



Place Directorate

HALL GREEN DISTRICT OFFICE

SCHOOL ROAD

TRAFFIC IMPACT STUDY

KINGS HEATH

2017

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1.0 INTRODUCTION

- 1.1 Hall Green District Office (HGDO) was requested by Councillor Lisa Trickett, councillor for Moseley and Kings Heath Ward, to investigate concerns regarding traffic and pedestrian safety on School Road.
- 1.2 Complaints were received by Councillor Trickett from residents of School Road. Residents considered that the level of service of the section of School Road between its junctions with Blenheim Road and the Valentine Road/Cambridge Road/Springfield Road/Poplar Road roundabout was becoming a matter of significant concern. On this road section, conditions were such that traffic congestion, excessive delay to traffic, inconsiderate and reckless traffic behaviour were all viewed as being of significant concern in terms of detriment to highway safety, and also to the amenity of resident and business frontages.
- 1.3 Hall Green District Office has investigated the existing conditions on this section of School Road. Site surveys have been undertaken to obtain traffic flow data (See **Appendix D**), an understanding of parking conditions (See **Appendix B**) and the effect on the existing road system. A review of traffic accident data has also, been carried out (see **Appendix A**).
- 1.4 This report sets out the main causes of the concerns identified, the anticipated effects if scheme option implemented, and overall recommendations regarding highway safety and traffic management on this section of School Road. District engineers initially considered two options: Option One – A traffic calming scheme; Option Two – Introduction of one-way system on School Road. This study investigates the effects if Option Two were implemented on School Road.

2.0 EXISTING CONDITIONS

2.1 **School Road**

- 2.2 School Road is a local distributor road which runs for approximately 1 KM in a south westerly direction from its junctions with B4217 Wake Green Road and the roundabout junction with Valentine Road/Cambridge Road/Springfield Road/Poplar Road.

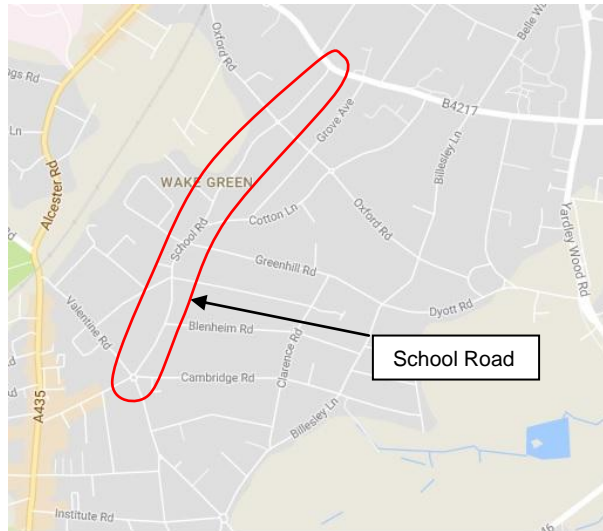


Figure 1 –School Road Extents

- 2.3 School Road is subject to a road speed limit of 20MPH along its entire length. Birmingham City Council implemented a 20MPH
- 2.4 School Road is predominantly residential in character. There are a few small commercial/retail premises on the section between the junctions with Blenheim Road and the Valentine Road/Cambridge Road/Springfield Road/Poplar Road roundabout.
- 2.5 **Valentine Road**
- 2.6 Valentine Road is a local distributor road (Subject to a 20MPH speed limit) running in a south easterly direction between A435 High Street and the School Road/Cambridge Road/Springfield Road/Poplar Road roundabout. Kings Heath Primary School occupies much of the western side of Valentine Road between its junctions with Ashfield Road and the roundabout – otherwise it is residential in character.
- 2.7 Traffic calming measures are present on Valentine Road, comprising a system of 2 speed cushions between the junction with A435 High Street and the roundabout junction.

2.8 ***Poplar Road***

- 2.9 Poplar Road is a local distributor road (Subject to a 20MPH speed limit) running in a easterly direction between A435 High Street and Valentine Road/Cambridge Road/Springfield Road/School Road roundabout.
- 2.10 Along the northern side of Poplar Road - Kings Heath Primary School and nursery school are situated between the junction of Poplar Avenue and the roundabout. Commercial/retail premises occupy the northern side of Poplar Road between the junctions with Poplar Avenue and A435 High Street.
- 2.11 Between the roundabout and Woodville Road, along the southern side of Poplar Road is residential land-use. Poplar Road Health Centre is located on the corner of Poplar Road with Woodville Road – vehicular access to which is provided off Woodville Road a short distance downstream of the junction with Poplar Road. Commercial/retail premises occupy the southern side of Poplar Road between the junctions with Woodville Road and B435 High Street – midway along this section is an access junction that serves an ASDA store.
- 2.12 Traffic calming measures are present on Poplar Road – raised table junction features at both of its junctions with Poplar Avenue and Woodville Road.

2.13 ***Springfield Road***

- 2.14 Springfield Road is a local distributor road (Subject to a 20MPH speed limit) running in a south-easterly direction between Valentine Road/Cambridge Road/Springfield Road/School Road roundabout and its junction with Billesley Lane/Gaddesby Road/Institute Road. A three-arm mini-roundabout junction (with Melton Road) is situated on Springfield Road between the two roundabouts previously mentioned. This section is traffic calmed – a system of one buildout/chicane and two speed cushions being present at three locations. The build-out/chicane features are all located along the western side of Springfield Road – and serve to narrow the roadway width/assist the speed reduction potential of the vertical deflection measures, and also define kerbside parking space for the residential houses on this side of Springfield Road.
- 2.15 Springfield Road serves as a “short-cut” between the A435 High Street (connecting in just south of its junction with Queensbridge Road) and with districts to east/south-east of this arterial corridor. Site observations show (especially during morning and afternoon peak periods) significant traffic movements between A435 to B4146 and A4040 via the Valentine Road and Springfield Road route. This route serves as a short cut to these geographical areas – and for some destinations, it serves to reduce overall journey time which would otherwise be greater if using the A435 road corridor which can experience congestion and delay especially during morning and afternoon peak periods.

2.16 Cambridge Road

- 2.17 Cambridge Road is a local access road (Subject to a 20MPH speed limit) running in an easterly direction between Valentine Road/Cambridge Road/Springfield Road/School Road roundabout and its junction with Billesley Lane. Cambridge Road is residential in character.

2.18 School Road/Cambridge Road/Springfield Road/Poplar Road/Valentine Road Junction

- 2.19 This is a raised-table roundabout junction with five entry/exit arms. The central core area is asymmetric in shape. The core is defined by an over-run strip, then raised kerbing defines the central core inside. The raised table, over-run strip and central core are further differentiated from each-other, the adjacent road and footway surfaces, by means of differentially coloured pavor blocks.
- 2.20 Five internally illuminated traffic bollards are situated on the central core, as is continuous white lining around the core perimeter – in order to reinforce awareness of its presence and layout to traffic movements to/through this junction. There are several dropped kerb points on the core – these are to aid pedestrian crossing movements which take place across the junction itself, and through the central core – at weekday morning/afternoon periods, this mode of crossing is facilitated by means of a School Crossing Warden.
- 2.21 On the Springfield Road arm entry to the junction, there is a kerbed traffic separator/pedestrian crossing reserve area – the crossing point positions being defined by buff coloured tactile paving areas. The raised-table nature of the junction enables pedestrian crossing movements on all five entries – albeit on the remaining four arms crossing points are not defined to a specific location (i.e., no areas of tactile paving are present).

2.22 A435 High Street/Valentine Road Junction

- 2.23 This junction is located approximately 0.35KM to the north-west of the School Road/Cambridge Road/Springfield Road/Poplar Road/Valentine Road Junction. Valentine Road joins A435 High Street, forming a three-arm priority controlled junction, which is situated 70 metres to the south of the A435/Queensbridge Road junction. Valentine Road (the minor arm at the junction) has single lane entry and exit lanes. There are wide single lane exit and entry carriageway lanes on the A435 arms.

2.24 A435 High Street/Poplar Road Junction

- 2.25 This junction is located approximately 0.25KM south-west of the School Road/Cambridge Road/Springfield Road/Poplar Road/Valentine Road Junction. Poplar Road joins A435 High Street – forming a three-arm priority controlled intersection.

