0.251		0.251	0.251							
	1152		1140	12							
	35		34	0							
	1117		1106	12							
L					114	4	118	0.429	14.2	22.9	**App**
T					12	0	12	0.429	14.2	116.3	**R**
R											**T**
App					103	3	106	0.429	14.2	12.7	**L**
	2242		986	23	1010		**LV***				
	69		31	1	31		**HV***				
	2311		1017	24	1041		**Total Vol***				
	0.429		0.295	0.295	0.295		**D.o.S.**				
	14.2		7.7	7.7	7.7		**95th %ile Back of Queue (m)**				
	1.8		0.9	16.4	1.3		**Average Delay (sec)**				
	Intersection	**L**	**T**	**R**	**App**						

Apllegum Crescent

*Output Volumes

Scoresby Road (South)

Give-Way/Yield *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[ScorApplPMExEx]*



Scoresby Road (North)

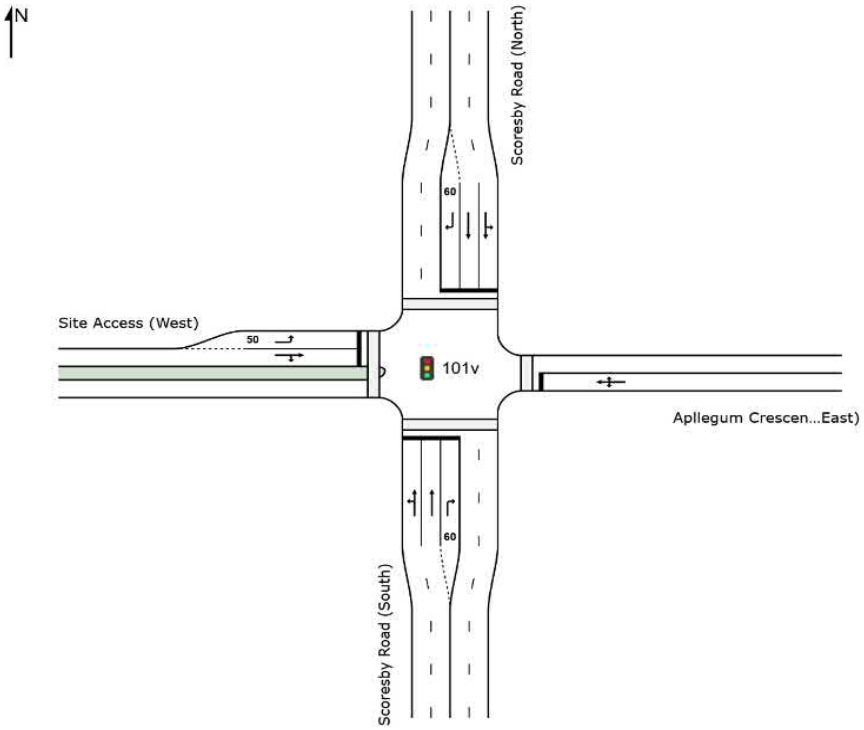
	App	R	T	L							
	0.1		0.1	5.6							
	0		0	0							
	0.378		0.378	0.378							
	1228		1209	19							
	37		36	1							
	1191		1173	18							
L					64	2	66	0.808	34.8	159.2	**App**
T					11	0	11	0.808	34.8	372.6	**R**
R											**T**
App					54	2	56	0.808	34.8	119	**L**
	2600		1287	56	1343		**LV***				
	80		40	2	42		**HV***				
	2680		1327	58	1385		**Total Vol***				
	0.808		0.428	0.428	0.428		**D.o.S.**				
	34.8		23.3	23.3	23.3		**95th %ile Back of Queue (m)**				
	5.5		2.1	20	2.9		**Average Delay (sec)**				
	Intersection	**L**	**T**	**R**	**App**						

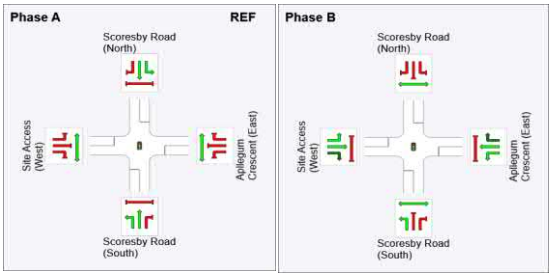
Apllegum Crescent

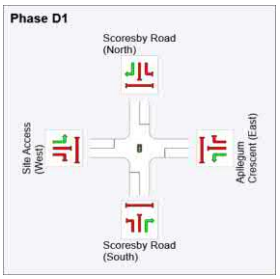
*Output Volumes

Scoresby Road (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[ScorApplAMSiFu]*







Phase	Grn	Yel	Red	Total	%
A	53	4	2	59	59
B	23	4	2	29	29
D1	6	4	2	12	12

Scoresby Road (North)

	App	R	T	L	
	16.6	55.6	15.7	20.5	**100**
	146.8	8	146.8	109.6	
	0.492	0.152	0.492	0.492	
	1199	23	1164	12	
	36	1	35	0	
	1163	22	1129	12	

Site Access (West)

L	31	12.8	0.09	53	2	51	123	4	127	0.25	34	33.1	**App**
T	40.4	44.5	0.502	14	0	14	12	0	12	0.25	34	33.3	**R**
R	46	44.5	0.502	123	4	119	5	0	5	0.25	34	28.7	**T**
App	41.5	44.5	0.502	189	6	183	108	3	111	0.25	34	33.3	**L**

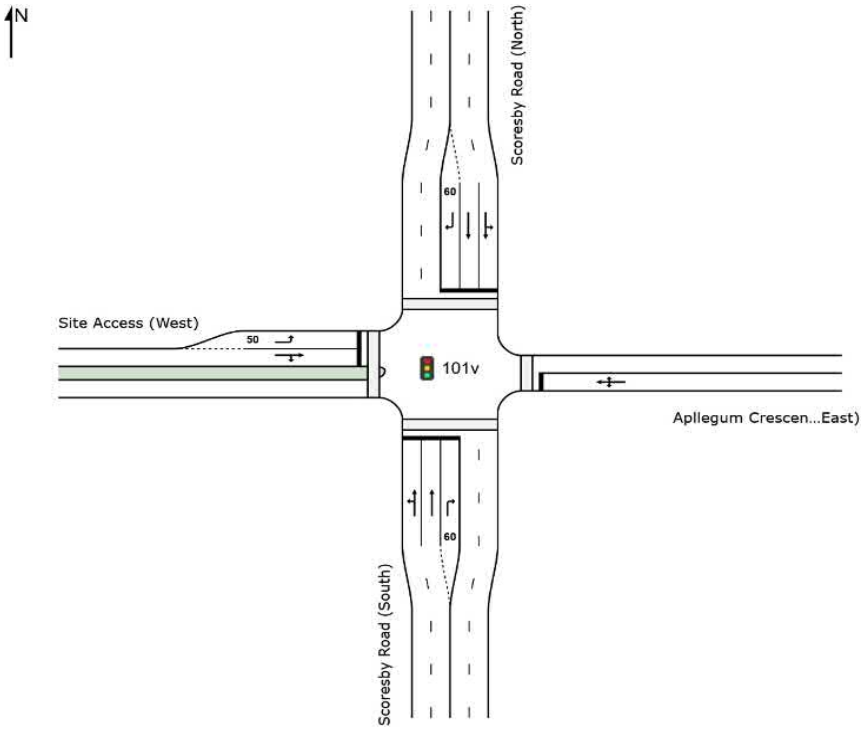
Apllegum Crescent (East)

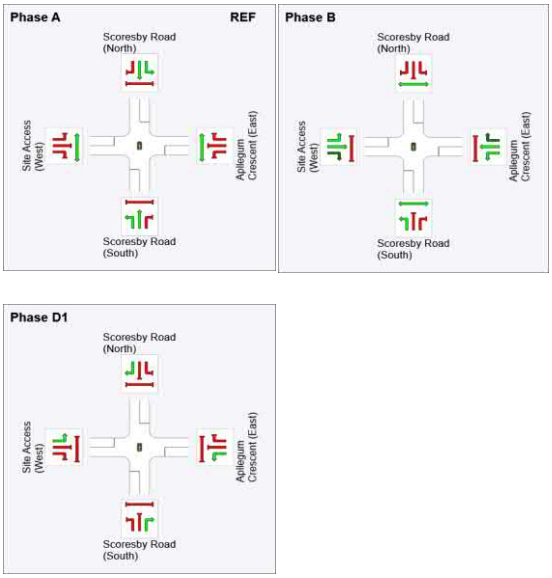
2432	27	915	19	962	**LV***
75	1	28	1	30	**HV***
2507	28	943	20	992	**Total Vol***
0.502	0.484	0.484	0.183	0.484	**D.o.S.**
146.8	105.6	105.6	7.1	105.6	**95th %ile Back of Queue (m)**
19.2	20.9	15.5	55.8	16.5	**Average Delay (sec)**
Intersection	**L**	**T**	**R**	**App**	

*Output Volumes

Scoresby Road (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[ScorApplPMSiFu]*





Phase	Grn	Yel	Red	Total	%
A	96	4	2	102	72.86
B	17	4	2	23	16.43
D1	9	4	2	15	10.71

Scoresby Road (North)

	App	R	T	L	
	13.1	76.6	10.7	15.5	
	142.5	22.4	142.5	142.5	
	0.484	0.387	0.484	0.484	
	1274	45	1209	19	
	38	1	36	1	
	1236	44	1173	18	

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Site Access (West)

L	54.4	12.1	0.084	31	1	30	76	2	78	0.311	34.6	62	**App**
T	67.3	37.4	0.527	7	0	7	11	0	11	0.311	34.6	62.6	**R**
R	72.9	37.4	0.527	69	2	67	12	0	12	0.311	34.6	58.1	**T**
App	67.3	37.4	0.527	107	3	104	54	2	56	0.311	34.6	62.6	**L**

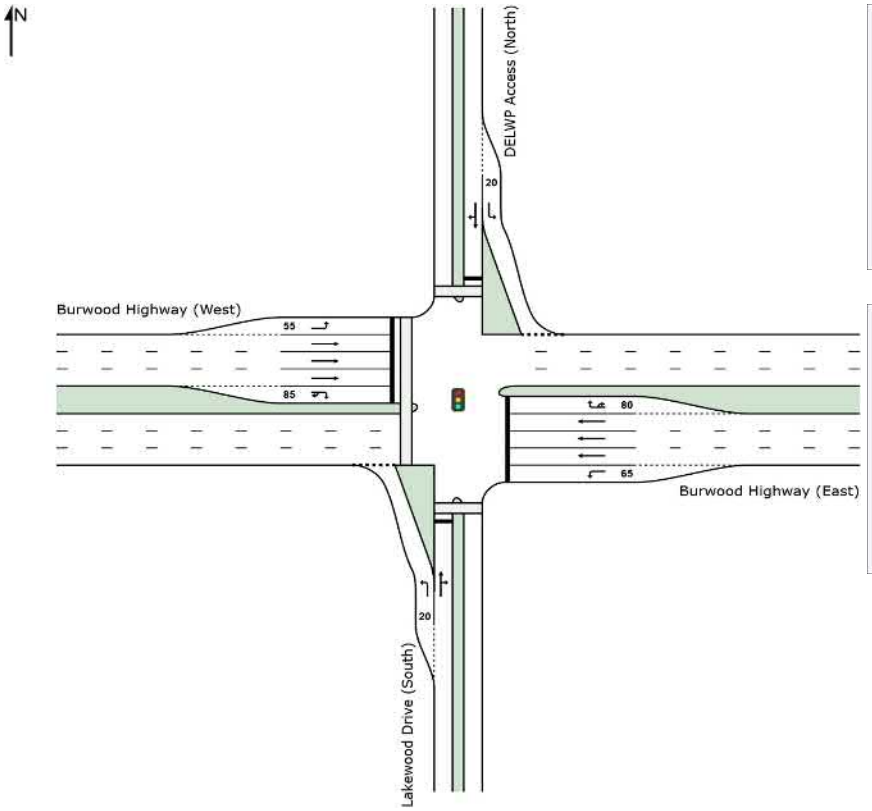
Apllegum Crescent (East)

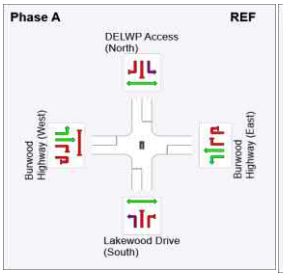
2812	53	1287	56	1397	**LV***
87	2	40	2	43	**HV***
2899	55	1327	58	1440	**Total Vol***
0.548	0.548	0.548	0.495	0.548	**D.o.S.**
169.2	169.2	169.2	28.9	169.2	**95th %ile Back of Queue (m)**
16.9	16.8	11.2	76.3	14	**Average Delay (sec)**
Intersection	**L**	**T**	**R**	**App**	

