

Oakham – 2017 Baseline Traffic Flows and Comparison with Westbound Closure Flows.

Client name Rutland County Council	Discipline Development Planning	Date August 2017	Project number 60494381
Prepared by Jon Gorstige	Approved by Peter Firth	Checked by Andrew Sherwood	

Revision History

Revision	Revision date	Details	Authorised	Name	Position

Introduction:

This technical note has been prepared to report on the July 2017 traffic surveys undertaken in Oakham town centre to establish baseline traffic flows along High Street and other town centre roads and junctions. The purpose of the surveys was to establish a ‘Do-Nothing’ baseline position. A similar data collection exercise was undertaken in April 2017 while roadworks were present on High Street which required a westbound closure, and hence provided a good indication of traffic patterns likely to result from a westbound closure as proposed as the ‘Do Something’ scenario developed as part of the proposed Oakham Public Realm works.

A Technical Note was prepared in May 2017 which reported on the April 2017 surveys and assessed a number of junctions using the recorded turning flows resulting from the westbound closure. This previous note identified the AM and PM peak hours. In order to obtain as direct a comparison as possible the same peak hours have been used in this new assessment.

This note then goes on to compare forecast traffic flows with and without the diversion in place, and identifies and quantifies where increases (and decreases) in traffic flows are likely to occur with a permanent westbound closure of the High Street. Identification of any particular pinch points along the alternative routes is then considered and whether any mitigation measures might be suitable

July 2017 Traffic Surveys

On Friday 28th July 2017 manual classified turning counts were undertaken at the following junctions. The dates for the traffic surveys were agreed with Rutland County Council officers and no roadworks or temporary traffic management measures were present during the surveys.

- Melton Road / Station Road / Northgate Priority Junctions
- Church Street / Northgate T-Junction
- Burley Road / Station Road T-Junction
- Uppingham Road / Catmos Street / South Street
- Brook Road / South Street / Mill Street
- South Street / New Street Roundabout

A suitable base count from May 2016 was already available at:

- High Street / Burley Road / Mill Street Roundabout

The resulting baseline flows are presented in **Figure 1** at the end of this report

In addition to these manual classified turning counts, Automatic Traffic Counts (ATCs) were recorded for 1 week at the following locations (between Monday 24th July 2017 and Sunday 30th July 2017).

- High Street East End (same location as 2016 surveys just west of Roundabout)

- South Street just west of Brooke Road traffic signals
- New Street just north of South Street roundabout
- Church Street south of Station Road
- Station Road east of Church Street

Factoring to Typical Term Time Flows

Time constraints meant that the July 2017 traffic counts couldn't be undertaken during school term time and therefore it was recognised that a suitable factor should be applied to the July counts to bring them up to typical weekday school term time levels. In order to do this ATC data at the Eastern end of the High Street was used to calculate appropriate factors for the AM and PM hours.

ATC data was available from the May 2017 traffic surveys to provide the typical school term time baseline and July 2017 to provide the school holiday flows.

The comparison showed a fairly significant difference as would be expected, particularly during the AM peak hour. The corresponding AM and PM peak hour flows are shown below together with the resulting factors to be applied to the July 2017 AM and PM peak flows to factor them up to term time levels.

School Term Time

Friday 27 th May 2017	AM Peak Hour	724 veh/hr two-way
Friday 27 th May 2017	PM Peak Hour	889 veh/hr two-way

School Holiday Time

Friday 28 th July 2017	AM Peak Hour	494 veh/hr two-way
Friday 28 th July 2017	PM Peak Hour	688 veh/hr two-way

Factor (B to A) to convert school holiday to School term time

AM Peak	1.466
PM Peak	1.196

These AM and PM factors were applied to the corresponding July 2017 AM and PM peak hour flows and the resulting turning flows are shown in **Figure 2**. It should be noted that the factors were not applied to the High Street / Burley Road / Mill Street Roundabout turning flows as these counts were recorded in May 2017 during a normal school term time weekday.

Comparison of Do-Nothing with Do Something Flows

The April 2017 traffic surveys were fully reported in the Technical Note prepared by AECOM in May 2017 (See Appendix A). The resulting turning counts are repeated in **Figure 3** of this report for ease of reference.

By assessing the difference in turning flows (and link flows) during the AM and PM peak hours between the factored July 2017 baseline flows and the April 2017 turning flows (with the westbound closure) a comparison can be made.

Figure 4 shows the net difference in traffic flows between the counts.

From an assessment of **Figure 4** the following trends and patterns have been identified resulting from the westbound closure of High Street.

- Whilst the full reduction of around 462 vehicles per hour in westbound traffic on High Street occurs during the AM peak hour (and around 425 in the PM peak hour) there is not a corresponding increase in traffic flows on the obvious alternative east to west routes (i.e. South Street to the South and Station Road to the North).

- The increases on these routes are much smaller. For example traffic flows on South Street turning right onto New Street increase by 58 in the AM peak and 81 in the PM peak.
- Traffic increases in the right turn into Station Road from Burley Road North increase by 47 in the AM peak and 57 in the PM peak.
- There is a significant reduction of westbound traffic on Catmos Street of around 130-200veh./hr which supports the above findings. These vehicles are likely to re-route to the north around the bypass
- Other noticeable trends in both peak hours are
 - An increase in the left turn from Catmos Street to Mill Street of around 45 vehicle (as the straight on is not possible anymore)
 - An increase of around 80 vehicles southbound on Mill Street, south of the High Street roundabout
 - An increase in the right turn from Mill Street to New Street of around 90 vehicles in the PM peak (at the traffic signals)

There are a number of points to note when comparing the flows however, and these are summarised below.

- During the April 2017 counts roadworks were also present on Station Road, just north of Northgate, resulting in much lower flows on Station Road than usual. This means no meaningful comparison can be made on this part of the network.
- The comparison is between two separate traffic counts, undertaken on different days in different months and with a large overall factor being applied to one of the count days. Small variations in other traffic flows (i.e. not associated with the westbound closure) are therefore present.

Consideration of Alternative Routes and Identification of Pinch Points

Station Road Route (East to West)

- **Burley Road / Station Road Junction** --
 - Increased Right turn flows into Station Road are forecast from Burley Road
 - Junction Modelling shows the junction will continue to operate within capacity
 - No improvements are needed
 - Land is available for widening and improvements if ever required
 - Station Road is a signed route to the Railway Station, coach parking, hospital and parking.
- **Station Road (between Burley Road and Church Street)**
 - On-street parking occurs along the north side
 - The road width is approximately 7.3m and 2-way movements past the parked cars is possible by cars (but not by HGVs).
- **Pedestrian Crossing / School Access Routes**
 - Pedestrian guard railing and zig-zag markings to protect pedestrian / vehicle inter-visibility are present.
 - Good streetlighting is provided

- **Station Road (between Church Street to Station Approach)**
 - On-street parking provision on one side only (mainly north side) but the road width still allows two-way movement when cars are parked.
 - Ambulance Station
 - Residential Frontage
 - Some residents parking / short stay parking
- **Station Road (between Station Approach and Melton Road)**
 - There is a bus stop outside the railway station but this is off the carriageway and does not block through traffic
 - There is a taxi rank on-street which reduces carriageway width but the road width is sufficient to allow two-way working
 - This section is a signed through route from Melton Road
 - Pedestrian crossing provision at the Station Road junction with Melton Road / High Street is poor and consideration of improvements (based on increased traffic flow) is recommended.

South Street Route

- **Uppingham Road Junction**
 - Traffic Signals
 - Signed Route to long stay car parking
- **Uppingham Road to Mill Street**
 - No on-street parking permitted
 - Fire Station and car parks off this section of the road
- **South Street / Mill Street / Brooke Road Junction**
 - Traffic signals – no significant impacts identified
- **Mill Street to New street**
 - Mainly double yellow lines along this length
 - Some resident's on-street parking but this is accommodated within pavement build outs and allows free flow two lane operation.
 - Some residential frontages
 - Some traffic calming features to reduce speeds
 - Zebra crossing
 - Off carriageway taxi rank and bus stop which do not restrict through movements
 - Narrow pedestrian footways in places
- **South Street / New Street Roundabout**
 - Mini-roundabout layout with low flows on west side which allows easy right turn into New Street
 - Access to Tesco's supermarket to the south

- **New Street**

- Residents permit parking on the east side restricts the carriageway width
- If the parking bay markings are narrowed two-way operation may be possible
- One way system (North) north of John Street
- Recommend more accurate surveys of roads and footways to confirm possibility of two-way operation past the residents parking. Chapter 8 of the Traffic sign Manual recommends a minimum width of 5.5m for two-way working. Consideration of priority signs to allow northbound traffic priority over southbound traffic.

