

TRAFFIC ASSESSMENT

**Subdivision of 42 Woodhams Lane,
Mortlake VIC 3727**

**Prepared for MAAPS Planning Services
3 April 2025
File Reference: 18042PD**

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1.0 Introduction and Scope

Traffkd has been retained by MAAPS Planning Services to prepare a traffic report for a proposed 26 lot subdivision at 42 Woodhams Road, Mortlake.

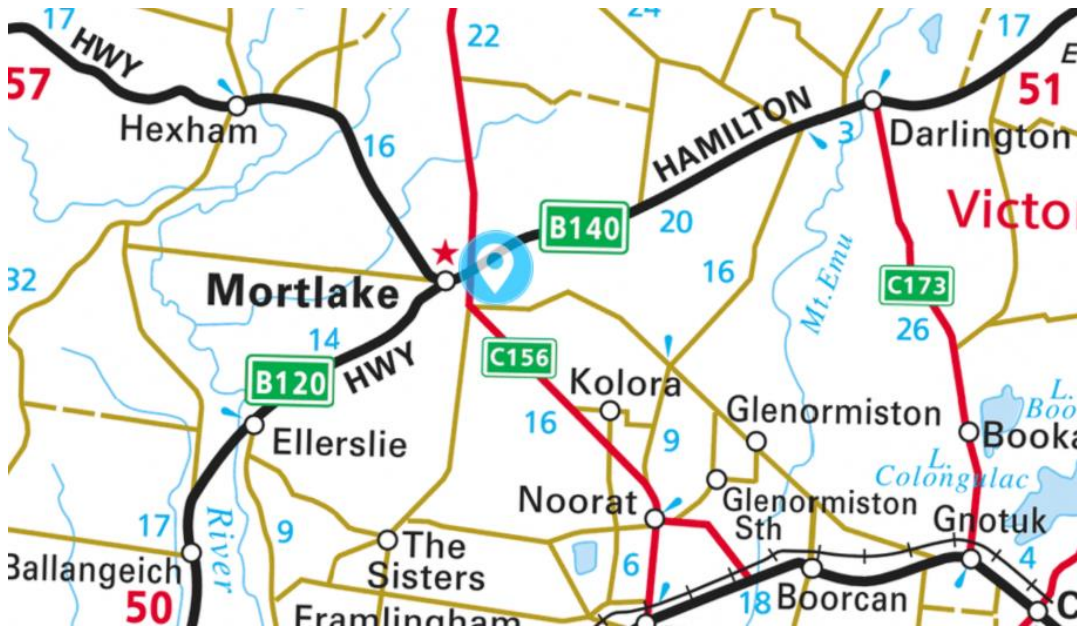
This report examines the traffic generation and potential impacts of the proposal, considering the projected traffic volumes expected to access each lot. Based on our analysis, a series of recommendations are provided to ensure the safe and efficient operation of the surrounding road network.

2.0 Current Conditions of Site and Surrounds

2.1. The site

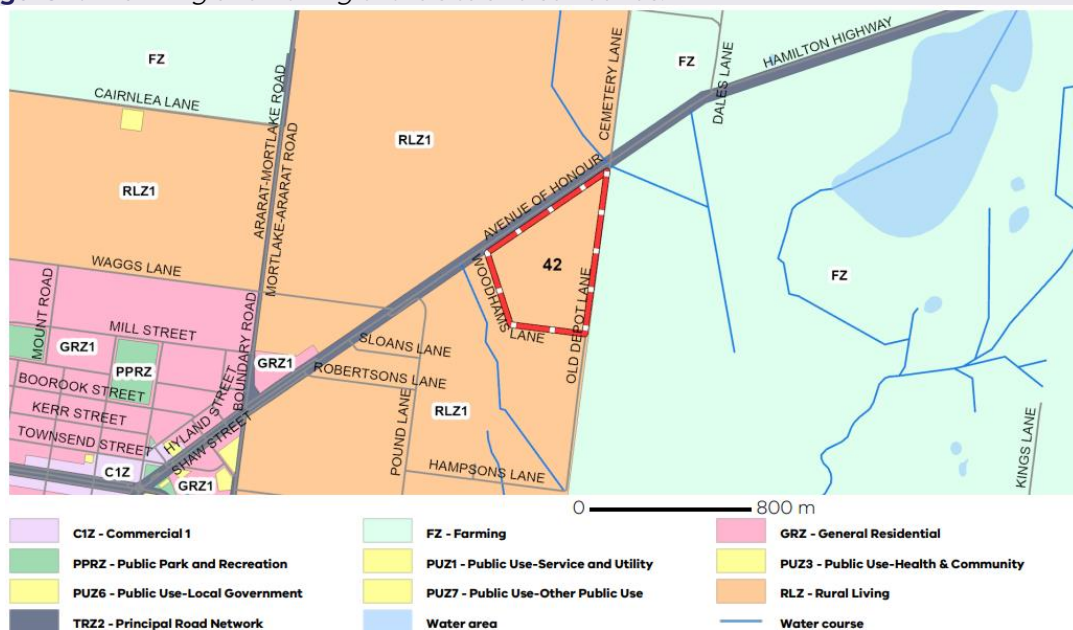
The subject site is located at 42 Woodhams Road, Mortlake where a subdivision into 26 individual lots is being proposed. The site is located within a rural living zone. An unsealed crossover to Woodhams Lane along the site's western property boundary provides access to the site. The site has a total area of approximately 281,000 sqm. The site is located along the Hamilton Highway approximately 1.44 kilometres north-east of the intersection of Boundary Road and Hamilton Highway.

Figure 1. Location of the site within the surrounding road network.



The site is located within a Rural Living Zone (RLZ) as set out in the Moyne Shire Planning Scheme and is located adjacent to other large lots.

Figure 2. Planning and Zoning of the site and surrounds.



2.2. The Street Network and Site Access

Hamilton Highway is a sealed two-way rural road aligned in northeast to southwest direction with a single traffic lane operating in each direction. Hamilton Highway is classified as a TRZ2 forming part of the Principal Road Network. Hamilton Highway is Department of Transport and Planning controlled road.

The road provides access to a small number of agricultural properties that include a dwelling within their site. No parking restrictions operate along Hamilton Highway proximate to the site. Hamilton Highway has a posted speed limit of 100km/h.

Figure 3. *Hamilton Highway – facing east.*



Figure 4. *Hamilton Highway – facing west*



Woodhams Lane is two-way unsealed single carriageway aligned in a north-south direction along the frontage of the subject site. The road is a local Council Road that operates with a default 50 km/h speed limit. The road extends for a short distance of approximately 740 metres extends from Hamilton Highway to Old Deport Road.

Figure 5. *Woodhams Lane - facing south*



2.3. Existing Public Transport Facilities within Close Proximity of the Site

Whilst there are bus services operating within the Mortlake town centre, approximately 2 kilometres west of the subject site, the site has limited access to these public transport services in the absence of any pedestrian connections between these bus stops and the subject site.

2.4. Existing Traffic Volumes

Traffkd commissioned speed, volume and classification surveys along both Hamilton Highway and Woodhams Lane. The data collection point for each of the traffic surveys is shown in the image below in Figure 6. The data was collected for a duration of a week from Monday 14 October 2024 to Sunday 20 October 2024 inclusive.