- 2.26 There is a traffic signal controlled (Puffin type) pedestrian crossing located on A435 High Street approximately 20 metres south of its junction with Poplar Road. Demand pedestrian crossing flows have been observed as moderate-to-high –the crossing being “called” very frequently. This part of the A435 road corridor experiences congestion due to its road characteristics – significant traffic levels, on-street parking, frequency of turning movements to/from junctions, stationary buses at bus stops, presence of pedestrian crossing facilities.
- 2.27 A435 High Street has single lane entry and exit approaches to the junction. For A435 (South Side) there is (between the pedestrian crossing and Poplar Road) a short section of right turning lane to accommodate traffic turning flows into Poplar Road.
- 2.28 ***Springfield Road/Melton Road Junction***
- 2.29 This three-arm mini-roundabout junction is located approximately 0.25KM south of the School Road/Cambridge Road/Springfield Road/Poplar Road/Valentine Road Junction.
- 2.30 ***School Road/Blenheim Road Junction***
- 2.31 This is a three-arm priority controlled junction. Each arm at the junction has a single lane entry and exit carriageway – Blenheim Road being the minor (give way) side road arm of the junction layout.
- 2.32 ***School Road/Prospect Road/Ashfield Road Junction***
- 2.33 This is a four arm priority crossroads junction. School Road is the major road – Ashfield Road and Prospect Road are the minor (give-way) side road arms at this junction. All arms have single lane entry and exit carriageway lanes.
- 2.34 ***Traffic Regulation Orders***
- 2.35 On School Road between its junctions with Blenheim Road and the roundabout junction, there is a signed prohibition of waiting by goods vehicles with maximum weight of, or greater than, 5 tonnes. This restriction is signed on the southbound approach of School Road into the roundabout junction.
- 2.36 On Cambridge Road, a short distance upstream of the roundabout, is a signed prohibition of waiting by goods vehicles with maximum weight of, or greater than, 5 tonnes.
- 2.37 On Springfield Road there are sections of No Waiting At Any Time (NWAAT) Traffic Regulation Order:

- On southbound exit carriageway, either side of, and progressing a short distance into, Woodfield Road
 - On southbound (exit) carriageway, commencing approximately 15 metres downstream of the roundabout junction, extending for approximately 15-20 metres in length.
- 2.38 Site observations show good compliance of both NWAAT restrictions at weekday pupil arrival/departure times to Kings Heath Primary School.
- 2.39 On Poplar Road, Traffic Regulation Order restrictions are present along the entire road-length.
- 2.40 Prohibition on waiting between the hours of 0745am and 1845pm on Monday to Saturday inclusive are present along:
- Westbound carriageway between roundabout and entry of Poplar Road into A435 High Street
 - Eastbound carriageway near junction with A435 High Street along Poplar Road to roundabout junction.
- 2.41 Prohibition on loading between the hours of 0700am and 1000am and 1600pm and 1900pm on Monday to Saturday inclusive are present on A435 High Street and into Poplar Avenue for a short distance.
- 2.42 Prohibition on waiting between the hours of 0745am and 1845pm on Monday to Saturday inclusive are present on:
- The exit carriageway of Woodville Road, at its junction with Poplar Road.
 - The exit carriageway of Poplar Avenue, at its junction with Poplar Road.
- 2.43 No Waiting At Any Time (NWAAT) restriction is present on the entry of Woodville Road into the junction with Poplar Avenue.
- 2.44 A School access is located on Poplar Road, opposite to its junction with Woodfield Road. Across this access is a "SCHOOL KEEP CLEAR" zig-zag marking.
- 2.45 On Valentine Road, Traffic Regulation Order restrictions are present along much of its road-length between A435 High Street and the roundabout junction.
- 2.46 No Waiting At Any Time (NWAAT) restriction are present:

- Westbound carriageway from junction with A435 High Street to a point approximately 45 metres south-east of the junction with Ashfield Avenue.
- Eastbound carriageway from junction with A435 High Street to a point approximately 45 metres south-east of the junction with Ashfield Avenue.
- On Valentine Road (both carriageways) at Ashfield Road junction.
- On Valentine Road (both carriageways) opposite Kings Heath Primary School.

2.47 On the exit carriageway of Valentine Road, a short distance downstream of the roundabout, is a signed prohibition of waiting by goods vehicles with maximum weight of, or greater than, 5 tonnes.

2.48 A SCHOOL KEEP CLEAR restriction is present across the main access point serving Kings Heath Primary School, along the westbound (exit) carriageway of Valentine Road. The restriction is signed such that no stopping is permitted between the hours of 0800am and 1600pm on Mondays to Fridays inclusive.

2.49 ***Compliance Levels - Existing Traffic Regulation Orders***

2.50 On Poplar Road: 2-3 vehicles were observed to be parked in contravention of the existing restrictions during the day. This rises during weekday pupil arrival and departure times – a maximum of 7 vehicles being observed in the afternoon period. The greatest problem was caused by vehicles parked upon the restrictions present on the southbound exit of Poplar Road, between the roundabout junction and the junction with Woodville Road. At school arrival/departure times, such behaviour exacerbated traffic congestion on Poplar Road by impeding southbound traffic onto Poplar Road from the roundabout. This in turn caused block-back into the roundabout for short periods during the weekday school arrival/departure periods.

2.51 The resultant congestion on Poplar Road blocking-back into the roundabout, causes “lock-up” of the circulatory carriageway, which can greatly reduce junction capacity, leading to increased delays, queues and journey travel time. Driver frustration at the delays can also lead to errors in judgement – i.e. drivers forcing entry into the roundabout which abrupt braking decisions required of them and/or vehicles within the junction or on other arms.

2.52 Compliance of existing restrictions on Valentine Road was observed as generally satisfactory. However significant levels of congestion were observed on Valentine Road during weekday school arrival and departure periods. This was due to increases both in traffic levels on Valentine Road and also kerb-side parking levels on the southbound approach of Valentine Road to the roundabout junction.

- 2.53 Reasonable compliance of Traffic Regulation Orders on the other road approaches to the roundabout (where restrictions were in place) was observed.

2.54 ***Kings Heath Primary School***

- 2.55 Kings Heath Primary School is situated on the corner of Valentine Road and Poplar Road. Site observations found that arrival trips to school in the morning, and departure trips from the school in the afternoon, had a significant impact on the performance of the School Road/Cambridge Road/Springfield Road/Poplar Road/Valentine Road Junction.

2.56 ***Kings Heath Primary School Travel Plan***

Birmingham City Council prepared a School Travel Plan in 2017. Parts of its findings are included in this study, to provide information regarding School pupil numbers, travel modes and proportions. The findings of the School Travel Plan are as follows:

- Kings Heath Primary School has a total of 734 pupils (including Nursery).
- School day starts at 08:55am and finishes at 15:30pm
- The School offers a breakfast club (Commencing at 07:45 am and finishing at 09:00 am)
- The Nursery operates between 09:00am and 15:15pm.
- The School runs several after-school clubs which finish at 18:00 pm.
- The School does not run Adult Education classes after the end of the normal School day. Evening activities are stated as happening infrequently, and usually at the end of terms. These are stated as concluding between 19:30-20:00pm
- During school holidays between 08:00am and 18:00pm an activity club is run for up to 30 children.

2.57 ***Mode Of Travel To Kings Heath Primary School***

The Year 2017 School Travel Plan found:

- 51.2% of pupils walked to School.
- 2.5% of pupils travelled to School by bus.
- 22.5% of pupils travelled to School by car.

- 13.2% of pupils travelled to School by cycling or “scooting”.
- 10.4% of pupils travelled to School by car.
- 13.2% of pupils travelled to School by “Park & Stride” (e.g., If trip-mode is by car, to park a 10.minute walk from school, and to complete the journey on foot)
- Of the 84 School staff members surveyed, 58.9% travelled to School by car.

3.0 SITE SURVEYS AND INVESTIGATIONS

3.1 Traffic Flow Counts

3.2 Junction traffic surveys were undertaken by TRACSIS on Thursday July 13th 2017 at the following locations:

- A435/Valentine Road Junction
- A435/Poplar Road Junction
- School Road/Prospect Road/Ashfield Road Junction
- School Road/Valentine Road/Cambridge Road/Springfield Road/Poplar Road Junction.
- Springfield Road/Melton Road Junction

3.3 Traffic turning counts at these locations are to assist the understanding of existing traffic flow levels and route movements within the study area. **Appendix D** contains the traffic surveys obtained for the five junctions listed previously.

3.4 Road Traffic Accidents

3.5 District engineers undertook a review of reported road traffic accidents for:

- School Road, between the junction with Blenheim Road and the roundabout.
- School Road/Valentine Road/Cambridge Road/Springfield Road/Poplar Road Junction – from the centre of the junction extending out to a 40 metres radius of the junction outline.

3.6 Review of JDT-Mott MacDonald SPECTRUM reported accidents database was undertaken for a 3-year reporting period, from July 2014 to July 2017. This assessment found zero reported accidents/collisions for each of the two defined study locations.

3.7 On Street Parking

3.8 During July and August 2017, District engineers undertook surveys of the numbers of vehicles parked at the road-side on School Road and the adjacent streets, to assess the demand for parking throughout the day by residents, staff and customers (where retail/business outlets are present) school staff/visitors/parents (Near Kings Heath Primary School). This information assisted the understanding of how the demand levels for parking affect the road network at various times during the day.