Traffic effects on alternative Routes

The comparison of the April 2017 traffic counts with the factored up July 2017 traffic counts has allowed a high level assessment in the changes in traffic flows on alternative routes to be made resulting from a westbound closure of High Street.

The following differences in traffic flows have been identified by assessing the two sets of traffic flows and focusing on the alternative routes and associated turning movements

Table 1. Traffic Effects on Alternative Westbound Routes

Link	2017 Factored Base 'Do Nothing' Flow	Increase due to Westbound Closure 'Do Something'	Percentage Increase due to Westbound Closure 'Do Something'
Station Road Westbound AM			
Peak	281	57	20.3%
Station Road Westbound PM			
Peak	244	47	19.3%
South Street Westbound AM			
Peak	196	58	29.6%
South Street Westbound PM			
Peak	181	81	44.8%
New Street AM Peak Northbound	107	58	54.2%
New Street PM Peak Northbound	238	81	34.0%

Source: April 2017 & July 2017 Traffic Counts

In addition to the above increases due to the westbound closure of High Street it is likely that further additional increases could occur on South Street (westbound) and New Street (Northbound) due to the proposed one way system on Mill Street. This additional increase has been estimated to be around 30 veh./hr (based on 30% of the 100 veh./hr currently travelling north on Mill Streets re-routing along South Street. The remaining 70% are likely to reroute via South Street East and Catmos Street or Brooke Road and Welland Road to the west.

The resulting two-way flows on South Street and New Street would be around 400 veh./hr two-way during both the AM and PM peak hours.

It has been noted in the previous section that the residents parking on New Street can restrict the carriageway width and only allow one way movement of traffic at a time. Given the forecast two-way flow along this short section (45m) would be in the order of 400-500 veh./hr it is considered that this would not cause any significant problems. Chapter 8 of the Traffic Signs Manual advises that give and take shuttle flows of up to 400 veh./hr can operate satisfactorily and up to 840 veh./hr can operate if a priority system is introduced.

Other capacity assessments of the junctions along these alternative routes were covered in the previous May 2017 Technical Note (see Appendix A) and earlier Technical Notes (including one on the capacity of the New Street / High Street traffic signals). No capacity issues were identified and these assessments are still considered to be valid.

Similarly the forecast length of queues resulting from the level crossing provided in this May 2017 Note are still valid

Traffic Growth

A long term DfT traffic counter is located on the A606 Bypass and provides annual traffic flows at this location. A summary of the recorded AADT traffic flows for the period 2008 to 2016 is shown in **Table 2**. The counts indicate that there has been no traffic growth since 2008.

Table 2. Annual Long Term Traffic Flows on Oakham Bypass (A606)

YEAR	Total 2-way AADT Flow	HGVs	% HGV	Year on Year % Traffic Growth
2008	9675	821	8.49%	-
2009	9588	754	7.86%	-0.90%
2010	9114	515	5.65%	-4.94%
2011	9077	487	5.37%	-0.41%
2012	9037	471	5.21%	-0.44%
2013	9054	463	5.11%	0.19%
2014	9081	451	4.97%	0.30%
2015	9164	473	5.16%	0.91%
2016	9321	478	5.13%	1.71%

Source: DfT website

Summary and Conclusions

This report has summarised the July 2017 traffic surveys which provide a 'Do-Nothing' baseline for comparing 'Do Something' options against.

The surveys were undertaken in the school holidays and appropriate factors have been applied to produce estimates of typical school term time traffic flows.

A comparison of the factored 'Do Nothing' flows with the proposed 'Do Something' Public Realm option which includes a westbound closure of High Street has then been undertaken.

The comparison shows that:-

- Although the westbound flows on High Street are in the order of 450veh./hr, the transfer of all these trips to other routes does not all occur on the local roads (to the north and south of High Street - Station Road and South Street)
- It is apparent that drivers choose alternative routes that avoid the town centre all together.
- The maximum increases in traffic flows forecast westbound along Station Road are in the order of 50-60 veh./hr which represents an increase of around 20% in both AM and PM peak hours.
- The maximum increases in traffic flows (resulting from the westbound closure of High Street) along South Street and turning right into New Street are in the order of 60-80veh./hr, representing increases of around 30% and 45% for the AM and PM peak respectively on South Street. In addition to these increases an additional 30 veh./hr may also re-route to South Street westbound due to the proposed one way proposal for Mill Street.
- There is a significant reduction of westbound traffic on Catmos Street of around 130-200veh./hr which supports the above findings. These vehicles are likely to re-route to the north around the bypass.

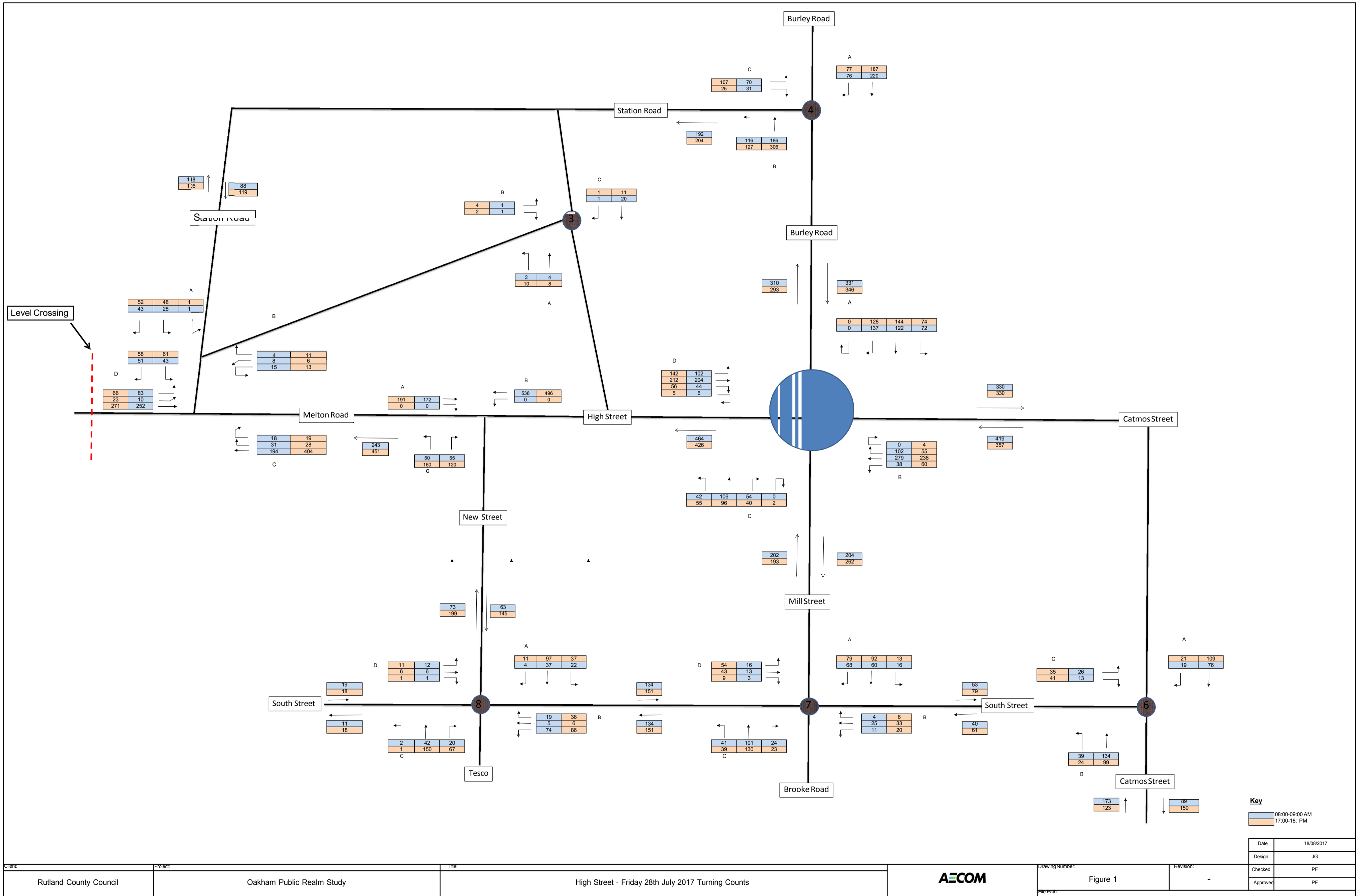
A review of the alternative local routes has been undertaken and no significant constraints have been identified, particularly when considered against the modest increases in traffic flows predicted along these routes.

Junction modelling was undertaken as part of a previous review (April 2017) and no capacity problems were identified. These assessments are still considered valid.

