Colston Budd Hunt & Kafes Pty Ltd
as Trustee for C & B Unit Trust
ABN 27623 918 759

Our Ref: JH\7085\jj

7 September 2010

Transport Planning
Town Planning
Retail Studies

Lipman Properties Pty Ltd
Level 6
66 Berry Street
NORTH SYDNEY NSW 2060

Attention: Wal Richardson
Email: walr@lipman.com.au

Dear Sir,

RE: PROPOSED RESIDENTIAL DEVELOPMENT, 128 HERRING ROAD, MACQUARIE PARK

As requested, we are writing regarding traffic and parking matters raised by Ryde Council, the Department of Planning, RTA and Department of Transport in relation to the above development. We have previously prepared a report[1] which was submitted with the Part 3A application.

In an undated memorandum, and letters dated 28 July, 21 June and 25 June respectively, Council, Department of Planning, Department of Transport and the RTA have raised a number of matters. These matters, and our responses, are set out below.

Council

1. *The proposed road structure is generally located as per the DCP. However it is shown as a cul-de-sac with a roundabout at the west end to allow for the possible extension of the access road in the future, instead of it being part of the future fine grained road network which is required to improve access and connectivity within Macquarie Park as the CBD develops. As part of this development site the future fine grained north access road between buildings C and D and, the half -width extension of the proposed west access road within the site should be shown on the plans. The north 16.1m wide road and west half -width road extension road reserves should also be dedicated to Council and the roads built as part of the proposed development. (The need for the fine grained road connectivity is outlined in the traffic comments, Item 7below.)*

[1] Concept Plan for Proposed Residential Development and Project Application for Proposed "Building A", 128 Herring Road, Macquarie Park: Transport Report (MP 09_0195), May 2010.

The proposed development includes the east-west access within the subject property, consistent with the DCP. This road has the ability to be extended in association with the future development of other sites to the west, thereby maintaining consistency with the DCP. The roundabout is proposed to provide for vehicles to turn around until such time as the road is extended in the future.

In relation to the north-south road, as noted in our report submitted with the application, the approved concept plan for Macquarie University (October 2009) does not adopt the new street network identified in DCP 2010. This means that the new roads identified through the subject site would not connect through the university site as identified in the DCP. A north-south road connection through the subject site would therefore terminate at the site boundary and would not serve any development, and is therefore not proposed.

Therefore, to the extent that the fine-grained road network is identified through the site in DCP 2010 (with the exception, as noted above, of the connection to Macquarie University), it is proposed as part of the development. It is therefore considered that the proposed development provides a fair and reasonable part of the fine grained road network.

2. *The proposed subdivision plans should also show the DCP fine grained 16.1m wide road reserves for the north access road and the west access road half-width extension within the site and these road reserves dedicated as public road.*

The proposed east-west access road will be dedicated as a public road. As discussed above, the north-south road is not proposed.

3. *The proposal is consistent with the DCP and uses the DCP Type 3 road cross section.*

4. *The proposed access road infrastructure should be constructed to Ryde Council's Engineering specifications. i.e. Environmental Standards – Development Criteria Section 4 – Public Works.*

5. *The proposed Public Domain works should match the specification and details contained in Macquarie Park Public Domain Technical Manual.*

6. *Road and Drainage IFC drawings should be submitted to Council for approval prior to commencement of construction. The proposed roundabout should be designed to accommodate the turning path and clearances of a 12.5m rigid truck./bus.*

Council comments numbered 3 to 6 inclusive are noted. The applicant's civil engineer has advised that the design of the new road and roundabout accommodates 12.5 metre trucks and buses.

7. *The Transport report addresses the Director -General's Environmental Assessment requirements. The transport report assesses the 'without' and 'with' development level of traffic and its implications essentially indicating there would be minor road network operational impacts. The key intersections are at present operating at level of service D; meaning that they are at or near capacity. Some of the inputs and outputs for the traffic impact assessment are*

not contained in the report (e.g. base line traffic surveys and Sidra files) so it is not possible to verify the report results and conclusions. The developer /traffic consultant should provide the supporting traffic information so that a decision can made, as to whether or not functional changes will be required at the key intersections. The 2007 AM - Paramics modelling indicates queuing will spillback from the intersection of Herring Road and Waterloo Road. This queuing would cause delay to traffic entering Herring Road northbound from the proposed cul-de-sac access road. When the new access to the M2 via Talavera Road and Christie Road is open additional and extended traffic congestion will be experienced along Herring Road. The fine grained road network connectivity shown in the DCP is required to allow alternative access in the Macquarie Park road network. The need for the fine grained road network connectivity has been largely ignored in the traffic report.

The traffic survey results are shown in Figures 2 and 3 of our previous report. SIDRA output summaries are attached to this letter. The fine-grained road network is discussed above in our response.

8. *Consideration has been given to the Macquarie Park 2007 Base Paramics Model by using a first principles approach instead of building the development activity into the model and running the model to assess the 'with development' traffic impacts and accounting for the accumulative operational and functional traffic impacts in the Macquarie Park Road network. The supporting information e.g. the existing zone 14 traffic survey and source of the traffic data from the Macquarie Park 2007 Base Paramics Model has not been provided, so it is not possible to verify the report results and conclusions. The developer/traffic consultant should provide the supporting traffic information. Council makes available the Macquarie Park 2007 Base Paramics Model to the developer/traffic consultant by the developer/traffic consultant making an application, agreeing to the conditions of use and paying the prescribed fees. No application has been received. The preference is that the developer/traffic consultant should complete the application, pay the fees for its use and undertake the traffic impact assessment 'with development' using the Paramics model provided by Council.*

The *Macquarie Park 2007 Base Paramics Model* includes existing traffic estimated to be generated by "zone 14", which is identified in Figures 4.1 and 4.2 of the Macquarie Park Paramics Model User Manual (Reference Document No. 2) (on Council' website, copies attached) as existing development with access from the western side of Herring Road, between Epping Road and Waterloo Road. We have counted the morning and afternoon traffic generation of the existing development on the western side of Herring Road, which includes zone 14 development, as well as some zone 6 development on the Macquarie University site. These surveys found existing traffic generations of some 210 and 150 vehicles per hour two-way during morning and afternoon peak hours respectively. As these generations include some development in zone 6, they are an over-estimate of traffic for zone 14.

