



**Kidderminster Station Access Report**  
**Traffic impact at Station Access junction on Comberton Road**

Document No. | 1  
July 2020

**Worcestershire County Council**



Document Title: Traffic impact at Station Access junction on Comberton Road  
Document No.: Document No.  
Revision: 1  
Date: 08/07/2020  
Client Name: Worcestershire County Council  
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NONE

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#### Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
0	03/07	Issue for Client	DM	PN	GN	CH
1	08/07	Issue for Client	DM	PN	GN	CH

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**Important note about your report**

*The sole purpose of the report is to advise Worcestershire County Council (WCC) on the current and future operation of the Kidderminster Station Access on Comberton Road.*

*Any information relied upon and presumed accurate in preparing the report including traffic forecast data supplied to Jacobs.*

*This report was requested by WCC on 26<sup>th</sup> June 2020.*

*Jacobs accept no liability for the accuracy of any data supplied by 3<sup>rd</sup> parties.*

*This report has been prepared exclusively for Jacobs' client and no liability is accepted for any use or reliance on the report by third parties*

## 1. Introduction

Jacobs has been commissioned by Worcestershire County Council (WCC) to assess the capacity of the Kidderminster railway station access onto the Comberton Road (A448).

A separate piece of work has been undertaken by SLC Rail Investment, supported by transport consultants SYSTRA, to produce an evidence base relating to the car park demand and capacity at Kidderminster mainline railway station in support of submissions to the Wyre Forest Local Plan.

The forecasting element of this work has informed the traffic demand associated with the two capacity tests at the Kidderminster mainline railway station access detailed in this report; 300 additional spaces and 125 additional spaces. Junction modelling, using industry standard computer software, has been used to compare traffic the level of 'change' at the station access. This 'change' has been measured using anticipated detailed metrics such as:

- delays for drivers,
- the capacity of the access junction, and
- queue lengths on Comberton Road.

As part of this modelling exercise, national growth statistics have been derived using the UK database and the Department for Transport design guidance has been applied where necessary and appropriate.

This report will also provide a summary of work already undertaken and of the existing data sources to provide an understanding of the predicted traffic conditions on Comberton Road in 2036.

### 1.1 Study area

The study area for this report covers the Comberton Road / Station Access / Lea Street staggered crossroads, as well as the A448 Comberton Road corridor, in Kidderminster.

### 1.2 Report structure

After this introduction chapter, the remainder of the report is structured as follows:

- Chapter 1: Introduction
- Chapter 2: Traffic flows
- Chapter 3: Access Junction capacity
- Chapter 4: Link capacity
- Chapter 5: Wyre Forest Transport Evidence
- Chapter 6: Summary and Conclusion

## 2. Traffic flows

### 2.1 2016 base flows

As part of the previous work undertaken to support the Kidderminster station development, a Manual Classified Turning Count (MCC) traffic survey was undertaken at the Comberton Road / Station Access and Comberton Road / Lea Street junctions in February 2016, alongside queue and delay surveys at both junctions.

The queue survey was undertaken to validate the base year model, meaning the model best reflects reality, at that time.

Table 2-1 to Table 2-3 provides a summary of the 2016 base flows for the three time periods; 0700-0800, 0800-0900 and 1700-1800.

Two AM peak periods have been used due to the different peaks they represent over the total AM period 0700-0900. The highest recorded traffic flows on Comberton Road were recorded between 0800-0900. Analysis of the 2016 car trip arrivals for the Station, demonstrated the peak period was 0700-0800.

Table 2-1: 2016 base AM (0700-0800) flows

	<b>Comberton Road east</b>	<b>Station Access</b>	<b>Comberton Road west</b>	<b>Lea Street</b>	<b>Total</b>
<b>Comberton Road east</b>	0	93	376	0	<b>469</b>
<b>Station Access</b>	32	0	170	0	<b>202</b>
<b>Comberton Road west</b>	441	251	0	0	<b>692</b>
<b>Lea Street</b>	32	7	27	0	<b>66</b>
<b>Total</b>	<b>505</b>	<b>351</b>	<b>573</b>	<b>0</b>	<b>1429</b>

Table 2-2: 2016 base AM (0800-0900) flows

	<b>Comberton Road east</b>	<b>Station Access</b>	<b>Comberton Road west</b>	<b>Lea Street</b>	<b>Total</b>
<b>Comberton Road east</b>	0	85	699	0	<b>784</b>
<b>Station Access</b>	38	0	143	0	<b>181</b>
<b>Comberton Road west</b>	481	116	0	0	<b>597</b>
<b>Lea Street</b>	75	9	71	0	<b>155</b>
<b>Total</b>	<b>594</b>	<b>210</b>	<b>913</b>	<b>0</b>	<b>1717</b>

Table 2-3: 2016 base PM (1700-1800) flows

	<b>Comberton Road east</b>	<b>Station Access</b>	<b>Comberton Road west</b>	<b>Lea Street</b>	<b>Total</b>
<b>Comberton Road east</b>	0	52	674	0	<b>726</b>
<b>Station Access</b>	40	0	193	0	<b>233</b>
<b>Comberton Road west</b>	600	84	0	0	<b>684</b>
<b>Lea Street</b>	30	5	69	0	<b>104</b>

<b>Total</b>	<b>670</b>	<b>141</b>	<b>936</b>	<b>0</b>	<b>1747</b>
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A seven-day Automatic Traffic Count (ATC) was also undertaken, covering the day of the MCC surveys, on the A448 Comberton Road.

Table 2-4 shows the five-day average flows in each direction for the 0700-0800, 0800-0900 and 1700-1800 hour periods.

Table 2-4: Comberton Road ATC, average hourly flows

<b>Time</b>	<b>Eastbound 5-day average</b>	<b>Westbound 5-day average</b>
0700-0800	499	445
0800-0900	551	791
1700-1800	646	719

## 2.2 2036 TEMPro growth flows

A forecast scenario has been produced to compare the level of change following the introduction of the additional demand associated with an additional 300 car park spaces.

