Appendix C

Traffic Impact Report

ratio:

Proposed Residential Development

Development Plan Traffic Impact Assessment

29 Browns Road
Clayton

June 2016

traffic:impact

r:

prepared for: Nan Xin Investments Pty Ltd

June 2016
Our reference: 12555rep05.docx

Table of contents:

1 Introduction:

Ratio Consultants has been engaged by Nan Xin Investment Pty Ltd to assess the traffic and parking implications of a Development Plan for a residential development at 29 Browns Road, Clayton.

This report has been prepared to address the parking and traffic matters to form part of the Development Plan and will be submitted to the Monash City Council.

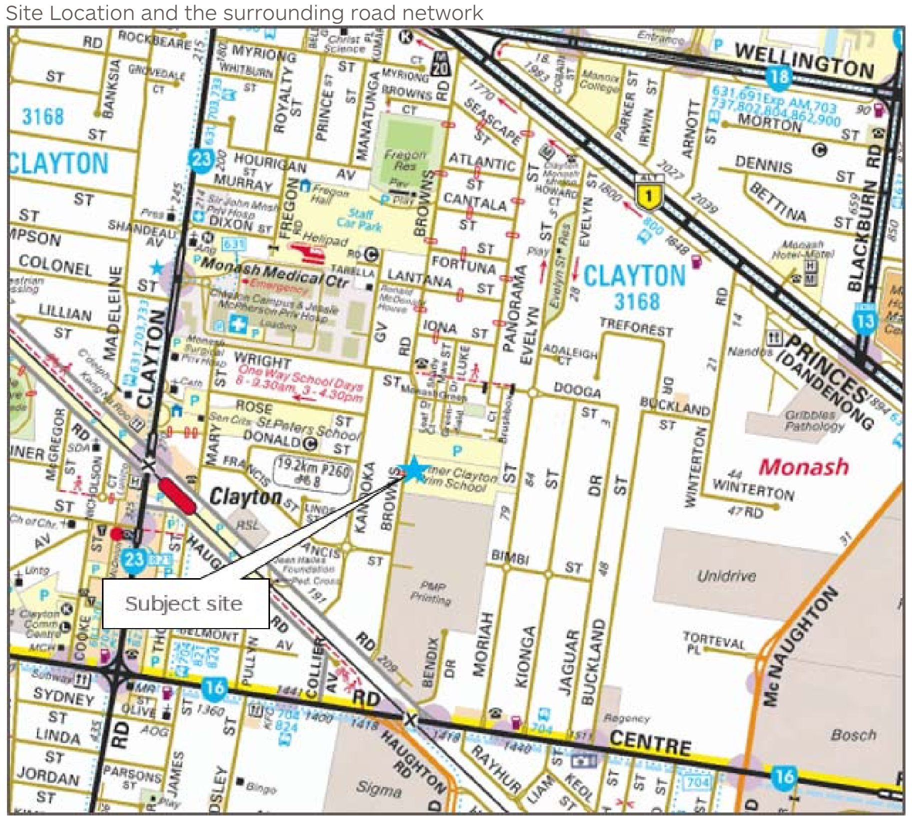
The report is based on recent surveys and observations in the vicinity of the site, and of previous studies of similar developments elsewhere in Melbourne.

2 Existing Conditions:

2.1 Location and Environment

The subject site is located at 29 Browns Road and is located south of Princes Highway, between Browns Road and Moriah Street in Clayton. The site and surrounding road network is shown below in Figure 2.1.

Figure 2.1:
Site Location and the surrounding road network



Source: http://www.melway.com.au/

The site is rectangular in shape with a frontage to Browns Road of approximately 90.86 metres, a frontage to Moriah Street of 16.36 metres and an approximate depth of 212.9 metres for an overall site area of approximately 2 hectares. There is currently an unoccupied single storey school (Clayton Primary School) and car park on-site. There is one existing vehicular crossover to/from Browns Road located along the northern boundary and one existing crossover to/from Moriah Street. There is also a pedestrian wombat crossing provided across Browns Road at the frontage of the site.

Photo 2-1: Subject Site

The subject site is located within a General Residential Zone – Schedule 1 (GRZ1), subject to a Development Plan Overlay – Schedule 5 (DPO5). The subject site is surrounded by a General Residential Zone – Schedule 2, to the east and west, and Industry 1 Zone (INZ1) to the north and south. Accordingly, the land use in the immediate vicinity of the site comprises a mixture of residential and industry uses.

Notable non-residential land uses in the vicinity of the site include:

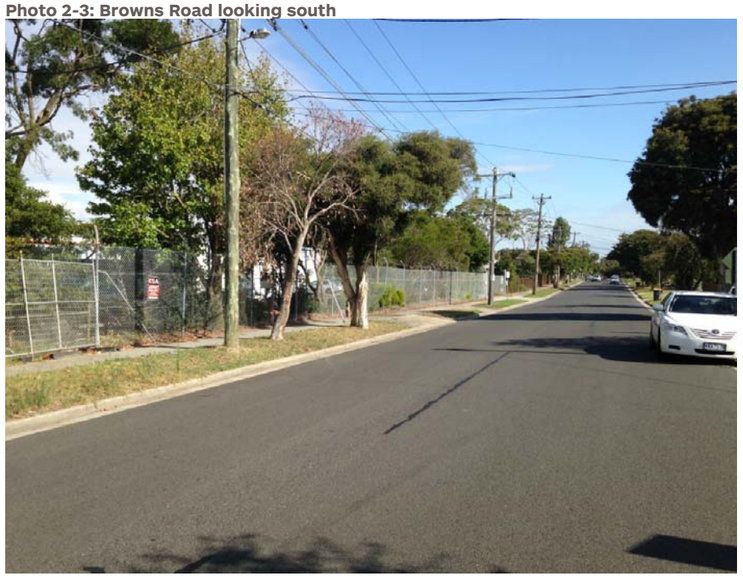
- Secured car parking to the north of the site.
- PMP Limited print and distribution warehouse to the south of the site.
- Various warehouse developments along the east side of Browns Road between the site and Carinish Road.
- Sir John Monash Private Hospital approximately 750 metres north-west of the site.
- Monash Institute of Medical Research located approximately 350 metres north-west of the site.
- Clayton Railway Station approximately 700 metres south-west of the site.
- Clayton Activity Centre approximately 700 metres south-west of the site.
- Monash University located approximately 1.2 kilometres north of the site.
- Springvale Homemaker Centre located approximately 1.4 kilometres east of the site.

2.2 Road Network

Browns Road is a municipal Local Road that runs in a north-south alignment between Princes Highway (Dandenong Road) and Carinish Road, in Clayton. In the immediate vicinity of the site, Browns Road has an approximate carriageway width of 9.0 metres accommodating one traffic lane in each direction and kerbside parking on both sides of the road. Footpaths are provided on both sides of the road. Browns Road has a default speed limit of 50km/hr.

Photo 2-2: Browns Road looking north

Photo 2-3: Browns Road looking south



Moriah Street is a municipal Local Road that runs in a north-south alignment between Centre Road and Dooga Street, in Clayton. In the immediate vicinity of the site, Moriah Street has an approximate carriageway width of 7.0 metres accommodating one trafficable lane in each direction and kerbside parking on both sides of the road. Footpaths are provided on both sides of the road. Moriah Street has a posted speed limit of 50km/hr.

Photo 2-4: Moriah Street looking south

2.3 Traffic Conditions

Ratio Consultants Pty Ltd commissioned a 7-day traffic volume and speed count on Browns Road from Tuesday 18 August 2015 to Monday 24 August 2015. The detailed survey results are presented in Figure 2.2 and Table 2.1 of Appendix A.

In summary, the survey results showed:

- A 7-day average of 3,249 vehicles per day, of which 2.8% were classified as Heavy Vehicles. Of this, 1418 vehicles were recorded travelling northbound and 1831 vehicles travelling southbound.
- The morning peak occurred between 8:00am and 9:00am when an average total of 245 vehicles movements were recorded over this section of Browns Road. This consisted of an average of 129 vehicles travelling northbound and an average of 116 vehicles travelling southbound.
- The evening peak occurred between 5:00pm and 6:00pm when an average total of 317 vehicles movements were recorded over this section of Browns Road. This consisted of an average of 95 vehicles travelling northbound and an average of 222 vehicles travelling southbound.
- The 85th percentile speed over the 7 days was 37.9km/h.