With the additional traffic from the proposed development, of some 160 vehicles per hour two-way, traffic generation of the zone 14 land uses would be some 370 and 310 vehicles per hour two-way during morning and afternoon peak hours respectively.

The consultant assisting Macquarie University has advised that the *Macquarie Park 2007 Base Paramics Model* includes traffic generation from zone 14 of some 480 and 500

vehicles per hour two-way during morning and afternoon peak hours respectively. Therefore, the Paramics model has been based on a higher generation than existing plus development flows. The proposed development traffic has therefore been included in the current Paramics modelling.

As also discussed in our previous report, the proposed development would have a peak hour traffic generation of some 160 vehicles per hour two-way at peak times. This is equivalent to two to three vehicles per minute at these times. In the context of existing and future development in Macquarie Park, this generation is small.

Access to and from Herring Road would be made by left turns. Herring Road intersections would continue to operate at their existing satisfactory levels of service, with average delays per vehicle only increasing by one or two seconds.

On a number of site inspections during peak periods, vehicles did not queue along Herring Road past the site from adjacent intersections. The SIDRA analysis (results attached) shows that with the additional traffic from the proposed development, vehicles do not queue on Herring Road past the proposed new access road.

Therefore, the surrounding road network will be able to cater for the traffic generation of the proposed development at satisfactory levels of service.

In this context, undertaking Paramics modelling is not considered to be necessary.

9. *The development is well positioned to take advantage of the existing transport infrastructure and services (train and bus).*

10. *The site provides pedestrian and cycle way connectivity.*

11. *The applicant has outlined the principles to be applied during construction. The site is to be developed in six stages. Separate Construction Traffic Management Plans should be submitted and approved by Council for each stage of the civil works and building works that would impact on Herring Road. In addition:*
    - *Construction vehicles and the like should be fully contained within the site before stopping. The design of the temporay construction access from Herring Road should be submitted to Council for review and approval.*
    - *The Construction Management plan indicates that site personal would make use of local on-street parking. Currently No Parking restrictions and 2P - Resident Parking schemes applying on the streets near the proposed development. Parking for site personal should be provided on-site or within Morling College grounds.*
    - *If site personal will be cycling to and from the site; secure bicycle storage facilities should be provided on-site or within Morling College grounds.*

Council comments numbered 9 to 11 inclusive are noted.

<u>Department of Planning</u>

3. *Parking and Traffic Generation*

The parking provisions for the development should be reconsidered to provide a minimalist approach considering the proximity of the site to public transport, retail, commercial and education facilities as required by the DGR's.

As discussed in our previous report, Section 6.3.8 of Part 4.5 of the Ryde DCP (Macquarie Park Corridor) indicates that car parking for all development other than commercial and industrial development should be provided in accordance with the Ryde DCP. Section 5 of Part 3.4 of the Ryde DCP and Section 2 of Part 9.3 of the Ryde DCP indicate that parking for residential flat buildings within 400 metres of Epping Road or a railway station should provide parking as follows:

- one space per one bedroom dwelling;
- 1.2 spaces per two bedroom dwelling;
- 1.6 spaces per three bedroom apartment;
- one space per four dwellings for visitors; and
- one space per 25m^2 for the café.

Therefore, the above rates take into account the site's accessibility to public transport, being close to Macquarie University railway station and bus services along Epping Road, Herring Road and Waterloo Road.

The proposed development originally provided parking to satisfy these requirements. Following discussions between the applicant and the Department of Planning, it is now proposed to embrace a more minimalist approach and reduce the parking to below that allowed for in the applicable Ryde DCP, as follows:

- one space per one or two bedroom apartment;
- 1.6 spaces per apartment with three or more bedrooms; and
- one space per six apartments for visitors.

For Building A, with 68 one bedroom apartments, 47 two bedroom apartments and eight apartments with three or more bedrooms, this is equivalent to 152 spaces, including 128 resident spaces, 21 visitor spaces and three spaces for the café. This represents a reduction of some 13 per cent in the number of spaces for Building A, compared to the 174 spaces originally proposed.

Final parking provision for buildings B, C, D and E will be determined at the time that project applications are made for these buildings, following confirmation of the final number and mix of apartments. However, parking in accordance with the above proposed rates will result in a similar reduction in parking provision for these buildings.

We also note that the proposed development now includes additional parking for motor cycles, bicycles (for residents and visitors) and small cars, compared to the original proposal.

The proposed parking provision is therefore less than Council's DCP requirements and consistent with DoP's suggestion for a minimalist approach, given the site's proximity to public transport.

Department of Transport

Given the accessibility of the site to public transport, TNSW recommends the proponent consider a range of Travel Demand Management measures including, but not limited to:

- *Provision of car share spaces prioritized in convenient locations;*

The amended plans prepared by the architect include three car share spaces along the proposed new access road which will be marked and allocated for this purpose.

- *Provision of a Transport Access Guide (TAG) consistent with the RTA's guidelines (located at www.rta.nsw.gov.au).*

The applicant is committed to preparing a transport access guide and promoting that guide to the owners' corporation for use by residents.

As noted, the DGRs require a minimalist approach to car parking which is not reflected in the traffic study. The proposal should provide car parking consistent with the City of Ryde DCP 2006, in particular the rate of 1.6 spaces per 3 or more bedroom unit.

A minimalist approach to parking provision is proposed as discussed in response to DoP comment 3.

Additionally, the study should respond to the objectives and initiatives of the Metropolitan Transport Plan, particularly the planned 1000 new buses, construction of the North West Rail Link and completion of 43 strategic bus corridors across Sydney, all of which will significantly enhance the servicing of the site by public transport.

These matters are normally addressed in the broader planning context, when local environmental plans and regional environmental plans are prepared. Access to the proposed development by public transport will be significantly improved by these initiatives.

Finally, TNSW supports the planned pedestrian and cycle only connections which provide a direct connection to the Macquarie University Precinct. This connection should be included in the conditions of consent.

This matter is noted.