A growth factor has been extracted from TEMPro<sup>1</sup> which presents data from the National Trip End Model. NTEM model forecasts the growth in trip origin-destinations (or productions-attractions) up to 2051 for use in transport modelling. The forecasts take into account national projections of:

- population
- employment
- housing
- car ownership
- trip rates

This growth factor has been applied to the base flow to generate 2036 forecast traffic flows using TEMPro v7.2 and has been adjusted for NTEM traffic growth for principle urban roads in the Wyre Forest District to ensure a relevant fit and appropriate application of statistics.

The adjusted growth factors are shown in Table 2-5.

Table 2-5: TEMPro growth factors

<b>Period</b>	<b>2016-2036 growth factor</b>
AM (0700-1000)	1.142
PM (1600-1900)	1.132

Table 2-6 to Table 2-8 show the 2036 base flows for the 0700-0800, 0800-0900 and 1700-1800 time periods.

<sup>1</sup> The DfT publishes the reference scenario forecasts from the National Trip End Model (NTEM) in a database format. TEMPro is a data browser that extracts results from NTEM. TEMPro be used to generate a first order approximation of the effect of the trip ends of perturbing the planning assumptions about household and Jobs.

Table 2-6: 2036 base AM (0700-0800) flows

	<b>Comberton Road east</b>	<b>Station Access</b>	<b>Comberton Road west</b>	<b>Lea Street</b>	<b>Total</b>
<b>Comberton Road east</b>	0	107	429	0	<b>536</b>
<b>Station Access</b>	37	0	194	0	<b>231</b>
<b>Comberton Road west</b>	504	287	0	0	<b>790</b>
<b>Lea Street</b>	37	8	31	0	<b>75</b>
<b>Total</b>	<b>577</b>	<b>401</b>	<b>654</b>	<b>0</b>	<b>1632</b>

Table 2-7: 2036 base AM (0800-0900) flows

	<b>Comberton Road east</b>	<b>Station Access</b>	<b>Comberton Road west</b>	<b>Lea Street</b>	<b>Total</b>
<b>Comberton Road east</b>	0	97	798	0	<b>895</b>
<b>Station Access</b>	43	0	163	0	<b>207</b>
<b>Comberton Road west</b>	549	132	0	0	<b>682</b>
<b>Lea Street</b>	86	10	81	0	<b>177</b>
<b>Total</b>	<b>678</b>	<b>240</b>	<b>1043</b>	<b>0</b>	<b>1961</b>

Table 2-8: 2036 base PM (1700-1800) flows

	<b>Comberton Road east</b>	<b>Station Access</b>	<b>Comberton Road west</b>	<b>Lea Street</b>	<b>Total</b>
<b>Comberton Road east</b>	0	59	763	0	<b>821</b>
<b>Station Access</b>	45	0	218	0	<b>264</b>
<b>Comberton Road west</b>	679	95	0	0	<b>774</b>
<b>Lea Street</b>	34	6	78	0	<b>118</b>
<b>Total</b>	<b>758</b>	<b>160</b>	<b>1059</b>	<b>0</b>	<b>1977</b>

## 2.3 Additional 2036 car park trips (Demand trips by SYSTRA)

A separate piece of work has been undertaken by SLC Rail Investment, supported by SYSTRA, to produce an evidence base relating to car park demand and capacity at both Blakedown and Kidderminster railway stations in support of submissions to the Wyre Forest Local Plan.

The forecasting element of this work has informed the traffic demand associated with the provision of an additional 300 car park spaces or 125 spaces at Kidderminster Railway Station which has been derived and supplied by SYSTRA. This has been modelled for the two AM peak hours (0700-0800 and 0800-0900) as no PM peak data has been supplied.



## Traffic impact at Station Access junction on Comberton Road

The figure below shows the two-hour peak period provided by SYSTRA for the demand associated with 300 spaces:

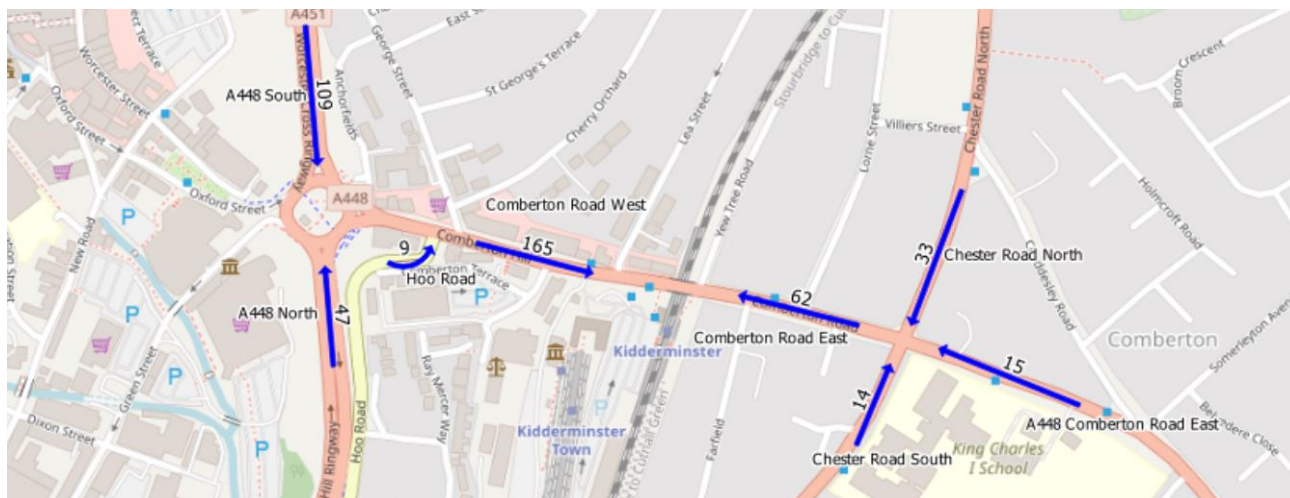


Figure 1: SYSTRA Demand Flows (0700-0900) (300 additional spaces)

Table 2-9 and Table 2-10 show the total 2036 base plus railway station demand for the 300 additional spaces. It should be noted that the TEMPro growth has only been applied to the traffic not associated with the station i.e. it has not been applied to traffic entering the car park. The SYSTRA growth has been applied to the turning movements into the railway station forecourt. This avoids any double counting which could skew, over or under exaggerate the results of the traffic modelling.

