M^CLAREN TRAFFIC ENGINEERING

Address: Shop 7, 720 Old Princes Highway Sutherland NSW 2232
Postal: P.O Box 66 Sutherland NSW 1499

Telephone: +61 2 8355 2440
Fax: +61 2 9521 7199
Web: www.mclarentraffic.com.au
Email: admin@mclarentraffic.com.au

Division of RAMTRANS Australia ABN: 45067491678 RPEQ: 19457

Transport Planning, Traffic Impact Assessments, Road Safety Audits, Expert Witness

9 November 2020 Reference: 200649.01FA

PMDL
17/124 Walker Street,
North Sydney,
NSW 2060 Australia
Attention: Kim Le Gras

SUPPLEMENTARY TRAFFIC MODELLING FOR THE PROPOSED SAINTS PETER AND PAUL ASSYRIAN PRIMARY SCHOOL AT 17 - 19 KOSOVICH PLACE, CECIL PARK, 2178

Dear Kim,

Reference is made to your request to provide supplementary traffic modelling of the traffic associated with the proposed Saints Peter and Paul Assyrian Primary School following the receipt of the Traffic Impact Assessment Peer Review by Bitzios Consulting dated 10 June 2020. This letter presents the results of supplementary traffic modelling with the view to providing a response to the items in the Peer Review. Specific responses to each of the items in the peer review are provided in Section 1, with the revised traffic modelling presented in detail in Section 2.

1 Response to Peer Review

The following sub-sections respond to each of the items in the peer review. The relevant sections have been quoted in italics and responded to below.

1.1 AM and PM Peak Hours

> *The AM and PM peak hours assessed in SIDRA have not been stipulated.*

The revised modelling presented in Section 0 is based on an AM peak of 8:00 AM – 9:00 AM and a PM peak of 2:45 PM – 3:45 PM, which are the peaks most affected by the traffic travelling to and from a primary school.

1.2 Traffic Generation

> *The directional Stage 1 student traffic generation in Tables 4 and 5 does not equal the total trips and should be rounded up to the nearest whole number. Thus, the estimated student traffic generation for the AM and PM peaks should be 114 trips in and 114 trips out.*

This relates to a minor typographical error in the text of the report which did not translate to the modelling. The volumes modelled are 113 IN and 113 OUT.

1.3 Growth Volumes

If negative growth rates were applied to calculate the 2028 turning volumes, then the 2018 volumes should be retained to avoid misinterpretation and maintain robust volumes. Technical rationale would be required to justify negative growth rates. In the absence of any reasonable rational, Sydney Strategic forecast model should be used to assist with the forecast volumes in the surrounding road network for the future year

Revised STM growth rates have been obtained from TfNSW which have been used in the updated traffic modelling as detailed in Section 0. The updated STM growth rates are provided in ANNEXURE for reference and now include only one negative growth rate.

1.4 Operation of Car Parking Areas

The staff parking spaces will conflict with parents/carers using the pick-up/drop-off spaces and as such, a separate staff parking area should be provided.

Pick-up/drop-off spaces 3, 4, 16 and 17 should not encroach the adjacent crossing to maintain drivers' sightlines to pedestrians and vice-versa. If these spaces cannot be relocated/resized, then these will need to be removed. Additionally, there should be 20-metre and 10-metre No Stopping zones before and after the crossing respectively in both directions of travel.

The proposed location of the southern crossing is adjacent to the "Keep Clear" area where multiple, conflicting vehicle movements will be made and drivers leaving the queueing area and U-turning will have little sight distance. One of the following alternatives should be considered:

1. *Relocate the southern crossing further north along the driveway and comply with the above No Stopping zone requirements. Adjacent pick-up/drop-off spaces will need to be removed if they cannot be relocated/resized. An additional staff member ("7") will be required to fulfil the same role as Staff Member "2" at the relocated southern crossing.*

2. *They will need to work with Staff Member "3" to ensure efficient traffic operations 2. As per Option 1, but also ban the U-turn arrangement. This will require drivers leaving pick-up/drop-off spaces 15 to 28 to exit the school either via the circulating loop or a bypass lane*

3. *Remove the northern and southern crossings and provide one crossing in the middle of the driveway. This would be managed by Staff Member "2".*

1.4.1 Staff Parking

With regards to the obstruction of the staff spaces, it is accepted that staff parking spaces will be temporarily obstructed during peak drop-off and pick-up hours. Only staff will be affected by this for approximately 15 minutes during the pick-up operations every afternoon, which is acceptable.

1.4.2 Operation of Crossings and Kiss and Drop Facility

The proposed crossings are not on a public road and the car parking does not need to be restricted as such. Parents will be travelling at low speed and with special care when within the school grounds. Further, the crossings are proposed to be staffed such that traffic will be stopped at each of the crossings when children are crossing.

The kiss and drop facility will operate under an operational plan of management, which is to be regularly reviewed based on the performance of the facility. The comments provided in the Peer Review will be taken into consideration on the first performance review of the facility after operating for 6 months.

1.5 SIDRA Geometric Modelling Parameters

> *3.1.1 General*
>
> *All Approach Distances, Lane and Circulating Widths, Island Diameters and Strip Islands should be confirmed using aerial imagery (i.e. Google Maps, Google Earth, Nearmap etc.) and the Wallgrove Road/Kosovich Place intersection concept plan, and applied to the models where necessary.*
>
> *3.1.2 The Horsley Drive / Wallgrove Road*
>
> *Lane 1 on the Wallgrove Road south approach should be 25 metres.*
>
> *3.1.3 Wallgrove Road / Kosovich Place*
>
> *The Approach Distance for the Wallgrove Road north leg should be 85 metres.*
>
> *The Approach Distance for the Kosovich Place west leg should be 330 metres.*
>
> *3.1.4 Wallgrove Road / Villiers Road*
>
> *The Approach Distance for the Wallgrove Road south leg should be 85 metres.*

Each of the above changes has been made as part of the revised traffic modelling which is presented in Section 2.

1.6 SIDRA Input Parameters - General

> *The Approach and Exit Cruise Speeds for all turning movements should be the same as the respective speed limit in all models.*
>
> *It is not clear why the Total & % Volume Data Method was used in any of the models. The Separate Volume Data Method should be used in all models and the growth rates in Annexure C of the traffic and parking impact assessment report should be applied to the 2018 turning volumes to calculate the 2028 volumes.*

The approach speeds, exit speeds and data input methods have been modified as per the above.

1.7 SIDRA Input Parameters – Pedestrian Crossing Priority- Elizabeth Drive/Wallgrove Road/M7 Off-Ramp

> *All pedestrian crossings should have priority over the conflicting turning movement in all models.*

The pedestrian crossings have been given priority as per the above.

1.8 SIDRA Input Parameters – Arrival Type – The Horsley Drive/Wallgrove Road

The Horsley Drive/Wallgrove Road and The Horsley Drive/M7 Interchange intersections have been modelled as a network and the corresponding arrival types reset to “Program”.

1.9 SIDRA Input Parameters – Approach and Exit Speeds– Kosovich Place/Wallgrove Road

The Exit Cruise Speed for all turning movements into and out of Kosovich Place should be 50km/h in the existing and existing+10-year growth models.

The Approach and Exit Cruise Speeds for all turning movements into and out of Kosovich Place should be 40km/h in the "with development" models.

The approach and exit cruise speeds have been adjusted as per the above.

1.10 Model Calibration/Validation

There is no evidence showing that the models have been properly calibrated based on actual signal phasing/timings derived from the Transport for NSW Intersection Diagnostic Monitor (IDM) data and SIDRA Environmental Factors or validated based on back-of-queue survey data and site observations.

There is no comparison between the model vs. observed queue data and IDM data vs. SIDRA phase times. Hence, the models cannot be verified.

The calibration and validation of the SIDRA models should be detailed in a modelling report and considered together with any assumptions to verify the modelling results.

The calibration of the models as part of the revised modelling is detailed in Section 2.4. It is noted that at the time of writing of this report (November 2020), COVID-19 was affecting traffic volumes and additional surveys to ascertain queue lengths etc. could not be reliably undertaken.

1.11 Signal Timing – General

The existing models should use User-Given Phase Times incorporating the Transport for NSW IDM data to reflect actual traffic conditions. The existing+10-year growth and "with development" models can use Practical or Optimal Cycle Time where necessary.

The intergreen times used in all models need to be checked against either the Transport for NSW LX file or site observations.

The calibration of the models as part of the revised modelling is detailed in Section 2.4.

1.12 Filter Turns at The Horsley Drive/Wallgrove Road

Site visits were undertaken on 5 November 2020 during the AM and PM peaks as outlined in Section 1.1. It was confirmed that right "filter" turns operate on both The Horsley Drive approaches during the AM and PM peak hours at the intersection, with an inter-green period of approximately 5 seconds. This finding has been applied to the models.

2 Revised Traffic Modelling

2.1 Traffic Generation

The traffic generation of the site used in the revised traffic modelling is consistent with the volumes provided in the Traffic and Parking Impact Assessment Report by M^{C}Laren Traffic Engineering dated 4 September 2018 lodged with the application. The volumes are reproduced in **Table 1** for reference.

TABLE 1: ESTIMATED TRAFFIC GENERATION

Peak Hour	IN	OUT	Total
Stage 1 (210 Students)			
AM	125	113	238
PM	113	125	238
Final Development (630 Students)			
AM	307	272	579
PM	272	307	579

2.2 Traffic Distribution

The traffic distribution used in the revised traffic modelling is consistent with that provided in the Traffic and Parking Impact Assessment Report by M^{C}Laren Traffic Engineering dated 4 September 2018 lodged with the application and is reproduced below.

2.2.1 AM Traffic to the Site

- 30% from the north via The Horsley Drive:
    - 20% from the east;
    - 10% from the west.
- 70% from the south via Elizabeth Drive:
    - 50% from the east;
    - 10% from the west;
    - 10% from the south (via the M7 exit).

2.2.2 AM Traffic from the Site

- 40% to the north:
    - 35% to the east at The Horsley Drive;
    - 5% to the west at The Horsley Drive.
- 60% to the south
    - 55% to the east at Elizabeth Drive;
    - 5% to the west at Elizabeth Drive.

2.3 Background Growth

Updated growth plots were provided by TfNSW to inform the revised traffic modelling. These growth plots are provided in **Annexure A** for reference.

The growth percentages provided on the plots were applied to all movements on each approach. Whilst this does not provide a completely accurate representation of the predicted growth of each individual movement, the STM outputs do not provide enough information for a more accurate assumption to be made.

The volumes used in the analysis, including the growth scenarios, are provided in **Annexure B** for reference.

2.4 Calibration

2.4.1 Wallgrove Road/Elizabeth Drive

Intersection Diagnostic Monitor (IDM) data for 25 July 2018 (the date of the survey) was obtained from TfNSW to assist with the calibration of the model. The phase timing for each of the relevant peak hours is provided in **Annexure C** for reference and summarised in **Table** 2.

It is noted that the intersection only ran phases "A" through "D" and that the LX file indicated that the "E" phase was not used by the signal controller.

