

# Walsall Town Centre Traffic Model

## 2021 Forecast Year Evaluation Report



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**Walsall Council**

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## **Section 1: Introduction**

### 1.1 Introduction

The Town Centre Traffic Model (TCTM) is an operational model of the key sections of the highway network created in PTV's VISSIM 7.0 software. The model includes the majority of the major junctions in the town centre. For a detailed breakdown of the model see the report entitled Town Centre Traffic Model Development Report.

This report will cover the evaluation of the Town Centre Area Action Plan medium term year (2021) to assess highway impact as a result of new development. General traffic growth has also been added to the model using TEMPro growth factors.

### 1.2 Evaluation Outputs

For the TCTM four different types of evaluation outputs have been used to test model performance. These are as follows:

- Queue lengths
- Journey times
- Network delay
- Average speeds

Queue lengths have three different measurements which are; average queue lengths, maximum queue lengths and queue stops. Average queue lengths take the average queue length across the modelled period. Maximum queue length is the farthest extent of the queue reached during the modelled period. Queue stops are the amount of stops at a queue length counter. For each of these a record is taken once a vehicle has reached a standstill therefore this output does not take into account slow moving traffic.

Journey times are the time taken to reach point B from point A. These are manually entered into the network. For consistency both the AM and PM have the same Journey time points. Only the major routes have been chosen through the network. The points can be seen in chapter 2.2.

### 1.3 Forecasting Methodology

There are two elements to the traffic generation for the 2021 forecast models. The first is general traffic growth and the second is the traffic generated through new developments. A traffic growth factor of 1.0302 has been applied to all vehicle inputs in both models. This factor was taken from TEMPro version 6.2 which is a Department for Transport tool that calculates general traffic growth over a number of years, in this case 2016 - 2021. Each site that fits into the 2021 forecast model has been run through the TRICS version 7.2.4 database to obtain a trip rate which consists of arrivals and departures of vehicles within a set time period for a given calculation value such as per 100 square meters. The trip rate can then be multiplied

to match the scale of the development. Once the trip rate had been obtained, assigning them in the model involved applying the new trip generation to the appropriate vehicle inputs. This was done using a weighting factor based on the volume of the vehicle input on each entry link in the network. The same methodology was reversed for departing vehicles including a weighting for exit links. The routing decisions in the network were also increased and were calculated based on the links proximity to the site assuming that the majority of sites would have more than one access link.

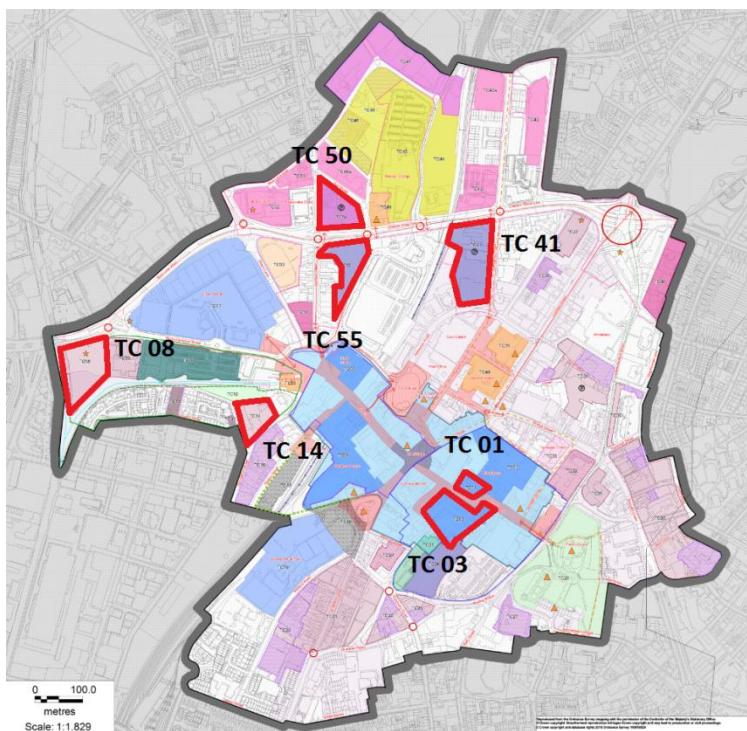
The results section does not include all queue counters as 85 counters were used in the model. For this study only the notable increases/decreases have been included. The full results data set can be requested from Matthew Pain.

