

Bramley Village

Transport Review

3 March 2016

For and on behalf of
Bramley Parish Council

Project Ref: 2016-284

LvW Highways Ltd
Highway, Traffic & Transport Consultants
Blaenparc
Felingwm Uchaf
Carmarthen
SA32 7PR

Tel: 01267 290769
E-mail: Karl.vonWeber@lvwhighways.com

This page is intentionally blank for double sided printing

REPORT CONTROL



e. paul.lacey@lvwhighways.com
w. www.lvwhighways.com

Wales Office:
Bleanparc
Felingwm Uchaf
Carmarthen
SA32 7PR

England Office:
4 Mountway Close
Bishops Hull
Taunton
TA1 5LP

t. 01267 290769
m. 07769 226695

t. 01823 257208
m. 07770 775835

Report Title:	Transport Review
File Location:	284-TR-v01.docx

Client:	Bramley Parish Council
Project Number:	2016-284

Draft Report Issued:	v01 – 03 March 2016
Final Report Issued:	V02 – dd mmmm yyyy

Prepared By:	Karl von Weber
Office:	Wales
Checked By:	Paul Lacey

© The contents of this document must not be copied or reproduced in whole or in part without the written consent of LvW Highways Ltd.

This page is intentionally blank for double sided printing

Contents

1	INTRODUCTION	1
	Structure of report	1
2	TRAFFIC ANALYSIS	1
	Available Traffic Survey Data.....	1
	Minchens Lane Transport Assessment (TA)	1
	Sherfield Road Transport Assessment (TA).....	2
	Changes in traffic volumes over time	2
	The level crossing traffic.....	4
3	BRAMLEY LEVEL CROSSING QUEUE LENGTH ANALYSIS.....	6
	Queueing overview	6
	Data collected	6
	Queue length analysis	7
4	PARAMICS MICROSIMULATION.....	8
	Paramics micro-simulation traffic model	8
	Queue Length Conclusions	9
5	CONCLUSION	9
	Traffic Levels	9
	Level Crossing Barrier Closures	10
	Queue Lengths.....	10
	APPENDIX A – PARAMICS MODELLING	11
	Methodology	11
	Extent of Model.....	11
	Time Periods	11
	Demands	11
	Profiles	15
	Level Crossing Barrier Time	18
	Results	19

FIGURES

Figure 1: Bramley Paramics Network.....	12
--	-----------

TABLES

Table 1: Observed traffic passing through Bramley level crossing on 20 th March 2014	4
Table 2: Observed vehicle queues at Bramley Level Crossing 2012 AM Peak Hour	7
Table 3: Observed vehicle queues at Bramley Level Crossing 2014 AM Peak Hour	7
Table 4: 2020 AM (07:00 to 10:00) Cars and LGVs	13
Table 5: 2020 AM (07:00 to 10:00) HGVs	13
Table 6: 2020 AM (07:00 to 10:00) Minchens Lane Residential Development (200 dwellings)	13
Table 7: 2020 AM (07:00 to 10:00) Sherfield Road Residential Development (50 dwellings)	14
Table 8: 2020 PM (16:00 to 19:00) Cars and LGVs	14
Table 9: 2020 PM (16:00 to 19:00) HGVs	14
Table 10: 2020 PM (16:00 to 19:00) Minchens Lane Residential Development (200 dwellings)	15
Table 11: 2020 PM (16:00 to 19:00) Sherfield Road Residential Development (50 dwellings)	15
Table 12: Profiles used in the AM models	17
Table 13: Profiles used in the PM models	18

CHARTS

Chart 1: Comparison of Observed two-way traffic on Sherfield Road in 2012 and 2014	2
Chart 2: Comparison of Observed Westbound traffic on Sherfield Road in 2012 and 2014	3
Chart 3: Comparison of Observed Eastbound traffic on Sherfield Road in 2012 and 2014	3
Chart 4: Observed two-way traffic passing through Bramley level crossing 2014	5
Chart 5: Observed westbound traffic passing through Bramley level crossing 2014	5
Chart 6: Observed eastbound traffic passing through Bramley level crossing 2014	6

1 INTRODUCTION

1.1 LvW Highways Ltd are commissioned by Bramley Parish Council to assess the operation of the highway network considering the impact of the recently approved residential developments at Minchens Lane (Planning Application No. 14/01075/OUT) and Sherfield Road (Planning Application No. 15/02708/OUT) and the impact at Bramley level crossing on road traffic.

1.2 In order to assess the operation of the Bramley level crossing, LvW Highways Ltd had to extract traffic survey data contained within the transport assessments for the approved Minchin's Lane residential development (200 dwellings) and the approved Sherfield Road residential development (50 dwellings). The transport assessment for the Minchin's Lane residential development undertook traffic surveys in 2012 and the transport assessment for the Sherfield Road residential development updated some of these surveys in 2014.

Structure of report

1.3 The remainder of this report is structured as follows:

- Section 2 analyses the traffic that uses The Street and Sherfield Road as well as the Bramley level crossing itself;
- Section 3 analyses the queues that result from the closure of the barriers at the level crossing;
- Section 4 provides information on the assessment undertaken using the Paramics Discovery microsimulation software; and
- Section 5 concludes the results.

2 TRAFFIC ANALYSIS

2.1 This section analyses the volume of traffic that uses the highway through Bramley both to the West and East of the level crossing, as well as the level crossing itself.

Available Traffic Survey Data

2.2 The available traffic data contained within the associated transport assessments are in comparable locations, and as such enable a direct comparison to be made regarding the change in vehicle proportions and traffic levels over time.

Minchens Lane Transport Assessment (TA)

2.3 To obtain baseline traffic information the Minchens Lane TA commissioned traffic turning movement surveys at eight junctions and at the level crossing. The traffic surveys were all undertaken on Wednesday November 7th 2012 and the junctions surveyed were:

- The Street / Vyne Road / Silchester Road;
- The Street / Cufaude Lane;
- The Street / Minchens Lane;
- Level Crossing (queue and pedestrian survey);
- Sherfield Road / Bramley Lane / Bramley Bakery;
- Sherfield Road / The Smithy;

- Sherfield Road / Farriers Lane;
- Reading Road / Bramley Road; and
- A33 / Bramley Road.

Sherfield Road Transport Assessment (TA)

2.4 To obtain baseline traffic information the Sherfield Road TA commissioned traffic turning movement surveys at five junctions and at the level crossing. The traffic surveys were undertaken on Thursday March 20th 2014 and Tuesday April 29th 2014 and the junctions surveyed were:

- The Street / Vyne Road / Silchester Road; 20/03/2014
- The Street / Cufaude Lane; 20/03/2014
- Level Crossing (traffic count); 20/03/2014
- Sherfield Road / Bramley Lane / Bramley Bakery; 20/03/2014
- Reading Road / Bramley Road; and 20/03/2014
- A33 / Bramley Road. 29/04/2014

2.5 There was also an Automatic Traffic Counter (ATC) located on Sherfield Road near the proposed access to measure traffic flows and speeds.

2.6 However, the traffic survey data available on the Basingstoke and Deane Borough Council web site (Appendix D) in the Sherfield Road transport assessment is primarily only for the morning. Therefore, this transport review concentrates on the morning period between 7am and 10am.

Changes in traffic volumes over time

2.7 To consider the changes in traffic volumes we have compared the traffic movements along The Street / Sherfield Road through the Sherfield Road / Bramley Lane / Bramley Bakery junction.

