Traffix Group

Draft Yarra Ranges Planning Scheme Amendment C193

4 Melba Avenue, Lilydale (Lilydale Quarry)

Date of Statement: 21 May 2021
Date of Inspection: 14 May 2021

Prepared For the Proponent: HBI Lilydale Pty Ltd
Instructed By: Norton Rose Fulbright

Reference: G29791A-01

STATEMENT TO THE STANDING ADVISORY COMMITTEE BY JASON LEE WALSH, TRAFFIC ENGINEER

Level 28, 459 Collins St
Melbourne Victoria 3000

T: 03 9822 2888
admin@traffixgroup.com.au

Traffix Group Pty Ltd
ABN: 32 100 481 570

traffixgroup.com.au

STATEMENT TO STANDING ADVISORY COMMITTEE BY JASON LEE WALSH, TRAFFIC ENGINEER

Draft Draft Yarra Ranges Planning Scheme Amendment C193

4 Melba Avenue, Lilydale (Lilydale Quarry)

Our Reference: G29791A-01

Table of Contents

List of Figures

List of Appendices

Introduction

1 I have been instructed by Norton Rose Fulbright on behalf of HBI Lilydale Pty Ltd to undertake a peer review of the Cardno reports that inform the draft Draft Yarra Ranges Planning Scheme Amendment C193, which relates to the land at 4 Melba Avenue, Lilydale (Lilydale Quarry).

2 In the course of preparing this statement, I inspected the site and surrounding area most recently on 14 May 2021, and reviewed relevant background material.

3 My qualifications and experience to undertake this assessment are set out in Appendix A.

4 My assessment, and opinion is set out as follows.

Preamble

5 The former Lilydale Quarry site is generally bounded by Mooroolbark Road to the west, Taylor Street / Melba Avenue to the north, existing industrial land and Box Hill Institute to the north east, existing residential land to the south east, and Hull Road to the south.

6 The Quarry site includes an existing parcel of land, fronting Hull Road, which is zoned General Residential Zone 2 and has a permit for residential development. It is known as Stage 1.

7 The remainder of the site, is currently zoned Special Use Zone, related to the former quarry use, and is currently under rehabilitation.

8 The applicant, HBI Lilydale, has been working with Yarra Ranges Council for a number of years to prepare an Amendment to the Planning Scheme to allow for the rezoning of the Special Use Zone land and development of a Comprehensive Development Plan (CDP) to allow infill development.

9 In August 2020, the Minister for Planning directed the Victoria Planning Authority (VPA) to lead the preparation of the amendment.

10 A Traffic Impact Assessment and Integrated Transport Plan were prepared by Cardno in 2020 and released for public consultation. The documents identify a suite of traffic infrastructure works to support the Comprehensive Development Plan, and also presume construction of a new railway station (by the state) within the CDP area.

11 The VPA released the Proposed Amendment for public consultation in November 2020.

12 Submissions were received during the public consultation period and a number of key concerns were raised in relation to transport, including:

a. The need for a clear commitment for the new train station and duplication of the train line.

b. Intersection works and widening of Hull Road and Mooroolbark Road underpass are necessary to support the redevelopment.

13 I have been instructed to undertake a peer review of the Cardno Traffic Impact Assessment Report and Integrated Transport Plan. My assessment and opinion are set out as follows.

Comprehensive Development Plan

14 The Comprehensive Development Plan, prepared by Urbis, guides the development of the site.

15 It contemplates a variety of uses, split between 4 key precincts (excerpt at Figure 1). The development contemplates the following approximate yields:

a. 3,200 dwellings.
b. 6,000 square metres of retail and commercial/office uses.
c. 15.67ha of public open space.
d. A Government Specialist School.

16 The CDP contemplates the State delivery of a new railway station on the existing Melbourne-Lilydale line.

17 The redevelopment is supported by a new road network, which is largely grid-based, with connections to the existing road network via:

a. 2 new signalised intersections to Mooroolbark Road.
b. A new signalised access to Hull Road (approved and currently under construction as part of Stage 1).
c. An upgrade of the existing site connection to Melba Avenue with a new roundabout at the intersection with Melba Avenue.

18 The internal network includes a hierarchy of roads, as shown in Figure 2.

19 Additional active transport connections are contemplated in the CDP, as shown in Figure 3.

20 The CDP has a Section on Integrated Transport, which outlines objectives and requirements that must be met to satisfy the transport needs of the Development.

21 The CDP also has a Section on Infrastructure & Staging, where it sets out the indicative staging of development, as well as triggers for the construction of infrastructure required to support the CDP.

22 Section 4.6 Built Form and Urban Design of the CDP envisions a highway frontage commercial use at the corner of Maroondah Highway and Mooroolbark Road.

23 The design guidelines for this site illustrate a left-in / left-out access to Maroondah Highway.

Figure 1: Map 1 to the Comprehensive Development Plan

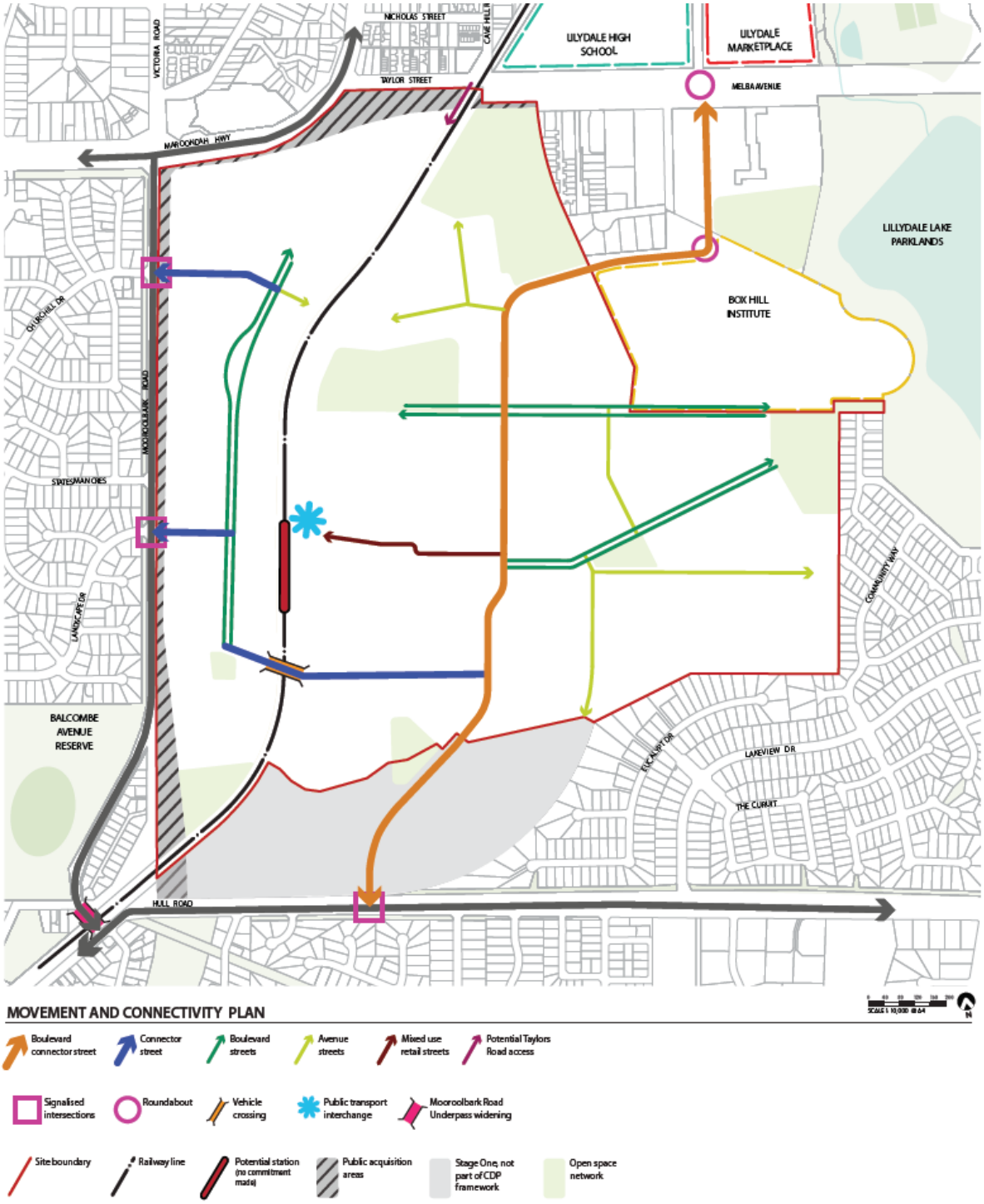


Figure 2: CDP Movement and Connectivity Plan

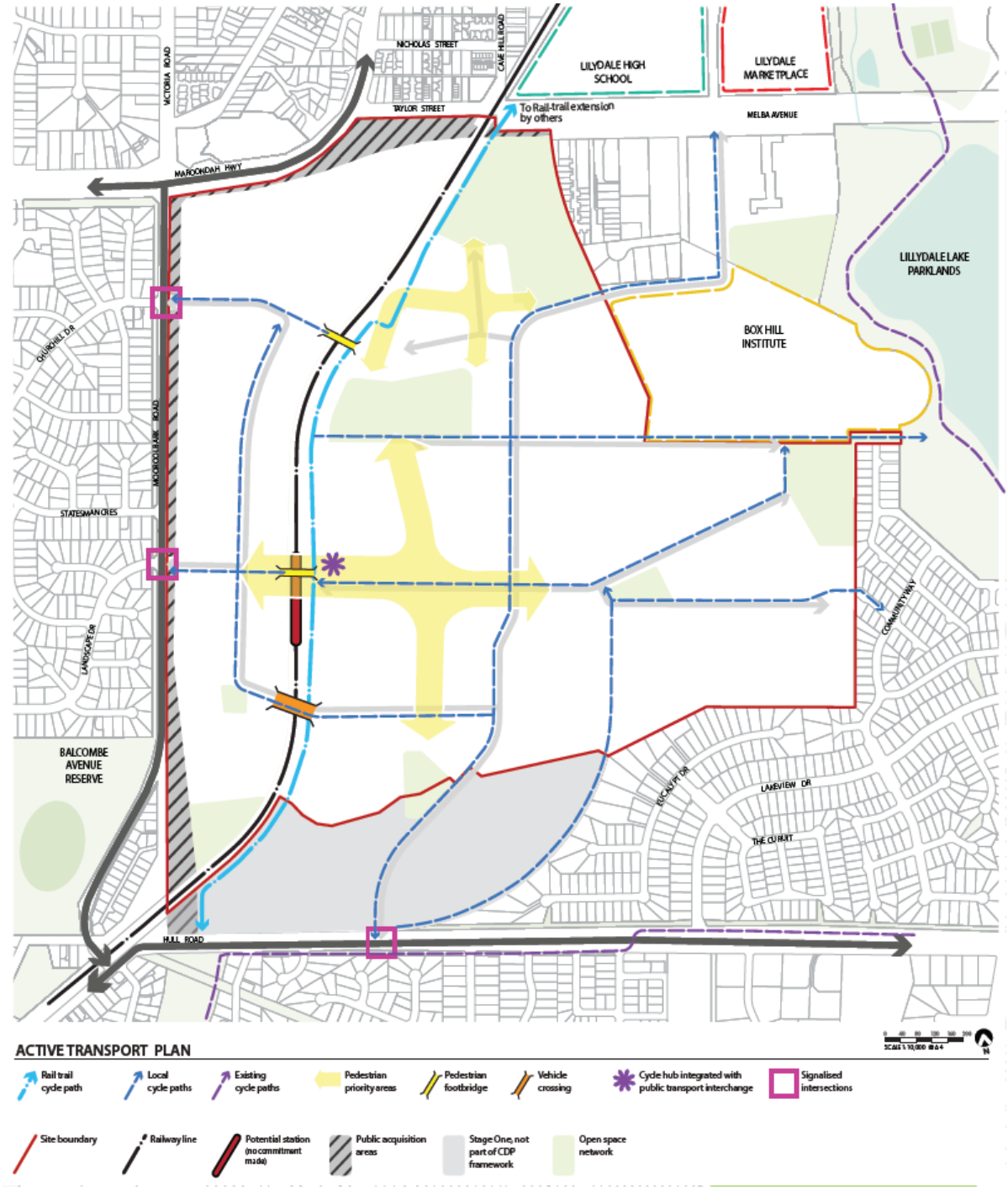


Figure 3: CDP Active Transport Plan

Schedule 1 to Clause 37.02

24 Draft Schedule 1 to Clause 37.02 of the Yarra Ranges Planning Scheme has been prepared to *'provide for the integrated planning, development and subdivision of the land primarily for residential purposes…."*

25 The Schedule includes a requirement for a permit application for use, building and works or subdivision to assess the effects of traffic.