#### 1.4 The Sites

The sites included for this modelling exercise are as follows (TC = town centre):

- TC01 – Old Square Phase 2
- TC03 – Old Square Phase 1
- TC08 – Lex Site
- TC14 – William House and Stafford Works
- TC41 – Challenge Block
- TC50 – Day Street
- TC55 – Wisemore

The locations for these sites can be seen on the below image:



An additional access has been added for site TC08 (lex Site). This is an indicative access based on the location of the site. This is composed of a left in - left out arrangement directly onto Blue Lane West. An additional access has also been added for site TC41. This is an indicative access based on the exiting access point, location of the site and the closest link to the site. The remaining sites have had the additional trips added via the nearest links as explained in section 1.3.

The traffic generated by each site can be seen in the table below:

AM		
Site	Arrivals	Departures
TC03	77	97
TC55	32	32
TC08	160	20
TC14	15	35
TC01	42	34
TC50	87	23
TC 41	119	66

**Table 1: AM trips – 08:00 – 09:30**

PM		
Site	Arrivals	Departures
TC03	64	90
TC55	80	80
TC08	30	170
TC14	45	30
TC01	35	38
TC50	36	201
TC 41	183	218

**Table 2: PM trips – 16:00 – 17:30**

The vehicle classes included are only private vehicles (cars/LGV). Delivery trips have not been included in the model as that level of detail is not available yet. This can be added to the model at a later stage once delivery trips have been submitted as part of a transport assessment.

## Section 2: 2021 Forecast Year Evaluation Results

### 2.1 Queue Lengths

This section will compare the queue length results taken from the 2021 forecast model with the base year model. Data will be presented in both tables and charts to understand the locations and to give a direct visual comparison. All three queue results will be compared which are as follows;

- Average queue lengths
- Maximum queue lengths
- Queue stops

Average queues and maximum queues are measured in metres. Queue stops are measured in how many vehicles have stopped in a queue during the modelled period.

Figure1 illustrates the junctions that correspond to the results tables (table 4 and table 5).