2.8 Chart 2.1 shows the observed two-way traffic profiles between 7am and 10am from both the 2012 and 2014 traffic data.

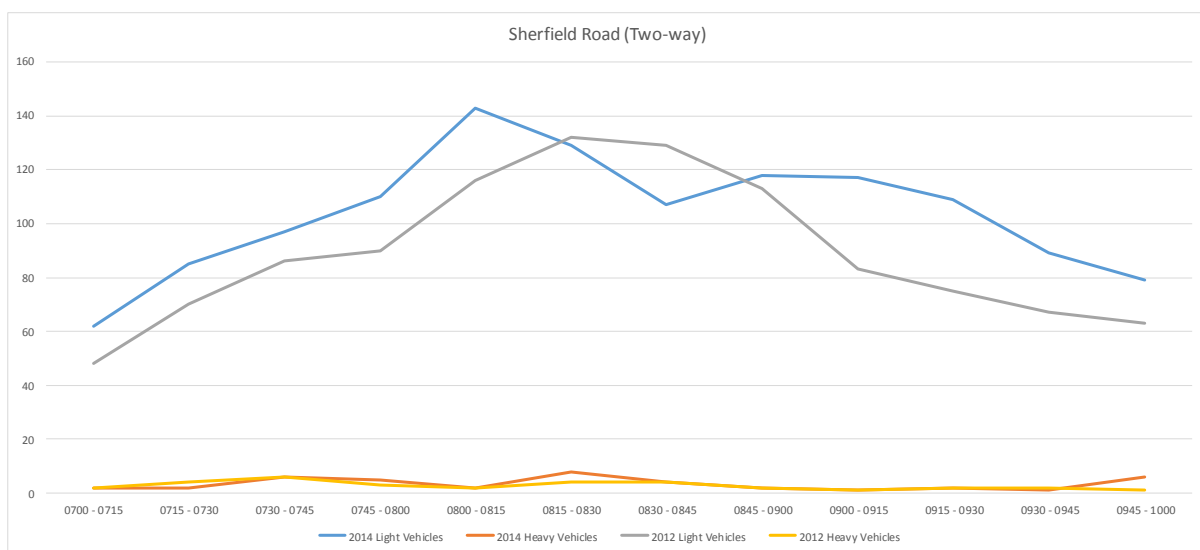


Chart 1: Comparison of Observed two-way traffic on Sherfield Road in 2012 and 2014

- 2.9 It can be seen from the figures above that while there is some variation in the profile, there is no significant change between the two datasets in terms of overall volume or pattern. It can be seen that the level of traffic has remained largely consistent between 2012 and 2014.
- 2.10 In 2012 (light grey line) the traffic profile exhibits a gradual increase in volume from 07:45 to 08:00 and this increases to its peak between 08:15 and 08:30 with a gradual decline after this.
- 2.11 In 2014 (light blue line) the traffic profile exhibits a sharp peak in volume from 07:45 to 08:00 and then a sharp decline after this time period to a second increase in traffic volumes between 09:00 and 09:15, then a gradual decline.
- 2.12 However, when comparing the directional flow it can be seen that from 2012 to 2014 there seems to be a decrease in the westbound direction flow and an increase in the eastbound direction flow, this can be seen in Chart 2 (for the westbound flow) and Chart 3 (for the eastbound flow).

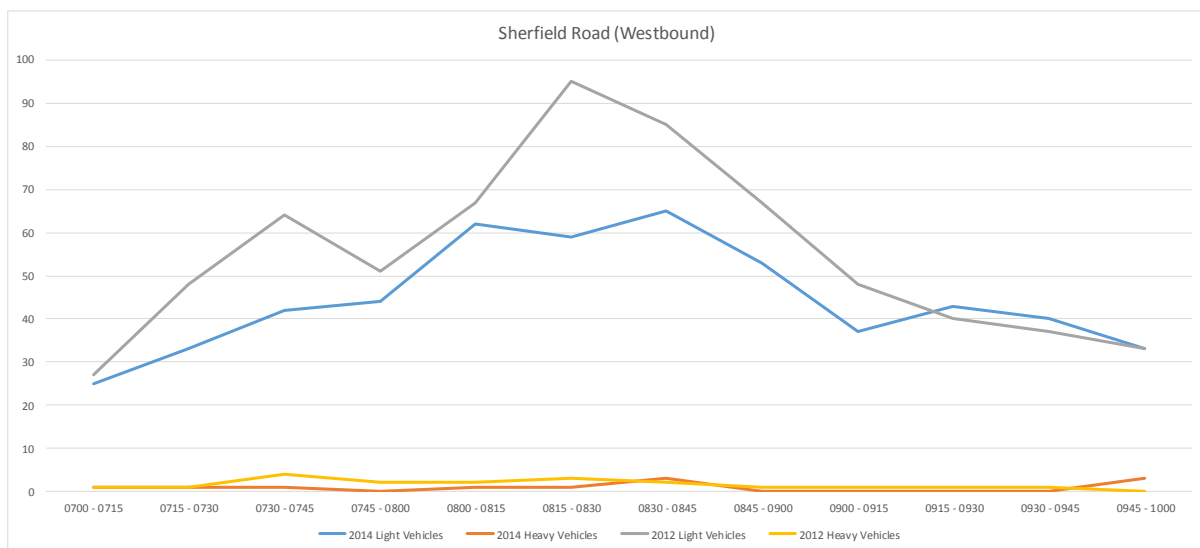


Chart 2: Comparison of Observed Westbound traffic on Sherfield Road in 2012 and 2014

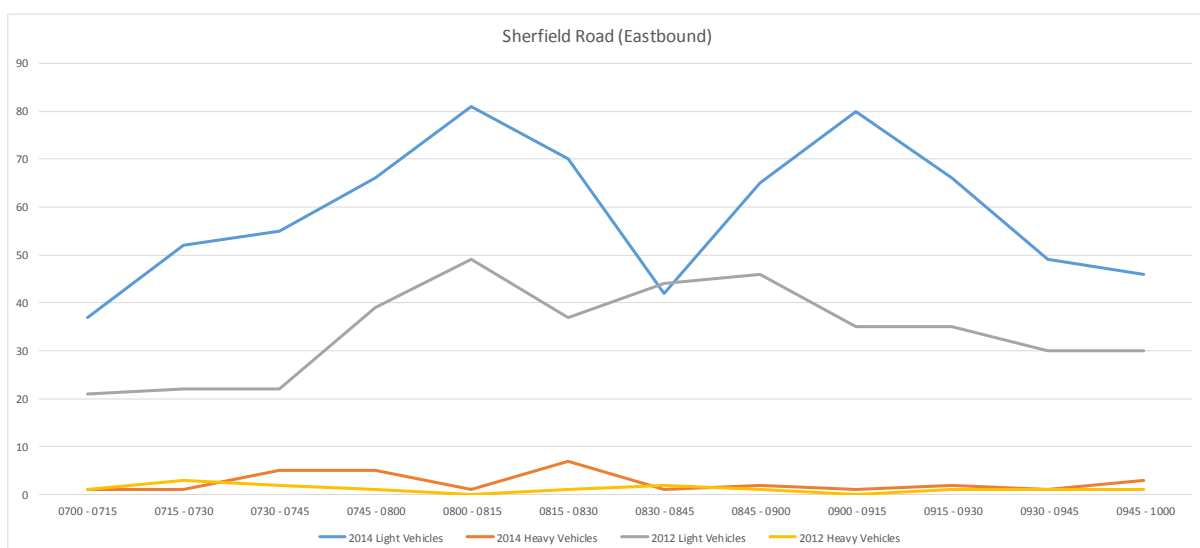


Chart 3: Comparison of Observed Eastbound traffic on Sherfield Road in 2012 and 2014

- 2.13 It should be considered that seasonal variation between the times of year that the surveys were undertaken will have an impact on the results. There are also highway improvement works being undertaken on the A33 in Basingstoke that may have had an impact on the traffic movements through Bramley.
- 2.14 However, the general trend and level of traffic appears consistent between the two datasets. It can be said that there has been no significant changes in overall traffic volumes between 2012 (987 two-way vehicle movements) and 2014 (992 two-way vehicle movements) during the morning, and therefore any data collected in 2012 would also give a fair representation of 2014 conditions.