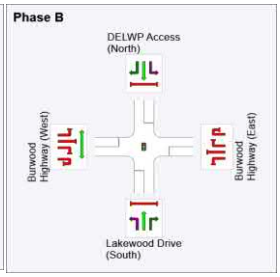
*Output Volumes

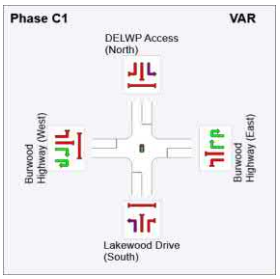
Scoresby Road (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[BurwLakeAMExEx]*









Phase	Grn	Yel	Red	Total	%
A	105	4	2	111	79.29
B	6	4	2	12	8.571
C1	11	4	2	17	12.14

DELWP Access (North)

	App	R	T	L	
	63.7	83.5	77.9	6.8	**140**
	3.3	3.3	3.3	0.1	
	0.141	0.141	0.141	0.003	
	8	5	1	2	
	0	0	0	0	
	8	5	1	2	

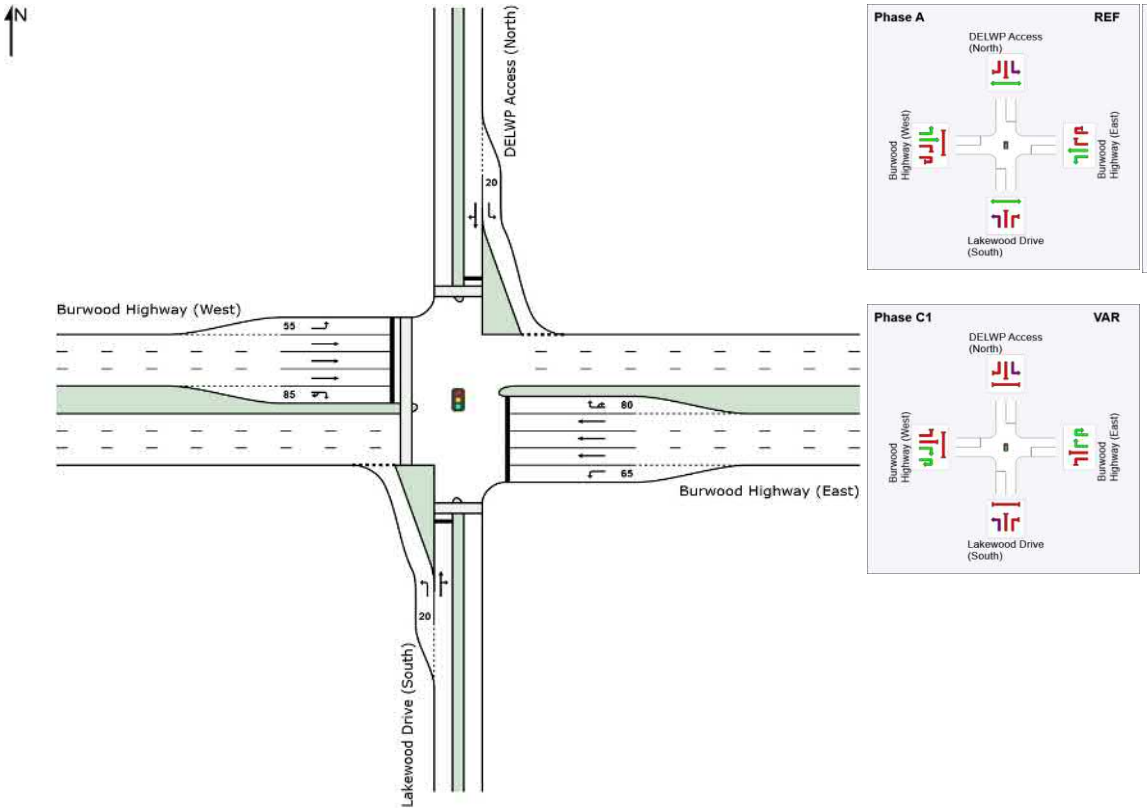
Burwood Highway (West)												**Burwood Highway (East)**		
L	11.3	3.2	0.018	24	1	23	2475	77	2552	0.589	181	8.8	**App**
T	5.7	55.2	0.26	1119	34	1085	13	0	13	0.206	12.1	73.3	**R**
R	76.2	32.6	0.552	24	1	23	2425	75	2500	0.589	181	8.1	**T**
App	9.7	55.2	0.552	1208	36	1172	25	1	26	0.02	3.5	11.3	**L**

3799	98	1	45	144	**LV***
118	3	0	1	4	**HV***
3917	101	1	46	148	**Total Vol***
0.589	0.322	0.545	0.545	0.545	**D.o.S.**
181	18.9	24.4	24.4	24.4	**95th %ile Back of Queue (m)**
10.2	13.2	75.6	81.2	34.9	**Average Delay (sec)**
Intersection	**L**	**T**	**R**	**App**	

*Output Volumes

Lakewood Drive (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[BurwLakePMExEx]*



Phase	Grn	Yel	Red	Total	%
A	88	4	2	94	67.14
B	10	4	2	16	11.43
C1	24	4	2	30	21.43

DELWP Access (North)

	App	R	T	L	
	66.2	80.7	75	20.3	**140**
	17.3	17.3	17.3	2.3	
	0.452	0.452	0.452	0.023	
	44	33	1	11	
	1	1	0	0	
	43	32	1	11	

Burwood Highway (West)

L	17.3	3.2	0.015	17	1	16	1725	53	1778	0.479	146.6	15.6	**App**
T	19.3	338.5	0.792	2666	80	2586	1	0	1	0.179	17.9	59.8	**R**
R	70.7	106.1	0.787	105	3	102	1640	51	1691	0.479	146.6	14.4	**T**
App	23	338.5	0.792	2894	87	2807	44	1	45	0.041	8.8	17.6	**L**

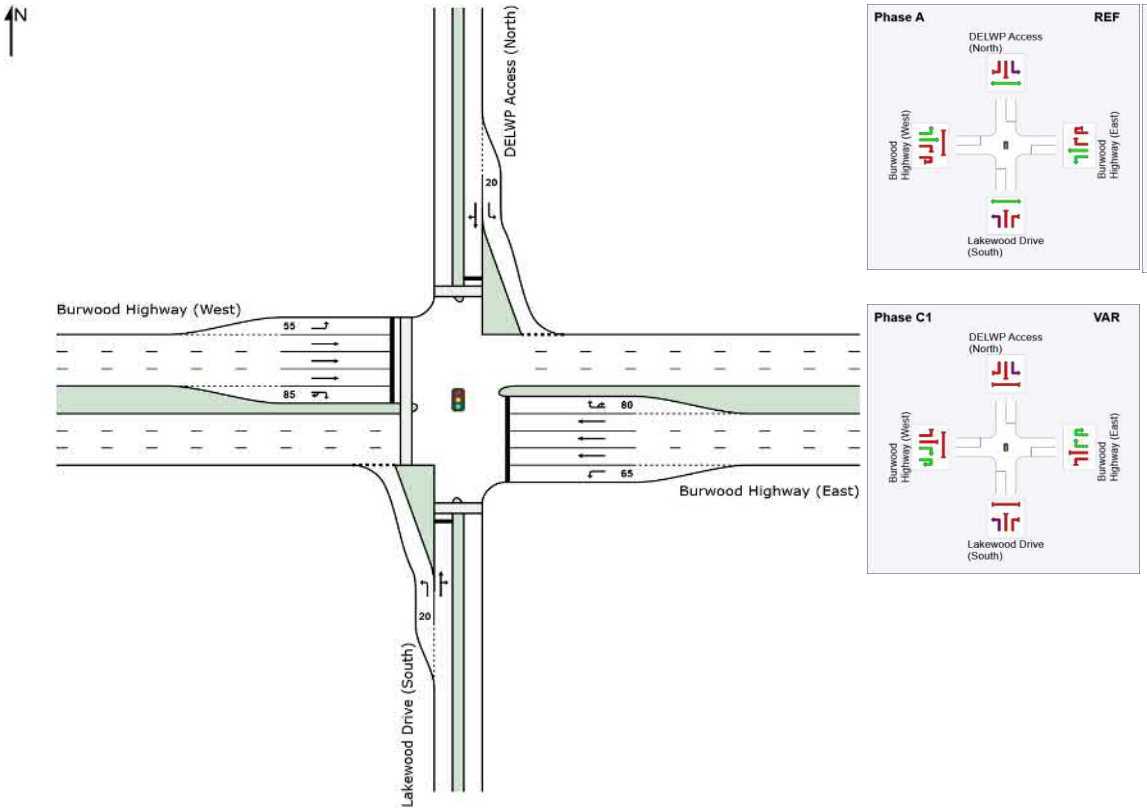
Burwood Highway (East)

4648	39	1	34	74	**LV***
144	1	0	1	2	**HV***
4792	40	1	35	76	**Total Vol***
0.792	0.086	0.276	0.276	0.276	**D.o.S.**
338.5	5.6	17.3	17.3	17.3	**95th %ile Back of Queue (m)**
21	11.6	69	74.6	41.3	**Average Delay (sec)**
Intersection	**L**	**T**	**R**	**App**	

*Output Volumes

Lakewood Drive (South)

Signals *N:\Projects\2019\190752\Sidra\190752SID001E.sip8[BurwLakeAMExFu]*



Phase	Grn	Yel	Red	Total	%
A	106	4	2	112	80
B	6	4	2	12	8.571
C1	10	4	2	16	11.43

DELWP Access (North)

				App	R	T	L							
				63.7	83.5	77.9	6.9							**140**
				3.3	3.3	3.3	0.1							
				0.141	0.141	0.141	0.003							
				8	5	1	2							
				0	0	0	0							
				8	5	1	2							
Burwood Highway (West)														**Burwood Highway (East)**
L	11	3.1	0.018	24	1	23		2601	80	2681	0.613	192.4	8.8	**App**
T	5.4	56.7	0.269	1171	35	1136		13	0	13	0.281	14.9	75.3	**R**
R	78.2	33.2	0.607	24	1	23		2540	79	2619	0.613	192.4	8	**T**
App	9.3	56.7	0.607	1260	38	1222		31	1	32	0.024	4.1	11	**L**
				3977		98	1	47	146		**LV***			
				123		3	0	1	5		**HV***			
				4100		101	1	48	151		**Total Vol***			
				0.613		0.339	0.569	0.569	0.569		**D.o.S.**			
				192.4		21	25.5	25.5	25.5		**95th %ile Back of Queue (m)**			
				10.1		14.7	75.8	81.4	36.6		**Average Delay (sec)**			
				Intersection		**L**	**T**	**R**	**App**					

*Output Volumes

Lakewood Drive (South)

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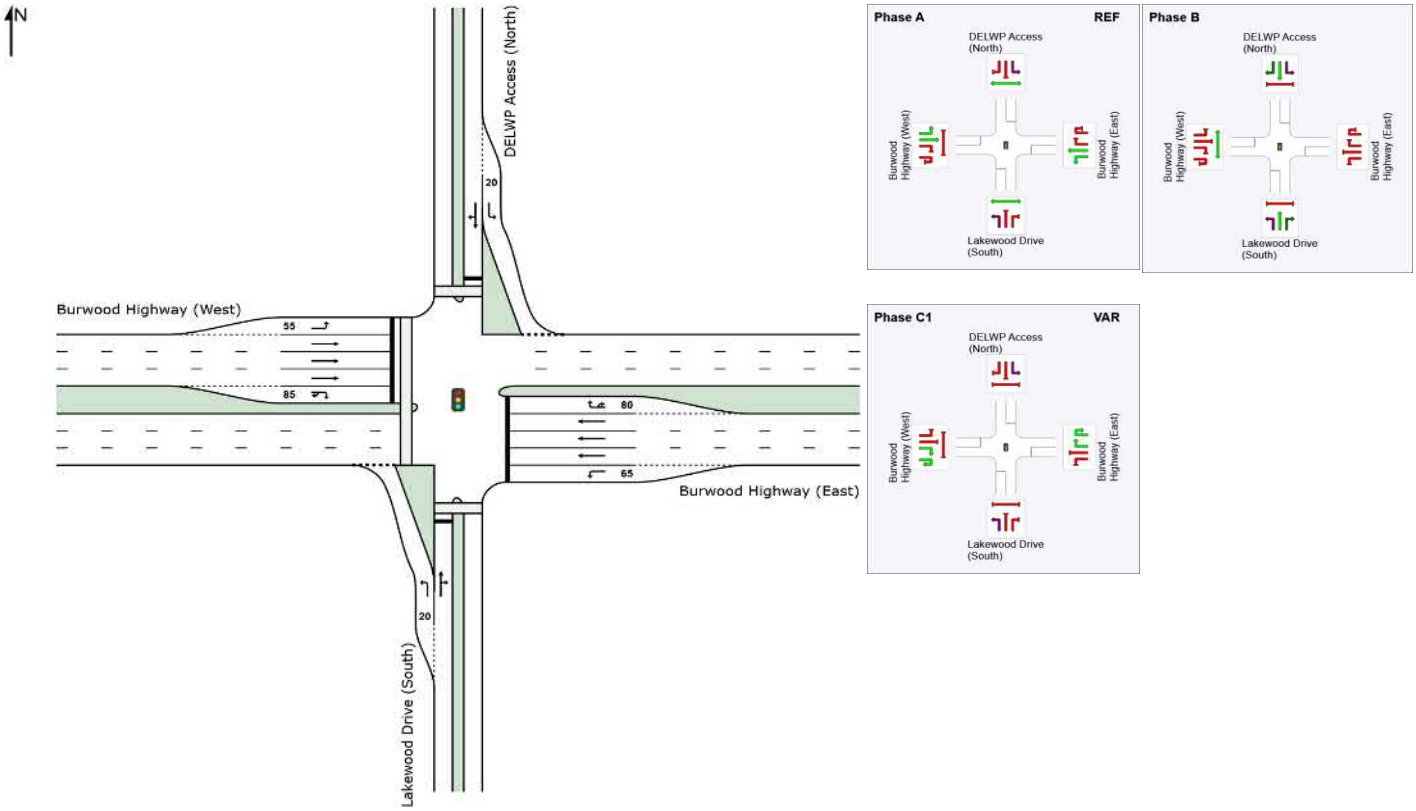