TABLE 2: ELIZABETH DR/WALLGROVE RD INTERSECTION PHASING ON 25/07/2018

Phase	8:00AM – 9:00AM		2:45PM – 3:45PM	
	Minimum	Maximum	Minimum	Maximum
A phase	16	64	13	54
B phase	12	36	12	28
C phase	12	22	13	33
D phase	17	26	17	31
Nominal cycle length	64	120	60	120

The intersection phasing run by SIDRA 8.0 for the "Existing" AM and PM scenarios is summarised in **Table 3**.

TABLE 3: ELIZABETH DR/WALLGROVE RD INTERSECTION PHASING – SIDRA EXISTING

Phase	8:00AM – 9:00AM		2:45PM – 3:45PM	
	Phase Time	Consistent with Real Operation?(1)	Phase Time	Consistent with Real Operation?(1)
A phase	41	Yes	31	Yes
B phase	33	Yes	18	Yes
C phase	14	Yes	23	Yes
D phase	23	Yes	20	Yes
Cycle Length	111	Yes	92	Yes

Notes:

(1) If the phase/cycle time is within the minimum and maximum bounds outlined in the IDM data, it is deemed consistent.

2.4.2 Wallgrove Road/The Horsley Drive

Intersection Diagnostic Monitor (IDM) data for 25 July 2018 (the date of the survey) was obtained from TfNSW to assist with the calibration of the model. The phase timing for each of the relevant peak hours is provided in **Annexure D** for reference and summarised in **Table** 2.

It is noted that the intersection only ran phases "A", "D", "E" and "G" and that the LX file indicated that no other phases were used by the signal controller. The LX file indicated that the intersections of Wallgrove Road/The Horsley Drive and M7 Interchange/The Horsley Drive run on Subsystem 2 with a 0-second offset. This offset was used in the network analysis.

TABLE 4: THE HORSLEY DR/WALLGROVE RD INTERSECTION PHASING ON 25/07/2018

Phase	8:00AM – 9:00AM		2:45PM – 3:45PM	
	Minimum	Maximum	Minimum	Maximum
A phase	14	83	15	66
D phase	14	38	14	39
E phase	21	38	22	38
G phase	14	28	14	26
Nominal cycle length	78	120	71	120

The intersection phasing run by SIDRA 8.0 for the "Existing" AM and PM scenarios is summarised in **Table 3**.

TABLE 5: THE HORSLEY DR/WALLGROVE RD INTERSECTION PHASING – SIDRA EXISTING

Phase	8:00AM – 9:00AM		2:45PM – 3:45PM	
	Phase Time	Consistent with Real Operation?(1)	Phase Time	Consistent with Real Operation?(1)
A phase	20	Yes	21	Yes
D phase	25	Yes	23	Yes
E phase	19	Yes	22	Yes
G phase	14	Yes	14	Yes
Cycle Length	78	Yes	80	Yes

Notes:

(1) If the phase/cycle time is within the minimum and maximum bounds outlined in the IDM data, it is deemed consistent.

2.4.3 M7 Interchange/The Horsley Drive

Intersection Diagnostic Monitor (IDM) data for 25 July 2018 (the date of the survey) was obtained from TfNSW to assist with the calibration of the model. The phase timing for each of the relevant peak hours is provided in **Annexure E** for reference and summarised in **Table** 2.

It is noted that the intersection only ran phases "A", "C" and "F" in the AM peak hour and "A", "C", "D" and "F" during the PM peak hour. The LX file indicates that only one of the signal controller's "plans" includes these phases and that phase "E" was available to run if required. The LX file indicated that the intersections of Wallgrove Road/The Horsley Drive and M7 Interchange/The Horsley Drive run on Subsystem 2 with a 0-second offset. This offset was used in the network analysis.

TABLE 6: THE HORSLEY DR/WALLGROVE RD INTERSECTION PHASING ON 25/07/2018

Phase	8:00AM – 9:00AM		2:45PM – 3:45PM	
	Minimum	Maximum	Minimum	Maximum
A phase	20	46	19	56
C phase	N/A	N/A	19	23
D phase	23	40	19	38
F phase	22	57	19	63
Nominal cycle length	78	120	71	120

The intersection phasing run by SIDRA 8.0 for the "Existing" AM and PM scenarios is summarised in **Table 3**.

TABLE 7: THE HORSLEY DR/M7 INTERCHANGE INTERSECTION PHASING – SIDRA EXISTING

Phase	8:00AM – 9:00AM		2:45PM – 3:45PM	
	Phase Time	Consistent with Real Operation?(1)	Phase Time	Consistent with Real Operation?(1)
A phase	30	Yes	23	Yes
C phase	N/A	Yes	19	Yes
D phase	23	Yes	19	Yes
F phase	25	Yes	19	Yes
Nominal cycle length	78	Yes	80	Yes

Notes:

(2) If the phase/cycle time is within the minimum and maximum bounds outlined in the IDM data, it is deemed consistent.

2.5 Proposed Kosovich Place/Wallgrove Road Intersection Treatment

Consistent with the previous submissions supporting the proposed Saints Peter and Paul Assyrian Primary School, it is proposed that the intersection of Kosovich Place/Wallgrove Road be modified to provide the following facilities:

- A 26.6m long auxiliary lane providing for the storage of vehicles waiting to turn right from Wallgrove Road into Kosovich Place:
    - It is noted that this does not include the taper length of 18m.
    - This length is the longest lane length that can be accommodated considering the proximity of the roundabout to the north and the narrow culvert across Ropes Creek.
    - A 26.6 long lane is sufficient to accommodate the 98th percentile queue predicted by SIDRA analysis sensitivity testing and can accommodate two 12.5m long Heavy Rigid Vehicles.

- It should be noted that traffic exiting the roundabout travels significantly slower than the 80km/h speed restriction and deceleration facilities are not required. Southbound vehicles intending to enter Kosovich Place will not significantly accelerate after exiting the roundabout and will have ample room in which to brake safely for the right turn. As depicted in Error! Reference source not found., vehicles exiting the roundabout will have a clear vision of vehicles ahead intending to turn right into Kosovich Place.

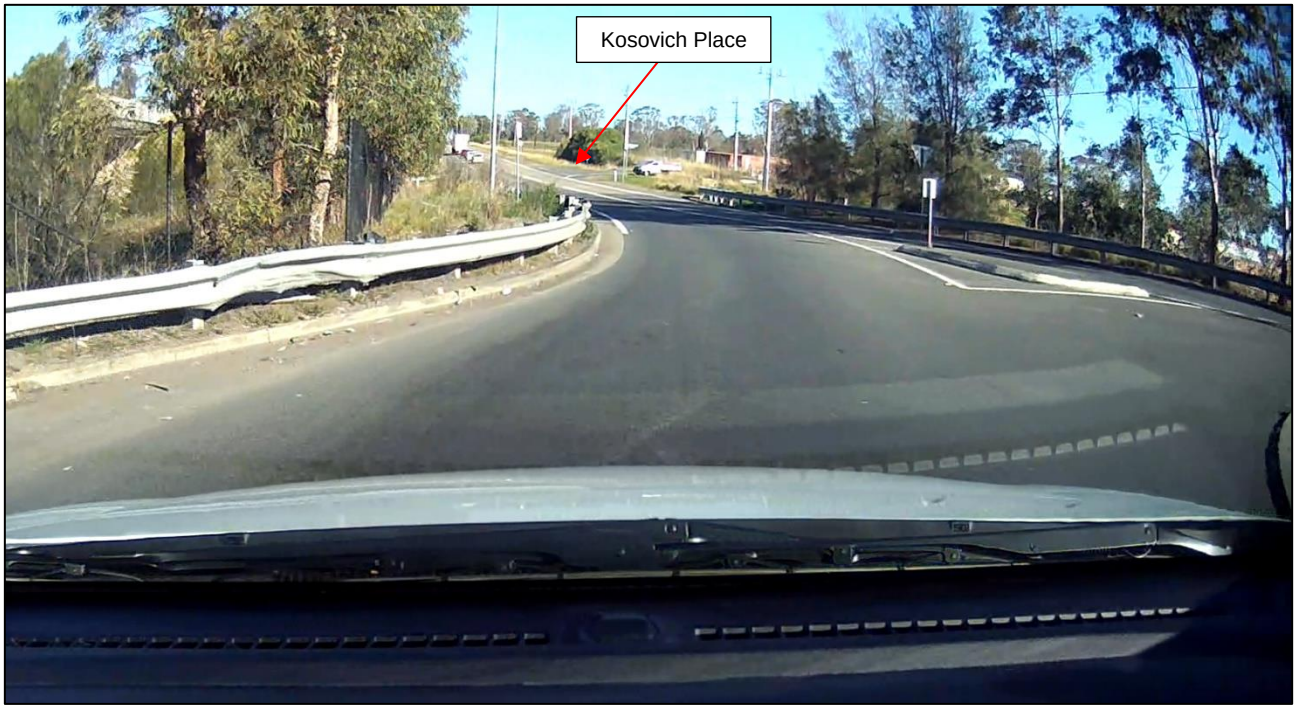


FIGURE 1: DRIVERS VIEWPOINT – EXITING THE ROUNDABOUT SOUTHBOUND

- A 100m long (including taper) auxiliary lane providing for the deceleration of vehicles turning left into Kosovich Place.
- "No Right Turn" and "Left Only" signage, complemented by a concrete island, restricting right turns out of Kosovich Place.
- Lane and shoulder widths generally matching the existing geometry of Wallgrove Road;
- All intersection turns designed to accommodate a 12.5m long Heavy Rigid Vehicle.

The proposed layout is illustrated in **Figure 2.** It is proposed that the upgrade be constructed prior to the opening of Stage 1 of the school and has been used in both the Stage 1 and Final Development modelling scenarios.