The level crossing traffic

- 2.15 The survey conducted in 2012 at the level crossing was a queue and pedestrian survey and therefore no volumetric counts are available for vehicles crossing through the level crossing apart from those observed at the adjacent junctions show above.
- 2.16 The 2014 survey counted vehicles crossing the level crossing and we have used this data to compare it with the traffic counts at the Bramley Lane / Bramley Bakery junction as shown above.
- 2.17 Table 1 provides breakdowns of the total volume and classification of the vehicles that use the level crossing throughout the morning period.

Time	Sherfield Road (East of Crossing)			The Street (West of Crossing)			Sherfield Road (Two-way)		
	Light Veh	Heavy Veh	TOTAL	Light Veh	Heavy Veh	TOTAL	Light Veh	Heavy Veh	TOTAL
0700 - 0715	26	1	27	33	1	34	59	2	61
0715 - 0730	35	1	36	48	1	49	83	2	85
0730 - 0745	41	0	41	46	4	50	87	4	91
0745 - 0800	48	0	48	69	5	74	117	5	122
0800 - 0815	66	0	66	90	2	92	156	2	158
0815 - 0830	57	2	59	51	4	55	108	6	114
0830 - 0845	83	3	86	60	5	65	143	8	151
0845 - 0900	77	0	77	60	2	62	137	2	139
0900 - 0915	29	0	29	61	1	62	90	1	91
0915 - 0930	46	2	48	94	2	96	140	4	144
0930 - 0945	32	0	32	42	1	43	74	1	75
0945 - 1000	36	4	40	52	3	55	88	7	95
Session Total	576	13	589	706	31	737	1282	44	1326

Table 1: Observed traffic passing through Bramley level crossing on 20th March 2014

- 2.18 The data above shows that the largest proportions of vehicles that use the level crossing are cars and light goods vehicles.
- 2.19 There is a peak in flow evident between eight o'clock and nine o'clock in both directions corresponding to the a.m. peak hour. Westbound traffic exhibits a continual reduction in traffic volume from its peak while the eastbound traffic volume reduces before increasing again between 09:15 and 09:30, before reducing again.
- 2.20 In comparing the level crossing data (Charts 4 to 6) with that passing through the Sherfield Road / Bramley Lane / Bramley Bakery junction (Charts 1 to 3) it can be seen that there are significant differences in the volume of traffic and the flow profile of the traffic.