In conclusion the comparison of 'Do Nothing' traffic flows and 'Do Something' traffic flows which include a westbound closure of High Street have shown that only modest increases of between 60-80 veh/hr are forecast to reroute to each of the local alternative routes of Station Road and South Street. An additional 30 veh./hr could also reroute along South street due to the proposed one-way system on Mill Street.

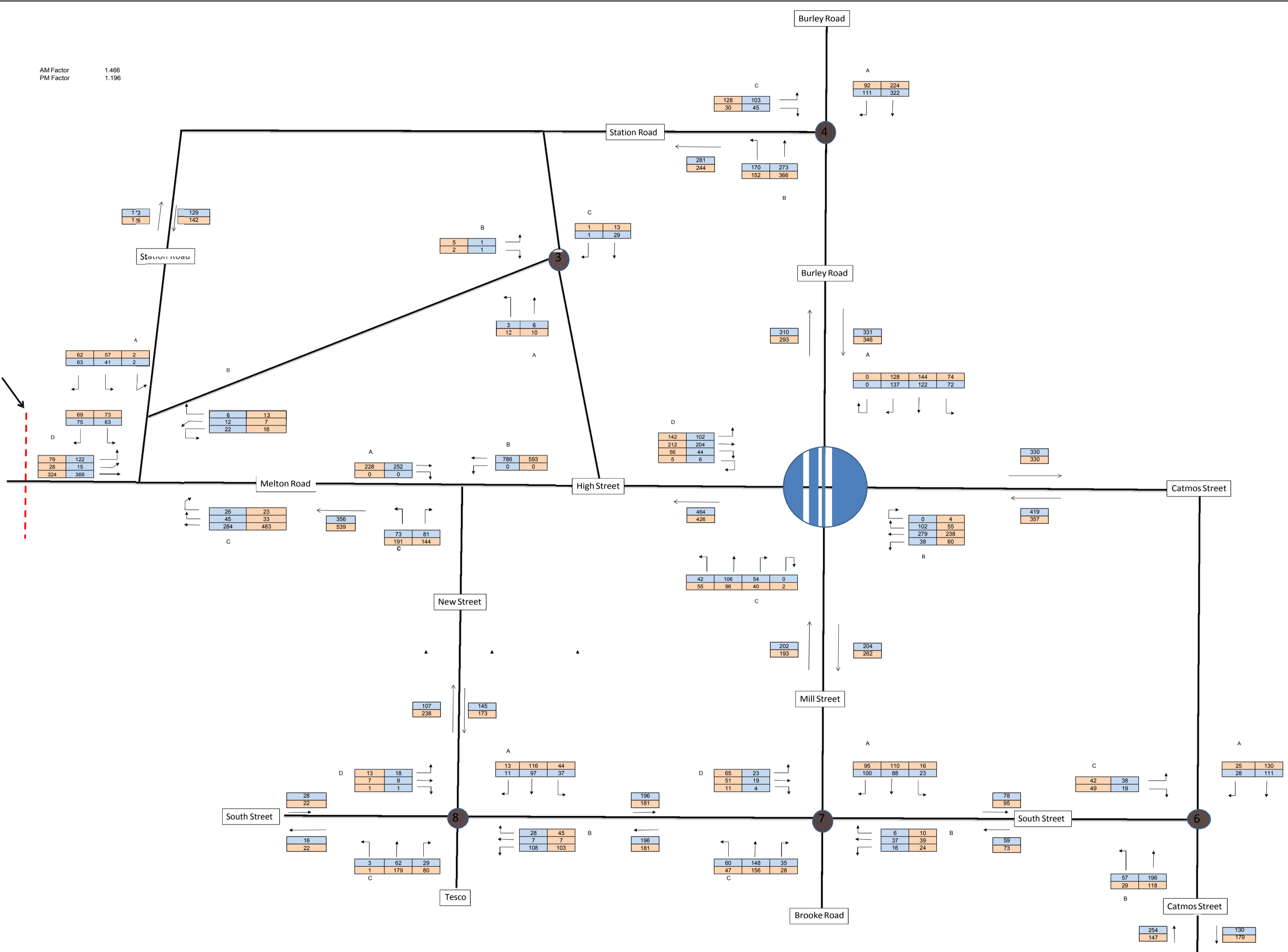
No significant constraints have been identified along the alternative routes.