Table 2-9: 2036 base + SYSTRA demand AM growth constrained (0700-0800) flows (300 additional spaces)

	Comberton Road east	Station Access	Comberton Road west	Lea Street	Total
Comberton Road east	0	112	429	0	541
Station Access	37	0	194	0	231
Comberton Road west	504	350	0	0	854
Lea Street	37	7	31	0	74
<b>Total</b>	<b>577</b>	<b>469</b>	<b>654</b>	<b>0</b>	<b>1700</b>

Table 2-10: 2036 base + SYSTRA demand AM growth constrained (0800-0900) flows (300 additional spaces)

	Comberton Road east	Station Access	Comberton Road west	Lea Street	Total
Comberton Road east	0	126	798	0	924
Station Access	43	0	163	0	207
Comberton Road west	549	178	0	0	727
Lea Street	86	9	81	0	176
<b>Total</b>	<b>678</b>	<b>313</b>	<b>1043</b>	<b>0</b>	<b>2034</b>

Table 2-11 and Table 2-12 below shows the total 2036 base plus railway station demand for the 125 additional spaces.

Table 2-11: 2036 base + SYSTRA demand AM growth constrained (0700-0800) flows (125 additional spaces)

	<b>Comberton Road east</b>	<b>Station Access</b>	<b>Comberton Road west</b>	<b>Lea Street</b>	<b>Total</b>
<b>Comberton Road east</b>	0	101	429	0	<b>530</b>
<b>Station Access</b>	37	0	194	0	<b>231</b>
<b>Comberton Road west</b>	504	291	0	0	<b>795</b>
<b>Lea Street</b>	37	7	31	0	<b>74</b>
<b>Total</b>	<b>577</b>	<b>399</b>	<b>654</b>	<b>0</b>	<b>1630</b>

Table 2-12: 2036 base + SYSTRA demand AM growth constrained (0800-0900) flows (125 additional spaces)

	<b>Comberton Road east</b>	<b>Station Access</b>	<b>Comberton Road west</b>	<b>Lea Street</b>	<b>Total</b>
<b>Comberton Road east</b>	0	102	798	0	<b>900</b>
<b>Station Access</b>	43	0	163	0	<b>207</b>
<b>Comberton Road west</b>	549	141	0	0	<b>690</b>
<b>Lea Street</b>	86	9	81	0	<b>176</b>
<b>Total</b>	<b>678</b>	<b>252</b>	<b>1043</b>	<b>0</b>	<b>1973</b>

### 3. Junction capacity

Junction capacity at the site access has been modelled using JUNCTIONS8 (formerly PICADY) software package.

This is an industry standard tool developed by the Traffic Research Laboratory (TRL) PICADY and is based on three decades of research and development by TRL. It is used for predicting capacities, queues, delays (both queueing and geometric) on the highway.

The model provides three outputs: -

1. RFC- Ratio of Flow to Capacity. This is the relationship between the traffic demand and the capacity of the junction. Empirical studies have detailed that an RFC of over 0.85 (i.e. 85% capacity) means the junction is operating over capacity. The higher the RFC suggest incremental worsening of traffic conditions for drivers resulting in exponential queueing and delays;
2. Queue- This is the mean maximum anticipated queue length formed at the junction. The outputs below are measured in Passenger Car Units (PCUs). A PCU is a metric used in traffic analysis to assess traffic-flow rates. One PCU is the equivalent of 5.75m; and,
3. Delay- The delay below is shown in seconds and is the predicted total delay a driver is anticipated to expect at the junction.

The site is connected to the Comberton Road and The Ringway roundabout in the west and to the signal-controlled junction crossing with Chester Road to the east. It is important to note that this junction modelling has been undertaken in isolation and cannot account for junctions either side of the access on Comberton Road , the A451/ A448 Roundabout and Chester Road / Comberton Road signalised crossroads, which may have an impact of the efficient movement of traffic once passed the access junction.

#### 3.1 2016 base results

Table 3-1 shows the 2016 base junction capacity results for the Comberton Road / Station Access Lea Street staggered crossroads, for the 0700-0800 and 0800-0900 peak periods.

Table 3-1: 2016 base junction capacity results

Arm	0700-0800			0800-0900			1700-1800		
	RFC	Delay	Queue	RFC	Delay	Queue	RFC	Delay	Queue
Comberton Road east	0.00	0.0	0	0.00	0.0	0	0.00	0.0	0
Station Access, left	0.30	8.4	0	0.31	10.4	0	0.41	11.9	1
Station Access, right	0.13	15.2	0	0.19	19.8	0	0.20	19.9	0
Comberton Road west	0.61	14.0	2	0.33	10.1	1	0.23	8.8	0
Lea Street	0.17	10.3	0	0.45	17.8	1	0.37	18.9	1

Note: RFC is the ratio of flow to capacity, Delay is the delay per vehicle in seconds, Queue is the mean maximum queue in PCUs

The junction is shown to be operating within capacity in the 2016 base during the two AM peak periods.

Table 3-2 shows a comparison between the 2016 modelling results queues and the surveyed queues. Whilst the queues are not an exact match, it shows that the modelled queues are of a similar magnitude to the surveyed queues.