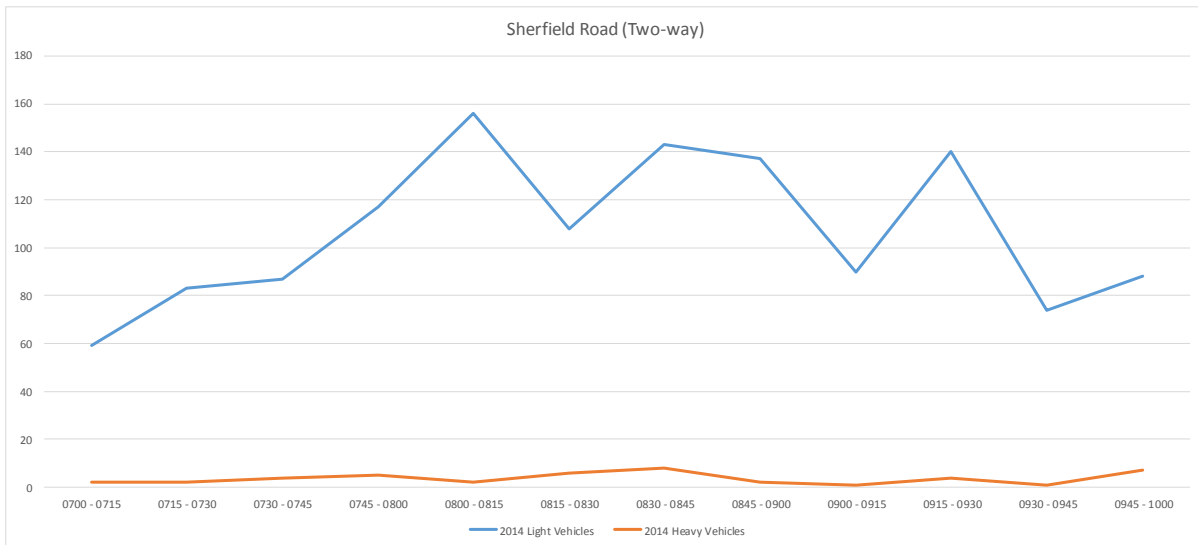


Chart 4: Observed two-way traffic passing through Bramley level crossing 2014

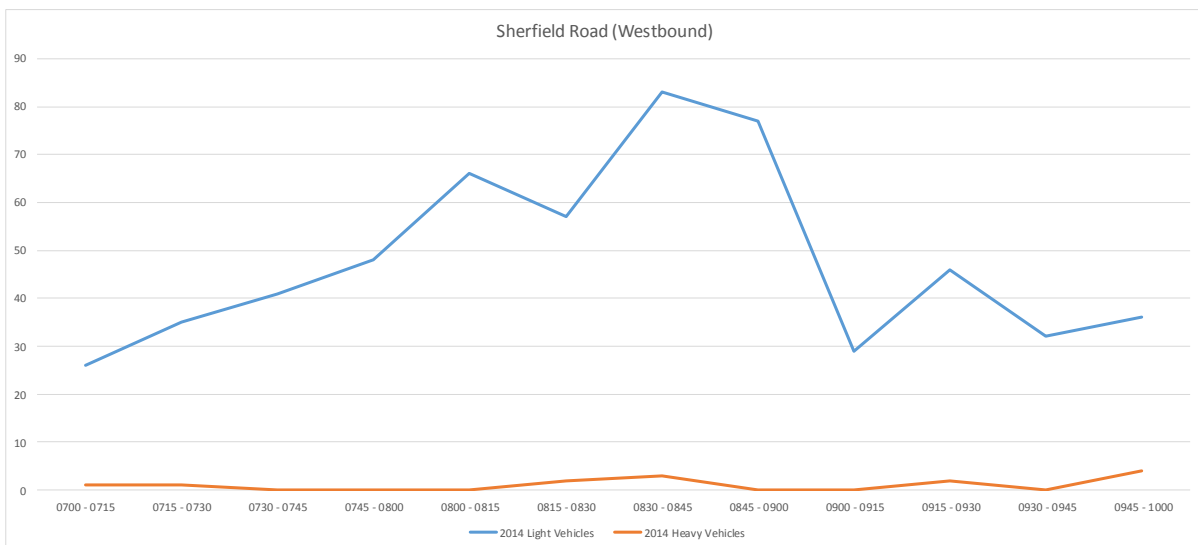


Chart 5: Observed westbound traffic passing through Bramley level crossing 2014

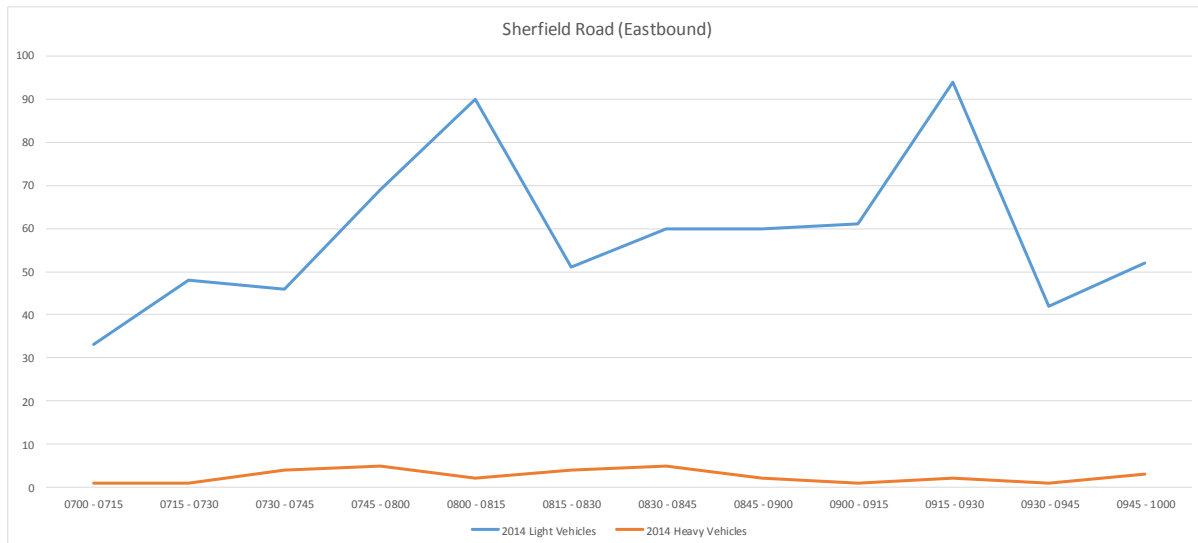


Chart 6: Observed eastbound traffic passing through Bramley level crossing 2014

- 2.21 If Chart 4 and Chart 1 are compared (Two-way flows) the blue lines represent the 2014 flows there are significant differences in the traffic volumes and traffic profiles. There are also significant differences in the westbound (Chart 5 and Chart 2) flows and the eastbound (Chart 6 and Chart 3) flows.
- 2.22 It is not understood or identified within the Sherfield Road TA, why there are these differences in the traffic flows and profiles when the level crossing and Bramley Lane junction are so close to each other.

3 BRAMLEY LEVEL CROSSING QUEUE LENGTH ANALYSIS

- 3.1 The Bramley level crossing causes queues to form on the approaches when the level crossing barriers close. This section analyses the length of the queues that form at the Bramley level crossing.

Queueing overview

- 3.2 The Bramley level crossing naturally causes vehicle queues to form on the approaches when the level crossing barriers are closed to road traffic. Once the barriers are closed, queues quickly form and these vehicles impact on the turning movements at the adjacent junctions.
- 3.3 Surveys of the queue links that were caused by the Bramley level crossing barrier closure were undertaken in order to determine the precise impact that the closure have upon traffic through Bramley.

Data collected

- 3.4 Queue length data was collected between 7 AM and 10 AM on a single day in November 2012 and March 2014. Records of the queue information and dispersal were maintained, and a zone base system of queue length measurements was employed to determine the length of queue that resulted from a level crossing barrier closure.
- 3.5 The available data covered a one-day period therefore, a robust average representation of typical queues cannot be formed.

Queue length analysis

3.6 Table 2 presents the frequency and duration of the level crossing barrier closures during the am peak hour 08:00 to 09:00 on Wednesday 7th November 2012.

3.7 Table 3 presents the frequency and duration of the level crossing barrier closures during the am peak hour 08:00 to 09:00 on Thursday 20th March 2014.

Barrier Down (Hr:Min)	Barrier Up (Hr:Min)	Duration Down (Hr:Min)	Sherfield Road (East of Crossing)	The Street (West of Crossing)
			Westbound	Eastbound
			Vehicles	Vehicles
08:00	08:03	00:03	18	11
08:09	08:14	00:05	19	16
08:21	08:25	00:04	21	6
08:30	08:34	00:04	18	8
08:38	08:40	00:02	8	3
08:50	08:55	00:05	30	3
08:56	08:59	00:03	19	4
Hourly Average		00:03:43	19	7

Table 2: Observed vehicle queues at Bramley Level Crossing 2012 AM Peak Hour

Barrier Down (Hr:Min)	Barrier Up (Hr:Min)	Duration Down (Hr:Min)	Sherfield Road (East of Crossing)	The Street (West of Crossing)
			Westbound	Eastbound
			Vehicles	Vehicles
08:07	08:10	00:03	27	19
08:17	08:21	00:03	20	18
08:22	08:25	00:02	16	11
08:25	08:28	00:02	21	18
08:37	08:41	00:03	5	7
08:47	08:51	00:04	5	15
08:53	08:55	00:02	2	7
Hourly Average		00:03:11	14	14

Table 3: Observed vehicle queues at Bramley Level Crossing 2014 AM Peak Hour

3.8 It can be seen from the tables above that there has probably been a change in time tabling of the rail services or it may relate to the different nature of the rail traffic. There does not seem to be a peak evident in the frequency of the closures within the a.m. peak hour.

3.9 There does not appear to be a direct relationship between the frequency of the level crossing closures, the total time closed within the hour and the extent of vehicle queue formed. This may be because the precise timing of trains arriving at or passing through Bramley station will dictate if one or more trains can pass within a single level crossing barrier closure and that the arrival profile of motorised vehicles changes on a daily basis.

3.10 Table 2 and Table 3 presents the survey data for the weekday, showing the number of vehicles in the queue on both the east and west sides of the Bramley level crossing in terms of the maximum observed queue within the hour.

- 3.11 It can be seen from the data above that the length of queue does not correlate with the traffic flow profiles (if you look at the charts above). The peaks in observed queueing do not match the times of the a.m. peak hour of total traffic flow. It is also apparent that there is little correlation between the volume of traffic using the level crossing, and the length of the queue that emanates from the crossing.
- 3.12 It can be seen that the westbound traffic reaches a peak in queue length at 08:55 in 2012 of 30 vehicles and 08:10 in 2014 of 27 vehicles. The average queue length of the westbound traffic remains at approximately 19 vehicles in 2012 and 14 vehicles in 2014. With an average length of vehicle and gap to next vehicle being 6 metres, the average queue lengths equate to approximately 114 metres in 2012 and 82 metres in 2014.
- 3.13 Eastbound traffic displays a slightly different trend. The maximum number of queuing vehicles observed in 2012 was 16 at 08:14 and in 2014 there were 19 vehicles observed queuing at 08:10. The average queue length of the eastbound traffic is 19 vehicles in 2012 and 14 vehicles in 2014.
- 3.14 It should be noted that the queue lengths observed for eastbound traffic in 2012 were significantly shorter than those for the westbound traffic. However, in 2014 the average queue lengths in 2014 were 14 vehicles in both directions.

4 PARAMICS MICROSIMULATION

Paramics micro-simulation traffic model

- 4.1 As part of the work undertaken by LvW Highways Ltd to investigate the impact that the approved residential developments may have on the highway network and on queueing at the Bramley level crossing in 2020, four Paramics Discovery models were constructed. The first using the observed 2012 traffic flows forecast to 2020 base flows and the second with the additional residential development traffic added to the 2020 base flows. These are run for the AM and PM periods, resulting in the making of four models.
- 4.2 The level crossing barrier closure times were modelled as a set of traffic lights on a cross roads. The traffic lights operate in two stages, the road vehicles are on stop when the railway level crossing is closed and then the road traffic flows as the level crossing barriers are opened (i.e. the railway traffic is stopped at a red light).
- 4.3 The models forecast traffic queue lengths for 07:00 to 10:00 and 16:00 to 19:00. While these are not a direct comparison given the predicted 2020 traffic flows and calculated barrier closure times, the forecast traffic flow will still give an interesting comparison to the 2012 observed data.
- 4.4 The model output videos for the peak hours (08:00 to 09:00 and 17:00 to 18:00) are available on the file sharing web site "Dropbox" at the following website address:-
https://www.dropbox.com/sh/da8a2hyo10kc9f8/AACeNIJM0uggZJNHpmm_rd6Ma?dl=0
- 4.5 Further details on the Paramics Discovery modelling can be found within Appendix A.