26 Furthermore, a permit for subdivision requires settlement of the Infrastructure Contributions Agreement, and preparation of a Precinct Integrated Traffic and Transport Management Plan.

27 More specifically, the "*Precinct Integrated Traffic and Transport Management Plan"* should:

> promote walking, cycling and public transport to the satisfaction of the responsible authority.
>
> The management plan may be submitted in the form of plans, tables and reports and should include the following where relevant:
>
> - Location of proposed roads, pedestrian, cyclist and vehicle access points.
> - Details of how the objectives of the Former Lilydale Quarry Integrated Transport Plan, October 2020 have been addressed.
> - An assessment of the impact of traffic generated by the precinct upon the surrounding road network.
> - Address internal road design requirements.
> - Predicted traffic volumes.
> - An assessment of potential traffic mitigation works and traffic management measures that may be required within and external to the site, including the staging of the measures and external works.
> - Details of proposed connections to the surrounding road network, where relevant.
> - Details of internal and external intersections, performance and treatments.
> - Details of the location of and linkages to public transport.
> - An assessment of car parking demand.
> - An assessment of public transport services in the locality, existing stops and any additional stops or infrastructure prepared in consultation with the relevant Victorian public transport authority.
> - Details of cycling and pedestrian infrastructure, including links to significant destinations and the potential future train station.

28 These requirements provide an opportunity to better resolve what works are necessary and reasonably required at the time of the application.

Traffic Considerations

Subject Site and Context

29 The site location in the context of the surrounding locality is provided at Figure 4.

30 The site is irregular in shape, but measures approximately 1.7 kilometres in a north-south direction and 1.3 kilometres in an east-west direction (at the widest point).

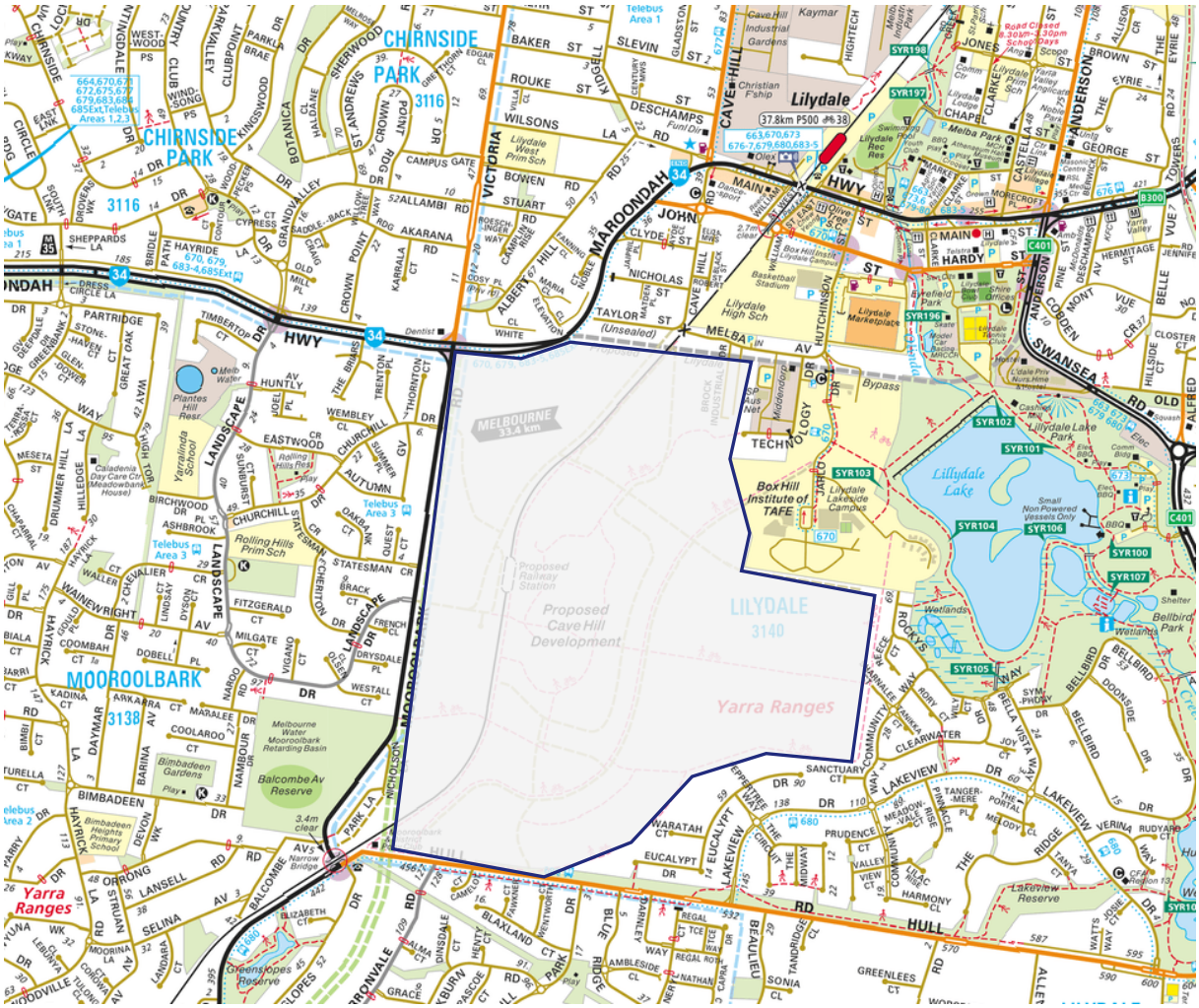


Figure 4: Site Location & Locality Map

31 The Lilydale Town Centre is located approximately 600 metres to the north-east of the site's boundary.

32 The site is bisected by the Melbourne-Lilydale Railway Line, aligned north-south. The nearest stations are Lilydale (approximately 700 metres north of the northern boundary) and Mooroolbark (approximately 2 kilometres south-west from the site's southern boundary).

33 I note as part of the removal of the Maroondah Highway level crossing, Lilydale Station is being moved to the south of Maroondah Highway, closer to the subject land.

Existing Road Network

34 The site has a limited abuttal to Maroondah Highway at the western extent of its northern boundary.

35 **Maroondah Highway** is a State Arterial road which operates generally in an east-west direction connecting the inner suburbs (Kew) through to the regional town of Alexandra.

36 In the vicinity of the site, Maroondah Highway has a varying cross section. West of Mooroolbark Road, it is duplicated with three lanes in each direction, separated by a vegetated median. East of Mooroolbark Road, as Maroondah Highway enters the Lilydale Township, Maroondah Highway narrows to a single carriageway, with a single lane in the easterly direction, and two lanes in the westerly direction.

37 The intersection of Maroondah Highway and Moroolbark Road is a signalised x-intersection.

38 **Mooroolbark Road** is a State Arterial Road and a Road Zone 1.

39 Mooroolbark Road operates in a north-south direction, bordering the western side of the site. It is currently constructed as a single carriageway with a single traffic lane in each direction, set within a 20 metre road reserve, with an additional 10 metre buffer on the western side. The landscape buffer limits access for abutting properties, which are accessed from local access roads.

40 At the southern extent of the site, Mooroolbark Road deviates to the west, to pass beneath the Lilydale railway line. At its southern extent, it connects with Hull Road as a signalised T-intersection.

41 **Hull Road** operates along the southern boundary of the site. East of its intersection with Mooroolbark Road, it is a Major Council road in a Road Zone Category 2. West of Mooroolbark Road, it is a State Arterial Road and Road Zone 1, under the control of Department of Transport.

42 Hull Road has a reservation of approximately 40 metres.

43 In the vicinity of the site, Hull Road operates with a single lane in each direction, with localised widening at local access street intersections.

44 The Stage 1 signalised access to 'Kinley' from Hull Road, and associated widening, is under construction.

45 **Taylor Street / Melba Avenue** form the northern boundary of the site.

46 Taylor Street is a limited local access street which operates west of the Railway line. It does not provide a vehicle connection through to Maroondah Highway.

47 Melba Avenue is a local Council road that connects across the Railway line at the west (to Taylor Street and Cave Hill Road) and through to Hutchinson Street at the east (which diverts north to connect through to Maroondah Highway in the town centre).

Planned / Future Road Works

Level Crossing Removals

48 The Victorian State Government is currently undertaking a number of level crossing removals across Melbourne.

49 These works include the removal of level crossings at Maroondah Highway, Lilydale and Manchester Road, Mooroolbark.

50 Works commenced in May 2020, with a planned completion in late 2021.

Lilydale Bypass & Healesville Freeway

51 The Lilydale Bypass has been contemplated since the 1970s.

52 It is identified on the Melway map (at Figure 4), operating along the northern boundary of the subject land, connecting Maroondah Highway in the west and Anderson Street in the east to provide a bypass of the Lilydale Town Centre.

53 The Victorian Government has not committed funding to planning or construction of the bypass. In 2020, Yarra Ranges Shire Council prepared the Lilydale Major Activity Centre Structure Plan Issues and Opportunities Paper.

54 It identified the need for Council to advocate to the State Government for future funding of the bypass to support the Structure Plan.

55 A Public Acquisition Overlay (PAO) has been placed over the proposed bypass route.

56 The Healesville Freeway is a future road project intended to connect Eastlink at the west (at Wantirna) with Maroondah Highway adjacent the subject site. Land has been set aside and a Public Acquisition Overlay applied to parts of the contemplated route.

57 Part of the route includes a duplication of Mooroolbark Road. However, the existing road reserve is insufficient for a duplicated road, and there is currently no Public Acquisition Overlay present along this section of the road.

58 To address this shortcoming, the CDP contemplates the inclusion of a PAO over the western extent of the subject land as it runs parallel to Mooroolbark Road.

59 The existing PAO extents, in the context of the subject site is shown at Figure 5.

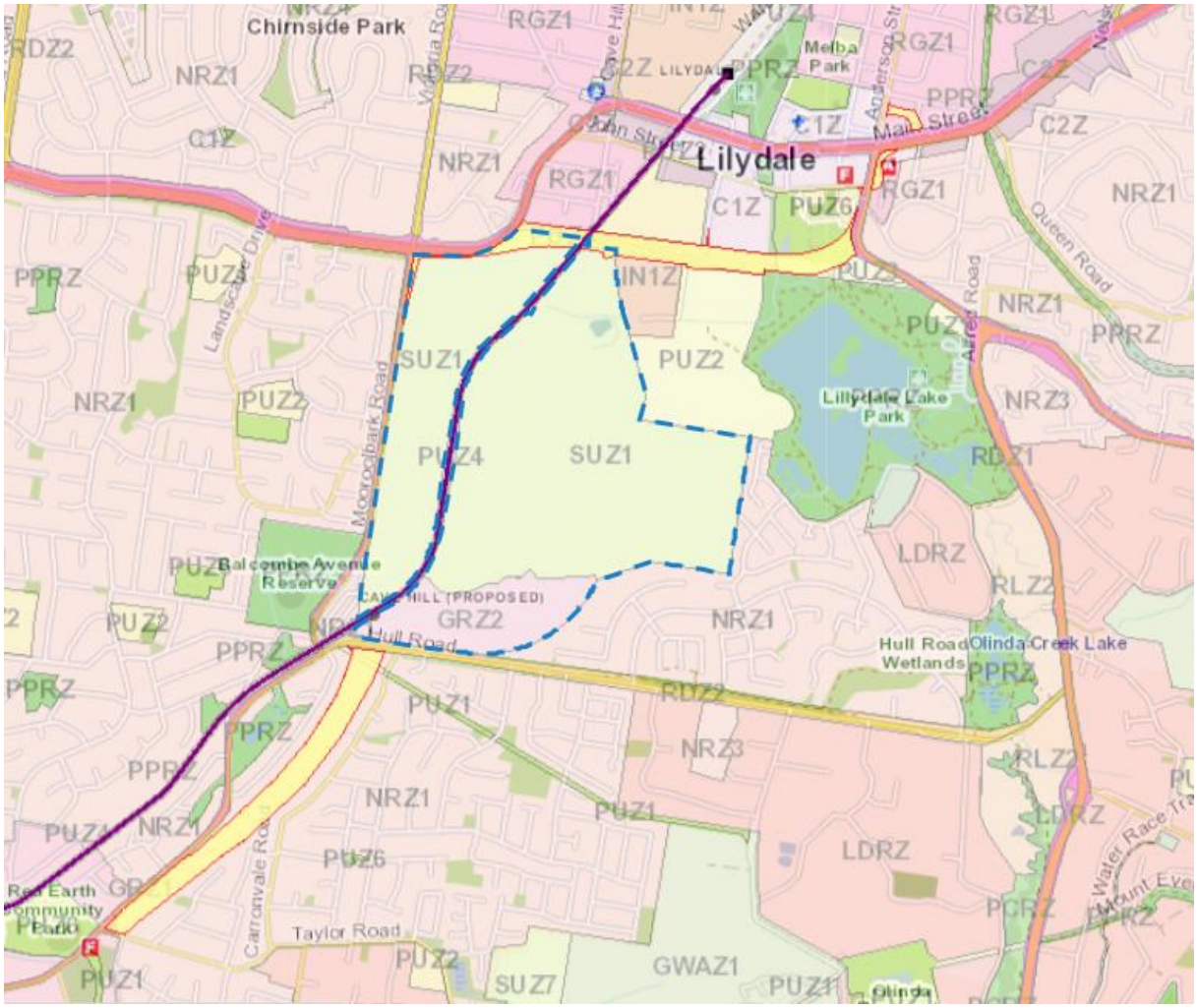


Figure 5: Existing Public Acquisition Overlay Extents

Lilydale Integrated Transport Plan

60 In 2015, GTA consultants prepared the Lilydale Integrated Transport Plan (LITP) (13M225000 dated 15 April 2015) for Yarra Ranges Shire Council to inform the Lilydale Structure Plan.