Once again, it should be noted that this junction is considered in isolation and therefore does not account for other potential congestion points which may result in queuing either side of the access onto Comberton Road.

Table 3-2: 2016 base junction validation

Arm	0700-0800		0800-0900		1700-1800	
	Survey queue	Model queue	Survey queue	Model queue	Survey queue	Model queue
Comberton road east	0	0	1	0	2	0
Station Access, left	0	0	1	0	2	1
Station Access, right	0	2	0	0	0	0
Comberton road west	0	0	0	1	0	0
Lea Street	0	0	1	1	0	1

### 3.2 2036 base results

Table 3-3 shows the 2036 base junction capacity results for the Comberton Road / Station Access Lea Street staggered crossroads, for the 0700-0800 and 0800-0900.

Table 3-3: 2036 base junction capacity results

Arm	0700-0800			0800-0900		
	RFC	Delay	Queue	RFC	Delay	Queue
Comberton Road east	0.00	0.0	0	0.00	0.0	0
Station Access, left	0.36	9.5	1	0.39	12.8	1
Station Access, right	0.18	18.8	0	0.27	27.7	0
Comberton Road west	0.76	21.0	3	0.41	11.4	1
Lea Street	0.21	11.6	0	0.58	25.7	1

As with the 2016 base results, the access junction is anticipated to operate within capacity in the 2036 base scenario.

### 3.3 2036 base plus 300 car park development results

Table 3-4 shows the shows the 2036 base plus car park development for junction capacity results for the Comberton Road / Station Access Lea Street staggered crossroads.

Table 3-4: 2036 base + development (growth constrained) junction capacity results (300 spaces)

Arm	0700-0800			0800-0900		
	RFC	Delay	Queue	RFC	Delay	Queue
Comberton Road east	0.00	0.0	0	0.00	0.0	0
Station Access, left	0.36	9.6	1	0.39	13.2	1
Station Access, right	0.20	21.7	0	0.30	32.8	0
Comberton Road west	0.96	54.0	6	0.59	15.2	2
Lea Street	0.20	11.5	0	0.58	26.6	1

The results in the table show that the Comberton Road access junction is predicted to operate over capacity following the demand associated with the additional 300 car park spaces. The results identify an anticipated delay of 54 seconds for drivers at the access and a queue length of 33m on Comberton Road towards the west.

### 3.4 2036 base plus 125 car park development results

Table 3-5 shows the 2036 base plus car park development with 125 space demand junction capacity results for the Comberton Road / Station Access Lea Street staggered crossroads.

Table 3-5: 2036 base + development with Blakedown sensitivity (growth constrained) junction capacity results

Arm	0700-0800			0800-0900		
	RFC	Delay	Queue	RFC	Delay	Queue
Comberton Road east	0.00	0.0	0	0.00	0.0	0
Station Access, left	0.36	9.5	1	0.39	12.9	1
Station Access, right	0.18	18.9	0	0.27	28.5	0
Comberton Road west	0.77	21.6	3	0.45	11.9	1
Lea Street	0.20	11.4	0	0.58	25.8	1

The results in the table show that the Comberton Road access junction is predicted to operate within capacity following the demand associated with the additional 125 car park spaces

### 3.5 Junction capacity summary

The Comberton Road / Station Access / Lea Street staggered crossroads has been modelled for the 2016 base, 2036 base and 2036 base plus development scenarios.

The junction operates within capacity in the 2016 base scenario and validates to 2016 queue data. The junction is predicted to operate within capacity in the 2036 base scenario.

However, the traffic modelling demonstrates that following the inclusion of the additional trips from the additional 300 space car park, the access junction is predicted to operate over capacity. The results identify an anticipated delay of 54 seconds for drivers at the access and a queue length of 33m on Comberton Road towards the west.

The results in the show that the Comberton Road access junction is predicted to operate within capacity following the demand associated with the additional 125 car park spaces.

## **4. Link capacity**

When undertaking a standalone work using manual assessment approach, a starting point to determine the capacity of a road is through the use of Design Manual for Roads and Bridges (DMRB), TA79/99.

Road capacity is defined by certain criteria such as geometrical features, number of lanes, speed, number of accesses/ junctions, crossings and the environment/setting on the road. For example, a rural 'A' road has a different capacity compared to an 'A' road that goes through a Town Centre or that within an urban setting, despite both being classified as 'A' roads.

In accordance with the national guidance, Comberton Road is an Urban All Purpose (UAP); a high street carrying predominately local traffic with frontage activity including loading and unloading. The approximate width of the carriageway in this location is 7.3m (based on the width options presented in this table), resulting in a 'one-way' hourly link capacity of approximately 1140 vehicles.

When considering a 2036 AM peak scenario, based on this analysis, the highest predicated flows are 903 vehicles. This is approximately 79% of the 1140 vehicle capacity for the link.

## 5. Wyre Forest Transport Evidence

A transport evidence base has been prepared to support the revised Wyre Forest Local Plan, 2016-2036 with a total of 5,581 dwellings and 40.71ha of employment land.

The Wyre Forest Transport Model (WFTM) has been used to provide the technical development for the schemes which have been included in the Wyre Forest Infrastructure Delivery Plan. This modelling is presented in Wyre Forest Local Plan Review, Transport Evidence, June 2019.

This modelling does not include the allocation of any additional car parking spaces at Kidderminster Mainline Railway Station. It is worth noting that this piece of work is an entirely separate to this report.

Some key data has been extracted from the Wyre Forest Local Plan Review, Transport Evidence, June 2019. The figure below shows the traffic volume to capacity ratio on the Kidderminster road network in the 2036 AM peak period.