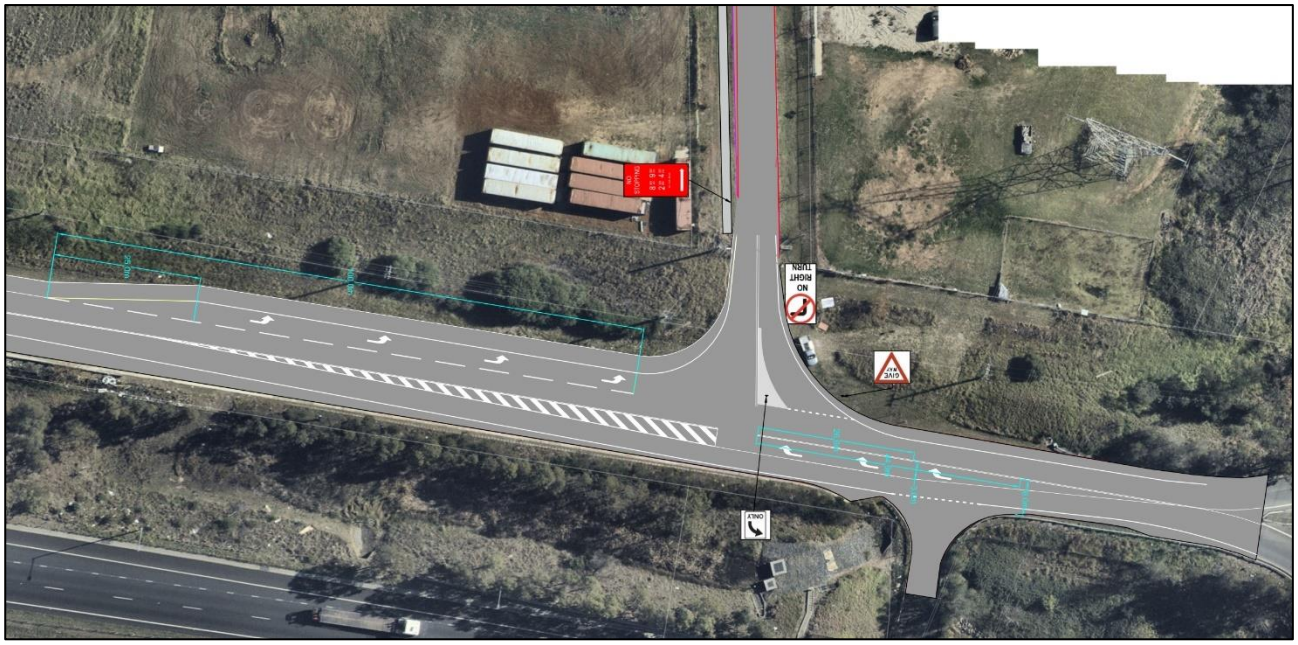


FIGURE 2: PROPOSED INTERSECTION LAYOUT

2.6 Results

2.6.1 Existing (2018)

The intersection performance results outputted by the model for the existing (2018) traffic volumes are summarised in **Table 8**. This the base case against which the "Stage 1" development will be compared. Each of the intersections is reflected to perform at a satisfactory Level of Service (LoS) of "C" or better.

TABLE 8: INTERSECTION PERFORMANCE – EXISTING SIDRA 8.0

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/vehicle)	Level of Service[3]	Control Type	Worst Movement	95th Percentile Queue
EXISTING PERFORMANCE							
Wallgrove Road / The Horsley Drive	AM	0.95	37.4	**C**	Signals	LT from The Horsely Drive (W)	9.6 veh (71.1m) The Horsely Drive (W)
	PM	0.73	29	**C**		RT from Wallgrove Road (S)	6.1 veh (46m) Wallgrove Road (N)
M7 / The Horsley Dr	AM	0.60	27.3	**B**	Signals	RT from M7 (S)	6.3 veh (46m) The Horsley Dr (E)
	PM	0.70	20.9	**B**		RT from M7 (S)	6.4 veh (47.1m) The Horsley Dr (W)
Wallgrove Road / Elizabeth Drive	AM	0.87	35.5	**C**	Signals	RT from Wallgrove Road	26.1 veh (198.7m) Elizabeth Drive
	PM	0.84	34.3	**C**		LT from M7 Exit	18.1 veh (139.3m) Elizabeth Drive
Wallgrove Road / Kosovich Place	AM	0.41	0.1 (Worst: 14.3)	**N/A** (Worst: A)	Give Way	RT from Kosovich Place (E)	0 veh (0.2m) Wallgrove Road (S)
	PM	0.45	0.1 (Worst: 15.3)	**N/A** (Worst: B)		RT from Kosovich Place (E)	0 veh (0.2m) Wallgrove Road (S)
Wallgrove Road / Equestrian Centre	AM	0.46	5 (Worst: 11.1)	**A** (Worst: A)	Roundabout	UT from Wallgrove Road (S)	1.4 veh (10.8m) Wallgrove Road (N)
	PM	0.49	5.7 (Worst: 11.1)	**A** (Worst: A)		UT from Wallgrove Road (S)	4.2 veh (31.3m) Wallgrove Road (N)

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

2.6.2 Existing Plus Stage 1 Development

The intersection performance results outputted by the model for the existing (2018) traffic volumes plus the "Stage 1" are summarised in **Table 9**.

The results reflect that the Stage 1 traffic volumes will have no significant impact on the performance of any of the intersections modelled. All intersections retain their existing LoS, with only a minor increase in delays predicted at each.

TABLE 9: INTERSECTION PERFORMANCE – EXISTING+ STAGE 1 DEVELOPMENT SIDRA 8.0

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/vehicle)	Level of Service[3]	Control Type	Worst Movement	95th Percentile Queue
EXISTING + STAGE 1 DEVELOPMENT PERFORMANCE							
Wallgrove Road / The Horsley Drive	AM	0.95	38.3	**C**	Signals	LT from The Horsely Drive (W)	9.6 veh (71.1m) The Horsely Drive (W)
	PM	0.73	29.8	**C**		RT from Wallgrove Road (S)	5.9 veh (45.5m) The Horsley Drive (E)
M7 / The Horsley Dr	AM	0.61	26.8	**B**	Signals	RT from M7 (S)	6 veh (44m) The Horsley Dr (E)
	PM	0.73	21.2	**B**		RT from M7 (S)	6.9 veh (50.5m) The Horsley Dr (W)
Wallgrove Road / Elizabeth Drive	AM	0.92	33.1	**C**	Signals	LT from M7 Exit	23.4 veh (178.1m) Elizabeth Drive
	PM	0.88	35.9	**C**		LT from M7 Exit	19.7 veh (145.9m) Wallgrove Road
Wallgrove Road / Kosovich Place	AM	0.41	1.6 (Worst: 11.1)	**N/A** (Worst: A)	Give Way	RT from Wallgrove Road (N)	1 veh (6.7m) Kosovich Place (E)
	PM	0.49	1.2 (Worst: 7.6)	**N/A** (Worst: A)		LT from Wallgrove Road (S)	0.5 veh (3.3m) Kosovich Place (E)
Wallgrove Road / Equestrian Centre	AM	0.52	5.5 (Worst: 11.1)	**A** (Worst: A)	Roundabout	UT from Wallgrove Road (S)	2 veh (15.4m) Wallgrove Road (N)
	PM	0.62	6.5 (Worst: 11.1)	**A** (Worst: A)		UT from Wallgrove Road (S)	6.3 veh (46.8m) Wallgrove Road (N)

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

2.6.3 Ten-Year Growth (2028)

The intersection performance results outputted by the model for the future (2028) traffic volumes are summarised in **Table 10**.

The results reflect that the intersections of Wallgrove Road/The Horsley Drive and Wallgrove Road/Elizabeth Drive both reach their practical capacity under the 2028 volume scenario. Both intersections exhibit degrees of saturation of above 1.0, which indicates that the intersection is at capacity.

The other intersections retain an acceptable level of performance in the 2028 volume scenario.

TABLE 10: INTERSECTION PERFORMANCE – EXISTING + 10-YEAR GROWTH SIDRA 8.0

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/vehicle)	Level of Service[3]	Control Type	Worst Movement	95th Percentile Queue
FUTURE 2028 PERFORMANCE							
Wallgrove Road / The Horsley Drive	AM	1.06	60.6	**E**	Signals	LT from The Horsely Drive (W)	20.8 veh (153.5m) The Horsely Drive (W)
	PM	0.84	36.5	**C**		RT from Wallgrove Road (S)	9.6 veh (72.3m) Wallgrove Road (N)
M7 / The Horsley Dr	AM	0.81	33.4	**C**	Signals	RT from M7 (S)	10.4 veh (75.9m) The Horsley Dr (E)
	PM	0.70	22.7	**B**		RT from The Horsley Dr (W)	10.2 veh (74.4m) The Horsley Dr (W)
Wallgrove Road / Elizabeth Drive	AM	1.04	58	**E**	Signals	RT from Wallgrove Road	45.5 veh (346.1m) Elizabeth Drive
	PM	1.16	125.3	**F**		LT from M7 Exit	97.2 veh (720.6m) Wallgrove Road
Wallgrove Road / Kosovich Place	AM	0.43	0.1 (Worst: 15.3)	**N/A** (Worst: B)	Give Way	RT from Kosovich Place (E)	0 veh (0.2m) Wallgrove Road (S)
	PM	0.48	0.1 (Worst: 18.1)	**N/A** (Worst: B)		RT from Kosovich Place (E)	0 veh (0.2m) Wallgrove Road (S)
Wallgrove Road / Equestrian Centre	AM	0.47	5 (Worst: 11.1)	**A** (Worst: A)	Roundabout	UT from Wallgrove Road (S)	1.5 veh (11.8m) Wallgrove Road (N)
	PM	0.53	5.7 (Worst: 11.1)	**A** (Worst: A)		UT from Wallgrove Road (S)	4.8 veh (36m) Wallgrove Road (N)

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

2.6.4 Ten Year Growth + Final Development

The intersection performance results outputted by the model for the future (2028) traffic plus final development volumes are summarised in **Table 11**.

The results indicate that, consistent with the 2028 scenario, the intersections of Wallgrove Road/The Horsley Drive and Wallgrove Road/Elizabeth Drive are at capacity, with degrees of saturation of above 1.0.

The other intersections retain an acceptable level of performance in the 2028 volume scenario.

TABLE 11: INTERSECTION PERFORMANCE – EXISTING + 10-YEAR GROWTH + FINAL DEVELOPMENT SIDRA 8.0

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/vehicle)	Level of Service[3]	Control Type	Worst Movement	95th Percentile Queue
2028 + FINAL DEVELOPMENT PERFORMANCE							
Wallgrove Road / The Horsley Drive	AM	1.16	84.9	**F**	Signals	LT from The Horsely Drive (W)	25.8 veh (190.3m) The Horsely Drive (W)
	PM	0.98	46.2	**D**		T from Wallgrove Road (N)	13 veh (97.9m) Wallgrove Road (N)
M7 / The Horsley Dr	AM	0.95	42.6	**D**	Signals	LT from M7 (N)	12.5 veh (90.6m) The Horsley Dr (E)
	PM	0.69	22.9	**B**		RT from The Horsley Dr (W)	10.3 veh (75m) The Horsley Dr (W)
Wallgrove Road / Elizabeth Drive	AM	1.12	90.4	**F**	Signals	RT from Wallgrove Road	58.6 veh (441.2m) Elizabeth Road
	PM	1.33	189.7	**F**		LT from M7 Exit	152 veh (1115.3m) Wallgrove Road
Wallgrove Road / Kosovich Place	AM	0.60	3.4 (Worst: 14.8)	**N/A** (Worst: B)	Give Way	LT from Kosovich Place (E)	3.6 veh (24.9m) Kosovich Place (E)
	PM	0.59	1.9 (Worst: 7)	**N/A** (Worst: A)		LT from Wallgrove Road (S)	1.6 veh (11m) Kosovich Place (E)
Wallgrove Road / Equestrian Centre	AM	0.63	6.1 (Worst: 11.1)	**A** (Worst: A)	Roundabout	UT from Wallgrove Road (S)	2.9 veh (22.4m) Wallgrove Road (N)
	PM	0.81	8.7 (Worst: 11.1)	**A** (Worst: A)		UT from Wallgrove Road (S)	13.3 veh (98.6m) Wallgrove Road (N)

NOTES:
(1) The Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) The Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) No overall Level of Service is provided for Give Way and Stop controlled intersections as the low delays associated with the dominant movements skew the average delay of the intersection. The Level of Service of the worst approach is an indicator of the operation of the intersection, with a worse Level of Service corresponding to long delays and reduced safety outcomes for that approach.

