

**Before the Hearings Panel appointed by
the Christchurch City Council**

Under

the Resource Management Act 1991
(**Act**)

And

In the Matter of

an application under section 88 of the
Act for land use consent to establish and
operate a new supermarket and
associated small scale retail including
signage, servicing, access, carparking
and landscaping

**Statement of Evidence of
Michael Christopher Rossiter
for Woolworths New Zealand Limited**

Dated: 18 July 2025

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Table of Contents

INTRODUCTION	2
SCOPE OF EVIDENCE.....	3
EXECUTIVE SUMMARY.....	3
SURROUNDING TRANSPORT ENVIRONMENT	5
DISTRICT PLAN ZONING	10
THE PROPOSAL	11
TRANSPORT ASSESSMENT.....	13
RESPONSE TO SUBMISSIONS.....	18
RESPONSE TO SECTION 42A REPORT	21
PROPOSED CONDITIONS OF CONSENT	23
CONCLUSION	24

INTRODUCTION

Qualifications and Experience

1. My full name is Michael Christopher Rossiter.
2. I am a Principal Transportation Engineer at Stantec New Zealand Limited (**Stantec**). I have held this position since 2013 and have been employed at Stantec (and TDG prior to its incorporation with Stantec) since 2006. Prior to joining TDG (now part of Stantec), I was employed as a Principal Systems Engineer and Technical Manager with BAE Systems in England.
3. I hold the academic qualifications of Bachelor of Science from the University of Exeter and Bachelor of Arts (Open) from the Open University, England.
4. I am registered as a Chartered Professional Engineer with Engineering New Zealand. I have over 35 years' engineering experience including 18 years' transportation engineering in New Zealand on a wide range of projects involving transportation engineering design, road safety audits, transportation planning and assessment.
5. My role includes preparing transportation assessment reports for resource consent applications and also providing transportation engineering services for many councils.¹ I have prepared expert transport evidence on behalf of councils and also for private developers in relation to a variety of land-use resource consent hearings and plan changes.
6. I have had extensive experience providing transportation engineering advice and assessment for land development projects in the greater Christchurch area. Relevant to this project, I am regularly involved in the planning, assessment and design of the transport aspects for retail and commercial developments.

Background and Involvement

7. Stantec was engaged by Woolworths New Zealand Limited (**Woolworths**) to provide transport engineering services in relation to its proposed supermarket and ancillary retail at 476-494 Madras Street, St Albans (**Site**). I have been responsible for providing transport design advice to Woolworths and preparing the Integrated Transport Assessment (**ITA**) that formed part of the resource consent application. I also prepared the response to the request for further information on transport matters.

¹ Hastings, Central Hawke's Bay, Gisborne, Palmerston North, Whanganui, Carterton, Upper Hutt, Tasman, Nelson, Buller, Waimakariri, Christchurch, Ashburton, Timaru, Clutha, Queenstown Lakes, Invercargill.

8. I have visited the Site several times at different times of the day to observe movement patterns and parking demands in the area.

Code of Conduct for Expert Witnesses

9. Although this is not an Environment Court hearing I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023. This evidence is within my area of expertise, except where I state that I am relying on material produced by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

SCOPE OF EVIDENCE

10. The topics covered in my evidence are as follows:
 - (a) the Site and surrounding transport environment;
 - (b) District Plan zoning;
 - (c) the Proposal;
 - (d) transport assessment;
 - (e) response to submissions;
 - (f) response to the Section 42A Report; and
 - (g) proposed conditions of consent.
11. I have read the Section 42A Report prepared by Scott Blair for Christchurch City Council (**Council**) and the accompanying reports relevant to transport.
12. I have read other evidence prepared for Woolworths. I explain in my evidence where I refer to or rely on that assessment or evidence for the purposes of my evidence.
13. I have also read all submissions lodged on the Proposal.

EXECUTIVE SUMMARY

14. The Proposal involves establishing a supermarket and smaller retail outlets on land in St Albans. My forecast of the expected traffic generation indicates that the Proposal will result in acceptable traffic effects.
15. Vehicle access is proposed via two driveways to Madras Street. I would expect the southern driveway to attract more entry movement than the northern driveway due

to the highly directional nature of existing traffic flows on Madras Street. Departures from the car park will be more evenly distributed between the driveways because this will be more strongly influenced by where a vehicle is parked.

16. Since the traffic flows on Madras Street are strongly platooned, the Proposal includes provision for alterations to the line markings on Madras Street to create a flush central median strip to provide space for right turning vehicles to stop clear of through traffic. A 2 m wide median can be created by removing the parking lane on the eastern side of the road without any alterations to the existing traffic lane or cycle lane widths.
17. The site access design has been updated in response to comments within the Section 42A Report to increase queuing space and also to reduce the overall width of the northern crossing. With these alterations, I consider that there are no reasons why the accessways could not operate safely and efficiently.
18. The submissions on the Proposal cover a broad range of topics with the primary transport matters raised relating to traffic generation and parking.
19. With respect to traffic generation, the submissions focus on the change in traffic volumes compared with the current situation rather than what could occur under the current zoning. My analysis of the traffic generation suggests that development of currently undeveloped land in accordance with the zone rules could result in 450 to 500 vehicle movements per hour (**vph**) during the evening peak period. The Proposal is likely to generate about 500 vph during the weekday evening peak period. On that basis, I consider that any differences in transport effects between the Proposal and development which would be anticipated within the zone will not be noticeable.
20. Following the release of the National Policy Statement on Urban Development 2020 (**NPS-UD**), there are no minimum parking supply requirements in the District Plan. However, Woolworths aims to supply sufficient parking at its supermarkets to meet anticipated demands in all but the busiest weeks of the year. Since the parking supply rate of the Proposal of 4.2 spaces per 100 m² Gross Floor Area (**GFA**) exceeds the 85th percentile demand rate of 3.9 spaces per 100 m² GFA, I consider that the car park is appropriately sized and the potential for overflow parking demands to arise would be restricted to the busiest weeks of year.
21. There are multiple submissions also relating to staff parking. Woolworths aims to provide as much flexibility as possible with its parking in terms of users. However, where there is a need to reduce movements at parking spaces for safety reasons such as locations close to entrances, spaces will be marked for staff use only. In my

opinion, this represents a practical approach to maintaining a high level of parking supply while reducing the risk of crashes in higher potential conflict locations.

22. Overall, I consider that the Proposal can be supported from a transport perspective with the alterations to Madras Street to enable marking of a flush median strip and updates to the northern driveway design to narrow its width and increase queuing space.

SURROUNDING TRANSPORT ENVIRONMENT

Road Network

23. **Figure 1** shows the development site location in the context of the wider central city area. The Site is located north of Bealey Avenue which forms the northern boundary to the “Four Avenues” area of central Christchurch. Madras Street, which forms the western boundary of the Site, is classified as a Collector Road north of Bealey Avenue and has been formed as a two-lane, two-way road. South of Bealey Avenue, Madras Street is formed as a one-way, north-bound road and as such forms part of the north-south, one-way pair of roads with Barbadoes Street providing access to the eastern side of the Christchurch central city.

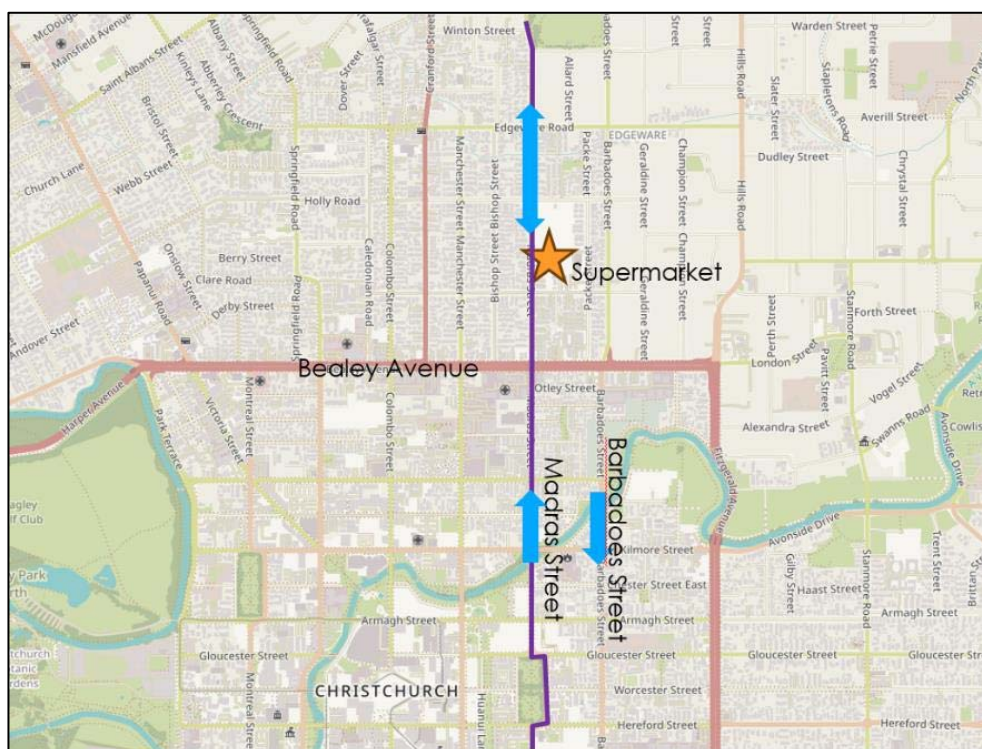


Figure 1: Site Location – wide area context

24. **Figure 2** shows the local road network surrounding the Site. The Site is located between Canon Street to the north and Purchas Street to the south, which are both

classified as local roads. Packe Street is located to the east which is also a local residential street. The Site only has road frontage to Madras Street.

25. Madras Street has been constructed along the site frontage as a two-lane road with a cycle lane and parking lane on each side of the road. There are footpaths on both sides of the carriageway which are separated from the parking lane by grassed berms. The Madras Street intersections with Bealey Avenue about 400 m to the south and Edgeware Road about 400 m to the north are both signal controlled.
26. Purchas Street and Canon Street are local roads with an east-west alignment and operate within a 40km/h speed limit zone. Both roads meet Madras Street at stop controlled crossroads intersections, with Madras Street having priority.

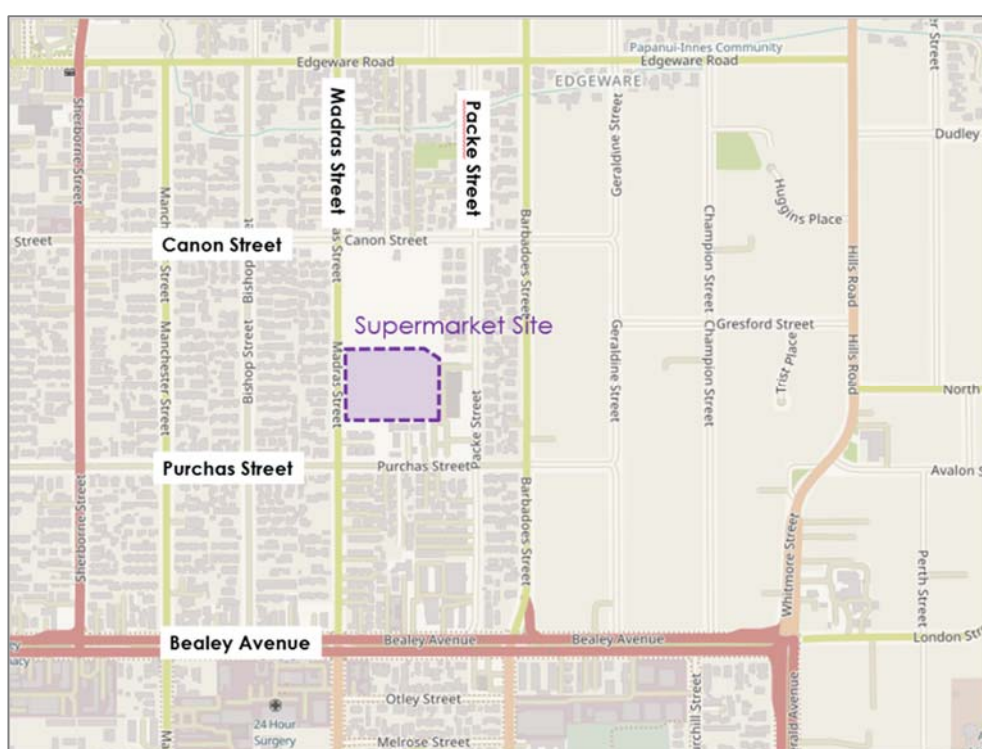


Figure 2: Supermarket Site Location

27. There are footpaths on both sides of Madras Street and pedestrian refuge islands north of Purchas Street and north of Canon Street. All roads within 10 minutes' walk of the Site have footpaths on both sides of the road, ensuring good accessibility for supermarket customers. The walkable area within 10 minutes is discussed by Mr Church. His analysis indicates that the walking area extends north of Edgeware Road, south of Bealey Avenue, west of Sherborne Street and east of Geraldine Street.