RTA

The RTA has the following recommendation on the subject application:

- *The RTA raises concern with the proposed access arrangement on Herring Road and its close proximity to Windsor Drive as it increases the potential for vehicles exiting the development to carry out a weaving manoeuvre into the right turn lane to perform a potential illegal U-Turn at Windsor Drive to head towards Epping Road. The Department should consider alternative access via the existing roundabout at the intersection of Herring Road/Ivanhoe Place that provides access to Morling College.*

  If access via the roundabout is not supported, the Department should consider relocating the access road to the northern extremity of the subject site to reduce any potential for U-turn manoeuvres.

There are existing regulatory signs at Windsor Drive preventing u-turns in both directions on Herring Road. Vehicles exiting the new public road onto Herring Road would be subject to these restrictions. We consider that vehicles exiting the new public road would be less likely to undertake a u-turn at this intersection than other northbound vehicles on Herring Road, due to the relative locations of the two intersections. There are alternative routes for traffic to access Epping Road from the site, including Lyon Park Road, Lane Cove Road and Wicks Road.

The proposed public road, which will connect to Herring Road, is identified in DCP 2010 as part of the fine-grained road network in Macquarie Park. The Morling College site, which is accessed via the roundabout, is not part of the subject site. Access is therefore not possible from this roundabout. There is not sufficient space at the northern end of the site to accommodate a new public road. This location is also not consistent with the DCP and any change in location would limit future opportunities to establish the longer term fine grained road network.

The proposed location of the access road onto Herring Road is therefore considered appropriate.

We trust the above provides the information you require. Finally, if you should have any queries, please do not hesitate to contact us.