Phase	Grn	Yel	Red	Total	%
A	86	4	2	92	67.15
B	10	4	2	16	11.68
C1	23	4	2	29	21.17

DEWLP Access (North)

				App	R	T	L							
				65.2	78.9	73.3	22.1							**137**
				16.9	16.9	16.9	2.4							
				0.442	0.442	0.442	0.023							
				44	33	1	11							
				1	1	0	0							
				43	32	1	11							
Burwood Highway (West)														**Burwood Highway (East)**
L	17.2	3.2	0.015	17	1	16		1802	56	1858	0.502	153.9	15.8	**App**
T	19.6	356.6	0.821	2768	83	2685		1	0	1	0.224	21.8	59.7	**R**
R	71	105.4	0.804	105	3	102		1705	53	1758	0.502	153.9	14.4	**T**
App	23.2	356.6	0.821	2996	90	2906		47	1	48	0.044	9.3	17.4	**L**
				4829		39	1	38	78					**LV***
				149		1	0	1	2					**HV***
				4978		40	1	39	80					**Total Vol***
				0.821		0.088	0.302	0.302	0.302					**D.o.S.**
				356.6		5.8	19	19	19					**95th %ile Back of Queue (m)**
				21.1		12.1	67.5	73.1	42.5					**Average Delay (sec)**
				Intersection		**L**	**T**	**R**	**App**					

*Output Volumes

Lakewood Drive (South)

aurecon

Bringing ideas to life

Knoxfield

Construction & Demolition Waste Management Plan

Development Victoria

Reference: 510039

Revision: 0

2020-11-09

Document control record

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Document control						
Report title	Construction & Demolition Waste Management Plan					
Document code	REP-KD-0004		**Project number**	510039		
File path	Https://aurecongroup.sharepoint.com/sites/510039/5 Deliver Design/501 Engineering/Certification/Green Star Communities/4. Credits/30 Waste Management/Knoxfield C&D WMP Draft.docx					
Client	Development Victoria					
Current revision	**0**					

Approval

Contents

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1 Introduction

This Waste Management Plan (WMP) has been developed to plan for diverting waste from landfill during construction and demolition (C&D) of the Knoxfield project. A waste diversion rate of 95% is being targeted as this is a Best Practice requirement for the land developer, Development Victoria (DV).

C&D waste at Knoxfield must adhere to all environmental regulations. Additionally, Knoxfield is targeting a 6 Star Green Star Communities rating. This requires the preparation of a C&D WMP in accordance with Credit 30.1 Construction and Demolition Waste in the Green Star Communities tool. The WMP addresses the development of the whole project site, and identifies, investigates and implements waste management strategies to design out waste.

1.1 Purpose

The purpose of this WMP is to formalise the waste management approach considered in design and also used during throughout the construction process, in order to achieve the DV Best Practice waste diversion target of 95% and achieve to the Green Star Communities rating credit. This includes establishment of targets, and setting a method to implement effective waste diversion and well as measure and evaluate the success of these measures.

1.2 Scope

The scope of this WMP covers the whole project site, noting that each contractor delivering buildings will be required to develop and implement a separate C&D WMP to achieve the DV Best Practice waste target on a building-specific scale.

2 Context

2.1 Project overview

Knoxfield is a 19.2 ha site located at the corner of Burwood Highway and Scoresby Road in Knoxfield. This site was formerly a DELWP horticultural research facility. DV acquired the Knoxfield site, and had it rezoned to a Comprehensive Development Zone (CDZ) to support residential and mixed use development. Construction site works are likely to begin early in the year of 2021.

2.2 Site location

The Knoxfield site is located 26 km East of Melbourne, and will be a mainly residential site, with a single mixed-use development located at the South East corner. To the North of the site, a large area has been reserved for a wetland which will partially replace, and complement the existing dam, to provide natural habitat for the native fauna, and provide stormwater treatment services.

The site is located at the corner of Burwood Highway and Scoresby Road. Its interfaces include Blind Creek to the north; Fairhills High School and residential properties to the east; Burwood Hwy and the remaining DELWP offices to the south; and a light industrial estate to the west. Linkages with surrounding areas will be key to the development forming a cohesive part of Knoxfield rather than an island development.

Figure 1 Knoxfield masterplan

2.3 Waste targets

DV has a target to divert 95% of C&D waste from landfill. This target forms part of the DV 'Best Practice' requirements. Achieving this target will contribute 0.93 points to Credit 30.1 Construction and Demolition Waste in the Green Star Communities tool provided that the appropriate documentation is submitted to and approved by the Green Building Council of Australia (GBCA).

2.4 Waste hierarchy

The waste hierarchy shown in Figure 2 below demonstrates the approach that should be applied to minimise waste. The three strategies are reduce, reuse and recycle:

1. Reduce the amount of materials used and waste generated, whether it be landfill, recyclable, or another form of waste
2. Reuse materials again or repurpose materials to be used in a different way to what they were intended for
3. Convert waste into new items, through transforming waste using a range of mechanical and/or chemical processes at a recycling facility

This hierarchy should be used as a guide for waste minimisation in design and waste management during construction and demolition.

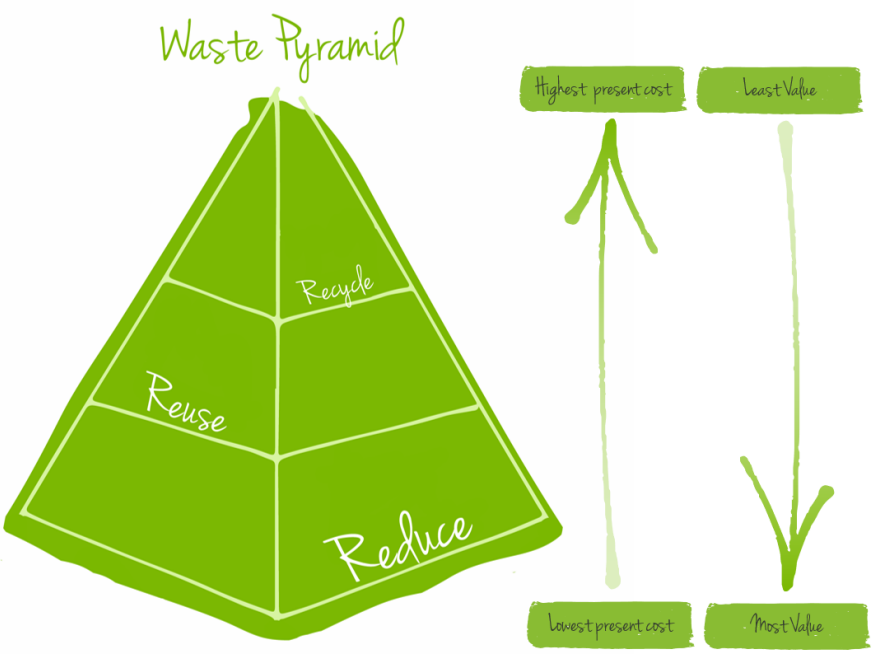

Figure 2 The waste hierarchy

3 Design

3.1 Designing out waste

Waste minimisation measures consider the way that design can impact the amount of materials used, thereby reducing waste generation. The five principles of 'Designing out Waste' as identified in Section 3 of the Waste & Resources Action Programme (WRAP) "Designing out Waste Tool for Civil Engineering" have been addressed to reduce waste through design:

1. Design for reuse and recovery
2. Design for off site construction
3. Design for materials optimisation
4. Design for waste efficient procurement
5. Design for deconstruction and flexibility

3.1.1 Design for reuse and recovery

This principle is particularly relevant for earthworks, pavements and structures as these can generate large quantities of waste. Reusing and recovering materials already on site is fundamental to achieving materials resource efficiency, by minimising the quantities of materials that have to be imported to or exported from the site. For site elements that do require importing to site, materials resource efficiency can be maximised by using materials with high recycled content.

Table 1 Design response for reuse and recovery

Key question	Project response
Can any elements of the existing site be reused in the new development?	To be determined by the Contractor prior to implementation of this WMP.
Can demolition and excavation materials be recycled as aggregates on or off site?	To be determined by the Contractor prior to implementation of this WMP.
Can the site layout be adapted to the existing topography to minimise earthworks?	To be determined by the Contractor prior to implementation of this WMP.
Can a cut and fill balance be achieved with the ground conditions on site?	To be determined by the Contractor prior to implementation of this WMP.
Can unsuitable soils be used for soil manufacture with PAS 100 compost?	To be determined by the Contractor prior to implementation of this WMP.
Can unsuitable soils be rendered suitable by stabilisation or geosystems?	To be determined by the Contractor prior to implementation of this WMP.
Can contaminated soils be remediated or encapsulated on site?	To be determined by the Contractor prior to implementation of this WMP.
Can existing pavements be recycled into new pavements using cold recycling techniques?	To be determined by the Contractor prior to implementation of this WMP.
Where can recycled products be used in the design?	To be determined by the Contractor prior to implementation of this WMP.
Are recycled products of adequate quality available locally at reasonable cost?	To be determined by the Contractor prior to implementation of this WMP.

Is the use of recycled products tracked using the ICE demolition protocol and WRAP guide 'The efficient use of materials in regeneration projects'?	To be determined by the Contractor prior to implementation of this WMP.

3.1.2 Design for offsite construction

The benefits of offsite factory production include the potential to considerably reduce waste on site. Its application also has the potential to significantly change operations on site, reducing the amount of site activities and changing the construction process into one of a rapid assembly of parts. This can lead to reduced transport movements, improved health and safety on site, reduced site errors and re-work, and reduced construction timelines.

Table 2 Design response for off site construction

Key question	Project response
Can any part of the design be manufactured off site?	To be determined by the Contractor prior to implementation of this WMP.
Can site activities become a process of assembly rather than construction?	To be determined by the Contractor prior to implementation of this WMP.

3.1.3 Design for materials optimisation

Materials optimisation means adopting a design approach that focuses on materials resource efficiency so that less material is used in the design (ie lean design/value engineering) and/or less waste is produced in the construction process, without compromising the design concept or required performance.

Table 3 Design response for materials optimisation

Key question	Project response
Can the amount of excavation be avoided by using ground improvement techniques?	To be determined by the Contractor prior to implementation of this WMP.
Can the overall use of materials be reduced by use of geosystems?	To be determined by the Contractor prior to implementation of this WMP.
Can the working platform (if required) be incorporated in the final structure?	To be determined by the Contractor prior to implementation of this WMP.
Can innovative designs or materials be used for structures to reduce material use?	To be determined by the Contractor prior to implementation of this WMP.
Can the design, form and layout be simplified without compromising the design concept?	To be determined by the Contractor prior to implementation of this WMP.
Can the design be coordinated to avoid/minimise excess cutting and jointing of materials (eg pipes and geosynthetics) that generate waste?	To be determined by the Contractor prior to implementation of this WMP.
Is there repetition and coordination of the design, to reduce the number of variables and allow for operational refinement (eg reusing formwork)?	To be determined by the Contractor prior to implementation of this WMP.

3.1.4 Design for waste efficient procurement

Designers need to understand how their design choices lead to the generation of waste on site. Once this is understood, methods can be applied that can reduce waste through some or a combination of the following: design (e.g. designing structural elements which can be constructed efficiently); specification (e.g. writing tighter specifications of work procedures to avoid waste and allow the use of recycled materials); and contracts (e.g. encouraging early contractor involvement).

Table 4 Design response for waste efficient procurement

Key question	Project response
Has research been carried out by the design team and/or WRAP's Net Waste Tool used to identify where on site waste arises?	To be determined by the Contractor prior to implementation of this WMP.
Can construction methods that reduce waste be devised through liaison with the contractor and specialist subcontractors?	To be determined by the Contractor prior to implementation of this WMP.
Have the project specifications been reviewed to select elements/components/materials and construction processes that reduce waste?	To be determined by the Contractor prior to implementation of this WMP.
Has the programme been developed to include opportunities for reuse or recycling of materials on site?	To be determined by the Contractor prior to implementation of this WMP.
Have appropriate KPIs and targets for waste been set and included in contracts for the whole supply chain?	To be determined by the Contractor prior to implementation of this WMP.