2.4 Parking Conditions

Ratio Consultants conducted surveys of parking supply and demand on Thursday 5 March 2015 between 12:00pm to 8:00pm. The extent of the survey area and detailed survey results are presented in Figure 2.3 and Table 2.1, attached in Appendix A.

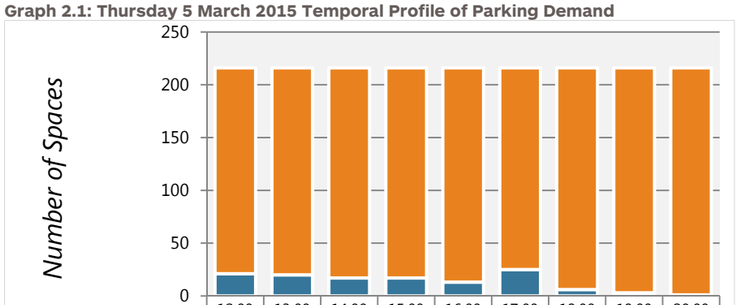
A summary of the results are as follows:

Thursday 5 March 2015

- There were a total of 216 publicly available car parking spaces available during the survey period, subject to a range of parking restrictions.
- The peak period occurred between 12:00pm and 1:00pm, when a total of 21 parking spaces were recorded occupied out of an available supply of 216 spaces, representing a parking occupancy of 10%.
- The demand for parking was low during the survey period, ranging between 0% and 10%.
- On Browns Road immediately in front of the site, there is a supply of 26 parking spaces on the eastern side of the road (Zone I) and 15 spaces on the western side of the road (Zone B), with a mixture of 2P and 1/2P parking restrictions. These were observed to be very minimally used during the survey period.
- On Browns Road to the south of the site, there is a supply of 25 spaces on the eastern side of the road (Zone J) and 10 spaces on the western side of the road (Zone C), with 2P parking restrictions. Similarly, these were observed to be very little used.

Graph 2.1 provides a graphical representation of the Thursday parking demands.

Graph 2.1: Thursday 5 March 2015 Temporal Profile of Parking Demand



	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
PUBLIC VACANCIES	195	196	199	199	203	191	210	213	215
PUBLIC OCCUPANCIES	21	20	17	17	13	25	6	3	1

The survey results indicate that the overall parking demand is low during the survey period, indicating that there is ample parking capacity within close vicinity of the subject site to accommodate any additional visitor parking demand generated by the site.

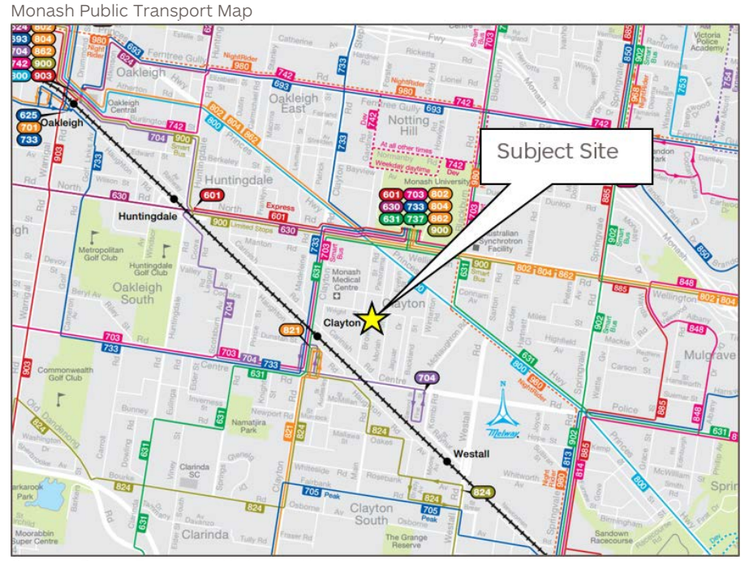
2.5 Sustainable Transport

The site has access to the following public transport facilities:

- Clayton Railway Station located 700 metres south-west of the site.
- Bus Route 703 SMARTBUS (Middle Brighton – Blackburn via Bentleigh, Clayton, Monash University) operates along Clayton Road, with the closest stop located 620 metres west of the subject site.
- Bus Route 631 (Southland – Waverley Gardens via Clayton, Monash University) operates along Clayton Road, with the closest stop located 620 metres west of the subject site.
- Bus Route 733 (Oakleigh – Box Hill via Clayton, Monash University, Mt Waverley) operates along Clayton Road, with the closest stop located 620 metres west of the subject site.
- Bus Route 800 (Dandenong – Chadstone via Princes Highway, Oakleigh) operates along Princes Highway, with the closest stop located 950 metres north of the site.

Refer to Figure 2.3 for a graphical representation of the available public transport services in the vicinity of the site.

Figure 2.3:
Monash Public Transport Map



Source: Public Transport Victoria http://ptv.vic.gov.au/

2.6 Crash Analysis

A review has been conducted of VicRoads 'Crashstats' data base for the most recent five year period of available data from 1 July 2008 to 30 June 2013 for any reported casualty crashes along Browns Road (between Francis Street and Wright Street inclusive of the intersections), and along Moriah Street (between Dooga Street and Bimbi Street inclusive of the intersections).

The analysis revealed one casualty crash at the intersection of Browns Road and Wright Street, involving a vehicle running off the road into a parked vehicle, resulting in a serious injury. Given the low number of crashes in the area, it is considered that the road network surrounding the subject site is operating in a relatively safe manner.

3 The Development Plan:

The Development Plan envisages 4 four-storey apartment buildings and 78 townhouses, plus associated on-site basement car parking on land at 29 Browns Road, Clayton.

Initial plans indicate:

- 172 apartments across 4x four-story apartment buildings, comprising:
  - 78 x one-bedroom apartments; and
  - 94 x two-bedroom apartments.
- 78 townhouses, comprising:
  - 23 x two-bedroom townhouses;
  - 45 x three-bedroom + study townhouses[1];
  - 10 x four-bedroom townhouses[1].
- 2 four-bedroom townhouses accessed from Moriah Street
- A total of 361 car parking spaces is proposed to be provided on-site, comprising:
  - 212 at-grade car parking spaces provided within a basement car park for residents and visitors of the apartments, accessed via a ramp to/from the internal road;
  - 16 visitor spaces provided on ground level within the internal streets; and
  - 133 car parking spaces provided for the 78 townhouses, with each of the two-storey townhouses provided single or double width garage, and each of the three-storey townhouses provided with a tandem garage.

Access to the site will be via Browns Road. Access to the townhouses and apartments within the site will be via a network of internal roads.

Vehicular access to the basement apartment car park is proposed via a double width ramp, accessed from the northern internal street.

In addition to the above, there are 2 four-bedroom townhouses proposed at the eastern end of the site, accessed from Moriah Street. Each of these two townhouses will be provided with a double garage (ie. four spaces). No through vehicular access is proposed between Moriah Street and Browns Road.

A network of footpaths throughout the site has been provided to accommodate access to each of the townhouses and the apartment buildings.

Refer to Appendix B for the Development Plans prepared by Mushan Architects.

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[1] The dimensions of the studies are not considered to be of sufficient size to allow them to function as a bedroom. Therefore, for the purpose of this assessment, these apartments have been considered as three-bed apartments.

4 Parking and Traffic Assessment:

4.1 Clause 52.06 Assessment

Parking requirements for a range of uses are set out under Clause 52.06 of the Victoria Planning Provisions. The purpose of the Clause, amongst other things, is:

- To ensure that car parking is provided in accordance with the State Planning Policy Framework and Local Planning Policy Framework.
- To ensure the provision of an appropriate number of car parking spaces having regard to the demand likely to be generated, the activities on the land and the nature of the locality.
- To support sustainable transport alternatives to the motor car.
- To promote the efficient use of car parking spaces through the consolidation of car parking facilities.
- To ensure that car parking does not affect the amenity of the locality.
- To ensure that the design and location of car parking is of a high standard, creates a safe environment for users and enables easy and efficient use.