Public Transport

28. **Figure 3** shows the public transport network and bus stop locations in the vicinity of the Site. Although service route 91 between Rangiora and Christchurch City Central

travels along Madras Street, this service does not include any bus stops along Madras Street, as it is an express service. The commuter service between Kaiapoi and Christchurch (Route 92) uses Manchester Street and Sherbourne Street to the west but again there are no bus stops on those roads.

29. The Route 44 service travels along Barbadoes Street to the east of the Site. The nearest bus stops are close to the Barbadoes Street / Purchas Street intersection, about 400m walking distance from the supermarket entrance. There are also bus stops close to the Barbadoes Street / Canon Street intersection that are about 500m walking distance from the supermarket entrance. Since the walking time to the nearest bus stops is approximately 5 minutes, I consider that there is an existing, effective connection to the Site for public transport users. I am not aware of any potential changes to bus routes in this area that could affect walking distances between bus stops and the Site.

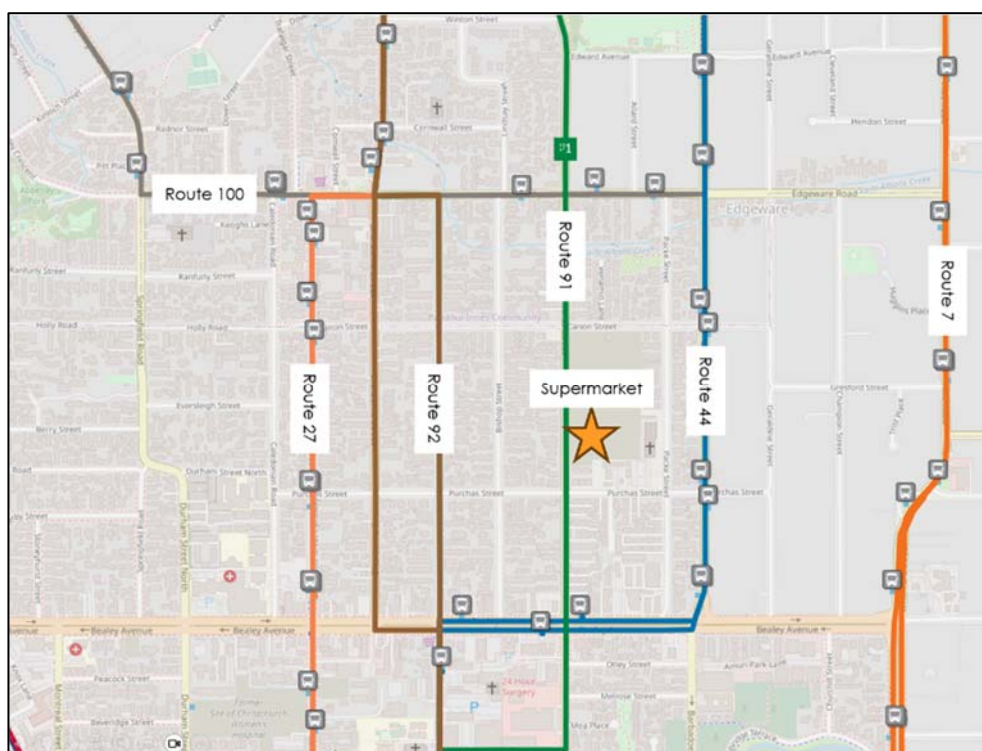


Figure 3: Public Transport Network (Source: Metroinfo)

Cycle Network

30. There is an extensive cycle network on nearby roads. This comprises a mixture of on-road cycle lanes and separated cycleways (the Papanui Parallel Major Cycleway on Colombo Street) as shown in **Figure 4**.
31. The northbound cycle lane on Madras Street is about 2.0 m wide with the adjacent parking lane being 2.0 m wide. The southbound cycle lane is narrower at 1.8 m wide with the parking lane being 2.0 m wide.

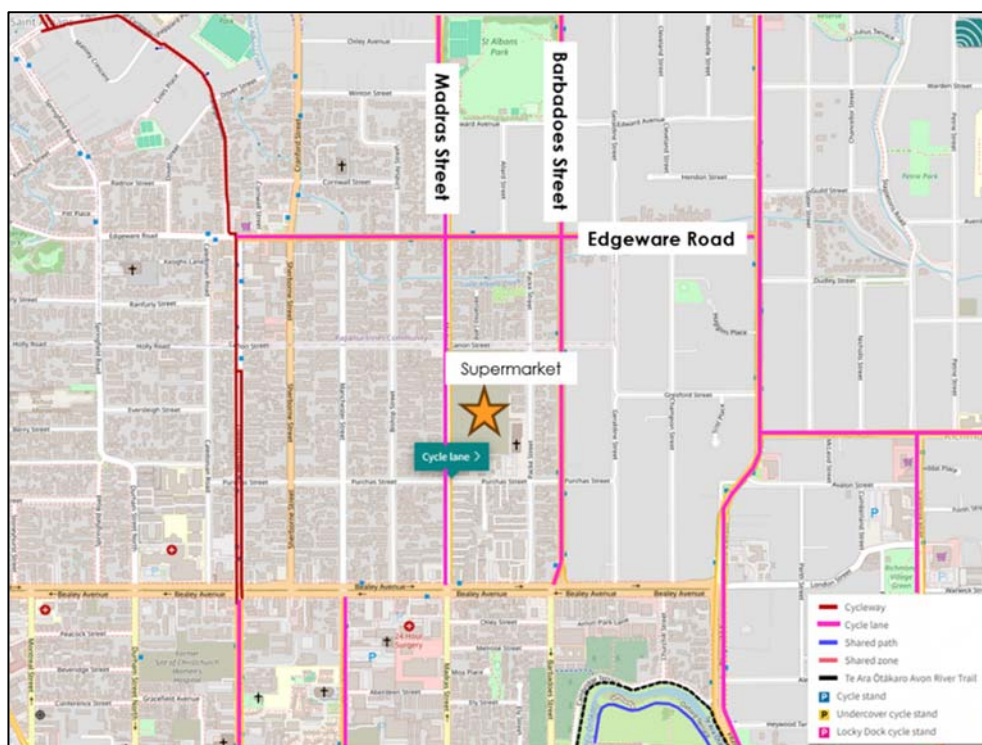


Figure 4: Cycle Network (Source: Christchurch City Council)

Traffic Volumes

32. Based on Council traffic counts, Madras Street north of Purchas Street carries an average daily traffic volume of about 7,000 vehicles per day (vpd) on weekdays and less than 6,000 vpd at the weekend. Figure 5 shows the variation in weekday hourly volumes on Madras Street south of Purchas Street recorded by the Council in November 2024. This shows a small peak in the morning of about 350 vehicle movements per hour (vph) and a larger peak of about 830 vph in the afternoon around 5:00 PM. The late afternoon represents the critical period for assessing the effects on the transport network because traffic volumes on Madras Street are greatest at that time.
33. The southbound volumes on Madras Street are currently very low, typically less than 100 vph throughout the day, compared with northbound volumes of up to 800 vph. The large difference in the northbound and southbound flows can be directly attributed to the downstream effects of the northbound one-way operation of Madras Street south of Bealey Avenue.
34. The traffic signals at the Bealey Avenue / Madras Street intersection and the two lane to one lane merge on Madras Street north of Bealey Avenue together create very strong platooning patterns in the northbound flows during the evening peak period, that is, periods with continuous northbound flows separated by periods with negligible northbound or southbound vehicle movements present. I have measured gaps in the flows ranging from five seconds to over one minute with an average of

more than 30 seconds. The regularity and length of the gaps provides ample opportunity for turning and cross movements at Purchas Street and Canon Street to occur safely but the waiting times vary widely because it is not possible to turn through a platoon of traffic when it is present.

35. The pattern of hourly volumes has not changed in any noticeable manner from the volumes recorded in 2021 that are reported within the ITA. I am not aware of any developments in the wider area that would contribute to changes in this general pattern.

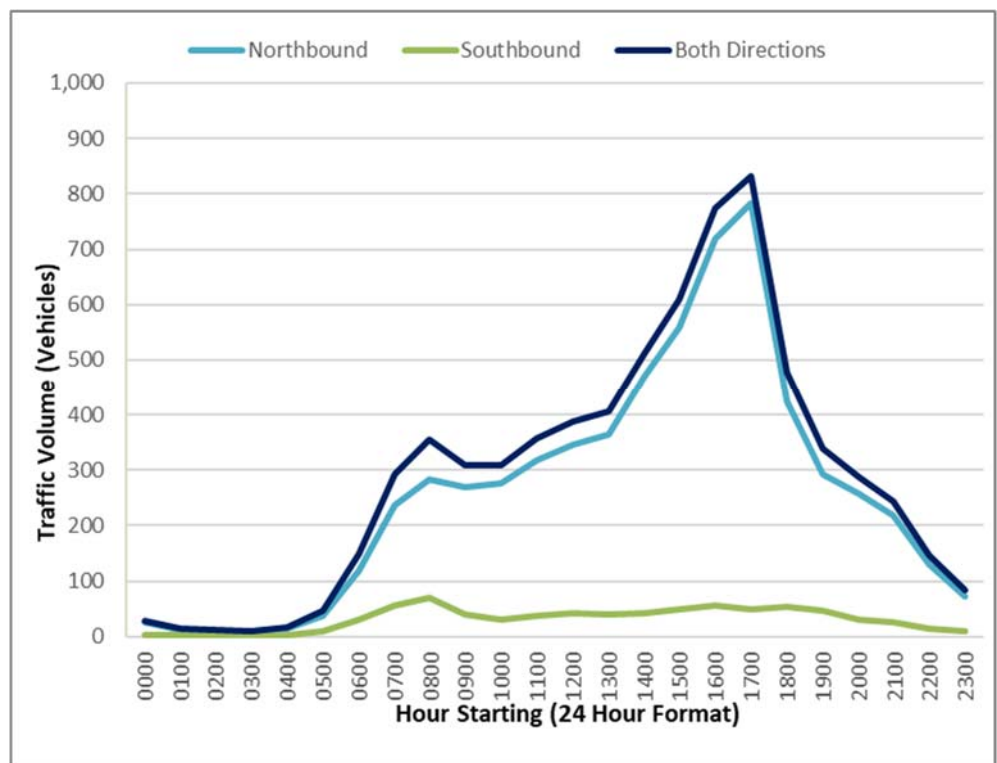


Figure 5: Hourly traffic volumes on Madras Street north of Purchas Street

36. The photographs included in **Annexure A** of Madras Street were taken during the evening peak period in May 2025 and show the absence of vehicles between platoons.