3.1.5 Design for deconstruction and flexibility

Designers need to consider how materials can be recovered effectively during the life of the building when maintenance and refurbishment is undertaken or when the building comes to the end of its life. While some civil engineering structures, such as pavements and earthworks, cannot be disassembled and reconstructed in the same way as buildings, the construction should not include any materials or components that would make future extension or recycling difficult or impossible.

Table 5 Design response for deconstruction and flexibility

Key question	Project response
Is the design adaptable for potential expansion or alternative use in the future?	To be determined by the Contractor prior to implementation of this WMP.
Does the design contain anything that would make it difficult to deconstruct or recycle the structure or element at the end of its life?	To be determined by the Contractor prior to implementation of this WMP.
Does the design incorporate reusable/recyclable components and materials?	To be determined by the Contractor prior to implementation of this WMP.
Can the components be maintained, upgraded or replaced without creating excessive waste?	To be determined by the Contractor prior to implementation of this WMP.

4 Construction and demolition

4.1 Waste estimates

4.1.1 Anticipated waste streams and estimates

The Contractor is to determine the anticipated waste streams, along with their generation estimates, prior to implementation of this WMP. At a minimum, the following four waste types must be considered in line with environmental regulations:

1. Fill material
2. Solid inert waste from an industrial source, e.g. concrete, bricks, timber, plastic, glass and metals
3. Putrescible waste from an industrial source, e.g. domestic garbage
4. Prescribed industrial waste (PIW), e.g. hazardous waste and contaminated soils

4.1.2 Anticipated waste reduction and disposal strategies

The Contractor is to determine the anticipated waste reduction and disposal strategies for each waste stream, prior to implementation of this WMP. Generally, the following waste reduction strategies should be applied:

- Manage and plan the delivery and storage of materials efficiently
  - Ensure materials are stored with waterproof protection on site
  - Coordinate deliveries so that there is sufficient storage space on site before materials are ready to be used
- Place accurate orders for materials so that there are no excess materials
- Reduce waste from packaging of materials
  - Engage with suppliers to limit the use of non-recyclable packaging
  - Engage with suppliers to adopt reusable packaging and take-back programs

4.2 Site controls

4.2.1 Bins and storage

The Contractor is to determine bins and storage of waste prior to implementation of this WMP. Generally, bins should be supplied that allow on site segregation of waste.

Appropriate locations should be determined for storage of different waste streams. Key considerations include:

- Bins to be located away from areas of water movement to minimise potential for water or soil contamination
- Bins to be clearly labelled for each waste stream
- Bin lids to be kept closed where possible
- Site office to be equipped with relevant bins for office waste streams
- Bin areas to be kept in a tidy manner

4.2.2 Transportation

There are strict requirements on the transport of waste, particularly for hazardous waste. The Contractor is to adhere to all environmental regulations for the transportation of waste.

4.2.3 Training

All site personnel including sub-contractors must attend a site induction, which is to include environmental training. The environmental training must include the following information:

- An outline of the key requirements of the WMP and the waste targets
- Responsibilities of all site personnel for adhering to the WMP
- Site waste management rules
- Location of onsite storage compounds
- Utilising recycled materials throughout construction process where possible

Posters or similar communications must be utilised in appropriate locations that educate and reinforce best practice waste management, and must also include information on how the project is tracking towards the waste targets. These must be regularly updated with quantities of material diverted from landfill.

4.3 Monitoring and reporting

4.3.1 Inspections

Daily site walks should incorporate a waste inspection by the ESM. Additionally, weekly waste inspections should be undertaken by the ESM or other appropriate delegate to ensure that:

- Waste streams are being segregated correctly
- Waste storage areas are being used appropriately and are not causing any issues with odour or overflowing litter
- Waste is contained and not discharging to the environment

Additional inspections shall be undertaken if required, such as if community complaints arise or construction activities change.

4.3.2 Reporting requirements

The recycling and reuse of construction and demolition waste associated with the project site, and its measurement, must comply with environmental regulations as well as the following reporting requirements:

- The proportion by mass, of construction and demolition waste from all construction works that has been re-used or recycled, must be recorded and documented. This includes:
  - Weighbridge dockets and reported data from waste service suppliers
  - Actual quantities and composition of materials
  - Locations of where material is taken
  - Auditing of material tracking and management
- On at least a quarterly basis the ESM must be informed of:
  - The processes being used to monitor the re-use and recycling of construction and demolition waste
  - The quantities achieved for re-used and recycled waste

- Where the construction works are carried out by a number of independent contractors at different stages of the project development, the ESM must provide extracts from the developer and contractor agreement(s) that state the conditions of the agreement including the determined waste targets.
- If a sub-contractor is engaged to sort and recycle construction waste on the project's behalf and does it on a 'bulk' basis, not on a project basis, the sub-contractor must provide evidence of diverting the stipulated percentage of waste.
- If waste is measured by volume rather than mass, the Contractor must convert the results to mass and the conversion factors chosen must be justified. Full details of the justification of the conversion factors used must be given.
- Any waste that is not normally sent to landfill must be excluded from calculations. This includes soil (from land clearing and excavation activities) or waste that legally must be withheld from general construction waste (such as asbestos). Land clearing debris must also be excluded.

5 Roles and responsibilities

Table 6 summarises the key roles and their associated responsibilities on this project. These are to be confirmed by the Contractor prior to implementation of this WMP. The Contractor is to provide the name of the person responsible for waste on site.

Table 6 Roles and responsibilities

Team	Role	Responsibilities
Construction	Project Manager	■ Ensure the necessary staff and resources are available to develop and implement the WMP ■ Ensure compliance with the WMP ■ Ensure all incidents are reported internally and externally, as required, and corrective/preventive action is closed out within applicable timeframes ■ Ensure appropriate consultation arrangements are established with the workforce, client and other stakeholders ■ Ensure that site staff and site personnel are provided with appropriate training, information, instruction and supervision in relation to waste management
Construction	Environment and Sustainability Manager (ESM)	■ Provide training to project staff to support achievement of the projects waste goals ■ Ensure the requirements of the WMP are implemented ■ Communicate any issues to relevant parties ■ Inspect, check and audit project waste handling
Construction	Construction Manager	■ Ensure the site staff attend training ■ Implement and oversee of the requirements of WMP ■ Allow space, facilities, time and resources within the project to carry out the waste management activities set out in this WMP ■ Respond to and correct issues identified by the ESM through inspections, audits and incident investigations, or otherwise as necessary
Construction	Contracts Administrator	■ Incorporate waste management requirements in all subcontracts and provide prospective subcontractors with relevant documentation ■ Advise subcontractors that they will be required to attend a pre-commencement meeting with members of the site team
Construction	Site Manager	■ Assist the Project Manager with the implementation and maintenance of this WMP ■ Issue directions to cease work for activities that do not comply with accepted environmental controls ■ Monitor the site and site activities to ensure these remain compliant with regulatory requirements and other requirements as identified in the WMP ■ Review site logistics plans & arrangements to ensure onsite waste is managed as efficiently as possible
Construction	Project Engineer	■ Ensure the waste record management system is established and maintained ■ Monitor compliance with waste requirements by all employees including subcontractor employees and take prompt corrective action when necessary ■ Provide support to supervisors in determining appropriate work methodology and in the selection of suitable building materials

Construction	Site Supervisor	▪ Assist the Site Manager by reviewing the site and site activities to ensure these remain compliant with regulatory requirements and other requirements as identified in the WMP ▪ Assist the Site Manager by reviewing site logistics plans & arrangements to ensure onsite waste is managed as efficiently as possible ▪ Conduct and document weekly site inspections and detail responsibilities for completing corrective actions within specified timeframes ▪ Issue directions to cease work for activities that do not comply with accepted environmental controls
Construction	Project Coordinator	▪ Assist Project Engineers to ensure that the waste record management system is established and maintained ▪ Assist Site Supervisors in conducting and documenting weekly site inspections and detailing responsibilities for completing corrective actions within specified timeframes ▪ Assist the Site Manager with reviewing logistics arrangements
Construction	General / Subcontractors	▪ All personnel working on the project including subcontractors are responsible for following the requirements of this WMP ▪ Contracts issued to subcontractors shall include provisions to support or enforce the requirements of this WMP
Design	Sustainability Lead	▪ Developing the WMP ▪ Ensuring the requirements of the WMP are considered in design ▪ Fulfilling the role of Green Star Accredited Professional (GSAP) on the project
Design	General	▪ All personnel working on the project must consider the impact of design on waste minimisation and diversion during construction in line with the requirements of this WMP

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621 Burwood Highway, Knoxfield

Waste Management Plan

190752WMP001D-F.docx

19 February 2021

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DOCUMENT INFORMATION

Prepared for	Development Victoria		
File Name	190752WMP001D-F.docx	**Report Date**	19 February 2021

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

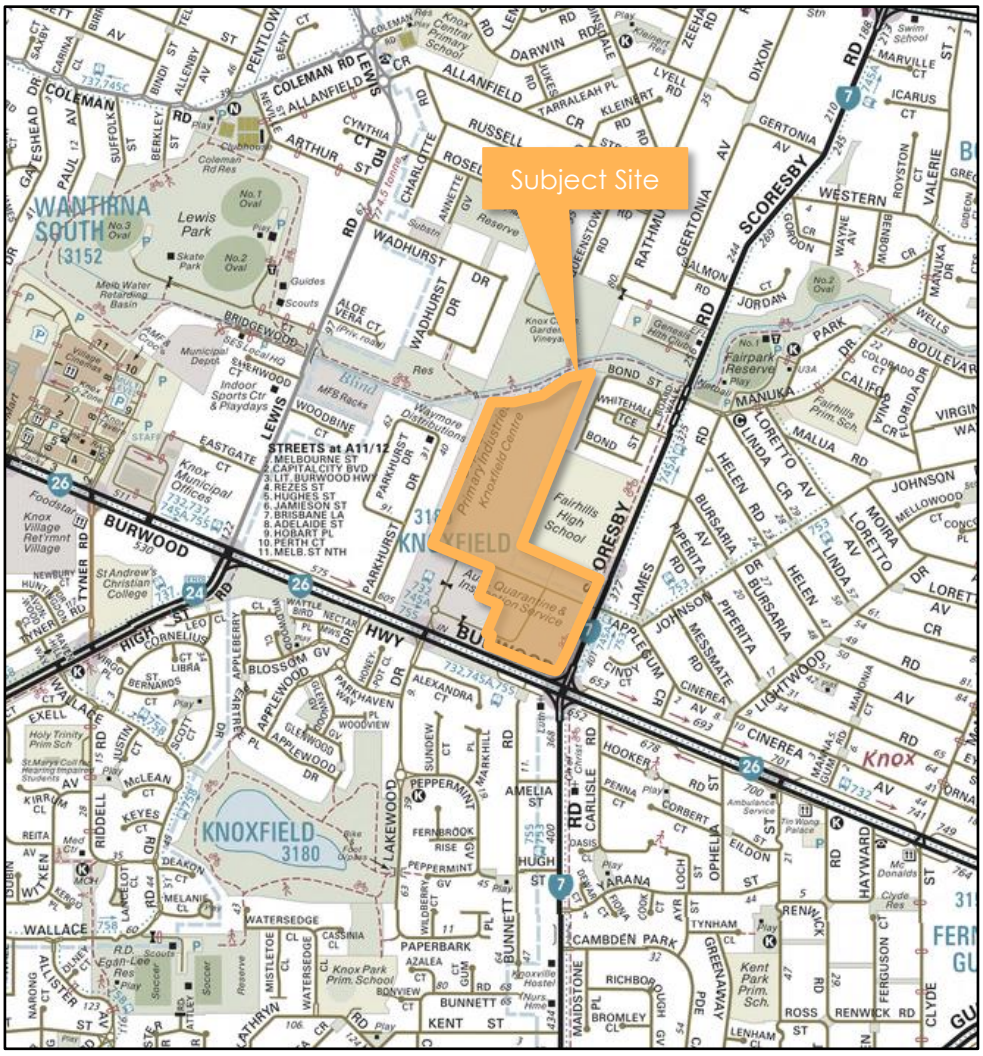
onemile**grid** has been requested by Development Victoria to prepare a Waste Management Plan for the proposed residential subdivision at 621 Burwood Highway, Knoxfield.

The preparation of this management plan has been undertaken with due consideration of the Sustainability Victoria Better Practice Guide for Waste Management and Recycling in Multi-unit Developments and relevant Council documentation.

2 EXISTING SITE CONDITIONS

The subject site is located at the north-east corner of the intersection between Burwood Highway and Scoresby Road, addressed as 621 Burwood Highway, Knoxfield, as shown in Figure 1. The site is irregular in shape with frontages to Burwood Highway and Scoresby Road.