2.7 Discussion

Considering the results presented in Section 2.6, the following outcomes are relevant to note:

- The proposed, upgraded intersection of Wallgrove Road/Kosovich Place and the intersection of Wallgrove Road/Equestrian Centre will retain a good level of service in the future under both development traffic volume scenarios tested.
- The intersection of Elizabeth Drive/Wallgrove Road reaches its practical capacity in the 2028 base case based on background traffic flow growth and will need to be upgraded by TfNSW prior to 2028 in order to operate satisfactorily. It is expected that the future upgraded intersection will have ample capacity to serve the traffic associated with the school.
    - The previous modelling undertaken by M^{C}Laren Traffic Engineering indicated that in the 2028 scenario, the intersection would continue to operate satisfactorily and that the development traffic would trigger the requirement for upgrades to the intersection.

- The revised modelling, which has been based on newer growth data provided by TfNSW, reflects that the intersection will require upgrade irrespective of the development. It is the responsibility of TfNSW to undertake the upgrades of this intersection between two State Classified Main Roads to provide for the necessary capacity to serve future traffic flows, including those related to the subject application.
- The TfNSW website indicates that the Elizabeth Drive corridor is to be upgraded to cater for projected growth in the Western Sydney Region. It is anticipated that the upgrades will include the intersection of Wallgrove Road/Elizabeth Drive, which is key to the connection between the M7 and Elizabeth Drive.

- The intersection of Wallgrove Road/The Horsley Drive reaches its practical capacity in the 2028 base case based on background traffic flow growth and will need to be upgraded by TfNSW prior to 2028 in order to operate satisfactorily. It is expected that the future upgraded intersection will have ample capacity to serve the traffic associated with the school.
    - The upgrade of the Horsley Drive corridor is currently in the concept design stages and includes upgrades to the intersection of Wallgrove Road and The Horsley Drive. The TfNSW does not provide an estimated date for completion of the upgrade works.
    - It is expected that the upgraded intersection of Wallgrove Road/The Horsley Drive would provide ample capacity to serve the traffic associated with the school.

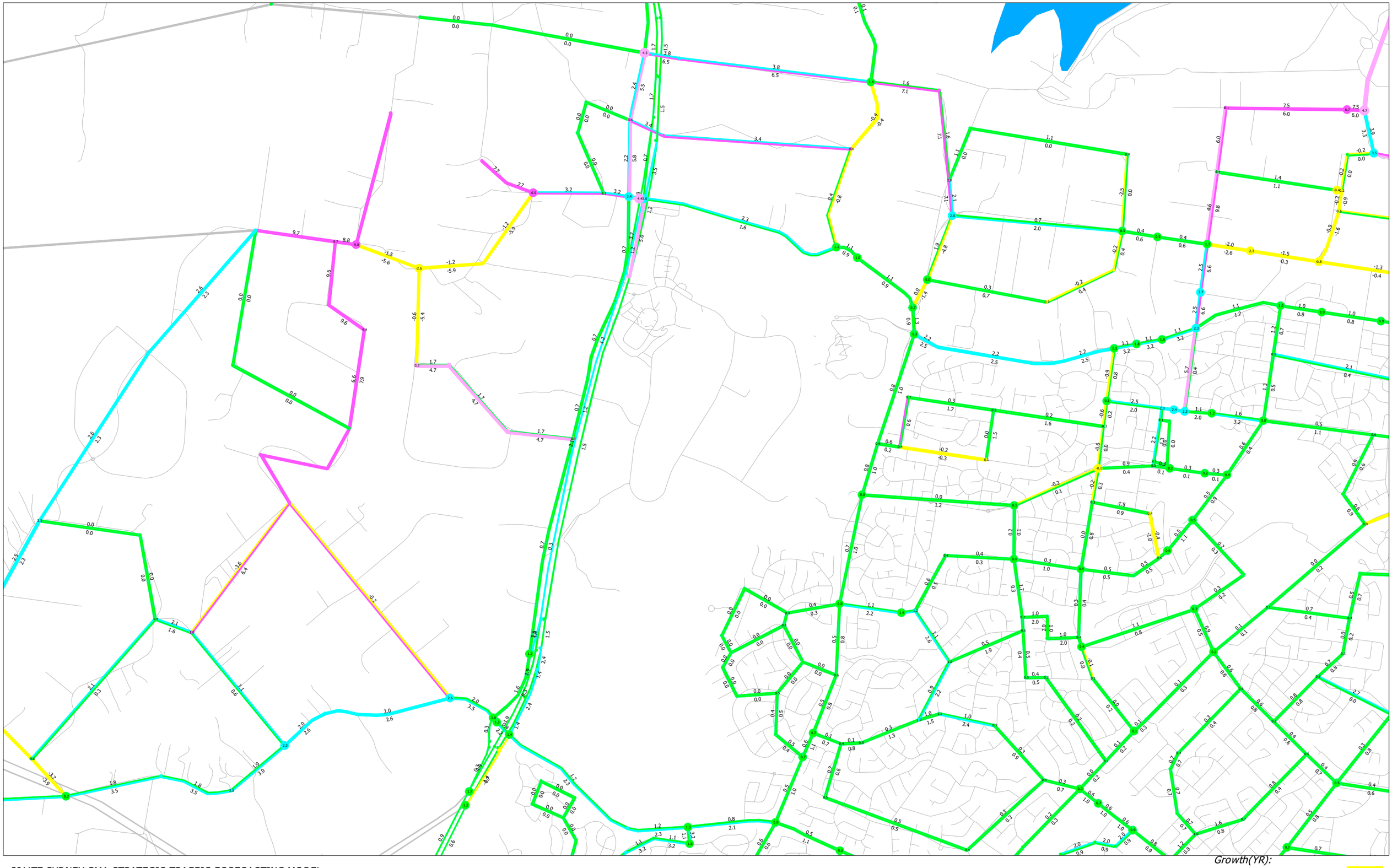
Please contact the undersigned should you require further information or assistance.

Yours faithfully
M^{c}Laren Traffic Engineering

Tom Steal
Senior Traffic Engineer
BE Civil AMAITPM MIEAust
RMS Accredited Level 1 Road Safety Auditor
RMS Accredited Work Zone Traffic Management Plan Designer and Inspector

ANNEXURE A: STM GROWTH PLOTS 2028
(2 SHEETS)

ROAD TRAFFIC GROWTH (%YR, 2HRSPK) LINKS & INTERSECTIONS

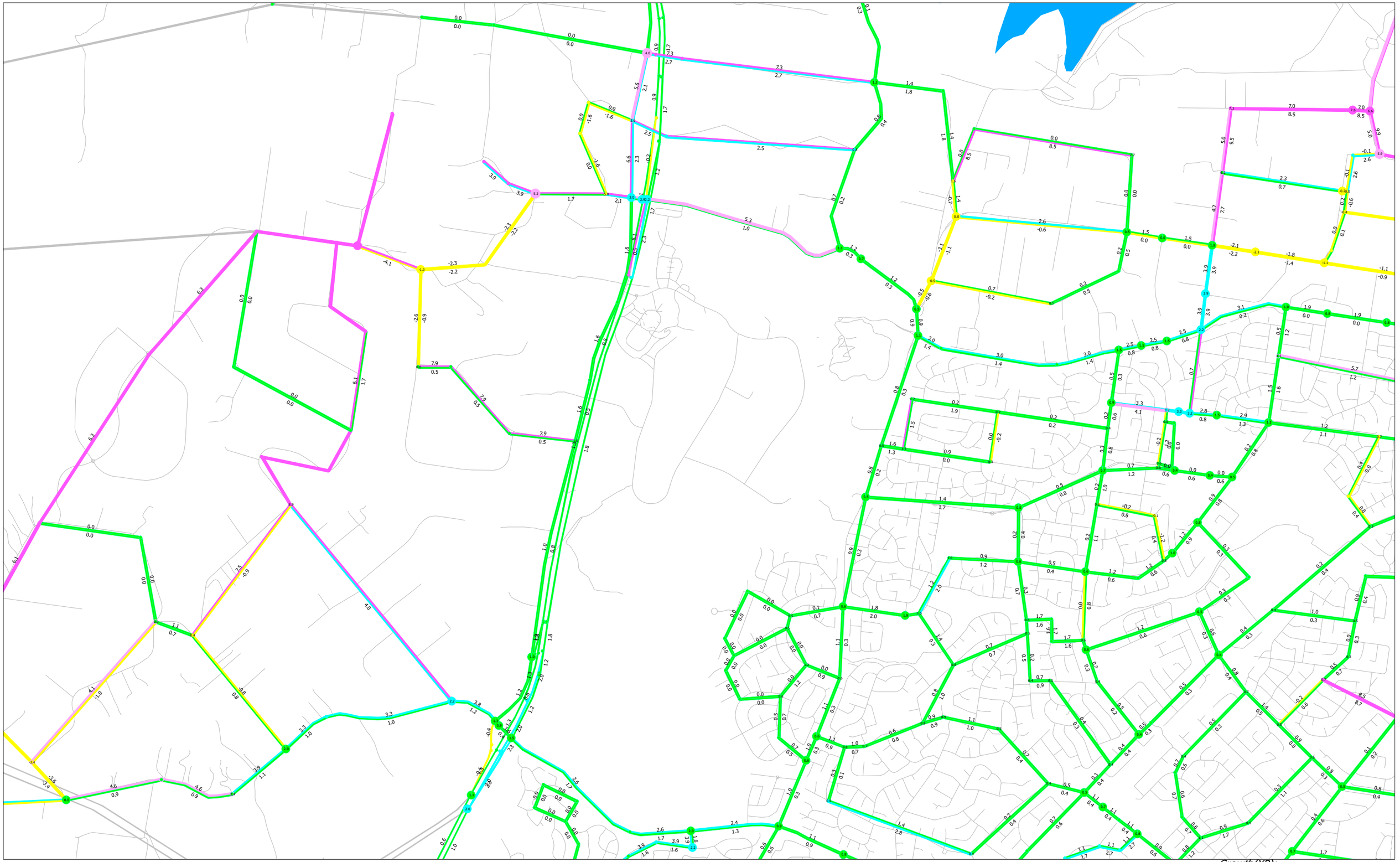


2011TZ SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL
Scenario 2031: 2031 SYDTRAFFICFORECASTMODELTZ11LU16V151STMV362-7-9AM(mf35)
2020-08-11 09:48

Growth(YR):

- <0
- <2.00
- 2.01-4.00
- 4.01-6.00
- >6.00
- New Links=999

ROAD TRAFFIC GROWTH (%YR, 2HRSPK) LINKS & INTERSECTIONS



2011TZ SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL
Scenario 20310: 2031 SYDTRAFFICFORECASTMODELTZ11LU16V151STMV362-4-6PM(mf55)
2020-08-11 09:47