Yours faithfully,
COLSTON BUDD HUNT & KAFES PTY LTD

J Hollis
Director

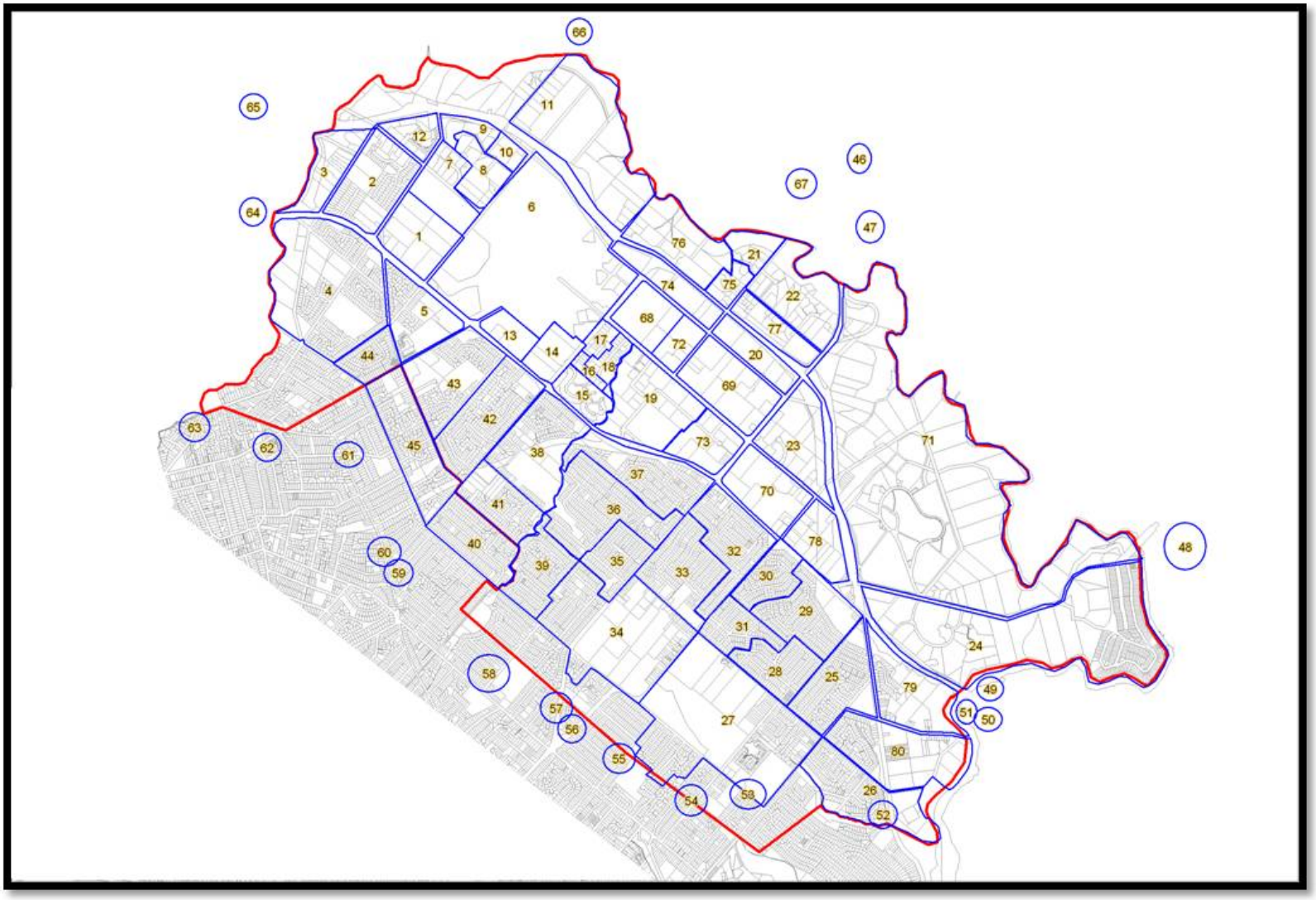

Figure 4.1: MPCPM Zone System

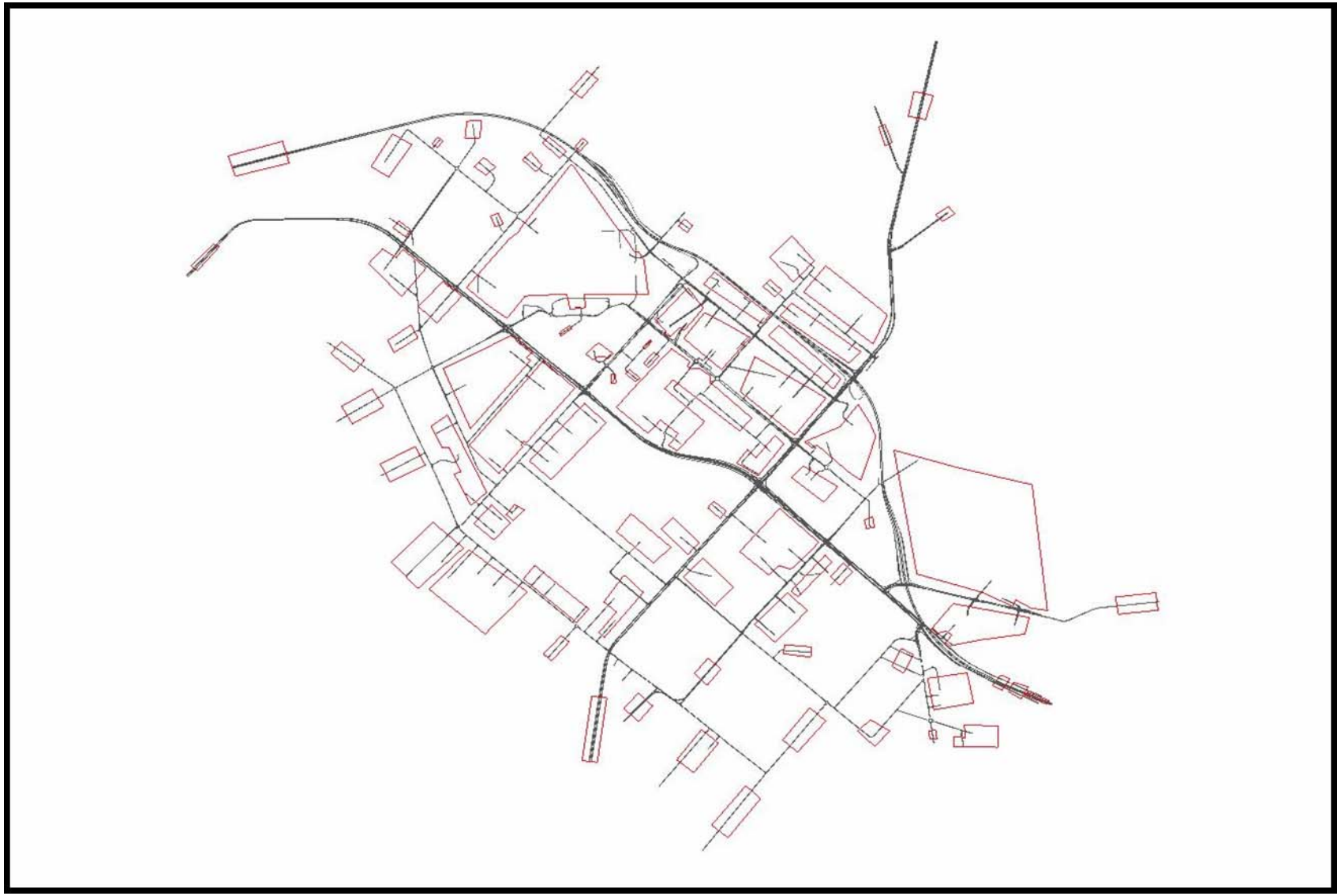

Figure 4.2: Zones in the MPCPM

MOVEMENT SUMMARY

Site: Herring Road & Waterloo Road - ex AM

Herring Road & Waterloo Road
Existing morning peak hour
Signals - Fixed Time Cycle Time = 116 seconds

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	105	2.0	0.526	43.8	LOS D	15.2	108.2	0.88	0.86	28.0
2	T	505	2.0	0.526	35.5	LOS C	16.0	113.8	0.88	0.75	28.9
3	R	905	2.0	0.796	33.0	LOS C	17.6	125.7	0.98	0.89	31.5
Approach		1515	2.0	0.796	34.6	LOS C	17.6	125.7	0.94	0.84	30.3
East: Waterloo Road											
4	L	80	2.0	0.312	52.4	LOS D	6.9	48.9	0.90	0.79	24.8
5	T	130	2.0	0.312	45.5	LOS D	6.9	48.9	0.92	0.73	25.5
6	R	165	2.0	0.804	68.5	LOS E	11.6	82.8	1.00	0.90	20.8
Approach		375	2.0	0.804	57.1	LOS E	11.6	82.8	0.95	0.82	23.1
North: Herring Road north											
7	L	65	2.0	0.300	37.8	LOS C	4.6	32.4	0.92	0.77	29.8
8	T	105	2.0	0.300	44.8	LOS D	5.9	41.7	0.93	0.73	25.6
9	R	55	2.0	0.213	49.7	LOS D	3.7	26.4	0.86	0.75	25.4
Approach		225	2.0	0.300	44.0	LOS D	5.9	41.7	0.91	0.74	26.6
West: University access											
10	L	80	2.0	0.422	53.5	LOS D	8.4	59.5	0.93	0.80	22.9
11	T	190	2.0	0.421	46.7	LOS D	8.9	63.3	0.94	0.76	23.2
12	R	45	2.0	0.219	58.9	LOS E	3.4	24.5	0.95	0.74	21.6
Approach		315	2.0	0.421	50.2	LOS D	8.9	63.3	0.94	0.77	22.9
All Vehicles		2430	2.0	0.804	40.9	LOS C	17.6	125.7	0.94	0.82	27.5

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	38.9	LOS D	0.1	0.1	0.82	0.82
P3	Across E approach	50	41.4	LOS E	0.1	0.1	0.84	0.84
P5	Across N approach	50	38.9	LOS D	0.1	0.1	0.82	0.82
P7	Across W approach	50	41.4	LOS E	0.1	0.1	0.84	0.84
All Pedestrians		200	40.1				0.83	0.83

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Herring Road & Waterloo Road - ex PM