Figures



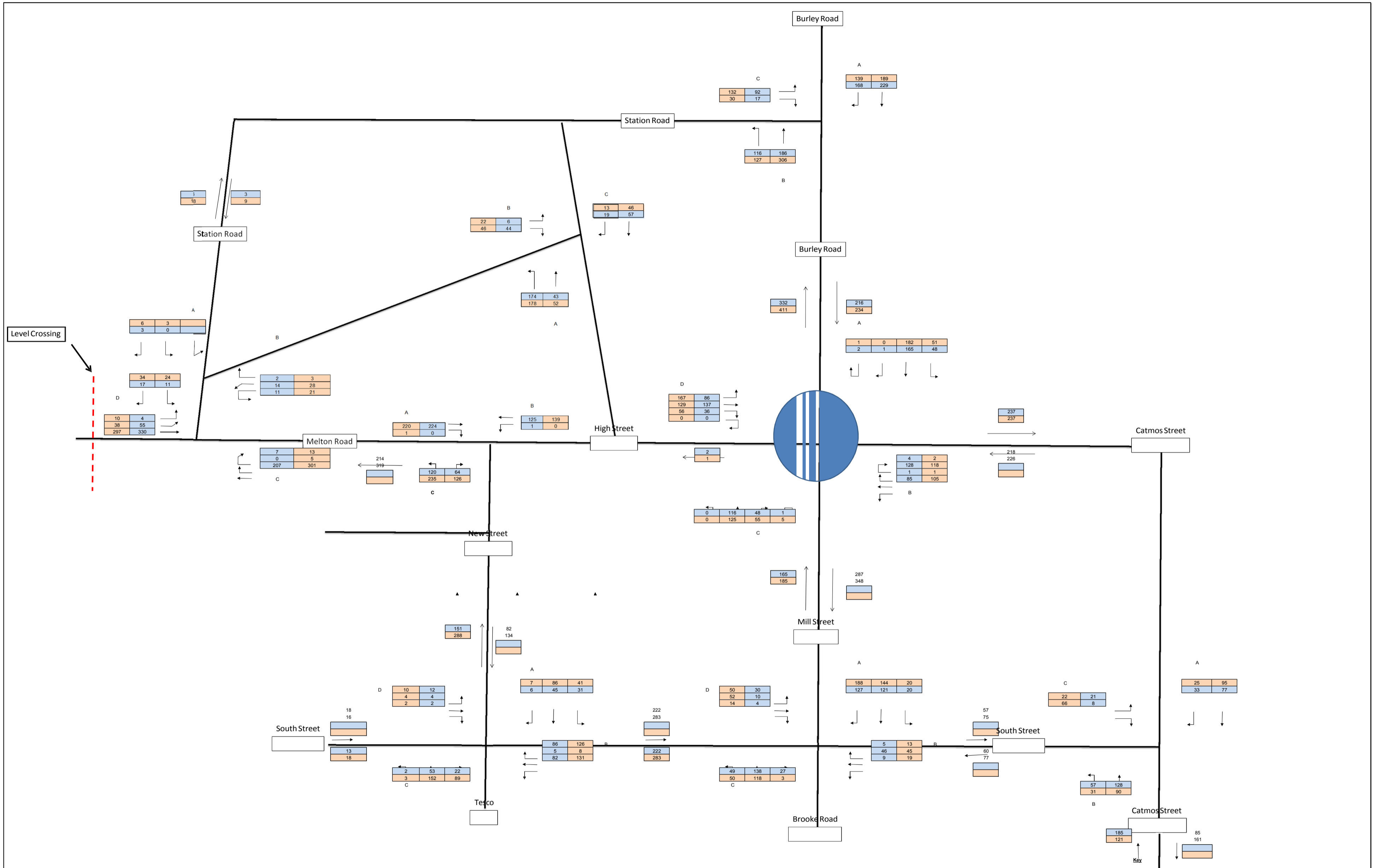
AM Factor 1.466
PM Factor 1.196

Level Crossing



Key
 08:00-09:00 AM
 17:00-18:00

Date	18/08/2017
Design	JG
Checked	PF
Approved	PF



08:00-09:00 AM
17:00-18:00 PM

Date	28/04/2017
Design	LO
Checked	PF
Approved	PF

Client: Rutland County Council

Project: Oakham Public Realm Study

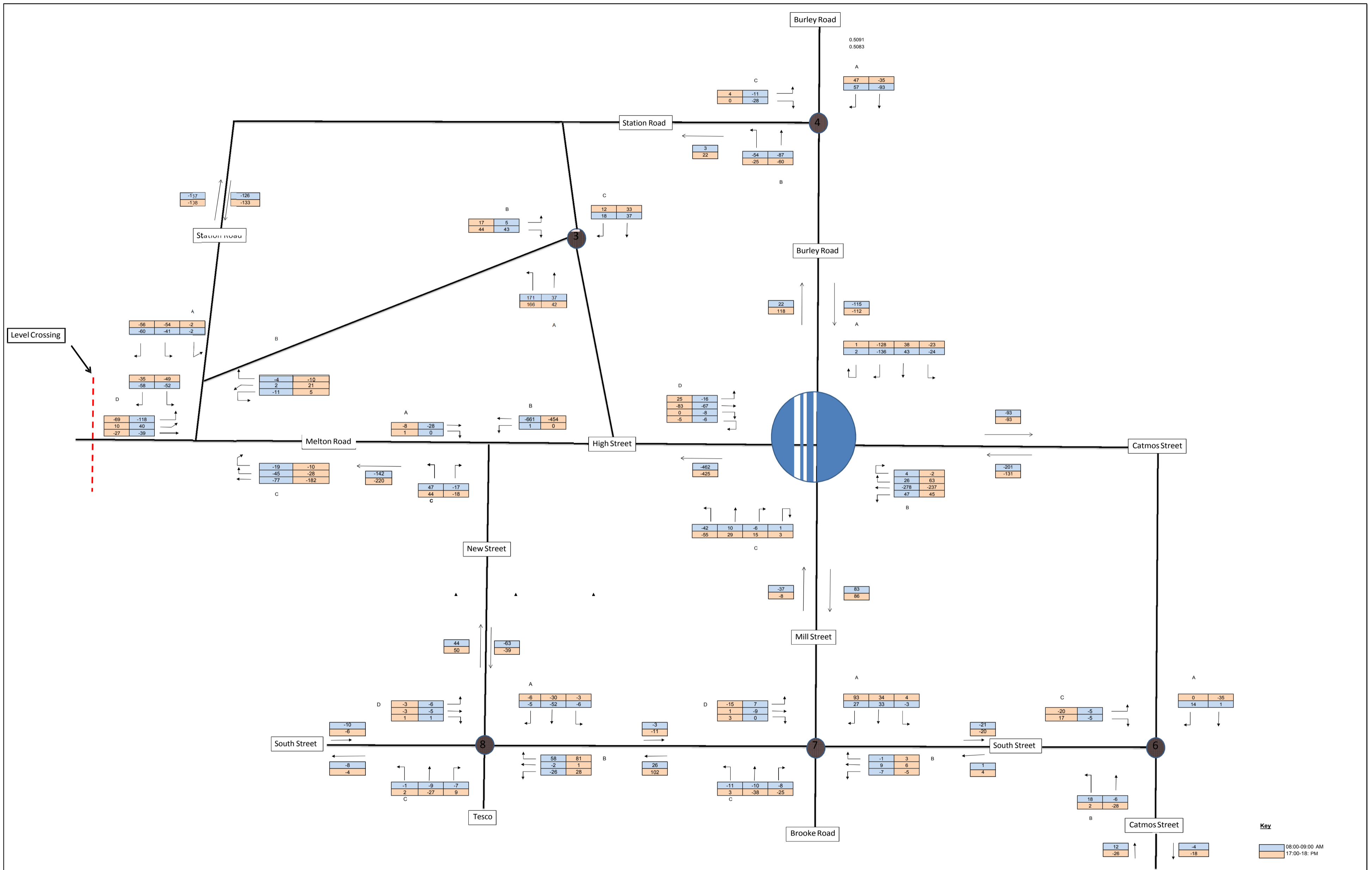
Title: High Street One-Way Eastbound - Friday 7th April 2017 Turning Counts



Drawing Number: Figure 3

File Path:

Revision:



Key
 08:00-09:00 AM
 17:00-18:00 PM

Date	18/08/2017
Design	JG
Checked	PF
Approved	PF

Appendix A – May 2017 Technical Note

Oakham – Junction Impact Assessments Associated With Proposed High Street EB Only One-Way Routing.

Client name Rutland County Council	Discipline Development Planning	Date April 2017	Project number 60494381
Prepared by Luke Oddy	Approved by Peter Firth	Checked by Peter Firth	

Revision History

Revision	Revision date	Details	Authorised	Name	Position
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Introduction:

This note has been prepared to assess the capacity of key junctions within Oakham that would be affected by the Public Realm proposals to make the High Street one-way only in an eastbound direction between New Street and the Mill Street / Burley Road roundabout, as shown in **Figure 1** below.



Figure 1 - Option 2 – One Way System

Utility works undertaken in Oakham Town Centre between Wednesday 5th April 2017 and Friday 7th April 2017, allowed for a temporary one-way system eastbound along the High Street, which mimicked the proposals.

As such, to coincide with the utility works, manual classified turning counts were undertaken between 07:00 and 19:00 over the three-day period.

Based on the above, the network peak hours were calculated to be between 08:00-09:00 and 17:00-18:00, which are included within traffic flow diagrams provided at **Appendix A**, with the overall network peak hour determined to be within the Friday PM peak.

As such, the following Technical Note assesses the capacity of the following junctions, based on traffic flows undertaken on Friday 7th April 2017 between 17:00-18:00:

- Catmos Street / High Street / Mill Street / Brooke Street Roundabout;
- Mill Street / South Street Signalised Junction;
- New Street / High Street Signalised Junction;
- Burley Road / Station Road T-Junction; and
- Melton Road / Station Road T-Junction.

The following sections provide a detailed analysis of the modelling results.

High St / New St Signalised Junction Capacity Assessment

Capacity Assessment of Existing Junction:

The junction has been fully assessed using a LINSIG model with peak hour traffic flows obtained from a turning count undertaken on Friday 7th April 2017.

The LINSIG model was developed using signal timing data taken from the May 2016 video surveys, associated with the AECOM 'Oakham Public Realm Study' – July 2016. The cycle time for the signals were set at 50 seconds for the AM Peak and 80 seconds for the PM Peak both of which include an all red phase when the pedestrian crossing is called.

No changes have been made to the PM Peak cycle time, which remains 80 seconds. However, cycle time optimisation has been used to ensure the most efficient use of green time.

To ensure a robust assessment, it has been assumed that the pedestrian crossing is called every cycle.

Tables 1 following summarises the PM Peak hour assessment. This output is expressed in terms of Degree of Saturation (DoS) and Mean Maximum Queue Length (MMQ). The MMQ is expressed in Passenger Car Units (PCUs).

In LinSig 3 a Degree of Saturation (DoS %) value of 90% or less typically demonstrates that a junction arm or turning movement is operating with spare capacity and is therefore unlikely to experience excessive queuing.

Table 1. Friday PM Peak LINSIG Results Summary

Arm	Movement	MMQ	DoS
1/1	High Street EB (Ahead)	4	36.0
2/1	New Street (Left Only)	4	36.8
2/2	New Street (Right Only)	2	23.7
3/1	High Street WB (Ahead)	2	23.2

Cycle Time: 80 seconds / PRC: 144.4%

As can be seen, the junction is predicted to operate with additional capacity during the Friday PM peak, with all arms of the junction predicted to operate with DoS's well below 90%.

The largest queues are predicted along the High Street for EB movements and New Street (Left only) turning movements, however the maximum predicted queue is 4 PCU's, which is considered minimal.

In summary, the results show that the junction is predicted to operate well within capacity with the proposed one-way system eastbound along the High Street.

Mill Street / South Street Junction Assessment

The Mill Street / South Street junction is a four arm signalised junction, located to the south of the High Street / Mill Street roundabout and provides single lane approach and pedestrian crossing at each arm of the junction.

This junction has also been assessed using LINSIG V3 software, using the Friday 7th April 2017 PM peak turning counts.

The junction has a pedestrian crossing located on each arm; therefore, the junction has been modelled during two PM peak scenarios, one with a pedestrian stage called during every cycle, and one without. The assumed signal stages at the junction are shown in **Figure 2** below.

The 'With Pedestrians' scenario runs stages 1-3, whereas the 'Without Pedestrians' scenario runs only stages 1 - 2.