In accordance with the Car Parking Table to Clause 52.06-5, Table 4.1 below sets out the statutory parking requirements for the initial development plans.

Table 4.1:
Clause 52.06 Planning Scheme Assessment

Use	Type	Number	Statutory Parking Rate	Statutory Requirement
Residential (apartments)	One Bedroom	78 x 1-bed apartment	1 space per dwelling	78 spaces
	Two Bedrooms	94 x 2-bed apartments	1 space per dwelling	94 spaces
Residential (townhouses)	Two bedrooms	23 x 2-bed townhouses	1 spaces per dwelling	23 spaces
	Three Bedrooms	45 x 3-bed townhouses	2 spaces per dwelling	90 spaces
	Four Bedrooms	10 x 4-bed townhouses	2 spaces per dwelling	20 spaces
Residential (townhouses accessed from Moriah Street)	Four Bedrooms	2 x 4-bed townhouses	2 spaces per dwelling	4 spaces
Visitor		250 dwellings total (172 apartments + 78 townhouses)	1 visitor space per 5 dwellings	50 spaces
TOTAL				359 spaces

On the basis of the above, the initial plans would have a statutory requirement to provide 355 spaces. Given that 365 on-site spaces are proposed, including 52 visitor spaces, the development exceeds the requirements of the Planning Scheme.

4.2 Access Arrangements

Access to the development will be to/from Browns Road via a 6.0 metre wide private access street. The location of the access is considered satisfactory and appropriate as it provides good sightlines to both directions of traffic on Browns Road, and at a good distance away from

any existing intersections to avoid any potential conflict with turning vehicles.

Internal Streets

The proposed internal private street network is configured to provide a main entry road between the site entry point on the north-eastern corner of the site and the basement car park entry. This section is anticipated to carry the largest volume of traffic. Lower order access streets extending from the main road are also provided, giving access to the remaining townhouses.

The main access road between the site access and the basement entry has been provided with a kerb to kerb road width of 6.0 metres. The lower order side access streets extending out from the main section has been provided with a kerb to kerb road width of 5.5 metres.

Footpaths are proposed to be provided at a width of 1.4 metres.

A one-way road is proposed through the apartment buildings, which is envisaged to be bollarded on both ends and closed to vehicular traffic, and only to be used for emergency vehicles and waste removal vehicles. The road is proposed to be 3.5 metres wide, and has been designed to accommodate the movements of an 8.8 metre long truck.

Provision has been made at the ends of the side streets to allow for a turnaround area for cars. The crossovers will be designed to enable vehicles to perform three-point turn manoeuvres at the end of the street and exit in a forwards direction.

Basement Car Park Access

- The initial plans show a basement car park access ramp to the north of the site, accessed from the internal street and leading down into the basement car park. This provides sufficient width to accommodate two-way traffic and a central intercom island, if required.
- Ramp gradients will be determined during the conceptual design stage, and designed within the gradient transition requirements set out in Clause 52.06-8 of the Planning Scheme.
- It is recommended that an exit sight splay measuring 2.0 metres by 2.5 metres is provided at the top of the basement car park ramp, to provide adequate sight distance to pedestrians on the footpath

4.3 Car Park Layout

The development accommodates a total of 365 parking spaces, comprising of:

- 212 parking spaces within a basement level car park, comprising:
  - 176 resident parking; and
  - 36 visitor parking spaces;
- 137 parking spaces within garages for the townhouses; and
- 16 visitor parking spaces on the ground level, accessed from the internal streets.

Each car space will be designed consistent with the dimensions and standards outlined in Clause 52.06-8 of the Monash Planning Scheme and/or AN/NZS 2890.1:2004.

Basement Parking Spaces

The basement car parking spaces will comply with the dimensional requirements of Clause 52.06 of the Planning Scheme and/or AS/NZS 2890.1:2004, with the following minimum requirements:

- Minimum width of 2.6 metres and a length of 4.9 metres, accessed via a minimum 6.4 metre wide access aisle
- In accordance with Design Standard 2: Diagram 1 of Clause 52.06, a minimum of 300mm clearance will be provided to parking spaces located adjacent to structures or objects that impact upon the parking envelope;
- No columns are currently shown in the basement level, and will be detailed during a detailed design stage. All columns adjacent to parking bays will be set back 250mm and extending to 1.25m back from the front of the parking space, which complies with Diagram 1 of Clause 52.06-8 Design Standard 2;
- End bay islands to be provided to protect cars that are parked in the end bays;
- Parking aisles to be extended by 1 metre beyond the last parking spaces at blind aisles to allow for vehicles to turn around at the end and drive out forwards in accordance to Section 2.4.2 of AS/NZS 2890.1:2004.

Townhouse Garage Spaces

Parking for the townhouses are provided within a combination of single garages, double garages and single garages plus a tandem space. The townhouse parking arrangement will be designed in accordance with Clause 52.06 of the Planning Scheme and/or AS/NZS 2890.1:2004, with the following minimum requirements:

- The single garages to have an internal width of 3.5 metres by 6.0 metres, in accordance to Design Standard 2 of Clause 52.06-8 of the Monash Planning Scheme.
- The double garages to have an internal width of 5.5 metres by 6.0 metres, accessed by a minimum aisle width of 6.4 metres.
- The tandem garages to have a minimum internal length of 11.4 metres and an internal width of 3.5 metres.

Townhouse Visitor Parking Spaces

The townhouse visitor parking spaces will be designed in accordance with the dimensional requirements of Clause 52.06 of the Planning Scheme, with the following minimum requirements:

- Minimum width of 2.6 metres and a length of 4.9 metres, accessed via a minimum 6.4 metre wide access aisle, in accordance with AS/NZS 2890.1:2004.

4.4 Bicycle Parking

The provisions set out under Clause 52.34-3 of the Monash Planning Scheme require that bicycle parking be provided at the following rates, as shown in Table 4.3:

Table 4.2:
Bicycle Parking Statutory Requirements

Use	Type	Number of Apartments	Statutory Parking Rate	Statutory Requirement
Residential (apartments)	Resident	172 apartments	1.0 space per five residential apartments	35 spaces
	Visitor	172 apartments	1.0 space per 10 residential apartments	18 spaces
Total				53 spaces

Accordingly, the proposal has a statutory requirement to provide 53 bicycle spaces. It is recommended that a minimum of 53 on-site bicycle spaces are provided for apartment residents and visitors. It is noted that there is ample space to provide the required level of bicycle parking.

Bicycle storage for the townhouses may be within the garage.

4.5 Waste Management

Waste storage areas for the apartments could be provided on the ground level between the two apartment buildings.

For the townhouses, bins may be accommodated within the garages.

Waste collection will be collected kerbside via private contractor within the internal streets. Townhouse residents will transfer bins to bin collection points located at various points around the site, and a building manager/caretaker will be responsible for transferring apartment garbage and recycling bins for collection from the bin storage areas to the kerbside collection points.

Prior to collection, residents within the eastern row of townhouses will shift their bins to western side of the street, adjacent to the apartment block, with waste collection to be undertaken at the intersection. A 1.3 metre wide nature strip has been provided at this location to accommodate the placement of bins in a single line without obstructing the footpath. Waste collection vehicles will utilise the intersection as a turning area, and prop within the street to undertake the waste collection.

A swept path assessment (Refer to Appendix C) has been conducted using the “Autodesk Vehicle Tracking’ software, which demonstrates that the intersection has been adequately designed to accommodate the turnaround of a Medium Rigid Vehicle (8.8 metre long truck) to enable the vehicle to exit in a forwards direction.

It is recommended that a Waste Management Plan be prepared at a later stage by a qualified consultant detailing the waste collection arrangements.