Figure 6. Traffic Survey – Tube locations



The results of traffic volumes on each road are summarised in the table below:

Road	Average Daily Traffic Volumes		Peak Hour Volumes	
	Weekday	7- day	Weekday	Weekend
Hamilton Highway	Eastbound	Eastbound	AM (11 am – 12 pm) Eastbound 87 Westbound 70 Combined 157	AM (11 am – 12 pm) Eastbound 77 Westbound 64 Combined 140
	862 vpd	823 vpd		
	Westbound	Westbound	PM (2 pm – 3pm) Eastbound 75 Westbound 69 Combined 143	PM (1 pm – 2pm) Eastbound 69 Westbound 72 Combined 132
	881 vpd	849 vpd		
	Combined	Combined		
	1,743 vpd	1,672 vpd		

Road	Average Daily Traffic Volumes		Peak Hour Volumes	
	Weekday	7- day	Weekday	Weekend
Woodhams Lane	Northbound	Northbound	AM (10 am – 11am) Northbound 0 Southbound 1 Combined 1	AM (10 am – 11am) Northbound 1 Southbound 1 Combined 1
	4 vpd	4 vpd		
	Southbound	Southbound		
	5 vpd	4 vpd		
	Combined	Combined	PM (1pm – 2 pm) Northbound 0 Southbound 1 Combined 1	PM (1pm – 2 pm) Northbound 1 Southbound 2 Combined 3
	9 vpd	8 vpd		

Figure 7. Average weekday traffic volumes

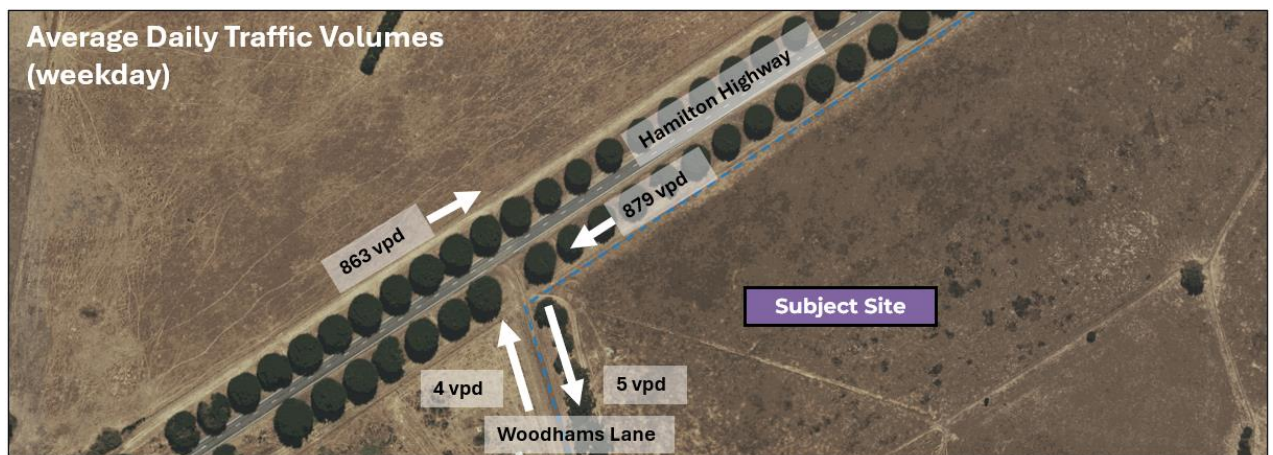
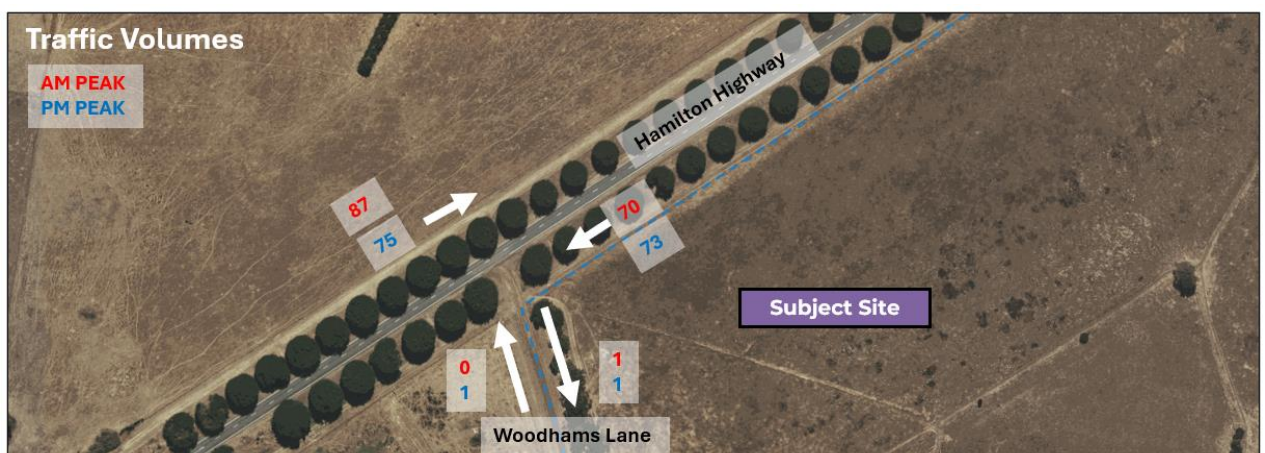


Figure 8. Existing AM PM Peak Hour traffic volumes



2.5. Pedestrian and Cyclist Connectivity

No pedestrian or cyclist connections are currently available proximate to the subject site.

2.6. Department of Transport and Planning Crash Stats Database

Traffkd has completed a review of publicly available crash statistics available from the Department of Transport and Planning's database accessed via the following link:

https://vicroadsopendata.vicroadsmaps.opendata.arcgis.com/datasets/25e6727f89f2472aa7b044a3ae730b9a_0/explore?location=-38.073107%2C142.831770%2C16.60

The review indicated no recorded crash data within the most recent 5-year period, concluding in June 2024, within a 500-metre radius of the intersection of Hamilton Highway and Woodhams Lane. In January 2019 a crash did occur along Hamilton Highway approximately 300 metres north-east of the intersection of Hamilton Highway and Woodhams Lane. The crash involved a vehicle colliding with a fix object and was recorded as a Code 173. The crash did not occur at an intersection.

Given the above there is no repeat crash history at the intersection of Hamilton Highway and Woodhams Lane that would suggest any existing safety items needing to be addressed regarding the existing operation of the intersection.

3.0 The Proposal

3.1. Proposed use

The proposal seeks to subdivide the existing subject site into 26 smaller individual lots of approximately 1 hectare in size each. Vehicular access to all 26 lots is proposed to occur from new roads within the site to be introduced as part of the development. It is noted no lots will have access directly onto Hamilton Highway without vehicles travelling along Woodhams Lane prior.

Figure 9. *Proposed Subdivision Layout.*



4.0 Traffic Impact Assessment

4.1. Traffic Generation

To assess the potential traffic impact of the proposal, an evaluation based on 26 individual residential lots has been conducted. The Australian Model Code for Residential Development (AMCORD) assumes a daily vehicle generation rate of 10.0 per dwelling, with 10% of that taking place in the commuter peak period.

A technical direction manual note published in 2013 as an update to NSW Governments Transport Roads and Maritime Services, a Guide to Traffic Generating Developments, indicates low density residential dwellings in regional areas generate:

- Daily vehicle trips of 7.4 trips per dwelling
- Weekday average evening peak hour vehicle trips 0.78 trips per dwelling in regional areas with a maximum of 0.9 vehicle trips per dwelling.
- Weekday average morning peak hour vehicle trips 0.71 trips per dwelling in regional areas with a maximum of 0.85 vehicle trips per dwelling.