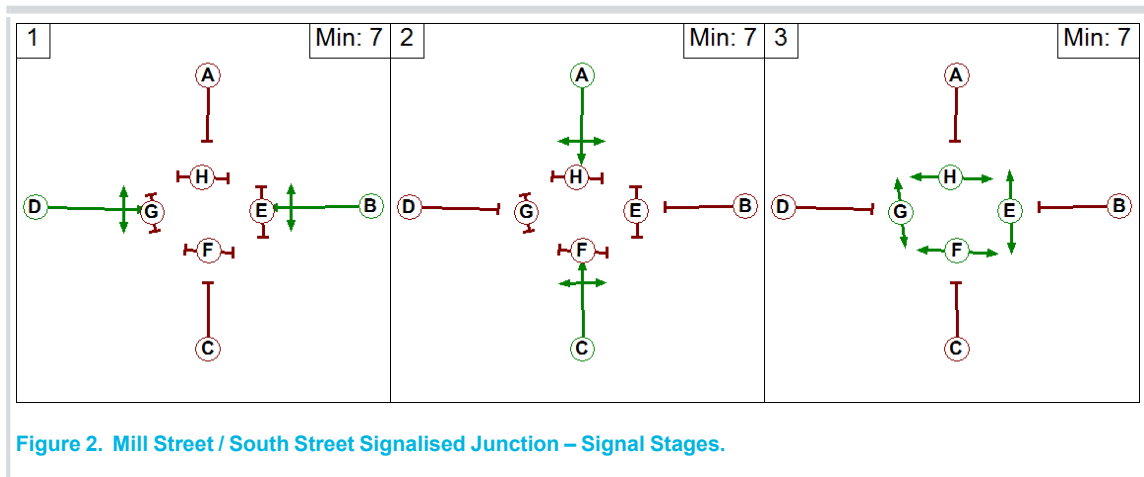


Figure 2. Mill Street / South Street Signalised Junction – Signal Stages.

Table 2 and **3** summarise the Friday PM 'With Pedestrians' and 'Without Pedestrians' scenarios respectively. This output is expressed in terms of Degree of Saturation (DoS) and Mean Maximum Queue Length (MMQ). The MMQ is expressed in Passenger Car Units (PCUs). The PRC 'Practical Reserve Capacity' is also shown, which represents the available capacity of the junction.

Table 2: Mill Street / South Street - Friday PM Peak – With Pedestrians

Arm	MMQ	DoS
1/1 Mill Street	6	43.4
2/1 South Street (E Arm)	2	32.4
3/1 Brooke Road	2	16.0
4/1 South Street (W Arm)	3	41.1

Cycle Time: 90 seconds / PRC: 107.3%

Table 3: Mill Street / South Street - Friday PM Peak – Without Pedestrians

Arm	MMQ	DoS
1/1 Mill Street	4	34.3
2/1 South Street (E Arm)	2	25.7
3/1 Brooke Road	2	12.9
4/1 South Street (W Arm)	3	33.7

Cycle Time: 90 seconds / PRC: 162.3%

The results above show that the current layout of the junction is predicted to operate well-within capacity during Friday PM peak, in both the 'With Pedestrians' and 'Without Pedestrians' scenarios.

During the 'With Pedestrians' scenario, the highest predicted DoS is along the Mill Street Arm at 43.4%, with an associated queue of 6 PCU's. The predicted PRC of the junction is 162.3%, which represents the junction operating with a significant amount of additional capacity.

During the 'Without Pedestrians' scenario, the highest predicted DoS is also along the Mill Street Arm at 34.3% and maximum predicted queue of 4 PCU's.

The overall PRC of the junction is predicted to increase by 55% from the 'With Pedestrians' scenario, from 107.3% to 162.3%, this represents the junction operating with greater capacity without pedestrians.

It is assumed that in practice junction is likely to operate between the levels detailed above, as at points, there is likely to be no pedestrian demand and at others, there is likely to be significant pedestrian demand.

In summary, the results show that the junction is predicted to operate well within capacity with the proposed one-way system eastbound along the High Street.

Burley Road (B668) / Station Road Junction

The Burley Road / Station Road junction is an un-signalised T-junction, located to the north of the High Street / Mill Street roundabout. Station Road forms the minor arm of the junction, providing a single lane approach, with the B668 Burley Road forming the major arm of the junction, also providing a single lane in either direction.

The modelling software package PICADY 5 has been used to assess the operation of the junction.

The PICADY software uses Ratio to Flow Capacity (RFC) to measure the capacity of the junction. RFC values of 0.85 or less are considered to indicate the junction is operating sufficiently, values of 0.85 – 1.0 are considered to that some queueing and delay is starting to occur, and values above 1.0 are considered to represent a condition whereby further extended delay and queueing is predicted to occur.

The following table provides a detailed analysis of the Friday PM Peak scenario:

Table 4: Burley Road / Station Road Junction - Friday PM Peak

Arm		RFC	Queue
B-C	Station Road (Left Turn)	0.079	0
B-A	Station Road (Right Turn)	0.425	1
C-AB	Burley Road N arm (Right Turn)	0.381	1

During the Friday PM Peak scenario detailed above, the additional traffic re-routing at the junction is not predicted to cause the junction to operate over capacity or result in significant queueing.

The maximum predicted queue is along Station Road (Right Turn) and Burley Road – N (Right Turn) Arms, with a predicted queue of 1 vehicle.

Melton Road (B640) / Station Road Junction

The following assessment considers the operation of the Melton Road / Station Road junction, which is a priority T-junction, located to the east of the level crossing.

Melton Road forms the major arm of the junction, providing two lanes westbound at the junction and a single lane eastbound, with a zebra crossing provided on the eastern arm. It has been modelled for the purposes of the following assessment, with a demand of 1 pedestrian per minute at the zebra crossing, which represents a particularly robust approach.

Station Road provides a single lane approach with a short right turn flare (Approx. 3 PCU capacity) and forms the minor arm of the junction.

The modelling software package PICADY 5 has again been used to assess the operation of the junction.

The following table provides a detailed analysis of the Friday PM Peak scenario:

Table 5: Melton Road / Station Road Junction - Friday PM Peak

Arm		RFC	Queue
B-C	Station Road (Left Turn)	0.051	0
B-A	Station Road (Right Turn)	0.097	0
C-A	Melton Road (Ahead)	0.158	0
C-B	Melton Road (Right)	0.173	0

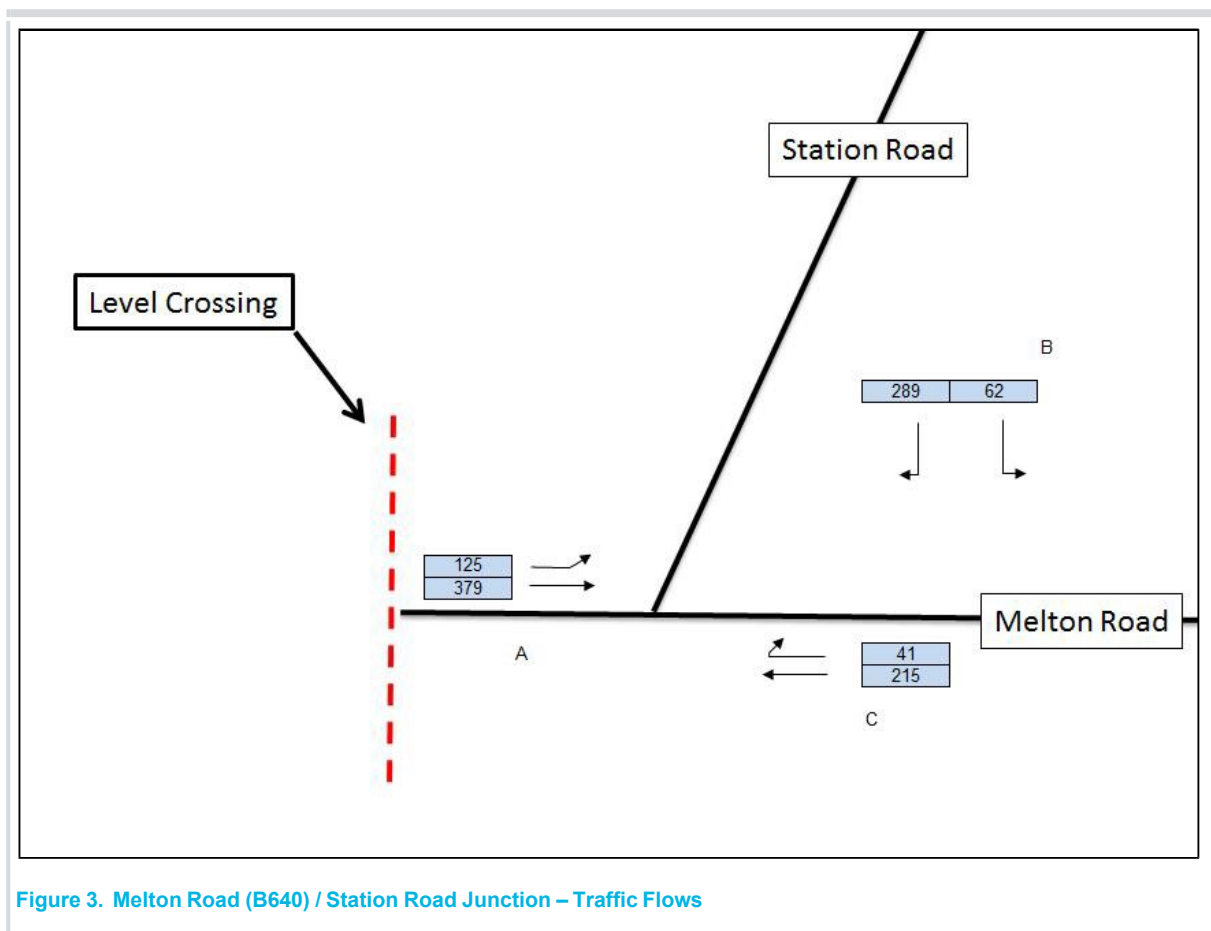
In summary, during the Friday PM Peak scenario detailed above, the additional traffic re-routing at the junction is not predicted result in any queueing, therefore continue operating well within capacity.