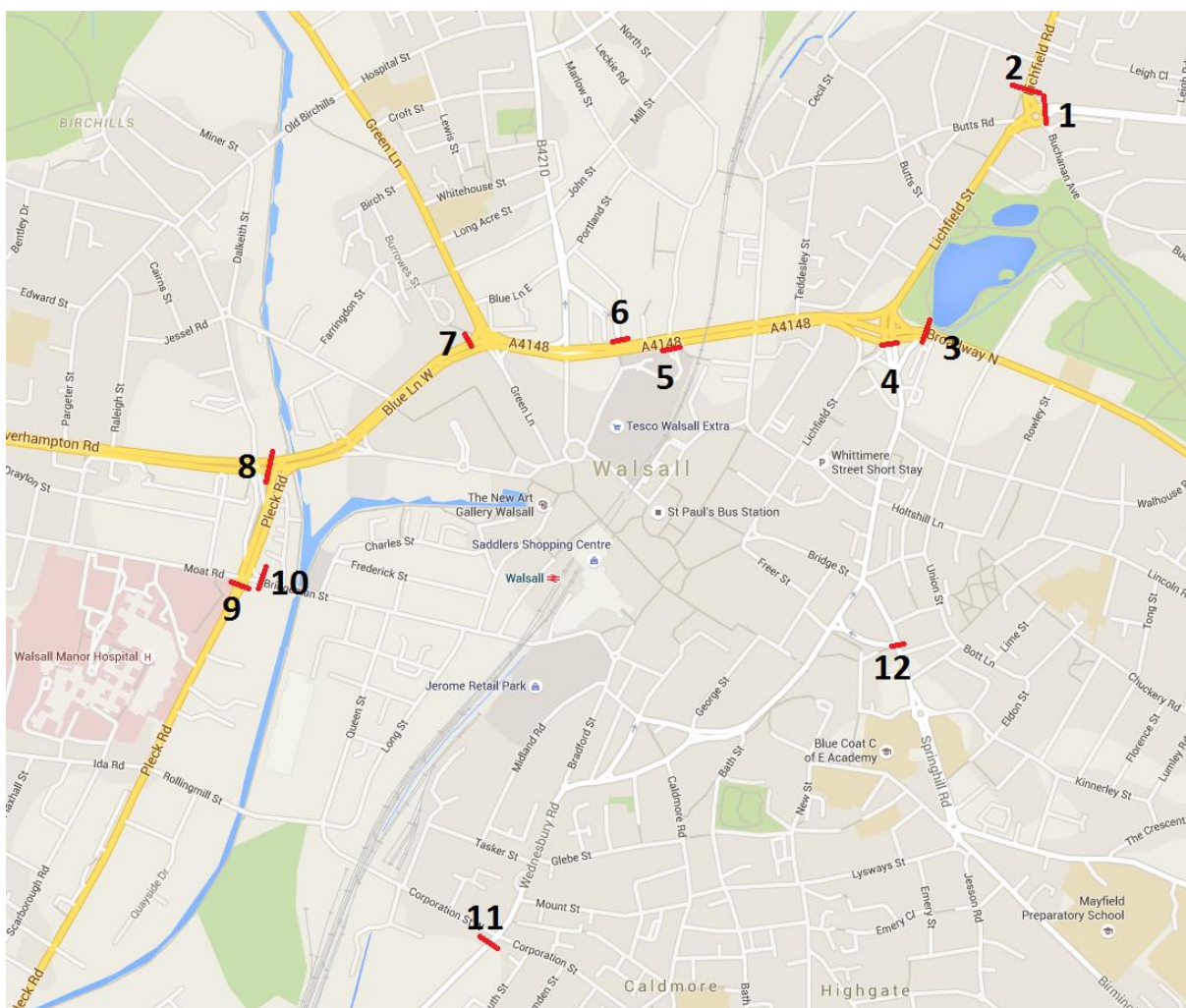


Figure 1: queue counter locations.

### 2.1.1 Queue Length Result Tables

		2016			2021		
Location	Map Ref	Q Avg (m)	Q Max (m)	Q Stops (veh)	Q Avg (m)	Q Max (m)	Q Stops (veh)
Mellish Road	1	123	299	206	360	414	164
Lichfield Road	2	43	230	288	63	233	363
Broadway North	3	250	364	665	265	364	681
Lower Rushall	4	26	116	126	38	156	173
Wisemore	5	8	32	50	12	32	60
Day Street	6	259	322	693	265	323	706
Blue Lane	7	301	353	1479	289	348	1330
Wolverhampton Road	8	144	344	610	264	340	782
Pleck Road	9	130	441	545	282	442	760
Bridgeman Street	10	91	303	290	305	327	699
Wednesbury Road	11	23	136	217	32	136	254
Ablewell Street	12	18	74	273	23	69	325

**Table 3: AM queue length results.**

		2016			2021		
Location	Map Ref	Q Avg (m)	Q Max (m)	Q Stops (veh)	Q Avg (m)	Q Max (m)	Q Stops (veh)
Mellish Road	1	8	61	187	11	60	121
Lichfield Road	2	2	67	100	5	75	82
Broadway North	3	72	350	412	249	364	409
Lower Rushall	4	20	87	101	29	126	85
Tesco Access	5	18	42	95	16	40	85
Day Street	6	178	322	639	283	317	421
Green Lane	7	299	353	1499	296	348	1002
Wolverhampton Road	8	248	342	919	258	344	682
Pleck Road	9	49	198	331	307	442	641
Bridgeman Street	10	304	327	739	307	332	451
Wednesbury Road	11	19	136	210	22	129	142
Ablewell Street	12	17	72	254	106	136	679