The Infrastructure Design Manual (Manual) adopted by Moyne Shire Council advises “estimated traffic volumes for undeveloped areas should normally be based upon the following factors:

- *Residential allotments at least 10 vehicle movements per day per lot.*

The manual also states, “Where other traffic generation assumptions are to be adopted in preparing a Traffic Impact Study, Council will expect the Design Engineer to submit details of the proposed assumptions to Council’s Engineering Department for acceptance prior to commencing work on the study.”

Given the above manuals that range between 7.4 – 10 vehicle trips per dwelling, Traffkd has conservatively adopted the following rates when undertaking an assessment of the impact of the proposal:

- 10 daily vehicle trips to be generated by each dwelling.
- 1 vehicle trip per dwelling in each AM and PM peak period.

Based on the rates above, the 26 lots are expected to generate the following:

- 26 trips in AM Peak
- 26 trips in PM Peak
- 260 vehicle movements a day.

4.2. Traffic Distribution

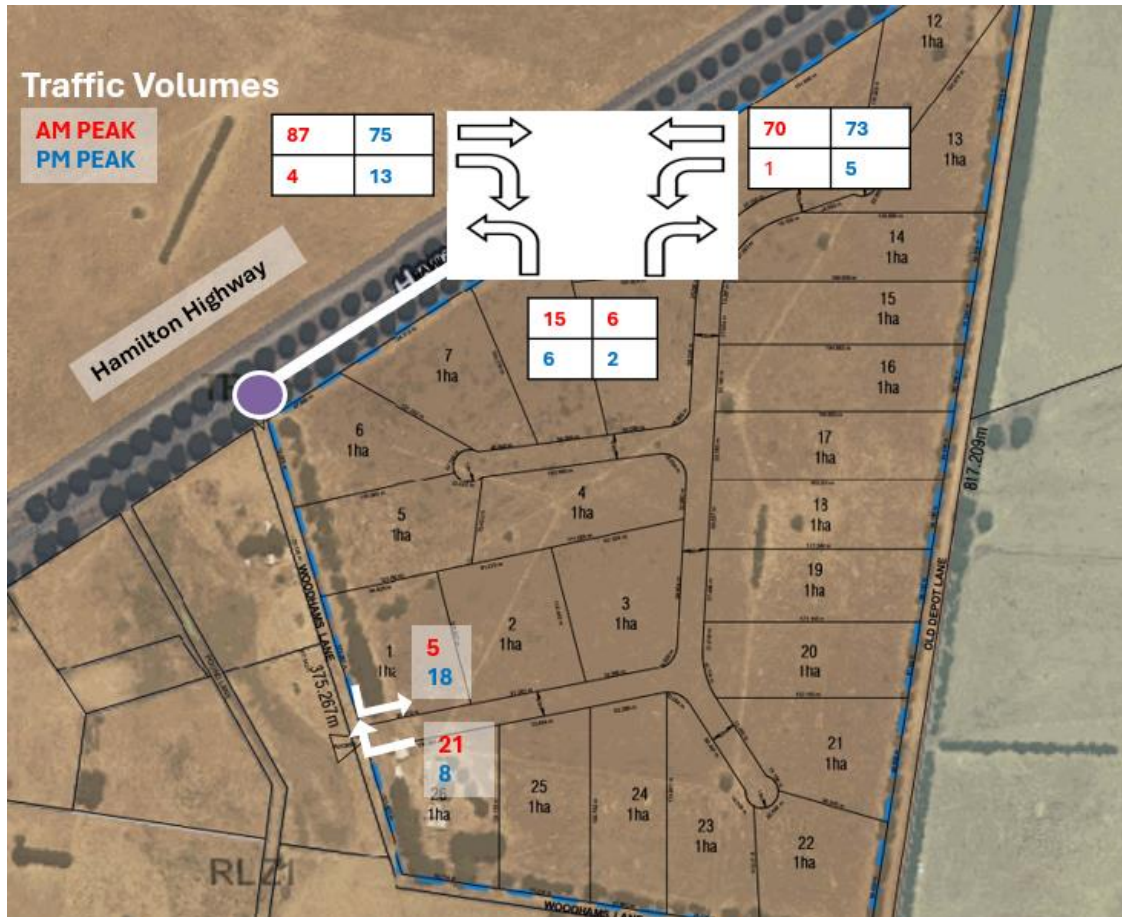
It is expected the traffic generation from the proposed development would be distributed as follows:

- AM Peak hour – 20% entering 80% egressing.
- PM Peak hour – 70% entering and 30% egressing.

When assessing the trip distribution of the proposal is expected that 70% of trips would occur towards the Mortlake Shire (via a left turn) and 30% of trips to occur towards Darlington (via a right turn) when existing from Woodhams Lane onto Hamilton Highway. The below figure demonstrates the traffic volumes expected from the proposed development in both AM and PM peak.

Figure 10 below demonstrates the proposed traffic generation from the proposal in peak periods.

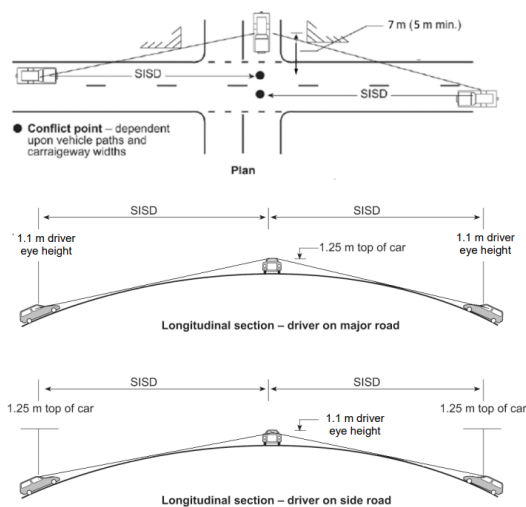
Figure 10. *Proposed Traffic Distribution.*



4.3. Sight Distance

Austrroads Guide to Road Design, Part 4A stipulates the minimum Safe Intersection Sight Distance (SISD). This distance is required to provide sufficient distance for a driver of a vehicle on a major road to observe a vehicle from the minor access approach.

Figure 11. *Safe Sight Distance.*



The minimum SISD specified in Table 3.2 of the Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections is 285 metres based on the general minimum reaction time of 2 seconds adopted and a design speed of 110km/h. A visibility test was undertaken measured at 5.0m from the edge of the traffic lane. When facing West, the SISD was noted to exceed the SISD requirement. When facing east, the SISD was also met however it is recommended that the branches of the trees along the site's northern boundary be trimmed to further improve the SISD.

Figure 12. *SISD Check facing West.*



Figure 13. *SISD check facing east*



4.4. Austroads Requirements - Warrants for Turn Treatments

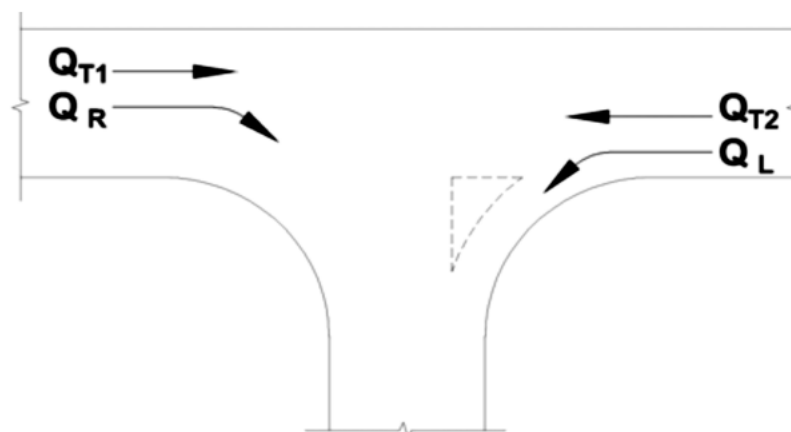
To enhance safety for the turning vehicle and minimise interference to through traffic it is common to widen the shoulder or provide an auxiliary lane. This is usually achieved by providing indented turning lanes on divided roads or a basic (BA) or channelised (CH) treatment on a two-lane two-way road.