In addition to the above, a previous assessment scenario was undertaken at the junction, which was based a manual re-assignment, using peak hour traffic flows, obtained from a turning count undertaken at the High St / Mill St / Burley Road roundabout on Thursday 26th May 2016.

The level of traffic travelling through the Melton Road / Station Road junction was also determined using June 2010 turning proportions to which a Temprow NTM growth factor was applied to represent a 2016 Base.

Additional traffic travelling towards the junction from Station Road, which represented re-routed traffic from the High Street, was summed with the right-turning manoeuvre at Station Road. This resulted in a predicted 128 vehicle movements that previously routed along the High Street westbound, to route westbound along Station Road. These movements were then subtracted from the Westbound movements along Melton Road / High Street at the Melton Road / Station Road Junction within the assessment.

The above methodology resulted in the traffic flows shown in **Figure 3**. This scenario is considered to represent a significant over assumption of traffic flows in comparison to those witnessed in the Friday 7th April 2017 PM peak turning counts. As such, the following assessment considers a sensitivity test at the junction.



Based on traffic flows shown in **Figure 3**, the modelling software package PICADY 5 has been used to assess the operation of the junction, with the following table providing a detailed analysis of the sensitivity test scenario:

Table 6: Melton Road / Station Road Junction - Weekday PM Peak

Arm		RFC	Queue
B-C	Station Road (Left Turn)	0.286	0
B-A	Station Road (Right Turn)	0.813	4
C-A	Melton Road (Ahead)	0.134	0
C-B	Melton Road (Right)	0.182	0

The maximum predicted queue is along Station Road arm, with a predicted queue of 4 vehicles, associated with the right turning manoeuvre.

In summary, during the Friday PM Peak scenario detailed above, which represents a significant over estimation of traffic travelling along Station Road, the junction is predicted to continue operating under capacity.

Maximum Predicted Queue Length

This section of the report focusses on the predicted queue lengths along the High Street, New Street and Station Road, associated with the level crossing closure.

In order to calculate the predicted queue lengths associated with the level crossing closure, the average delay of 10 minutes per hour has been taken, which is detailed further in the AECOM 'Technical Note – Cost Benefit Analysis of the Barleythorpe Road Roundabout' – Jan 2017.

In order to calculate the predicted level of queueing, the total number of vehicles approaching the junction from Melton Road, Station Road and Northgate have been determined based on the Friday 7th April 2017 PM peak turning counts.

The level of hourly traffic was then divided by 60 to determine a predicted level of traffic arriving at the junction per minute, then multiplied by 10 to determine the total number of vehicles likely to be delayed due to the level crossing closure within the hour.

This figure was then multiplied by 5.75m, which represents a typical PCU (Passenger Car Unit) length, which gave a total queue length likely to be experienced due to the level crossing closure within the peak hour.

As such, based on the above methodology, the level of queueing along Station Road, Northgate and Melton Road towards the level crossing has been calculated and shown in **Figure 4**.

It should be noted that the predicted queue length along Melton has been reduced by 50m, which represents the length of the additional westbound lane provided at the approach to the level crossing.

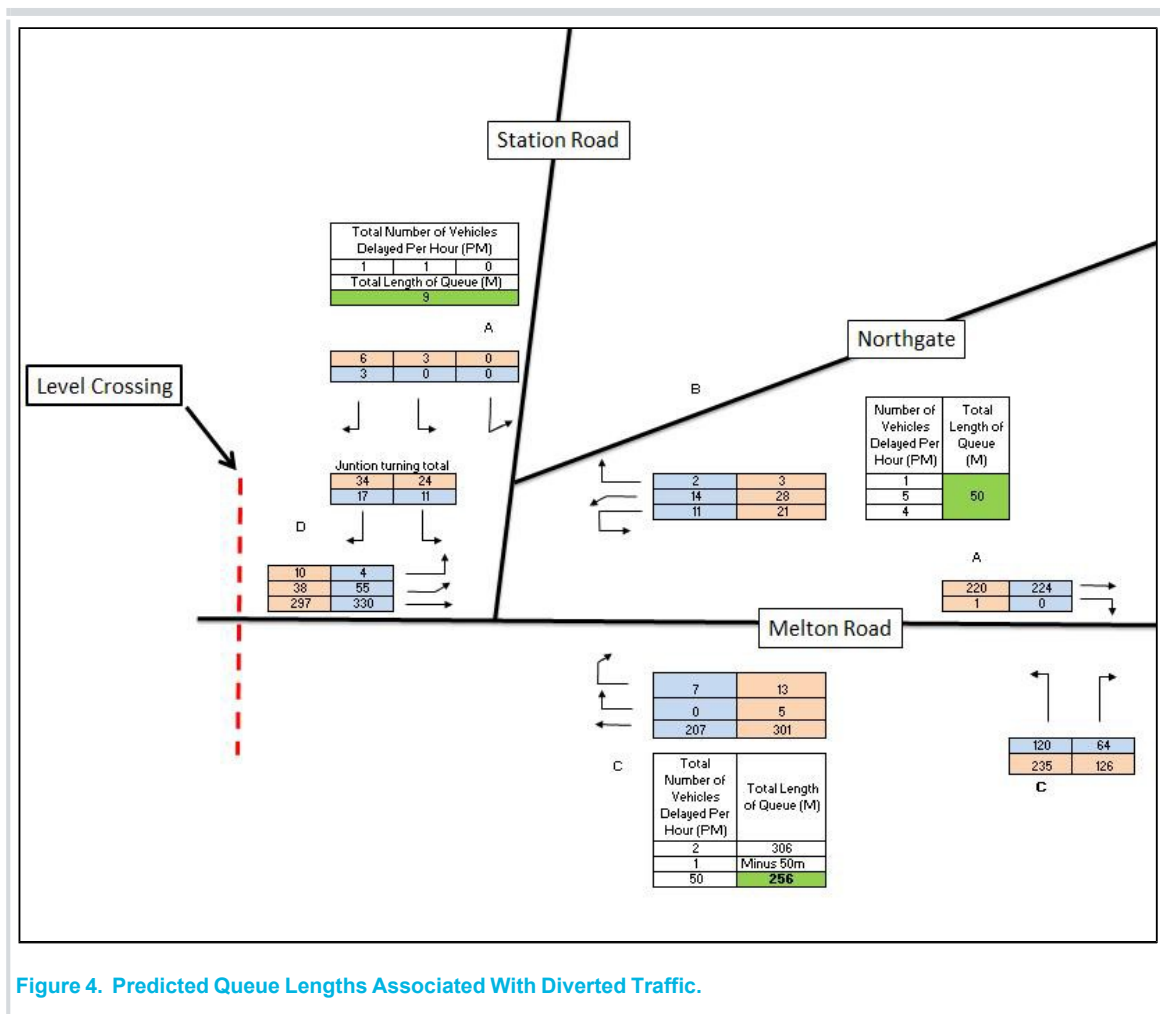
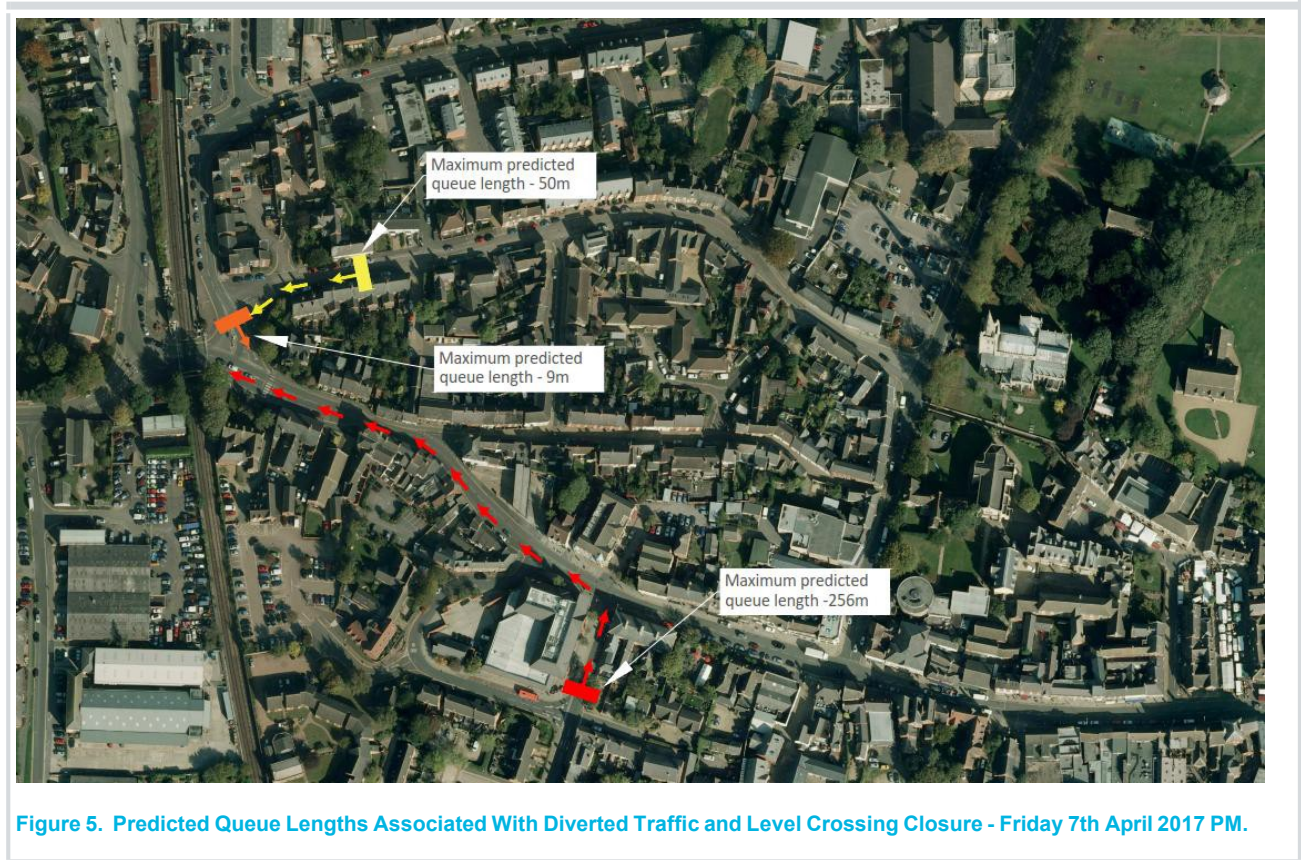