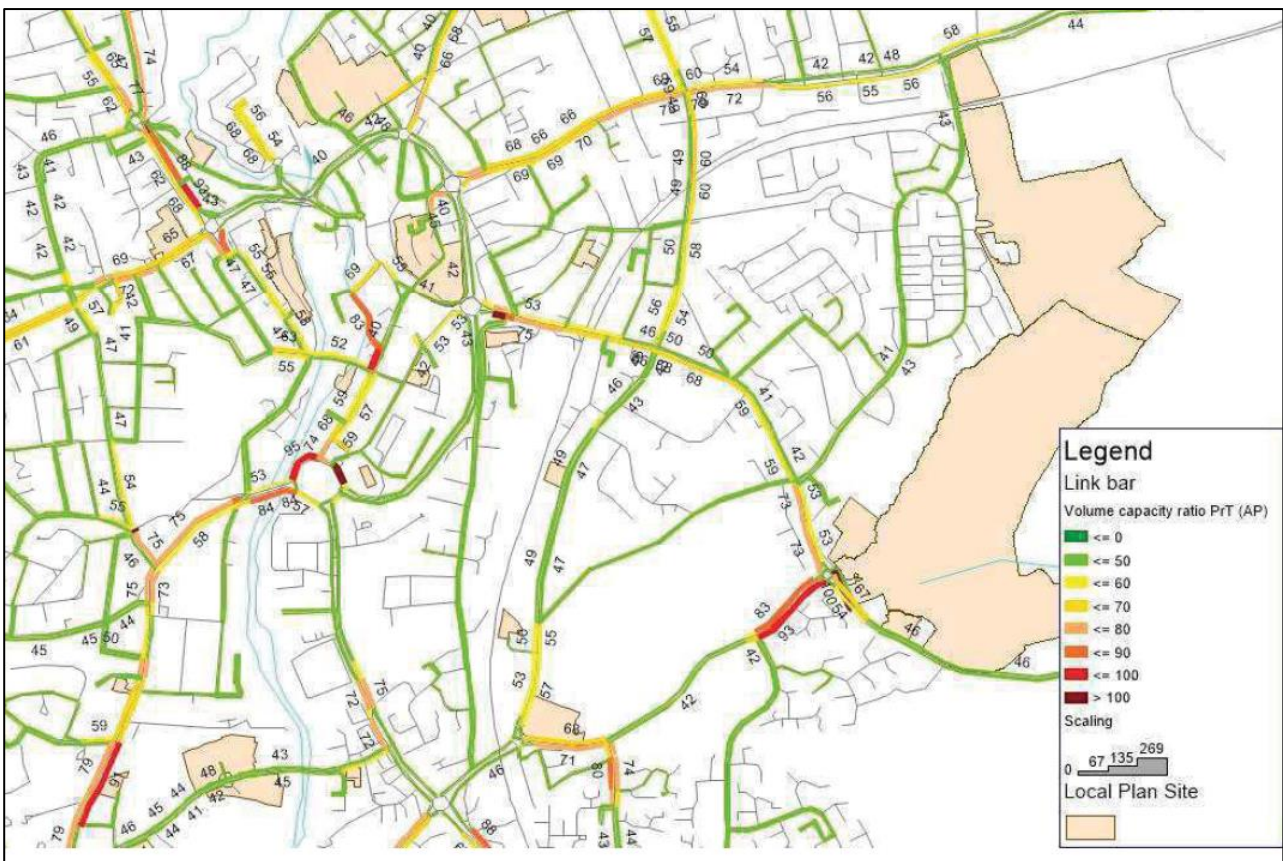


Figure 2: AM 2036 Link Volume to Capacity Ratio Wyre Forest Local Plan Review, Transport Evidence, June 2019

The output in figure 2 shows that the 'volume to capacity' ratio on Comberton Road adjacent to the station access is below 80%. Close to the A451/ Ringway Roundabout the capacity of Comberton Road exceeds 100% during the AM peak.

The output in figure 3 below shows traffic volume to capacity ratio on the Kidderminster road network in the 2036 PM peak period.