**Table 4: PM queue length results.**



2.1.2 Queue Length Result Charts

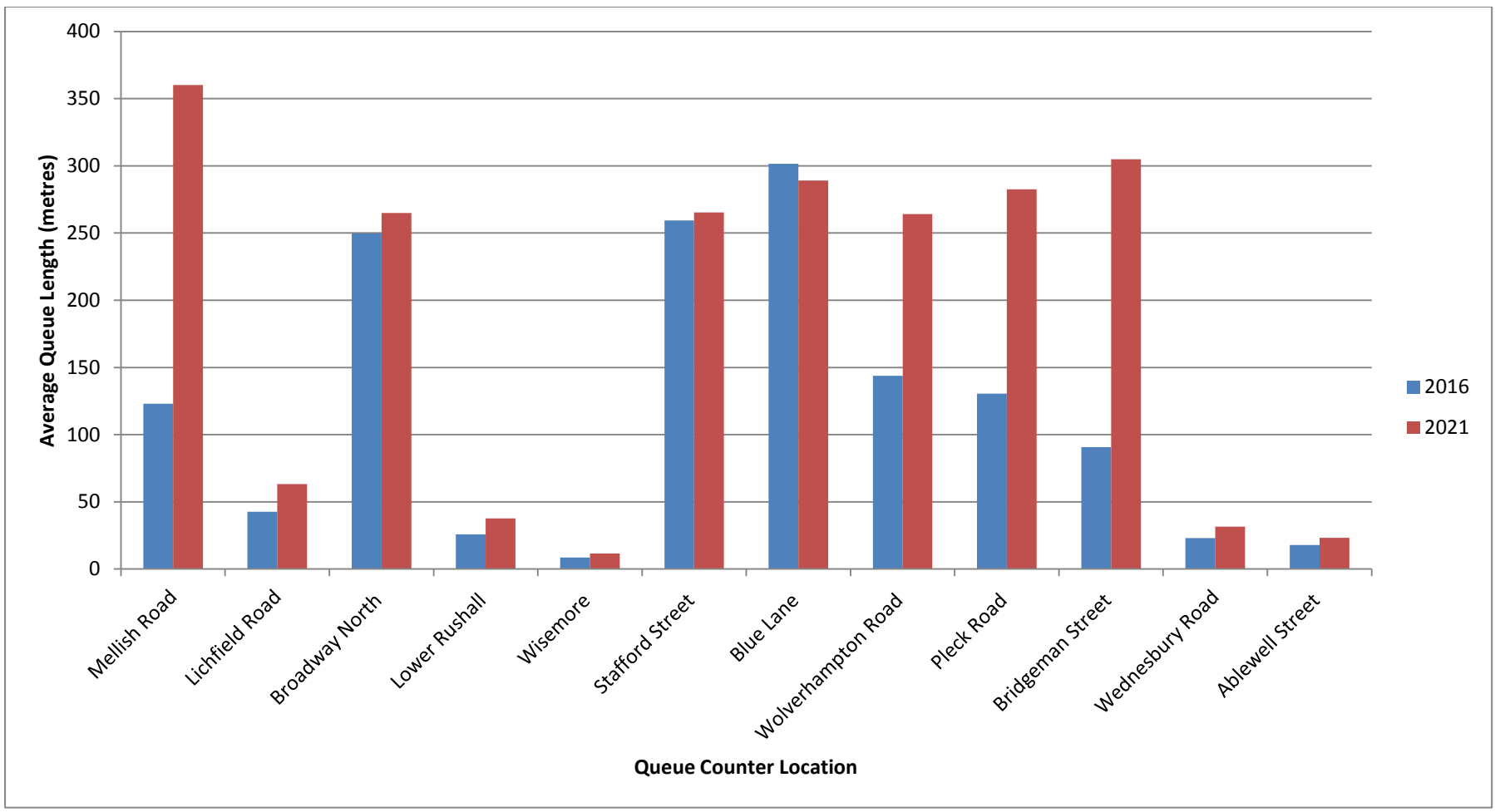


Chart 1: AM queue length results.