Figure 4 then shows the maximum predicted queue length associated with re-routed traffic along Station Road, Northgate and Melton Road associated with the Friday PM Peak turning counts.



As such, the maximum predicted queue length along Melton Road/ New Street is shown to travel as far back as the New Street / John Street junction at a length of 256m. The longest predicted queue along Northgate is 50m, whereas the longest predicted queue along Station Road is 9m.

It should be noted that the above assessment has been based on longest queue length calculated from the Friday 7th April 2017 PM turning counts and as such represents a maximum predicted queue length associated with temporary one-way system in place on that day.

In addition to the above, a further sensitivity test scenario has also been undertaken, based on the aforementioned manual re-assignment using peak hour traffic flows, obtained from a turning count undertaken at the High St / Mill St / Burley Road roundabout on Thursday 26th May 2016.

The maximum witnessed westbound queue was then taken from the 'Oakham Town Centre Public Realm Study', produced by AECOM in July 2016, which was calculated to cover a length of approximately 420m along the High Street during a Friday PM peak between 17:00-18:00 and represented the worst level of queueing witnessed within that study.

As such, based on a worst case scenario of a 420m queue length, this level of queue was proportioned between westbound movements (left turn) onto the High Street from New Street and the westbound movements from Station Road (right turn), based on the total level of hourly traffic, as shown in **Figure 5**.

This resulted in a maximum predicted queue length of 158m along Station Road (38% of total westbound traffic) and a maximum predicted queue length of 262m (62% of total westbound traffic) along the High Street and New Street.

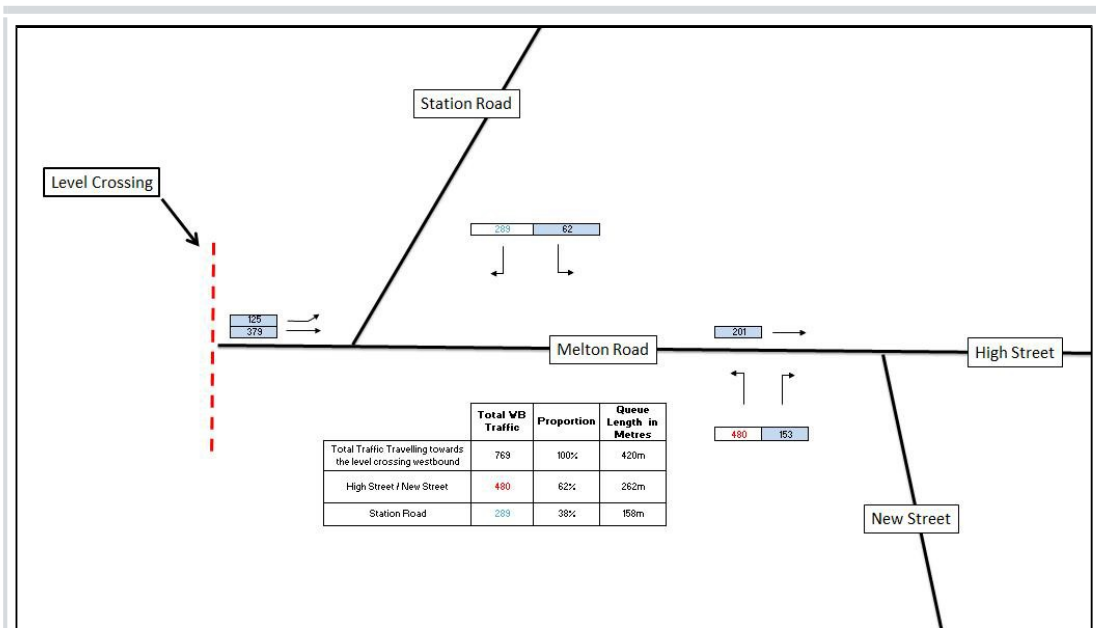


Figure 6. Predicted Queue Lengths With Associated Diverted Traffic – Sensitivity Test Scenario

Figure 7 following then shows the maximum predicted queue length along the High Street and Station Road, based on the sensitivity test scenario.

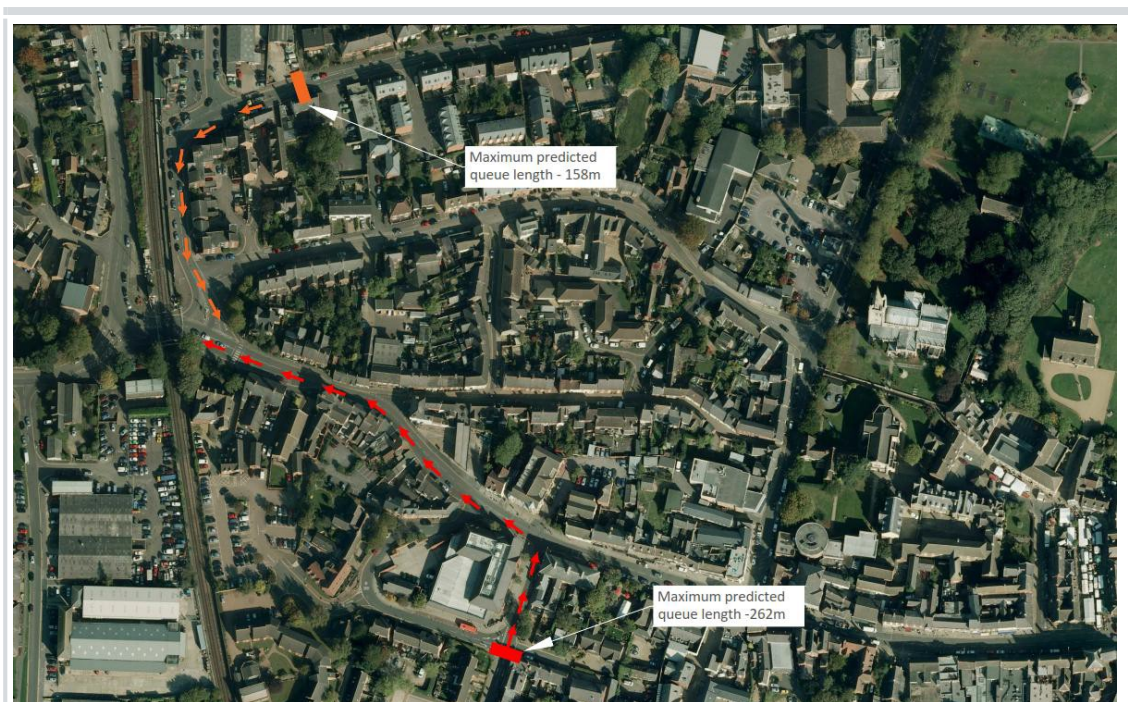


Figure 7. Predicted Queue Lengths Associated With Diverted Traffic and Level Crossing Closure.