Parking Demands

37. The existing configuration of Madras Street between Canon Street and Purchas Street includes a parking lane on each side of the road. I have estimated the total on-street parking capacity for this section of road as about 60 vehicles. On my visits to the Site, I have observed low utilisation of the on-street parking with a maximum of 15 parked vehicles on this section of road which represents an occupancy rate of less than 25%. **Annexure A** includes photographs of Madras Street to demonstrate the low on-street parking demands in the area during the evening peak period.

DISTRICT PLAN ZONING

38. Figure 6 shows that the supermarket site is located on land with a split zoning. The southern portion of the Site forms part of the Neighbourhood Centre (**NC**) zone with the northern part of the Site being in the Residential Medium Density (**RMD**) zone.

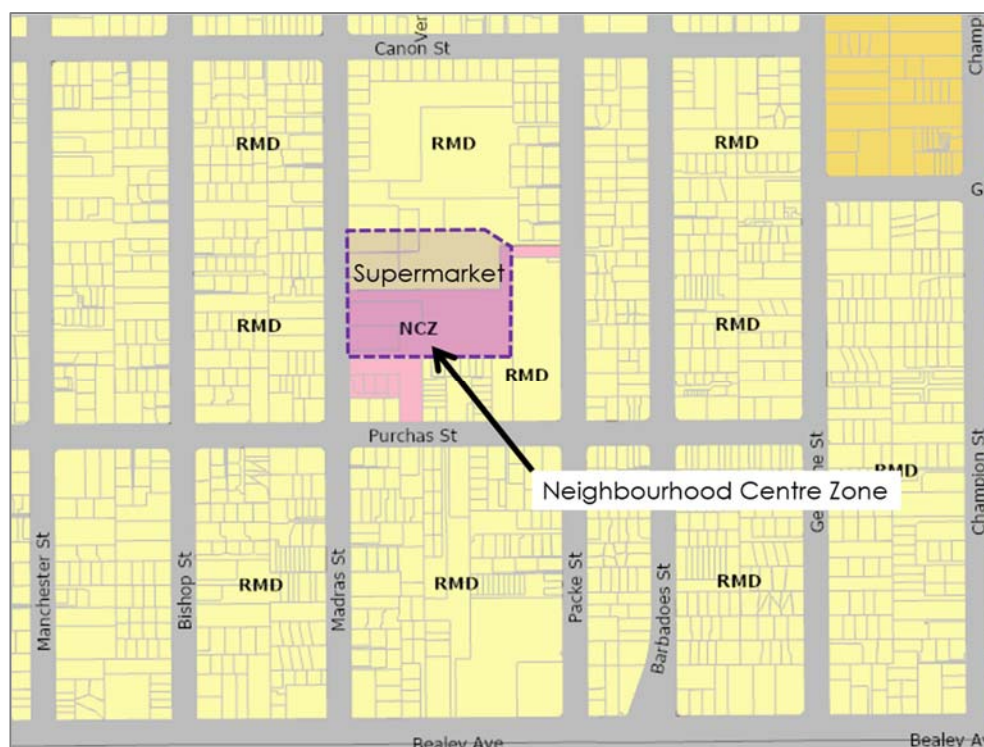


Figure 6: District Plan Zones

39. For comparative purposes only, I have investigated the potential traffic generation of the NC zone (St Albans) if it was developed in line with the controls for the zone. The NC zone (St Albans) has an area of about 9,940 m² compared with the supermarket area of about 14,400 m². This means that the supermarket development will reduce the land available for residential development by about 4,500 m². If this land was developed to a similar density to the existing development along Canon Street east of Madras Street, it would enable 20 to 25 dwellings to be established.
40. The District Plan includes an Outline Development Plan (**ODP**) and specific controls for the NC zone (St Albans). The controls include a maximum Gross Leasable Floor Area (**GLFA**) of non-residential activity of 3,500 m², a single tenancy with a GLFA of 800 m² and all other tenancies having a maximum GLFA of 450 m² per tenancy.
41. The New Zealand Transport Agency Research Report No 453 "*Trips and Parking related to Landuse*" (RR453) includes traffic generation rates for small shopping centres (< 4,000 m² GFA). It reports the 50th percentile peak hour traffic generation rate as 14.6 vph per 100 m² GFA and an 85th percentile rate of 18.9 vph per 100 m²

GFA. Since I am aware that many of the surveys used to inform these rates date from before 2000 and may not reflect current shopping behaviour, I have examined the recorded rates for more recent surveys at Christchurch sites from 2006 onwards. The average traffic generation rate from those surveys was 13.9 vph per 100 m² GFA. Based on that rate, a centre of the size anticipated by the District Plan could be expected to generate about 490 vph during the weekday peak hour of activity. This level of traffic generation allows for some customers visiting multiple destinations with the centre.

42. During the afternoon peak period, the residential development could increase the peak hour traffic generation of the wider area by about 20 vph based on a traffic generation rate of 0.8 vehicle movements per hour per dwelling.
43. Overall, this means development of land in accordance with what is anticipated by the controls in the District Plan could result in an evening peak traffic generation on Madras Street of more than 500 vph.

THE PROPOSAL

44. Full details of the Proposal are included within the evidence of Mr Cleese. From a transport perspective, the most relevant information relates to the size and nature of the retail areas and the number of car parking spaces. The combined GFA of all the building spaces is about 5,300 m² GFA and is summarised in Table 1.

Table 1: Development floor areas by activity

Activity	Quantity
Supermarket including - Main retail space - Entrance lobby and headeroom - Office space - Click and collect facility	3,350 m ² 200 m ² 200 m ² 150 m ²
Small scale retail outlets	860 m ²
Commercial (first floor)	530 m ²
TOTAL	5,290 m²

45. A car park with capacity for 228 vehicles is now proposed² at the front of the Site with access provided by two driveways to Madras Street. The northern driveway has been designed to accommodate the tracking of large articulated vehicles which will be required to service the supermarket. The loading bay has been designed to ensure that Heavy Goods Vehicles can turn within the loading bay before exiting via the northern driveway. The southern driveway is suitable for light vehicles only.

² Increased from 223 shown in the plans included in the resource consent application.

46. The car park includes 17 spaces³ which will be permanently allocated for staff parking. The rest of the car park will be available to both staff and customers.
47. Alterations to the road markings on Madras Street are proposed to enable a painted flush median to be marked. This can be accommodated in the existing road carriageway but will require removal of up to 150 m of on-street parking on the eastern side of the road largely along the site frontage.

Traffic Generation

48. For the ITA, I reviewed traffic generation rates recorded at Countdown / Woolworths supermarkets since 2008 by Stantec, and also those reported in the New Zealand Trips and Parking Database (**Figure 7**). The peak hour traffic generation rates for supermarket sizes in the range 3,300 m² to 5,400 m² range from 10 vph / 100 m² GFA to 14 vph / 100 m² GFA with an average of 12.1 vph / 100 m² GFA. The surveys suggest that the traffic generation rate of supermarkets in this size range is not materially affected by their floor area. On that basis, for the assessment of traffic assessment, I adopted a traffic generation for the supermarket of 12.1 vph / 100 m² GFA during the weekday evening peak.

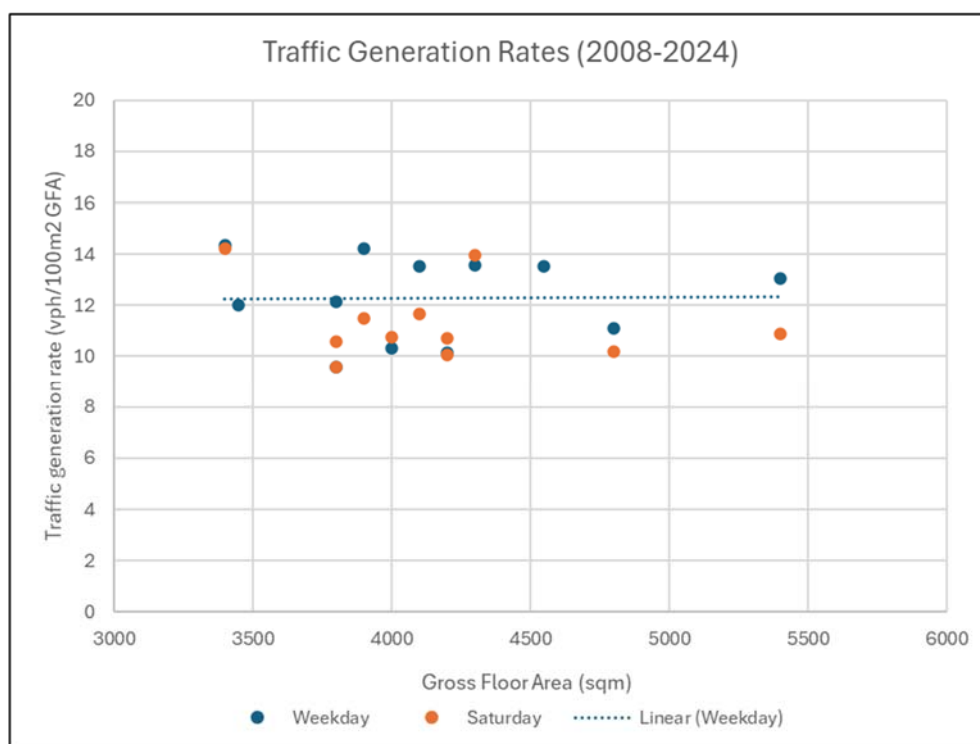


Figure 7: Supermarket peak hour traffic generation rates

49. The ITA sets out the calculation of the potential peak hour traffic generation of all activities within the Site on the basis that all trips are independent, that is with no trips involving multiple destinations on the Site. This calculation suggests that the

³ Increased from 10 spaces shown in the plans included in the resource consent application.

combined activities on the Site could generate about 550 vph (total in and out) across both driveways.

50. In practice, some trips to the Site will involve multiple destinations and for the purposes of this assessment, I have reduced the peak hour traffic generation to 500 vph (about 10%) to reflect this effect. Overall, I consider that the traffic generation of the Site will be similar to what could be anticipated on the Site in the NC zone (St Albans).
51. The traffic generation of a site is measured in terms of vehicle movements across any driveways. The change in traffic volumes on the frontage road cannot be directly inferred from the driveway volumes because these are influenced by existing travel patterns on the road network. Trips to local shopping destinations typically comprise three types of travel pattern:
 - (a) Primary trips – these are trips that are new to the road network, with the specific purpose of visiting the Site.
 - (b) Pass-by trips – these are trips being made by drivers passing the Site on Madras Street, where the driver then chooses to access the Site. These add trips to the Site access points but do not change traffic volumes on nearby roads or at intersections.
 - (c) Diverted trips – these are trips made by drivers altering an existing trip to divert to the Site. These add trips to the Site access points, and potentially nearby roads and intersections, but remove movements elsewhere in the road network. In practice, these trip movement patterns are often not distinguishable from primary trip movement patterns because the diversions could arise from roads within the wider area.
52. The ITA includes discussion of the trip types and assignment. I have adopted a pass-by rate of 30% for my assessment. This means that during the weekday evening peak, the proposed development could add about 200 vph new vehicle movements to Madras Street south of the development and about 150 vph to the north of the development.

TRANSPORT ASSESSMENT

Network Effects

53. Based on my analysis of the expected traffic generation of the Site, the Proposal could generate about 500 vph during the weekday evening peak hour. While this is higher than would be anticipated by a development that was aligned with the District Plan rules for the NC (St Albans) zone, in my opinion, there will be no noticeable

changes in the scale of effects that would arise as the anticipated level of development within the NC (St Albans) could still generate nearly 500 vph in the weekday peak.