- 3.9 Counts were taken of the numbers of parked roadside vehicles on: School Road, Ashfield Road, Valentine Road, Cambridge Road, Springfield Road, Blenheim Road, and Poplar Road. **Diagram B1** within **Appendix B** shows the parking beat locations.
- 3.10 The impact of weekday school arrival and departure trips was observed as considerable. Parking surveys were therefore undertaken during school term time (July 11th 2017 and July 13th 2017) and school recess period (August 15th 2017 and August 15th 2017) to enable a comparison of highway performance under both scenarios.
- 3.11 ***Morning Period***
- 3.12 **Table B1** in **Appendix B** shows the numbers of vehicles parked during the morning period for weekday School Term and weekday School Recess scenarios.
- 3.13 Reference to **Table B1** when comparing School term versus School Recess weekday parking shows some clear patterns. The main findings of the survey on Recess weekday at 0715am (representing the time at which most journeys from home to work have not yet commenced) are:
- A large reduction in parked vehicles on Blenheim Road and Cambridge Road.
 - A small reduction in parked vehicles on Springfield Road
 - A small reduction in parked vehicles on Ashfield Road
- 3.14 Observations at 0815am on a weekday during the School Term, show increasing congestion at the roundabout and on adjacent streets, due to vehicle and pedestrian interactions. Trips to school are observed to be the major cause of this situation. Survey comparisons indicate that during the School summer Recess:
- There is a moderate reduction in parked vehicles on Valentine Road.
 - There is a large reduction in parked vehicles on Blenheim Road and Cambridge Road.
 - A moderate reduction in parked vehicles on Ashfield Road.
 - A moderate reduction in parked vehicles on Ashfield Road.
- 3.15 Observations at 0845am show often considerable congestion at the roundabout due to vehicle and pedestrian interactions. Also noticeable is northbound traffic onto A435 High Street routeing via Springfield Road-Valentine Road. During Recess, survey findings are:

- There is a moderate reduction in parked vehicles on Valentine Road.
- There is a large reduction in parked vehicles on Blenheim Road and Cambridge Road.
- A moderate reduction in parked vehicles on Ashfield Road.
- A moderate reduction in parked vehicles on Springfield Road.

- 3.16 Site observations taken during weekday School Term found congestion occurred on School Road, Springfield Road, Valentine Road and Poplar Road. There was significant congestion at the roundabout junction. The source of the congestion was the traffic levels at school arrival trip time. Observations during weekday School Term confirm congestion at the roundabout is exacerbated by vehicles parked on Valentine Road (between Ashfield Road and School Road junctions) and Springfield Road (between Cambridge Road and Melton Road junctions). Vehicles parked on the Valentine Road southbound approach to the roundabout cause entry impedance and delay – as southbound vehicles are held up waiting behind parked vehicles, for gaps in the oncoming northbound traffic, in order to progress down Valentine Road and through the roundabout. Vehicles parked on the southbound exit into Springfield Road from the roundabout may block back into the roundabout during the most congested times of the school morning arrival trip period.
- 3.17 Site observations during weekday School summer Recess found congestion at the roundabout junction and on adjacent streets did not occur. Congestion of and within the roundabout junction – which during the weekday School Term acts as a significant impedance to junction throughput – was not observed. Consequently, vehicle throughput was improved – delays and queues on all entry arms to the roundabout were greatly reduced. The improvement is of course also due to the absence of the vehicular trips to School – therefore the overall reduction in traffic volume at the same time means reduced pressure on the junction.
- 3.18 Observations taken during weekday School Recess found show moderate reductions in parked car levels on Ashfield Road, Blenheim Road, Cambridge Road and Springfield Road. This (along with reduced traffic levels owing to absence of school traffic) enabled improved free-flow of vehicles on these streets.
- 3.19 In the morning period, the northbound routeing of traffic from Springfield Road (through the roundabout) along Valentine Road, to A435 High Street was observed to progress with reduced levels of delay time and queueing that were noticed during weekday morning School Term time.

3.20 ***Afternoon Period***

3.21 **Table B2 in Appendix B** shows the numbers of vehicles parked during the afternoon period for weekday School Term and weekday School Recess scenarios.

3.22 Observations at 1510pm show traffic, pedestrian and parking levels increasing with the onset of the weekday afternoon school departure period. Congestion is also noted as increasing at the roundabout junction. Survey comparisons indicate that during the School Recess:

- There is a moderate reduction in parked vehicles on Valentine Road between junctions of Ashfield Rd and A435 High Street.
- There is a moderate reduction in the number of parked vehicles on Ashfield Road.
- A large reduction in parked vehicles on School Road (between the junctions with Blenheim Road and Valentine Road), Blenheim Road, Springfield Road and Cambridge Road.
- A moderate reduction in parked vehicles on Poplar Road.

3.23 During weekday School Term, by 1610pm school departure trip levels have largely tailed off, and the afternoon peak period for the roundabout junction is commencing. Survey comparisons indicate that during the School Recess:

- A moderate increase in the number of parked vehicles on Valentine Road between its junctions with A435 High Street and Ashfield Road.
- A large reduction in parked vehicles on Springfield Road, Blenheim Road and Cambridge Road.
- A moderate reduction in parked vehicles on Poplar Road and Ashfield Road.

3.24 During weekday School term, the middle of the afternoon traffic peak occurs around 1645pm – the roundabout junction is experiencing greater traffic throughput. Delays and queues are not observed as problematic – albeit slightly higher on certain entries, most notably Valentine Road.

A moderate increase in the number of parked vehicles on Valentine Road between its junctions with A435 High Street and Ashfield Road.

- A large reduction in the number of parked vehicles on Blenheim Road and Cambridge Road.

- A moderate reduction in parked vehicles on Springfield Road, Ashfield Road and Poplar Road.

3.25 Observations taken during weekday School recess show in this period, moderate reductions in parked car levels on Ashfield Road and Poplar Road. There is a substantial reduction in parked vehicles on School Road (Between the junctions with Blenheim Road and Valentine Road) at the time of onset of the school departure trips around 1510pm – i.e., when parents park in School Road prior to collecting their children from school. There are large reductions in the number of parked vehicles observed on Blenheim Road and Cambridge Road, and a moderate reduction on Poplar Road. There is also a moderate reduction in the number of parked vehicles noted on Springfield Road – especially around 1510pm.

3.26 Congestion of the roundabout and its approaches was not observed in the weekday afternoon School Recess surveys. In afternoon period, the southbound routeing of traffic from A435 High Street along Valentine Road (through the roundabout) and along Springfield Road was observed to progress with less delay and queue that can arise during weekday School Term time.

3.27 ***Journey Time Surveys***

3.28 Journey time surveys were undertaken during morning and afternoon weekday periods. Surveys during school term time were undertaken on July 18th and 20th 2017. Surveys during school summer recess were undertaken on August 10th 2017. A review and comparison of weekday School Recess versus School Term Time statistics can be used to illustrate the differences observed in journey times over the same routes taken. Journey time comparisons with site observations of highway performance on the routes may also highlight locations where particular concerns arise – e.g., congested roadway performance, safety and accident potential.

3.29 Three journey time routes were selected. Journey Route One (**Diagram C1** within **Appendix C**) measures travel times on a circular route along School Road and Springfield Road. Journey Route Two (**Diagram C2** within **Appendix C**) measures travel times on the Poplar Road-Valentine Road-A435 High Street circuit (Anti-Clockwise Direction). Journey Route Three (**Diagram C3** within **Appendix C**) measures travel times on the Valentine Road-Poplar Road-A435 High Street circuit (Clockwise Direction). For each route, a series of timed vehicle circuits was undertaken so that the way travel times changed during progression of morning and afternoon periods could be seen. Tables were then prepared showing the time taken in minutes to progress between successive timing points.

3.30 ***Morning Journey Times – Weekday School Term***

- 3.31 **Table C1** shows surveyed travel times for Journey Route One (Route shown on **Diagram C1**), measured on July 20th 2017 (Weekday School Term). Congestion due to school travel activity was observed as being greatest between 0840-0915am. At 09:05am the total journey time is 5 minutes 42 seconds – which is 2 minutes 16 seconds greater than that measured at 07:56am.
- 3.32 The travel time between Timing Points 9 and 10 represents the northbound journey on School Road between the roundabout exit and the junction with Blenheim Road. At 07:56am this was measured at 19 seconds – when northbound traffic experienced little or no impedance. By 09:05am (the height of congested conditions), the time for this part of the journey had increased to 1 minute and 20 seconds. This is one of the biggest differences of survey time measured during the morning period, and was observed as being due to the combined effect of the congested roundabout, the increased number (11 counted) of parked vehicles on the northbound side of School Road, and the increased traffic levels on School Road during the morning peak. Travel activity associated with the School subsided at about 09:20 am – thereafter junction congestion decreased abruptly, parking levels on School Road reduced, junction and adjacent highway network performance improved markedly – as shown with a total journey time of 3 minutes 25 seconds at 09:22am – which is similar to that measured before commencement of morning peak conditions (07:56am).
- 3.33 **Table C2** shows surveyed travel times for Journey Route Two. Focus is chiefly on the streets at/adjacent to the School and the roundabout junction. Where Timing Points 1 to 4 represent Poplar Road between its junctions with A435 High Street and the entry into the roundabout junction at Valentine Road - The impact of congested morning peak conditions on Poplar Road is clearly shown in the survey results. The eastbound journey between the junctions of Poplar Avenue and Valentine Road (The summation of readings for TP 2-3 and TP 3-4) rises from 29 seconds (08:16am) to 1 minute 9 seconds (08:54am), then to 1 minute 49 seconds (09:00am). Congestion eases after 0915am, and by 09:31am Poplar Road is fairly free-running – reflected in the eastbound journey being much shorter, measured at 18 seconds duration. Congestion on Poplar Road was observed due to several factors : Traffic volumes for school arrival trips, downstream congestion at the roundabout junction, the frequency of School Crossing Warden operations (which increased frequency of traffic stoppages, reducing average speed and increasing travelling time), parked vehicles on Poplar Road in violation of the Traffic Regulation Order restrictions (Which caused traffic to halt whilst awaiting gaps in the oncoming flow, to progress along the street). These factors were abated after 09:15am and thereafter highway performance was greatly improved – with reductions in journey travel times, delays and queues at junctions, and parking levels.
- 3.34 On the northbound approach of Valentine Road to the junction with A435 High Street, journey times were observed as fluctuating between 54 seconds and 3 minutes 18 seconds. This component of the journey route is heavily influenced by the performance of A435 High Street,

and the desire for the right turn movement out of Valentine Road by northbound traffic at this time of the day. Queue “spikes” were observed when a pulse of northbound traffic on Valentine Road meets particular delay when a greater than average length northbound queue is present on A435 High Street at its junction with Queensbridge Road. This occurrence leads to greater difficulty in entering the A435 High Street, and imposes a greater delay and queue onto Valentine Road.