As shown in Figure 7, the maximum predicted queue length along the High Street / New Street associated with the level crossing closure was predicted to again reach as far back as the New Street / John Street junction.

However, the longest predicted queue length associated with the level crossing closure along Station Road, was predicted to travel as far back as the Railway Inn Pub to the east of the Station Approach / Station Road junction at a distance of 158m.

It should be noted that the above assessment has been based on longest queue length witnessed during the May 2016 video surveys of Oakham Town Centre and therefore can be considered to represent a worst-case scenario.

Summary and Conclusion

This Technical Note provides a high level assessment of the traffic impacts associated with the proposed introduction of a one-way system (eastbound only) along Oakham High Street between its junction with New Street and the High Street / Mill Street Roundabout.

The proposals would allow widening of the pedestrian footways at specific locations; decreased vehicle flows along the High Street associated with an eastbound only movement and as such would create a safer and more welcoming pedestrian environment.

Utility works undertaken in Oakham Town Centre between Wednesday 5th April 2017 and Friday 7th April 2017, allowed for a temporary one-way system eastbound along the High Street, which mimicked the proposals.

As such, to coincide with the utility works, manual classified turning counts were undertaken between 07:00 and 19:00 over the three-day period.

The network peak hours were calculated to be between 08:00-09:00 and 17:00-18:00, with the overall network peak hour determined to be within the Friday PM peak.

As such, this Technical Note has been based on traffic flows undertaken on Friday 7th April 2017 between 17:00-18:00:

The junctions assessed within this report are:

- B640 High Street / New Street Junction;
- Mill Street / South Street / Brooke Road Junction.
- B668 Burley Road / Station Road Junction; and
- B640 Melton Road / Station Road Junction.

The High St / New St signalised junction has been assessed during a Friday PM peak using LinSig V3 software. Results indicate that the maximum level of queueing is along the High Street (EB Movements) and New Street (Left) arm, with a total predicted queue of 4 PCU's. This is not considered to represent a significant level of queueing and as such the junction is predicted to continue operating well within capacity.

The Mill Street / South Street signalised junction has also been assessed using LinSig V3 software. The maximum predicted queue is during the 'With Pedestrians' PM Peak scenario, along the Mill Street Arm, with a maximum predicted queue of 6 PCU's, which is not considered to represent the junction operating over capacity with the addition of re-routed traffic.

The B668 Burley Road / Station Road and B640 Melton Road / Station Road junctions are both priority junctions, which have been assessed using PICADY 5 software.

The longest predicted queue at the B668 Burley Road / Station Road junction is along the Station Road (Right Turn) and Burley Road N (Right Turn) arms, with a total predicted queue of 1 vehicle at each arm. This level of queue is considered minimal and represents the junction continuing to operate well-within capacity with the addition of re-routed traffic.

Based on the Friday 7th April 2017 turning counts, the B640 Melton Road / Station Road junction is predicted to operate with no queueing, therefore operate well-within capacity with the addition of re-routed traffic.

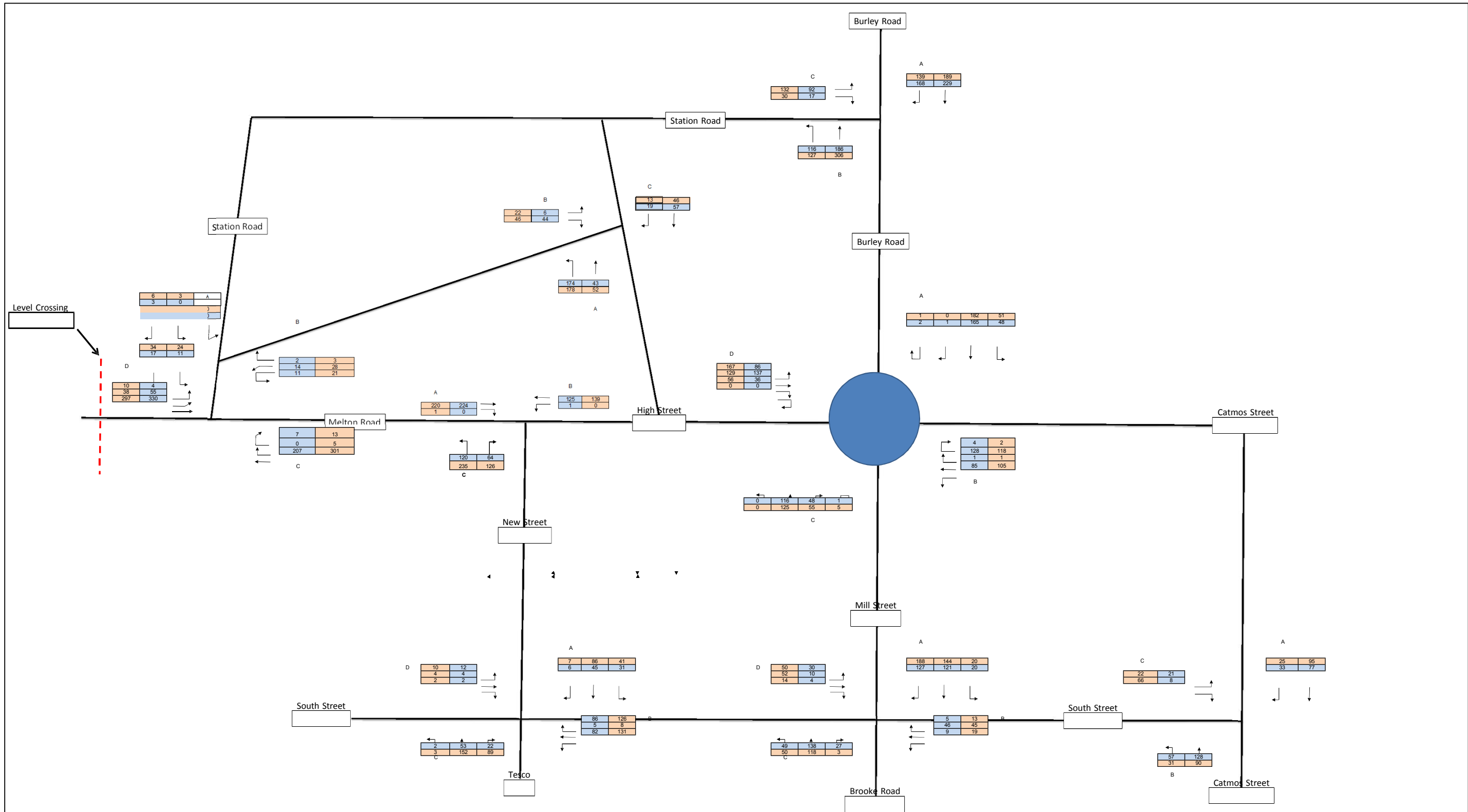
Notwithstanding the above, the sensitivity test scenario, based on a manual re-assignment using peak hour traffic flows, obtained from a turning count undertaken at the High St / Mill St / Burley Road roundabout on Thursday 26th May 2016 resulted in a maximum predicted queue of 4 vehicles at the Station Road (Right Turn) arm, which is also considered minimal.

In summary, it is considered that all junctions assessed will continue to operate with additional capacity with the addition of re-routed traffic associated with an eastbound only one-way system along the High Street.

In addition to the above assessments, a maximum predicted queue length has calculated, based on the maximum queue length witnessed from the May 2016 video surveys, associated with the 'Oakham Town Centre Public Realm Study' produced by AECOM in July 2016. The queue length associated with the level crossing closure is predicted to cover a distance of 158m along Station Road and 262m along the High Street / New Street towards the level crossing.

However, this represents a worst-case scenario, with queues along Station Road also predicted to be approximately 9m when based on the Friday 7th April 2017 turning count assessment.

Appendix A – Traffic Flow Diagram



Key

08:00-09:00 AM	Date	28/04/2017
17:00-18:00 PM	Design	LO
	Checked	PF
	Approved	PF