Herring Road & Waterloo Road
Existing afternoon peak hour
Signals - Fixed Time Cycle Time = 90 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	90	2.0	0.663	47.2	LOS D	10.9	77.3	0.98	0.85	26.8
2	T	365	2.0	0.663	38.3	LOS C	11.8	84.3	0.98	0.83	27.7
3	R	310	2.0	0.508	46.1	LOS D	8.1	57.6	0.96	0.80	26.5
Approach		765	2.0	0.663	42.5	LOS D	11.8	84.3	0.97	0.82	27.1
East: Waterloo Road											
4	L	640	2.0	0.874	44.9	LOS D	31.2	222.4	0.99	0.97	26.8
5	T	120	2.0	0.281	31.7	LOS C	31.2	222.4	0.87	0.70	30.7
6	R	250	2.0	0.878	58.8	LOS E	14.2	101.0	1.00	0.99	22.9
Approach		1010	2.0	0.878	46.8	LOS D	31.2	222.4	0.98	0.95	26.1
North: Herring Road north											
7	L	85	2.0	0.792	51.3	LOS D	13.4	95.7	1.00	0.94	25.7
8	T	460	2.0	0.791	42.4	LOS C	14.6	104.1	1.00	0.94	26.3
9	R	80	2.0	0.262	44.3	LOS D	4.4	31.4	0.91	0.77	27.1
Approach		625	2.0	0.791	43.8	LOS D	14.6	104.1	0.99	0.91	26.3
West: University access											
10	L	85	2.0	0.207	34.3	LOS C	4.8	34.0	0.81	0.77	28.5
11	T	105	2.0	0.207	30.5	LOS C	4.8	34.0	0.85	0.67	28.2
12	R	150	2.0	0.527	46.0	LOS D	8.0	56.7	0.97	0.80	24.7
Approach		340	2.0	0.527	38.3	LOS C	8.0	56.7	0.89	0.75	26.6
All Vehicles		2740	2.0	0.878	43.9	LOS D	31.2	222.4	0.97	0.88	26.5

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	26.5	LOS C	0.1	0.1	0.77	0.77
P3	Across E approach	50	28.8	LOS C	0.1	0.1	0.80	0.80
P5	Across N approach	50	26.5	LOS C	0.1	0.1	0.77	0.77
P7	Across W approach	50	28.8	LOS C	0.1	0.1	0.80	0.80
All Pedestrians		200	27.6				0.78	0.78

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Herring Road & Morling College - ex AM

Herring Road & Morling College access
Existing morning peak hour
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	10	2.0	0.556	8.0	LOS A	6.2	44.0	0.20	0.66	48.8
2	T	1660	2.0	0.565	6.6	LOS A	6.3	44.5	0.21	0.49	49.8
3	R	100	2.0	0.565	12.4	LOS A	6.3	44.5	0.22	0.81	45.1
Approach		1770	2.0	0.565	7.0	LOS A	6.3	44.5	0.21	0.51	49.5
East: Ivanhoe Place											
4	L	35	2.0	0.052	7.6	LOS A	0.2	1.7	0.43	0.63	43.0
5	T	1	2.0	0.053	6.9	LOS A	0.2	1.7	0.43	0.59	43.2
6	R	10	2.0	0.052	11.7	LOS A	0.2	1.7	0.43	0.78	40.9
Approach		46	2.0	0.052	8.5	LOS A	0.2	1.7	0.43	0.66	42.5
North: Herring Road north											
7	L	10	2.0	0.141	7.6	LOS A	0.9	6.6	0.27	0.66	48.2
8	T	345	2.0	0.140	6.9	LOS A	0.9	6.6	0.27	0.52	49.4
9	R	20	2.0	0.141	12.9	LOS A	0.9	6.6	0.28	0.82	45.2
Approach		375	2.0	0.140	7.2	LOS A	0.9	6.6	0.27	0.54	49.1
West: Morling College access											
10	L	5	2.0	0.033	12.1	LOS A	0.2	1.2	0.70	0.82	39.6
11	T	1	2.0	0.032	10.6	LOS A	0.2	1.2	0.70	0.78	39.2
12	R	10	2.0	0.033	16.1	LOS B	0.2	1.2	0.70	0.88	37.8
Approach		16	2.0	0.033	14.5	LOS B	0.2	1.2	0.70	0.86	38.4
All Vehicles		2207	2.0	0.565	7.1	LOS A	6.3	44.5	0.23	0.52	49.1

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: Herring Road & Morling College - ex PM

Herring Road & Morling College access
Existing afternoon peak hour
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	10	2.0	0.313	8.0	LOS A	2.6	18.2	0.14	0.68	48.9
2	T	870	2.0	0.308	6.5	LOS A	2.6	18.2	0.14	0.50	50.2
3	R	75	2.0	0.307	11.4	LOS A	2.5	18.1	0.15	0.83	45.4
Approach		955	2.0	0.308	6.9	LOS A	2.6	18.2	0.14	0.53	49.8
East: Ivanhoe Place											
4	L	25	2.0	0.067	9.8	LOS A	0.3	2.3	0.62	0.80	41.5
5	T	1	2.0	0.067	9.1	LOS A	0.3	2.3	0.62	0.77	41.8
6	R	15	2.0	0.067	13.8	LOS A	0.3	2.3	0.62	0.89	39.4
Approach		41	2.0	0.067	11.3	LOS A	0.3	2.3	0.62	0.83	40.7
North: Herring Road north											
7	L	10	2.0	0.417	7.6	LOS A	3.5	24.9	0.28	0.66	48.2
8	T	1155	2.0	0.409	6.9	LOS A	3.5	24.9	0.29	0.52	49.3
9	R	10	2.0	0.417	12.4	LOS A	3.5	24.8	0.30	0.81	45.6
Approach		1175	2.0	0.409	6.9	LOS A	3.5	24.9	0.29	0.52	49.3
West: Morling College access											
10	L	10	2.0	0.023	8.9	LOS A	0.1	0.7	0.54	0.70	42.3
11	T	1	2.0	0.023	7.4	LOS A	0.1	0.7	0.54	0.64	42.0
12	R	5	2.0	0.023	13.0	LOS A	0.1	0.7	0.54	0.81	40.0
Approach		16	2.0	0.023	10.1	LOS A	0.1	0.7	0.54	0.73	41.5
All Vehicles		2187	2.0	0.417	7.0	LOS A	3.5	24.9	0.23	0.53	49.2

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: Epping Road & Herring Road - ex AM