Swept Path Assessment

A swept path assessment (Refer to Appendix C) has been conducted using the “Autodesk Vehicle Tracking’ software, to test that:

- Cars are able to enter and exit the basement car park simultaneously (B99 has been used for this assessment).
- Cars are able to adequately turn around at the end of each of the side streets (B99 has been used for this assessment)
- Waste collection vehicles are able to circulate through the one-way street (8.8m long Medium Rigid Vehicle has been used for this assessment)
- Waste collection vehicles are able to utilise the intersection on the north-eastern corner of the site to turn around and exit in a forward direction (8.8m long Medium Rigid Vehicle has been used for this assessment).

5 Traffic Assessment:

5.1 Traffic Generation

Residential apartments of the type and location proposed generate approximately four vehicle trips per day for one and two bedroom dwellings with one car space, and up to eight trips a day for three or four bedroom dwellings with two car spaces. Therefore, the 172 apartments and 80 townhouses (consisting of 57 three or four-bedroom dwellings and 195 one and two bedroom dwellings) would be expected to generate in the order of 1,236 vehicle trips per day. Generally, 10 percent of the trips, which equates to about 124 peak hour trips, will occur in each of the morning and evening peak hours.

The majority of the traffic generated by the residential development during the morning peak period will be residents departing the site (80 percent out and 20 percent in) and the majority of the traffic during the evening peak period will be residents returning to the site (30 percent out and 70 percent in).

Accordingly the expected trip generation for a typical weekday AM and PM peak hours is estimated as shown in Table 5.1

Table 5.1:
Traffic Generation for the Development

	AM Peak	PM Peak
Arriving trips:	25	87
Departing trips:	99	37
Total trips:	124	124

5.2 SIDRA Analysis

The Australian Research Board (ARRB) developed a computer program called SIDRA, as an aid in the design and analysis of both signalised and unsignalised intersections. The relevant major performance measures calculated by SIDRA are the 95th percentile queue length, the average delay, and the Level of Service (LOS).

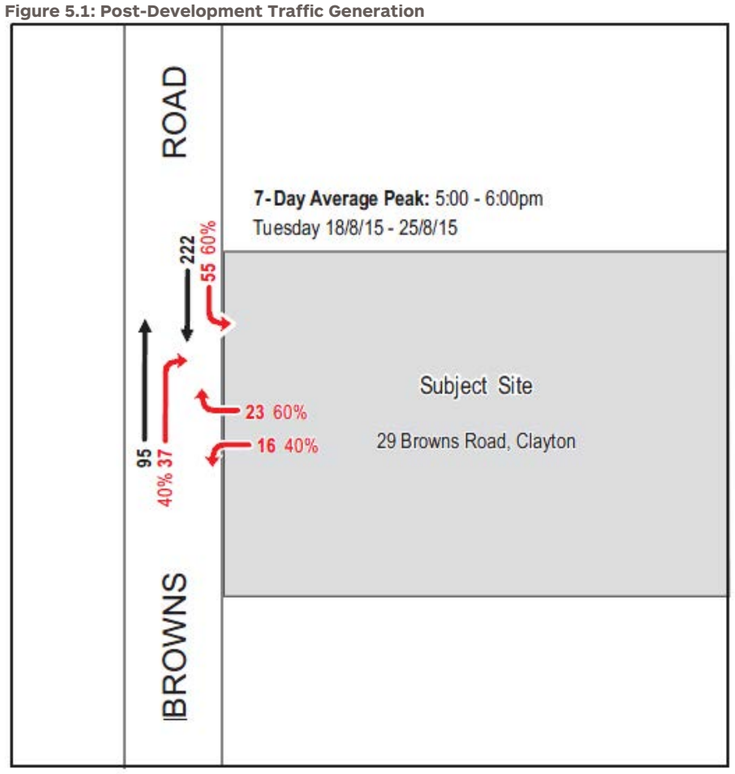
The location of the site access for the proposed development is on Browns Road, midblock between Francis Street and Monash Green Drive.

Traffic volume data was obtained as described previously in Section 2.3 of this report, and a SIDRA analysis was undertaken, including both the existing AM and PM peak periods.

A model with the current road geometry and the existing peak hour volumes along Browns Road was conducted for the afternoon / evening critical period, based on the 7-day average volumes obtained from the tube counts. A 5% heavy vehicle percentage was applied to both the eastbound and westbound traffic volumes. A further model of the proposed intersection was then conducted, incorporating the estimated additional volumes.

For the purposes of the study, the distribution of traffic is assumed to be 60% arrival/departure from the north, and 40% arrival/departure from the south. Using the traffic generation estimates outlined in Table 5.1 above, the expected generated traffic volumes are shown graphically in Figure 5.1 below:

Figure 5.1: Post-Development Traffic Generation



The results of the SIDRA analysis for the proposed conditions are summarised in Table 5.2 below, and the full set of results have been included for reference in Appendix D.

Table 5.2: SIDRA Analysis – Browns Road Future Conditions

Approach	Movement	PM Peak Hour (5:00pm-6:00pm)		
		Average Delay (sec)	Level of Service	95% Back of Queue (metres)
Browns Road (South Approach)	Through	0.5	A	1.9
	Right	5.6	A	1.9
Site	Left	2.7	A	0.9
	Right	3.8	A	0.9
Browns Road (North Approach)	Through	0	A	0
	Left	4.6	A	0

The results indicate that in the critical PM peak hour (5:00pm-6:00pm), the traffic generated by the site would have a very minor impact on the existing operation of Browns Road. The through traffic would be largely unaffected by the additional 124 vehicles during the PM peak hour, and there would be a negligible queue in both directions of Browns Road as well as within the site.

5.3 Traffic Distribution and Impact

The majority of the additional traffic generated by the proposed development will flow onto Browns Road and the surrounding road network, with a low level of traffic generated onto Moriah Street. It is considered that the traffic generated by the proposed development (in the order of 124 vehicle movements in the morning and afternoon peak hours) can be managed in a safe and effective manner without creating adverse safety or capacity impacts to the wider road network.

6 Conclusion:

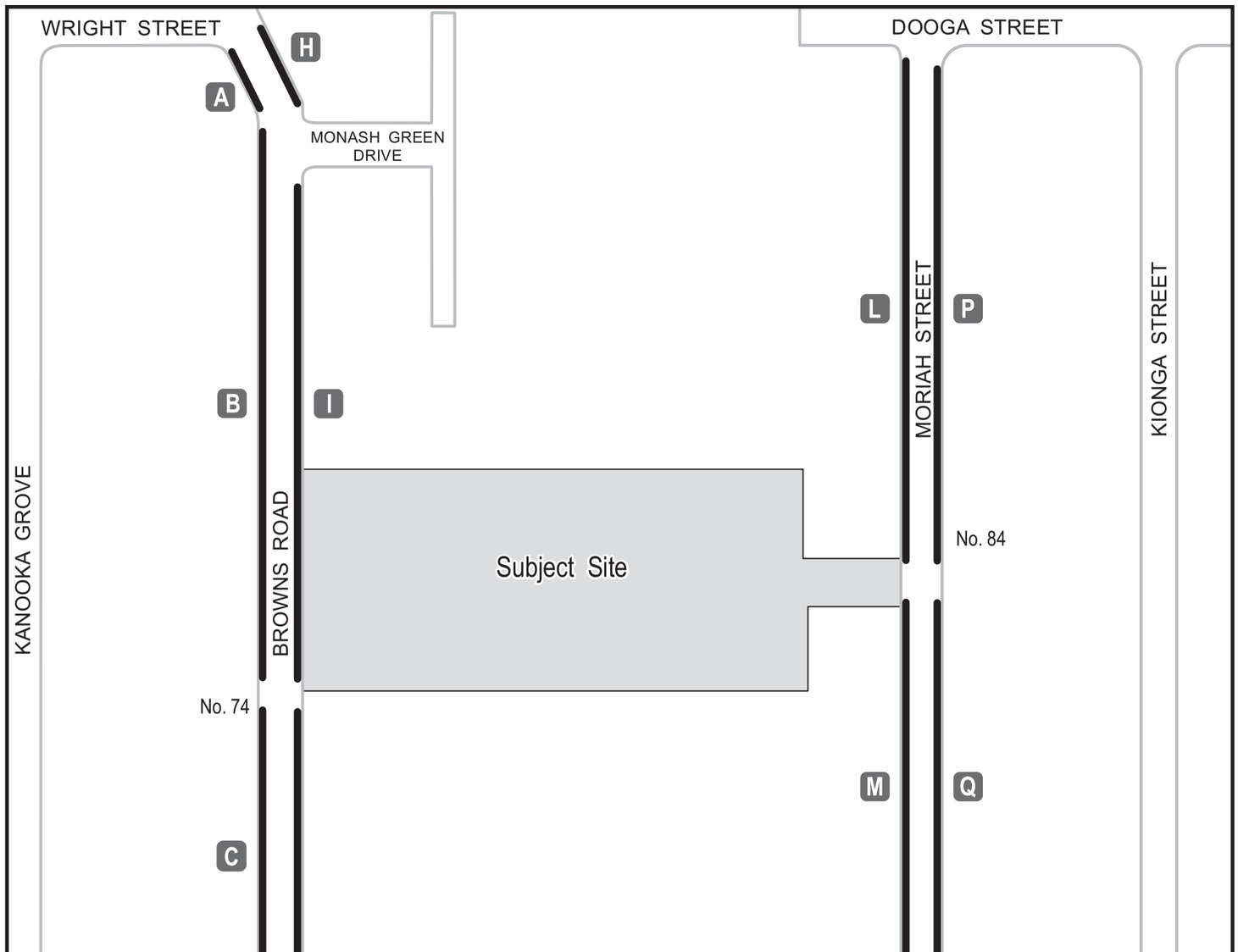
The initial development plans for residential development at 29 Browns Road, Clayton, comprises 172 apartments within 4x four-storey buildings, 23 two-bedroom townhouses, 45 three-bedroom townhouses and 10 four-bedroom townhouses. The proposed development would also include the provision of 365 on-site car parking spaces, with 361 spaces accessed via Browns Road and four spaces accessed Moriah Street.