Traffkd conducted an assessment specifically focusing on the trips generated to the site (arriving) to ascertain if there is a need to introduce any turning lane treatments to ensure the safe and efficient operation for road users at Hamilton Highway at the intersection with Woodhams Lane post-development.

A warrant assessment was completed for both AM and PM peak periods using the table below obtained from Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management.

Road type	Turn type	Splitter island	Q _M (veh/h)
Two-lane two-way	Right	No	$= Q_{T1} + Q_{T2} + Q_L$
		Yes	$= Q_{T1} + Q_{T2}$
	Left	Yes or no	$= Q_{T2}$
Four-lane two-way	Right	No	$= 50\% \times Q_{T1} + Q_{T2} + Q_L$
		Yes	$= 50\% \times Q_{T1} + Q_{T2}$
	Left	Yes or no	$= 50\% \times Q_{T2}$
Six-lane two-way	Right	No	$= 33\% \times Q_{T1} + Q_{T2} + Q_L$
		Yes	$= 33\% \times Q_{T1} + Q_{T2}$
	Left	Yes or no	$= 33\% \times Q_{T2}$

Figure 14. Calculation of the major road traffic volume Q_M (Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management)



Each peak period has been calculated as per below.

AM peak period

$$Q_M (\text{Right}) = (Q_{T1} + Q_{T2} + Q_L) = 87 + 70 + 1 = 158$$

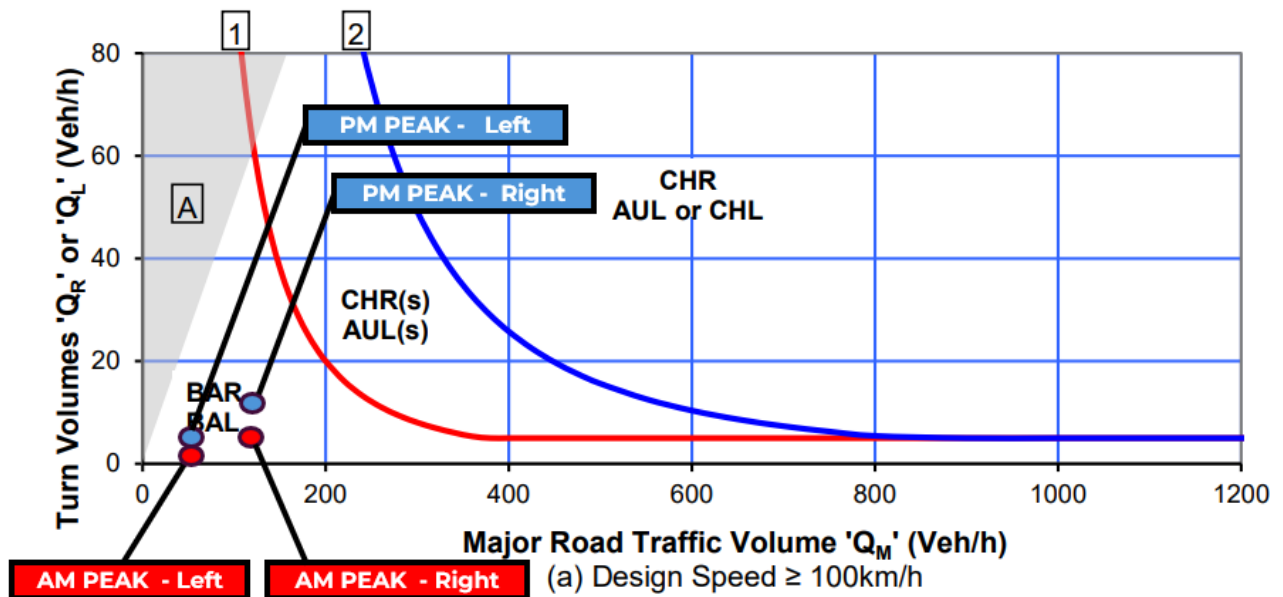
$$Q_M (\text{Left}) = Q_{T2} = 70$$

PM peak period

$$Q_M (\text{Right}) = (Q_{T1} + Q_{T2} + Q_L) = 75 + 73 + 5 = 153$$

$$Q_M (\text{Left}) = Q_{T2} = 73$$

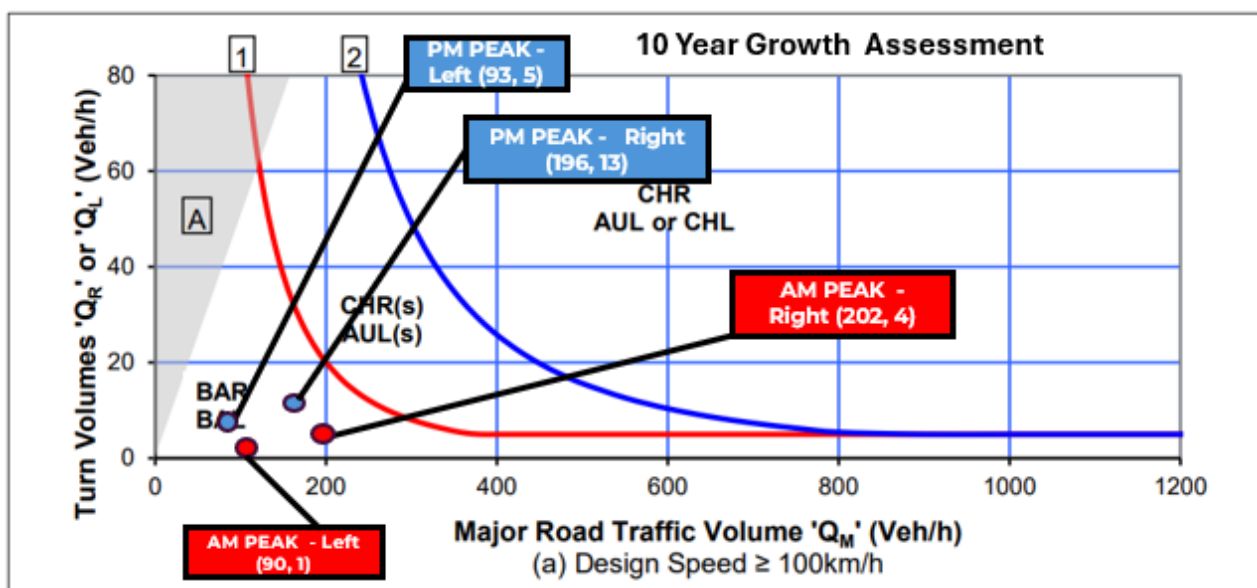
Figure 15. Graph used to determine appropriate left and right turn treatments and Woodhams Lane and Hamilton Highway.



As per Section 2.3.6 of the Guide to Traffic Management Part 6, Q_R and Q_L represent the volumes of right turns and left turns per hour into Woodhams Lane at the intersection of Hamilton Highway. As shown in the image above, the volumes for both Q_R and Q_L fall within the threshold to require a BAR and BAL treatment to be introduced at the intersection of Woodhams Lane and Hamilton Highway.