- 3.35 The overall journey time was observed increase significantly between Travel activity associated with the School subsided at about 09:15 am – thereafter junction congestion decreased abruptly, parking levels reduced, junction and adjacent highway network performance improved markedly. This is shown by the total journey time being recorded as 4 minutes 3 seconds at 09:31am – a reduction of one minute and 8 seconds over that surveyed at 08:54am.
- 3.36 **Table C3** shows surveyed travel times for Journey Route Three. At 09:13am the survey results show a significant increase in the travelling time taken on the southbound approach of Valentine Road to the roundabout (Timing Points 1 to 2). Travel time is logged at one minute and 14 seconds – which is a considerable increase over the previous reading (30 seconds) and the next reading (26 seconds) – and reflects the congested situation observed on this street and the adjacent streets during the 0840-0915am period.
- 3.37 Survey results show a considerable variation in the westbound journey time on Poplar Road between Poplar Avenue and entering A435 High Street (Timing Points 5 to 6) – due mainly to the variability of the performance of A435 High Street itself, which can lead to delay to traffic entering from Poplar Road.
- 3.38 Likewise, survey results show noticeable variability for the A435 High Street from Findlay Road into Valentine Road (Timing Points 9 to 10). Lengthier times are noted when northbound queues on A435 High Street at the junction with Queensbridge Road cause delays to vehicles within this queue seeking to make the right turn into Valentine Road.
- 3.39 ***Afternoon Journey Times – Weekday School Term***
- 3.40 **Table C4** shows surveyed travel times for Journey Route One (Route shown on **Diagram C1**), measured on July 18th 2017 (Weekday School Term). From 15:00pm for approximately an hour, congestion builds on the roundabout and adjacent streets – due to the increased traffic flows and parked vehicles associated with school departure traffic patterns. School Road southbound travelling time (Timing Points 2 to 3) between the junctions with Blenheim Road and the roundabout may reach 46 seconds at the height of this congested period (15:25pm and 15:38pm) – which contrasts with the much-reduced time taken to travel this road section of 23 seconds at 16:24pm when the school departure period has largely concluded.

- 3.41 Traffic travelling through the roundabout from Springfield Road to School Road (Timing Points 8 to 9) is lengthier at height of school departure period. At 15:38pm it is logged at 25 seconds rather than the more usual time of between 5-8 seconds which was observed before and after the school departure period. Factors including traffic congestion, high frequency of School Crossing Warden operations at the roundabout, were observed to increase delay and reduce entry capacity of this arm.
- 3.42 Northbound travelling time on School Road between its exit from the roundabout and junction with Blenheim Road (Timing Points 9 to 10) was observed to increase significantly – being 58 seconds at 15:32pm – which may be some 20-30 seconds greater than usual. The logged journey time of 1 minute and 12 seconds recorded at 16:57pm is an anomaly, due to the length of time taken by a HGV to travel along this road section – with consequent delaying effects to both oncoming and following vehicles.
- 3.43 Travel times along Journey Route Two are shown in **Table C5** (Route shown on **Diagram C2**).
- 3.44 From 15:00pm, the School Crossing Warden is operational on Poplar Road at its junction with Poplar Avenue. At 15:15pm the eastbound journey time on Poplar Road between the junctions with Poplar Road and Woodville Road (Timing Points 2 to 3) was observed at 46 seconds, which is a notable increase compared to the 10-14 seconds for this journey at other times in the survey.
- 3.45 As noted in the morning survey analyses, variability of conditions on A435 High Street, may cause some fluctuation in the time to travel along the street – and also for traffic making turning movements to, and particularly from it. The left turn into Poplar Road (Timing Point 10 to 1) may be lengthier owing to the effects of a pulse of southbound traffic, and frequency of pedestrian crossing actuation (On A435 just south of the junction with Poplar Road). Similarly northbound traffic exiting Valentine Road onto A435 High Street (Timing Point 6 to 7) may experience a lengthier travelling time, due to the impedance caused by stationary queued vehicles on A435 High Street at the downstream junction with Queensbridge Road.
- 3.46 **Table C6** (Route shown on **Diagram C3**) displays travelling times measured for Journey Route Three.
- 3.47 At 15:48pm the survey results show a significant increase in the travelling time taken on the southbound approach of Valentine Road to the roundabout (Timing Points 1 to 2). Travel time is logged at one minute and 34 seconds. At 15:55pm, the recorded travel time was 51 seconds. Both readings represent a significant increase in the time taken to travel this section of road – where times of between 18-28 seconds may be more typical, and are reflective of the congestion observed at the roundabout and on adjacent streets during the school departure period.

- 3.48 Journey times are again observed as variable along A435 High Street and for turning movements both to and from A435 High Street. However, the recorded travel time of 1 minute and 9 seconds at 16:39pm for the southbound journey along Valentine Road between A435 High Street and Ashfield Road (Timing Points 10 to 1) is an anomaly and was due to impedance caused by a parked “Royal Mail” collection van on that side of the road. The effects are more pronounced because of the increase in southbound traffic routeing from A435 High Street to Springfield Road, along Valentine Road during the afternoon traffic period.
- 3.49 ***Morning Journey Times – Weekday School Summer Recess***
- 3.50 Site observations and weekday School Recess journey time surveys were undertaken on August 10th 2017. Lower traffic flows were observed on the road network – especially on A435 High Street, and the absence of school traffic in vicinity of the school itself. School Recess journey times are therefore generally lower when compared against School Term journey times.
- 3.51 **Table C7** (Route shown on **Diagram C1**) shows southbound journey times on School Road between Blenheim Road and the roundabout (Timing Points 2 and 3) vary from 29 seconds (08:20am on **Table C1**) during School Term to 18 seconds (08:29am) during School Recess. This table also shows northbound journey times on Springfield Road between Melton Road and the roundabout are reduced from 52 seconds (08:20am) during School Term to 32 seconds (08:24am) during School Recess. The northbound journey time on School Road between the roundabout and Blenheim Road is reduced from 45 seconds (at 08:27am) during School Term, to 19 seconds (08:29am) during School Recess.
- 3.52 This correlates to site observations that in the absence of school traffic conditions, congestion is largely absent from the roundabout and the adjacent road network.
- 3.53 **Table C13** shows the total route travelling time for Journey Route One is reduced by between 28-57 seconds in the Recess period, and by a maximum of 2 minutes and 36 seconds at the height of the congested morning period – when a considerable delay of one minute and 20 seconds is experienced on the northbound journey on School Road between the roundabout and Blenheim Road.
- 3.54 **Table C8** (route shown on **Diagram C2**) shows surveyed travel times for Journey Route Two. Eastbound journey times on Poplar Road between A435 High Street and Valentine Road (Timing Points 1 and 4) vary from 2 minutes 31 seconds (09:00am on **Table C2**) during School Term to 35 seconds (09:00am) during School Recess. This significant improvement in travelling time is due to relatively free-running conditions during Recess period owing to the absence of school traffic, parking and School Crossing Warden operations.