Based on the above considerations, it is considered that:

- The proposed on-site parking provision meets the requirements of Clause 52.06 of the Monash Planning Scheme and is expected to accommodate the resident and visitor parking demand. Parking surveys indicate that there is ample parking along Browns Road in the immediate vicinity of the site to accommodate for additional visitor parking if and when required.
- The proposed car park and access arrangements are suitably designed and will be designed in accordance with the requirements of the Monash Planning Scheme and/or AS/NZS2890.1:2004.
- Up to 124 vehicular trips will be generated during the morning and afternoon peak hours by the proposed development. Traffic generated by the proposed development will be dispersed onto the surrounding road network, which has the capacity to accommodate the additional traffic volumes in a safe and satisfactory manner.
- Bicycle parking is currently not shown in the plans. However, it is noted that there is ample space to provide for the required number of bicycle parking under Clause 52.34 of the Monash Planning Scheme.

Overall, the proposed development is not expected to create adverse traffic or parking impacts in the precinct. Accordingly, it would be appropriate to approve a Development Plan incorporating a proposal of the indicated type and scale.

Appendix A: **Survey Results:**



Browns Road Clayton

Parking Occupancy Survey

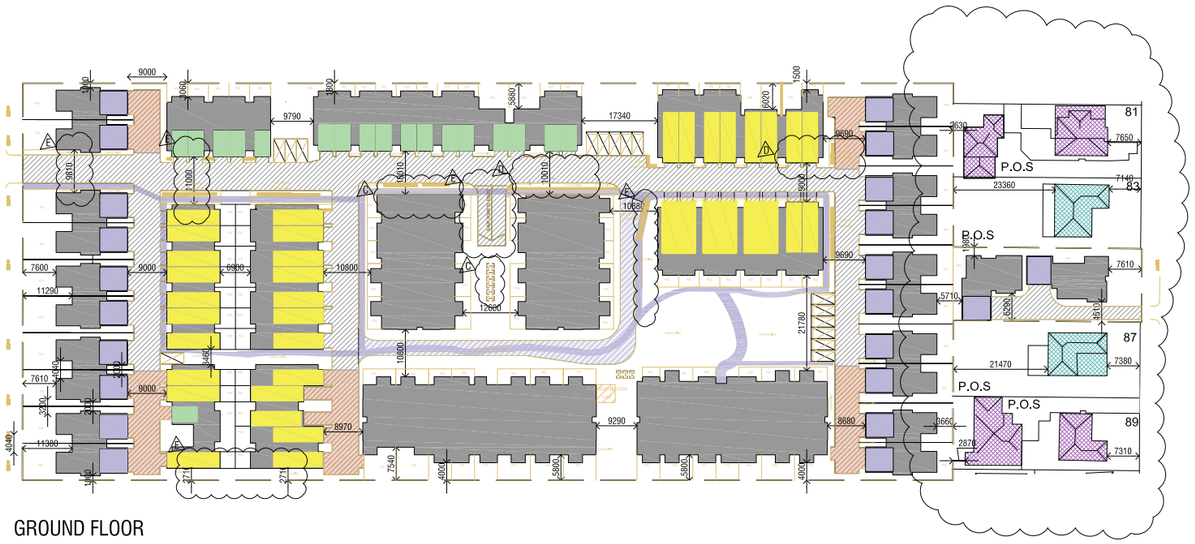
Location 29 Browns Road, Clayton

Date Thursday, 5 March 2015

Weather Mild And Overcast

Public Parking (1/0)	Ratio Map Ref	Street	Section	Side	Restriction	Capacity	Parking Occupancy								
							12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
0	A	Browns Rd	From Monash Green Drive To Wright St	W	No Standing	0	0	0	0	0	0	0	0	0	0
1	B		From No.74 To Monash Green Drive	W	2P 7:30a-5:30p Mon-Fri	1	0	0	0	0	0	0	0	0	0
1					1/2P 8a-6p Mon-Fri	14	1	0	0	0	0	1	0	0	0
1	C		From Francis St To No.74	W	2P 7:30a-5:30p Mon-Fri	10	0	0	0	0	0	1	0	0	0
1	D	Francis St	From Browns Rd To Kanooka Grove	N	1/2P 8a-6p Mon-Fri	7	0	0	0	0	0	0	0	0	0
1	E		From Browns Rd To Kanooka Grove	S	1/2P 8a-6p Mon-Fri	8	0	0	0	0	0	0	0	0	0
1	F	Browns Rd	From No.106 To Francis St	W	2P 7:30a-5:30p Mon-Fri	10	0	0	0	0	1	1	0	0	0
1	G		From Carnish Rd To No.106	W	2P 7:30a-5:30p Mon-Fri	12	0	1	0	0	0	1	0	0	0
0	H		From Monash Green Drive To Wright St	E	No Standing	0	0	0	0	0	0	0	0	0	0
1	I		From No.74 To Monash Green Drive	E	2P 7:30a-5:30p Mon-Fri	4	0	0	0	0	0	0	0	0	0
1					1/2P 8a-6p Mon-Fri	22	0	0	0	0	1	1	0	0	0
1	J		From No.106 To Francis St	E	2P 7:30a-5:30p Mon-Fri	11	3	2	2	2	1	1	0	0	0
1			From Francis St To No.74	E	2P 7:30a-5:30p Mon-Fri	14	0	0	0	0	0	1	0	0	0
1	K		From Carnish Rd To No.106	E	2P 7:30a-5:30p Mon-Fri	14	1	0	0	1	0	0	0	0	0
1	L	Moriah Street	From No.84 To Dooga St	W	Unrestricted	2	2	2	2	2	1	1	0	0	0
1					1P 8a-6p Mon-Fri	17	4	4	3	3	2	4	3	2	1
1	M		From Bimbi St To No.84	W	Unrestricted	15	2	2	2	2	2	3	1	0	0
1	N	Bimbi St	From Moriah Street To End (W)	N	Unrestricted	3	0	0	0	0	0	1	0	0	0
1	O		From Moriah Street To End (W)	S	Unrestricted	4	2	2	2	1	1	1	0	0	0
1	P	Moriah Street	From No.84 To Dooga St	E	Unrestricted	2	1	1	1	1	1	1	0	0	0
1					1P 8a-6p Mon-Fri	18	1	2	2	2	1	3	0	0	0
1	Q		From Bimbi St To No.84	E	Unrestricted	15	3	3	2	2	2	3	2	1	0
1	R	Bimbi St	From Moriah Street To Kionga St	N	Unrestricted	6	0	0	0	0	0	1	0	0	0