Growth(YR):

- <0
- <2.00
- 2.01-4.00
- 4.01-6.00
- >6.00
- New Links=999

ANNEXURE B: TRAFFIC VOLUMES
(5 SHEETS)

The Horsley DR/Wallgrove Road

Existing

Light Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	33	195	156	0	313	204	21	0	93	464	74	0	37	230	54
14:45	15:45	0	52	380	197	0	204	113	69	0	38	164	30	0	35	120	24

Heavy Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	6	39	70	0	77	18	9	0	11	50	1	0	8	15	4
14:45	15:45	0	8	37	54	0	56	18	11	0	6	26	3	0	3	20	3

Growth Rates

Growth Rates

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.058	0.058	0.058	0.058	0.016	0.016	0.016	0.016	0.007	0.007	0.007	0.007	0.032	0.032	0.032	0.032
14:45	15:45	0.023	0.023	0.023	0.023	0.01	0.01	0.01	0.01	0.016	0.016	0.016	0.016	0.06	0.06	0.06	0.06

Heavy Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.058	0.058	0.058	0.058	0.016	0.016	0.016	0.016	0.007	0.007	0.007	0.007	0.032	0.032	0.032	0.032
14:45	15:45	0.023	0.023	0.023	0.023	0.01	0.01	0.01	0.01	0.016	0.016	0.016	0.016	0.06	0.06	0.06	0.06

10 Year Growth Volumes

10 Year Growth Volumes

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	52	308	246	0	363	237	24	0	100	496	79	0	49	304	71
14:45	15:45	0	64	467	242	0	224	124	76	0	44	190	35	0	56	192	38

Heavy Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	9	62	111	0	89	21	10	0	12	54	1	0	11	20	5
14:45	15:45	0	10	46	66	0	62	20	12	0	7	30	3	0	5	32	5

Development % IN

Development % IN

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00								0.2						0.1		
14:45	15:45								0.35						0.05		

Heavy Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Development % OUT

Development % OUT

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00										0.35		0.05				
14:45	15:45										0.2		0.1				

Heavy Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Stage 1 Development Volumes

Stage 1 Development Volumes

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	0	25	0	40	0	6	0	13	0	0
14:45	15:45	0	0	0	0	0	0	0	44	0	23	0	11	0	6	0	0

Heavy Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Existing + Stage 1 Development Volumes

Existing + Stage 1 Development Volumes

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	33	195	156	0	313	204	46	0	133	464	80	0	50	230	54
14:45	15:45	0	52	380	197	0	204	113	113	0	61	164	41	0	41	120	24

Heavy Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	6	39	70	0	77	18	9	0	11	50	1	0	8	15	4
14:45	15:45	0	8	37	54	0	56	18	11	0	6	26	3	0	3	20	3

Stage 2 Development Volumes

Stage 2 Development Volumes

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	0	61	0	95	0	14	0	31	0	0
14:45	15:45	0	0	0	0	0	0	0	107	0	54	0	27	0	15	0	0

Heavy Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

10 Year Growth + Stage 2 Development Volumes

10 Year Growth + Stage 2 Development Volumes

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	52	308	246	0	363	237	85	0	195	496	93	0	80	304	71
14:45	15:45	0	64	467	242	0	224	124	183	0	98	190	62	0	71	192	38

Heavy Vehicles

Peak Time		North Approach Wallgrove Rd				East Approach The Horsley Dr				South Approach Wallgrove Rd				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	9	62	111	0	89	21	10	0	12	54	1	0	11	20	5
14:45	15:45	0	10	46	66	0	62	20	12	0	7	30	3	0	5	32	5

The Horsley DR/M7

Existing

Light Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	29	0	455	0	200	512	194	0	363	0	71	0	33	491	40
14:45	15:45	0	38	0	228	0	200	502	378	0	210	0	64	0	52	485	48

Heavy Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	1	0	24	0	20	27	10	0	19	0	4	0	2	26	2
14:45	15:45	0	2	0	12	0	20	26	20	0	11	0	3	0	3	26	2

Growth Rates

Growth Rates

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.035	0.035	0.035	0.035	0.016	0.016	0.016	0.016	0.037	0.037	0.037	0.037	0.032	0.032	0.032	0.032
14:45	15:45	0.012	0.012	0.012	0.012	0.01	0.01	0.01	0.01	0.005	0.005	0.005	0.005	0.05	0.05	0.05	0.05

Heavy Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.035	0.035	0.035	0.035	0.016	0.016	0.016	0.016	0.037	0.037	0.037	0.037	0.032	0.032	0.032	0.032
14:45	15:45	0.012	0.012	0.012	0.012	0.01	0.01	0.01	0.01	0.005	0.005	0.005	0.005	0.05	0.05	0.05	0.05

10 Year Growth Volumes

10 Year Growth Volumes

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	39	0	614	0	232	594	225	0	497	0	97	0	44	648	53
14:45	15:45	0	43	0	255	0	220	552	416	0	221	0	67	0	78	728	72

Heavy Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	1	0	32	0	23	31	12	0	26	0	5	0	3	34	3
14:45	15:45	0	2	0	13	0	22	29	22	0	12	0	3	0	5	39	3

Development % IN

Development % IN

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00							0.2									
14:45	15:45							0.35									

Heavy Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Development % OUT

Development % OUT

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00															0.35	
14:45	15:45															0.2	

Heavy Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Stage 1 Development Volumes

Stage 1 Development Volumes

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	25	0	0	0	0	0	0	0	40	0
14:45	15:45	0	0	0	0	0	0	44	0	0	0	0	0	0	0	23	0

Heavy Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Existing + Stage 1 Development Volumes

Existing + Stage 1 Development Volumes

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	29	0	455	0	200	537	194	0	363	0	71	0	33	531	40
14:45	15:45	0	38	0	228	0	200	546	378	0	210	0	64	0	52	508	48

Heavy Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	1	0	24	0	20	27	10	0	19	0	4	0	2	26	2
14:45	15:45	0	2	0	12	0	20	26	20	0	11	0	3	0	3	26	2

Stage 2 Development Volumes

Stage 2 Development Volumes

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	61	0	0	0	0	0	0	0	95	0
14:45	15:45	0	0	0	0	0	0	107	0	0	0	0	0	0	0	54	0

Heavy Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

10 Year Growth + Stage 2 Development Volumes

10 Year Growth + Stage 2 Development Volumes

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	39	0	614	0	232	655	225	0	497	0	97	0	44	743	53
14:45	15:45	0	43	0	255	0	220	659	416	0	221	0	67	0	78	782	72

Heavy Vehicles

Peak Time		North Approach M7				East Approach The Horsley Dr				South Approach M7				West Approach The Horsley Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	1	0	32	0	23	31	12	0	26	0	5	0	3	34	3
14:45	15:45	0	2	0	13	0	22	29	22	0	12	0	3	0	5	39	3

Wallgrove Road/Elizabeth Drive

Existing

Light Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	75	0	183	0	561	559	0	0	17	55	63	0	0	817	327
14:45	15:45	0	216	0	394	0	272	608	0	0	22	33	93	0	0	665	152

Heavy Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	21	0	23	0	38	99	0	0	7	10	56	0	0	91	79
14:45	15:45	0	33	0	29	0	30	108	0	0	2	8	73	0	0	86	44

Growth Rates

Growth Rates

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.03	0.03	0.03	0.03	0.022	0.022	0.022	0.022	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02
14:45	15:45	0.08	0.08	0.08	0.08	0.004	0.004	0.004	0.004	-0.004	-0.004	-0.004	-0.004	0.038	0.038	0.038	0.038

Heavy Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.03	0.03	0.03	0.03	0.022	0.022	0.022	0.022	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02
14:45	15:45	0.08	0.08	0.08	0.08	0.004	0.004	0.004	0.004	-0.004	-0.004	-0.004	-0.004	0.038	0.038	0.038	0.038

10 Year Growth Volumes

10 Year Growth Volumes

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	98	0	238	0	684	682	0	0	22	72	82	0	0	980	392
14:45	15:45	0	389	0	709	0	283	632	0	0	21	32	89	0	0	918	210

Heavy Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	27	0	30	0	46	121	0	0	9	13	73	0	0	109	95
14:45	15:45	0	59	0	52	0	31	112	0	0	2	8	70	0	0	119	61

Development % IN

Development % IN

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00						0.5					0.1					0.1
14:45	15:45						0.55					0.1					0.05

Heavy Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Development % OUT

Development % OUT

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00		0.05		0.55												
14:45	15:45		0.1		0.6												

Heavy Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Stage 1 Development Volumes

Stage 1 Development Volumes

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	6	0	62	0	63	0	0	0	0	13	0	0	0	0	13
14:45	15:45	0	11	0	68	0	69	0	0	0	0	13	0	0	0	0	6

Heavy Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Existing + Stage 1 Development Volumes

Existing + Stage 1 Development Volumes

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	81	0	245	0	624	559	0	0	17	68	63	0	0	817	340
14:45	15:45	0	227	0	462	0	341	608	0	0	22	46	93	0	0	665	158

Heavy Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	21	0	23	0	38	99	0	0	7	10	56	0	0	91	79
14:45	15:45	0	33	0	29	0	30	108	0	0	2	8	73	0	0	86	44

Stage 2 Development Volumes

Stage 2 Development Volumes

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	14	0	150	0	154	0	0	0	0	31	0	0	0	0	31
14:45	15:45	0	27	0	163	0	169	0	0	0	0	31	0	0	0	0	15

Heavy Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

10 Year Growth + Stage 2 Development Volumes

10 Year Growth + Stage 2 Development Volumes

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	112	0	388	0	838	682	0	0	22	103	82	0	0	980	423
14:45	15:45	0	416	0	872	0	452	632	0	0	21	63	89	0	0	918	225

Heavy Vehicles

Peak Time		North Approach Wallgrove				East Approach Elizabeth Dr				South Approach M7				West Approach Elizabeth Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	27	0	30	0	46	121	0	0	9	13	73	0	0	109	95
14:45	15:45	0	59	0	52	0	31	112	0	0	2	8	70	0	0	119	61

Wallgrove Road/Kosovich Place

Existing

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	1	316								714	2		2		2
14:45	15:45		1	759								315	1		2		1

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00			54								55					
14:45	15:45			65								41					

Growth Rates

Growth Rates

Growth Rates

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.007	0.007	0.007	0.007					0.003	0.003	0.003	0.003	0	0	0	0
14:45	15:45	0.008	0.008	0.008	0.008					0.01	0.01	0.01	0.01	0	0	0	0

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.007	0.007	0.007	0.007					0.003	0.003	0.003	0.003	0	0	0	0
14:45	15:45	0.008	0.008	0.008	0.008					0.01	0.01	0.01	0.01	0	0	0	0

10 Year Growth Volumes

10 Year Growth Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	1	338	0					0	0	735	2	0	2	0	2
14:45	15:45	0	1	820	0					0	0	347	1	0	2	0	1

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	58	0					0	0	57	0	0	0	0	0
14:45	15:45	0	0	70	0					0	0	45	0	0	0	0	0

Development % IN

Development % IN

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00		0.3										0.7				
14:45	15:45		0.4										0.6				