Figure 1 Site Location



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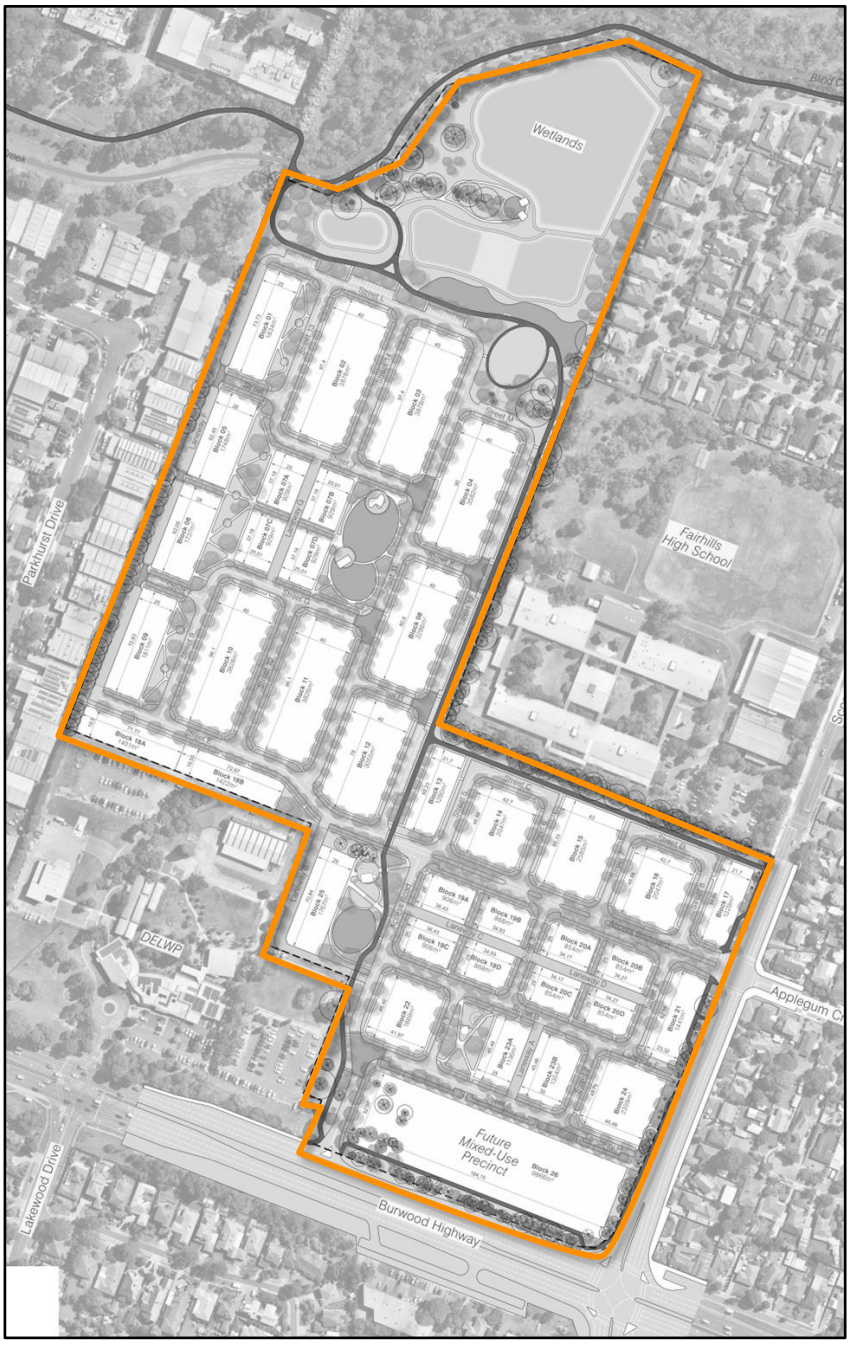
3 DEVELOPMENT PROPOSAL

3.1 General

It is proposed to develop the subject site for the purposes of a residential subdivision, with an indicative residential yield of 433 dwellings. A mixed use precinct is identified in the south-east of the development at the Burwood Highway frontage, though the specific nature of this use is unknown and will not be addressed as part of the current application. A view of the indicative masterplan is provided in Figure 2 below.

Access to the site is proposed via a signalised four-way intersection with Scoresby Road and Applegum Crescent and at a left-in/left-out intersection with Burwood Highway.

Figure 2 Subdivision Layout



3.2 Waste Management

It is proposed to utilise Knox City Council's municipal waste collection services to manage the collection and disposal of all waste streams associated with the development.

All bins will be stored within the individual allotments between collections. Bins will be transferred by residents to the street frontages for collection on the specified collection day. Following collection, bins will be collected and returned to each residential lot.

Bins shall be placed kerbside in accordance with Council standard requirements, including spacing of bins, clearances to street trees and street furniture, and clearances to corner locations. Where sufficient kerbside space is not available in close proximity to each lot, and to allow for increased landscaping area, bins may be placed within the crossover for the dwelling. Given that each dwelling (other than those with laneway access) will be provided with a crossover of at least 2.8m, sufficient space will be available adjacent all developments for bin placement.

While residents will generally place their bins at their property street frontage, it is noted that the lots which are accessed via a rear laneway, extended driveway, or front the open space areas will be required to transfer their bins to alternative locations for collection. For these dwellings, sufficient space is available on the adjacent road to provide for collection.

The proposed road network comprises access streets and laneways, with minimum pavement widths of 7.3m wide allowing parking on both sides, or 5.5m wide allowing parking on one-side, with standard kerb radii to ensure that waste collection vehicles can be accommodated throughout the site.

4 WASTE GENERATION

4.1 Garbage, Recycling and Green Waste

It is proposed to provide garbage and recycling bins in accordance with Council standard bin provision. Residents able to request a green waste bin, a larger general waste bin, or secondary bins for an extra cost.

Furthermore, it is noted that Knox City Council will be introducing separated recycling streams with one bin for plastics, paper, and metals and a second bin for glass. It is understood that no more than two bins per household will be placed kerbside at any one time.

4.2 Hard Waste

Hard waste will be collected from kerbside locations in accordance with Council standard requirements, with two free kerbside collections provided per household per year. Hard waste collections are required to be booked by residents.

Additional to the above, hard waste may be disposed of independently by residents, at the Knox Transfer Station and Recycling Facility.

4.3 Electronic Waste (E-Waste)

E-waste includes all manner of electronic waste, such as televisions, computers, cameras, phones, household electronic equipment, batteries and light bulbs. On 1st July 2019, the disposal of E-waste to landfill was banned by the Victorian Government.

E-waste contains valuable materials that can be recovered and reused such as tin, nickel, zinc, aluminium, copper, silver and gold.

Council does not provide a residential kerbside pick-up service for E-waste, therefore E-waste must be taken by residents to the appropriate collection centre, as described below:

- Knox Transfer Station and Recycling Facility;
- Planet Ark operate a number of e-waste recycling drop-off locations throughout Victoria (https://recyclingnearyou.com.au/electrical);
- Officeworks stores accept small amounts of personal E-waste;
- Aldi stores accept batteries; and
- Some Bunnings stores accept batteries.

Additional recycling locations are provided at https://www.sustainability.vic.gov.au/Campaigns/eWaste.

4.4 Soft Plastics

Soft plastic waste is estimated to contribute approximately 20% of landfill waste volumes, and includes such things as bread bags, plastic bags, bubble wrap and snap lock bags.

Soft plastics can be recycled via REDcycle bins located at most Coles and Woolworths supermarkets, including Coles Knox, Coles Ferntree Gully and Woolworths Mountain Gate in the vicinity of the site.

No specific bin provision is required for soft plastic recycling, though it is recommended that residents are made aware of soft plastic recycling.

5 BIN REQUIREMENTS

5.1 Bin Provision and Specifications

It is proposed to utilise Council's municipal waste collection for all waste services for the proposed development. Consequently, the following bins will be provided for each dwelling.

Table 1 Bin Provision

Component	Bin Size	Collection Frequency	Colour
Garbage	80L or 120L	Weekly	Yellow lid and green body
Recycling*	240 L	Fortnightly	Blue lid and black body
Green Waste**	240 L	Fortnightly	Red lid and dark green body

* Following the roll out of separated recycling streams, an additional bin will be required for each dwelling.

** Optional

5.2 Bin Collection

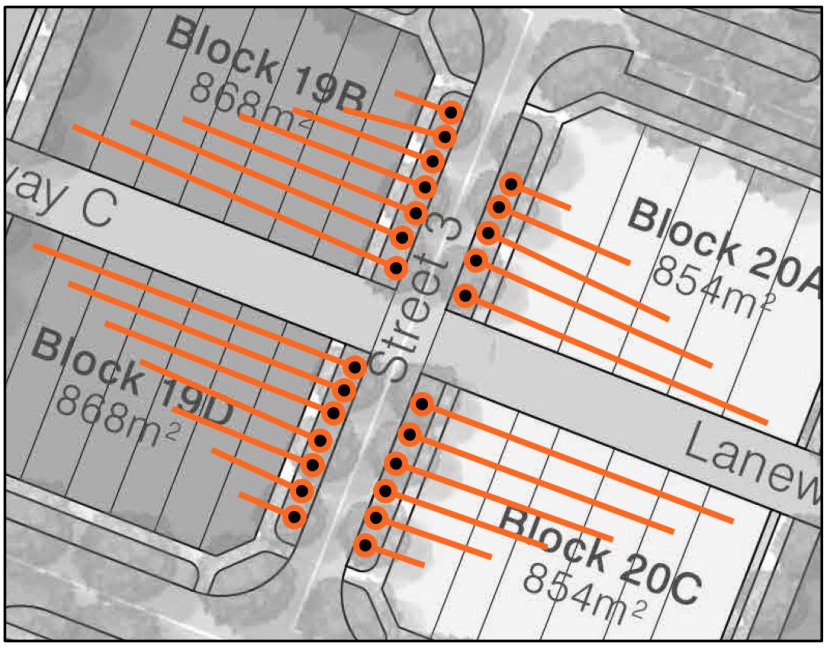
To allow for collection, bins will be transported to the nature strip of the respective streets and positioned kerbside for collection by Council.

Knox Council requires bins are placed facing outwards, with an allowance for approximately 500mm between bins, and 1.0m from street furniture.

Typically, bins shall be placed on the nature strip immediately adjacent the dwelling, in accordance with Council requirements.

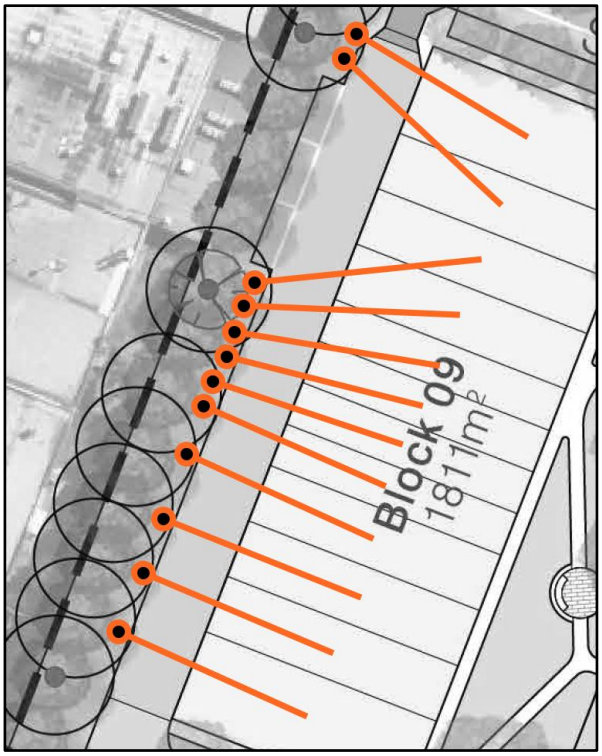
Where lots are provided with access via a double-sided rear laneway, bins will need to be placed on the adjacent residential street, as per the example below.

Figure 3 Double-Sided Laneway Bin Placement Example



Conversely, where lots are provided with access via a single-sided rear laneway, as per the western site boundary, bins may be placed on the laneway, opposite the dwelling, though avoiding indented parking where possible, as per the example below.

Figure 4 Western Laneway Bin Placement Example



Where sufficient kerbside space is not available in close proximity to each lot, bins may be placed within the crossover for the dwelling. With each dwelling provided with a crossover of minimum 2.8m wide, sufficient space is available to contain 2 bins, with the required clearances. This is considered to be a minor inconvenience for residents, and common practice for residential areas, though ensures that landscaping along the internal roads can be maximised, and the desired dwelling density can be achieved.

6 WASTE MANAGEMENT

6.1 Best Practice Waste Management

Best Practice Waste Management is an initiative designed to reduce the amount of waste generated through encouraging a change of behaviour and action on waste management and moreover recycling.