Appendix B: **Development Plans:**



GROUND FLOOR

TANDEM GARAGES

SINGLE GARAGES

DOUBLE GARAGES

NOTE
ALL ROADS TO BE PRIVATE INTERAL ROADS

SITE BOUNDARY
DRIVE WAY
SHARED SURFACE
WASTE COLLECTION / EMERGENCY ONLY

FOOTPATH
2-STOREY NEIGHBOR
1-STOREY NEIGHBOR
GROUND LEVEL

2 STOREY
3 STOREY
4 STOREY

RESPONSE TO RFI

MUSHAN DESIGN STUDIO PTY LTD
LEVEL 15, 333 COLLINS STREET
MELBOURNE VIC 3000
ABN: 44 162 772 714

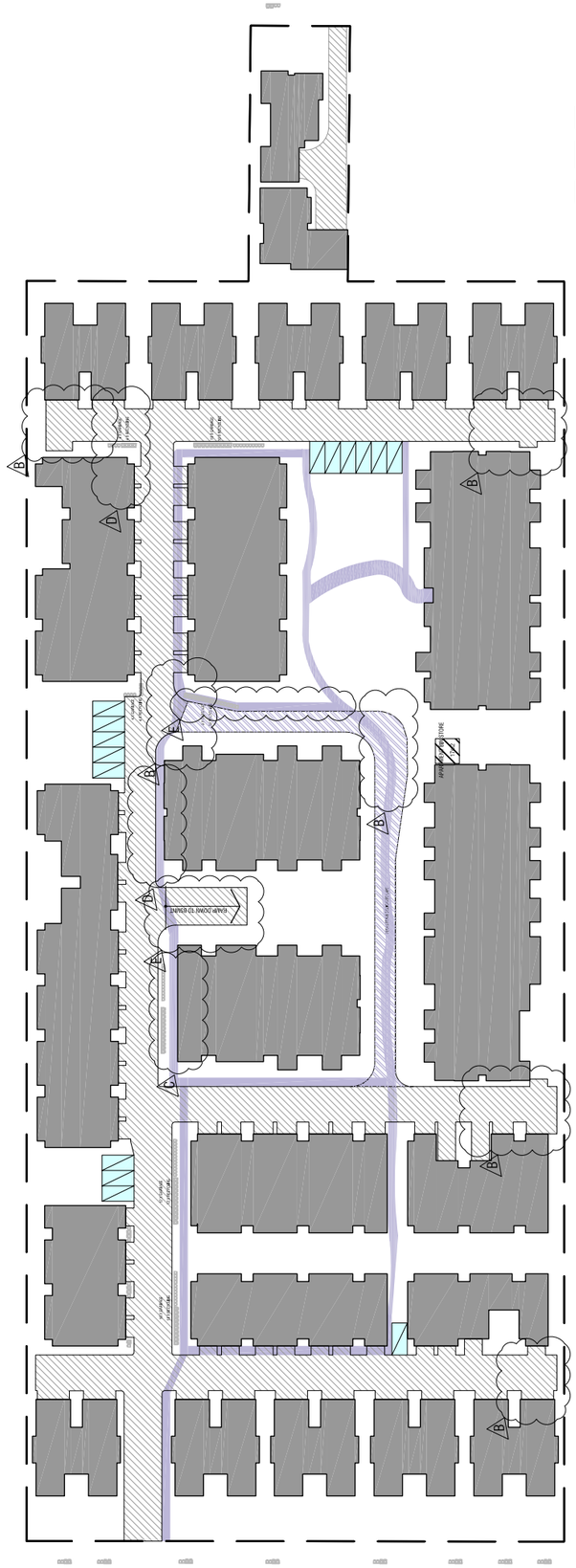
PH: 03 8611 7605
EMAIL: INFO@MUSHAN.COM.AU

NORTH

PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
29 BROWNS ROAD, CLAYTON
VIC 3168

TITLE
PROPOSED BUILT FORM AND CIRCULATION

DATE	APRIL 2016
SCALE	1:700 @ A3
PROJECT NO.	M023
DRAWING NO.	F DP08



GROUND FLOOR

SITE BOUNDARY
DRIVE WAY
WASTE COLLECTION / EMERGENCY ONLY
FOOTPATH
GF BUILDING FORM
VISITOR PARKING

RESPONSE TO RFI

NORTH

PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
29 BROWNS ROAD, CLAYTON
VIC 3168

TITLE
VEHICLE CIRCULATION & PARKING (GL)

DATE	APRIL 2016
SCALE	1:700 @ A3
PROJECT NO.	M023
DRAWING NO.	E DP12

MUSHAN DESIGN STUDIO PTY LTD
LEVEL 15, 333 COLLINS STREET
MELBOURNE VIC 3000
ABN: 44 162 772 714

PH: 03 8611 7605
EMAIL: INFO@MUSHAN.COM.AU

RESPONSE TO RFI

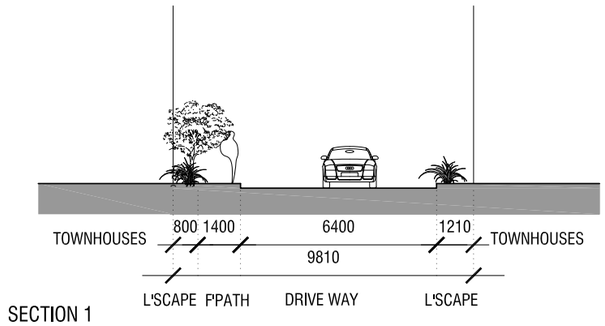
DATE SEPTEMBER 2015
SCALE 1:700 @ A3
PROJECT NO. M023
DRAWING NO. B DP13

PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
29 BROWNS ROAD, CLAYTON
VIC 3168

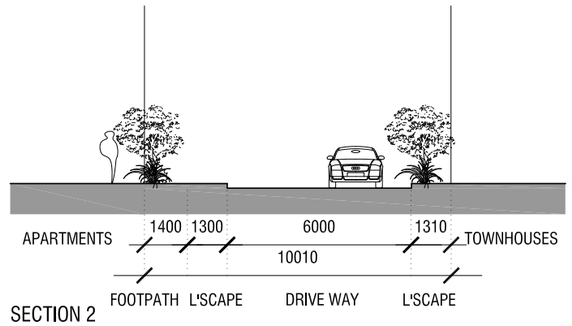
TITLE
VEHICLE CIRCULATION & PARKING (BL)

NORTH

MUSHAN DESIGN STUDIO PTY LTD
LEVEL 15, 333 COLLINS STREET
MELBOURNE VIC 3000
ABN: 44 162 772 714
PH: 03 8611 7605
EMAIL: INFO@MUSHAN.COM.AU



SECTION 1



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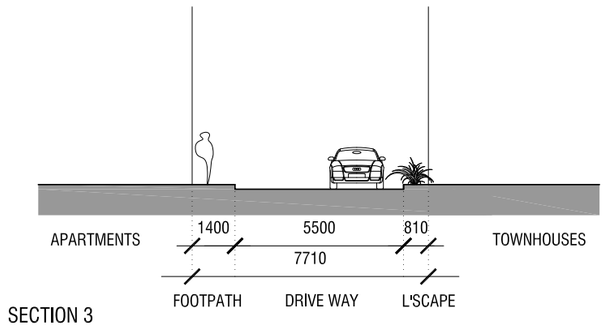

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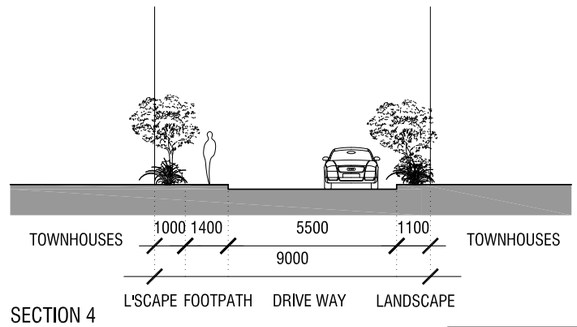