Queue Length Conclusions

- 4.6 It can be seen from the model videos that the queue lengths at the Bramley level crossing are variable throughout the modelled periods, and that there is little correlation between the profile of traffic flow, and the length of the queue.
- 4.7 This is likely to be due to that the driving factors behind the instigation of a queue are the traffic and the frequency and length of the level crossing barrier closures. Both of these remain fairly consistent throughout the modelled morning period, and as such there is little variation in the queue lengths observed.
- 4.8 Some variation is of course apparent on street, with the effects of different lengths of barrier closures times.
- 4.9 Queues are generally longer on the westbound approach to the level crossing, but this is due in part to the higher volume of modelled traffic travelling in this direction in the morning (based on the 2012 flows forecast to 2020).
- 4.10 On the eastbound approach, the number of vehicles queuing is less and therefore, the queue length does not seem to be as long as observed.

5 CONCLUSION

- 5.1 The Bramley level crossing has a significant impact on traffic using The Street and Sherfield Road due to the closure of the barriers causing the traffic on the road to block the side roads either side, thus causing delays to all vehicles on the local highway network.
- 5.2 The queues and delays occur throughout every day of the week, associated with the high frequency and duration of level crossing barrier closures, particularly in the AM and PM Peak periods.
- 5.3 The predicted additional vehicles associated with the approved residential developments at Minchens Lane and land north of Sherfield Road will add additional vehicles to the queues. However, due to the irregular nature of queue formation the additional vehicles do not seem to create significantly longer queues.
- 5.4 It can be seen from the data presented above, that the Bramley level crossing has a significant impact on traffic passing through Bramley due to the closure of the barriers causing the traffic on the road to block the side roads, thus causing delays to other vehicles trying to get on the route.

Traffic Levels

- 5.5 The highest volume of traffic using the Bramley level crossing occurs in the AM and PM Peak periods, with the PM Peak hour being slightly greater than the AM Peak hour.
- 5.6 The majority of traffic that uses the level crossing are cars and light goods vehicles, although there is a small portion of heavy vehicles that also use the crossing.
- 5.7 The number of HGVs remains relatively consistent throughout the day; however the greatest proportion can often be seen during the morning period. The number of HGVs is slightly greater heading westbound, although there is little variance between the west and eastbound HGV traffic levels.

Level Crossing Barrier Closures

- 5.8 The Bramley Level Crossing exhibits many closures during the day. The greatest number of closures per hour can be seen to take place during the AM and PM Peak periods; although the precise peak hours differ from that of the road traffic to coincide more closely to the peak train arrival times to and from London.
- 5.9 The AM Peak of barrier closures occurs between 07:00 and 08:00, with an average of 8 closures per hour during the week, with an average duration of 27 minutes. There are also 8 closures between 08:00 and 09:00 with an average duration of 26 minutes and this does coincide with the AM Peak hour in terms of road traffic flow.
- 5.10 The PM Peak barrier closure occurs between 14:00 and 15:00, with a closure per hour of 39 minutes. This occurs significantly earlier in the day than the PM Peak hour of traffic flow. There are 6 closures between 17:00 and 18:00 with an average duration of 29 minutes and this does coincide with the PM Peak hour in terms of road traffic flow.

Queue Lengths

- 5.11 Since both the level of traffic and the frequency and duration of the Level Crossing barrier closures remain fairly consistent throughout an average weekday and are the key factors that affect the queue lengths, there is little variation in the queue lengths observed. There is some variation however, as would be expected.
- 5.12 Queues are generally longer on the westbound approach to the Level Crossing due to the slightly higher number of vehicles on this approach to the Level Crossing.
- 5.13 The average maximum observed queues fluctuate between 125m and 225m in the westbound direction, and 80m to 140m in the eastbound direction throughout the modelled periods however, these values are only reached for a small percentage of the hour, as the substantially lower averages demonstrate.
- 5.14 The additional vehicles predicted to use the highway network from the approved residential developments will add to the queues and the Paramics models clearly show that there is an impact on the local road network when the Level Crossing barriers close and this impacts on the adjacent junctions. However, the queues quickly dissipate and move off in small platoons of traffic through the village.

APPENDIX A – PARAMICS MODELLING

Methodology

Paramics Discovery microsimulation models of Bramley High Street have been constructed in order to view the impact of the proposed/approved residential developments of Minchin's Lane and Land north of Sherfield Road.

The transport assessment associated with these approved developments considered the priority junctions in isolation and therefore did not consider the impact that the network rail level crossing has on the adjacent junctions.

The models were built using Paramics Discovery version 2.173. It is important that the models are run using the same version to maintain consistency in output. This version of Paramics Discovery limits the length of highway network to be modelled to 3000 metres.

Extent of Model

Due to the limitations of the Paramics Discovery software, the model extends the length of Bramley to include Minchin's Lane to the West of the level crossing and includes the access to the approved Sherfield Road development to the East of the level crossing. The models include the Ringshall Gardens; Coopers Lane; Bramley Lane; Longbridge Road; Strawberry Fields; The Smithy; and Farriers Close junctions.

To enable the modelled network build for the existing highway network (i.e. nodes, links and junctions), data was obtained from the ordnance survey mapping as a base for the geometry of the Bramley highway network.

A site visit was conducted to observe and verify Street dimensions and operational aspects on site during the modelled time periods. Stop line locations, road widths and lane allocations etc. were evident from the mapping and confirmed on the site visit.

The highway improvement works associated with the proposed/approved developments was obtained from the plans included within the associated transport assessments.

Time Periods

The models simulate the morning peak period between 7 am and 10 am and the evening peak period 4 pm and 7 pm as these are the surveyed periods and of the greatest traffic attraction of the approved residential developments.

Demands

In order to create a suitable zoning system for the model, the study area was aggregated into key origin and destination areas. These areas were then defined in the model in zones. The zones are the origin and destination of all vehicle trips in the model. The modelled highway network and zones are shown in the figure below.