A further assessment has been completed to determine the impact of the proposal taking into account growth projections. A growth factor of 2% is commonly accepted when anticipating future traffic volumes for the purpose of traffic impact assessments. To determine the impact of the proposal on the future volumes on Hamilton Highway, a conservative growth factor of 2.5% has been adopted. An assessment adopting this growth factor has been shown in the image below.

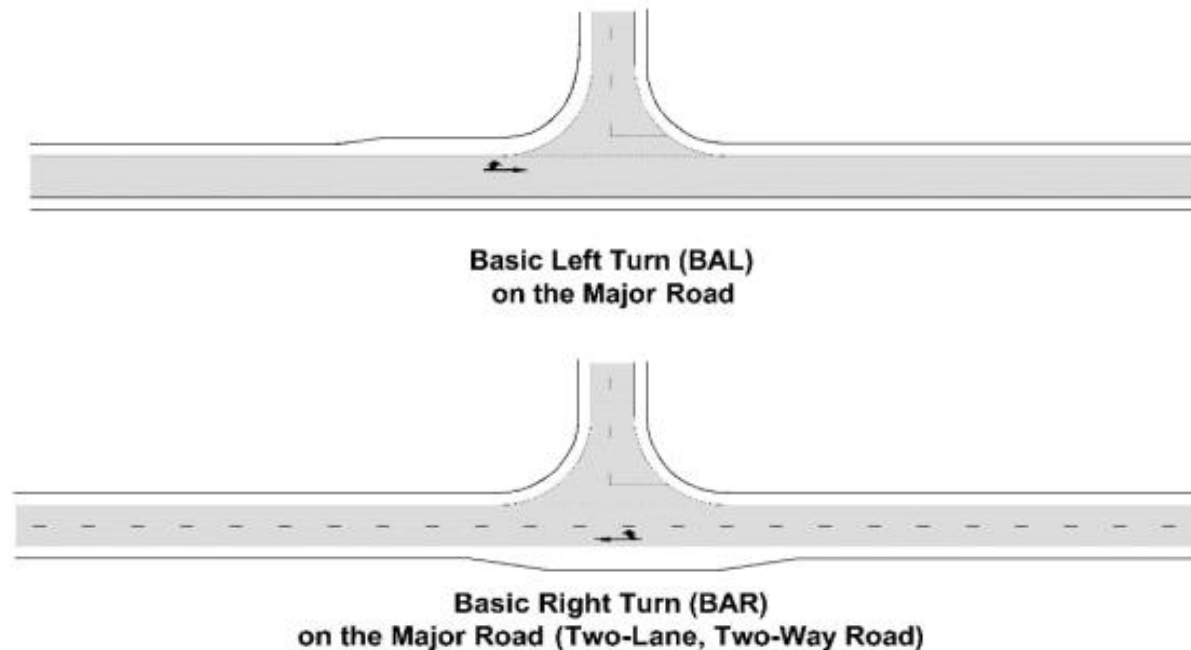
Figure 16. Graph used to determine appropriate left and right turn treatments and Woodhams Lane and Hamilton Highway (10-year future case)



As shown in the image above, the volumes for the 10-year growth assessment both QR and QL fall within the threshold and confirm the introduction of a BAR and BAL treatment at the intersection of Woodhams Lane and Hamilton Highway is adequate to accommodate future traffic volumes.

The typical configuration of BAR and BAL treatments has been shown in the below images. This can be implemented by way of permit condition when approving the development.

Figure 17. *BAL and BAR treatments to be adopted*



4.5. SIDRA Assessment

The SIDRA assessment was undertaken using SIDRA Intersection 9 by modelling the intersection with the two traffic scenarios. The first scenario reviewed the operation of the intersection of Hamilton Highway and Woodhams Lane immediately post development whilst the second scenario reviewed the operation of the intersection following the application of a 10-year growth rate. Both scenarios adopted an unsignalised two-way, give way configuration. The sidra modelling completed was prepared based on an earlier 27 lot development proposal with all vehicular access provided via Woodhams Lane. As the scenario indicated the intersection to function adequately the results of the 27 lot development have been presented as part of the SIDRA analysis undertaken below.

An analysis of the intersection was conducted for both scenarios reviewing the following:

- Level of Service
- Degree of Saturation
- Queuing Lengths

Base Case – Immediately Post Development

- LOS: The results of SIDRA analysis indicated that a Level of Service (LOS) A is being achieved for both AM and PM peak periods.
- DOS: The DOS represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. The highest value for the degree of saturation (DOS) for both scenarios is 0.057, well below 0.8 which is the target for an unsignalised intersection.
- The 95th percentile queue length is the value below which 95 percent of all observed queue

lengths fall, or 5 per cent of all observed queue lengths exceed. All legs had a 95th percentile queue length of less than one vehicle which is considered satisfactory.

Future Case – 10-year post development

An assessment was completed by applying a 10-year growth rate to volume along Hamilton Highway. A 2.5% growth rate was applied cumulatively for each year. The growth rate of 2.5% that has been applied is considered conservative given a 2% growth rate is generally applied.

- LOS: The results of SIDRA analysis indicated that a Level of Service (LOS) A is being achieved for both AM and PM peak periods
- DOS: The DOS represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. The highest value for the degree of saturation (DOS) for both scenarios is 0.072, well below 0.8 which is the target for an unsignalised intersection.
- The 95th percentile queue length is the value below which 95 percent of all observed queue lengths fall, or 5 per cent of all observed queue lengths exceed. All legs had a 95th percentile queue length of less than one vehicle which is considered satisfactory.

Based on the above, it is considered that the additional traffic generated by the proposed development will not have any adverse impact on the operation of the intersection of Woodhams Lane and Hamilton Highway.

4.6. Site Access

All lots within the subdivision will have access to Woodhams Lane solely via new roads located within the subdivision.

A Section 173 agreement will be implemented to ensure no access in future is provided for lots 6,7, 10, 11 and 12 via Hamilton Highway. Similarly, a Section 173 agreement will also limit lots 12 – 26 to be accessed via the internal road network and not via Woodhams Lane or Old Depot Lane.

4.7. Proposed Internal Road Configuration - Infrastructure Design Manual - Standard Requirements

This Infrastructure Design Manual (Manual) was originally prepared by the Cities of Greater Bendigo and Greater Shepparton and the Shire of Campaspe. Their joint initiative was one which recognised the benefits of municipalities working together towards consistent requirements and standards for the design and development of Infrastructure. The manual has been adopted by over 30 Council's in Victoria including the Moyne Shire Council in December 2014.

A review has been completed against Infrastructure Design Manual (IDM) Version 5.4 2022. Clause 12.4.2 which specifies the requirements for new roads and upgrades of existing roads affected by developments located within a Rural Living Zone.

Table 6 of the IDM states a minimum road reserve with for rural living access road of 20m. A minimum seal width of 6.2m is required with 1.5m shoulder on either side.

Based on the vehicle volumes to be accommodated by each road segment a seal width has been nominated as per the image below. It is noted that some sections of road will accommodate less than 50 vehicles per day where a cul-de-sac forms, example along the frontage of lots of 21-24 and a 4m gravel road could be nominated in this section. However, to ensure a consistent road network within the development all roads have been recommended to be sealed. This will also reduce future maintenance and increase the design life of these new roads in addition to providing a safer road environment.

The figure below indicates sealed road widths to be adopted for each road segment.