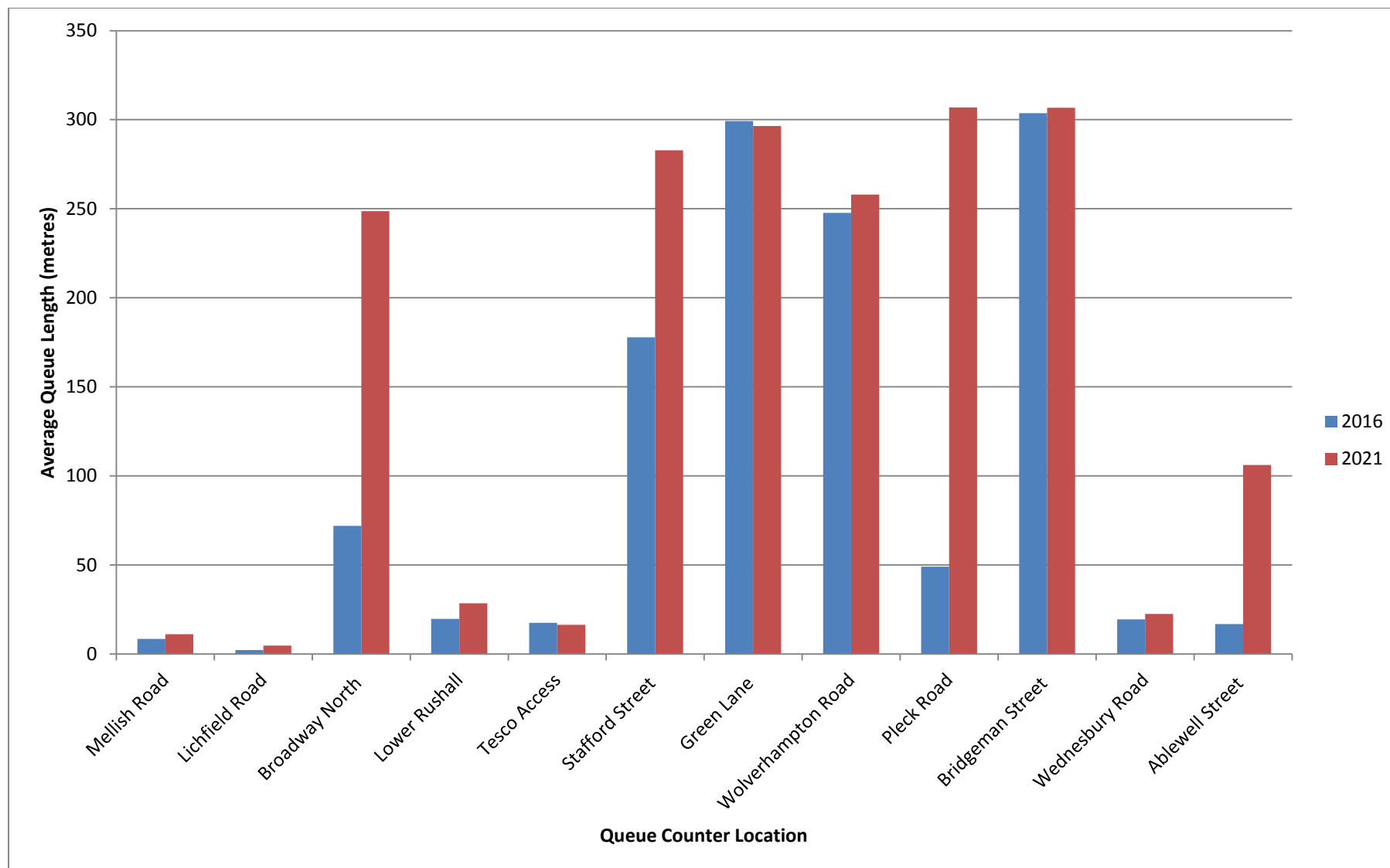


Chart 2: PM queue length results.