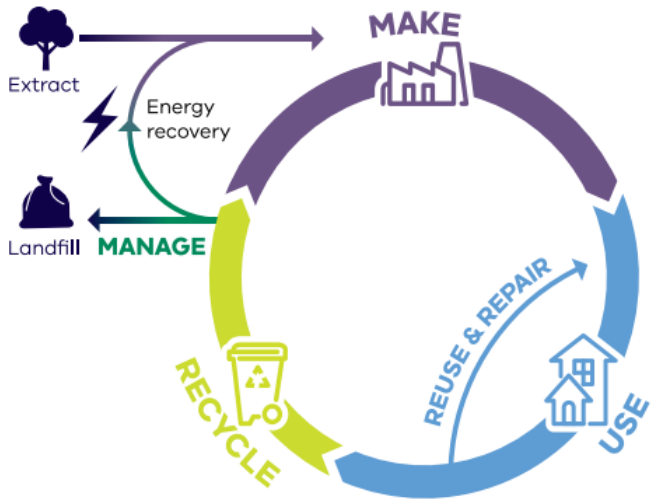
The benefits of reducing waste generation are far reaching and has been identified as significantly important by Council and the Victorian Government.

Recycling Victoria: A New Economy is a policy and 10-year action plan, prepared by the Victoria Government, to "deliver a cleaner, greener Victoria, with less waste and pollution, better recycling, more jobs and a stronger economy".

Four overarching goals have been identified in order to achieve a circular economy in relation to waste, as below:

1. MAKE – Design to last, repair and recycle;
2. USE – Use products to create more value;
3. RECYCLE – Recycle more resources;
4. MANAGE – Reduce harm from waste and pollution.

Figure 5 Resource Flows in a Circular Economy



In relation to the proposed development, recycling is of key importance, and in this regard, the Council shall encourage residents to participate in minimising and reducing solid waste production by:

- Promoting the waste hierarchy, which in order of preference seeks to:
  - Avoid waste generation in the first place;
  - Increase the reuse and recycling of waste when it is generated; and
  - Recover, treat or contain waste preferentially to;
  - Its disposal in Land Fill (which is least desirable).
- Providing information detailing recyclable materials to ensure that non-recyclable materials do not contaminate recycling collections;
- Providing information regarding safe chemical waste disposal methods and solutions, including correct battery and electronics disposal methods;
- Encouraging composting for residents;

- Providing tips for recycling and reusing waste, including encouraging the disposal of reusable items in good condition via donations to Opportunity Shops and Charities.

Additionally, it is recommended that a four bin system is provided within each dwelling, providing separate bins for garbage, recycling, organics and glass.

6.2 Bin Usage

Residents will bag and dispose of garbage in the appropriate bins. Residents will dispose of recyclables and green waste (non-bagged) in the appropriate bins. Cardboard boxes should be flattened, and containers rinsed and cleaned prior to disposal in the provided bins.

6.3 Signage

To avoid contamination between garbage streams, bin lids will be colour coded in accordance with Council standards. Furthermore, bins should include typical signage (preferably on the bin lid) to reinforce the appropriate materials to be deposited in each bin. Example signage available from Sustainability Victoria is shown below.

Figure 6 Example Waste Signage

6.4 Resident Information

To ensure all residents are aware of their responsibilities with regard to waste and bin management, an information package will be provided to all residents, including the following information:

- A copy of this Waste Management Plan;
- Methods and techniques for waste reduction and minimisation;
- A copy of Knox Council's A-Z Guide to Waste and Recycling;
- Information regarding bin collection days and requirements; and
- Resident responsibilities with regard to bin usage, storage, and collection.

7 CONTACT INFORMATION

Knox City Council

Phone: (03) 9298 8000 (Customer Service)

Web: www.knox.vic.gov.au

Email: knoxcc@knox.vic.gov.au

Sustainability Victoria

Services: Sustainable Waste Management initiatives and information

Phone: 1300 363 744 (Energy, Waste and Recycling)

Web: www.sustainability.vic.gov.au

Email: info@sustainability.vic.gov.au

PAROISSIEN GRANT & ASSOCIATES PTY LTD
Consulting Engineers & Surveyors

609-621 Burwood Hwy, Knoxfield

SERVICES INVESTIGATION & DEVELOPMENT REPORT

26th October, 2020

Development Victoria

Suite 10, 131 Bulleen Road, Balwyn North Vic 3104
Phone 03 9859 6400 Fax 03 9859 5022
Email: info@pga.net.au

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DOCUMENT ISSUE

ISSUE VERSION	DATE	DESCRIPTION	PROJECT CONSULTANT/AUTHOR	DIRECTOR APPROVAL
1	29th September, 2020	DRAFT ISSUE	BK	NGP
2	26th October, 2020	FINAL ISSUE	BK	NGP

1.0 EXECUTIVE SUMMARY

Paroissien Grant and Associates Pty Ltd has been commissioned by Development Victoria to prepare a Services Investigation & Development Report to support a planning application for a proposed 493 residential dwelling subdivision which is located at 609-621 Burwood Hwy, Knoxfield. The proposed Concept Master Plan is shown in Figure 1.

The strategies outlined in this report provide an appropriate response to the various requirements for Knox City Council to consider for servicing requirements in respect of the planning application for development.

- Both minor (pipe) and major (overland) stormwater systems to cater for the development of the site and external catchments will be constructed. Ultimately this includes a new retarding basin and combined sediment/wetland system for water quality improvement before discharging to Blind Creek;
- During the initial stages of development temporary stormwater quality management measures including a sediment basin will be constructed and remain in operation until the ultimate wetland/retarding basin works are completed. This is required to prevent sediment laden runoff from produced during and post construction of the initial stages of the development entering the existing dam and ultimately discharging to Blind Creek.
- Development adjoining Blind Creek and the proposed retarding basin/wetland is to achieve a minimum freeboard height of 600mm from the 1 % AEP flood levels;
- An internal sewerage network is to be aligned within road reserves and allotment easements where feasible all in accordance with South East Water design standards and to connect to the existing sewerage infrastructure adjoining the site;
- Construction of a reticulated water supply (potable) main network is to be aligned within the road reserves and designed in accordance with South East Water water design standards. The system will be reticulated with connection points at the Scoresby Road and Burwood Hwy existing infrastructure in consideration of the two separate reservoir supply zones;
- For a residential development of this site the electrical distribution network must be via underground supply with on ground kiosk reserves required within the development area. A proposed network of low and high voltage cables will be installed within the subdivision with high voltage links between the various substation sites and surrounding high voltage network at the development frontages. The existing overhead lines within the subdivision, specifically along the western boundary and at the existing entrance driveway on Scoresby Road will be removed as part of the proposed reticulation network;
- Depending on the chosen service provider telecommunication options include the following:
- Extend the NBN fibre network to the development site from adjoining infrastructure by NBN Co and following a development application and assessment;
- Make formal application to Telstra, the project is registered for provision of underground cable supply. The developer as part of the subdivision would construct the pit and pipe network in readiness for Telstra to accept the assets and use for their cabling network; and
- Make formal application to Optus, the project is registered for provision of underground cable supply. The developer as part of the subdivision would construct the pit and pipe network in readiness for Optus to accept the assets and use for their cabling network; and
- Provision of a gas reticulation network by the gas authority within the subdivision in a common trench with the water supply will be provided for the development.

Figure 1: Concept Master Plan: 609-621 Burwood Hwy, Knoxfield

Suite 10, 131 Bulleen Road, Balwyn North Vic 3104
Phone 03 9859 6400 Fax 03 9859 5022
Email: info@pga.net.au

2.0 INTRODUCTION

The site location of the property at 609-621 Burwood Hwy, Knoxfield, is shown in Figure 2.

Figure 2: Site Locality Plan: 609-621 Burwood Hwy, Scoresby

2.1 Site Locality and Description

The site area is 19.21Ha and is irregular in shape. The subject land has a frontage to Burwood Hwy of approximately 210 metres and to Scoresby Road of approximately 290 metres and is surrounded by existing development west and east, Fairhills Secondary College to the east and Blind Creek to the north.

The subject land was previously used as the horticultural research and flora quarantine facility for the Department of Environment, Land, Water and Planning (DELWP) and comprises grassed vacant land, some sparse tree cover, a dam and some abandoned road pavements. The previous land use ceased operation in 2013.

A Feature and Level Survey Plan of the site is shown in Figure 3.

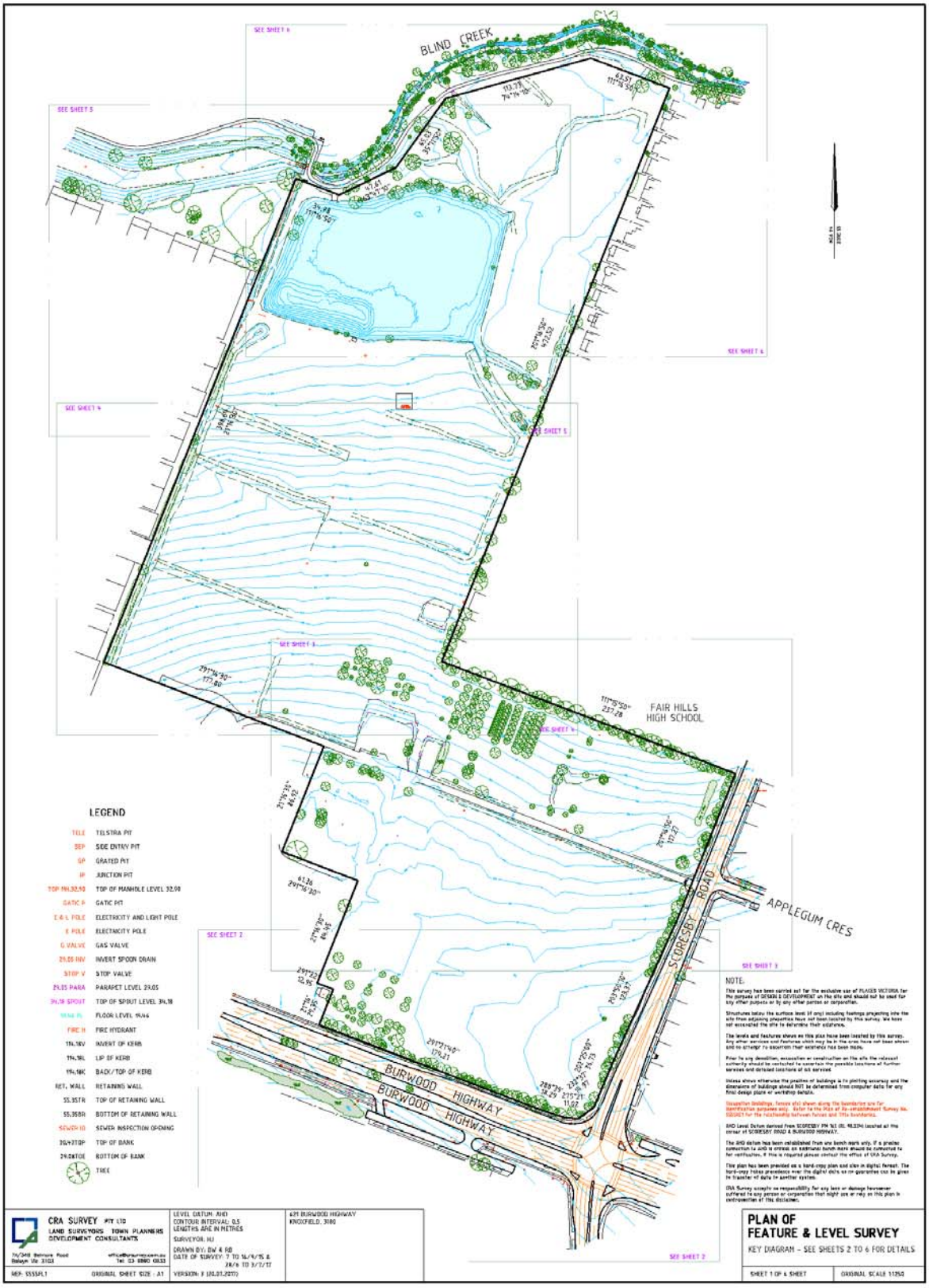

Figure 3: Feature and Level Survey Plan: 609-621 Burwood Hwy, Scoresby

3.0 EXISTING STORMWATER DRAINAGE

3.1 Catchment Characteristics

The site broadly falls from the south to the north towards Blind Creek and has a large dam of approximately 1.40 hectares in area situated in the north-west corner of the site (See Figure 4) and which connects to the waterway corridor. This dam currently provides a water storage function, with limited treatment capability. The dam was built to provide for water supply for the previous use of the site for agricultural purposes. There is a Dam Condition Assessment Report prepared by Engeny dated July 2017.