SECTION 4

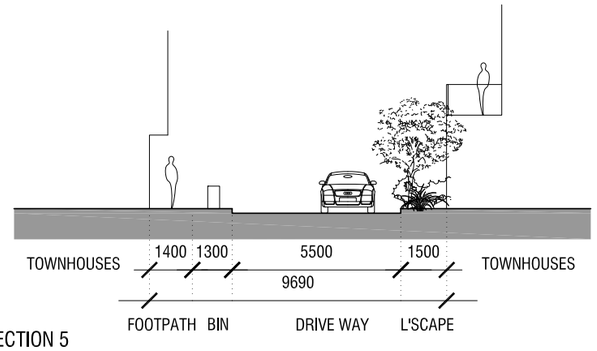
RESPONSE TO RFI

MUSHAN DESIGN STUDIO PTY LTD
LEVEL 15, 333 COLLINS STREET
MELBOURNE VIC 3000
ABN: 44 162 772 714
PH: 03 8611 7605
EMAIL: INFO@MUSHAN.COM.AU

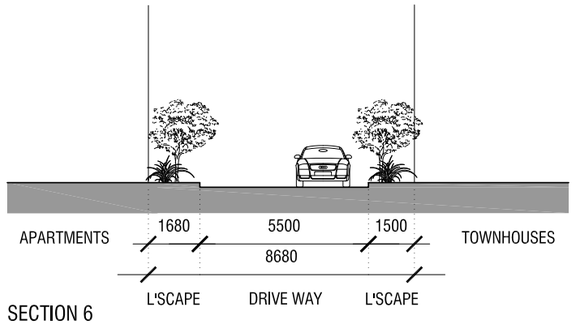
PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
29 BROWNS ROAD, CLAYTON
VIC 3168

TITLE
FOOTPATH & DRIVEWAY DIAGRAM

DATE APRIL 2016
SCALE 1:100 @ A3
PROJECT NO. M023
DRAWING NO. A DP29



SECTION 5



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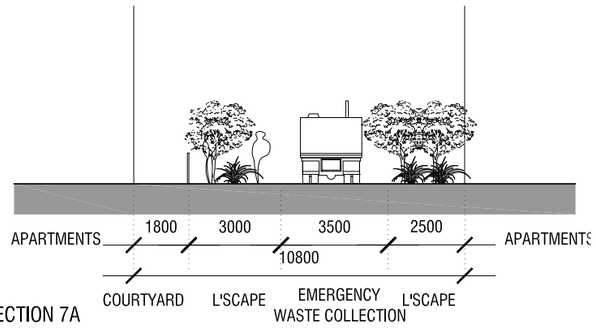
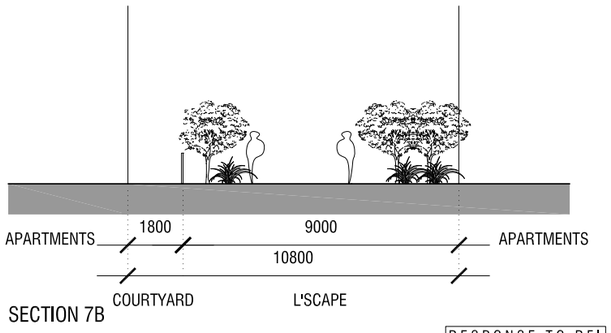


SECTION 7A

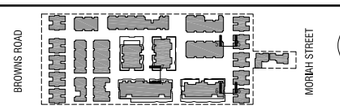


SECTION 7B

RESPONSE TO RFI

MUSHAN DESIGN STUDIO PTY LTD
LEVEL 15, 333 COLLINS STREET
MELBOURNE VIC 3000
ABN; 44 162 772 714

PH. 03 8611 7605
EMAIL: INFO@MUSHAN.COM.AU



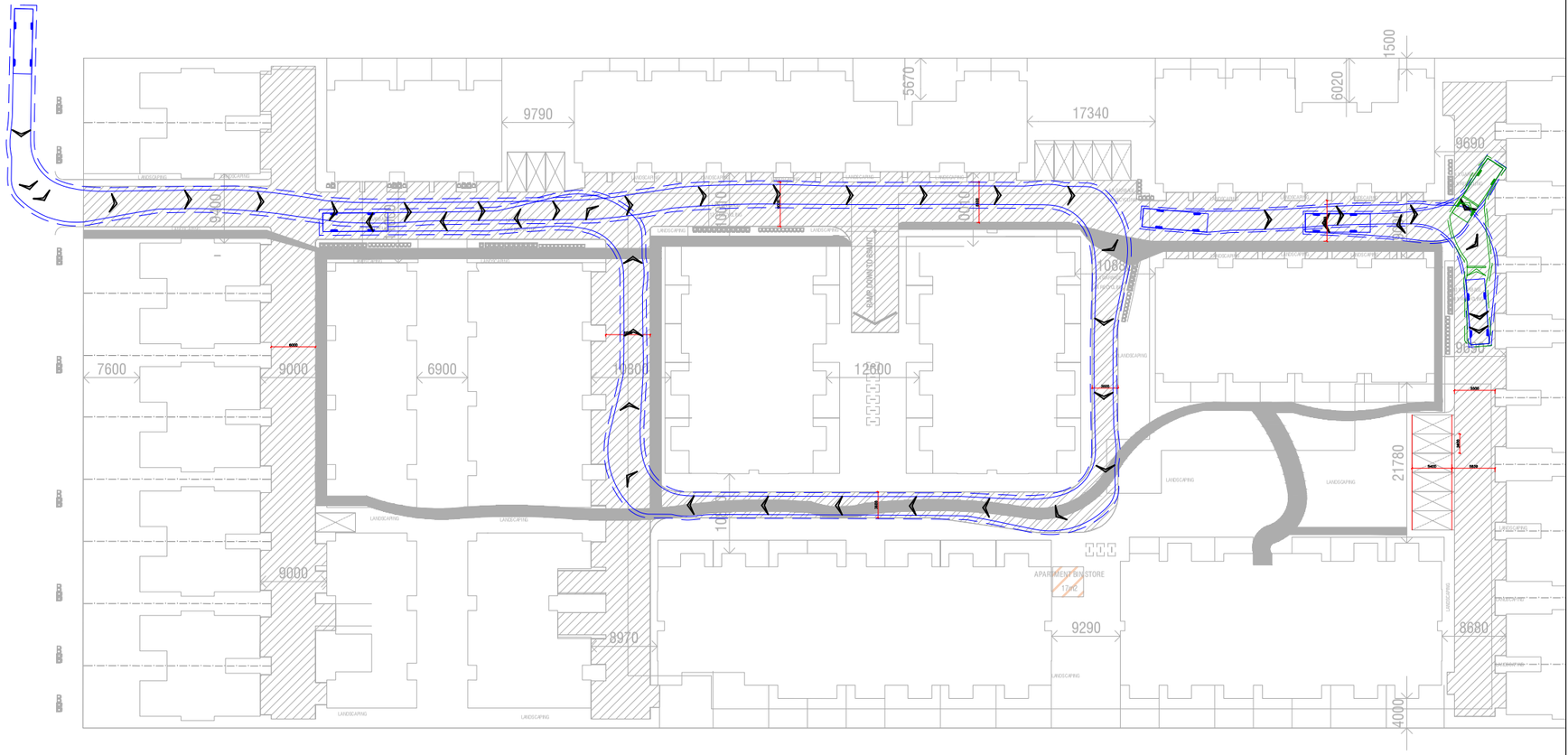
PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT
29 BROWNS ROAD, CLAYTON
VIC 3168

TITLE
FOOTPATH & DRIVEWAY DIAGRAM

DATE	APRIL 2016
SCALE	1:100 @ A3
PROJECT NO.	M023
DRAWING NO.	