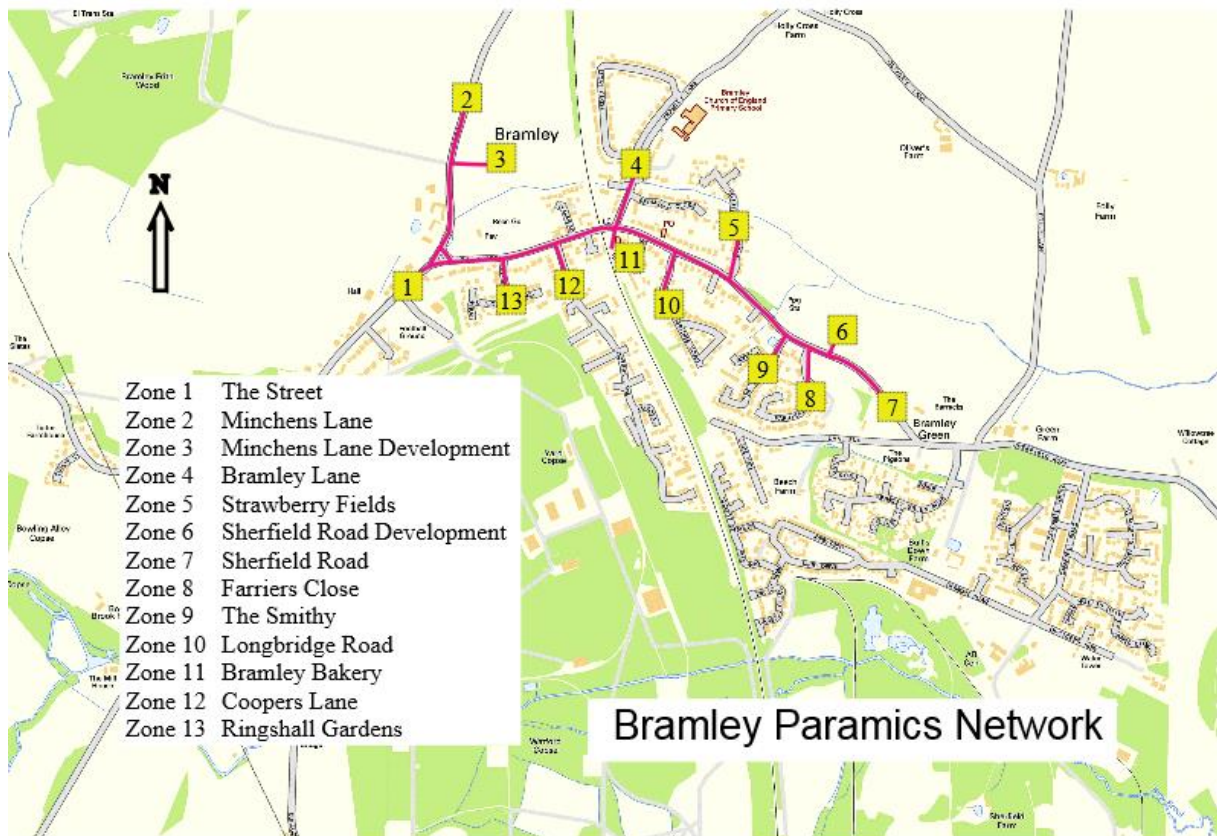


Figure 1: Bramley Paramics Network

Traffic demands for the models were taken from the 2012 junction turning movement counts forecast to 2020. However, as the surveys did not count the Ringshall Gardens; Coopers Lane; Longbridge Road or Strawberry Fields junctions, we have had to interpret the turning movements at these junctions based on the available information at the adjacent surveyed junctions.

A matrix furnishing process was used to balance the inbound and outbound flows.

Three matrices ([1] Cars and Light Goods Vehicles, [2] Heavy Goods Vehicles and [3] Coaches {to represent trains}) were entered into the Paramics base models. Two further matrices were added to the 'with development' models for the Minchens Lane development traffic and the Sherfield Road development traffic.

The AM period matrices used for the assessments are included below in Table 4 to Table 7.

AM 20 CARS & LGVS		Vehicle colour in Paramics model											Total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	0	149	0	29	3	0	306	5	8	4	2	9	4	519
2	75	0	0	5	0	0	50	1	1	1	0	1	1	135
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	51	7	0	0	1	0	92	1	2	1	3	2	1	161
5	18	3	0	4	0	0	14	0	0	1	0	1	0	41
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	444	63	0	87	15	0	0	6	9	16	6	21	7	674
8	16	2	0	3	1	0	24	0	0	1	0	1	0	48
9	24	3	0	5	1	0	30	0	0	1	0	1	0	65
10	19	3	0	4	0	0	13	0	0	0	0	1	0	40
11	0	0	0	0	0	0	10	0	0	0	0	0	0	10
12	15	2	0	2	0	0	20	0	1	0	0	0	0	40
13	6	1	0	1	0	0	11	0	0	0	0	0	0	19
Total	668	233	0	140	21	0	570	13	21	25	11	37	13	1752

Table 4: 2020 AM (07:00 to 10:00) Cars and LGVs

AM 20 HGVS		Vehicle colour in Paramics model											and	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	0	0	0	0	1	0	9	0	0	1	0	3	0	14
2	3	0	0	0	0	0	1	0	0	0	0	0	0	4
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	2	0	0	0	0	0	3	0	0	0	0	0	0	5
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	13	1	0	0	0	0	0	0	0	1	0	1	1	17
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	1	0	0	0	0	0	0	1
10	2	0	0	0	0	0	1	0	0	0	0	0	0	3
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	3	0	0	0	0	0	3	0	0	0	0	0	0	6
13	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	24	1	0	0	1	0	18	0	0	2	0	4	1	51

Table 5: 2020 AM (07:00 to 10:00) HGVs

AM MINCHENS LANE		Vehicle colour in Paramics model											Total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	0	0	25	0	0	0	0	0	0	0	0	0	0	25
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	124	0	0	0	0	0	151	0	0	0	0	0	0	275
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	30	0	0	0	0	0	0	0	0	0	0	30
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	124	0	55	0	0	0	151	0	0	0	0	0	0	330

Table 6: 2020 AM (07:00 to 10:00) Minchens Lane Residential Development (200 dwellings)

AM SHERFIELD ROAD		Vehicle colour in Paramics model													Total
	1	2	3	4	5	6	7	8	9	10	11	12	13		
1	0	0	0	0	0	8	0	0	0	0	0	0	0	8	
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	3	0	0	0	0	0	0	0	3	
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6	33	0	0	3	0	0	41	0	0	0	0	0	0	77	
7	0	0	0	0	0	8	0	0	0	0	0	0	0	8	
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	33	0	0	3	0	19	41	0	0	0	0	0	0	96	

Table 7: 2020 AM (07:00 to 10:00) Sherfield Road Residential Development (50 dwellings)

The PM period matrices used for the assessments are included below in Table 8 to Table 11.

PM 20 CARS & LGVS		Vehicle colour in Paramics model													Total
	1	2	3	4	5	6	7	8	9	10	11	12	13		
1	0	56	0	29	20	0	302	11	10	21	4	98	57	608	
2	109	0	0	5	3	0	51	2	2	4	1	17	10	204	
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	33	4	0	0	9	0	133	5	5	9	1	6	3	208	
5	20	3	0	8	0	0	103	4	3	3	2	4	2	152	
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7	250	32	0	108	33	0	0	25	11	35	31	45	23	593	
8	5	1	0	2	1	0	21	0	0	1	1	1	0	33	
9	13	2	0	6	2	0	23	1	0	2	2	2	1	54	
10	22	3	0	9	6	0	96	3	3	0	3	4	2	151	
11	8	1	0	14	1	0	16	1	1	1	0	1	1	45	
12	43	6	0	2	1	0	22	1	1	2	0	0	4	82	
13	22	3	0	1	1	0	15	1	1	1	0	5	0	50	
Total	525	111	0	184	77	0	782	54	37	79	45	183	103	2180	

Table 8: 2020 PM (16:00 to 19:00) Cars and LGVs

PM 20 HGVS		Vehicle colour in Paramics model													and	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13			
1	0	0	0	0	0	0	4	0	0	1	0	2	0	7		
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5	0	0	0	0	0	0	1	0	0	0	0	0	0	1		
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
7	3	0	0	0	0	0	0	0	0	0	0	0	0	3		
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
10	2	0	0	0	0	0	0	0	0	0	0	0	0	2		
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
12	2	0	0	0	0	0	2	0	0	0	0	0	0	4		
13	1	0	0	0	0	0	0	0	0	0	0	0	0	1		
Total	8	0	0	0	0	0	7	0	0	1	0	2	0	18		