61 The LITP contemplated the development of the Lilydale Quarry Site for the purpose of 3,211 dwellings with additional commercial and education offerings.

62 As part of the LITP, a review of the proposed Lilydale Bypass was undertaken. It was not included within the preferred road network for the following reasons:

- The Lilydale Bypass would be a major physical barrier between the Activity Centre, the Lilydale Quarry redevelopment site, Lillydale Lake Parklands and Box Hill Institute site, creating a poor pedestrian environment and reduced connectivity and permeability.

- The complexity and significant cost of construction raise serious doubt about whether it will be funded given competing transport infrastructure priorities.
- There will be a continuation of the uncertainty that has blighted larger areas of the activity centre affected by the bypass reservation.
- On account of the challenging topography, it would require a visually intrusive elevated structure leading to visual and acoustic impacts.

63 The preferred network identified by the LITP included the "Healesville Arterial" (including duplication of Mooroolbark Road) which will provide a direct link to Eastlink and assist with relieving congestion on the existing arterial road network.

64 A VITM model was undertaken to assess a number of different road network and land use options for 2046. Eight (8) different network options were investigated with varying degrees of work, including a 'do nothing' option. Overall, the modelling showed that in each of the options, the network operating conditions will be similar to current levels and would operate at reasonable levels in 2046.

65 A further four (4) options were investigated to test different scenarios for development of the Lilydale Quarry Site. The modelling of the Quarry site highlighted the provision of a four-lane arterial road through the quarry did not provide any real benefit to the network.

66 Following the development of the preferred network, additional modelling was undertaken to confirm that future traffic volumes could be accommodated without the need for the Lilydale Bypass. Two (2) design options were investigated being 'downgrading' Maroondah Highway to two lanes through the activity centre, or 'upgrading' Maroondah Highway to four lanes through the activity centre.

67 The downgraded option indicated a moderate to high level of congestion on Maroondah Highway during the peak period. The upgraded Maroondah Highway option indicates the inclusion of four lanes will result in lower levels of saturation, and John Street and Hardy Street are significantly below the maximum capacity.

68 Overall, the modelling shows a satisfactory result can be achieved in 2046 under the four-lane Maroondah Highway option without the need for the Lilydale Bypass.

69 The ultimate road network identified within the LITP is illustrated at Figure 6.

70 I note the LITP includes recommended Road Network Projects over the short to long term. Some of those projects include:

- The signalisation of Maroondah Highway and Hutchinson Street as a Council funded and delivered project – short term.
- Council to advocate to VicRoads (now Department of Transport) for capacity improvements to the section of Anderson Street between Hardy Street and Maroondah Highway – medium term.

- Council to investigate / implement intersection capacity upgrades at the Hutchinson Street / John Street intersection and the Anderson Street / Hardy Street intersection – medium term.

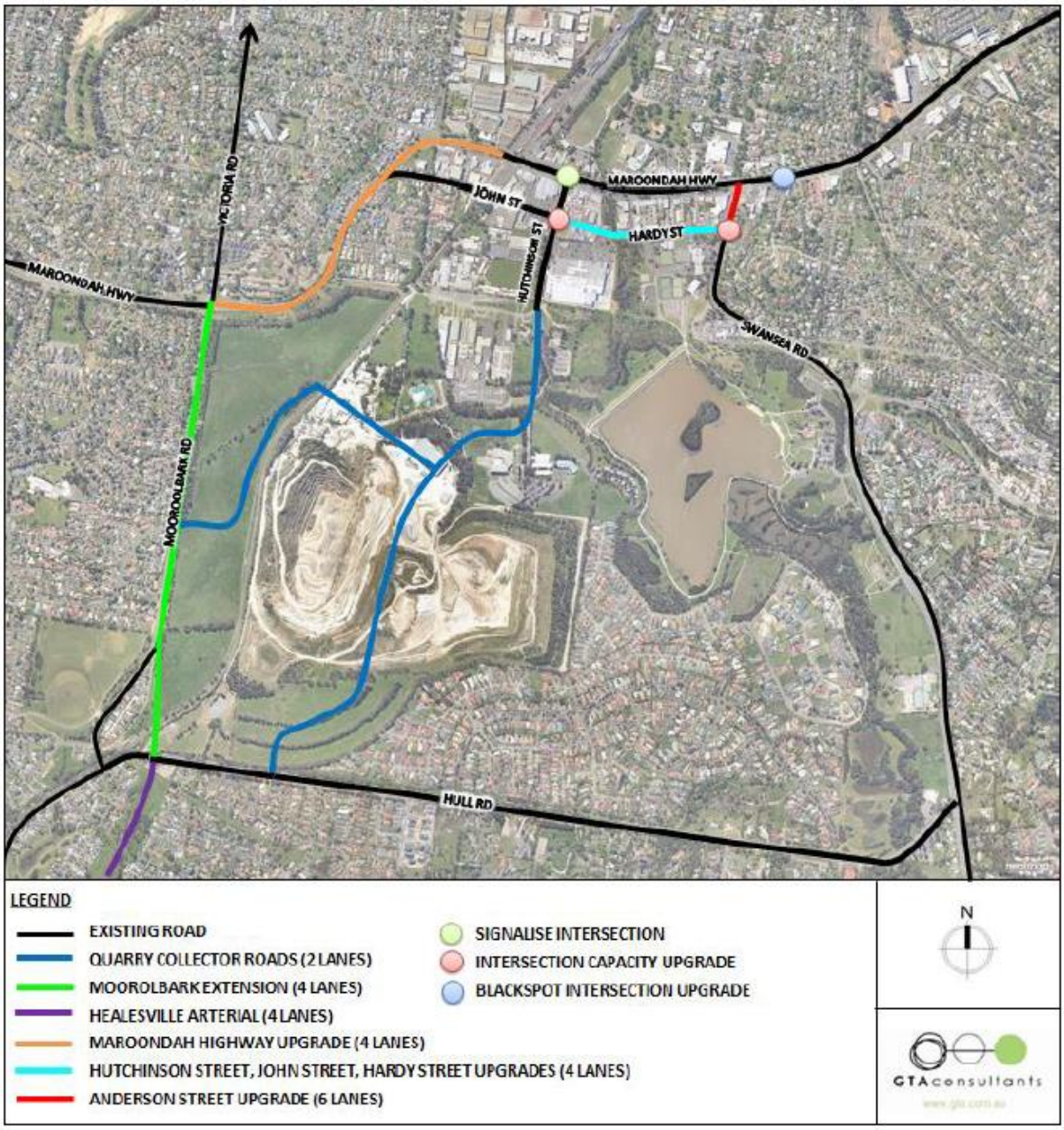


Figure 6: Lilydale Integrated Transport Plan - Ultimate Road Network (GTA 2015)

Lilydale Major Activity Centre Structure Plan (Issues & Opportunities Paper)

71 In 2020, Yarra Ranges Shire Council prepared the Lilydale Major Activity Centre Structure Plan – Issues and Opportunities Paper which included Council's position of key strategic issues such as the Lilydale Bypass which will form the basis of a new Structure Plan for the area.

72 As part of the paper an assessment was undertaken which considered two options, being the delivery of the Bypass and not delivering the Bypass with the upgrade of existing roads.

73 The design options were assessed against the directions of the Lilydale Place Plan. A summary of the traffic and transport findings is:

> *"Both options will improve through traffic, however, the Bypass option will provide the most improvement by separating through traffic from local traffic."*

74 On balance, the paper supports delivery of the Bypass and seeks community views, however further technical work is required to support either design option.

75 I now provide an assessment of the Cardno Integrated Transport Plan and Cardno Supporting Traffic Impact Assessment.

Cardno Integrated Transport Plan (ITP)

76 The Transport Plan includes Objectives, Requirements and Guidelines to provide clear direction for the establishment of an integrated transport network.

77 The plan outlines the concept of a 20 minute neighborhood and the principles of a Transport Oriented Development (TOD), as well as describing the transport opportunities for all modes, including active transport, public transport and cars.

78 The Framework Plan provides for a logical road network that provides for connectivity, both vehicle and active transport, between precincts and external to the site. The road network is appropriately designed to be bus capable and allow equitable accessibility across the site.

79 The proposed road cross sections are appropriate for the projected traffic volumes and function of roads.

80 I have reviewed the Integrated Transport Plan and overall believe it is reasonably drafted and structured to guide the transport objectives of the CDP.

Cardno Traffic Impact Assessment Report

81 Cardno prepared a Traffic Impact Assessment (TIA) to support the ITP and inform the preparation of an Infrastructure Agreement in relation to the Comprehensive Development Plan.

82 The Cardno TIA included existing conditions analysis, development traffic generation and distribution analysis, post development intersection operating assessments, and identified a suite of mitigating works to support the CDP.

83 I have reviewed the Cardno report and make the following commentary.

Extent of the Study Area

84 Cardno adopted a traffic modelling/study area that included the following key intersections surrounding the site as shown in Figure 7.

a. Maroondah Highway / Victoria Road / Mooroolbark Road.
b. Maroondah Highway / John Street.
c. Maroondah Highway/ Hutchinson Street.
d. Maroondah Highway / Anderson Street.
e. Mooroolbark Road / Churchill Drive.
f. Mooroolbark Road / Landscape Drive.
g. Mooroolbark Road/Hull Road.
h. John Street / Hutchinson Street.
i. Hutchinson Street / Melba Avenue.
j. Hardy Street / Anderson Street.
k. Hull Road / Swansea Road.
l. Hull Road/Honour Avenue (new intersection to Stage 1 of Kinley).

85 I am comfortable this is an appropriate extent of the model and that the inclusion of further intersections surrounding the site, or within the model area, is not necessary.