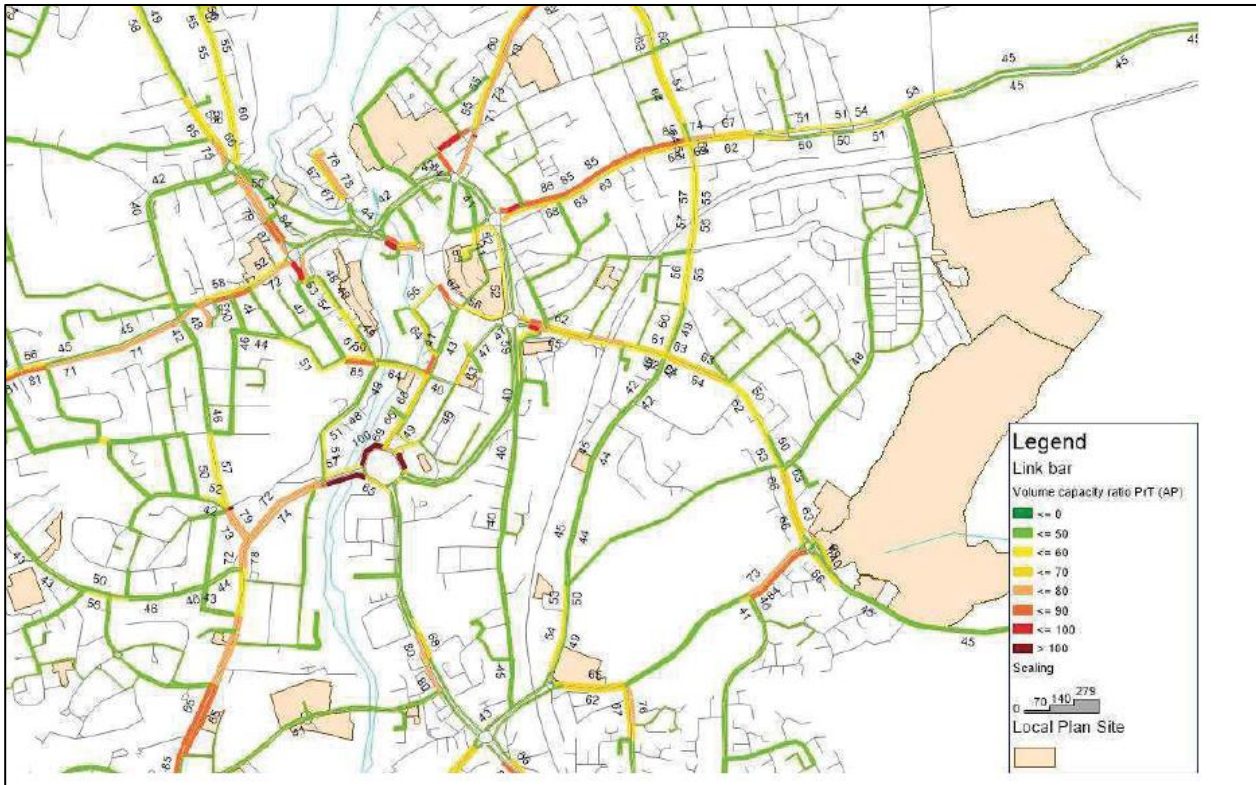


Figure 3: PM 2036 Link Volume to Capacity Ratio Wyre Forest Local Plan Review, Transport Evidence, June 2019

The output in figure 3 shows the 'volume to capacity' ratio on Comberton Road adjacent to the station access is above 80%, but below 90%.



The output in figure 4 below shows the queuing traffic on the Kidderminster road network in the 2036 AM peak period.

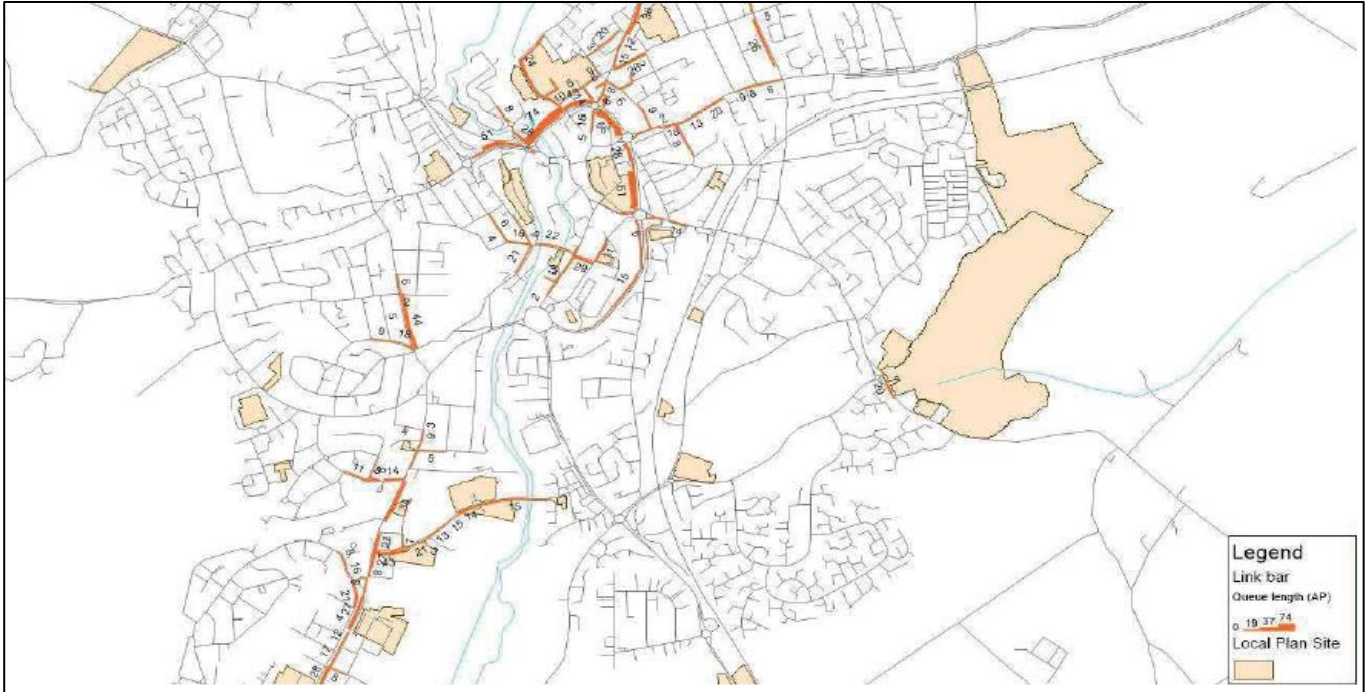


Figure 4: AM 2036 Queuing Wyre Forest Local Plan Review, Transport Evidence, June 2019

The output in figure 4 demonstrates a rolling queue on Comberton Road extended up to the Station access.

The output in figure 5 below shows the queuing traffic on the Kidderminster road network in the 2036 PM peak period.