54. The strongly platooned nature of the northbound flows on Madras Street, particularly during the weekday peak period, means that the delays experienced by individual vehicles turning from side roads can be highly variable. Only left turns to the south from side roads are unaffected by the platoons. All other turning movements from side roads or driveways are only possible in the gaps between the northbound platoons. These gaps are however substantial, so turning movements are easily made, with the length of any delays simply a function of the timing of arrival at the intersection or driveway, i.e. does a turning vehicle arrive just as the start of a platoon is passing, or at the end when the gap is available.
55. I have updated my modelling of intersection delays to reflect the inclusion of the most recent traffic count information on Madras Street.
56. Table 2 shows the average delays calculated using SIDRA intersection analysis software for the weekday evening peak hour for the worst movement at the Canon Street and Purchas Street intersections. The table shows the average intersection delay at the signalised intersections at Edgware Road and Bealey Avenue, with the “2024” column showing existing delays without the supermarket, and the “supermarket” column showing the delays once the supermarket is operational. Levels of Service⁴ of B to D represents typical conditions during peak periods.

Table 2: Average delay and levels of service – weekday evening peak

Intersection	Delay (s) & LOS	
	2024	Supermarket
Madras Street / Edgware Road	14 (B)	15 (B)
Madras Street / Canon Street	20 (C)	26 (D)
Madras Street / Purchas Street	24 (C)	23 (C)
Madras Street / Bealey Avenue	41 (D)	43 (D)

57. Although there will be some changes in delays at the Canon Street and Purchas Street intersections, in my opinion, this would not be noticeable to a driver waiting to turn because of the wide variability in the individual delays experienced by a driver due to platoon sequencing. A driver approaching an intersection as a platoon starts may need to wait more than 75 s before being able to turn compared with a negligible delay if they arrive during a gap in the platoons.
58. Right turn out movements at the driveways will be subject to longer delays than left turns due to the northbound platoons of traffic on Madras Street. Right turns into the

⁴ See **Annexure B** for definitions and descriptions.

car park will generally occur as part of the northbound platooned flow and will be opposed by only low southbound flows even with increased volume of traffic from the north. During the evening peak period, right-turn exit movements from the car park will not be possible when a northbound platoon of traffic is present. These have an average duration of 75 s and are typically followed by a long gap of about 35 s on average with little or no other traffic present. This pattern of flows means that the driveways will operate with a similar level of delay to the Canon Street and Purchas Street intersections.

59. The primary effect of the platooning on movements at the driveway is that queues will form within the car park when a platoon is present. I have used the SIDRA intersection software to evaluate the likely delays at the driveway. The SIDRA model suggests that the drivers would experience average delays of 15 to 20 seconds with average queues of up to two vehicles. The SIDRA model outputs are appended to my evidence as **Annexure C**.

Parking Effects

60. Stantec (and TDG prior to its incorporation with Stantec) has undertaken parking occupancy surveys at a wide range of supermarkets across the country. The surveys recorded peak parking rates in the range 3 to 5 spaces per 100 m² GFA with an average rate of about 4 spaces per 100 m² GFA for supermarket sizes in the range 3,000 to 5,000 m².
61. The New Zealand Trips and Parking Database reports 85th percentile parking demand rates of 3.9 spaces per 100 m² GFA for supermarkets and 3.3 spaces per 100 m² GFA for a shopping centre.
62. I am aware that Woolworths' design standards aim to provide parking at a rate of 5 spaces per 100 m² GFA for its supermarkets with a lower rate of about 3 spaces for other activities on the same site. This reflects a desire to ensure that customer and staff parking demands can be met on site as far as practical for all but the busiest weeks of the year. The Site as a whole includes 223 parking spaces which represents a supply rate of 4.2 spaces per 100 m² GFA for all activity on the Site and is broadly aligned with the Woolworths supply rate standard. Since the parking supply rate exceeds the reported parking demand rate for a standalone supermarket or small shopping centre, I consider that the level of supply is appropriate.
63. From a first principles perspective, the proposed parking supply is sufficient to meet a peak hour customer parking demand based on an average parking duration of 40 minutes and still accommodate staff parking of up to 80 spaces. In practice, I understand that the average duration of parking at a supermarket is typically closer to 30 minutes which will reduce the peak parking demand.

64. Since the parking supply rate exceeds the parking demand rates that could typically be expected at a supermarket of the size proposed, I consider that the supermarket car park is appropriately sized and the potential for overflow parking demands to occur will be low. I respond in more detail below to specific parking-related concerns raised by submitters.

Road Safety Effects

65. Based on my assessment of customer movement patterns, the supermarket could create a right turn entry demand at the southern driveway of about 150 vph during the weekday evening peak hour. Given that the southern driveway is the first entrance encountered by northbound vehicles, I would expect that the southern entrance will attract more right turn demand than the northern entrance. Although the opposing southbound flows are very low, any vehicle that stops in the carriageway before turning right will temporarily obstruct the movement of northbound vehicles. This creates a safety risk given the strongly platooned nature of the flows at peak times.
66. To address this safety concern, the Proposal includes alterations to the line markings on Madras Street to create a flush median strip that runs for the full length of the site frontage so that right turning vehicles can stop within the carriageway clear of the north bound traffic lane.
67. Since creating space for the flush median involves removal of the parking lane along the site boundary, I have investigated options for re-allocating this space. The simplest option involves a direct transfer of the parking lane space into a 2 m wide flush median as shown in Figure 8 and Figure 9. This does not require any alterations to the existing cycle lane widths or traffic lane widths. This represents the typical width of a median strip in an urban environment and provides sufficient width for a light vehicle to stop clear of through traffic. It is similar to the road cross-section on Peer Street in Upper Riccarton which carries volumes of about 18,000 vpd by the supermarket, compared with about 7,000 vpd for the Site.



Figure 8: Existing cross-section



Figure 9: Proposed cross-section with flush median

68. I have also considered the option of widening the median to 2.5 m so that a right turn bay can be marked. To achieve this within the existing carriageway involves reducing the widths of the western parking lane, both cycle lanes and both traffic lanes by 100 mm each. The width of the northbound cycle lane would need to be reduced to 1.8 m with the parking lane reduced to 1.9 m. Although the northbound cycle lane width meets the minimum desirable standard, the narrow width of the parking lane could contribute to partial obstruction of the cycle lane and cyclists travelling closer to the traffic lane. The risk of a crash with a motor vehicle would be offset to some extent by the creation of the flush median because it will create more space for motor vehicles to pass a cyclist even if a cyclist adopted a position closer to the outer edge of the cycle lane to avoid car doors. However, the available space for this type of manoeuvre would be reduced if a car was waiting in the median.
69. Although both options represent viable road cross-sections, following further consideration of the effects on cycle safety, I consider that the option with a 2 m wide median would provide better safety for cyclists than any option with a wider median that requires cycle lane widths to be reduced.
70. If the carriageway was widened by re-aligning the eastern kerb line along the site frontage, several other cross-section options would be possible. In my opinion though, creation of the flush median represents sufficient mitigation of the cycle safety effects and widening of the carriageway is not necessary.
71. The Proposal also includes the addition of solid green cycle lane paint markings at the two vehicle crossings to alert drivers to the presence of the cycle lane.
72. The vehicle crossings have been designed to retain pedestrian priority and to minimise the length of exposure to vehicle movements as far as practical. Since Madras Street is straight and level, and the crossings are well clear of any structures, there are no obstructions to sight lines between pedestrians and drivers.
73. The width of crossings allows for large heavy vehicle movements to enter the Site at the northern crossing without crossing the exit lane which will reduce the potential

for conflict. The volume of service vehicle movements is low which represents a low risk of exposure and will not occur during the peak periods on Madras Street.

74. Overall, I consider that the Proposal provides an appropriate level of mitigation to address the road safety effects that could be expected.

RESPONSE TO SUBMISSIONS

75. I have read all the submissions and identified the key transportation related concerns raised by submitters, which I have grouped to provide comments on the following topics:

- (a) traffic generation;
- (b) Christchurch Northern Corridor (**CNC**) Downstream Effects Management Plan (**DEMP**);
- (c) parking;
- (d) pedestrian access; and
- (e) cycle lanes.

Traffic Generation

76. Many submissions⁵ raise concerns about the level of vehicle movements that could be generated by the development. I have estimated that the development would generate about 500 vph at the driveways in the evening peak with about 350 vph of these being additional to the Madras Street traffic volumes. I note that many submissions have interpreted this figure as 500 customers travelling to and from the development. This is an incorrect interpretation as the 500 vph is a two-way total, that is, 250 vehicles entering and 250 leaving in the busiest hour. I have estimated that traffic volumes on Madras Street north of the development will increase by about 150 vph (two-way) north of the development and by about 200 vph (two-way) south of the development since about 30% of customers could be expected to come from people that are already passing the Site.
77. For comparison, a neighbourhood centre of the size anticipated under the District Plan rules inclusive of a smaller supermarket could be expected to generate up to 500 vph in the evening peak period as small format retail activity generates more customers per m² than a large supermarket. As with the Proposal, I would expect up to 30% of movements could be associated with pass-by travel patterns and on

⁵ 1, 8, 9, 12, 42, 46, 56, 58, 59, 60, 61, 62, 64, 68, 69, 72, 77, 78, 79, 82, 88, 93.

that basis, a neighbourhood centre would still generate more than 300 vph of new movements on Madras Street.

78. While the traffic generation of the Proposal is marginally higher than would be anticipated by a development that was aligned with the District Plan rules for the NC zone, in my opinion, there will be no noticeable changes in the scale of effects that would arise. The Site is not located adjacent to a high volume signalised intersection and as such, traffic entering and leaving the Site does not result in any material loss of service that would impact on the function or efficiency of the wider road network. I would still anticipate a need for a median style treatment on Madras Street to provide safe access to a centre of the scale anticipated by the District Plan.

Christchurch Northern Corridor Downstream Effects Management Plan

79. The CNC DEMP was established to manage the effects of additional traffic travelling through St Albans as a direct consequence of the CNC connection to Cranford Street. In particular, the DEMP was intended to provide a framework for implementing controls to discourage drivers from using the local road network, e.g. rat-running. Two submitters⁶ have suggested that the changes in traffic volumes attributable to the development will trigger the DEMP intervention conditions. Since the development is not part of the CNC and any change in traffic volumes is not related to the CNC, I do not consider that the Proposal will trigger the need for any intervention under DEMP. In my opinion, the establishment of a supermarket on Madras Street which forms part of the classified road network will reduce the potential for customers to use the local road network as part of “rat-run” route options to access the supermarket.
80. Since Madras Street is classified as a Collector road, that is, a road that is intended to distribute traffic between neighbourhood areas and arterial roads, the proposed location of the development on this route will reduce the need for any customers to use the local road network. I note that this represents one of the desired outcomes of the DEMP because it would encourage drivers to stay on the classified road network.

Parking

81. Based on my analysis of parking demands for the supermarket, I consider that the level of supply will be sufficient to meet the anticipated demands for both staff and customers in all but the busiest weeks of the year. This reflects good design practice and is in line with the expected outcomes of the NPS-UD in relation to parking.

⁶ 21, 57.