Figure 18. Internal Road Configuration

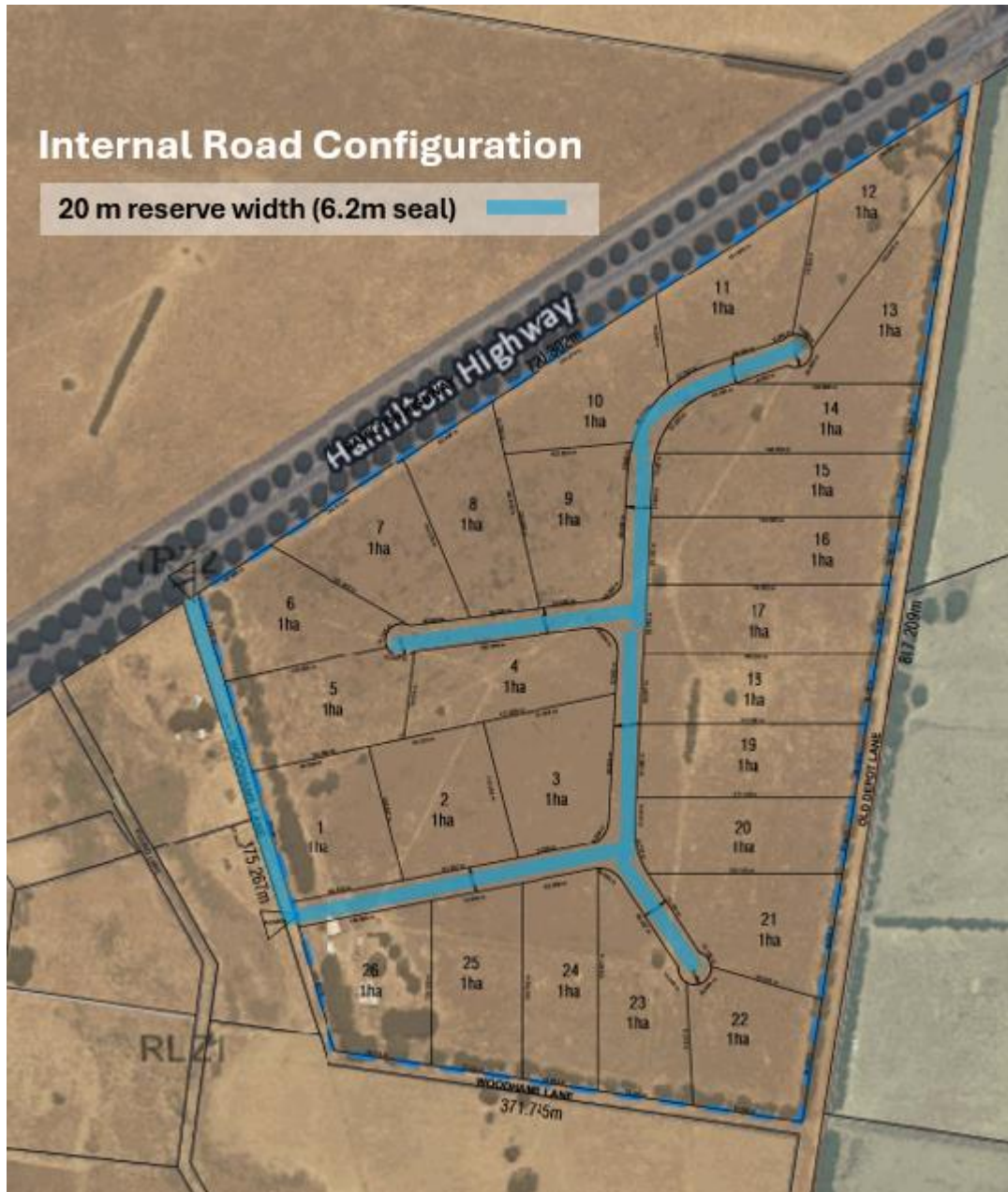
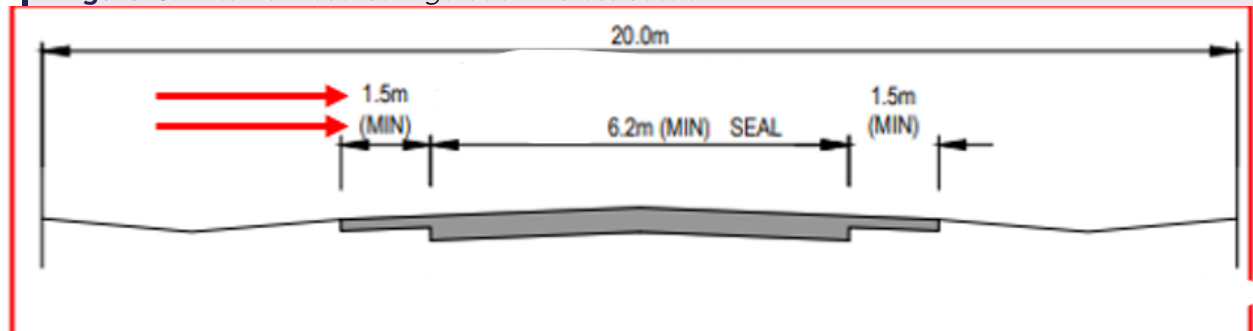


Figure 19. Internal Road Configuration – Cross Section



8. Summary and Conclusion

The applicant has submitted a proposal for a 26-lot subdivision at 42 Woodhams Road, Mortlake. Following a review of the traffic impacts and the recommended actions outlined in this report, the proposal is deemed satisfactory from a traffic engineering perspective and is considered suitable for the granting of a Planning Permit.

It is noted Council's referral has indicated that preliminary contact with DTP has indicated a left and right turn lanes and street lighting will be required on Hamilton Highway at Woodhams Lane. Section 4.4 of this report clearly shows that only a BAR and BAL is required due to the minimal additional traffic generated from the use. A formal response from DTP has not been received for the proposal. It is expected that this referral is received as part of Council's review and management of the application.

Yours sincerely,



Chris Tsiafidis
Traffic Engineer
B. Eng Civil (Hons)
Traffkd Pty Ltd

APPENDIX A

Traffic Surveys

Woodhams Lane

GPS information		Lat 38° 4' 19.95 South Long 142° 49' 42.90 East	Direction of Travel		
			Both directions	Northbound	Southbound
Traffic Volume :		Weekdays Average	6	2	4
(Vehicles/Day)		7 Day Average	4	2	2
Weekday	AM	05:00	1	0	1
Peak hour starts	PM	13:00	1	1	1
Speeds :		85th Percentile	45.7	45.3	46.2
(Km/Hr)		Average	44.4	44.2	44.7
Classification % :		Light Vehicles up to 5.5m	100.0%	100.0%	100.0%

Day Date	Monday 14/10/2024	Tuesday 15/10/2024	Wednesday 16/10/2024	Thursday 17/10/2024	Friday 18/10/2024	Saturday 19/10/2024	Sunday 20/10/2024	7 days		Weekday		Weekend	
AM Peak	11:00	10:00	07:00	05:00	02:00	11:00	00:00	Total	Average	Total	Average	Total	Average
PM Peak	13:00	13:00	14:00	14:00	12:00	13:00	13:00	N/A	05:00	N/A	05:00	N/A	11:00
00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	1	0	0	1	0	1	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	4	0	0	0	4	1	4	1	0	0
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00	1	0	1	0	0	0	0	2	0	2	0	0	0
08:00	0	1	0	0	0	0	0	1	0	1	0	0	0
09:00	1	0	1	0	0	0	0	2	0	2	0	0	0
10:00	0	3	1	0	1	0	0	5	1	5	1	0	0
11:00	2	1	0	0	0	2	0	5	1	3	1	2	1
12:00	0	0	0	1	1	0	0	2	0	2	0	0	0
13:00	2	1	2	1	1	2	3	12	2	7	1	5	3
14:00	0	0	3	4	0	2	2	11	2	7	1	4	2
15:00	1	1	0	0	0	0	0	2	0	2	0	0	0
16:00	0	1	0	2	0	0	0	3	0	3	1	0	0
17:00	1	0	0	0	0	0	0	1	0	1	0	0	0
18:00	1	0	0	0	0	0	0	1	0	1	0	0	0
19:00	2	0	0	0	1	0	0	3	0	3	1	0	0
20:00	0	1	0	0	0	0	0	1	0	1	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	11	9	8	12	5	6	5	56	8	45	9	11	6
% Heavy	9.09%	11.11%	25.00%	33.33%	20.00%	0.00%	0.00%	16.07%		20.00%		0.00%	