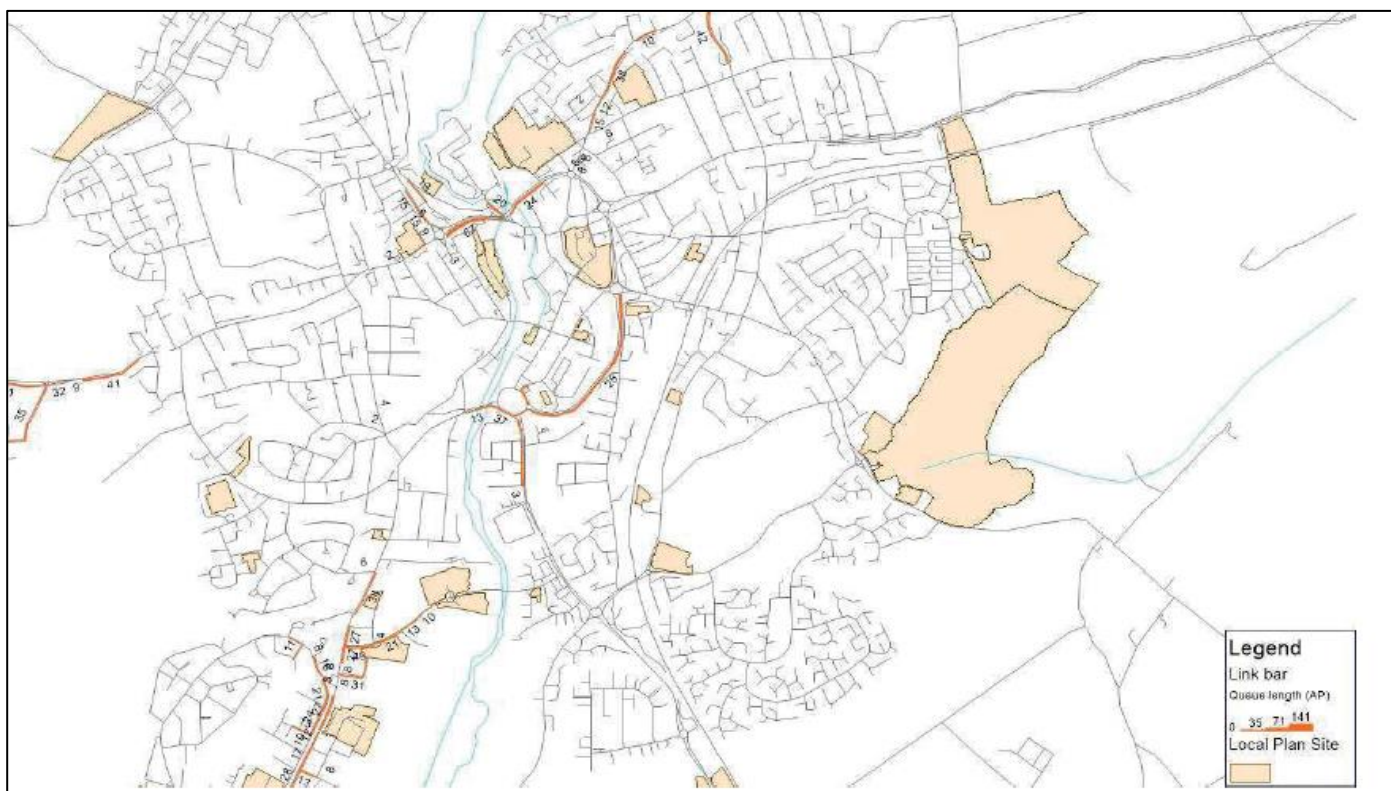


Figure 5: PM 2036 Queuing Wyre Forest Local Plan Review, Transport Evidence, June 2019

The output in figure 5 does not demonstrate such rolling queuing on Comberton Road as seen during the AM peak during the PM peak. The output in figure 6 below shows the average delays at junctions on the Kidderminster road network in the 2036 AM peak period.