- 3.55 **Table C9** (Route shown on **Diagram C3**) shows the surveyed travel times for Journey Route Three. Southbound journey time on Valentine Road between junctions of Ashfield Road and the roundabout (Timing Points 1 to 2) was logged at 1 minute 14 seconds (09:13am on **Table C3**) during the congested period on weekday School Term. However a much reduced travel time of 26 seconds (08:48am on **Table C8**) was logged in School Recess – during which period no conditions of highway congestion are apparent, nor a problem with parking on this section of Valentine Road.
- 3.56 ***Afternoon Journey Times – Weekday School Summer Recess***
- 3.57 Site observations and weekday School Recess journey time surveys were undertaken on August 10th 2017. As with morning surveys, observations found traffic levels and congestion generally reduced on the highway network – therefore weekday afternoon School Recess journey times are therefore generally lower when compared against School Term journey times for the same period. However periods of congestion (albeit of less duration and frequency) were still observed to occur on A435 High Street.
- 3.58 **Table C10** (Route shown on **Diagram C1**) shows the surveyed travel times for Journey Route One. Southbound journey time on School Road between Blenheim Road and the roundabout (Timing Points 2 to 3) was observed to be 46 minutes (15:25pm and 15:38pm, on **Table C4**) in School Term versus a time of 18 seconds (15:43pm on **Table C10**) measured during School Recess. During School Term, this period has increased traffic and parking levels – as it is within the afternoon departure period for pupils from school. Observations within School Recess period show reduced traffic levels on School Road and reduced parking levels also – Both correlate to the absence of school traffic conditions at this time of the day.
- 3.59 The northbound journey on School Road between the roundabout and Blenheim Road (Timing Points 9 to 10) was observed as 58 seconds (15:32pm, on **Table C4**) during weekday School Term congested conditions – by comparison with a journey time of 18 seconds (15:43pm on **Table C10**) measured during the School Recess.
- 3.60 Parking levels on School Road are observed to be reduced during the School Recess - which (Along with reduced traffic volumes due to school closure) reduces congestion and improves journey times along this section of School Road. Delay during morning and afternoon periods is always present as roadway width does not enable two vehicles to pass each other on School Road. The delay is reduced slightly where the number of parked vehicles is reduced – as vehicles do not have to successively stop behind several vehicles. Also the greater the number of vehicles that are parked, the longer a vehicle takes to overtake – which in turn leads to the driver waiting to be sure of sufficient time to complete the overtaking movement without meeting an oncoming vehicle.

- 3.61 **Table C11** (Route shown on **Diagram C2**) shows the surveyed travel times for Journey Route Two.
- 3.62 Eastbound journey time on Poplar Road between Poplar Avenue and Woodville Road (Timing Points 2 and 2) was 46 seconds (at 15:15pm, on **Table C5**) during the congested period of the weekday afternoon School Term period. During School Term, a travel time of 10 seconds was recorded (At 15:23pm on **Table C11**).
- 3.63 Northbound journey time on Valentine Road between the roundabout and Ashfield Road (Timing Points 5 and 6) was logged at 39 seconds (15:15pm, on **Table C5**) during School Term - compared to 21 seconds (15:23pm, on **Table C11**) in School Recess. During School Recess, northbound traffic entering A435 High Street from Valentine Road (Timing Points 6 to 7) generally has a shorter journey time.
- 3.64 **Table C12** (Route shown on **Diagram C3**) shows the surveyed travel times for Journey Route Three.
- 3.65 The southbound journey time on Valentine Road between Ashfield Road and the roundabout was recorded as being 51 seconds (15:55pm, on **Table C6**) during School Term, versus the significantly reduced time of 23 seconds (16:08pm, on **Table C12**) during School Recess.
- 3.66 School Term surveys showed a tendency to congestion for northbound traffic on A435 High Street between Poplar Road and Grange Road junctions (Timing Points 6 to 7) where travel times of one minute and 12 seconds and 45 seconds were logged (15:02pm and 15:48pm, on **Table C6**) which was not observed in School Recess surveys. A435 High Street can experience quick build-up of congestion owing to turning patterns to/from side-roads, stationary buses, frequency of pedestrian crossing operation.
- 3.67 School Recess surveys showed lengthier travel times for westbound traffic entering A435 High Street from Poplar Road (Timing Points 5 to 6) were noted in School Recess by comparison to School Term period.
- 3.68 ***Summary of existing problems***
- 3.69 Congestion at School Road/Valentine Road/Cambridge Road/Springfield Road/Poplar Road Junction: Problem arises during school pupil arrival and departure times on weekdays. Increased traffic arrivals at the junction, and increased pedestrian crossing movements (which necessitate frequent crossings of pedestrian groups by School Crossing Warden) are the principle causes. There being a School Crossing Warden (SCW) on Poplar Road (at Poplar Avenue junction) and at the roundabout is necessary for pedestrian safety. However, SCW operation does itself cause congestion at both junctions and between them.

- 3.70 Congestion on School Road: At pupil arrival and departure times there is an increase in take-up of kerbside parking on the section of School Road between the roundabout and the junction with Blenheim Road. Roadway width does not enable two-way traffic movement when parking takes place on one side of the road – resulting in traffic waiting behind a parked vehicle to allow oncoming traffic to pass by, before proceeding along the street. Parking congestion is observed to impede traffic flow and cause significant delays - traffic exiting from the roundabout to School Road is frequently observed stationary within the roundabout as it cannot clear the junction. The problem is observed to be worse at pupil departure time – as parents park and wait for 15 minutes or longer before collecting their children – with more kerbside parking take-up, greater potential for congestion happening over a longer time-span.
- 3.71 Congestion on Poplar Road: High crossing frequency by SCW, plus parking on the exit carriageway (in violation of existing TRO) are two of the main causes of congestion.
- 3.72 Traffic delay on Valentine Road entry to roundabout: This is most noticeable during the weekday evening period – after the pupil departure period of mid-afternoon has subsided – and is due to the volume of traffic bypassing the A435 High Street (routeing via Valentine Road & Springfield Rd) and for trips from A435 to areas immediately to the east.

4.0 PROPOSED SCHEMES

4.1 Based on issues highlighted in the previous section proposals to solve/reduce these problems are reviewed below:

4.2 **ONE-WAY PROPOSAL – SCHOOL ROAD.**

4.3 Drawing reference **IMSE/GD/436** (Please refer to **Appendix G**) shows the scheme proposals which comprise:

- Implementation of One-Way Traffic Order on section of School Road, between its junctions with Blenheim Road and Valentine Road/Cambridge Road/Springfield Road/Poplar Road roundabout junction. Henceforth, this road section will (a) permit pedal cyclists in BOTH northbound and southbound directions (b) Prohibit all other traffic movements in southbound direction. **NB: Safety Audit of RBT operation (with scheme) – Identify if risk to SB (entry) pedal cyclists to circulating traffic movements – where this traffic may believe no SB entry flow at all to RBT from School Rd – whereas pedal cyclists ARE the sole entry flow component.**
- Road narrowing feature on School Road (South Side) at its junction with Blenheim Road, with associated road markings and signage, and a short section of on-road cut-through lane for southbound pedal cyclist traffic.
- Modified traffic priority at School Road/Blenheim Road junction: Northbound traffic into junction, from School Road (South Side) henceforth to give way to School Road (North Side) and Blenheim Road entry flows at the junction. Previously Blenheim Road was the minor (give-way) arm at this three-arm priority junction. **NB: Design may require further road signage/markings to reinforce modified junction priority.**
- School Road/Prospect Road/Ashfield Road Junction
- School Road/Valentine Road/Cambridge Road/Springfield Road/Poplar Road Junction.
- Road signage on School Road, immediately south of its junction with Ashfield Road/Prospect Road – to provide advanced warning to southbound traffic of the one-way road section encountered further downstream beyond the junction with Blenheim Road.
- “No Right Turn” road signage on Blenheim Road approach to junction with School Road.

4.4 **Traffic Flow Impacts**

4.5 The scheme proposals shown on Drawing reference **IMSE/GD/436** will prohibit southbound traffic (except pedal cyclists) on School Road between the roundabout and Blenheim Road.

4.6 Junction traffic surveys (12 hour duration from 07:00am to 19:00pm) were undertaken by TRACSIS on Thursday July 13th 2017 at the following locations:

- A435/Valentine Road Junction
- A435/Poplar Road Junction
- School Road/Prospect Road/Ashfield Road Junction
- School Road/Valentine Road/Cambridge Road/Springfield Road/Poplar Road Junction.
- Springfield Road/Melton Road Junction

4.7 **Appendix D** contains the full traffic surveys obtained for the five junctions –these are shown on **Diagram D1**.

4.8 **Existing Traffic Flows**

4.9 The following four time periods that were selected: 08:00-09:00am (representing the “standard” morning peak hour, 15:00-16:00pm (representing the mid-afternoon school departure peak hour, and 17:00-18:00pm (representing the “standard” afternoon/evening peak hour). The full 12 hourly count (07:00am-19:00pm) was also included to show the overall traffic patterns for this whole time period. However, for capacity assessment purposes, only the morning peak hour (0800-0900am) and evening peak hour (1700-1800pm) will be considered. **Figure 2** below shows the table for each analysis period for each of the five junctions.

Site	Junction ID	Period			
		0800-0900	1500-1600	1700-1800	0700-1900
1	A435 High Street-Valentine Road	Table D1	Table D2	Table D3	Table D4
2	A435 High Street - Poplar Road Junction	Table D5	Table D6	Table D7	Table D8
3	School Road-Valentine Road-Cambridge Road-Springfield Road-Poplar Road junction	Table D9	Table D10	Table D11	Table D12
4	School Road-Prospect Road-Ashfield Road Junction	Table D13	Table D14	Table D15	Table D16
5	Springfield Road-Melton Road Junction	Table D17	Table D18	Table D19	Table D20

Figure 2 - Tables For Traffic Analysis - By Time Period & Location

4.10 Within **Appendix D**, “Site 3” represents the School Road/Valentine Road/Cambridge Road/Springfield Road/Poplar Road roundabout junction. Junction turning flows are shown in **Tables D9-D12**. Total southbound traffic from School Road into the junction is: 188 vehicles

between 0800-0900am, 229 vehicles between 1500-1600pm, 214 vehicles between 1700-1800pm and 2152 vehicles for the 12 hourly period from 0700am-1900pm.