Hamilton Highway

GPS information	Lat	38° 4' 15.38 South	Direction of Travel		
	Long	142° 49' 37.91 East	Both directions	Westbound	Eastbound
Traffic Volume : (Vehicles/Day)	Weekdays Average		1,743	881	862
	7 Day Average		1,672	849	823
Weekday	AM	11:00	157	70	87
Peak hour start	PM	14:00	143	69	75
Speeds : (Km/Hr)	85th Percentile		102.6	101.8	103.4
	Average		97.2	96.8	97.7
Classification % :	Light Vehicles up to 5.5m		77.9%	78.2%	77.7%

Two - way

Day Date	Monday 14/10/2024	Tuesday 15/10/2024	Wednesday 16/10/2024	Thursday 17/10/2024	Friday 18/10/2024	Saturday 19/10/2024	Sunday 20/10/2024	7 days		Weekday		Weekend	
								Total	Average	Total	Average	Total	Average
AM Peak	11:00	08:00	11:00	11:00	11:00	11:00	11:00	N/A	11:00	N/A	11:00	N/A	11:00
PM Peak	13:00	13:00	14:00	14:00	14:00	12:00	14:00	N/A	14:00	N/A	14:00	N/A	13:00
00:00	4	2	1	1	5	8	3	24	3	13	3	11	6
01:00	4	1	3	9	6	4	4	31	4	23	5	8	4
02:00	3	4	3	4	6	7	3	30	4	20	4	10	5
03:00	4	5	8	9	11	4	3	44	6	37	7	7	4
04:00	5	15	11	11	12	4	5	63	9	54	11	9	5
05:00	21	19	17	31	28	12	6	134	19	116	23	18	9
06:00	61	49	56	72	50	23	8	319	46	288	58	31	16
07:00	104	96	109	99	82	52	34	576	82	490	98	86	43
08:00	116	142	118	122	92	93	54	737	105	590	118	147	74
09:00	126	121	120	121	121	106	89	804	115	609	122	195	98
10:00	138	118	132	149	134	131	121	923	132	671	134	252	126
11:00	180	137	167	151	150	135	145	1065	152	785	157	280	140
12:00	148	122	113	134	154	127	134	932	133	671	134	261	131
13:00	160	138	109	152	140	109	155	963	138	699	140	264	132
14:00	120	109	131	160	196	102	158	976	139	716	143	260	130
15:00	142	105	122	152	178	95	157	951	136	699	140	252	126
16:00	134	103	106	126	159	87	147	862	123	628	126	234	117
17:00	107	82	93	110	145	81	129	747	107	537	107	210	105
18:00	63	65	77	89	113	77	95	579	83	407	81	172	86
19:00	42	38	46	40	86	44	59	355	51	252	50	103	52
20:00	30	24	35	39	40	40	65	273	39	168	34	105	53
21:00	29	12	28	20	26	14	36	165	24	115	23	50	25
22:00	10	11	18	19	21	13	14	106	15	79	16	27	14
23:00	7	4	9	13	12	10	8	63	9	45	9	18	9
Total	1758	1522	1632	1833	1967	1378	1632	11722	1675	8712	1742	3010	1505
% Heavy	24.06%	29.04%	29.53%	27.50%	21.40%	10.89%	10.48%	22.12%		26.08%		10.66%	

West-bound

Day Date	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	7 days		Weekday		Weekend	
	14/10/2024	15/10/2024	16/10/2024	17/10/2024	18/10/2024	19/10/2024	20/10/2024	Total	Average	Total	Average	Total	Average
AM Peak	11:00	08:00	11:00	11:00	11:00	10:00	11:00	N/A	11:00	N/A	11:00	N/A	11:00
PM Peak	13:00	13:00	14:00	13:00	14:00	12:00	16:00	N/A	15:00	N/A	15:00	N/A	15:00
00:00	2	2	1	1	5	6	2	19	3	11	2	8	4
01:00	4	1	0	4	2	3	1	15	2	11	2	4	2
02:00	1	2	2	3	3	4	2	17	2	11	2	6	3
03:00	3	2	4	2	5	3	1	20	3	16	3	4	2
04:00	1	6	3	7	7	1	1	26	4	24	5	2	1
05:00	10	11	9	13	12	6	1	62	9	55	11	7	4
06:00	34	24	28	39	23	9	3	160	23	148	30	12	6
07:00	57	39	57	53	37	10	9	262	37	243	49	19	10
08:00	79	80	63	52	37	26	23	360	51	311	62	49	25
09:00	61	60	56	61	40	48	35	361	52	278	56	83	42
10:00	73	65	56	58	49	68	50	419	60	301	60	118	59
11:00	80	67	77	68	58	66	61	477	68	350	70	127	64
12:00	81	54	52	58	62	72	58	437	62	307	61	130	65
13:00	87	64	53	74	71	66	72	487	70	349	70	138	69
14:00	58	50	62	71	102	48	74	465	66	343	69	122	61
15:00	85	55	61	72	92	60	84	509	73	365	73	144	72
16:00	74	57	48	68	83	48	96	474	68	330	66	144	72
17:00	63	52	52	53	86	52	75	433	62	306	61	127	64
18:00	34	40	42	54	74	51	65	360	51	244	49	116	58
19:00	29	20	29	22	57	29	33	219	31	157	31	62	31
20:00	16	13	26	24	24	22	41	166	24	103	21	63	32
21:00	15	5	15	6	17	10	19	87	12	58	12	29	15
22:00	3	6	8	15	11	7	12	62	9	43	9	19	10
23:00	5	3	6	10	9	8	7	48	7	33	7	15	8
Total	955	778	810	888	966	723	825	5945	849	4397	879	1548	774
% Heavy	23.04%	27.63%	28.89%	27.25%	21.84%	11.34%	11.64%	21.87%		25.52%		11.50%	