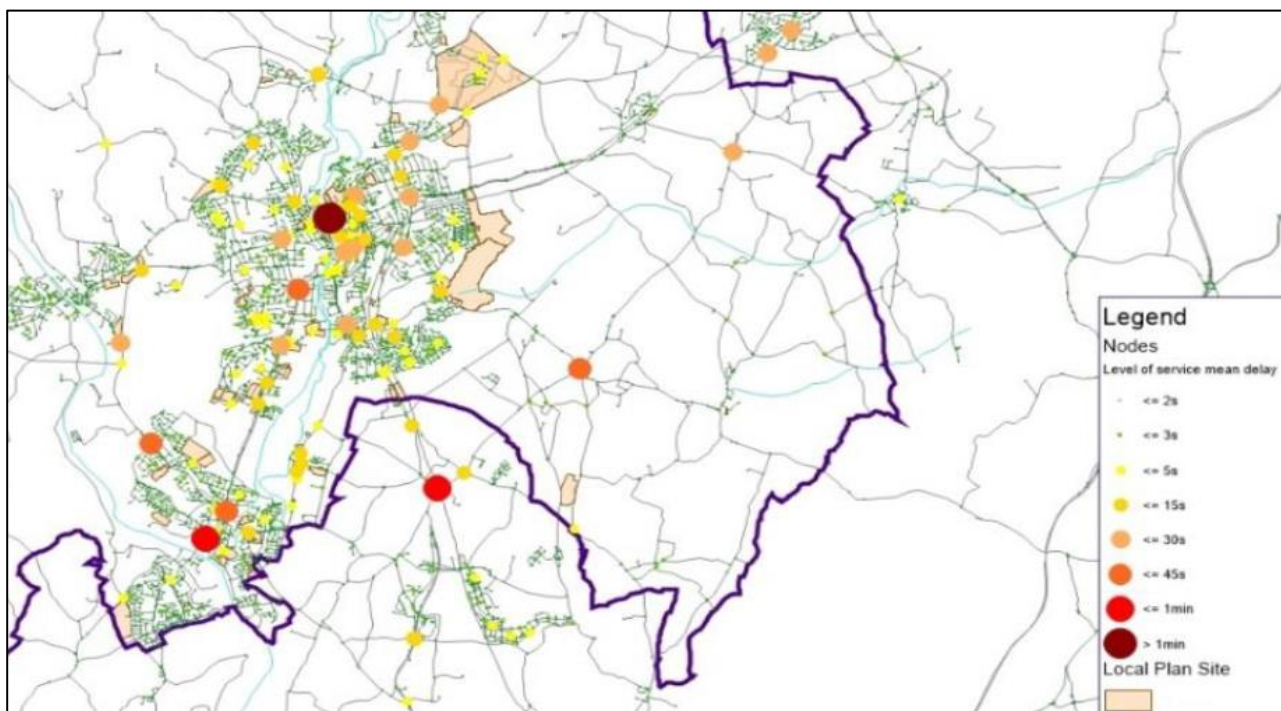
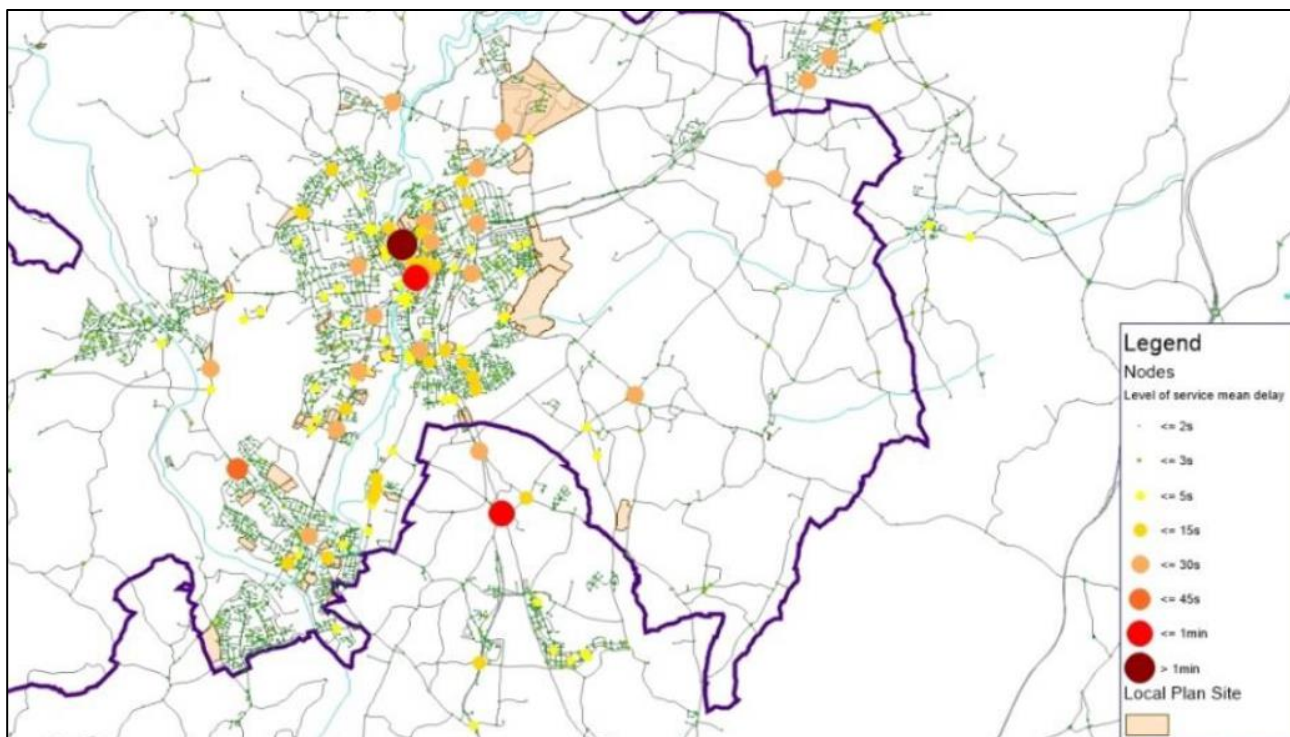


Figure 6: PM 2036 Queuing Wyre Forest Local Plan Review, Transport Evidence, June 2019

The figure below shows the average delays at junctions on the Kidderminster road network in the 2036 PM peak period.



The previous two figures show that in both the AM and PM peak hours, most junctions along Kidderminster Ring Road, town centre, on the A449 between A442 Worcester Road and A451 Stourbridge Road will experience delays in excess of 30s/vehicle at the junctions.

There queuing of less than 30 seconds on junctions on Comberton Road either side of the station access junction.

## 6. Summary

A capacity assessment has been undertaken to determine the existing performance and impact of an additional 300 car parking spaces being introduced at the Kidderminster mainline railway station. The capacity of the Comberton Road / Station Access / Lea Street junction has been considered, along with the capacity of the Comberton Road link. A summary of the key findings are detailed below: -

- The access junction is shown to be operating within capacity in the 2016 base during the two AM peak periods;
- As with the 2016 base results, the access junction is anticipated to operate within capacity in the 2036 base scenario. Note the junction is approaching 76% capacity;
- The results show that the Comberton Road access junction is predicted to operate over capacity with the demand associated with the additional 300 car park spaces. The results identify an anticipated delay of 54 seconds for drivers at the access and a queue length of 33m on Comberton Road towards the west.;
- The results in the show that the Comberton Road access junction is predicted to operate within capacity following the demand associated with the additional 125 car park spaces
- When considering a 2036 AM peak scenario, based on this analysis, the highest predicated flows are 903 vehicles. This is approximately 79% of the 1140 vehicle capacity for Comberton Road;
- The strategic modelling shows the volume to capacity ratio on Comberton Road adjacent to the station access is below 80%. Close to the A451/ Ringway Roundabout the capacity of Comberton Road exceeds 100% during the AM peak. (this is without the 300 additional spaces);
- The 2036 strategic modelling demonstrates a rolling queue on Comberton Road up to the Station access during the AM peak (this is without any additional spaces); and,
- The strategic modelling demonstrates that in 2036 in both the AM and PM peak hours, most junctions along Kidderminster Ring Road, town centre, on the A449 between A442 Worcester Road and A451 Stourbridge Road will experience delays in excess of 30s/vehicle at the junctions. There queuing of less than 30 seconds on junctions on Comberton Road either side of the station access junction.

The access junction modelling outputs indicate that following the additional demand associated with 300 car park spaces the junction is anticipated to operate over capacity and result in queueing and delays.

The results show that the Comberton Road access junction is predicted to operate within capacity following the demand associated with the additional 125 car park spaces

The analysis demonstrates the care and attention that is required to maintain traffic flow and safety