Traffic Flows After Scheme Introduction

- 4.11 The one-way scheme proposal prohibits southbound movement (except pedal cyclists) on School Road between its junctions with Blenheim Road and the roundabout.
- 4.12 First, it is necessary to derive an understanding of the existing traffic volumes and destinations of the main southbound traffic movements on School Road into the roundabout. Thereafter this methodology can be adapted to show the alternative routes predicted to be taken by southbound traffic when School Road is closed to this movement, in the event of the one-way proposal scheme being implemented.
- 4.13 The red-bounded area in **Figure 3** below, shows the network of streets that are anticipated to contribute southbound traffic onto School Road, which will enter the roundabout junction.



Figure 3 - Main Area Generating School Road Southbound Traffic

- 4.14 A robust methodology for trip generation has been utilised. Vehicle trip generation will be considered for the morning hour period of 0800-0900am and the afternoon hour period of 1700-1800pm. **Figure 4** shows the peak hour period traffic generation of trips from these streets. For robustness the same peak hour generation of trips from these streets has been assumed to apply for both the morning peak hour and the afternoon peak hour periods.

Street	Vehicle Trips From	To	
		Poplar Road	Springfield Road
Manor Park Close	14	3	1
Grove Avenue	36	8	5
Oxford Road	20	1	1
Laurel Court	10	2	1
Cotton Lane	19	2	1
Poulton Close	6	1	1
Ashdown Close	8	2	2
Ritchie Close	14	3	4
Greenhill Road	42	9	5
Prospect Road	29	2	4
Blenheim Road	48	6	6
Clarence Road	18	2	2
Ashfield Road	16	0	1
Ashfield Avenue	20	0	1
Leasowes Road	11	0	1
Birches Close	9	2	2
Greenend Road & Elmfield Crescent	32	4	4
School Road	52	9	13
Paton Grove	26	4	3
Ascot Road & Woodrough Drive	30	4	4
TOTAL	460	64	62

Figure 4 – Weekday Peak Hour Traffic Generation (Morning & Afternoon Peak Hour Periods)

- 4.15 From site observations, southbound trips are also observed as originating from B4217 Wake Green Road – using School Road to bypass the A435 High Street road corridor at its most congested times and to “short-cut” to areas further to the south-east via B4146 and A4040 road corridors. In this case, for southbound trips into the roundabout from School Road, these trips originating from outside of the residential area that is directly adjacent to School Road are called “external” trips. Therefore trips originating from inside the area adjacent to School Road are called “internal” trips.
- 4.16 **Figure 5** shows the total traffic flow on School Road that seeks to progress through the roundabout into Springfield Road and Poplar Road – which are (See **Table D9**) shown by traffic counts as the two main destinations for the southbound traffic flow entering the roundabout from School Road.

Turn From	Turn To	Total Flow	Internal Trips		External Trips	
			Flow	%of Total	Flow	%of Total
School Road	Springfield Road	93	62	67	31	33
School Road	Poplar Road	84	64	76	20	24

Figure 5 – Morning Peak (0800-0900) - School Road Flows To Springfield Road & Poplar Road

- 4.17 The level of external trip on School Road has been derived by subtracting the internal flow from the total surveyed traffic flow. From this methodology a robust assumption is therefore made that the level of internally generated trips to Springfield Road is 62 vehicles (Or 67% of the total outflow to Springfield Road) versus 31 externally generated vehicle trips (Which comprises 33% of the total outflow).
- 4.18 **Figure 5** shows 84 vehicles entering Poplar Road from School Road – namely 64 vehicles generated from internal trips and 20 vehicles from external trips. Therefore internal trips comprise 76% of total outflow to Poplar Road and external trips constitute 24%.
- 4.19 **Figure 6** shows the afternoon peak hour traffic generation for southbound traffic flows into the roundabout from School Road. The surveyed peak hour turning flows to Springfield Road (104 vehicles) and Poplar Road (86 vehicles) are derived from existing junction traffic count (Please refer to **Table D11**).

Turn From	Turn To	Total Flow	Internal Trips		External Trips	
			Flow	%of Total	Flow	%of Total
School Road	Springfield Road	104	62	60	42	40
School Road	Poplar Road	86	64	74	22	26

Figure 6 – Afternoon Peak (1700-1800) - School Road Flows To Springfield Road & Poplar Road

- 4.20 The number of internally generated trips to Springfield Road is 62 vehicles (60% of total overall flow) versus 42 vehicles (40% of overall flow) generated externally.
- 4.21 The number of internally generated trips to Poplar Road is 64 vehicles (64% of total overall flow) versus 22 vehicles (26% of overall flow) generated externally. The level of southbound trips generated externally can be seen to be higher during the afternoon period – possibly to bypass the A435 corridor which may experience greater southbound congestion during the weekday afternoon period.
- 4.22 **Existing Traffic Destinations**
- 4.23 By reference to the traffic surveys and direct site observation, a robust methodology has been derived of the destinations for the main southbound inflows into Springfield Road from the roundabout junction.
- 4.24 **Figure 7** shows the morning peak destinations

From	Into Melton Road	Into Springfield Rd
	(To Destinations To South)	(To Billesley Lane And Destinations East)
Valentine Road	25%	75%
Poplar Road	0%	100%
School Road	25%	75%

Figure 7 – Destination Percentages of Main Southbound Flows Into Springfield Road – Morning Peak

- 4.25 Of the westbound flow entering Poplar Road from School Road, approximately 75% will turn left into A435 High Street to head in a southerly or westerly direction (e.g., A435 High Street and B4122 Vicarage Road respectively).
- 4.26 Of the southbound traffic flow entering Springfield Road, approximately 75% will continue southwards to the junction with Billesley Lane and onwards to the B4146 Brook Lane. The remaining 25% proceeds into Melton Road and to destinations to the south.
- 4.27 Of the southbound traffic entering Springfield Road from School Road, site observations confirm approximately 75% of the southbound flow progresses along Springfield Road to destinations further to the south east – using the junctions with Billesley Lane and with B4122 Brook Lane. The remaining 25% turns into Melton Road, to destinations immediately south and west and to the retail areas on/adjacent A435 High Street.
- 4.28 **Figure 8** (below) shows the afternoon peak destinations

From	Into Melton Road (To Destinations To South)	Into Springfield Rd (To Billesley Lane And Destinations East)
Valentine Road	25%	75%
Poplar Road	0%	100%
School Road	20%	80%

Figure 8 – Destination Percentages of Main Southbound Flows Into Springfield Road – Afternoon Peak

- 4.29 Of the southbound traffic entering Springfield Road from School Road, the methodology is similar to that used for the morning peak. However it is noted that external southbound trip levels comprise 40% of the outflow from School Road to Springfield Road in the afternoon, versus 33% in the morning peak. This would imply that in the afternoon a greater number of southbound external trips seek to bypass afternoon southbound congestion on the A435 via utilising School Road as a bypass route. Therefore the percentage of School Road traffic proceeding southbound along Springfield Road towards the Billesley lane junction has been increased to 80% to reflect this scenario.
- 4.30 **Traffic Destinations**
- 4.31 Closure of School Road (between the roundabout and the junction with Blenheim Road) will lead to alternative traffic routes being selected by the southbound traffic that currently enters the roundabout from School Road.
- 4.32 **Figure 9** shows alternative route choices for southbound traffic into Springfield Road from School Road. The route indicated in red (Oxford Road->Billesley Lane->B4166/A4040) may be assumed by southbound traffic from Oxford Road and areas to the north. The routes indicated in blue show possible new routes taken by the residential road network adjacent to School Road.

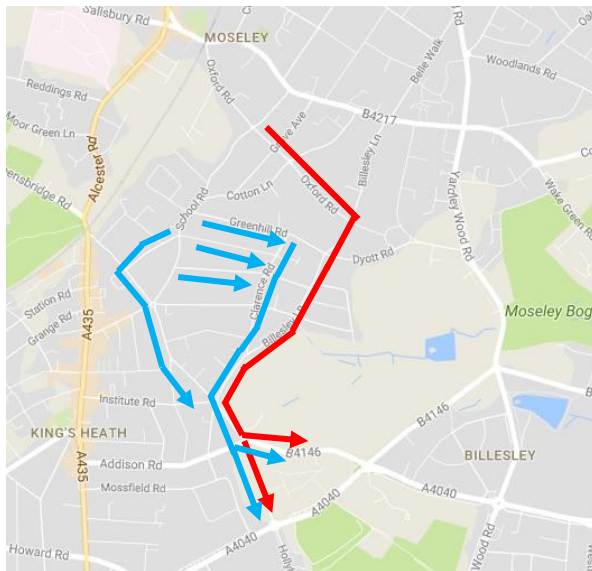


Figure 9 – Traffic Redistributions - Southbound Flows Into Springfield Road

- 4.33 **Figure 10** shows alternative route choices for southbound and westbound traffic into Poplar Road from School Road. The route indicated in red (Oxford Road->B4217->A435) may be assumed by a small proportion of westbound traffic from Oxford Road and areas to the north. The routes indicated in blue show possible new routes taken by the residential road network adjacent to School Road. For streets nearer to Valentine Road, it is possible that westbound and southbound traffic may proceed via Ashfield Road, into Valentine Road, then through the roundabout and head westwards down Poplar Road. It is presumed that traffic proceeding via A435 to Queensbridge Road and areas to the north-west – do already make this route choice via Ashfield Road, as it would be the most suitable choice of route. For streets on the eastern side of School Road, westbound and southbound traffic may possibly head in an easterly direction from Greenhill Road, Blenheim Road and Prospect Road, to Cambridge Road via Clarence Road. Traffic would then proceed into the roundabout from Cambridge Road, into Poplar Road and head westwards to the junction with A435 High Street.