82. Submitters⁷ have raised concerns in relation to the ten spaces that will be permanently marked for staff parking. It appears that these concerns are based on a misunderstanding that these will be the only spaces that staff are allowed to park in. These spaces have been allocated to staff to reduce turnover at those locations (due to proximity of the spaces to the main entrances and loading bay access). Staff are still able to use the other parking spaces within the Site. The number of parking spaces on the Site as a whole has been maximised to utilise all available space as far as practical allowing for some landscaping but results in some spaces being close to a driveway or less easy to access, and therefore, these more constrained spaces have been allocated for staff use only given they will have increased familiarity with the spaces.
83. One submitter⁸ seeks a large reduction in the number of car parking spaces. I consider that a reduction in car park capacity of the scale suggested will contribute to an increased demand for on-street parking. The extent of any effects of overflow parking on the adjacent road network would depend upon the size of any reduction but would adversely affect residents on nearby streets, including submitters who have sought additional car parking be provided on site. In my opinion, since the size of the car park is appropriately sized for the level of anticipated demands, there are no reasons for reducing the car park capacity.
84. The Burrell submission has raised concerns with the reduction in on-street parking capacity. Based on my observations of the on-street parking demands close to the Site, existing parking occupancy rates are low (See photographs in **Annexure A**). Even with the removal of 150 m of kerbside parking on the eastern side of Madras Street, there will still be ample capacity to meet the existing parking demands.

Pedestrian Access

85. One submitter seeks pedestrian access from Packe Street and Purchas Street as shown in the ODP. The Site does not have frontage to either Packe Street or Purchas Street; it only has frontage to Madras Street. This means that it is not possible to provide the connections anticipated in the ODP. The lack of connections will primarily increase walking distances to the Site for residents of Packe Street between Purchas Street and Canon Street but will have little effect on walking distances for the wider area.
86. Mr Church has investigated the change in the number of properties that could be within 10 minutes walking distance if a pedestrian access to Packe Street was

⁷ 8, 22, 27, 39, 40, 42, 46, 56, 75, 81.

⁸ 22, 27, 39, 40.

possible. His analysis indicates that a Packe Street access would contribute to a small increase in the number of properties within a 10 minute walk.

87. I do note that the lack of an access to Packe Street provides benefits to residents on that section of Packe Street because the development will not contribute to any change in traffic volumes on the street.

Cycle Lanes

88. Submitters⁹ have raised concerns about the potential reduction in cycle lane widths following the alterations to the line markings on Madras Street. I have investigated two potential options for providing a space for turning vehicles to wait clear of through traffic on Madras Street. One option involved creating a right turn bay and required all lane widths to be reduced with the second option involving a flush median and not change to lane widths. I am now of the opinion that the option with a 2 m wide flush median should be adopted along the site frontage. This avoids the need for multiple minimum width lanes and ensures that no reduction in existing lane widths is necessary.

RESPONSE TO SECTION 42A REPORT

89. The Section 42A Report raises the following transport related matters:
- (a) queuing space;
 - (b) width of the northern crossing;
 - (c) Madras Street configuration and cycle lane widths; and,
 - (d) pedestrian and cycle access.

Queuing Space

90. Although the site layout does not comply with the District Plan requirement for 18 m of queuing space at each access, I consider that the design approach does include appropriate mitigation measures.
91. Since drivers have the choice of two routes after entering the car park at the southern entrance, I do not consider it necessary to provide 18 m of queuing space on both routes. On the revised plans however, the parking spaces on the sections of aisles closest to the boundary will be marked as staff spaces to reduce the potential for conflict arising and means that the practical queuing space is about 18m on both routes.

⁹ 8, 27, 43.

92. Based on my assessment of turning demands at the driveways, the northern driveway will attract a lower volume of entry movements than the southern driveway because of the highly directional flows on Madras Street. However, I do acknowledge that the nature of the platooned flows could create short peaks in the entry demand. I have investigated some options to modify the parking layout that would increase the queuing space in this location.
93. One option would involve complete removal of the connection between the western aisle and northern aisle. This would force all entry movement to travel towards the loading bay before turning south. Other options include formation of an exit only link or a two-way link between the two northern most aisles with at least 18 m offset from road boundary.
94. Following discussion with Woolworths, the preferred approach to addressing the Council concern involves complete removal of the connection between the western and northern aisle. This will provide the 18 m of queuing space sought by Council.
95. This allows the exit lane to be aligned further south to create separation between the entry and exit lanes. With these changes the crossing width at the boundary and at the footpath is about 11 m long.

Northern Crossing Design

96. The removal of the direct connection between the western and northern parking aisles does create an opportunity to revise the layout of the northern access. Following discussion with Woolworths, the preferred approach is to adopt a design similar to the drawing in **Annexure D** of my evidence. This design approach introduces an offset of 2.5 m between the entry and exit lanes with a total access width at the road boundary and footpath of about 11 m.
97. The separation between the entry and exit lanes provides benefits in terms of the overall width of the crossing. It provides clear separation between the lanes and provides space to accommodate the tracking of articulated service vehicles.
98. The length of dropped kerb is dependent upon the path taken by a truck turning left. If the Council requires a design that avoids the need for a truck to traverse the northbound traffic lane, then the length of dropped kerb would need to be over 20 m long. This can be reduced to about 14 m if trucks are permitted to turn across the northbound lane. Given that Woolworths anticipates only three large truck movements per day and that these would typically occur during the morning when traffic volumes on Madras Street are below 400 vph, I consider that this represents a practical option because there will be ample opportunity for a truck to turn safely.

Madras Street

99. I have reviewed options for the alterations to the Madras Street road cross-section. In my opinion, the option of removing the eastern parking lane and introducing a 2 m wide flush median represents the most appropriate option as it does not require any change to existing lane widths and provides sufficient space to accommodate the tracking of all vehicles anticipated on the Site.
100. I do not consider that widening the carriageway by 0.5 m as suggested in the Section 42A Report would provide any benefits beyond the ability to mark a minimum width right turn bay. Service vehicle exit movements would still need to cross over this lane.

Pedestrian and Cycle Access

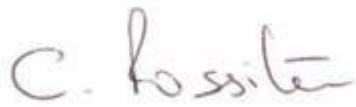
101. Although the Section 42A Report seeks a pedestrian access to Packe Street, I understand that the land required for such a connection is not owned by Woolworths and so an access cannot be formed by Woolworths.
102. The site layout includes a central pedestrian route leading to the supermarket entrance. The walking distance between the store entrance and either the northern or southern site boundary will be same whether a pedestrian chooses to walk along the parking aisles or via the central path. Since the central path provides a lower level of conflict with vehicles than the parking aisles, I consider that this route would be preferred by pedestrians.
103. A car park represents a low speed environment where vehicle speeds will typically be travelling at less than 20 km/h. At these speeds, there is a low risk of injury in the event that a crash occurs involving either a pedestrian or cyclist. In this type of environment, I do not consider that it is necessary to provide separated cycle facilities. The central path does provide a route choice for cyclists to avoid the parking aisles and can link directly to the cycle lane on Madras Street. However, I do note that the width of this link does mean that a cyclist may need to dismount and walk during busier periods.

PROPOSED CONDITIONS OF CONSENT

104. I support the conditions of consent in so far as they relate to transport related matters.
105. I consider that a condition that restricts the times of day when deliveries can occur would be appropriate so that these do not occur during the evening peak period on the road network.

CONCLUSION

106. Based on my analysis of the likely traffic generation of the Site, I consider that any traffic effects arising would be similar to those which can be anticipated to occur within the NC zone.
107. Overall, I consider that the Proposal can be supported from a transport perspective and have recommended alterations to Madras Street to enable marking of a flush median strip and updates to the northern driveway design in accordance with the drawing in **Annexure D**.



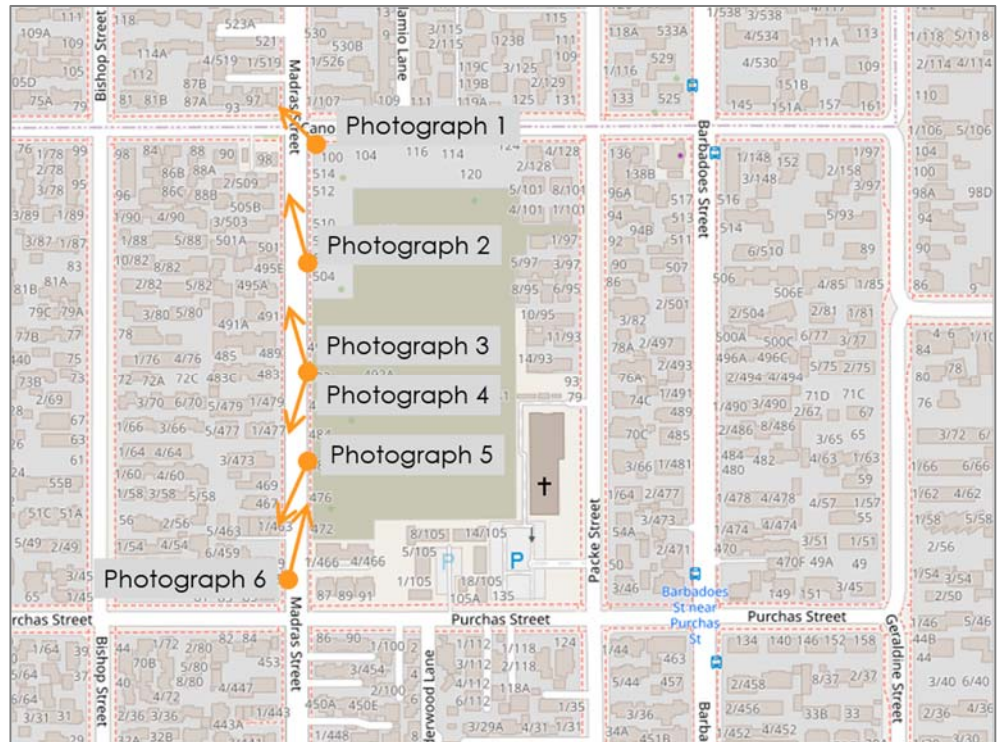
Michael Christopher Rossiter

18 July 2025

Appendix A

Photographs

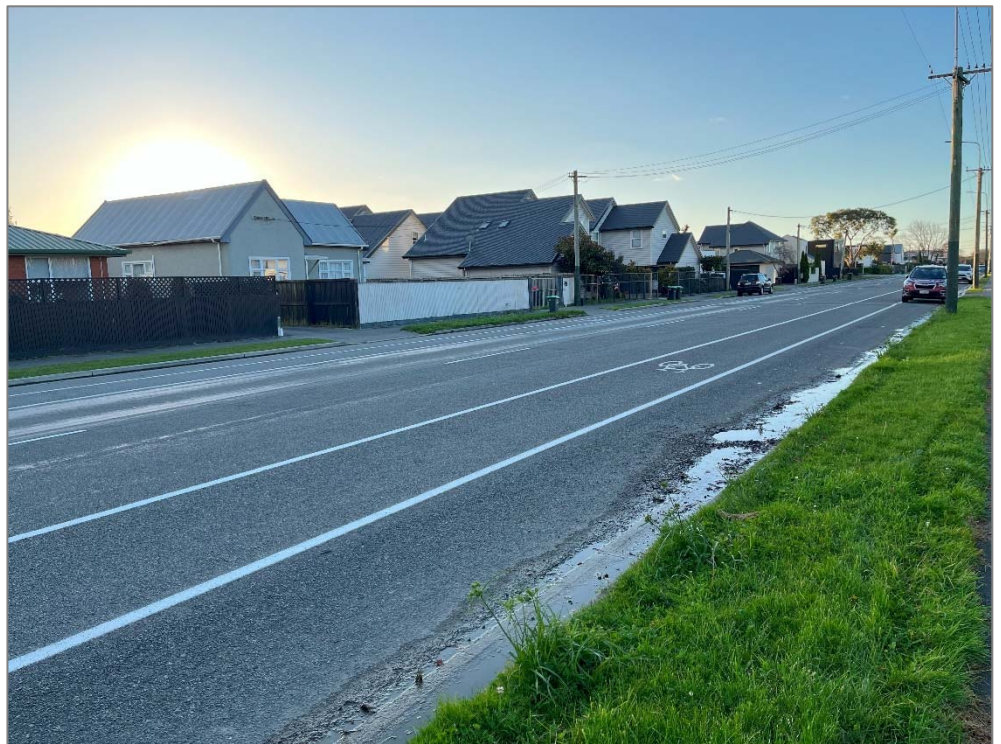
ANNEXURE A: PHOTOGRAPHS



Photograph 1: Madras Street / Canon Street intersection



Photograph 2: Madras Street south of Canon Street - view north



Photograph 3: Madras Street north of development site - view north



Photograph 4: Madras Street adjacent to site -view south



Photograph 5: Madras Street - view south from site frontage



Photograph 6: Madras Street north of Purchas Street

Appendix B

Level of Service Descriptions

ANNEXURE B: LEVEL OF SERVICE DESCRIPTIONS

Level of service (LOS) is a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of factors such as speed and travel time, delay, density, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.