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Development % OUT

Development % OUT

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00			0.6													1
14:45	15:45			0.7													1

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Stage 1 Development Volumes

Stage 1 Development Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	38	68	0					0	0	0	88	0	0	0	113
14:45	15:45	0	50	79	0					0	0	0	75	0	0	0	113

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0					0	0	0	0	0	0	0	0
14:45	15:45	0	0	0	0					0	0	0	0	0	0	0	0

Existing + Stage 1 Development Volumes

Existing + Stage 1 Development Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	39	384	0					0	0	714	90	0	2	0	115
14:45	15:45	0	51	838	0					0	0	315	76	0	2	0	114

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	54	0					0	0	55	0	0	0	0	0
14:45	15:45	0	0	65	0					0	0	41	0	0	0	0	0

Stage 2 Development Volumes

Stage 2 Development Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	92	163	0					0	0	0	215	0	0	0	272
14:45	15:45	0	123	190	0					0	0	0	184	0	0	0	272

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0					0	0	0	0	0	0	0	0
14:45	15:45	0	0	0	0					0	0	0	0	0	0	0	0

10 Year Growth + Stage 2 Development Volumes

10 Year Growth + Stage 2 Development Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	93	501	0					0	0	735	217	0	2	0	274
14:45	15:45	0	124	1010	0					0	0	347	185	0	2	0	273

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				West Approach Kosovich Place			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	58	0					0	0	57	0	0	0	0	0
14:45	15:45	0	0	70	0					0	0	45	0	0	0	0	0

Wallgrove Road/Equestrian Centre

Existing

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00			317								716					
14:45	15:45			760								316					

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00			54								55					
14:45	15:45			65								41					

Growth Rates

Growth Rates

Growth Rates

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.007	0.007	0.007	0.007					0.003	0.003	0.003	0.003				
14:45	15:45	0.008	0.008	0.008	0.008					0.01	0.01	0.01	0.01				

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0.007	0.007	0.007	0.007					0.003	0.003	0.003	0.003				
14:45	15:45	0.008	0.008	0.008	0.008					0.01	0.01	0.01	0.01				

10 Year Growth Volumes

10 Year Growth Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	339	0					0	0	737	0				
14:45	15:45	0	0	821	0					0	0	348	0				

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	58	0					0	0	57	0				
14:45	15:45	0	0	70	0					0	0	45	0				

Development % IN

Development % IN

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00			0.3													
14:45	15:45			0.4													

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Development % OUT

Development % OUT

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00									0.6		0.4					
14:45	15:45									0.7		0.3					

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00																
14:45	15:45																

Stage 1 Development Volumes

Stage 1 Development Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	38	0					68	0	45	0				
14:45	15:45	0	0	50	0					79	0	34	0				

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0					0	0	0	0				
14:45	15:45	0	0	0	0					0	0	0	0				

Existing + Stage 1 Development Volumes

Existing + Stage 1 Development Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	355	0					68	0	761	0				
14:45	15:45	0	0	810	0					79	0	350	0				

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	54	0					0	0	55	0				
14:45	15:45	0	0	65	0					0	0	41	0				

Stage 2 Development Volumes

Stage 2 Development Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	92	0					163	0	109	0				
14:45	15:45	0	0	123	0					190	0	82	0				

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	0	0					0	0	0	0				
14:45	15:45	0	0	0	0					0	0	0	0				

10 Year Growth + Stage 2 Development Volumes

10 Year Growth + Stage 2 Development Volumes

Light Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	431	0					163	0	846	0				
14:45	15:45	0	0	944	0					190	0	430	0				

Heavy Vehicles

Peak Time		North Approach Wallgrove				-				South Approach Wallgrove				-			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
8:00	9:00	0	0	58	0					0	0	57	0				
14:45	15:45	0	0	70	0					0	0	45	0				

ANNEXURE C: INTERSECTION PHASING HISTORY – WALLGROVE/ELIZABETH

(5 SHEETS)

Wednesday, 25 July 2018, 7:45:00 AM to Wednesday, 25 July 2018, 8:00:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	38	55	46	370
B phase	8	25	31	27	222
C phase	7	12	16	13	96
D phase	8	17	29	19	159
Nominal cycle length	9	96	112	104	939
Active cycle length	9	96	112	104	939
Actual cycle	8	94	117	105	847
Split plan 4	1	96	96	96	96
Signal group 1	9	32	49	39	355
Signal group 2	8	57	79	68	545
Signal group 3	8	19	25	21	175
Signal group 4	7	6	10	7	53
Signal group 5	8	11	22	13	108
Signal group 6	8	21	38	33	270
Signal group 9	8	58	89	76	608
Pedestrian movement 2	8	58	89	76	608

Wednesday, 25 July 2018, 8:00:00 AM to Wednesday, 25 July 2018, 8:15:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	40	57	47	333
B phase	8	26	36	31	255
C phase	8	13	18	15	122
D phase	8	17	22	19	156
Nominal cycle length	7	107	120	114	802
Active cycle length	7	107	120	114	802
Actual cycle	7	103	127	115	806
Signal group 1	7	34	51	41	291
Signal group 2	7	64	85	74	520
Signal group 3	8	20	30	25	207
Signal group 4	8	7	12	9	74
Signal group 5	8	11	16	13	107
Signal group 6	8	35	45	41	329
Signal group 9	7	76	97	85	596
Pedestrian movement 2	7	76	97	85	596

Wednesday, 25 July 2018, 8:15:00 AM to Wednesday, 25 July 2018, 8:30:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	29	59	41	333
B phase	9	23	33	28	260
C phase	7	15	22	16	118
D phase	8	17	26	21	168
Nominal cycle length	7	85	120	101	713
Active cycle length	7	85	120	101	713
Actual cycle	7	87	127	107	749
Split plan 4	1	120	120	120	120
Signal group 1	8	23	53	35	285
Signal group 2	8	52	84	64	512
Signal group 3	9	17	27	22	206
Signal group 4	7	9	16	10	75

Signal group 5	8	11	20	14	119
Signal group 6	9	23	43	35	323
Signal group 9	8	43	96	70	565
Pedestrian movement 2	8	43	96	70	565

Wednesday, 25 July 2018, 8:30:00 AM to Wednesday, 25 July 2018, 8:45:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	11	22	53	31	341
B phase	11	12	29	21	233
C phase	9	12	14	12	116
D phase	10	17	23	18	182
Nominal cycle length	11	70	99	81	891
Active cycle length	11	70	99	81	891
Actual cycle	10	67	111	81	813
Split plan 3	1	98	98	98	98
Split plan 4	2	97	170	133	267
Signal group 1	11	16	47	24	274
Signal group 2	11	32	72	46	507
Signal group 3	11	6	23	15	167
Signal group 4	9	6	8	6	59
Signal group 5	11	11	16	12	134
Signal group 6	11	18	32	25	280
Signal group 9	11	33	81	50	559
Pedestrian movement 2	11	33	81	50	560

Wednesday, 25 July 2018, 8:45:00 AM to Wednesday, 25 July 2018, 9:00:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	10	16	64	33	334
B phase	10	17	30	23	239
C phase	8	12	16	13	109
D phase	10	17	26	20	201
Nominal cycle length	11	64	108	89	989
Active cycle length	11	64	108	89	989
Actual cycle	10	62	128	88	883
Split plan 4	1	87	87	87	87
Signal group 1	10	10	58	27	275
Signal group 2	10	27	86	51	513
Signal group 3	10	11	24	17	178
Signal group 4	8	6	10	7	60
Signal group 5	10	11	20	13	139
Signal group 6	10	19	38	28	286
Signal group 9	10	25	98	56	569
Pedestrian movement 2	10	25	98	56	569

Wednesday, 25 July 2018, 9:00:00 AM to Wednesday, 25 July 2018, 9:15:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	10	13	48	30	304
B phase	11	12	31	22	243
C phase	8	12	18	12	103
D phase	10	17	31	21	215
Nominal cycle length	10	60	113	87	873
Active cycle length	10	60	113	87	873

Actual cycle	10	57	116	83	836
Split plan 2	2	95	449	272	544
Split plan 4	1	83	83	83	83
Signal group 1	10	7	48	25	258
Signal group 2	10	19	70	41	411
Signal group 3	9	6	16	11	99
Signal group 4	11	8	19	11	131
Signal group 5	11	10	18	13	146
Signal group 6	10	8	38	26	268
Signal group 9	10	30	82	52	527
Pedestrian movement 2	10	30	82	52	527

Wednesday, 25 July 2018, 2:30:00 PM to Wednesday, 25 July 2018, 2:45:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	11	15	44	29	321
B phase	11	13	22	18	204
C phase	10	12	20	16	163
D phase	10	17	25	20	208
Nominal cycle length	10	60	103	84	847
Active cycle length	10	60	103	84	847
Actual cycle	10	54	103	85	850
Split plan 2	1	80	80	80	80
Split plan 3	1	88	88	88	88
Split plan 4	1	203	203	203	203
Signal group 1	10	9	38	22	223
Signal group 2	10	28	57	40	406
Signal group 3	11	7	16	12	138
Signal group 4	10	6	14	10	103
Signal group 5	10	11	19	14	145
Signal group 6	11	15	36	27	301
Signal group 9	10	21	69	49	496
Pedestrian movement 2	10	21	69	49	496

Wednesday, 25 July 2018, 2:45:00 PM to Wednesday, 25 July 2018, 3:00:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	12	13	43	29	353
B phase	10	12	20	14	143
C phase	10	13	17	15	150
D phase	11	17	31	20	221
Nominal cycle length	11	60	90	79	869
Active cycle length	11	60	90	79	869
Actual cycle	11	57	96	75	833
Split plan 2	1	121	121	121	121
Split plan 3	2	67	71	69	138
Split plan 4	2	85	404	244	489
Signal group 1	12	7	37	23	281
Signal group 2	12	19	51	37	445
Signal group 3	11	6	15	8	98
Signal group 4	10	7	11	9	90
Signal group 5	11	11	25	13	153
Signal group 6	11	8	28	20	227
Signal group 9	11	30	63	45	495
Pedestrian movement 2	11	30	63	45	495

Wednesday, 25 July 2018, 3:00:00 PM to Wednesday, 25 July 2018, 3:15:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	11	16	42	28	308
B phase	10	13	25	19	195
C phase	11	14	24	17	192
D phase	11	17	21	18	198
Nominal cycle length	11	65	97	82	910
Active cycle length	11	65	97	82	910
Actual cycle	10	62	105	83	835
Split plan 2	1	96	96	96	96
Split plan 3	1	262	262	262	262
Signal group 1	11	10	36	22	242
Signal group 2	11	23	61	40	448
Signal group 3	11	6	19	12	140
Signal group 4	11	8	18	11	125
Signal group 5	11	11	15	11	130
Signal group 6	10	22	39	30	309
Signal group 9	10	35	73	53	538
Pedestrian movement 2	10	35	73	53	539