A DP30

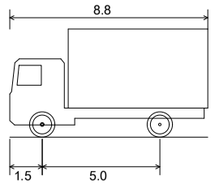
Appendix C: Swept Path Assessment:



NOTE:
1) Base Plan Supplied by Mushan Group on 2/05/2016
2) Maximum Design Speed 10km/h

0 7.5 15

MRV - Medium Rigid Vehicle (AS/NZS2890.2:2002)



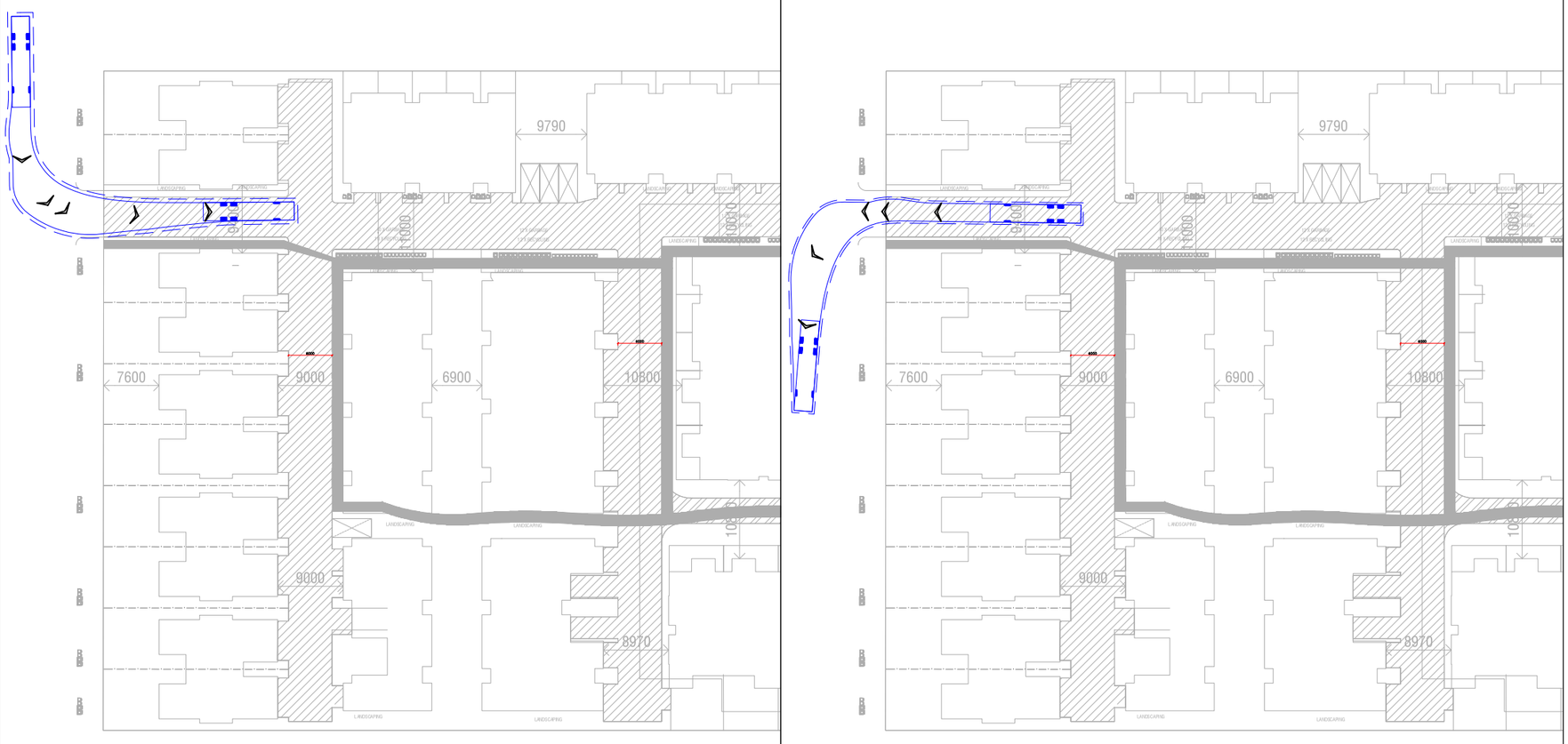
VEHICLE ENVELOPE (FORWARD)
500mm CLEARANCE (FORWARD)
VEHICLE ENVELOPE (REVERSE)
500mm CLEARANCE (REVERSE)

Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	3.633m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	10.000m

ratio:
RATIO CONSULTANTS PTY LTD
ACN 005 422 104
9 CLIFTON STREET
RICHMOND, VICTORIA 3121
FACSIMILE (03)9429 3011
TELEPHONE (03)9429 3111

Proposed Residential Development
29 Browns Road, Clayton
Swept Path Assessment

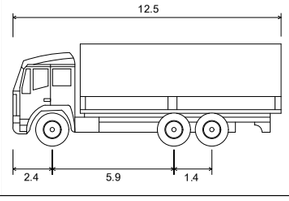
RATIO REFERENCE	SHEET No.	SCALE	DATE
12555-AT05/TC	AT (2)	1:750@A4	03/05/2016



NOTE:
1) Base Plan Supplied by Mushan Group on 2/05/2016
2) Maximum Design Speed 10km/h

0 7.5 15

HRV - Heavy Rigid Vehicle (AS/NZS2890.2:2002)



VEHICLE ENVELOPE (FORWARD)
500mm CLEARANCE (FORWARD)
VEHICLE ENVELOPE (REVERSE)
500mm CLEARANCE (REVERSE)

Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.417m
Track Width	2.500m
Lock to Lock Time	6.00 sec
Curb to Curb Turning Radius	12.500m

ratio:
RATIO CONSULTANTS PTY LTD
ACN 005 422 104
9 CLIFTON STREET
RICHMOND, VICTORIA 3121
FACSIMILE (03)9429 3011
TELEPHONE (03)9429 3111

Proposed Residential Development
29 Browns Road, Clayton
Swept Path Assessment

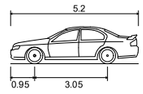
RATIO REFERENCE	SHEET No.	SCALE	DATE
12555-AT05/TC	AT	1:750@A4	03/05/2016

Appendix D: **SIDRA Results:**

NOTE:
1) Base Plan Supplied by Mushan Group on 2/05/2016
2) Maximum Design Speed 10km/h

0 7.5 15

B99 Vehicle (AS/NZS2890.1:2004)



VEHICLE ENVELOPE (FORWARD)
300mm CLEARANCE (FORWARD)
VEHICLE ENVELOPE (REVERSE)
300mm CLEARANCE (REVERSE)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	2.200m
Min Body Ground Clearance	0.312m
Track Width	1.840m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	6.250m

ratio:
RATIO CONSULTANTS PTY LTD
ACN 005 422 104
9 CLIFTON STREET
RICHMOND, VICTORIA 3121
FACSIMILE (03)9429 3011
TELEPHONE (03)9429 3111

Proposed Residential Development
29 Browns Road, Clayton
Swept Path Assessment

RATIO REFERENCE	SHEET No.	SCALE	DATE
12555-AT05/TC	AT (3)	1:750@A4	03/05/2016

MOVEMENT SUMMARY

Site: Browns Road Site Access

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Browns Road South Approach											
2	T1	100	0.0	0.077	0.5	LOS A	0.3	1.9	0.24	0.16	48.5
3	R2	39	0.0	0.077	5.6	LOS A	0.3	1.9	0.24	0.16	47.7
Approach		139	0.0	0.077	1.9	NA	0.3	1.9	0.24	0.16	48.3
East: Site Access											
4	L2	24	0.0	0.037	2.7	LOS A	0.1	0.9	0.33	0.43	29.6
6	R2	17	0.0	0.037	3.8	LOS A	0.1	0.9	0.33	0.43	29.4
Approach		41	0.0	0.037	3.1	LOS A	0.1	0.9	0.33	0.43	29.5
North: Browns Road North Approach											
7	L2	58	0.0	0.142	4.6	LOS A	0.0	0.0	0.00	0.11	48.9
8	T1	234	0.0	0.142	0.0	LOS A	0.0	0.0	0.00	0.11	49.4
Approach		292	0.0	0.142	0.9	NA	0.0	0.0	0.00	0.11	49.3
All Vehicles		472	0.0	0.142	1.4	NA	0.3	1.9	0.10	0.15	46.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.