In general, there are six levels of service, designated A to F, with level of service A representing the best operating condition (i.e. free-flow) and level of service F the worst (i.e. forced or breakdown flow).

LOS	Description
A	A condition of free-flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
B	B In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with level of service A.
C	Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
D	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
E	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.
F	In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

Appendix C

SIDRA Model Outputs

MOVEMENT SUMMARY

 Site: 101 [2024PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Existing Intersection - Madras St / Edgeware Rd
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 55 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand [Total	Flows HV]	Arrival [Total	Flows HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back [Veh.	Of Queue Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Madras St															
1	L2	All MCs	47	2.0	47	2.0	0.049	11.3	LOS B	0.6	4.4	0.51	0.65	0.51	42.3
2	T1	All MCs	726	2.0	726	2.0	* 0.716	11.2	LOS B	15.3	109.2	0.82	0.75	0.84	43.3
3	R2	All MCs	32	2.0	32	2.0	0.042	11.4	LOS B	0.4	2.9	0.50	0.64	0.50	42.4
Approach			805	2.0	805	2.0	0.716	11.3	LOS B	15.3	109.2	0.79	0.74	0.80	43.2
East: Edgeware Rd															
4	L2	All MCs	11	2.0	11	2.0	0.023	21.3	LOS C	0.2	1.5	0.77	0.65	0.77	38.0
5	T1	All MCs	116	2.0	116	2.0	0.236	18.1	LOS B	2.5	18.1	0.83	0.66	0.83	40.1
6	R2	All MCs	42	2.0	42	2.0	0.156	26.1	LOS C	1.0	7.2	0.88	0.72	0.88	36.2
Approach			168	2.0	168	2.0	0.236	20.3	LOS C	2.5	18.1	0.84	0.67	0.84	38.9
North: Madras St															
7	L2	All MCs	16	2.0	16	2.0	0.016	11.2	LOS B	0.2	1.4	0.49	0.62	0.49	42.4
8	T1	All MCs	37	2.0	37	2.0	0.036	6.7	LOS A	0.5	3.4	0.50	0.38	0.50	45.8
9	R2	All MCs	16	2.0	16	2.0	0.066	22.3	LOS C	0.3	2.4	0.78	0.68	0.78	37.5
Approach			68	2.0	68	2.0	0.066	11.3	LOS B	0.5	3.4	0.57	0.50	0.57	42.8
West: Edgeware Rd															
10	L2	All MCs	63	2.0	63	2.0	0.415	23.7	LOS C	4.6	33.1	0.88	0.74	0.88	38.3
11	T1	All MCs	137	2.0	137	2.0	* 0.415	19.1	LOS B	4.6	33.1	0.88	0.74	0.88	39.0
12	R2	All MCs	21	2.0	21	2.0	0.064	23.6	LOS C	0.5	3.3	0.82	0.68	0.82	37.1
Approach			221	2.0	221	2.0	0.415	20.8	LOS C	4.6	33.1	0.87	0.73	0.87	38.6
All Vehicles			1263	2.0	1263	2.0	0.716	14.1	LOS B	15.3	109.2	0.80	0.72	0.81	41.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped Dist] m		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Madras St												
P1	Full	50	53	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
East: Edgeware Rd												
P2	Full	50	53	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
North: Madras St												
P3	Full	50	53	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
West: Edgeware Rd												
P4	Full	50	53	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
All Pedestrians		200	211	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 101 [2024PM - Woolworths (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Existing Intersection - Madras St / Edgware Rd
Total intersection movements increased by 120 vph overall to reflect effects of the supermarket in the evening peak
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 55 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand [Total	Flows HV]	Arrival [Total	Flows HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [Veh.	Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Madras St															
1	L2	All MCs	100	2.0	100	2.0	0.104	11.8	LOS B	1.3	9.6	0.53	0.67	0.53	42.2
2	T1	All MCs	737	2.0	737	2.0	* 0.729	11.9	LOS B	15.9	113.4	0.83	0.76	0.86	43.1
3	R2	All MCs	58	2.0	58	2.0	0.077	11.8	LOS B	0.8	5.5	0.52	0.66	0.52	42.3
Approach			895	2.0	895	2.0	0.729	11.9	LOS B	15.9	113.4	0.77	0.75	0.80	43.0
East: Edgware Rd															
4	L2	All MCs	32	2.0	32	2.0	0.068	21.7	LOS C	0.7	4.7	0.79	0.69	0.79	37.8
5	T1	All MCs	105	2.0	105	2.0	0.215	17.9	LOS B	2.3	16.3	0.83	0.65	0.83	40.2
6	R2	All MCs	42	2.0	42	2.0	0.150	26.1	LOS C	1.0	7.1	0.87	0.72	0.87	36.2
Approach			179	2.0	179	2.0	0.215	20.5	LOS C	2.3	16.3	0.83	0.67	0.83	38.7
North: Madras St															
7	L2	All MCs	16	2.0	16	2.0	0.016	11.2	LOS B	0.2	1.4	0.49	0.62	0.49	42.4
8	T1	All MCs	47	2.0	47	2.0	0.047	6.7	LOS A	0.6	4.4	0.51	0.39	0.51	45.8
9	R2	All MCs	16	2.0	16	2.0	0.069	23.2	LOS C	0.3	2.5	0.80	0.69	0.80	37.1
Approach			79	2.0	79	2.0	0.069	10.9	LOS B	0.6	4.4	0.56	0.49	0.56	43.1
West: Edgware Rd															
10	L2	All MCs	63	2.0	63	2.0	0.383	23.5	LOS C	4.2	30.2	0.87	0.73	0.87	38.3
11	T1	All MCs	121	2.0	121	2.0	* 0.383	18.9	LOS B	4.2	30.2	0.87	0.73	0.87	39.1
12	R2	All MCs	47	2.0	47	2.0	0.143	24.1	LOS C	1.1	7.6	0.84	0.72	0.84	36.9
Approach			232	2.0	232	2.0	0.383	21.2	LOS C	4.2	30.2	0.86	0.73	0.86	38.4

All Vehicles	1384	2.0	1384	2.0	0.729	14.5	LOS B	15.9	113.4	0.78	0.72	0.80	41.6
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Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped	Dist]			sec	m	m/sec
South: Madras St												
P1	Full	50	53	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
East: Edgeware Rd												
P2	Full	50	53	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
North: Madras St												
P3	Full	50	53	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
West: Edgeware Rd												
P4	Full	50	53	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14
All Pedestrians		200	211	21.9	LOS C	0.1	0.1	0.89	0.89	175.7	200.0	1.14

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: U:\310206139\technical\09_sidra\madras_edgeware_250521.sip9

MOVEMENT SUMMARY

▽ Site: 101 [2024PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Existing intersection - Madras St / Canon St
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand	Flows	Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Madras Street															
1	L2	All MCs	47	2.0	47	2.0	0.452	4.8	LOS A	0.0	0.0	0.00	0.03	0.00	48.3
2	T1	All MCs	821	2.0	821	2.0	0.452	0.2	LOS A	0.0	0.0	0.00	0.03	0.00	49.6
3	R2	All MCs	11	2.0	11	2.0	0.008	4.7	LOS A	0.0	0.2	0.08	0.54	0.08	45.6
Approach			879	2.0	879	2.0	0.452	0.5	NA	0.0	0.2	0.00	0.04	0.00	49.4
East: Canon Street															
4	L2	All MCs	5	1.0	5	1.0	0.056	4.7	LOS A	0.2	1.5	0.51	0.53	0.51	42.9
5	T1	All MCs	16	1.0	16	1.0	0.056	10.9	LOS B	0.2	1.5	0.51	0.53	0.51	43.2
6	R2	All MCs	5	1.0	5	1.0	0.056	13.4	LOS B	0.2	1.5	0.51	0.53	0.51	42.8
Approach			26	1.0	26	1.0	0.056	10.1	LOS B	0.2	1.5	0.51	0.53	0.51	43.1
North: Madras Street															
7	L2	All MCs	11	1.0	11	1.0	0.049	4.6	LOS A	0.3	2.2	0.48	0.51	0.48	45.6
8	T1	All MCs	42	1.0	42	1.0	0.049	0.0	LOS A	0.3	2.2	0.48	0.51	0.48	46.7
9	R2	All MCs	16	1.0	16	1.0	0.049	19.5	LOS C	0.3	2.2	0.48	0.51	0.48	45.4
Approach			68	1.0	68	1.0	0.049	5.2	NA	0.3	2.2	0.48	0.51	0.48	46.2
West: Canon Street															
10	L2	All MCs	11	1.0	11	1.0	0.100	10.5	LOS B	0.1	0.8	0.36	0.68	0.36	42.3
11	T1	All MCs	11	1.0	11	1.0	0.100	11.1	LOS B	0.1	0.8	0.36	0.68	0.36	42.5
12	R2	All MCs	5	1.0	5	1.0	0.100	14.4	LOS B	0.1	0.8	0.36	0.68	0.36	42.2
Approach			26	1.0	26	1.0	0.100	11.5	LOS B	0.1	0.8	0.36	0.68	0.36	42.3
All Vehicles			1000	1.9	1000	1.9	0.452	1.4	NA	0.3	2.2	0.06	0.10	0.06	48.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: U:\310206139\technical\09_sidra\madras_canon_250521.sip9

MOVEMENT SUMMARY

▽ Site: 101 [2024PM - Supermarket (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Existing intersection - Madras St / Canon St
With supermarket traffic
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand [Total	Flows HV]	Arrival [Total	Flows HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [Veh.	Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Madras Street															
1	L2	All MCs	58	2.0	58	2.0	0.488	4.8	LOS A	0.0	0.0	0.00	0.03	0.00	48.3
2	T1	All MCs	879	2.0	879	2.0	0.488	0.2	LOS A	0.0	0.0	0.00	0.03	0.00	49.5
3	R2	All MCs	21	2.0	21	2.0	0.016	4.9	LOS A	0.0	0.3	0.14	0.54	0.14	45.4
Approach			958	2.0	958	2.0	0.488	0.6	NA	0.0	0.3	0.00	0.04	0.00	49.3
East: Canon Street															
4	L2	All MCs	16	1.0	16	1.0	0.084	4.9	LOS A	0.3	2.1	0.55	0.57	0.55	42.6
5	T1	All MCs	16	1.0	16	1.0	0.084	14.5	LOS B	0.3	2.1	0.55	0.57	0.55	42.8
6	R2	All MCs	5	1.0	5	1.0	0.084	17.8	LOS C	0.3	2.1	0.55	0.57	0.55	42.5
Approach			37	1.0	37	1.0	0.084	10.9	LOS B	0.3	2.1	0.55	0.57	0.55	42.7
North: Madras Street															
7	L2	All MCs	11	1.0	11	1.0	0.084	4.6	LOS A	0.4	2.8	0.32	0.38	0.32	46.5
8	T1	All MCs	100	1.0	100	1.0	0.084	0.0	LOS A	0.4	2.8	0.32	0.38	0.32	47.6
9	R2	All MCs	16	1.0	16	1.0	0.084	26.2	LOS D	0.4	2.8	0.32	0.38	0.32	46.3
Approach			126	1.0	126	1.0	0.084	3.7	NA	0.4	2.8	0.32	0.38	0.32	47.3
West: Canon Street															
10	L2	All MCs	11	1.0	11	1.0	0.162	11.9	LOS B	0.3	2.2	0.59	0.81	0.61	40.2
11	T1	All MCs	11	1.0	11	1.0	0.162	14.5	LOS B	0.3	2.2	0.59	0.81	0.61	40.4
12	R2	All MCs	16	1.0	16	1.0	0.162	19.7	LOS C	0.3	2.2	0.59	0.81	0.61	40.1
Approach			37	1.0	37	1.0	0.162	16.0	LOS C	0.3	2.2	0.59	0.81	0.61	40.2