Wednesday, 25 July 2018, 3:15:00 PM to Wednesday, 25 July 2018, 3:30:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	26	54	36	291
B phase	8	15	21	17	142
C phase	9	19	33	27	246
D phase	9	19	25	21	197
Nominal cycle length	9	90	117	105	950
Active cycle length	9	90	117	105	950
Actual cycle	8	88	130	104	838
Split plan 2	1	115	115	115	115
Split plan 4	2	108	116	112	224
Signal group 1	8	20	48	30	243
Signal group 2	8	38	69	48	385
Signal group 3	8	9	15	11	94
Signal group 4	9	13	27	21	192
Signal group 5	9	13	19	15	142
Signal group 6	8	34	47	40	321
Signal group 9	8	50	81	60	481
Pedestrian movement 2	8	50	81	60	481

Wednesday, 25 July 2018, 3:30:00 PM to Wednesday, 25 July 2018, 3:45:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	25	47	37	263
B phase	8	20	28	23	190
C phase	8	22	28	25	207
D phase	8	20	31	25	205
Nominal cycle length	3	104	120	111	333
Active cycle length	3	104	120	111	333
Actual cycle	7	98	124	113	793
Split plan 3	1	240	240	240	240
Signal group 1	7	19	41	31	221

Signal group 2	7	44	66	55	391
Signal group 3	8	14	22	17	142
Signal group 4	8	16	22	19	158
Signal group 5	8	14	25	19	156
Signal group 6	8	40	50	43	348
Signal group 9	7	56	78	67	475
Pedestrian movement 2	7	56	78	67	475

Wednesday, 25 July 2018, 3:45:00 PM to Wednesday, 25 July 2018, 4:00:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	22	60	35	321
B phase	10	17	22	19	194
C phase	9	13	24	17	157
D phase	9	17	27	20	184
Nominal cycle length	9	78	118	92	830
Active cycle length	9	78	118	92	830
Actual cycle	8	73	130	92	742
Split plan 2	1	78	78	78	78
Split plan 3	2	168	256	212	424
Signal group 1	9	16	54	29	267
Signal group 2	9	34	75	49	442
Signal group 3	10	11	16	13	134
Signal group 4	9	7	18	11	103
Signal group 5	9	11	20	14	127
Signal group 6	9	27	39	31	279
Signal group 9	9	45	87	60	546
Pedestrian movement 2	9	45	87	60	546

Wednesday, 25 July 2018, 4:00:00 PM to Wednesday, 25 July 2018, 4:15:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	37	52	42	294
B phase	7	17	24	20	146
C phase	7	26	35	30	214
D phase	8	22	29	25	203
Nominal cycle length	6	116	120	117	707
Active cycle length	6	116	120	117	707
Actual cycle	7	110	129	119	835
Split plan 4	1	356	356	356	356
Signal group 1	8	26	46	34	278
Signal group 2	7	50	63	56	398
Signal group 3	7	11	18	14	104
Signal group 4	7	20	29	24	172
Signal group 5	8	16	23	19	153
Signal group 6	7	42	52	45	318
Signal group 9	7	62	75	68	482
Pedestrian movement 2	7	62	75	68	482

Wednesday, 25 July 2018, 4:15:00 PM to Wednesday, 25 July 2018, 4:30:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	35	52	42	298
B phase	8	20	24	22	177
C phase	8	27	35	31	248

ANNEXURE D: INTERSECTION PHASING HISTORY – WALLGROVE/THE HORSLEY

(5 SHEETS)

Wednesday, 25 July 2018, 7:30:00 AM to Wednesday, 25 July 2018, 7:45:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	28	65	44	313
D phase	7	14	37	33	231
E phase	7	24	32	29	207
G phase	6	18	29	22	133
Nominal cycle length	7	107	120	115	807
Active cycle length	7	107	120	115	807
Actual cycle	6	101	157	128	771
Signal group 1	7	21	58	36	257
Signal group 2	6	26	58	46	279
Signal group 3	5	6	14	10	51
Signal group 4	6	11	22	14	88
Signal group 5	7	22	62	46	327
Signal group 6	7	16	37	24	169
Signal group 7	6	27	30	29	175
Signal group 8	4	6	13	8	32
Signal group 9	7	21	95	68	478
Signal group 10	6	26	70	54	328
Signal group 11	6	11	21	14	87
Signal group 12	5	5	14	10	50

Wednesday, 25 July 2018, 7:45:00 AM to Wednesday, 25 July 2018, 8:00:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	15	50	30	243
D phase	8	17	38	26	213
E phase	8	21	38	29	238
G phase	8	15	31	22	181
Nominal cycle length	8	94	120	104	837
Active cycle length	8	94	120	104	837
Actual cycle	8	88	136	109	875
Signal group 1	9	7	42	21	189
Signal group 2	8	7	73	29	237
Signal group 3	6	5	12	7	45
Signal group 4	8	7	24	15	122
Signal group 5	8	31	57	44	352
Signal group 6	8	14	31	22	178
Signal group 7	8	10	31	19	157
Signal group 8	3	6	7	6	20
Signal group 9	8	25	79	49	397
Signal group 10	8	7	88	35	280
Signal group 11	8	7	24	15	121
Signal group 12	6	5	12	7	45

Wednesday, 25 July 2018, 8:00:00 AM to Wednesday, 25 July 2018, 8:15:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	14	39	23	189
D phase	9	25	38	30	274
E phase	9	23	36	28	260
G phase	8	15	25	19	155
Nominal cycle length	6	78	120	96	576
Active cycle length	6	78	120	96	576

Actual cycle	7	78	128	101	711
Signal group 1	8	7	46	19	155
Signal group 2	8	7	42	22	182
Signal group 3	7	6	12	8	62
Signal group 4	7	9	18	14	101
Signal group 5	9	40	62	48	438
Signal group 6	9	16	29	21	193
Signal group 7	9	17	31	23	208
Signal group 8	2	7	8	7	15
Signal group 9	8	32	82	51	410
Signal group 10	8	7	48	26	214
Signal group 11	7	9	18	14	100
Signal group 12	7	6	12	8	60

Wednesday, 25 July 2018, 8:15:00 AM to Wednesday, 25 July 2018, 8:30:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	15	39	22	201
D phase	9	14	35	25	233
E phase	9	25	38	30	277
G phase	8	18	26	22	179
Nominal cycle length	9	89	118	100	907
Active cycle length	9	89	118	100	907
Actual cycle	8	93	119	101	812
Signal group 1	9	7	31	14	130
Signal group 2	8	12	54	27	222
Signal group 3	4	6	15	9	37
Signal group 4	8	11	19	15	123
Signal group 5	9	28	56	43	395
Signal group 6	9	17	43	24	223
Signal group 7	8	11	28	20	162
Signal group 8	3	7	13	9	27
Signal group 9	9	27	66	39	353
Signal group 10	8	14	74	34	272
Signal group 11	8	11	18	15	121
Signal group 12	4	6	14	9	36

Wednesday, 25 July 2018, 8:30:00 AM to Wednesday, 25 July 2018, 8:45:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	15	83	33	265
D phase	8	16	37	30	242
E phase	7	21	38	31	217
G phase	7	14	28	19	139
Nominal cycle length	8	89	120	105	847
Active cycle length	8	89	120	105	847
Actual cycle	7	83	168	113	794
Signal group 1	8	6	93	27	219
Signal group 2	8	10	75	32	259
Signal group 3	5	6	11	9	45
Signal group 4	6	5	21	12	72
Signal group 5	8	30	62	48	389
Signal group 6	8	13	30	23	187
Signal group 7	8	9	30	23	186
Signal group 8	3	7	9	7	23

Signal group 9	8	34	131	58	469
Signal group 10	8	15	90	38	306
Signal group 11	6	5	20	11	71
Signal group 12	5	6	11	8	43

Wednesday, 25 July 2018, 8:45:00 AM to Wednesday, 25 July 2018, 9:00:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	16	80	38	266
D phase	7	24	37	33	236
E phase	7	26	33	30	213
G phase	8	15	25	18	149
Nominal cycle length	7	108	119	114	802
Active cycle length	7	108	119	114	802
Actual cycle	7	96	173	120	846
Signal group 1	8	8	76	30	244
Signal group 2	8	15	72	34	276
Signal group 3	7	6	12	8	58
Signal group 4	8	5	19	10	86
Signal group 5	7	25	57	43	307
Signal group 6	7	19	26	22	159
Signal group 7	7	17	31	26	188
Signal group 8	5	7	16	10	54
Signal group 9	7	43	111	65	459
Signal group 10	7	22	95	46	327
Signal group 11	8	5	19	10	84
Signal group 12	7	6	12	8	56

Wednesday, 25 July 2018, 9:00:00 AM to Wednesday, 25 July 2018, 9:15:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	15	57	29	264
D phase	9	18	37	25	228
E phase	9	20	32	27	246
G phase	8	14	26	18	148
Nominal cycle length	9	70	110	92	830
Active cycle length	9	70	110	92	830
Actual cycle	8	64	122	93	750
Signal group 1	9	7	49	25	232
Signal group 2	9	7	49	24	218
Signal group 3	7	6	20	10	72
Signal group 4	6	7	14	10	65
Signal group 5	9	21	47	35	321
Signal group 6	9	12	42	22	201
Signal group 7	8	10	31	18	151
Signal group 8	4	6	14	8	34
Signal group 9	9	7	76	45	408
Signal group 10	9	7	63	29	268
Signal group 11	6	7	14	10	64
Signal group 12	7	6	19	10	71

Wednesday, 25 July 2018, 9:15:00 AM to Wednesday, 25 July 2018, 9:30:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	16	49	35	283

Signal group 6	9	14	31	19	179
Signal group 7	8	7	30	17	138
Signal group 8	6	6	14	8	51
Signal group 9	9	22	93	48	435
Signal group 10	9	21	83	37	339
Signal group 11	8	4	14	8	71
Signal group 12	8	5	12	8	69

Wednesday, 25 July 2018, 2:45:00 PM to Wednesday, 25 July 2018, 3:00:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	15	59	36	326
D phase	9	18	39	26	234
E phase	7	22	31	26	182
G phase	8	15	24	18	145
Nominal cycle length	9	71	120	92	831
Active cycle length	9	71	120	92	831
Actual cycle	8	76	145	106	854
Signal group 1	9	7	51	28	259
Signal group 2	9	7	59	33	305
Signal group 3	5	6	16	11	57
Signal group 4	8	8	13	10	80
Signal group 5	8	24	55	37	297
Signal group 6	7	14	24	18	129
Signal group 7	9	11	32	19	173
Signal group 8	3	6	8	7	22
Signal group 9	9	26	86	55	503
Signal group 10	9	7	63	39	351
Signal group 11	8	8	13	9	79
Signal group 12	5	6	16	11	56