Epping Road & Herring Road
Existing morning peak hour
Signals - Fixed Time Cycle Time = 116 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	20	2.0	0.033	8.3	LOS A	0.2	1.2	0.16	0.62	45.7
2	T	675	2.0	0.823	52.4	LOS D	20.9	149.1	1.00	0.96	21.2
3	R	215	2.0	1.000[3]	54.2	LOS D	13.0	92.7	0.97	0.82	24.6
Approach		910	2.0	1.000	51.9	LOS D	20.9	149.1	0.98	0.92	22.4
East: Epping Road east											
4	L	165	2.0	0.161	10.1	LOS A	0.8	5.9	0.12	0.68	56.7
5	T	915	2.0	0.334	20.2	LOS B	12.2	87.2	0.67	0.58	45.7
6	R	795	2.0	0.969	59.8	LOS E	23.6	168.2	1.00	0.87	24.2
Approach		1875	2.0	0.969	36.1	LOS C	23.6	168.2	0.76	0.71	34.4
North: Herring Road north											
7	L	225	2.0	0.235	9.0	LOS A	2.9	21.0	0.23	0.66	45.1
8	T	120	2.0	0.812	66.5	LOS E	6.6	47.3	1.00	0.91	18.6
9	R	125	2.0	0.812	74.0	LOS F	6.8	48.8	1.00	0.91	20.6
Approach		470	2.0	0.812	41.0	LOS C	6.8	48.8	0.63	0.79	27.4
West: Epping Road west											
10	L	460	2.0	0.251	11.2	NA[9]	NA[9]	NA[9]	0.00	0.69	58.8
11	T	1705	2.0	0.979	74.1	LOS F	42.7	304.3	1.00	1.14	22.7
12	R	25	2.0	0.253	70.5	LOS E	2.1	15.3	0.98	0.71	21.6
Approach		2190	2.0	0.979	60.8	LOS E	42.7	304.3	0.79	1.04	26.0
All Vehicles		5445	2.0	1.000	49.1	LOS D	42.7	304.3	0.80	0.89	27.7

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane
9 Continuous movement

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	27.6	LOS C	0.1	0.1	0.69	0.69
P3	Across E approach	50	34.9	LOS D	0.1	0.1	0.78	0.78
P5	Across N approach	50	27.6	LOS C	0.1	0.1	0.69	0.69
P7	Across W approach	50	34.9	LOS D	0.1	0.1	0.78	0.78
All Pedestrians		200	31.3				0.73	0.73

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Epping Road & Herring Road - ex PM

Epping Road & Herring Road
Existing afternoon peak hour
Signals - Fixed Time Cycle Time = 142 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	55	2.0	0.177	9.4	LOS A	0.9	6.1	0.23	0.65	44.9
2	T	330	2.0	0.487	57.2	LOS E	12.0	85.5	0.95	0.78	20.4
3	R	80	2.0	0.462	63.6	LOS E	6.5	46.2	0.92	0.77	22.5
Approach		465	2.0	0.487	52.7	LOS D	12.0	85.5	0.86	0.76	22.4
East: Epping Road east											
4	L	250	2.0	0.241	10.1	LOS A	1.0	6.9	0.07	0.67	57.0
5	T	1780	2.0	0.893	53.2	LOS D	41.6	296.0	0.99	0.96	28.0
6	R	350	2.0	0.646	72.5	LOS F	12.9	92.1	0.97	0.82	21.1
Approach		2380	2.0	0.893	51.5	LOS D	41.6	296.0	0.89	0.91	28.1
North: Herring Road north											
7	L	205	2.0	0.188	8.2	LOS A	1.9	13.9	0.15	0.64	45.8
8	T	420	2.0	0.908	72.1	LOS F	32.1	228.4	1.00	1.06	17.7
9	R	595	2.0	0.908	83.9	LOS F	25.4	180.6	1.00	1.03	19.0
Approach		1220	2.0	0.908	67.1	LOS E	32.1	228.4	0.86	0.97	20.7
West: Epping Road west											
10	L	305	2.0	0.167	11.2	NA[9]	NA[9]	NA[9]	0.00	0.69	58.8
11	T	995	2.0	0.627	48.4	LOS D	21.0	149.3	0.93	0.80	29.7
12	R	100	2.0	0.899	96.3	LOS F	9.8	69.4	1.00	0.95	17.0
Approach		1400	2.0	0.899	43.7	LOS D	21.0	149.3	0.74	0.79	31.7
All Vehicles		5465	2.0	0.908	53.1	LOS D	41.6	296.0	0.84	0.88	26.3

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

9 Continuous movement

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	36.6	LOS D	0.1	0.1	0.72	0.72
P3	Across E approach	50	47.4	LOS E	0.2	0.2	0.82	0.82
P5	Across N approach	50	36.6	LOS D	0.1	0.1	0.72	0.72
P7	Across W approach	50	47.4	LOS E	0.2	0.2	0.82	0.82
All Pedestrians		200	42.0				0.77	0.77

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Herring Road & Waterloo Road
Existing morning peak hour + development
Signals - Fixed Time Cycle Time = 119 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	105	2.0	0.559	45.8	LOS D	16.6	118.5	0.89	0.86	27.4
2	T	545	2.0	0.559	37.1	LOS C	17.4	123.7	0.89	0.77	28.3
3	R	975	2.0	0.812	33.6	LOS C	19.4	138.3	0.98	0.90	31.2
Approach		1625	2.0	0.812	35.6	LOS C	19.4	138.3	0.94	0.85	29.9
East: Waterloo Road											
4	L	90	2.0	0.327	52.5	LOS D	7.4	52.6	0.90	0.80	24.7
5	T	130	2.0	0.326	46.9	LOS D	7.4	52.6	0.92	0.73	25.0
6	R	165	2.0	0.825	71.3	LOS F	12.0	85.4	1.00	0.92	20.3
Approach		385	2.0	0.825	58.7	LOS E	12.0	85.4	0.95	0.83	22.7
North: Herring Road north											
7	L	65	2.0	0.330	39.6	LOS C	4.9	34.9	0.93	0.77	29.1
8	T	115	2.0	0.331	46.4	LOS D	6.4	45.6	0.94	0.74	25.2
9	R	55	2.0	0.214	49.4	LOS D	3.7	26.6	0.85	0.75	25.4
Approach		235	2.0	0.331	45.2	LOS D	6.4	45.6	0.92	0.75	26.2
West: University access											
10	L	80	2.0	0.432	55.2	LOS D	8.6	61.0	0.94	0.80	22.5
11	T	190	2.0	0.432	48.4	LOS D	9.1	64.9	0.94	0.76	22.7
12	R	45	2.0	0.225	60.6	LOS E	3.5	25.2	0.95	0.74	21.2
Approach		315	2.0	0.432	51.9	LOS D	9.1	64.9	0.94	0.77	22.5
All Vehicles		2560	2.0	0.825	41.9	LOS C	19.4	138.3	0.94	0.83	27.1