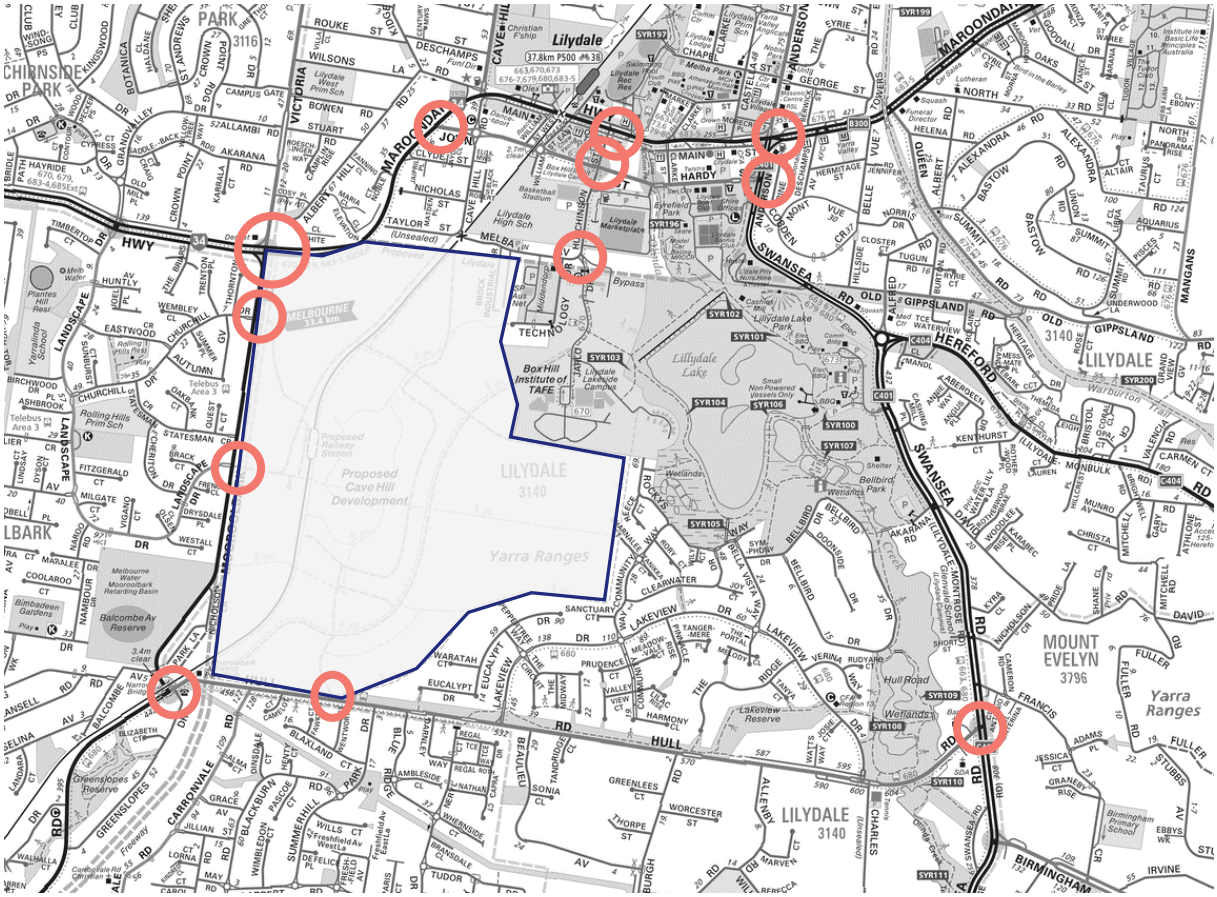


Figure 7: Existing Traffic Network Model Extents

Traffic Generation and Distribution Analysis

86 I understand the proponent went through a stakeholder consultation process with one of the key themes being Transport. A series of workshops and meetings were held between the proponent and government agencies including Department of Transport and Yarra Ranges Council.

87 The consultation process occurred over 2018 to 2020.

88 Ultimately traffic generation rates were agreed.

89 I have reviewed the agreed rates and I am of the opinion they are fit for the purposes of analysis.

90 I note the agreed rates are premised on the delivery of the train station. However, the report includes an assessment of the potential traffic generation for a development without the train station. In essence, the report outlines the residential density and commercial use would be less in this scenario, and projects that a lesser overall traffic generation would occur.

91 Consequently, the with train station development is a larger traffic generator and appropriate for assessment.

92 The Cardno report also includes assumptions in relation to the distribution of traffic throughout the network.

93 This distribution is primarily based on the CDP access strategy, locational attributes, and VISTA data.

94 I have reviewed the traffic distribution splits and am comfortable they are appropriate for the purposes of the analysis.

Use of a Spreadsheet Model

95 Cardno has utilised a detailed spreadsheet model to determine individual turning movements to the key intersections providing access to the CDP area, and those within the surrounding road network.

96 In an established road network such as this, I am of the opinion that a spreadsheet model is an appropriate method of assessing a development of this scale, to determine the impacts on the external road network and access requirements.

97 Whilst the spreadsheet model may not automatically redistribute traffic flows to the network based on capacity limitations in the area, the development of the spreadsheet model is ultimately an iterative process.

98 It allows for adjustment of traffic distributions and movements to/from key linkages and intersections at a level that is appropriate for this development, which is relatively discrete in its traffic generation and distribution.

Traffic Surveys, Data and Analysis

99 Cardno collected a variety of survey data, including individual turning movement counts for a number of intersections in 2015 and supplemented this with Department of Transport SCATS data in 2019 for the signalised intersections.

100 To determine 'current' volumes on the network, Cardno then undertook a process to apply growth at an annual compounding rate of 1.1% from 2015 to 2020. They then compared the 'factored' traffic volumes including growth with available SCATS data. In the majority of cases, the 'factored' volumes were higher than the SCATS data suggested.

101 To establish "post development' volumes, the generated traffic volumes from the spreadsheet were then superimposed on the 'factored' 2020 volumes.

102 SIDRA Analysis was then undertaken for the existing and future conditions, adopting the existing intersection layouts and phasing arrangements. In the post development scenario, a suite of mitigating works was identified to return the network operations to an appropriate level of service.

103 I have reviewed the Cardno analysis, including the SIDRA files and summaries. The results of that review are set out as follows.

Validation and Additional Analysis

104 To test the analysis, and in particular the proposed suite of mitigating works, I have sourced 2020 SCATs data and prepared my own SIDRA assessment of existing and post development conditions.

105 As detailed above, I have accepted the adopted traffic generation rates, proposed distributions and model extent.

106 I have been provided the spreadsheet model prepared by Cardno, and have extracted a diagram to show the development generated traffic volumes on the network. This plan is provided at Appendix B.

107 In relation to 'existing' conditions, I have undertaken the following process:

Traffic Surveys and Data

108 COVID-19 impacted traffic conditions and volumes throughout most of 2020 and arguably are still having an impact today.

109 We are fortunate in Victoria to be returning to a more 'normal' working arrangement, and traffic activity on the road during peak hours, on some weekdays, is returning to levels consistent with pre-COVID conditions.

110 However, I am of the view current 2021 traffic conditions are still not representative of 'normal' conditions. This is because there is still a proportion of workers working from home, and anecdotally public transport patronage remains lower than pre-COVID 'normal' conditions.

111 In this respect, my firm has obtained and reviewed, DoT SCATS data for the existing signalised intersections within the study area for Thursday 13th February 2020. This period is pre-COVID, and in my view, likely to be most representative of 'existing' volumes.

112 For the unsignalised intersection of Hutchinson Street and Maroondah Highway, I have adopted the Cardno projected 2020 existing conditions volumes.

113 The network adopted 'existing' conditions volumes are provided in Appendix B.

114 I have then undertaken SIDRA analysis of each of the existing intersections.

Intersection Analysis - Existing

115 SIDRA is a computer program originally developed by the Australian Road Research Board, which can be used to analyse the operation of intersections. SIDRA provides information about the capacity of an intersection in terms of a range of parameters, as described below:

> ***Degree of Saturation (D.O.S.)*** *is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Various values of degree of saturation and their rating are shown below.*
>
> *The* ***95th Percentile*** *Queue represents the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour.*
>
> ***Average Delay*** *(seconds) is the average delay time that can be expected for all vehicles making a particular movement in the peak hour.*

Level of Service		Intersection Degree of Saturation	
		Unsignalised Intersection	Signalised Intersection
A	Excellent	≤ 0.60	≤ 0.60
B	Very Good	0.60 – 0.70	0.60 – 0.70
C	Good	0.70 – 0.80	0.70 – 0.90
D	Acceptable	0.80 – 0.90	0.90 – 0.95
E	Poor	0.90 – 1.00	0.95 – 1.00
F	Very Poor	≥ 1.0	≥ 1.0

116 SIDRA models should ideally be calibrated, via observation, to as best as possible replicate existing conditions.

117 To calibrate the SIDRA models, my firm obtained IDM data (signal phasing data) from Department of Transport for the same day as the February 2020 SCATS data, and also undertook sample peak hour queue surveys of the existing signalised intersections in April 2021.

118 Clearly, it was not possible for the queue observations to retrospectively take place in 2020. So, to validate the observations, I have then compared SCATS data from April 2021 with the February 2020 SCATS data to confirm the general traffic volumes through the intersections are comparable, and they were.

119 On the basis of the above, I have calibrated the SIDRA models to as best as possible reflect the 'existing' operating conditions.

120 It is noted as the analysis is based on stop line volumes recorded at the intersections, the SIDRA models should not operate at a Degree of Saturation significantly greater than 1.0.

121 The calibration process comparably matched existing conditions for most intersections, however the extended queues observed in the morning peak on the north approach to the Mooroolbark Road and Hull Road intersection, and the south approach to the Anderson Street and Hardy Street intersection could not be replicated.

122 A summary of the existing conditions models is provided in Table 1, and excerpts of the SIDRA outputs are contained in Appendix C.

Table 1: Existing Conditions SIDRA Analysis - Intersection Degrees of Saturation

Intersection	AM	PM
Victoria Road/ Maroondah Highway/ Mooroolbark Road	0.81	0.97
Mooroolbark Road/ Hull Road	1.02	0.88
Maroondah Highway/ Anderson Street[1]	0.85	0.94
Anderson Street/ Hardy Street[1]	0.90	1.05
Hutchinson Street/ John Street	0.69	0.64
Swansea Road/ Hull Road	0.85	0.84
Maroondah Highway/ Hutchinson Street	0.40	0.52
Maroondah Highway/ John Street	0.67	0.61

123 The analysis identifies the majority of signalised intersections along Maroondah Highway operate with a Degree of Saturation (DoS) around or approaching 1.0, suggesting they are reaching capacity. It is important to note, however, in the most part, there are only 1 or 2 movements at each intersection that are at, or reaching, capacity. There is spare capacity on some legs and for most movements.

124 For example, at the intersection of Maroondah Highway/Mooroolbark Road/Victoria Road, the more critical legs are the north and south legs, operating with DoS's up to 0.97, whilst the Maroondah Highway through movements operate with Degrees of Saturation of not more than 0.72.

125 This is not unusual in urbanised areas, and in particular on main roads where 'green time' is deliberately biased to the main road. In these circumstances, this is to the disbenefit of the lower order side roads and this is where the degree of saturation can approach 1.0.

[1] Intersections have been run as a network.

126 For the intersection of Anderson Street and Hardy Street, I have run the intersection as a network model with the intersection of Anderson Street and Maroondah Highway. In field observations revealed the intersection works acceptably, with the exception of extended queues on the south approach in the morning peak hour.

127 This seems to occur as a result of the signal phasing, where north bound vehicles are obstructed on the approach to Hardy Street, as the Hardy Street phase allows vehicles to fill the Anderson Street storage between Maroondah Highway and Hardy Street, before a green phase is afforded at the Hardy Street intersection for north bound vehicles. The impact is that only limited north bound vehicles can get through the Hardy Street intersection leading to extended queues. This is also accentuated by the proximity of the traffic signals to the Council offices.

128 A signal coordination and phasing review may improve the operation of this intersection.

129 The other intersection that experienced extended queues was the intersection of Mooroolbark Road and Hull Road. Queues extended for some distance on the north approach during the morning peak hour. This intersection is constrained by its geometry, most notably its underpass of the Melbourne-Lilydale rail line.

130 The throat of the underpass is limited to a single lane in each direction, and the stop line on the north approach is setback significantly, such that there is 'lost time' in every cycle to clear the intersection.

131 In my view, this is an intersection that is congested, and irrespective of the CDP, is an intersection that warrants upgrading. The difficulty is that due to the rail underpass, improvements are expensive. Furthermore, construction of the Healesville arterial would diminish the need for upgrades at this intersection.

Intersection Analysis – Site Accesses

132 It is a Department of Transport requirement that new access traffic signals are designed with a 10 year life span.

133 Therefore in the analysis of the three (3) site access traffic signals (Mooroolbark Road / Churchill Drive, Mooroolbark Road/Landscape Drive and Hull Road/Honour Drive), 2030 volumes have been estimated.

134 The projected volumes consist of full development of the CDP area and a 1% compounded growth rate on Mooroolbark Road and Hull Road.

135 This is a conservative assessment as comparisons of 2020 SCATS data with the 2015 surveys suggest that background growth on the network is actually only in the order of a flat 3% in total over the 5 years.

136 The tested volumes are contained in Appendix B.

137 For the SIDRA analysis of the proposed site accesses, I have modelled these based on the Concept Layout Plans prepared by Cardno.

138 In relation to signal operations, I have adopted conventional phasing operations for the concept intersections (based on their layouts), and let SIDRA 'choose' the signal cycle times and phasing allocations.

139 The results of the analysis are summarised in Table 2, with excerpts of the SIDRA outputs provided within Appendix C.