### 2.1.3 Queue Length Result Analysis

#### AM

The highest increase from the base year in the AM was recorded on Mellish Road. The increase recorded was 237 meters the equivalent of 47 vehicles. The Lichfield Road at the same junction recorded an increase of about 10 meters the equivalent of 2 vehicles. The maximum queue length on the Lichfield road indicates that the queue can reach similar lengths to the Mellish Road queue. It must be noted that the queue counters only count stopped vehicles in a queue. Model observations indicate that the average queue was similar to that of the maximum queue but was not being recorded as the traffic is constantly moving therefore not being fully recorded by the queue counter.

Bridgeman Street and Pleck Road at the Bridgeman Street/Moat Road/Pleck Road junction both recorded the second and third highest increase from the base year, both increasing by an average of 200 meters. From observing the model the increase is caused by an increase in congestion on the eastbound section of the ring road between the Wolverhampton Road/Pleck Road junction and the Arboretum junction. Traffic coming from the Pleck Road onto the ring road is blocked by the congestion on the ring road subsequently increasing the queue length on Pleck Road and Bridgeman Street. Moat road also recorded an increase but traffic volume was lower than the other arms.

Wolverhampton Road recorded an increase of 100 metres, the equivalent of 20 vehicles, indicating capacity constraints for that arm at the Wolverhampton Road/Pleck Road junction. This is further exacerbated by the congestion along the eastbound section of the ring road restricting vehicles turning right from Pleck Road onto the ring road.

The queue at Blue Lane at the Green Lane/Blue Lane junction is consistent from the base year to the forecast year indicating that this arm is at capacity in the base year. Model observations support this as the queue blocks back to the Wolverhampton Road/Pleck Road junction albeit reaching this point faster in the 2021 forecast year causing the queue increase on the Pleck Road.

#### PM

The highest queue increase from the base year to the forecast year was recorded at Pleck Road at the Pleck Road/Moat Road/Bridgeman Street junction. The increase recorded was 250 meters the equivalent of 50 vehicles. The queue was caused by congestion on the ring road for traffic heading eastbound. The congestion made it difficult for right turners coming from the Pleck Road onto the ring road subsequently causing the increased queue which was the same situation for the AM period.

The second highest increase was recorded at the Broadway North arm of the Arboretum junction where an increase of 175 meters was recorded. From model

observations it appears that increased congestion for traffic heading westbound on the ring road caused less traffic to pass through the Arboretum junction each cycle causing increased queues on that arm. This was also exacerbated by traffic on Lichfield Street on the approach to the Mellish roundabout.

Both Ablewell Street and Stafford Street recorded an increase of 100 metres the equivalent of 20 vehicles. The increase at Stafford Street is caused by increased congestion on the east bound direction on the ring road where traffic turning left out of Day Street is being blocked by the congestion on the ring road. The traffic on Ablewell Street is caused by increased flows. Future consideration should be given to the green splits at this junction for that arm as traffic increases.

## 2.2 Journey Times Evaluation

This section evaluates journey times through the network. The points are labelled in the tables but a map showing all of these locations can be seen in figure 2 below. The journey time results are displayed in minutes.