All Vehicles	1158	1.8	1158	1.8	0.488	1.8	NA	0.4	2.8	0.07	0.12	0.07	48.5
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Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

▽ Site: 101 [2024PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Existing intersection - Madras St / Purchas St
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand [Total	Flows HV]	Arrival [Total	Flows HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back Of [Veh.	Queue Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Madras Street															
1	L2	All MCs	53	2.0	53	2.0	0.477	4.8	LOS A	0.0	0.0	0.00	0.03	0.00	48.3
2	T1	All MCs	863	2.0	863	2.0	0.477	0.2	LOS A	0.0	0.0	0.00	0.03	0.00	49.5
3	R2	All MCs	26	2.0	26	2.0	0.019	4.7	LOS A	0.1	0.4	0.07	0.54	0.07	45.6
Approach			942	2.0	942	2.0	0.477	0.6	NA	0.1	0.4	0.00	0.05	0.00	49.3
East: Purchas Street															
4	L2	All MCs	5	1.0	5	1.0	0.059	4.6	LOS A	0.2	1.6	0.44	0.47	0.44	42.6
5	T1	All MCs	16	1.0	16	1.0	0.059	11.6	LOS B	0.2	1.6	0.44	0.47	0.44	42.9
6	R2	All MCs	5	1.0	5	1.0	0.059	14.3	LOS B	0.2	1.6	0.44	0.47	0.44	42.5
Approach			26	1.0	26	1.0	0.059	10.8	LOS B	0.2	1.6	0.44	0.47	0.44	42.7
North: Madras Street															
7	L2	All MCs	21	1.0	21	1.0	0.038	4.6	LOS A	0.2	1.8	0.49	0.57	0.49	44.8
8	T1	All MCs	21	1.0	21	1.0	0.038	0.0	LOS A	0.2	1.8	0.49	0.57	0.49	45.9
9	R2	All MCs	11	1.0	11	1.0	0.038	23.5	LOS C	0.2	1.8	0.49	0.57	0.49	44.7
Approach			53	1.0	53	1.0	0.038	6.5	NA	0.2	1.8	0.49	0.57	0.49	45.2
West: Purchas Street															
10	L2	All MCs	11	1.0	11	1.0	0.105	11.1	LOS B	0.1	0.9	0.39	0.70	0.39	41.9
11	T1	All MCs	11	1.0	11	1.0	0.105	11.8	LOS B	0.1	0.9	0.39	0.70	0.39	42.2
12	R2	All MCs	5	1.0	5	1.0	0.105	15.3	LOS C	0.1	0.9	0.39	0.70	0.39	41.8
Approach			26	1.0	26	1.0	0.105	12.2	LOS B	0.1	0.9	0.39	0.70	0.39	42.0
All Vehicles			1047	1.9	1047	1.9	0.477	1.4	NA	0.2	1.8	0.05	0.10	0.05	48.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Organisation: STANTEC NEW ZEALAND | Licence: NETWORK / Enterprise Level 5 | Processed: Thursday, 22 May 2025 8:16:27 am

Project: U:\310206139\technical\09_sidra\madras_purchas_250521.sip9

MOVEMENT SUMMARY

▽ Site: 101 [2024PM - Supermarket (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Existing intersection - Madras St / Purchas St
With supermarket traffic movements
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand [Total	Flows HV]	Arrival [Total	Flows HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [Veh.	Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Madras Street															
1	L2	All MCs	53	2.0	53	2.0	0.524	4.8	LOS A	0.0	0.0	0.00	0.03	0.00	48.3
2	T1	All MCs	953	2.0	953	2.0	0.524	0.3	LOS A	0.0	0.0	0.00	0.03	0.00	49.5
3	R2	All MCs	26	2.0	26	2.0	0.020	4.8	LOS A	0.1	0.4	0.12	0.54	0.12	45.5
Approach			1032	2.0	1032	2.0	0.524	0.6	NA	0.1	0.4	0.00	0.04	0.00	49.3
East: Purchas Street															
4	L2	All MCs	5	1.0	5	1.0	0.119	4.8	LOS A	0.4	2.9	0.70	0.70	0.70	40.6
5	T1	All MCs	16	1.0	16	1.0	0.119	14.9	LOS B	0.4	2.9	0.70	0.70	0.70	40.8
6	R2	All MCs	16	1.0	16	1.0	0.119	18.7	LOS C	0.4	2.9	0.70	0.70	0.70	40.5
Approach			37	1.0	37	1.0	0.119	15.1	LOS C	0.4	2.9	0.70	0.70	0.70	40.6
North: Madras Street															
7	L2	All MCs	32	1.0	32	1.0	0.131	4.6	LOS A	1.0	6.8	0.64	0.74	0.64	43.7
8	T1	All MCs	63	1.0	63	1.0	0.131	0.0	LOS A	1.0	6.8	0.64	0.74	0.64	44.7
9	R2	All MCs	47	1.0	47	1.0	0.131	22.8	LOS C	1.0	6.8	0.64	0.74	0.64	43.6
Approach			142	1.0	142	1.0	0.131	8.6	NA	1.0	6.8	0.64	0.74	0.64	44.1
West: Purchas Street															
10	L2	All MCs	21	1.0	21	1.0	0.189	13.6	LOS B	0.2	1.4	0.36	0.70	0.42	40.4
11	T1	All MCs	11	1.0	11	1.0	0.189	16.3	LOS C	0.2	1.4	0.36	0.70	0.42	40.7
12	R2	All MCs	5	1.0	5	1.0	0.189	21.0	LOS C	0.2	1.4	0.36	0.70	0.42	40.3
Approach			37	1.0	37	1.0	0.189	15.4	LOS C	0.2	1.4	0.36	0.70	0.42	40.5

All Vehicles	1247	1.8	1247	1.8	0.524	2.4	NA	1.0	6.8	0.11	0.16	0.11	48.0
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Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 Site: 101 [2024PM - 110s cycle (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Existing Intersection - Bealey Ave / Madras St
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand	Flows	Arrival	Flows	Deg. Satn	Aver. Delay	Level of Service	95% Back Of	Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%	v/c	sec							km/h
South: Madras Street															
1	L2	All MCs	242	2.0	242	2.0	0.316	27.5	LOS C	8.6	61.5	0.71	0.76	0.71	35.7
2	T1	All MCs	789	2.0	789	2.0	* 0.884	46.4	LOS D	32.9	234.3	0.91	0.90	1.04	33.2
3	R2	All MCs	226	2.0	226	2.0	0.391	41.3	LOS D	8.6	61.0	0.75	0.77	0.75	35.2
Approach			1258	2.0	1258	2.0	0.884	41.9	LOS D	32.9	234.3	0.84	0.85	0.92	34.0
East: BEaley Avenue															
5	T1	All MCs	905	2.0	905	2.0	0.337	20.7	LOS C	10.2	72.6	0.67	0.58	0.67	39.6
6	R2	All MCs	58	2.0	58	2.0	* 0.580	68.3	LOS E	3.3	23.4	1.00	0.78	1.06	26.4
Approach			963	2.0	963	2.0	0.580	23.6	LOS C	10.2	72.6	0.69	0.59	0.69	38.4
North: Madras Street															
7	L2	All MCs	32	2.0	32	2.0	0.041	24.6	LOS C	1.0	7.0	0.62	0.67	0.62	36.7
Approach			32	2.0	32	2.0	0.041	24.6	LOS C	1.0	7.0	0.62	0.67	0.62	36.7
West: Bealey Avenue															
10	L2	All MCs	95	2.0	95	2.0	0.142	44.8	LOS D	3.4	24.1	0.71	0.72	0.71	34.9
11	T1	All MCs	1789	2.0	1789	2.0	* 0.875	48.6	LOS D	34.7	246.8	1.00	1.01	1.14	31.3
Approach			1884	2.0	1884	2.0	0.875	48.4	LOS D	34.7	246.8	0.99	0.99	1.12	31.4
All Vehicles			4137	2.0	4137	2.0	0.884	40.5	LOS D	34.7	246.8	0.87	0.85	0.96	33.7

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

Vehicle movement LOS values are based on average delay per movement.