Figure 4: Existing Dam on 609-621 Burwood Hwy, Scoresby

3.2 Existing Drainage

There are existing underground drainage pipes across the site. There is an external catchment east of Scoresby Road that drains through Fairhills Secondary College via an 825mm diameter drainage pipe just to the east of the site. Stormwater from this pipe is then partially permitted to discharge to the existing on-site dam via an overland flow channel and then to Blind Creek. There is also a minor flow continuing westwards via a smaller 225mm diameter drainage pipe to the west boundary of the site and then along the west boundary of the site to also discharge at Blind Creek. There is no water quality treatment for the existing discharge to Blind Creek. Refer to Figures 5A and 5B.

Figure 5A: Existing On-Site Drainage 609-621 Burwood Hwy, Scoresby

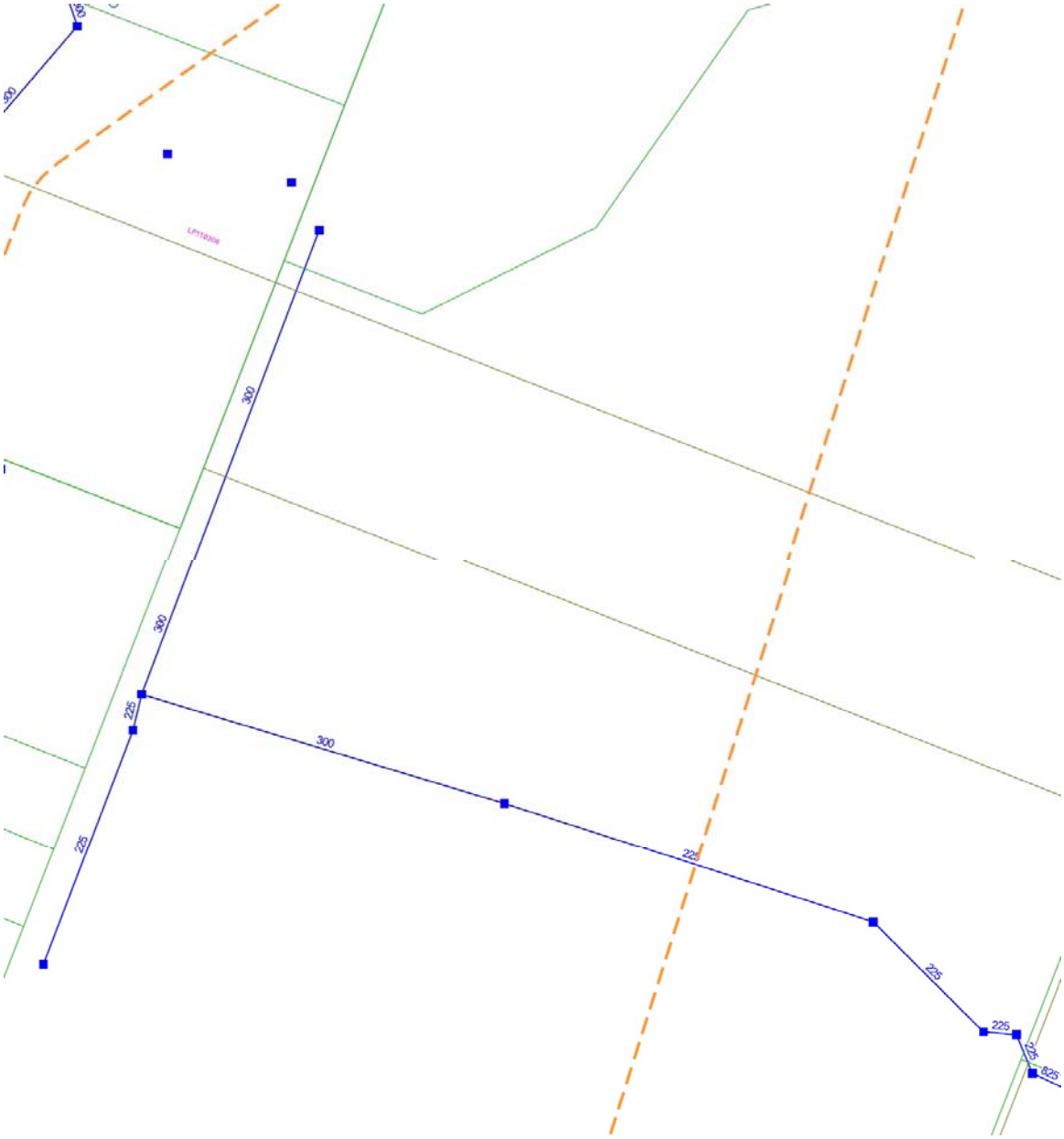

Figure 5B: Existing On-Site Drainage 609-621 Burwood Hwy, Scoresby

There is pipe drainage exiting the DELWP site onto the subject site which is not evident in Dial-Before-You-Dig information, but has been located in the feature and level survey.

4.0 STORMWATER MANAGEMENT DESIGN RESPONSE

4.1 Minor Stormwater Strategy

The minor stormwater drainage system will consist of a subsurface pipe network designed to capture and convey all stormwater runoff generated from the catchment for rainfall events up to and including the 20 % AEP (annual exceedance probability) design storm (1 in 5 year ARI).

The local catchment is less than 60 ha, and therefore the drainage system will be designed in accordance with the Knox City Council Stormwater Drainage Guidelines. Allowance will be made for

the conveyance of the external catchments in the pipe drainage network. There is a 28 hectare external catchment entering the development area at the rear of Fairhills Secondary College from an existing 825 mm diameter drain. The stormwater flow from this external catchment will be either piped through the development area or partially permitted as overland flow and will be subject to detailed design.

Similarly, the runoff from the catchment within the DELWP site and drainage pipes that exit DELWP will need to be captured and conveyed in the pipe drainage network for this development and will require the removal of existing drainage within the development.

It's proposed that the ultimate pipe network for the development will discharge into a sedimentation basin, wetland and retarding basin facility and finally a wildlife habitat lake before ultimately discharging to Blind Creek just upstream of the existing pedestrian footbridge. The wetland system will treat stormwater from both the development site and the external catchment thereby minimising the impact upon Blind Creek and downstream waterways.

Prior to the removal of the existing dam and construction of the ultimate wetland/retarding basin assets, the initial stages of the development that are to be along Scoresby Road and Burwood Hwy sides of the site will require construction of a temporary sedimentation basin and outfall drains to manage stormwater flows from the site catchment. The temporary sedimentation basin and drainage outfalls must cater for stormwater flows during and post construction until the permanent drainage outfalls are completed.

4.2 Major Stormwater Strategy

The primary objective of the major drainage system is to provide protection to allotments from flooding from the 1 % AEP (1 in 100 year ARI) storm event and to ensure that overland flows can be safely conveyed through the road network within the development prior to discharging into Blind Creek. The flow computations within the Engeny Preliminary Stormwater Management Report of August 2017 indicate that overland flows generated in a major storm event can be safely conveyed within the road reserves.

The development within the site abutting the Blind Creek and proposed wetland/retarding basin will need to be constructed with 600mm freeboard to the 1 % AEP flood levels within Blind Creek and the retarding basin.

The existing dam will be removed and it is proposed to construct a new wetland and retarding basin system for the retardation of peak flows from the development and existing catchment. This can be seen in Figure 1. When the development of the site is completed the retarding basin will ensure that the peak flow discharged from the site does not increase in the 1 % AEP event within Blind Creek based on existing condition discharge rates, taking into account the retardation that will be provided.

A catchment plan is shown in Appendix A.

4.3 Stormwater Quality

The State Environment Protection Policy (Waters of Victoria) defines the required water quality conditions for urban waterways. The aim of stormwater quality treatment is to reduce typical pollutant loads from urban areas to Best Management Practices as defined below and as required by Clause 56.07-4 of the Victoria Planning Provisions.

BPEMG Environmental Management Objectives for Stormwater (CSIRO, 1999)

1. Total Suspended Solids (TSS) 80 % reduction from typical urban load.
2. Total Phosphorous (TP) 45 % reduction from typical urban load.
3. Total Nitrogen (TN) 45 % reduction from typical urban load.
4. Gross Pollutants (GP) 70 % reduction from typical urban load.

Source: Urban Stormwater: Best Practice Environmental Management Guidelines – Victorian Stormwater Committee, 1999.

To meet these objectives, Engeny have proposed a stormwater treatment train comprising a sediment pond and wetland, with treated stormwater discharging into a new waterbird habitat for the Flora and Fauna Guarantee Act listed Blue Billed Duck and other waterbirds. The MUSIC model was designed with input parameters specified as per the Melbourne Water MUSIC Guidelines (2016). In Appendix B of the Engeny Preliminary Stormwater Management Report of August 2017 it details the parameter inputs utilised within the MUSIC Model. The Fair and Geyer equation was used to size the sedimentation pond.

From this, it was determined that the combination of a 1,100m^2 sediment pond plus a 4,500m^2 wetland was appropriate to meet the water quality objectives for the development. The treatment system is designed to treat all runoff from the development site and external catchment. The proposed arrangement of the wetland system is shown in Appendix C of the Engeny Preliminary Stormwater Management Report of August 2017.

5.0 SEWERAGE DESIGN RESPONSE

South East Water is the water authority responsible for the provision of reticulated sewerage within the proposed area.

Existing sewerage infrastructure adjoining the site is shown in Figure 6. These consist of a 675mm diameter concrete sewer along Blind Creek and a 225 mm diameter UPVC sewer along the east boundary adjoining the school site in part and the existing residential area.

Figure 6: Existing Sewerage Infrastructure Adjoining 609-621 Burwood Hwy, Scoresby

South East Water have confirmed that the existing 225mm and 675mm sewers have sufficient capacity to service the proposed development.

As part of the South East Water Land Development Deed process, it will be determined where the required connections to the sewer mains can be made. If that requires connection to the 225mm

sewer, written approval from the effected property owner/s will be required prior to commencement of the works.

The internal sewerage network will be aligned within allotment easements and road reserves all in accordance with South East Water design standards and will connect to the existing sewerage infrastructure.

5.0 WATER SUPPLY DESIGN RESPONSE

South East Water is the water authority responsible for the provision of reticulated water within the proposed area.

Existing water infrastructure is shown in Figure 7, with the infrastructure being potable water only.

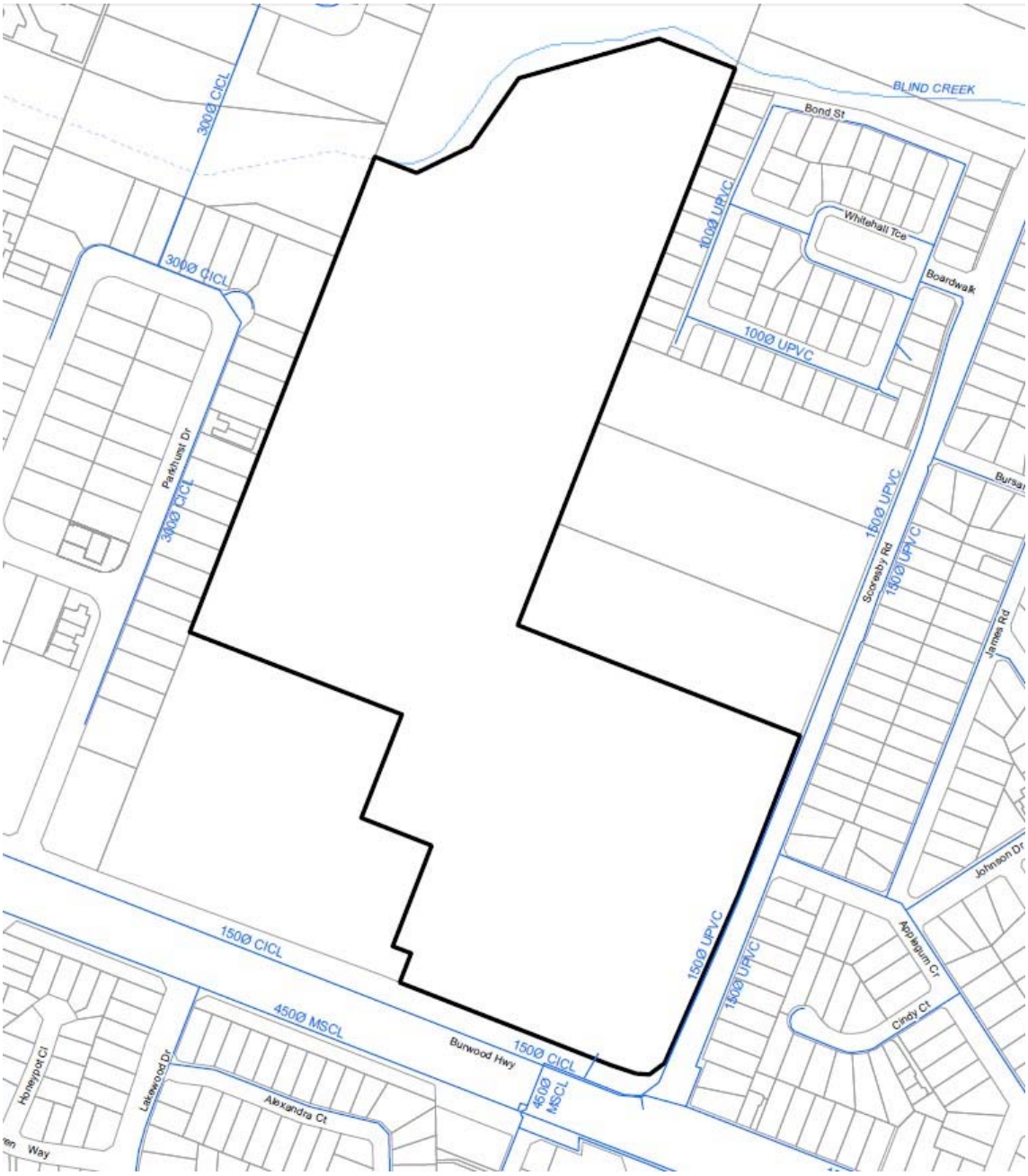

Figure 7: Existing Potable Water Infrastructure Adjoining 609-621 Burwood Hwy, Scoresby

Along Burwood Hwy there is a 150mm diameter Cast Iron Cement Lined (CICL) main on the north side of the road and a 450mm diameter Mild Steel Cement Lined (MSCL) main on the south side of the road. Along both sides of Scoresby Road there exists 150mm diameter UPVC mains. The current DBYD information supplied by South East Water does not indicate that a Class A recycled water network is available to this area.