Table 2: Proposed Site Accesses - SIDRA Analysis - Intersection Degrees of Saturation

Intersection	AM	PM
Mooroolbark Rad/ Site Access/ Churchill Drive	0.58	0.65
Mooroolbark Rad/ Site Access/ Landscape Drive	0.70	0.62
Honour Avenue/ Hull Road	0.78	0.65

140 The results for the intersections demonstrate the extent of works is sufficient to accommodate both the development traffic and 10 years of growth on the existing road network.

141 Review of the detailed SIDRA outputs shows that queues on Mooroolbark Road and Hull Road are contained within the approaches and do not extend to the neighbouring signalised intersections.

142 Accordingly, the three (3) site accesses have been appropriately designed to accommodate development traffic and future growth on the network.

143 It is also noted the concept access intersection designs have been prepared cognisant of the future duplication of Mooroolbark Road.

144 I have not independently modelled the site access roundabout, Hutchinson Street / Melba Avenue intersection, however I have reviewed the Cardno analysis of this intersection and note it is expected to operate with a Dos, that does not exceed 0.6.

145 This is consistent with my expectations for a collector road roundabout intersection.

146 Based on the above review, I am satisfied the access strategy for the CDP is appropriate.

Intersection Analysis – Other Intersections

147 For existing intersections on the network, Department of Transport Traffic Impact Assessment Guidelines require a development proposal to model the post development traffic volumes for neighbouring and affected intersections. Where the intersections do not provide direct site access, the modelled volumes do not need to consider road network growth.

148 The projected post development peak hour traffic volumes for these intersections are contained in Appendix B.

149 Where it is possible to do so, a nexus exists and it is equitable, mitigating works should then be undertaken to return the intersection operating conditions to an appropriate level. This could include a range of works, including simple linemarking changes, signal phasing and operational improvements, or more significant kerb works and road widening.

150 If there is significant spare capacity at an intersection post development, mitigating works may not necessarily be required.

151 Cardno has identified a suite of mitigating works for the surrounding intersections. This includes the following:

a. Maroondah Highway/Mooroolbark Road/Victoria Road – additional right turn lane from the west and widening of the southern leg to extend the existing short lanes.

b. Mooroolbark Road/Hull Road – widening of the south-western and north-eastern legs to provide a second through lane in each direction, additional widening on the north-east to provide an extended right turn lane and works beneath the train overpass to provide an additional approach lane from Mooroolbark Road.

c. Swansea Road/Hull Road – linemarking to convert the existing left turn only lane to a shared left and right turn lane.

d. John Street/Hutchinson Street – linemarking changes to provide additional turn lanes and lengths (through modified peak hour parking restrictions).

152 There is also a presumption that the intersection of Maroondah Highway/Hutchinson Street, which is currently unsignalised, would be signalised by Council as contemplated within the Yarra Ranges Shire's Lilydale Integrated Transport Plan.

153 I have modelled the post development scenario and future road network arrangements identified above by Cardno.

154 It is important to note that all intersection timings are dynamic. Whilst existing IDM and signal phasing data gives a picture of how an intersection operates in one peak hour, there are variations in phase times across peaks because they respond to actual demands at the time.

155 In the case of the study area and this intersection analysis, the additional works proposed at the existing signalised intersections will offer an opportunity to balance some demands on each leg and also adjust signal operations at these intersections. In this regard, whilst I have been mindful of existing phasing arrangements for the existing intersections, I have also made adjustments to the intersection phasing to reflect the amended intersection layouts.

156 For example, at Maroondah Highway/Mooroolbark Road/Victoria Road, the introduction of a second right turn from the west allows for modifications to the current diamond right turn phasing for right turns from Maroondah Highway.

157 A summary of the existing and proposed (with works) intersection Degrees of Saturation is provided in Table 3, and detailed outputs are provided in Appendix C.

Table 3: Comparison of Existing and Proposed Intersection Degrees of Saturation

Intersection	Existing		Proposed	
	AM	PM	AM	PM
Victoria Road/ Maroondah Highway/ Mooroolbark Road	0.81	0.97	0.94	0.95
Mooroolbark Road/ Hull Road	1.02	0.88	1.03	1.06
Maroondah Highway / Anderson Street	0.85	0.94	0.92	1.00
Anderson Street/ Hardy Street	0.90	1.05	0.90	0.96
Hutchinson Street/ John Street	0.69	0.64	0.95	0.91
Swansea Road/ Hull Road	0.85	0.84	0.96	0.96
Maroondah Highway/ Hutchinson Street	0.40	0.52	0.47[2]	0.56[2]
Maroondah Highway/ John Street	0.67	0.61	1.07	1.07

158 Review of the detailed SIDRA summaries suggests the following:

a. The extent of works proposed at the intersection of Maroondah Highway / Mooroolbark Road / Victoria Road will allow the intersection to continue operating under 'acceptable' conditions with a DoS of not more than 0.95. There will be a marginal increase in the DoS in the morning period, but the afternoon period will remain comparable between existing and proposed conditions. I am therefore comfortable the extent of works identified at this intersection is appropriate.

b. The works identified at the intersection of Mooroolbark Road/Hull Road will return the intersection to an appropriate operating condition comparable with existing. In my view, the works at this intersection are significant and very constrained. This intersection is already operating at capacity due to these constraints and whilst the development will exacerbate these issues, it should not necessarily be responsible for the full funding of the works at this intersection. Furthermore, construction of the Healesville arterial will provide relief for this intersection.

   The works at this intersection are complicated by the existing rail structure, and in this regard I am of the opinion that it is reasonable for alternative solutions to be considered at the relevant time.

[2] Intersection is presumed to be signalised by Council in 'proposed conditions'

This opportunity is afforded in the Clause 37.02 requirements, whereby a traffic assessment is required for each application. At the time identified for the works to this intersection, the application traffic report could explore alternative options.

c. The intersection of Hutchinson Street/John Street is constrained by existing property boundaries and operates with a split phase on the east and west legs due to the existing alignments, which is inherently inefficient. The modified intersection arrangements delivered through linemarking will allow the intersection to operate with a single side road phase with some right turn priority phasing which will be more efficient overall. It will operate under 'acceptable' conditions with a DoS of around 0.95. I do not expect it is possible to return this intersection to its 'existing' DoS, nor do I believe it is necessary in this instance to do so. Furthermore, the Lilydale Integrated Transport Plan contemplates further consideration of this intersection in the context of the Lilydale Bypass.

d. The modification of the left turn lane to a shared left and right turn at the intersection of Swansea Road / Hull Road, along with some adjustments to the signal phasing will allow this intersection to operate under 'acceptable' conditions post development. The DoS will increase from 0.84-0.85 to 0.96 in both peak hours. I have reviewed the intersection and there are limited further works that can be delivered to further improve this intersection operation. I am comfortable this post development outcome is acceptable.

e. The combined intersection of Maroondah Highway/Anderson Street /Hardy Street will continue to be congested. I am of the view improvements to this intersection need to be considered as part of the Lilydale Bypass and should be a Department / Council funded project.

f. Without signals, the intersection of Maroondah Highway/Hutchinson Street is likely to reach capacity, primarily related to the right turn out of Hutchinson Street opposed by large volumes on Maroondah Highway. Council has identified a desire to signalise the intersection as part of the Lilydale ITP. The future signals would operate satisfactorily with degrees of saturation consistent with existing conditions.

g. The intersection of Maroondah Highway/John Street currently operates as a pseudo Lilydale Bypass. The post development analysis suggests the intersection would reach capacity, primarily due to through and right turning volumes from the south-west on Maroondah Highway (and entering John Street). Putting aside the increase in degrees of saturation in the peaks, in my view, the operation of this intersection should be monitored and considered more broadly when Council resolves its preferred road network for the Lilydale Bypass.

Infrastructure Works

159 The suite of infrastructure works, including mitigation works at some existing intersections, triggers for such works, and responsibility for delivery are outlined in Section 4.8 of the CDP.

160 In my review of the proposed transport infrastructure works, whilst not directly applicable to the CDP, I have been mindful of the ICP Guidelines.

161 The intent of the ICP system is to ensure the planning and provision of infrastructure is equitable, efficient and cost effective. Moreover, the provision of the infrastructure needs to be basic and essential, and should be considered in the context of the wider planning framework.

162 In relation to equity, the ICP guidelines state:

> *'Developers, local government, state agencies and other stakeholders all share the responsibility for funding infrastructure, and the contribution made by development should be proportionate to the need it is expected to generate. Accordingly, infrastructure contributions will not necessarily fund the full cost of infrastructure to be provided through an ICP'.*

163 I am also cognisant of my experience in the planning and implementation of PSP's, whereby it is typical for PSP's to fund (sometimes partially) intersections in the immediate influence of the PSP area, and it would be unusual for PSPs to contribute to intersections further afield.

164 In this regard, I have formed the view that it is not necessary for the infrastructure works to contribute to improvements at the intersections of Anderson Street / Maroondah Highway, Anderson Street / Hardy Street, Hutchinson Street / Maroondah Highway, or John Street / Maroondah Highway.

165 These are projects that have either been earmarked for some time or form part of the consideration of the Lilydale Bypass project. In my mind, these projects are also not 'essential' for the development as there are other traffic routes available should congestion worsen at these intersections.

166 On the other hand, whilst it could be reasonably argued the developer should not shoulder sole responsibility for the improvements to the intersection of Mooroolbark Road and Hull Road, this intersection is critical to the full development of the Precinct. Moreover, in consideration of the exclusion of the other projects on Maroondah Highway and Anderson Street, I think it is reasonable for this project to form part of the infrastructure works.

167 However, given the complex nature of this intersection in relation to the existing rail structure, there should be enough flexibility in the infrastructure agreement for alternative measures to increase capacity to / from the south west, including consideration of the need for the project should the Healesville arterial secure funding.

168 In view of the foregoing principles, I am generally comfortable with the transport infrastructure list and believe it has sought to provide an equitable arrangement where funding for projects is reasonably shared between the developer, local government, and state agencies.

169 I have reviewed the triggers for the provision of the infrastructure works and the delivery responsibility, and accordingly provide the following comments.

CI /DI	PROJECT ID	PROJECT SUMMARY	DESCRIPTION	TRIGGERS	DELIVERY RESPONSIBILITY	Comment
INTERSECTIONS						
DI	DI-RD-01	Mooroolbark Rd and Churchill Dr – new intersection	Construction of a new signalised intersection to provide site access and associated land acquisition withinthe site.	It is assumed that interim access to Precinct 1 (Western Neighbourhood) is to be provided via Taylor St. If DI-RD-01 is delivered before DI-RD-02, DI- RD-01 is to be constructed prior to the delivery of the 330th dwelling in Precinct 1. If delivered subsequent to DI-RD-02, DI-RD-01is to be constructed prior to the delivery of the 1,000th dwelling.	Developer	In my view only limited access should be provided via Taylor St, given its local nature (occupation of up to 250 lots based on amenity expectations for Taylor St) Furthermore, as DI-RD-01 forms a cross intersection with existing Churchill Dr, the intersection should be signalised as soon as the connection to Mooroolbark Rd is provided.
DI	DI-RD-02	Mooroolbark Rd and Landscape Dr – new intersection	Construction of a new signalised intersection to provide site access and associated land acquisition withinthe site.	It is assumed that interim access to Precinct 1 (Western Neighbourhood) is to be provided viaTaylor St. If DI-RD-02 is delivered before DI-RD-01, DI- RD-02 is to be constructed prior to the delivery of the 330th dwelling in Precinct 1. If delivered subsequent to DI-RD-01, DI-RD-02is to be constructed prior to the delivery of the 1,000th dwelling.	Developer	The CDP contemplates in the order of 600 lots within Precinct 1. This level of development could be supported by a single signalised access. In this regard, the provision of the second set of signals in my view should be provided when the vehicle connection is provided to Precinct 4 or as soon as the vehicle connection is provided to Mooroolbark Rd opposite Landscape Dr.
DI	DI-RD-03	Hull Rd/North-South Connector Rd intersection upgrade (ultimate)	Construction of the ultimate intersection at Hull Rd / North-South Connector Rd (to be fully constructed with	To be delivered in accordance with the existingagreed commitment reached under the Permit for Stage One.	Developer	Acceptable.