Table 9: 2020 PM (16:00 to 19:00) HGVs

PM MINCHENS LANE			Vehicle colour in Paramics model										Total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	0	0	74	0	0	0	0	0	0	0	0	0	0	74
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	88	0	0	0	0	0	107	0	0	0	0	0	0	195
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	88	0	0	0	0	0	0	0	0	0	0	88
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	88	0	162	0	0	0	107	0	0	0	0	0	0	357

Table 10: 2020 PM (16:00 to 19:00) Minchens Lane Residential Development (200 dwellings)

PM SHERFIELD ROAD			Vehicle colour in Paramics model										Total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1	0	0	0	0	0	25	0	0	0	0	0	0	0	25
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	14	0	0	0	0	0	17	0	0	0	0	0	0	31
7	0	0	0	0	0	30	0	0	0	0	0	0	0	30
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	14	0	0	0	0	55	17	0	0	0	0	0	0	86

Table 11: 2020 PM (16:00 to 19:00) Sherfield Road Residential Development (50 dwellings)

Profiles

Paramics uses profiles with 5 minute time segments in order to vary the demand with appropriate fluctuations over the assessed time period. The same survey as identified above was used to calculate the profiles used in the model. A profile for each zone was used in the models. The development site profiles were based on the same profiles as those observed at The Smithy.

The traffic surveys were completed using 15 minute segments. Appropriate turning movements were summed within the 15 minute period and divided by the sum of the turning movements over the whole three hours to create a proportion for that period. A flat profile was assumed within each 15 minute period, so 5 minute traffic proportions were calculated by simply dividing the 15 minute proportions by 3.

Profile 1: Zone 1												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	1.987	1.987	1.987	1.282	1.282	1.282	2.885	2.885	2.885	3.974	3.974	3.974
08:00 - 09:00	4.615	4.615	4.615	2.821	2.821	2.821	3.205	3.205	3.205	3.077	3.077	3.077
09:00 - 10:00	2.885	2.885	2.885	2.500	2.500	2.500	2.308	2.308	2.308	1.795	1.795	1.795
Profile 2: Zone 2												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	0.494	0.494	0.494	0.741	0.741	0.741	1.728	1.728	1.728	1.975	1.975	1.975
08:00 - 09:00	1.728	1.728	1.728	4.938	4.938	4.938	6.173	6.173	6.173	5.185	5.185	5.185
09:00 - 10:00	2.469	2.469	2.469	3.457	3.457	3.457	2.222	2.222	2.222	2.222	2.222	2.222
Profile 7: Zone 3												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	2.488	2.488	2.488	3.980	3.980	3.980	0.995	0.995	0.995	1.493	1.493	1.493
08:00 - 09:00	2.985	2.985	2.985	4.975	4.975	4.975	5.473	5.473	5.473	2.488	2.488	2.488
09:00 - 10:00	3.980	3.980	3.980	1.493	1.493	1.493	0.995	0.995	0.995	1.990	1.990	1.990
Profile 3: Zone 4												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	0.823	0.823	0.823	2.058	2.058	2.058	1.646	1.646	1.646	1.235	1.235	1.235
08:00 - 09:00	2.263	2.263	2.263	4.733	4.733	4.733	5.556	5.556	5.556	3.909	3.909	3.909
09:00 - 10:00	3.292	3.292	3.292	2.263	2.263	2.263	3.704	3.704	3.704	1.852	1.852	1.852
Profile 4: Zone 5												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	0.813	0.813	0.813	0.813	0.813	0.813	5.691	5.691	5.691	1.626	1.626	1.626
08:00 - 09:00	0.000	0.000	0.000	2.439	2.439	2.439	8.943	8.943	8.943	6.504	6.504	6.504
09:00 - 10:00	4.878	4.878	4.878	1.626	1.626	1.626	0.000	0.000	0.000	0.000	0.000	0.000
Profile 7: Zone 6												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	2.488	2.488	2.488	3.980	3.980	3.980	0.995	0.995	0.995	1.493	1.493	1.493
08:00 - 09:00	2.985	2.985	2.985	4.975	4.975	4.975	5.473	5.473	5.473	2.488	2.488	2.488
09:00 - 10:00	3.980	3.980	3.980	1.493	1.493	1.493	0.995	0.995	0.995	1.990	1.990	1.990
Profile 5: Zone 7												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	1.436	1.436	1.436	2.359	2.359	2.359	3.333	3.333	3.333	2.718	2.718	2.718
08:00 - 09:00	3.795	3.795	3.795	5.026	5.026	5.026	3.128	3.128	3.128	3.026	3.026	3.026
09:00 - 10:00	2.000	2.000	2.000	2.462	2.462	2.462	2.410	2.410	2.410	1.641	1.641	1.641
Profile 6: Zone 8												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	0.694	0.694	0.694	1.389	1.389	1.389	2.778	2.778	2.778	3.472	3.472	3.472
08:00 - 09:00	6.250	6.250	6.250	6.944	6.944	6.944	2.083	2.083	2.083	2.778	2.778	2.778
09:00 - 10:00	1.389	1.389	1.389	2.778	2.778	2.778	0.694	0.694	0.694	2.083	2.083	2.083
Profile 7: Zone 9												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	2.488	2.488	2.488	3.980	3.980	3.980	0.995	0.995	0.995	1.493	1.493	1.493
08:00 - 09:00	2.985	2.985	2.985	4.975	4.975	4.975	5.473	5.473	5.473	2.488	2.488	2.488
09:00 - 10:00	3.980	3.980	3.980	1.493	1.493	1.493	0.995	0.995	0.995	1.990	1.990	1.990

Profile 8: Zone 10												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	1.626	1.626	1.626	0.813	0.813	0.813	4.878	4.878	4.878	2.439	2.439	2.439
08:00 - 09:00	0.000	0.000	0.000	1.626	1.626	1.626	8.130	8.130	8.130	7.317	7.317	7.317
09:00 - 10:00	4.065	4.065	4.065	2.439	2.439	2.439	0.000	0.000	0.000	0.000	0.000	0.000
Profile 9: Zone 11												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
08:00 - 09:00	0.000	0.000	0.000	3.030	3.030	3.030	3.030	3.030	3.030	0.000	0.000	0.000
09:00 - 10:00	3.030	3.030	3.030	6.061	6.061	6.061	15.152	15.152	15.152	3.030	3.030	3.030
Profile 10: Zone 12												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	0.000	0.000	0.000	3.968	3.968	3.968	0.000	0.000	0.000	7.143	7.143	7.143
08:00 - 09:00	0.000	0.000	0.000	7.937	7.937	7.937	3.968	3.968	3.968	5.556	5.556	5.556
09:00 - 10:00	0.000	0.000	0.000	2.381	2.381	2.381	0.000	0.000	0.000	2.381	2.381	2.381
Profile 11: Zone 13												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
07:00 - 08:00	0.000	0.000	0.000	5.000	5.000	5.000	0.000	0.000	0.000	3.333	3.333	3.333
08:00 - 09:00	0.000	0.000	0.000	5.000	5.000	5.000	6.667	6.667	6.667	8.333	8.333	8.333
09:00 - 10:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.000	5.000	5.000