Wednesday, 25 July 2018, 3:00:00 PM to Wednesday, 25 July 2018, 3:15:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	15	36	25	206
D phase	8	24	35	32	262
E phase	7	25	36	32	225
G phase	8	16	26	19	155
Nominal cycle length	5	87	120	109	549
Active cycle length	5	87	120	109	549
Actual cycle	7	81	131	110	770
Signal group 1	8	7	41	23	188
Signal group 2	8	7	35	20	161
Signal group 3	7	7	17	11	81
Signal group 4	6	5	18	10	62
Signal group 5	8	32	62	44	353
Signal group 6	8	18	29	24	196
Signal group 7	8	17	28	25	205
Signal group 8	5	7	23	14	71
Signal group 9	8	36	76	57	457
Signal group 10	8	7	56	34	272
Signal group 11	6	5	18	10	62
Signal group 12	7	7	17	11	81

Wednesday, 25 July 2018, 3:15:00 PM to Wednesday, 25 July 2018, 3:30:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	25	52	35	282
D phase	7	20	38	32	227
E phase	7	23	33	30	210
G phase	8	16	26	20	164
Nominal cycle length	4	115	120	117	470
Active cycle length	4	115	120	117	470
Actual cycle	7	106	130	117	823
Signal group 1	8	23	44	28	231
Signal group 2	8	16	44	29	234
Signal group 3	8	6	19	10	87
Signal group 4	8	8	18	11	91
Signal group 5	7	35	60	42	296
Signal group 6	7	16	25	22	156
Signal group 7	7	13	31	25	178
Signal group 8	6	6	18	10	60
Signal group 9	8	34	65	58	464
Signal group 10	8	29	55	42	341
Signal group 11	8	8	18	11	91
Signal group 12	8	6	19	10	87

Wednesday, 25 July 2018, 3:30:00 PM to Wednesday, 25 July 2018, 3:45:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	17	66	37	297
D phase	8	14	37	26	210
E phase	8	26	38	30	241
G phase	8	14	24	17	141
Nominal cycle length	7	87	120	102	720
Active cycle length	7	87	120	102	720
Actual cycle	7	59	149	105	738
Signal group 1	8	9	82	33	271
Signal group 2	8	11	58	31	248
Signal group 3	7	7	17	11	78
Signal group 4	7	7	13	9	66
Signal group 5	9	8	58	34	313
Signal group 6	7	19	42	25	178
Signal group 7	7	7	30	20	140
Signal group 8	4	7	15	11	45
Signal group 9	7	9	153	67	472
Signal group 10	8	11	75	40	325
Signal group 11	7	7	13	9	63
Signal group 12	7	7	17	11	77
Signal group 16	1	9	9	9	9
Pedestrian movement 4	1	9	9	9	9

Wednesday, 25 July 2018, 3:45:00 PM to Wednesday, 25 July 2018, 4:00:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	30	46	35	287
D phase	7	18	37	31	222
E phase	7	18	49	32	228
G phase	7	15	21	18	129

ANNEXURE E: INTERSECTION PHASING HISTORY – THE HORSLEY/M7

(4 SHEETS)

Nominal cycle length	8	94	120	104	837
Active cycle length	8	94	120	104	837
Actual cycle	7	89	133	110	774
Split plan 2	1	230	230	230	230
Signal group 1	8	15	51	30	241
Signal group 2	8	15	84	53	431
Signal group 3	4	8	11	9	37
Signal group 4	8	16	32	23	191
Signal group 5	8	16	27	23	184
Signal group 6	8	16	27	23	184
Signal group 7	8	16	32	23	191
Signal group 8	4	53	438	159	638
Signal group 14	16	5	7	6	98
Pedestrian movement 6	16	4	7	6	104

Wednesday, 25 July 2018, 8:00:00 AM to Wednesday, 25 July 2018, 8:15:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	20	46	30	273
D phase	9	26	31	29	263
F phase	8	22	57	40	324
Nominal cycle length	6	78	120	96	576
Active cycle length	6	78	120	96	576
Actual cycle	8	73	122	98	784
Split plan 4	1	87	87	87	87
Signal group 1	9	9	35	19	175
Signal group 2	9	16	83	47	431
Signal group 3	4	8	8	8	32
Signal group 4	8	11	46	30	240
Signal group 5	9	14	21	18	170
Signal group 6	9	14	21	18	170
Signal group 7	8	11	46	30	240
Signal group 8	4	65	188	129	518
Signal group 14	18	5	7	6	112
Pedestrian movement 6	18	6	7	6	119

Wednesday, 25 July 2018, 8:15:00 AM to Wednesday, 25 July 2018, 8:30:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	9	28	40	33	298
D phase	9	23	40	30	278
F phase	8	23	52	35	284
Nominal cycle length	9	89	118	100	907
Active cycle length	9	89	118	100	907
Actual cycle	8	88	121	98	790
Split plan 3	2	183	209	196	392
Split plan 4	3	91	118	102	308
Signal group 1	9	17	30	22	204
Signal group 2	8	22	52	36	294
Signal group 3	8	8	13	9	79
Signal group 4	8	12	41	25	201
Signal group 5	9	13	30	20	186
Signal group 6	9	13	30	20	186
Signal group 7	8	12	41	25	201
Signal group 8	7	47	86	66	467

Signal group 14	18	6	8	6	115
Pedestrian movement 6	18	6	8	6	122

Wednesday, 25 July 2018, 8:30:00 AM to Wednesday, 25 July 2018, 8:45:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	21	73	35	280
D phase	8	21	43	30	240
F phase	8	33	53	41	330
Nominal cycle length	8	89	120	105	847
Active cycle length	8	89	120	105	847
Actual cycle	8	85	145	106	850
Split plan 4	1	91	91	91	91
Signal group 1	8	9	63	24	195
Signal group 2	7	24	80	46	327
Signal group 3	5	8	15	9	48
Signal group 4	8	23	42	30	245
Signal group 5	8	11	32	19	156
Signal group 6	8	11	32	19	156
Signal group 7	8	23	42	30	245
Signal group 8	4	46	194	117	470
Signal group 14	17	6	7	6	103
Pedestrian movement 6	17	6	7	6	112

Wednesday, 25 July 2018, 8:45:00 AM to Wednesday, 25 July 2018, 9:00:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	33	41	37	261
D phase	8	25	40	30	245
F phase	7	41	55	48	337
Nominal cycle length	7	108	119	114	802
Active cycle length	7	108	119	114	802
Actual cycle	6	105	121	113	683
Signal group 1	7	22	30	26	187
Signal group 2	7	44	77	55	389
Signal group 3	7	8	21	11	79
Signal group 4	8	24	45	35	285
Signal group 5	8	15	29	20	163
Signal group 6	8	15	29	20	163
Signal group 7	8	24	45	35	285
Signal group 8	6	73	195	102	617
Signal group 14	15	6	7	6	92
Pedestrian movement 6	15	6	7	6	97

Wednesday, 25 July 2018, 9:00:00 AM to Wednesday, 25 July 2018, 9:15:00 AM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	10	19	46	30	304
D phase	10	20	34	26	269
F phase	9	23	45	32	294
Nominal cycle length	9	70	110	92	830
Active cycle length	9	70	110	92	830
Actual cycle	9	62	120	90	815
Signal group 1	10	9	35	19	199
Signal group 2	9	12	58	36	329

Split plan 4	1	105	105	105	105
Signal group 1	8	9	30	19	156
Signal group 2	8	13	70	46	372
Signal group 3	7	8	45	14	103
Signal group 4	10	10	45	29	291
Signal group 5	9	8	26	15	140
Signal group 6	8	11	26	16	132
Signal group 7	10	10	48	30	307
Signal group 8	6	39	180	89	538

Wednesday, 25 July 2018, 2:45:00 PM to Wednesday, 25 July 2018, 3:00:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	20	46	31	255
C phase	6	19	22	20	123
D phase	9	19	38	25	229
F phase	9	19	55	28	257
Nominal cycle length	9	71	120	92	831
Active cycle length	9	71	120	92	831
Actual cycle	8	78	124	98	786
Split plan 2	1	234	234	234	234
Signal group 1	8	9	35	20	165
Signal group 2	8	28	58	38	307
Signal group 3	8	8	45	19	155
Signal group 4	15	9	45	15	225
Signal group 5	9	9	28	15	135
Signal group 6	9	9	28	15	135
Signal group 7	15	9	45	15	225
Signal group 8	7	48	131	73	512

Wednesday, 25 July 2018, 3:00:00 PM to Wednesday, 25 July 2018, 3:15:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	22	40	29	204
C phase	4	20	23	21	86
D phase	8	20	33	28	228
F phase	7	20	63	48	342
Nominal cycle length	5	87	120	109	549
Active cycle length	5	87	120	109	549
Actual cycle	6	117	143	123	742
Split plan 3	2	236	240	238	476
Split plan 4	1	120	120	120	120
Signal group 1	7	10	29	18	126
Signal group 2	7	34	102	59	413
Signal group 3	6	8	12	9	57
Signal group 4	11	9	53	28	312
Signal group 5	8	10	23	18	148
Signal group 6	8	10	23	18	148
Signal group 7	11	9	53	28	312
Signal group 8	6	67	221	106	636

Wednesday, 25 July 2018, 3:15:00 PM to Wednesday, 25 July 2018, 3:30:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	31	45	40	281

C phase	1	23	23	23	23
D phase	7	19	35	26	188
F phase	7	26	61	47	335
Nominal cycle length	4	115	120	117	470
Active cycle length	4	115	120	117	470
Actual cycle	7	116	122	118	827
Split plan 3	1	240	240	240	240
Split plan 4	1	120	120	120	120
Signal group 1	7	20	35	29	209
Signal group 2	7	34	95	66	464
Signal group 3	6	7	16	10	60
Signal group 4	8	12	50	33	271
Signal group 5	7	8	24	15	111
Signal group 6	7	8	24	15	111
Signal group 7	8	12	50	33	271
Signal group 8	6	86	184	110	662

Wednesday, 25 July 2018, 3:30:00 PM to Wednesday, 25 July 2018, 3:45:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	8	19	56	33	264
C phase	2	21	22	21	43
D phase	9	23	34	30	270
F phase	8	19	60	33	268
Nominal cycle length	7	87	120	102	720
Active cycle length	7	87	120	102	720
Actual cycle	7	79	117	102	716
Split plan 4	1	200	200	200	200
Signal group 1	8	9	46	22	177
Signal group 2	8	9	85	46	374
Signal group 3	6	8	16	11	69
Signal group 4	10	9	49	20	203
Signal group 5	9	13	23	19	176
Signal group 6	9	13	23	19	176
Signal group 7	10	9	49	20	203
Signal group 8	5	38	215	129	645

Wednesday, 25 July 2018, 3:45:00 PM to Wednesday, 25 July 2018, 4:00:00 PM:

Data item	Frequency	Minimum	Maximum	Average	Total
A phase	7	37	48	41	288
C phase	4	19	24	22	88
D phase	7	22	29	26	185
F phase	7	27	54	39	278
Nominal cycle length	6	118	120	118	713
Active cycle length	6	118	120	118	713
Actual cycle	7	117	121	119	839
Split plan 2	1	120	120	120	120
Split plan 3	1	238	238	238	238
Split plan 4	2	120	237	178	357
Signal group 1	7	26	37	30	210
Signal group 2	7	37	92	65	455
Signal group 3	7	8	10	8	58
Signal group 4	11	9	43	22	249
Signal group 5	7	12	20	16	112