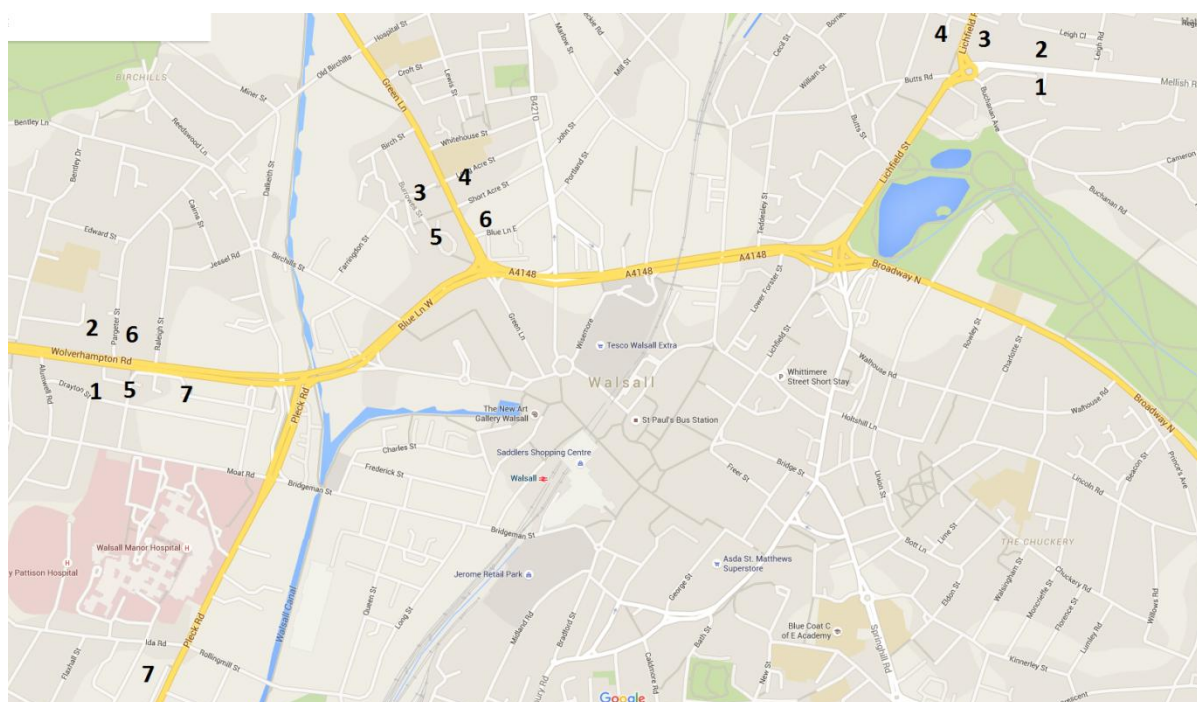


Figure 2: journey time locations.

AM	Map Ref	Journey Time (min)	
Movement		2016	2021
Mellish Road - Wolverhampton Road	1	7	10
Wolverhampton Road - Mellish Road	2	18	23
Lichfield Road - Green Lane	3	6	7
Green Lane - Lichfield Road	4	12	12
Wolverhampton Road - Green Lane	5	4	6
Green Lane - Wolverhampton Road	6	3	3
Pleck Road - Wolverhampton Road	7	5	9

Table 5: AM journey times.

PM	Map Ref	Journey Time (min)	
Movement		2016	2021
Mellish Road - Wolverhampton Road	1	6	5
Wolverhampton Road - Mellish Road	2	21	23
Lichfield Road - Green Lane	3	5	5
Green Lane - Lichfield Road	4	12	12
Wolverhampton Road - Green Lane	5	6	5
Green Lane - Wolverhampton Road	6	3	3
Pleck Road - Wolverhampton Road	7	4	10

Table 6: PM journey times.

The AM results indicate that the eastbound and westbound directions between Wolverhampton Road and the Mellish Roundabout have increased congestion from the base year to 2021. The eastbound direction recorded a 5 minute increase and the westbound direction recorded a 3 minute increase. This congestion increase has had an impact to Pleck Road where a 4 minute increase was recorded from the Pleck Road south of the Ida Road/Rollingmill Street/ Pleck Road junction to the Wolverhampton Road. These journey time results reflect the queue length increases recorded in the same areas demonstrating an increased level of congestion across the network.

The PM results recorded less increase from the base year to the forecast year overall compared to the AM. The biggest increase was recorded on the Pleck Road – Wolverhampton road movement with an increase of 6 minutes. The level of congestion on the eastbound section of the ring road between Wolverhampton Road and the Mellish Roundabout were the same as the AM, but traffic flows were slightly higher on Pleck Road heading north causing the increased journey time and the subsequent increased queue length.

### 2.3 Network Delay Evaluation

This section evaluates network delay. Network delay is taken across the entire network as an average and recorded in seconds. Network delay varies across the network therefore certain pockets of the network are likely to experience more delay than others. This statistic is useful when comparing forecast years with a base year to assess overall network performance. The average delay is taken when a vehicle is stopped in traffic in the network which is taken as an average for all vehicles for the extent of the evaluation period.