East-bound

Day Date	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	7 days		Weekday		Weekend	
	14/10/2024	15/10/2024	16/10/2024	17/10/2024	18/10/2024	19/10/2024	20/10/2024	Total	Average	Total	Average	Total	Average
AM Peak	11:00	11:00	11:00	10:00	11:00	11:00	11:00	N/A	11:00	N/A	11:00	N/A	11:00
PM Peak	13:00	13:00	14:00	14:00	14:00	12:00	14:00	N/A	14:00	N/A	14:00	N/A	14:00
00:00	2	0	0	0	0	2	1	5	1	2	0	3	2
01:00	0	0	3	5	4	1	3	16	2	12	2	4	2
02:00	2	2	1	1	3	3	1	13	2	9	2	4	2
03:00	1	3	4	7	6	1	2	24	3	21	4	3	2
04:00	4	9	8	4	5	3	4	37	5	30	6	7	4
05:00	11	8	8	18	16	6	5	72	10	61	12	11	6
06:00	27	25	28	33	27	14	5	159	23	140	28	19	10
07:00	47	57	52	46	45	42	25	314	45	247	49	67	34
08:00	37	62	55	70	55	67	31	377	54	279	56	98	49
09:00	65	61	64	60	81	58	54	443	63	331	66	112	56
10:00	65	53	76	91	85	63	71	504	72	370	74	134	67
11:00	100	70	90	83	92	69	84	588	84	435	87	153	77
12:00	67	68	61	76	92	65	76	495	71	364	73	131	66
13:00	73	74	56	78	69	43	83	476	68	350	70	126	63
14:00	62	59	69	89	94	54	84	511	73	373	75	138	69
15:00	57	50	61	80	86	35	73	442	63	334	67	108	54
16:00	60	46	58	58	76	39	51	388	55	298	60	90	45
17:00	44	30	41	57	59	29	54	314	45	231	46	83	42
18:00	29	25	35	35	39	26	30	219	31	163	33	56	28
19:00	13	18	17	18	29	15	26	136	19	95	19	41	21
20:00	14	11	9	15	16	18	24	107	15	65	13	42	21
21:00	14	7	13	14	9	4	17	78	11	57	11	21	11
22:00	7	5	10	4	10	6	2	44	6	36	7	8	4
23:00	2	1	3	3	3	2	1	15	2	12	2	3	2
Total	803	744	822	945	1001	655	807	5777	825	4315	863	1462	731
% Heavy	25.28%	30.51%	30.17%	27.72%	20.98%	10.38%	9.29%	22.38%		26.65%		9.78%	

APPENDIX B

SIDRA ANALYSIS RESULTS

MOVEMENT SUMMARY

▽ Site: 101 [Hamilton Highway - Woodhams Lane AM PEAK (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: Woodhams Lane															
1	L2	All MCs	16	22.0	16	22.0	0.019	6.1	LOS A	0.1	0.6	0.19	0.54	0.19	51.4
3	R2	All MCs	7	22.0	7	22.0	0.019	6.5	LOS A	0.1	0.6	0.19	0.54	0.19	51.1
Approach			23	22.0	23	22.0	0.019	6.2	LOS A	0.1	0.6	0.19	0.54	0.19	51.3
East: Hamilton Highway (east)															
4	L2	All MCs	1	22.0	1	22.0	0.044	5.8	LOS A	0.0	0.0	0.00	0.01	0.00	56.3
5	T1	All MCs	74	22.0	74	22.0	0.044	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.9
Approach			75	22.0	75	22.0	0.044	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
West: Hamilton Highway (west)															
11	T1	All MCs	92	22.0	92	22.0	0.057	0.0	LOS A	0.0	0.2	0.02	0.03	0.02	59.7
12	R2	All MCs	4	22.0	4	22.0	0.057	5.8	LOS A	0.0	0.2	0.02	0.03	0.02	55.7
Approach			96	22.0	96	22.0	0.057	0.3	NA	0.0	0.2	0.02	0.03	0.02	59.5
All Vehicles			194	22.0	194	22.0	0.057	0.9	NA	0.1	0.6	0.03	0.08	0.03	58.5

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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MOVEMENT SUMMARY

▽ Site: 101 [Hamilton Highway - Woodhams Lane PM PEAK (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: Woodhams Lane															
1	L2	All MCs	6	22.0	6	22.0	0.007	6.1	LOS A	0.0	0.2	0.19	0.54	0.19	51.4
3	R2	All MCs	2	22.0	2	22.0	0.007	6.5	LOS A	0.0	0.2	0.19	0.54	0.19	51.1
Approach			8	22.0	8	22.0	0.007	6.2	LOS A	0.0	0.2	0.19	0.54	0.19	51.4
East: Hamilton Highway (east)															
4	L2	All MCs	6	22.0	6	22.0	0.049	5.8	LOS A	0.0	0.0	0.00	0.04	0.00	56.0
5	T1	All MCs	77	22.0	77	22.0	0.049	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.6
Approach			83	22.0	83	22.0	0.049	0.5	NA	0.0	0.0	0.00	0.04	0.00	59.3
West: Hamilton Highway (west)															
11	T1	All MCs	79	22.0	79	22.0	0.056	0.1	LOS A	0.1	0.8	0.07	0.11	0.07	58.9
12	R2	All MCs	14	22.0	14	22.0	0.056	6.1	LOS A	0.1	0.8	0.07	0.11	0.07	55.1
Approach			93	22.0	93	22.0	0.056	1.0	NA	0.1	0.8	0.07	0.11	0.07	58.3
All Vehicles			184	22.0	184	22.0	0.056	1.0	NA	0.1	0.8	0.04	0.10	0.04	58.4

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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MOVEMENT SUMMARY

Site: 101 [Hamilton Highway - Woodhams Lane AM PEAK 10Year (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: Woodhams Lane															
1	L2	All MCs	16	22.0	16	22.0	0.020	6.2	LOS A	0.1	0.6	0.23	0.55	0.23	51.3
3	R2	All MCs	7	22.0	7	22.0	0.020	6.8	LOS A	0.1	0.6	0.23	0.55	0.23	51.0
Approach			23	22.0	23	22.0	0.020	6.4	LOS A	0.1	0.6	0.23	0.55	0.23	51.2
East: Hamilton Highway (east)															
4	L2	All MCs	1	22.0	1	22.0	0.056	5.8	LOS A	0.0	0.0	0.00	0.01	0.00	56.3
5	T1	All MCs	95	22.0	95	22.0	0.056	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.9
Approach			96	22.0	96	22.0	0.056	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.9
West: Hamilton Highway (west)															
11	T1	All MCs	118	22.0	118	22.0	0.072	0.0	LOS A	0.0	0.3	0.02	0.02	0.02	59.7
12	R2	All MCs	4	22.0	4	22.0	0.072	5.9	LOS A	0.0	0.3	0.02	0.02	0.02	55.8
Approach			122	22.0	122	22.0	0.072	0.2	NA	0.0	0.3	0.02	0.02	0.02	59.6
All Vehicles			241	22.0	241	22.0	0.072	0.7	NA	0.1	0.6	0.03	0.07	0.03	58.8

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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MOVEMENT SUMMARY

Site: 101 [Hamilton Highway - Woodhams Lane PM PEAK - 10 year (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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: Woodhams Lane															
1	L2	All MCs	6	22.0	6	22.0	0.007	6.2	LOS A	0.0	0.2	0.22	0.54	0.22	51.4
3	R2	All MCs	2	22.0	2	22.0	0.007	6.7	LOS A	0.0	0.2	0.22	0.54	0.22	51.0
Approach			8	22.0	8	22.0	0.007	6.3	LOS A	0.0	0.2	0.22	0.54	0.22	51.3
East: Hamilton Highway (east)															
4	L2	All MCs	6	22.0	6	22.0	0.061	5.8	LOS A	0.0	0.0	0.00	0.04	0.00	56.1
5	T1	All MCs	98	22.0	98	22.0	0.061	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	59.6
Approach			104	22.0	104	22.0	0.061	0.4	NA	0.0	0.0	0.00	0.04	0.00	59.4
West: Hamilton Highway (west)															
11	T1	All MCs	101	22.0	101	22.0	0.069	0.1	LOS A	0.1	0.8	0.07	0.10	0.07	59.1
12	R2	All MCs	14	22.0	14	22.0	0.069	6.2	LOS A	0.1	0.8	0.07	0.10	0.07	55.2
Approach			115	22.0	115	22.0	0.069	0.8	NA	0.1	0.8	0.07	0.10	0.07	58.6
All Vehicles			227	22.0	227	22.0	0.069	0.8	NA	0.1	0.8	0.04	0.08	0.04	58.7

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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