			Stage 1 works).			
DI	DI-RD-04a	Melba Av and Hutchinson St intersection – new roundabout	Construction of anew roundabout including associated land acquisition.	The street connection is to be delivered prior to DI-RD-03 exceeding a Degree of Saturation (DoS) of 0.90 in either the morning or evening commuter peak periods.	Developer	This presumes there is a connection to the south to connect o Hull Rd. If there is no connection to the south, and Precinct 2 is sought to be developed, then temporary access could be afforded to Melba Avenue for a limited number of lots (say 200). If temporary access is not afforded, then the intersection should be required as part of the 1st application for Precinct 2.
DI	DI-RD-04b	Proposed Connector and Proposed Connector intersection – new roundabout	Construction of a new roundabout including associated land acquisition.	The street connection is to be delivered prior toDI-RD-03 exceeding a DoS of 0.90 in either the morning or evening commuter peak periods.	Developer	See response to DI-RD-04.
DI	DI-RD-05	Hutchinson St and John St intersection upgrade	Construction of minor upgrade to existing intersection via removal of on-street parking adjacent to intersection, signal phasing and timing optimisation. No land acquisition required.	Once DI-RD-04/09 & DI-RD-10 works are fully delivered, the DI-RD-05 works will betriggered. Thus, DI-RD-05 works are to be constructed concurrently with DI-RD-04/09.	Council	This is identified as a Council responsibility within the Lilydale ITP
DI	DI-RD-06	Maroondah Hwy and Mooroolbark Rd intersection upgrade	Constructionof upgrade to existing intersection.	To be constructed prior to the delivery of the 400th dwelling in Precinct 1.	Developer by agreement withDoT (TBC)	In consideration of equity, there needs to be a sufficient number of lots to warrant the proposed works, and accordingly I agree with this trigger.
DI	DI-RD-07a	Mooroolbark Rd and Hull Rd intersection	Construction of upgrade existing intersection and associated land acquisition.	To be constructed prior to the delivery ofthe final stage within Precinct 1 (Western Neighbourhood).	Developer	In consideration of equity, there needs to be a sufficient number of lots to warrant the proposed works, and accordingly I agree with this trigger. However, there should be a level of flexibility on this item to allow consideration of

						alternative solutions and potential state funding of the Healesville arterial.
DI	DI-RD-07b	Mooroolbark Rd and Hull Rd intersection – bridge widening	Works to the existing rail bridge to facilitate proposed road works under DI-RD-07a.	To be constructed prior to the delivery of the final stage within Precinct 1 (Western Neighbourhood).	Developer	See response to item DI-RD-07a
DI	DI-RD-08	Hull Rd and Swansea Rd intersection upgrade	Construction of a minor upgrade to existing intersection to provide for a right turn lane from HullRd to Swansea Rd.	To be delivered prior to the delivery of the first dwelling in any stage east of the railway line (within Precincts 2, 3 & 4).	Council	Acceptable.
COLLECTOR AND MAJOR ROADS						
DI	DI-RD-09	North South Connector Rd extension	Construction of a new connector road from the site boundary to extent of works ofitem RD-04a and associated land acquisition.	The street connection is to be delivered prior to DI-RD-03 exceeding a DoS of 0.90 in either the morning or evening commuter peak periods.	Council to provide land in its ownership. Developer to acquire land in other ownership.	Acceptable.
DI	DI-RD-10	North South Connector Rd	Construction of a new connector road within the site from the northern-eastern Site boundary to the southern Siteboundary (Stage 1) and associatedland provision.	To be delivered sequentially as adjacent development progresses.	Developer	Acceptable.
BRIDGES						
DI	DI-BR-01	East West Rd bridge (rail crossing)	Construction of a new road bridge across the rail-linein the southern section of the site.	To be constructed once the delivery of the final stage within Precinct 1 (Western Neighbourhood) is complete and development has commenced in Precinct 4 (Urban Core).	Developer	Acceptable.
DI	DI-BR-02	Pedestrian bridge (rail crossing)	Construction of a new pedestrian bridge across the rail-line in	At the time when urban core is fully built out.	Developer	Acceptable.

			the northern section of the site.			

Commercial Site Access

170 The CDP contemplates a highway frontage commercial use at the corner of Maroondah Highway and Mooroolbark Road, including a left-in / left-out access to Maroondah Highway.

171 This access is illustrated in the Cardno plan for the intersection of Maroondah Highway and Mooroolbark Road.

172 The access is sited approximately 150 metres east of Mooroolbark Road.

173 In my view, access to Maroondah Highway is highly desirable for the viability of a commercial use at this corner.

174 I am of the opinion the access as sited can provide for safe and convenient access, without material impact to the operation of Maroondah Highway, including its intersection of Mooroolbark Road.

175 I form this view as the access is sufficiently distant from the Mooroolbark Road traffic signals, is improved by a left turn deceleration lane, and is afforded reasonable sight distance to the east to allow exiting motorists to safely choose a gap to enter the west bound traffic stream.

Committee Questions

176 Direction 17 of the committee's directions has requested traffic specific items be addressed as follows.

> *17. Council and the Proponent must address the following through expert evidence:*
>
> *a) Likely traffic volumes expected as a result of Lilydale Bypass and/or Healesville Bypass, particularly at the following intersections:*
>
> *(i) Maroondah Highway/Mooroolbark Road /Victoria Street.*
>
> *(ii) Mooroolbark Road /Hull Road.*
>
> *(iii) Maroondah Highway/Anderson Street.*
>
> *(iv) Anderson St/Hardy Street.*
>
> *b) Any additional works that may be required to bring these intersections to an acceptable operating capacity if the Bypasses are not built.*

177 The Proponent's traffic model is premised on the existing road network. That is, it has not allowed for the Lilydale Bypass nor Healesville Bypass in the model. In this regard, if either of these projects is constructed it is likely to lessen the need for the agreed infrastructure works, particularly the Mooroolbark Road / Hull Road intersection improvements.

178 On this basis, I do not believe the proponent should be responsible for any other works if the Bypasses are not built.

179 In relation to Direction 17 (a), Council is better placed to respond to this item as it commissioned GTA to prepare the 2015 Lilydale Integrated Transport Plan. The Transport Plan was informed by VITM modelling, which predicts traffic volumes for 2046.

180 I understand the VITM model considered development of the quarry, the delivery of the Healesville Arterial and investigated the potential downgrade (2-lanes) and upgrade (4-lane) of Maroondah Highway.

Conclusions

181 Based on the preceding assessment, I am of the opinion:

a. The CDP Framework Plan illustrates a connective road network with appropriate connections to the external road network provided through signalised intersections to Mooroolbark Road and Hull Road, and a roundabout connection to Melba Avenue.

b. The Framework Plan illustrates improved pedestrian and bicycle connectivity through the provision of a rail trail along the Melbourne-Lilydale rail line, a pedestrian bridge across the rail line, and footpaths and bicycle paths provided throughout the internal road network.

c. The objectives, requirements and guidelines within the Transport Section of the CDP are appropriate to guide development.

d. The proposed road hierarchy and cross sections within the CDP are well resolved for the projected traffic volumes and intended functions of the roads.

e. The CDP appropriately sets out the transport infrastructure requirements in Section 4.8.

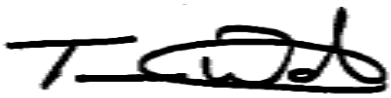
f. The triggers for and delivery responsibility set out within the CDP are generally acceptable, subject to incorporation of my recommended changes.

g. The Integrated Transport Plan has been reasonably drafted and structured to guide the transport objectives of the CDP.

h. The design of the site access traffic signals at Mooroolbark Road and Hull Road, and the roundabout design at Melba Avenue are acceptable to accommodate projected traffic volumes and allow future users of the CDP a variety of access options.

i. The suite of external traffic mitigation measures proposed within the Cardno Traffic Impact Assessment is appropriate in the context of need, nexus and equity.

182 I have made all the inquiries that I believe are desirable and appropriate and there are no matters of significance I regard as relevant, which to the best of my knowledge, have been withheld from the Panel.



JASON LEE WALSH
DIRECTOR
TRAFFIX GROUP
21 May 2021

Appendix A
Qualifications & CV

Name

Jason Lee Walsh - Director, Traffix Group Pty Ltd

Address

Level 28, 459 Collins Street

MELBOURNE

VICTORIA 3000

Qualifications

My educational qualifications and membership of professional associations are as follows:-

- Bachelor of Civil Engineering, Monash University
- Bachelor of Science, Monash University
- Fellow, Victorian Planning & Environmental Law Association

Experience

I have approximately 25 years experience in Traffic Engineering including,

- 1995-2000 at Turnbull Fenner (now Traffix Group), including short term placements at the cities of Bayside and Whittlesea.
- 2000-2011 at Grogan Richards Pty Ltd (now Cardno).
- 2011-present at Traffix Group.

Areas of Expertise

- Car parking and Traffic.
- Traffic advice and assessment of land uses and development proposals to planning authorities, government agencies, corporations and developers (including major residential, retail, food and drink, commercial, industrial, institutional and mixed use projects).
- Preparation and presentation of evidence before VCAT and Panels.

Expertise to Prepare this Assessment

My experience and expertise over the past 25 years, including involvement with varied forms of developments, qualifies me to comment on the traffic implications of the proposed development.

Instructions

I was instructed by Norton Rose Fulbright on behalf of HBI Lilydale Pty Ltd to undertake a traffic engineering assessment and prepare an evidence statement in relation to Draft Yarra Ranges Planning Scheme Amendment C193

Facts, Matters and Assumptions Relied Upon

- Amendment C193 supporting documentation.
- Lilydale Integrated Transport Plan 2015.
- Lilydale Major Activity Centre Structure Plan – Issues and Opportunities Paper.
- Lilydale Comprehensive Development Plan.
- Integrated Transport Plan – Lilydale Quarry Urban Renewal, prepared by Cardno, dated 30 October 2020.
- Supporting Traffic Impact Assessment – Lilydale Quarry Urban Renewal, prepared by Cardno, dated 30 October 2020.
- Transport Peer Review prepared by GTA Consultants on behalf of Yarra Ranges Council.
- Yarra Ranges Planning Scheme.
- Submissions.
- Site inspection.
- Relevant experience.

Documents Taken into Account

See above.

Identity of Persons Undertaking Work

Jason Walsh as per the evidence statement.

Carlo Morello (Senior Associate, Traffix Group) assisted with preparation of the evidence report.

Summary of Opinions

See Conclusions section of the evidence statement.

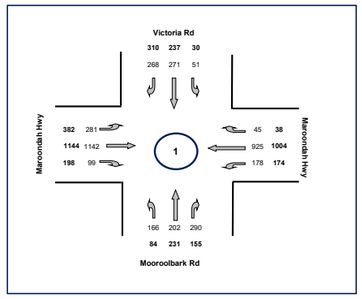
Appendix B
Adopted Traffic Volumes

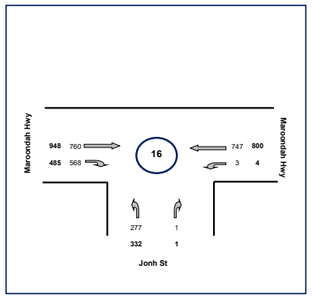
Traffix Group

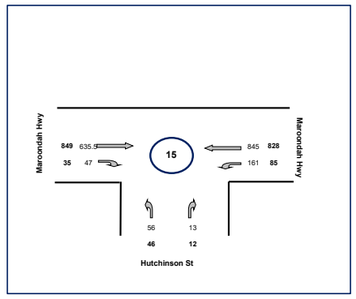
Existing Network Traffic Volumes

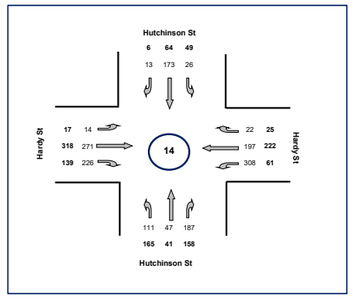
- Modelling Layout from Cardno, checked by Traffix Group and updated with new traffic volumes.
- Traffic volumes adopted from 13th February 2020 SCATS data & 2015 Cardno survey volumes with calculated growth of 3%.