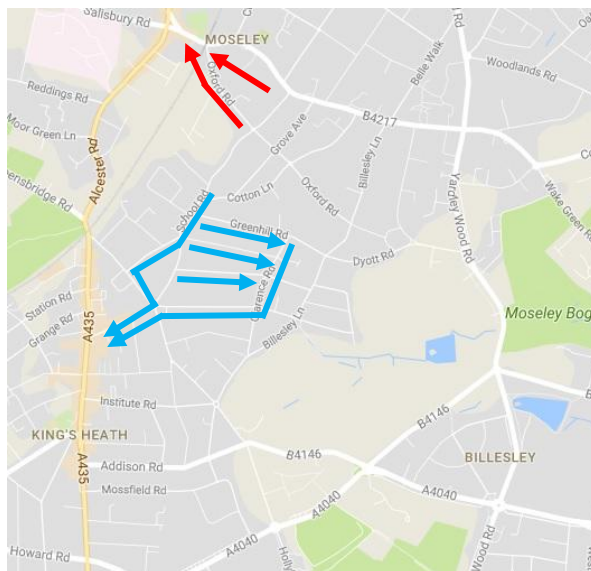


Figure 10 – Traffic Redistributions - Southbound & Westbound Flows Into Poplar Road

- 4.34 **Diagrams E1, E2, E3, E4 and E5** (Please refer to **Appendix E**) respectively show the predicted route changes and traffic flows taken by the southbound traffic flows on School Road, when the prohibition to southbound flows into the roundabout from School Road arises upon implementation of one-way scheme. The existing routes are shown in red and the route changes are shown in green. Where more than one route change is shown in green, the quantity of traffic assigned to a particular route is derived from a robust methodology in which traffic uses the route(s) nearest to the street in which the traffic has been generated from. On **Diagram E1** there is no U turn traffic flow on School Road during the morning peak therefore vehicle flow is zero.
- 4.35 **Diagram E6** shows the existing traffic flows on Ashfield Road in red (From **Table D13**) and in green, the traffic flows anticipated following implementation of one-way scheme. It can be seen that an increase from 82 vehicles to 175 southbound vehicles may occur. Ashfield Road has narrow constrained roadway width and site observations find moderate parking congestion occurs on this street at present. Therefore a moderate level of increased delay is probable to traffic journey times on Ashfield Road due to the extra traffic arising from implementation of the one-way scheme.
- 4.36 **Table E1** shows existing surveyed traffic flows at the roundabout. **Table E2** indicates the changes to certain turning flows due to the prohibition to southbound traffic arising from the one-way scheme. The negative figures indicate traffic flow deductions – i.e., due to southbound traffic no longer using School Road. The positive figures indicate additional traffic onto other entry arms (i.e., Valentine Road and Cambridge Road) due to the traffic re-routing to these entries, following closure of the southbound route. The southbound pedal cyclist flow from School Road into the roundabout will still take place but as flows are very low and have very little effect on capacity, they have been omitted from this stage of traffic review. **Table E3** shows what the one-way scheme traffic flows will be at the roundabout once the changed flows have been made to the existing traffic flows.

4.37 ***One Way Proposal Traffic Flows – Morning Peak***

4.38 **Diagrams E1, E2, E3, E4 and E5** respectively show the alterations to the morning peak traffic flows at the roundabout caused by implementation of the one-way scheme proposals.

4.39 **Table E1** shows existing surveyed traffic flows at the roundabout. **Table E2** indicates the changes to certain turning flows due to the prohibition to southbound traffic arising from the one-way scheme. The negative figures indicate traffic flow deductions – i.e., due to southbound traffic no longer using School Road. The positive figures indicate additional traffic onto other entry arms (i.e., Valentine Road and Cambridge Road) due to the traffic re-routing to these entries, following closure of the southbound route. The southbound pedal cyclist flow from School Road into the roundabout will still take place but as flows are very low and have very little effect on capacity, they have been omitted from this stage of traffic review.

4.40 **Table E3** shows what the one-way scheme traffic flows will be at the roundabout once the changed flows have been made to the existing traffic flows. It can be seen that the additional traffic loads arising from one-way scheme increases arm entry flow on Valentine Road from 209 vehicles to 295 vehicles (an increase of 41.2%). There is also an increase from 103 vehicles to 124 vehicles on Cambridge Road entry (an increase of 20.4%).

4.41 For existing traffic flows, **Table E4** shows the percentage that each flow turn is as a proportion of the whole entry flow, on each entry arm at the junction. **Table E5** shows the turn percentages for the one-way scheme scenario.

4.42 ***One Way Proposal Traffic Flows – Afternoon Peak***

4.43 **Diagrams E7, E8, E9, E10 and E11** respectively show the alterations to the afternoon peak traffic flows at the roundabout caused by implementation of the one-way scheme proposals.

4.44 **Table E6** shows existing surveyed traffic flows at the roundabout. **Table E7** indicates the changes to certain turning flows due to the prohibition to southbound traffic arising from the one-way scheme. **Table E8** shows the additional traffic loads arising from one-way scheme increases arm entry flow on Valentine Road from 529 vehicles to 616 vehicles (an increase of 16.5%). There is also an increase from 57 vehicles to 78 vehicles on Cambridge Road entry (an increase of 36.8%).

4.45 For existing traffic flows, **Table E10** shows the percentage that each flow turn is as a proportion of the whole entry flow, on each entry arm at the junction. **Table E11** shows the turn percentages for the one-way scheme scenario.

4.46 **Diagram E12** shows the existing traffic flows on Ashfield Road in red (From **Table D15**) and in green, the traffic flows anticipated following implementation of one-way scheme. It can be

seen that an increase from 67 vehicles to 168 southbound vehicles may occur. Ashfield Road may experience a moderate increase in congestion during afternoon peak. Given that the maximum southbound queue on the Valentine Road entry to the roundabout can at times extend for short periods upstream to beyond the junction with Ashfield Road, it is possible that extra delay will be experienced on Ashfield Road at this time.

4.47 Capacity Assessments

4.48 School Road/Cambridge Road/Springfield Road/Poplar Road/Valentine Road Junction

- 4.49 The operation of this junction has been assessed using the TRL ARCADY Version 8 traffic capacity modelling software program.
- 4.50 ARCADY is a traffic capacity assessment software program for roundabout and mini-roundabout junctions. The program requires the user to input the relevant geometric parameters of the junction, and details of the traffic flow volumes, composition and turning proportions. The program then undertakes the capacity assessment and reports the performance of the junction.
- 4.51 For the assessment of roundabout junctions, the main criterion is the ratio of flow to capacity (RFC) which refers to the theoretical capacity taken up by traffic on each entry arm at the junction. The threshold RFC value is 0.85 (i.e the demand flow of a particular entry arm is 85% of its calculated capacity). An entry arm operates within capacity if the calculated value of its RFC does not exceed 0.85. Where the calculated RFC value exceeds 0.85 the junction may have insufficient reserve capacity to manage the variations in traffic demand within the specified modelled time period. And where RFC values increase beyond 0.85, the prediction of entry (and overall junction) performance may be less realistic and reliable. And in such circumstances, significant and lengthy delays and queues may well be experienced on certain entries, before drivers can enter the junction itself.
- 4.52 There will be one ARCADY traffic assessment model for each of the morning and afternoon peak hour periods – for the existing junction and the one-way scheme scenario – making a total of four models overall. Each model covers the identified one-hour time period for the respective peak, which is then disaggregated into four 15 minute time segments, which are chosen as the most optimum time-span to show the rate of change of capacity, and resultant queues and delays, for each entry arm throughout the progress of the peak hour.
- 4.53 During the morning peak hour period a School Crossing Warden (SCW) assists the crossing of pedestrians across the roundabout. The SCW can cross from various points, but the most frequently used crossing route is from the corner of School Road/Cambridge Road across to the centre of the roundabout, to the corner of Valentine Road/Poplar Road (and vice-versa). Crossing frequency may be as often as every 1-2 minutes during the busiest time of this peak

period, with up to 12 persons crossing the roundabout during this time. Factors have been calculated from site observation and introduced into the model to replicate the effect of SCW operations upon the junction capacity.

4.54 **Morning Peak Assessment**

- 4.55 Roundabout junction operation was assessed using the ARCADY program for the existing junction and for the one-way scheme layout. The full results outputs for both these models are contained in **Appendix F** and are summarised for both scenarios in **Figure 11** below.