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped Dist] ped m		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Madras Street												
P1	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98
East: BEaley Avenue												
P2	Full	20	21	49.2	LOS E	0.1	0.1	0.95	0.95	203.1	200.0	0.98
North: Madras Street												
P3	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98
West: Bealey Avenue												
P41	Stage 1	20	21	49.2	LOS E	0.1	0.1	0.95	0.95	203.1	200.0	0.98
P42	Stage 2	20	21	49.2	LOS E	0.1	0.1	0.95	0.95	203.1	200.0	0.98
All Pedestrians		160	168	49.2	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: 101 [2024PM - 110s cycle - Supermarket (Site Folder: General)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Existing Intersection - Bealey Ave / Madras St
Supermarket traffic added to flows
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand	Flows	Arrival	Flows	Deg. Satn	Aver. Delay	Level of Service	95% Back Of	Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%	v/c	sec							km/h
South: MAdras Street															
1	L2	All MCs	242	2.0	242	2.0	0.316	27.5	LOS C	8.6	61.5	0.71	0.76	0.71	35.7
2	T1	All MCs	800	2.0	800	2.0	* 0.902	49.4	LOS D	34.8	247.4	0.92	0.93	1.07	32.5
3	R2	All MCs	226	2.0	226	2.0	0.415	42.7	LOS D	8.8	62.5	0.77	0.77	0.77	34.9
Approach			1268	2.0	1268	2.0	0.902	44.0	LOS D	34.8	247.4	0.85	0.87	0.95	33.4
East: BEaley Avenue															
5	T1	All MCs	879	2.0	879	2.0	0.329	20.4	LOS C	9.9	70.5	0.67	0.57	0.67	39.6
6	R2	All MCs	95	2.0	95	2.0	* 0.813	70.7	LOS E	5.6	40.0	1.00	0.94	1.30	25.8
Approach			974	2.0	974	2.0	0.813	25.3	LOS C	9.9	70.5	0.70	0.61	0.73	37.6
North: Madras Street															
7	L2	All MCs	68	2.0	68	2.0	0.089	25.1	LOS C	2.2	15.6	0.63	0.69	0.63	36.5
Approach			68	2.0	68	2.0	0.089	25.1	LOS C	2.2	15.6	0.63	0.69	0.63	36.5
West: Bealey Avenue															
10	L2	All MCs	137	2.0	137	2.0	0.211	45.9	LOS D	5.1	36.2	0.74	0.74	0.74	34.5
11	T1	All MCs	1758	2.0	1758	2.0	* 0.891	51.7	LOS D	35.7	253.8	1.00	1.04	1.18	30.4
Approach			1895	2.0	1895	2.0	0.891	51.3	LOS D	35.7	253.8	0.98	1.02	1.15	30.7
All Vehicles			4205	2.0	4205	2.0	0.902	42.6	LOS D	35.7	253.8	0.87	0.87	0.98	33.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped Dist] ped m		Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: MAdras Street												
P1	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98
East: BEaley Avenue												
P2	Full	20	21	49.2	LOS E	0.1	0.1	0.95	0.95	203.1	200.0	0.98
North: Madras Street												
P3	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98
West: Bealey Avenue												
P41	Stage 1	20	21	49.2	LOS E	0.1	0.1	0.95	0.95	203.1	200.0	0.98
P42	Stage 2	20	21	49.2	LOS E	0.1	0.1	0.95	0.95	203.1	200.0	0.98
All Pedestrians		160	168	49.2	LOS E	0.2	0.2	0.95	0.95	203.1	200.0	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101v [South Driveway (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand	Flows	Arrival	Flows	Deg. Satn	Aver. Delay	Level of Service	95% Back Of	Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total	HV]	[Total	HV]				[Veh.	Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Madras Street															
2	T1	All MCs	826	2.0	826	2.0	0.429	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
3	R2	All MCs	163	2.0	163	2.0	0.100	4.9	LOS A	0.4	2.9	0.16	0.54	0.16	45.4
Approach			989	2.0	989	2.0	0.429	1.0	NA	0.4	2.9	0.03	0.09	0.03	49.0
East: Driveway															
4	L2	All MCs	53	0.0	53	0.0	0.305	5.4	LOS A	1.4	9.7	0.64	0.63	0.70	41.2
6	R2	All MCs	74	0.0	74	0.0	0.305	19.8	LOS C	1.4	9.7	0.64	0.63	0.70	41.1
Approach			126	0.0	126	0.0	0.305	13.8	LOS B	1.4	9.7	0.64	0.63	0.70	41.1
North: MAdras Street															
7	L2	All MCs	11	2.0	11	2.0	0.052	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	48.4
8	T1	All MCs	89	2.0	89	2.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	49.7
Approach			100	2.0	100	2.0	0.052	0.5	NA	0.0	0.0	0.00	0.06	0.00	49.5
All Vehicles			1216	1.8	1216	1.8	0.429	2.3	NA	1.4	9.7	0.09	0.14	0.09	48.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: U:\310206139\technical\09_sidra\madras_driveway_250521.sip9

MOVEMENT SUMMARY

▽ Site: 101v [North Driveway (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand	Flows	Arrival	Flows	Deg. Satn	Aver. Delay	Level of Service	95% Back Of	Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver.
			[Total	HV]	[Total	HV]				[Veh.	Dist]				km/h
			veh/h	%	veh/h	%	v/c	sec		veh	m				
South: Mdras Street															
2	T1	All MCs	868	2.0	868	2.0	0.451	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	49.7
3	R2	All MCs	32	2.0	32	2.0	0.020	5.0	LOS A	0.1	0.5	0.18	0.53	0.18	45.4
Approach			900	2.0	900	2.0	0.451	0.4	NA	0.1	0.5	0.01	0.02	0.01	49.6
East: Driveway															
4	L2	All MCs	37	0.0	37	0.0	0.325	5.7	LOS A	1.6	11.2	0.66	0.65	0.76	40.5
6	R2	All MCs	89	0.0	89	0.0	0.325	19.1	LOS C	1.6	11.2	0.66	0.65	0.76	40.4
Approach			126	0.0	126	0.0	0.325	15.2	LOS C	1.6	11.2	0.66	0.65	0.76	40.5
North: MAdras Street															
7	L2	All MCs	68	2.0	68	2.0	0.070	4.6	LOS A	0.0	0.0	0.00	0.28	0.00	47.2
8	T1	All MCs	63	2.0	63	2.0	0.070	0.0	LOS A	0.0	0.0	0.00	0.28	0.00	48.4
Approach			132	2.0	132	2.0	0.070	2.4	NA	0.0	0.0	0.00	0.28	0.00	47.8
All Vehicles			1158	1.8	1158	1.8	0.451	2.2	NA	1.6	11.2	0.08	0.12	0.09	48.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

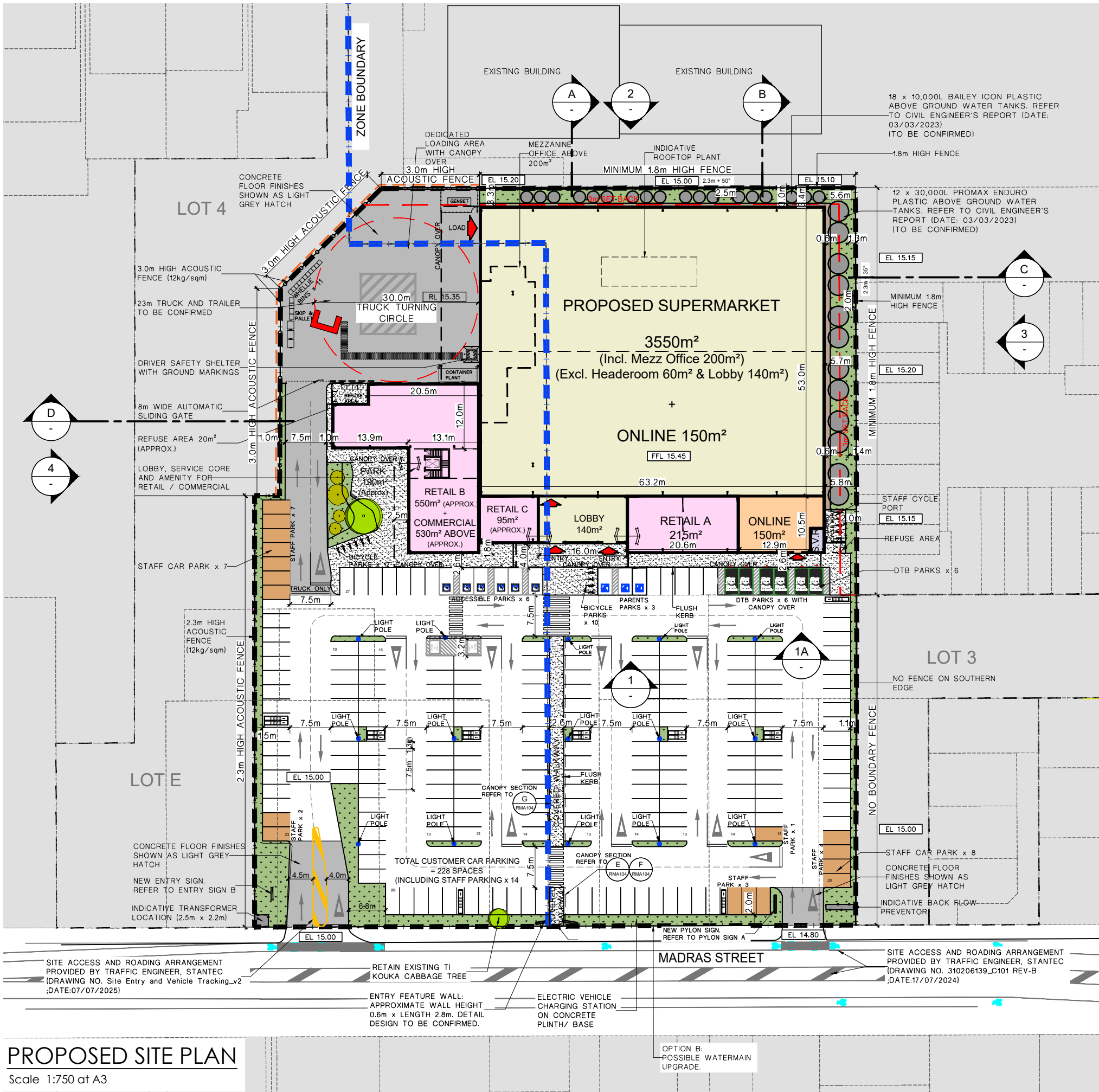
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Appendix D

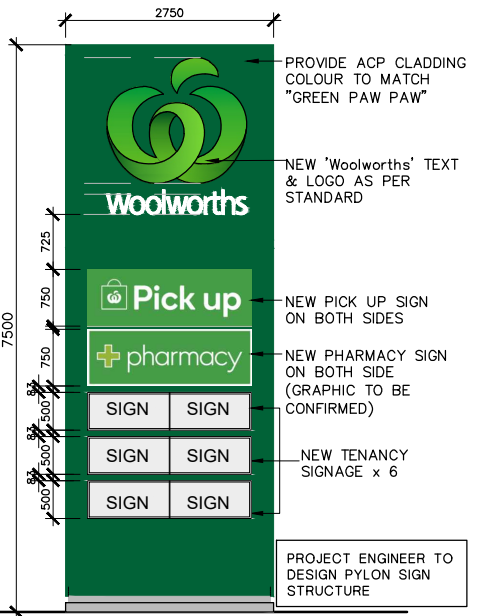
Site Access Alterations



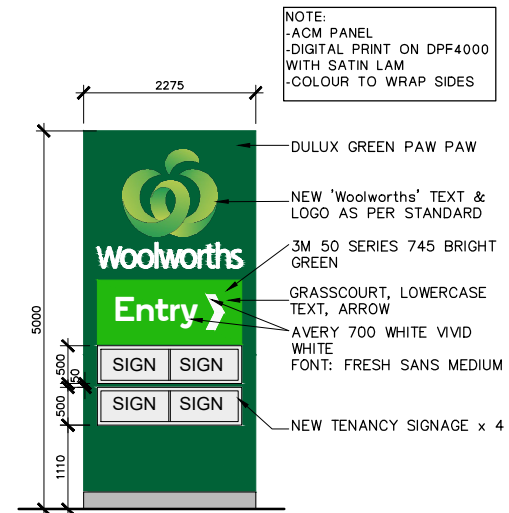
PROPOSED SITE PLAN
Scale 1:750 at A3

DEVELOPMENT SUMMARY:	
①	SUPERMARKET DEVELOPMENT SITE AREA = 14430m² (APPROX.)
②	SUPERMARKET AREA = 3550m² (1:20) (Incl. Mezz Office 200m²)
③	LOBBY = 140m² (APPROX.)
④	HEADROOM = 60m² (APPROX.)
⑤	ONLINE = 150m² (1:50)
⑥	RETAIL A + B + C = 860m² (1:30) (INCL. CORE + AMENITY = 70m²)
⑦	COMMERCIAL (ABOVE RETAIL B) = 530m² (1:30)
⑧	S.V.R. = 13m² (APPROX.)
⑨	TOTAL BUILD GFA = 5303m² (APPROX.)

PARKING SUMMARY:	
①	TOTAL CAR PARKING = 228 SPACES CONSISTS OF :
	STANDARD PARK = 195 SPACES
	ACCESSIBLE PARK = 6 SPACES
	PARENTS PARK = 3 SPACES
	STAFF PARK = 17 SPACES
	DTB PARK = 6 SPACES
	DROP OFF PARK = 1 SPACE
②	TOTAL CYCLE PARK = 32 SPACES CONSISTS OF :
	SUPERMARKET VISITOR CYCLE = 10 SPACES (SUPERMARKET FRONT ENTRANCE)
	RETAIL VISITOR CYCLE = 12 SPACES (NEXT TO THE PARK)
	SUPERMARKET STAFF CYCLE = 10 SPACES (NEXT TO S.V.R.)



PROPOSED PYLON
SIGN A
Scale 1:100 at A3



PROPOSED ENTRY
SIGN B
Scale 1:100 at A3