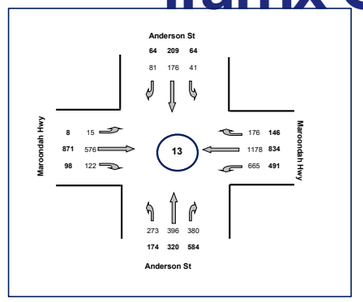
EXISTING

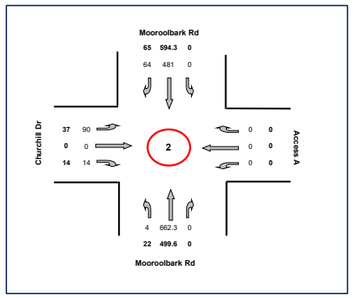


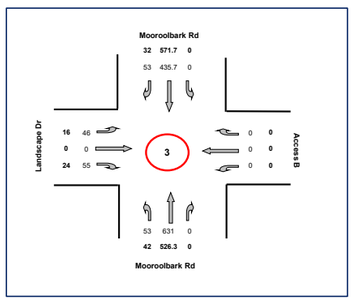


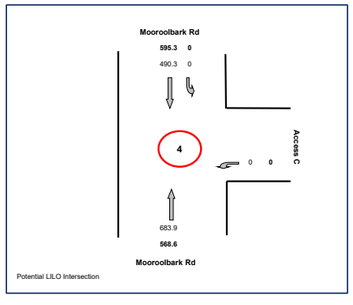




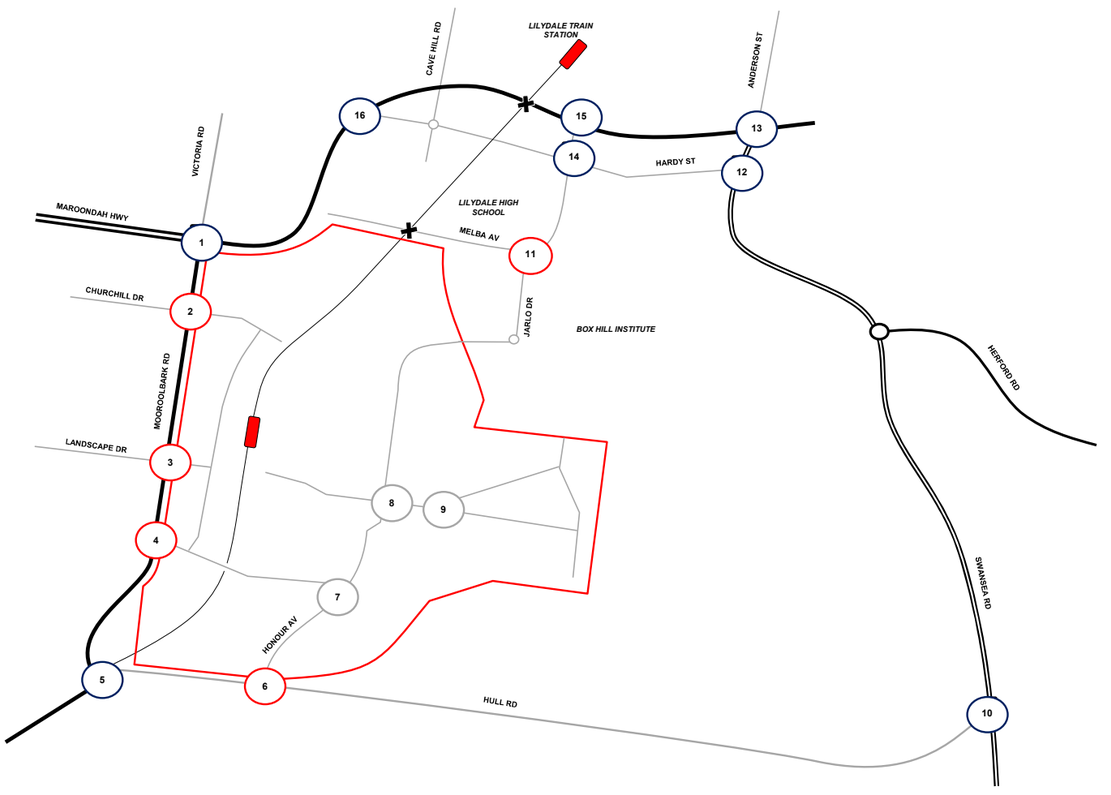


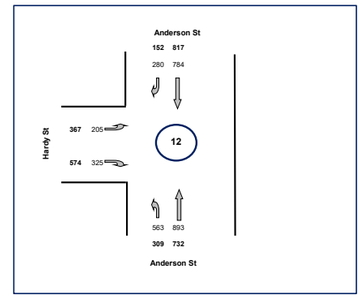


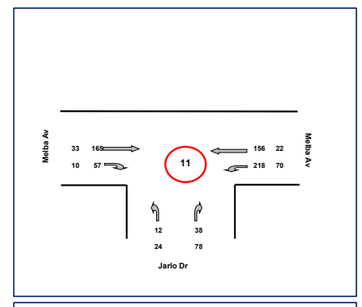


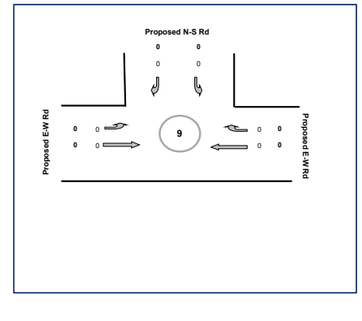


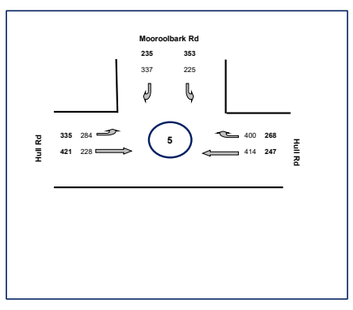
Potential LILO Intersection

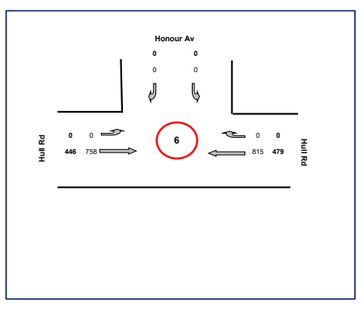


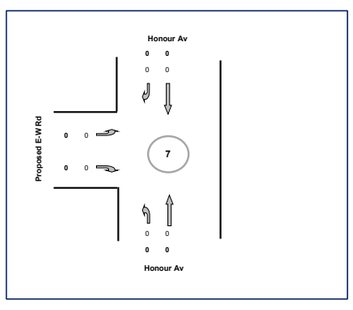


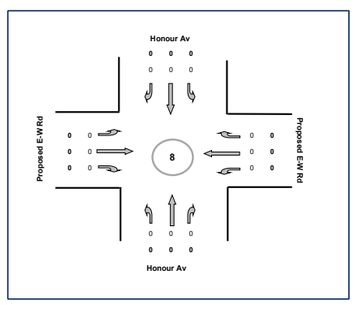


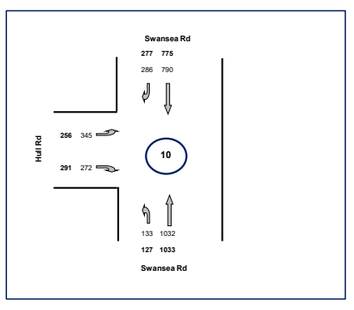












LEGEND

Internal road layout is only indicative in this map

- Subject Site
- Arterial Roads
- Local Roads
- North

XXX: AM Peak Volumes

XXX: PM Peak Volumes

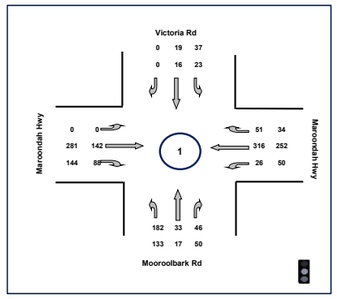
- External Development Access Locations
- Internal Intersections
- External Intersections

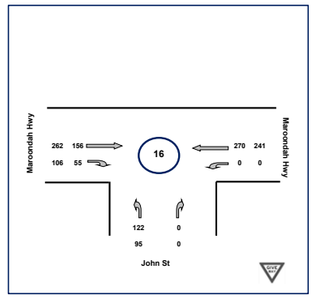
Traffix Group

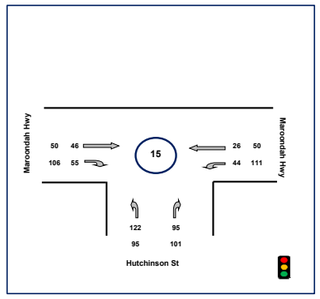
TOTAL TRAFFIC GENERATION

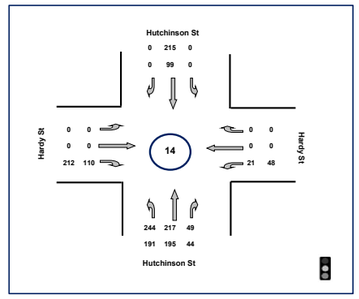
- Modelling Layout from Cardno, checked and accepted by Traffix Group.