Entry	Existing Junction			One-way scheme		
	RFC	Max Queue (vehicles)	Delay (Seconds Per vehicle)	RFC	Max Queue (vehicles)	Delay (Seconds Per vehicle)
School Road	0.55	2	21.02	0	0	0
Cambridge Road	0.2	1	8.03	0.23	1	7.68
Springfield Road	0.55	1	9.9	0.55	2	9.75
Poplar Road	0.41	1	16.62	0.41	1	16.25
Valentine Road	0.51	2	16	0.71	3	27.38

Figure 11 – Comparison Of Existing Versus One-way scheme Junction Performance – Morning Peak (0800-0900)

- 4.56 Comparing the results for the two scenarios, the one-way scheme results show School Road having zero RFC, queue and delay values – as southbound traffic flow into the roundabout (except pedal cyclists) have been diverted to alternative routes in the highway network. The majority of the diverted flow has been transferred to Valentine Road (routeing via Ashfield Road) and one-way scheme modelling results show increased levels of queue (From 2 to 3 vehicles) and increased delay time per vehicle entering the junction (From 16 to almost 28 seconds). Valentine Road experiences a reduction in its capacity – as the RFC value has increased from 0.51 to 0.71 – which is closer to, but not exceeding the threshold value of 0.85.

4.57 **Afternoon Peak Assessment**

- 4.58 Roundabout junction operation was assessed using the ARCADY program for the existing junction and for the one-way scheme layout. The full results outputs for both these models are contained in **Appendix F** and are summarised for both scenarios in **Figure 12** below.

Entry	Existing Junction			One-way scheme		
	RFC	Max Queue (vehicles)	Delay (Seconds Per vehicle)	RFC	Max Queue (vehicles)	Delay (Seconds Per vehicle)
School Road	0.54	2	17.58	0	0	0
Cambridge Road	0.1	1	6.58	0.13	1	6.01
Springfield Road	0.28	1	4.31	0.28	1	4.23
Poplar Road	0.48	1	10.41	0.47	1	10.23
Valentine Road	0.89	7	44.12	1.04	26	130.57

Figure 12 – Comparison Of Existing Versus One-way scheme Junction Performance – Afternoon Peak (1700-1800)

- 4.59 Site observations showed a significant volume of southbound traffic flow on Valentine Road into the roundabout junction. Valentine Road experienced the greatest level of delay and queueing of any of the entry arms into the roundabout during the afternoon peak period. Capacity assessment results for the existing junction correctly show Valentine Road having an RFC of 0.89 (Thus exceeding the threshold value) and operating at excess capacity. The remaining entry arms perform within capacity with no particular capacity, delay or queue issues.
- 4.60 Capacity assessment results for the one-way scheme scenario indicate that the additional traffic assigned onto the southbound entry of Valentine Road into the roundabout causes this arm to operate at an RFC value of 1.04. This is significantly over capacity, and predictably the level of queue has increased markedly (From 7 vehicles to 25 vehicles), as has the delay per vehicle (From 45 seconds to 131 seconds) Therefore southbound vehicles may in the one-way scheme scenario now experience a delay of 2 minutes 11 seconds – compared to the 45 seconds delay time in the existing scenario.
- 4.61 **Summary of Existing Versus Proposed Junction Performance**
- 4.62 Capacity analyses clearly show a significant reduction in capacity on the Valentine Road entry to the roundabout within the afternoon peak hour period. The queue of 26 vehicles may equate to an actual queue length of 156 metres. Valentine Road is of approximately 350 metres length between the roundabout junction and its junction with A435 High Street. The junction of Valentine Road with Ashfield Road is situated approximately 160 metres upstream from the roundabout. Therefore the queue of 156 metres may be expected to block back along Valentine Road, upstream across the junction with Ashfield Road for significantly lengthy periods within the afternoon peak.

- 4.63 Site observations have, on certain days, observed existing queue levels during afternoon peak may infrequently block back across Ashfield Road – where heavier than usual pulses of traffic flow have been observed – which is a function of the daily variability of traffic movements at/near major routes such as the A435 corridor. If therefore these infrequent queues can occur now to block across Ashfield Road – then the one-way scheme queues could at times of heavier-than-usual traffic flows, extend to lie between Ashfield Road and A435 High Street itself.
- 4.64 Therefore the reported queue length of 156 metres reported for Valentine Road in the one-way scheme model may, on certain days of heavier-than-usual traffic flows, be exceeded. And where the queue may in fact lie between Ashfield Road and A435 High Street, the possibility of block-back from Valentine Road into A435 High Street may arise – whereas site observations have not noticed this tendency in the existing scenario. Block back onto A435 High Street could have significant safety and capacity implications - including traffic “locking-up” the nearby A435 High Street/Queensbridge Road junction, also exacerbating weekday afternoon peak period congestion levels on the A435 corridor – which is an important strategic arterial route to/from Birmingham City Centre.
- 4.65 ***Possible Impacts On Ashfield Road, Arising From One Way Proposal***
- 4.66 **Figure E6** (Please refer to **Appendix E**) shows the two-way traffic levels on Ashfield Road between its junctions with School Road and Valentine Road, for the morning peak hour period. Existing traffic flows are given in red, and the one-way scheme traffic flows are shown in green. Ashfield Road may experience an increase in southbound flow (towards its junction with Valentine Road) from 82 vehicles to 175 vehicles in the morning peak hour – an increase of 113.4%. During the afternoon peak hour (As shown on **Figure E12**), southbound traffic levels may rise from 67 to 168 vehicles – an increase of 150.8%.
- 4.67 The roadway width on Ashfield Road is relatively constrained and narrow – two-way passing traffic flow is often not possible where a car is parked on one side of the carriageway. Parking surveys also confirm kerbside parking levels are moderate along the length of Ashfield Road throughout the morning and afternoon periods surveyed. Currently, parked vehicles can cause vehicles turning into Ashfield Road from Valentine Road, to have to wait before being able to perform their turning movement. The combination of relatively narrow roadway width, the existing levels of kerbside parking, and the increased traffic flows due to the one-way scheme may lead to a situation of moderate congestion arising on Ashfield Road. Whilst it is not certain what impact the one-way scheme would have regarding northbound traffic flow levels on Ashfield Road, the number of southbound vehicles may increase from between 1-2 vehicles per minute to between 3-4 vehicles per minute. Therefore the greater frequency of vehicles would result in fewer gaps in flow for oncoming vehicles to use which are seeking to overtake parked cars – increasing travel delay, journey time and congestion on this street.

- 4.68 The potential of the junction of Ashfield Road with Valentine Road to handle the increase southbound traffic loads caused by the one-way scheme must also be considered. Where junction corner geometry into and out of Ashfield Road are of small radii (i.e., creating the conditions of a “tight turn”), this has been observed to cause traffic turning movements to take longer and to take place at lower speeds, whilst sometimes encroaching into the oncoming (or opposing) traffic lane to make the turn. Also the physical layout often means a vehicle turning out cannot do so, whilst a vehicle is turning into Ashfield Road – and vice-versa. The physical layout of the junction additionally is unsuitable for the movements of vehicles of larger size than a small delivery light van. There is potential for congestion (and concerns regarding safety/increased accident risk) in the event of a large vehicle seeking to turn to or from Ashfield Road, and having insufficient roadway width to safely do so, because of the proximity of parked vehicles at the kerb-side.
- 4.69 There are significant concerns that by reason of narrow roadway, constrained junction layout, and existing levels of kerbside parking uptake, Ashfield Road would be adversely affected by the additional demands imposed by one-way scheme traffic flow levels along its length. The afternoon peak period queues on Valentine Road (which would block back across the junction with Ashfield Road) would magnify the traffic congestion effects and safety implications on Ashfield Road to a serious degree.

5.0 CONCLUSION

- 5.1 As an outcome of this report the following is recommended:
- 5.2 The one-way scheme proposals on School Road are not taken forward for implementation – as this would cause congestion, capacity and safety problems on Ashfield Road, Valentine Road, with possible implications also to the A435 road corridor.
- 5.3 Investigation of measures to reduce parking congestion on School Road between its junctions with the roundabout and Blenheim Road. Traffic Regulation Order restrictions to regulate or prohibit waiting/parking may serve to reduce the potential for northbound congestion and blocking back into the roundabout junction.
- 5.4 Investigation of measures to reduce parking congestion on Valentine Road near to the roundabout junction. One measure may be to consider modifying the existing Traffic Regulation Order along the southbound carriageway to run continually between the roundabout junction and the junction with Ashfield Road.
- 5.5 Non-compliance with existing Traffic Regulation Orders is observed to exacerbate congestion and lead to potential accident risks on Poplar Road. Weekday pupil arrival and departure times at the nearby school are the main problem times. It is recommended that Civil Enforcement Officer monitoring is undertaken to ensure compliance is achieved.

Appendices

Appendix A

Road Traffic Accidents

Appendix B

Parking Surveys

Appendix C

Journey Time Surveys

Appendix D

Traffic Counts

Appendix E

Traffic Methodology

Appendix F

Capacity Assessments

Appendix G

Drawings