South East Water have confirmed that the development site is able to be serviced with connection to the existing external infrastructure in the adjoining roads.

The development will be serviced from two distribution zones. They are:

Boronia Reservoir Zone (HGL 185m), for the area of the site higher than the 90m contour (south); and

Knox Reservoir Zone (HGL 130m), for the area of the site lower than the 90m contour (north).

Boronia Reservoir Zone

The existing 150mm potable water mains located in Burwood Hwy and the eastern side of Scoresby Road have sufficient capacity and are to be used to supply the development above/south of the 90m site contour.

Knox Reservoir Zone

The existing 150mm potable water main located on the western side of Scoresby Road has sufficient capacity and is to be used to supply the development below/north of the 90m site contour. This proposed water main will need to be constructed through the Boronia Reservoir Zone.

Separate property connection tappings are to be made on this main below the 90m contour and must be constructed on the opposite side of the road to the tappings water main for the Boronia Reservoir Zone.

The proposed potable water mains located at the interface of the two zones shall be constructed with a Hydrant-Valve-Hydrant arrangement.

The proposed water reticulation network will be aligned within the road reserves and designed in accordance with South East Water water design standards. The system will be reticulated with connection points at the Scoresby Road and Burwood Hwy infrastructure.

6.0 ELECTRICAL SUPPLY DESIGN RESPONSE

AusNet Services is the authority responsible for the provision of electrical supply within the proposed area.

The existing electrical distribution infrastructure for the development area is shown in Figure 8. AusNet Services have high voltage and low voltage cable assets both underground and overhead surrounding the proposed site. An existing 22,000 volt substation – Burwood HRI Burnett, is located at the Burwood Highway frontage, however this asset is not within the development site and facilitates the adjoining DELWP site and external properties to the south of the development.

AusNet Services has advised that existing high voltage assets exist along Scoresby Road and Burwood Hwy. The proposed development can be supplied from these assets without the need for any external high voltage substation/conductor upgrades.

The following legend details the existing infrastructure.

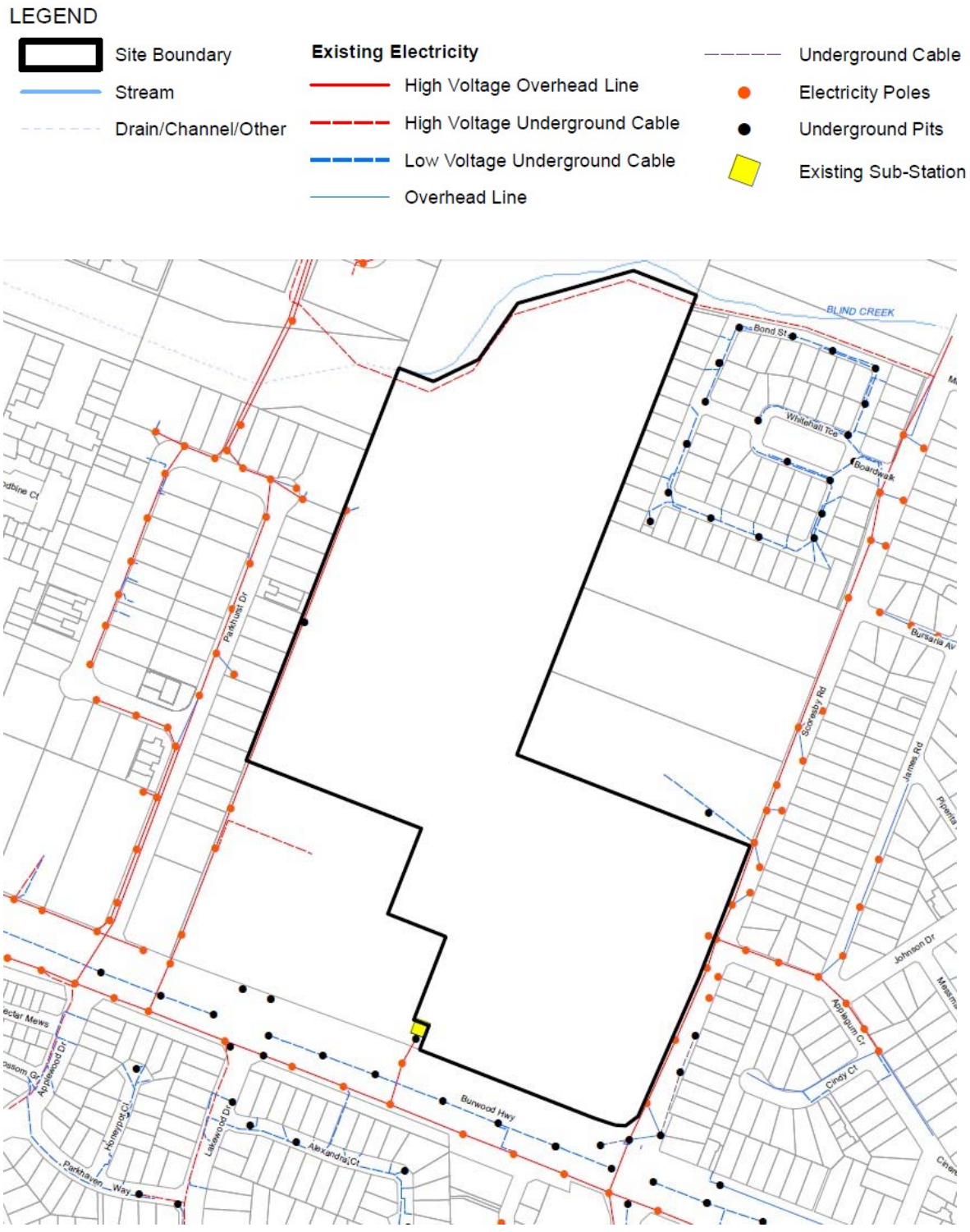

Figure 8: Existing Electrical Infrastructure Adjoining 609-621 Burwood Hwy, Scoresby

For a residential development of this site the electrical distribution network must be via underground supply with on ground kiosk reserves (likely to be 4 no.) required within the development area. It is expected that all proposed electrical conduit and cable assets will be within road reserves and the new kiosk substation/s would be positioned in the open space areas within the development.

For the commercial/mixed use development a kiosk substation or an indoor substation will be required and the size will depend on final electrical load requirements.

A proposed network of low and high voltage cables will need to be installed within the subdivision with high voltage links between the various substation sites and surrounding high voltage network at the development frontages.

The existing overhead lines within the subdivision, specifically along the western boundary will need to be removed as part of the proposed reticulation network. The existing overhead supply appears to service a pump station at the dam and therefore will be removed as the dam will be removed as part of the development and construction of the proposed wetland/retarding basin.

An existing pole mounted transformer at the existing entrance to the site on Scoresby Road will need to be removed and possibly replaced in an alternative location. It's expected a re-alignment of existing overhead power will be required at both the Scoresby Road and Burwood Highway entrances to the site to accommodate the proposed works at both intersections.

7.0 TELECOMMUNICATIONS SUPPLY DESIGN RESPONSE

Telstra and Optus are the authorities responsible for the existing supply and reticulation of telecommunication services within the area of the proposed development site.

The NBN Co network has also been rolled out in this area and is active.

Within the adjoining Burwood Hwy and Scoresby Road there is adequate telecommunication assets and therefore it is expected that no external works are required to facilitate supply to the development.

7.1 Existing Infrastructure

Existing telecommunications infrastructure is shown in Figure 9.

7.1.1 Telstra

Dial-Before-You-Dig plans provided by Telstra indicate that there are Telstra assets along Scoresby Road and Burwood Hwy.

There are minor existing networks supplied from Burwood Hwy and Scoresby Road that will need to be decommissioned and removed to facilitate the new development telecommunications network.

7.1.2 Optus

Dial-Before-You-Dig plans provided by Optus indicate that there are Optus assets along Scoresby Road and Burwood Hwy.

There is a minor existing network supplied from Scoresby Road that will need to be decommissioned and removed to facilitate the new development telecommunications network.

7.1.3 NBN

The NBN Co network has also been rolled out in this area and is active.

7.2 Proposed Telecommunication Infrastructure

7.2.1 Internal Development Infrastructure

7.2.1.1 NBN

NBN is wholly government owned and includes the role to design, build and operate the infrastructure. NBN will become the wholesale provider of fixed line telecommunication through a network of fibre optic cables.

The preliminary advice we have received has advised as follows:

- The Knoxfield area is an active wired NBN area. This means NBN will be made available to this development;
- The requirement for this development is to run the infrastructure to a point external to the site and NBN would do the connection;

- As this is an active area, it is not expected that there will be back-haul charge payable;
- NBN will charge $600.00 (GST inclusive) per lot to provide the service; and
- An NBN pit and pipe network is required for supply within the development.

7.2.1.2 Telstra

If Telstra is chosen as the telecommunication provider, it has sufficient existing infrastructure assets surrounding the site which consists of both copper and optic fibre that can supply the site. Telstra would require further information and plans to be submitted and registered as a new project for the authority to complete a thorough assessment. This will determine the extent of new works and alteration of existing assets which are allocated to different departments within Telstra.

Telstra outlined that 3 distinct departments would need to be involved in assessing and designing supply to the proposed development. They are the Network Integrity Team, the Optic Fibre Team and the Smart Communities team.

The process in determining capacity/level of supply available will require a field operative going on site to evaluate existing conditions, assets to be removed, abandoned or retained. Consultation would then be required with the fibre optic team for the fibre optic supply to the site and then registering the project with Telstra Smart Communities, who can determine the additional infrastructure.

Typically upon formal application to Telstra, the project is registered on their system for provision of underground cable supply. The developer as part of the subdivision would construct the pit and pipe network in readiness for Telstra to accept the assets and use for their cabling network. As this is an essential service no contributions are warranted.

It is anticipated that any costs incurred for the supply of the development will be in terms of alterations to existing external assets. At this point in time Telstra will require a formal application for the development in order to understand the scope of these works.

7.2.1.3 Optus

In the same manner as Telstra, if Optus is chosen by the developer as the telecommunication provider then Optus has sufficient existing assets surrounding the site that can supply the site.

The relevant application and further information would need to be submitted to Optus for further assessment. It is anticipated that any costs incurred for the supply of the development will be in terms of alterations to existing assets. At this point in time Optus will require a formal application for the development in order to understand the scope of these works.

Figure 9: Existing Telecommunication Infrastructure Adjoining 609-621 Burwood Hwy, Scoresby

8.0 GAS SUPPLY DESIGN RESPONSE

The responsibility for provision of gas assets in Victoria is split between the transmission network authority and the distribution network authority. The transmission network in Victoria contains higher pressure mains which in turn supply the distribution network which generally consists of lower pressure mains.

The authorities responsible for ownership, maintenance and operation in the east and south eastern suburbs of Melbourne are APA Group for the transmission network and Multinet Gas for the distribution network.

The existing transmission and distribution gas infrastructure is shown in Figure 10.

The site already has high pressure gas mains available which minimises the need for gas augmentation for the development. This consists of 150mm diameter main along Scoresby Road and a 200mm diameter main along Burwood Hwy. Multinet Gas will require connection to the high pressure mains, however a formal development application and System Planning assessment will need to be completed in order to confirm this arrangement and determine if there is any pipe augmentation required.

The existing site has provision for a 50 mm high pressure connection point from Scoresby Road with a regulator kiosk within the site. These assets will be decommissioned and removed to facilitate the new development network.

The proposed development gas demands may be accommodated by the existing assets, however Multinet Gas needs to complete the relevant modelling to determine how this additional load will affect the surrounding gas reticulation network.

Figure 10: Existing Gas Transmission and Distribution Infrastructure Adjoining 609-621 Burwood Hwy, Scoresby

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9.0 APPENDIX A – CATCHMENT PLAN

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