AM		PM	
<b>2016</b>	2021	2016	2021
<b>224</b>	254	199	231

Table 7: Average network delay (seconds).

The results indicate that average network delay increases for both peak periods with the biggest increase being recorded in the PM. This demonstrates that general traffic growth and development traffic have an impact to the performance of the network.

### 2.4 Average Speed Evaluation

This section compares average speeds across the network which is reported in Km/h. Average speeds vary across the network therefore pockets of the network are likely to experience lower or higher speed than others.

The average speed results can be seen below:

AM		PM	
<b>2016</b>	2021	2016	2021
<b>12</b>	11	13	11

Table 8: Average network speed (Km/h).

The results indicate that average speeds for both peaks reduce which coincides with the average network delay results indicating an increased level of congestion attributed to general traffic growth and development trips.

## Section 3: Conclusion

### 3.1 Report Headlines

- The east bound direction on the northern section of the ring road between Wolverhampton Road and the Arboretum junction experiences a higher level of congestion than the west bound direction for both peaks for both the base and forecast year.
- The east bound congestion causes problems for all junctions with traffic turning right from the town centre onto that section of the ring road for both peaks.
- This problem is exacerbated in the 2021 forecast year through general traffic growth and additional new development trips. This subsequently causes the largest increase in queue length increases on the Pleck Road south of the Bridgeman Street/Moat Rd/Pleck Rd junction in the AM and worse in the PM.
- The AM 2021 forecast year recorded the highest average queue at the Mellish Roundabout on the Mellish Road arm indicating capacity constraints at this junction.
- Journey times reflect increased queue lengths for traffic traversing the northern section of the ring road from Wolverhampton Road to Mellish Road (eastbound) for both peak periods from the base year indicating capacity constraints for that section of the ring road.
- Network delay has increased and average network speeds have decreased across the whole network demonstrating increased congestion as a result of general traffic growth and new development trips.

### 3.2 Conclusion

Generally congestion has increased in the network which was expected with increased flows. It must be noted that not all of the 2021 traffic is associated with new development as general traffic growth has been included in the model. The most notable AM queue length increases were recorded at Mellish Road, Pleck Road, Wolverhampton Road and Bridgeman Street (see figure 1 for queue locations). The most notable queue increases in the PM were recorded at Broadway North, Pleck Road, Ablewell Street and Stafford Street. On top of these increased queue lengths the eastbound direction on the ring road between Wolverhampton Road and Mellish Road reported all junctions blocking back to the next in the base year and the forecast year. This impacted traffic entering the ring road for the connecting arms on all junctions along the northern section of the ring road. This eastbound congestion subsequently increased the queue on the Pleck Road by 250

metres in the PM for the 2021 forecast year. This demonstrates that the northern ring road junctions have a wider traffic impact and should be assessed to increase capacity.

Journey time results reflect the queue length results with the longest journey time recorded between the Wolverhampton Road and Mellish Road in the eastbound direction. Model observations indicate that the areas of congestion are at the Arboretum junction at the Littleton Street arm for east/south and northbound traffic and at the Green Lane junction where queues block back to the Pleck Road/Wolverhampton Rd junction which was the case for both peak periods and both the base and forecast year. The AM period recorded an increase of 3 minutes between Mellish Road and Wolverhampton Road for westbound traffic indicating capacity constraints along the westbound section of the ring road as well as the eastbound direction.

The next stage for the Town Centre Traffic Model is to assess the long term impacts of development in the town centre (developments proposed up to and beyond 2026). Initial assumptions will be made about trip generation but will be updated with further traffic information once more information for the individual sites becomes available.

### 3.3 Supporting Reports

Model development is not covered within this report therefore a separate report has been produced that discusses how the model has been developed, traffic data collection, future model development and the intended model uses. This report is called the Town Centre Traffic Model Development Report and can be requested from Matthew Pain – ext 4328