Table 12: Profiles used in the AM models

Profile 1: Zone 1												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	1.839	1.839	1.839	3.289	3.289	3.289	2.453	2.453	2.453	3.623	3.623	3.623
17:00 - 18:00	4.013	4.013	4.013	3.623	3.623	3.623	3.344	3.344	3.344	3.233	3.233	3.233
18:00 - 19:00	2.007	2.007	2.007	2.285	2.285	2.285	1.839	1.839	1.839	1.784	1.784	1.784
Profile 2: Zone 2												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	2.627	2.627	2.627	1.970	1.970	1.970	2.463	2.463	2.463	4.433	4.433	4.433
17:00 - 18:00	2.463	2.463	2.463	3.284	3.284	3.284	5.419	5.419	5.419	2.956	2.956	2.956
18:00 - 19:00	2.956	2.956	2.956	0.985	0.985	0.985	2.299	2.299	2.299	1.478	1.478	1.478
Profile 7: Zone 3												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	2.976	2.976	2.976	3.571	3.571	3.571	4.762	4.762	4.762	5.357	5.357	5.357
17:00 - 18:00	1.786	1.786	1.786	4.167	4.167	4.167	0.595	0.595	0.595	2.381	2.381	2.381
18:00 - 19:00	1.190	1.190	1.190	2.381	2.381	2.381	2.976	2.976	2.976	1.190	1.190	1.190
Profile 3: Zone 4												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	1.536	1.536	1.536	2.458	2.458	2.458	0.922	0.922	0.922	1.075	1.075	1.075
17:00 - 18:00	2.765	2.765	2.765	9.370	9.370	9.370	1.690	1.690	1.690	2.151	2.151	2.151
18:00 - 19:00	2.458	2.458	2.458	2.765	2.765	2.765	3.226	3.226	3.226	2.919	2.919	2.919
Profile 4: Zone 5												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	0.844	0.844	0.844	4.641	4.641	4.641	4.219	4.219	4.219	4.641	4.641	4.641
17:00 - 18:00	4.219	4.219	4.219	0.000	0.000	0.000	2.321	2.321	2.321	2.110	2.110	2.110
18:00 - 19:00	4.219	4.219	4.219	0.000	0.000	0.000	2.532	2.532	2.532	3.586	3.586	3.586

Profile 7: Zone 6												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	2.976	2.976	2.976	3.571	3.571	3.571	4.762	4.762	4.762	5.357	5.357	5.357
17:00 - 18:00	1.786	1.786	1.786	4.167	4.167	4.167	0.595	0.595	0.595	2.381	2.381	2.381
18:00 - 19:00	1.190	1.190	1.190	2.381	2.381	2.381	2.976	2.976	2.976	1.190	1.190	1.190
Profile 5: Zone 7												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	3.697	3.697	3.697	2.834	2.834	2.834	3.389	3.389	3.389	3.142	3.142	3.142
17:00 - 18:00	2.896	2.896	2.896	3.327	3.327	3.327	2.834	2.834	2.834	2.896	2.896	2.896
18:00 - 19:00	2.588	2.588	2.588	2.465	2.465	2.465	1.848	1.848	1.848	1.417	1.417	1.417
Profile 6: Zone 8												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	1.010	1.010	1.010	2.020	2.020	2.020	5.051	5.051	5.051	3.030	3.030	3.030
17:00 - 18:00	2.020	2.020	2.020	4.040	4.040	4.040	1.010	1.010	1.010	2.020	2.020	2.020
18:00 - 19:00	5.051	5.051	5.051	4.040	4.040	4.040	0.000	0.000	0.000	4.040	4.040	4.040
Profile 7: Zone 9												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	2.976	2.976	2.976	3.571	3.571	3.571	4.762	4.762	4.762	5.357	5.357	5.357
17:00 - 18:00	1.786	1.786	1.786	4.167	4.167	4.167	0.595	0.595	0.595	2.381	2.381	2.381
18:00 - 19:00	1.190	1.190	1.190	2.381	2.381	2.381	2.976	2.976	2.976	1.190	1.190	1.190
Profile 8: Zone 10												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	1.055	1.055	1.055	4.430	4.430	4.430	4.008	4.008	4.008	4.430	4.430	4.430
17:00 - 18:00	4.430	4.430	4.430	0.000	0.000	0.000	2.321	2.321	2.321	2.321	2.321	2.321
18:00 - 19:00	4.008	4.008	4.008	0.211	0.211	0.211	2.532	2.532	2.532	3.586	3.586	3.586
Profile 9: Zone 11												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	5.072	5.072	5.072	7.246	7.246	7.246	1.449	1.449	1.449	1.449	1.449	1.449
17:00 - 18:00	1.449	1.449	1.449	2.899	2.899	2.899	1.449	1.449	1.449	4.348	4.348	4.348
18:00 - 19:00	2.174	2.174	2.174	2.174	2.174	2.174	0.725	0.725	0.725	2.899	2.899	2.899
Profile 10: Zone 12												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	4.444	4.444	4.444	2.222	2.222	2.222	1.852	1.852	1.852	5.185	5.185	5.185
17:00 - 18:00	2.222	2.222	2.222	2.963	2.963	2.963	0.000	0.000	0.000	2.222	2.222	2.222
18:00 - 19:00	0.741	0.741	0.741	3.333	3.333	3.333	2.222	2.222	2.222	5.926	5.926	5.926
Profile 11: Zone 13												
	00 - 05	05 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
16:00 - 17:00	3.086	3.086	3.086	1.852	1.852	1.852	0.617	0.617	0.617	4.938	4.938	4.938
17:00 - 18:00	1.852	1.852	1.852	3.086	3.086	3.086	0.000	0.000	0.000	1.235	1.235	1.235
18:00 - 19:00	1.235	1.235	1.235	5.556	5.556	5.556	3.704	3.704	3.704	6.173	6.173	6.173

Table 13: Profiles used in the PM models

Level Crossing Barrier Time

The level crossing was modelled as a signalised cross roads (with traffic only moving along The Street and Sheffield Road). Every 4 minutes and 14 seconds traffic moving along the

highway was stopped at the crossroads (level crossing) for 3 minutes and 44 seconds to simulate the level crossing closing for this period eight times during the hour.

Results

This section outlines the flow and queue results generated by the model. As a comparison, AM peak results have been included, although these have not been assessed directly in this analysis work.

The model output videos for the peak hours (08:00 to 09:00 and 17:00 to 18:00) are available on the file sharing web site "Dropbox" at the following website address:-

https://www.dropbox.com/sh/da8a2hyo10kc9f8/AACeNIJM0uggZJNHpmm_rd6Ma?dl=0

The models have been set to simulate on a random seed. This essentially means that each run of the modelled time period is unique to effectively represent the random nature of journey start times (i.e. each seed releases vehicles into the network at random intervals – but always within the matrix and profile settings).

By running each model an animation of vehicles moving through the network is produced allowing the operation and interaction of the junctions and vehicles to be viewed. This allows problems to be quickly identified.

The baseline model (without development) shows that when the level crossing closes for the modelled times a greater frequency of queues of around 25 to 30 vehicles build up on Sheffield Road. When the level crossing opens the queues quickly dissipate.

The "with the development" models show that the proposed highway network operates with some extra queueing and delays.

When the level crossing barriers closes there is some discernible difference in the queue lengths compared to the baseline model. Queues continue to fluctuate in length between 15 and 30 vehicles. The extent of the queue from the level crossing along Sheffield Road reaches Longbridge Road in length and impacts on the existing junctions of Bramley Lane and Longbridge Road.

When the level crossing barriers are raised the traffic that has been held is released and allowed to move off along the highway network. The platoon of traffic is able to efficiently move along the highway network without any significant delay. The model demonstrates that the highway network does not delay the platoons of traffic to such a degree that queues form and impacts on the free flow of traffic movements.

The model shows that the proposed developments have minimal impact on the length of queues caused by the additional vehicles associated with the residential developments. The queues generated by the level crossing do not significantly interfere with the operation of the existing junctions.