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	40.4	LOS E	0.1	0.1	0.82	0.82
P3	Across E approach	50	42.9	LOS E	0.1	0.1	0.85	0.85
P5	Across N approach	50	40.4	LOS E	0.1	0.1	0.82	0.82
P7	Across W approach	50	42.9	LOS E	0.1	0.1	0.85	0.85
All Pedestrians		200	41.6				0.84	0.84

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Herring Road & Waterloo Road
Existing afternoon peak hour plus development
Signals - Fixed Time Cycle Time = 100 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	90	2.0	0.708	52.4	LOS D	12.2	87.2	0.99	0.87	25.3
2	T	375	2.0	0.709	43.8	LOS D	13.3	95.0	0.99	0.87	25.9
3	R	350	2.0	0.434	45.0	LOS D	9.2	65.5	0.91	0.81	26.9
Approach		815	2.0	0.709	45.3	LOS D	13.3	95.0	0.96	0.84	26.2
East: Waterloo Road											
4	L	660	2.0	0.838	40.9	LOS C	32.0	227.7	0.96	0.93	28.2
5	T	120	2.0	0.312	37.3	LOS C	32.0	227.7	0.90	0.72	28.4
6	R	250	2.0	0.853	60.7	LOS E	15.0	106.5	1.00	0.96	22.5
Approach		1030	2.0	0.853	45.3	LOS D	32.0	227.7	0.96	0.91	26.6
North: Herring Road north											
7	L	85	2.0	0.843	59.3	LOS E	15.4	109.8	1.00	0.98	23.5
8	T	470	2.0	0.843	50.4	LOS D	16.7	119.2	1.00	0.98	24.0
9	R	80	2.0	0.267	42.7	LOS D	4.5	32.0	0.85	0.76	27.6
Approach		635	2.0	0.843	50.6	LOS D	16.7	119.2	0.98	0.95	24.3
West: University access											
10	L	85	2.0	0.228	38.8	LOS C	5.4	38.4	0.83	0.78	26.9
11	T	105	2.0	0.228	35.7	LOS C	5.4	38.4	0.87	0.68	26.4
12	R	150	2.0	0.512	49.6	LOS D	8.6	61.2	0.96	0.80	23.7
Approach		340	2.0	0.512	42.6	LOS D	8.6	61.2	0.90	0.76	25.3
All Vehicles		2820	2.0	0.853	46.2	LOS D	32.0	227.7	0.96	0.88	25.8

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	31.2	LOS D	0.1	0.1	0.79	0.79
P3	Across E approach	50	32.8	LOS D	0.1	0.1	0.81	0.81
P5	Across N approach	50	31.2	LOS D	0.1	0.1	0.79	0.79
P7	Across W approach	50	32.8	LOS D	0.1	0.1	0.81	0.81
All Pedestrians		200	32.0				0.80	0.80

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Herring Road & Morling College - ex AM + dev

Herring Road & Morling College access
Existing morning peak hour + development
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	10	2.0	0.588	8.2	LOS A	6.8	48.4	0.29	0.64	48.5
2	T	1690	2.0	0.594	6.8	LOS A	6.8	48.7	0.30	0.50	49.2
3	R	100	2.0	0.595	12.6	LOS A	6.8	48.7	0.31	0.78	45.0
Approach		1800	2.0	0.594	7.1	LOS A	6.8	48.7	0.30	0.52	49.0
East: Ivanhoe Place											
4	L	35	2.0	0.053	7.7	LOS A	0.2	1.8	0.44	0.64	43.0
5	T	1	2.0	0.053	7.0	LOS A	0.2	1.8	0.44	0.59	43.2
6	R	10	2.0	0.053	11.7	LOS A	0.2	1.8	0.44	0.78	40.9
Approach		46	2.0	0.053	8.6	LOS A	0.2	1.8	0.44	0.67	42.5
North: Herring Road north											
7	L	10	2.0	0.147	7.6	LOS A	1.0	7.1	0.27	0.66	48.2
8	T	345	2.0	0.148	6.9	LOS A	1.0	7.1	0.28	0.52	49.3
9	R	40	2.0	0.148	13.1	LOS A	1.0	7.1	0.28	0.81	45.0
Approach		395	2.0	0.148	7.5	LOS A	1.0	7.1	0.28	0.55	48.8
West: Morling College access											
10	L	5	2.0	0.035	12.5	LOS A	0.2	1.3	0.72	0.83	39.4
11	T	1	2.0	0.036	10.9	LOS A	0.2	1.3	0.72	0.80	38.9
12	R	10	2.0	0.035	16.5	LOS B	0.2	1.3	0.72	0.90	37.6
Approach		16	2.0	0.035	14.9	LOS B	0.2	1.3	0.72	0.87	38.2
All Vehicles		2257	2.0	0.595	7.3	LOS A	6.8	48.7	0.30	0.53	48.7

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: Herring Road & Morling College - ex PM + dev