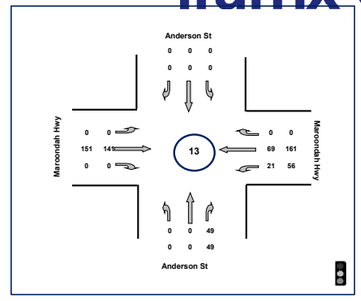
DEVELOPMENT TRAFFIC

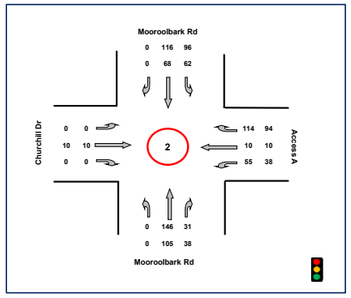


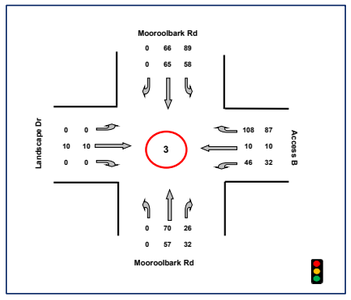


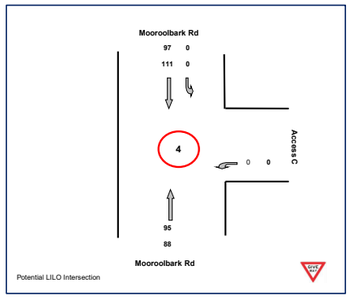




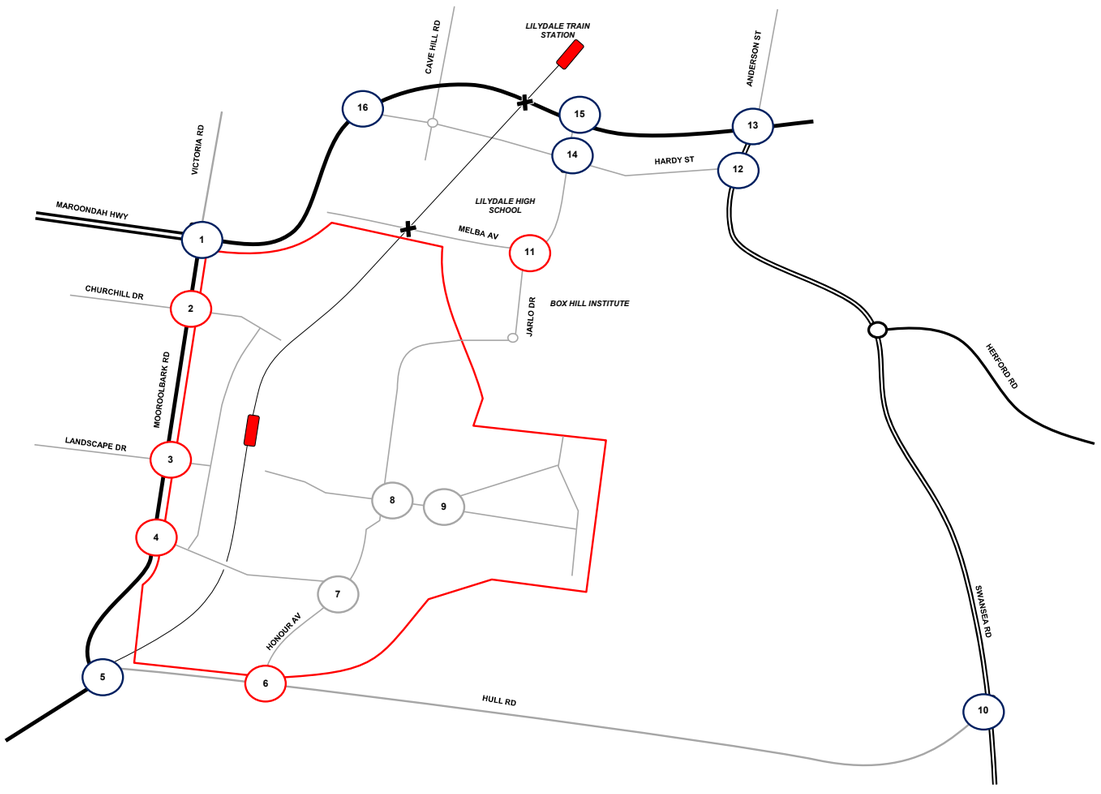


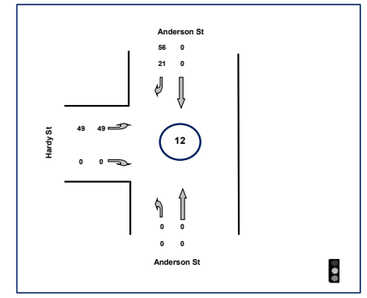


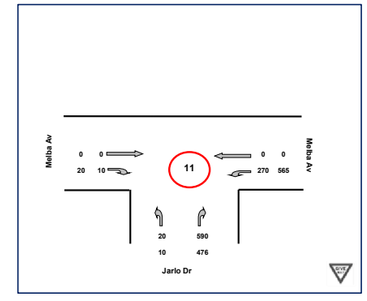


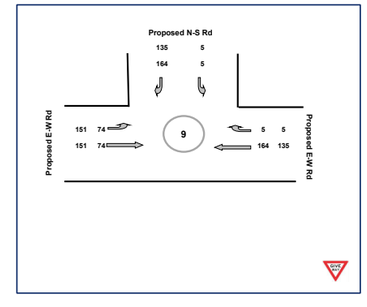


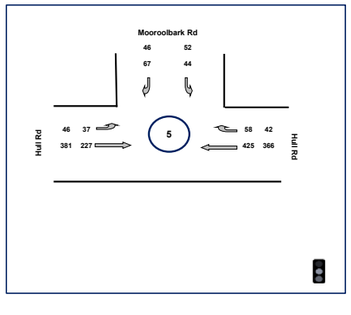
Potential LILO Intersection

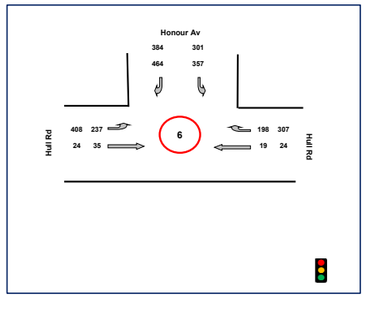


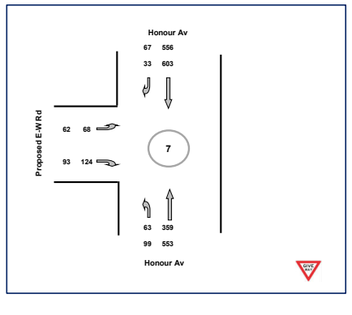


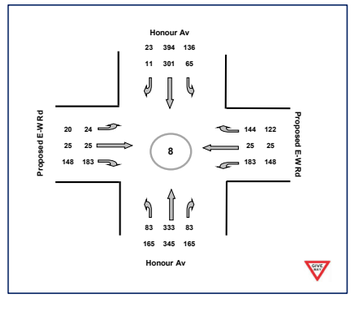


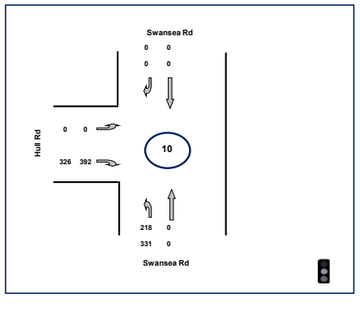












LEGEND

Internal road layout is only indicative in this map

- Subject Site
- Arterial Roads
- Local Roads

North

XXX: AM Peak Volumes

XXX: PM Peak Volumes

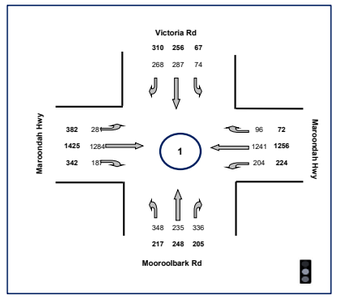
- External Development Access Locations
- Internal Intersections
- External Intersections

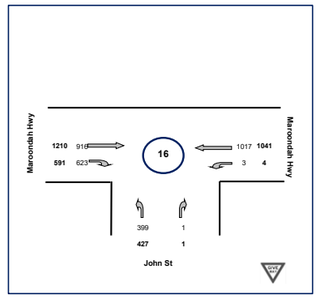
Traffix Group

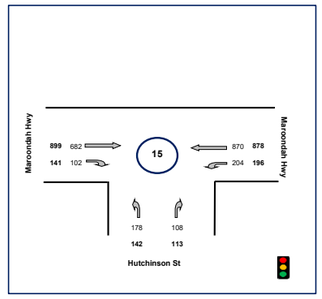
ANTICIPATED TRAFFIC VOLUMES

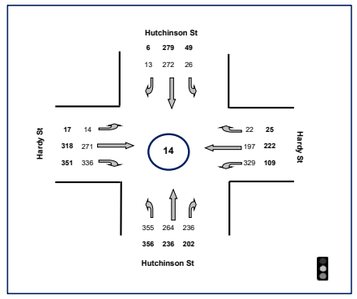
- Modelling Layout from Cardno, checked by Traffix Group and updated with new traffic volumes.

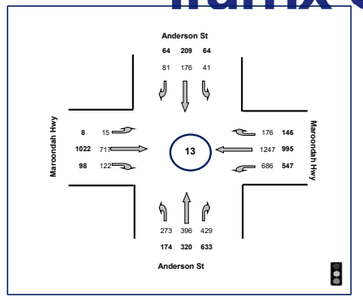
POST DEVELOPMENT

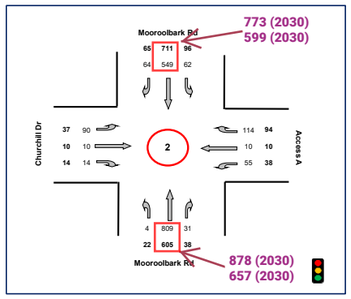


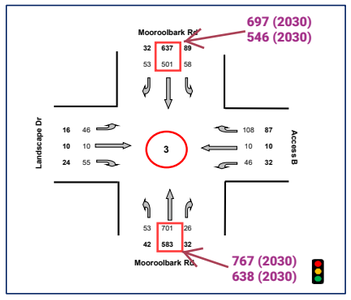


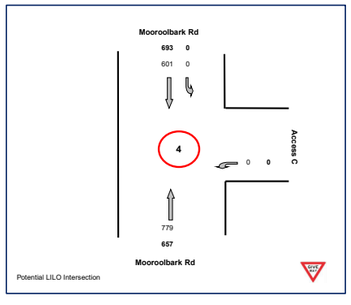


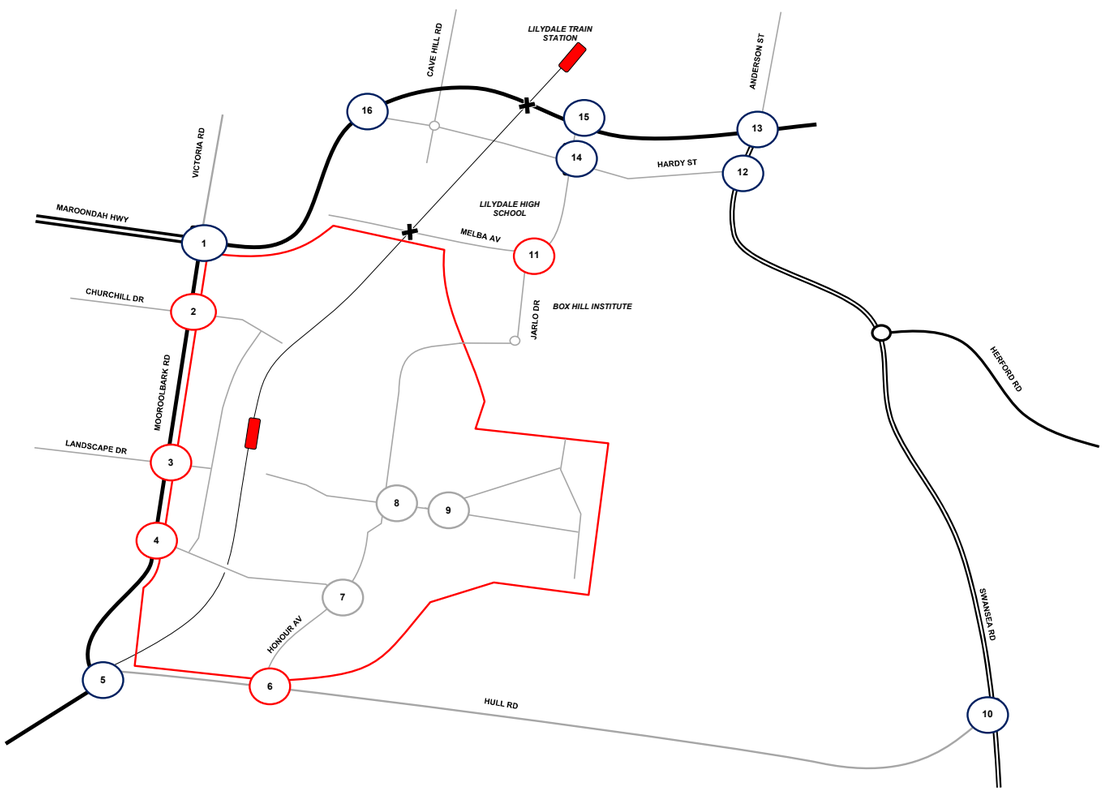


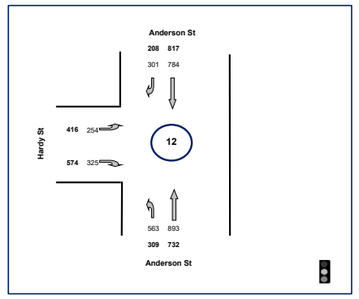


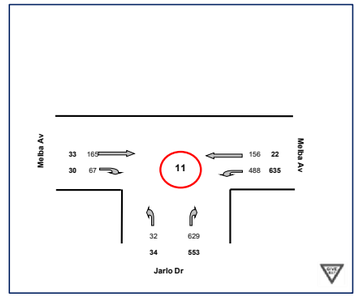


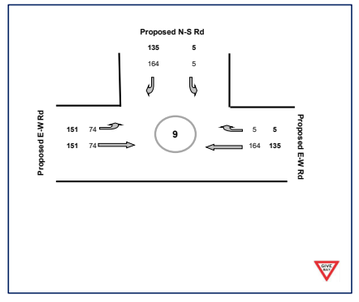


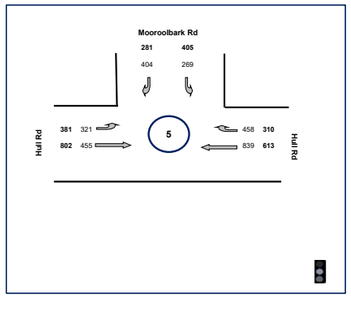


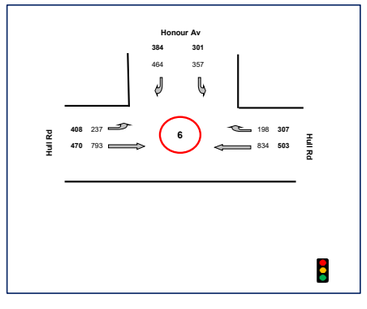


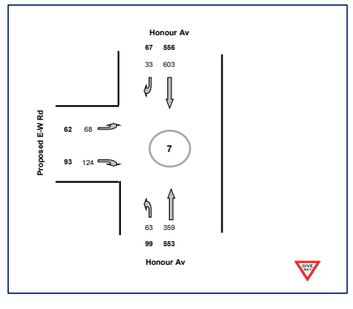


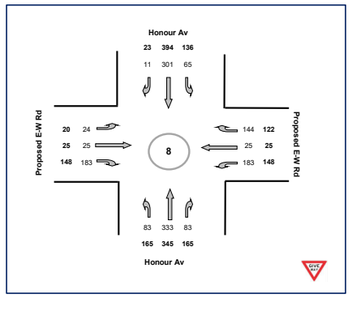


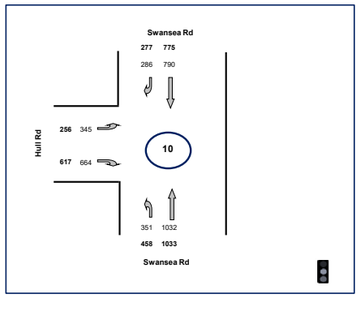












LEGEND

Internal road layout is only indicative in this map

- Subject Site
- Arterial Roads
- Local Roads

North

XXX: AM Peak Volumes

XXX: PM Peak Volumes

- External Development Access Locations
- Internal Intersections
- External Intersections

Appendix C
SIDRA Outputs