Herring Road & Morling College access
Existing afternoon peak hour plus development
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	10	2.0	0.345	8.1	LOS A	2.9	20.5	0.22	0.67	48.7
2	T	950	2.0	0.350	6.7	LOS A	2.9	20.5	0.22	0.51	49.7
3	R	75	2.0	0.350	11.6	LOS A	2.9	20.4	0.23	0.80	45.3
Approach		1035	2.0	0.350	7.1	LOS A	2.9	20.5	0.23	0.53	49.3
East: Ivanhoe Place											
4	L	25	2.0	0.068	9.9	LOS A	0.3	2.3	0.63	0.81	41.4
5	T	1	2.0	0.067	9.2	LOS A	0.3	2.3	0.63	0.78	41.7
6	R	15	2.0	0.068	13.9	LOS A	0.3	2.3	0.63	0.90	39.3
Approach		41	2.0	0.068	11.4	LOS A	0.3	2.3	0.63	0.84	40.6
North: Herring Road north											
7	L	10	2.0	0.417	7.6	LOS A	3.7	26.4	0.29	0.65	48.2
8	T	1155	2.0	0.420	6.9	LOS A	3.7	26.4	0.30	0.52	49.3
9	R	40	2.0	0.421	13.1	LOS A	3.7	26.2	0.31	0.82	45.1
Approach		1205	2.0	0.420	7.1	LOS A	3.7	26.4	0.30	0.53	49.1
West: Morling College access											
10	L	10	2.0	0.024	9.3	LOS A	0.1	0.8	0.58	0.72	42.0
11	T	1	2.0	0.024	7.7	LOS A	0.1	0.8	0.58	0.67	41.7
12	R	5	2.0	0.024	13.3	LOS A	0.1	0.8	0.58	0.82	39.8
Approach		16	2.0	0.024	10.5	LOS A	0.1	0.8	0.58	0.75	41.2
All Vehicles		2297	2.0	0.421	7.2	LOS A	3.7	26.4	0.27	0.54	48.9

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.
Roundabout Capacity Model: SIDRA Standard.

MOVEMENT SUMMARY

Site: Epping Road & Herring Road - ex AM + dev

Epping Road & Herring Road
Existing morning peak hour + development traffic
Signals - Fixed Time Cycle Time = 116 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	20	2.0	0.033	8.3	LOS A	0.2	1.2	0.16	0.62	45.7
2	T	685	2.0	0.835	53.4	LOS D	21.5	152.8	1.00	0.98	21.0
3	R	215	2.0	1.000[3]	54.2	LOS D	13.0	92.7	0.97	0.82	24.6
Approach		920	2.0	1.000	52.6	LOS D	21.5	152.8	0.98	0.93	22.2
East: Epping Road east											
4	L	165	2.0	0.161	10.1	LOS A	0.8	5.9	0.12	0.68	56.7
5	T	915	2.0	0.334	20.2	LOS B	12.2	87.2	0.67	0.58	45.7
6	R	805	2.0	0.981	59.0	LOS E	23.7	169.0	1.00	0.87	24.5
Approach		1885	2.0	0.981	35.9	LOS C	23.7	169.0	0.76	0.71	34.5
North: Herring Road north											
7	L	225	2.0	0.235	9.0	LOS A	2.9	21.0	0.23	0.66	45.1
8	T	120	2.0	0.812	66.5	LOS E	6.6	47.3	1.00	0.91	18.6
9	R	125	2.0	0.812	74.0	LOS F	6.8	48.8	1.00	0.91	20.6
Approach		470	2.0	0.812	41.0	LOS C	6.8	48.8	0.63	0.79	27.4
West: Epping Road west											
10	L	470	2.0	0.257	11.2	NA[9]	NA[9]	NA[9]	0.00	0.69	58.8
11	T	1705	2.0	0.979	74.1	LOS F	42.7	304.3	1.00	1.14	22.7
12	R	25	2.0	0.253	70.5	LOS E	2.1	15.3	0.98	0.71	21.6
Approach		2200	2.0	0.979	60.6	LOS E	42.7	304.3	0.79	1.04	26.0
All Vehicles		5475	2.0	1.000	49.1	LOS D	42.7	304.3	0.80	0.89	27.7

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane
9 Continuous movement

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	27.6	LOS C	0.1	0.1	0.69	0.69
P3	Across E approach	50	34.9	LOS D	0.1	0.1	0.78	0.78
P5	Across N approach	50	27.6	LOS C	0.1	0.1	0.69	0.69
P7	Across W approach	50	34.9	LOS D	0.1	0.1	0.78	0.78
All Pedestrians		200	31.3				0.73	0.73

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Epping Road & Herring Road
Existing afternoon peak hour + development traffic
Signals - Fixed Time Cycle Time = 148 seconds

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herring Road south											
1	L	55	2.0	0.179	9.3	LOS A	0.9	6.1	0.22	0.64	45.0
2	T	355	2.0	0.546	61.2	LOS E	13.4	95.2	0.97	0.79	19.6
3	R	80	2.0	0.481	66.9	LOS E	6.8	48.2	0.92	0.77	21.9
Approach		490	2.0	0.546	56.3	LOS D	13.4	95.2	0.88	0.77	21.6
East: Epping Road east											
4	L	250	2.0	0.246	10.1	LOS A	1.0	7.2	0.08	0.67	57.0
5	T	1780	2.0	0.877	51.6	LOS D	41.5	295.7	0.97	0.93	28.5
6	R	380	2.0	0.640	73.2	LOS F	14.1	100.6	0.96	0.82	21.0
Approach		2410	2.0	0.877	50.7	LOS D	41.5	295.7	0.88	0.89	28.4
North: Herring Road north											
7	L	205	2.0	0.187	8.2	LOS A	1.9	13.8	0.14	0.64	45.8
8	T	420	2.0	0.895	71.4	LOS F	32.6	231.9	1.00	1.03	17.8
9	R	595	2.0	0.895	83.1	LOS F	25.6	182.4	1.00	1.01	19.1
Approach		1220	2.0	0.895	66.5	LOS E	32.6	231.9	0.86	0.95	20.8
West: Epping Road west											
10	L	330	2.0	0.180	11.2	NA[9]	NA[9]	NA[9]	0.00	0.69	58.8
11	T	995	2.0	0.637	51.1	LOS D	21.9	155.6	0.94	0.81	28.8
12	R	100	2.0	0.882	97.2	LOS F	9.9	70.8	1.00	0.94	16.9
Approach		1425	2.0	0.882	45.1	LOS D	21.9	155.6	0.73	0.79	31.2
All Vehicles		5545	2.0	0.895	53.2	LOS D	41.5	295.7	0.83	0.87	26.3

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

9 Continuous movement

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	50	38.7	LOS D	0.2	0.2	0.72	0.72
P3	Across E approach	50	50.3	LOS E	0.2	0.2	0.82	0.82
P5	Across N approach	50	38.7	LOS D	0.2	0.2	0.72	0.72
P7	Across W approach	50	50.3	LOS E	0.2	0.2	0.82	0.82
All Pedestrians		200	44.5				0.77	0.77

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).