

# SDC Site Allocations Plan Housing Assessment Stratford upon Avon Capacity Assessment

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VM215331.TN001

## Introduction

1. This Technical Note has been produced by Vectos Microsim (VM) in response to a request from Stratford District Council (SDC), and Warwickshire County Council (WCC) to identify the impact associated with the delivery of a range of potential residential sites identified in SDC's Site Allocations Plan (SAP).
2. Testing is required to understand what the implications are of delivering the SAP sites on the transport network. The delivery of the SAP sites may be necessary to bridge any shortfall in the allocated housing delivery rates within the Stratford District, post adoption of the Core Strategy. As such, this assessment considers the cumulative effect of these sites alongside assumptions pertaining to the developments identified within the existing Core Strategy that are not yet permitted.
3. This Note documents the approach followed, development and model scenario assumptions and outputs identified therefrom.

## Background

4. VM has previously undertaken a detailed assessment of the SDC Reserve Sites<sup>1</sup> which, subject to the completions rate, may come forward in addition to the Core Strategy allocation. Modelling work and associated reporting was completed for an assessment of the implications of delivering a range of the Reserve Sites within both Stratford upon Avon and Southam.
5. This study work identified the quantum and locations of Reserve Site development that could be delivered, and the associated network mitigation, above that which was identified through the previous Core Strategy work that would be required to maintain an acceptable level of network operation.
6. In addition to this, VM has also undertaken additional modelling assessments on behalf of SDC, which reviewed the impact associated with different development assumptions in the area to the south of Stratford upon Avon<sup>2</sup>. This assessment was specifically focused on the impact on the Clopton Bridge and the level of development that could be delivered (in Reference Case conditions) before the previously identified cap at this location was met.
7. This updated assessment is now required to consider the cumulative effect of the SAP sites being proposed by SDC, whereby such additional developments are assessed on top of the Core Strategy allocations.
8. The assessment follows the same format as the previous Reserve Sites testing, with the intention being to identify the cumulative impact on the relevant model networks of delivering these sites alongside existing development proposals.

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<sup>1</sup> VM185174.TN002.SDC\_Reserve Sites\_Stratford upon Avon Assessment (April 2019)

<sup>2</sup> VM205280.TN001\_Additional Reserve Sites Assessment (September 2020)

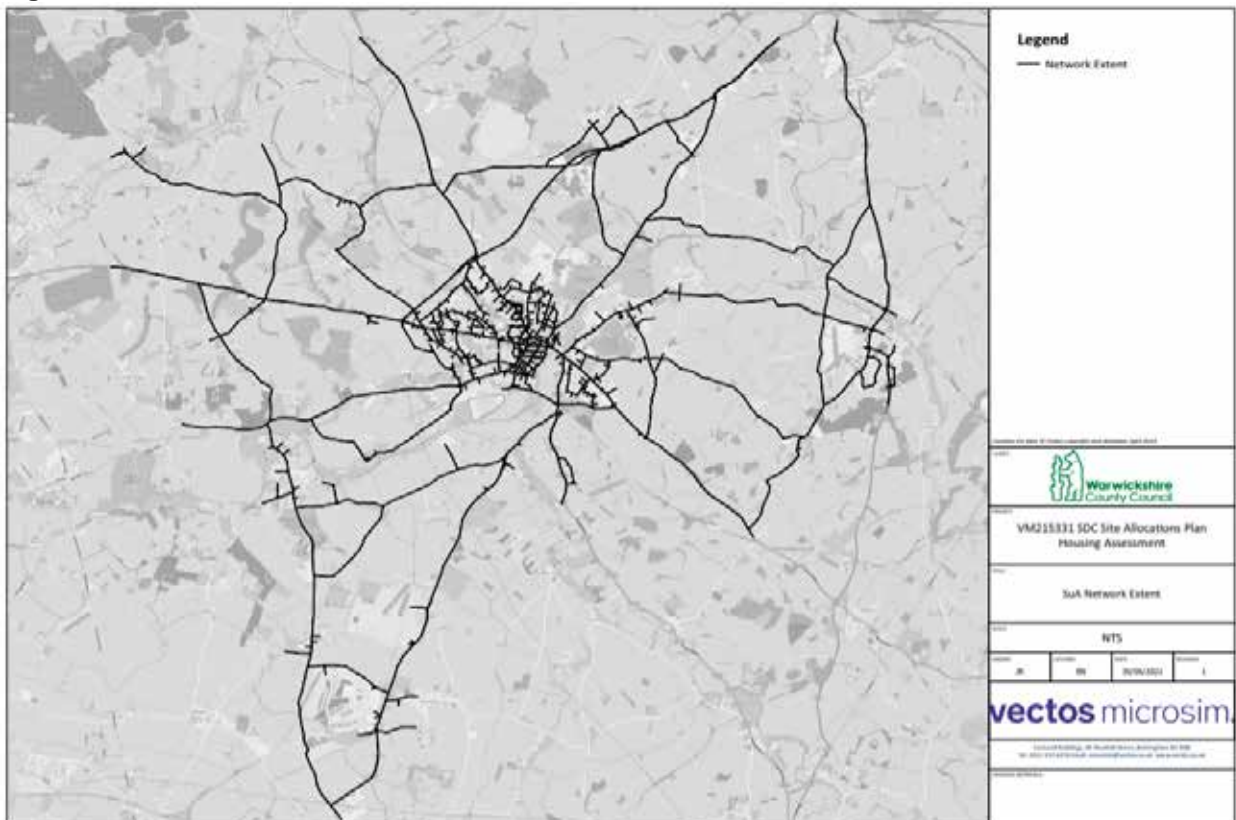
## Objectives

9. Through discussions between WCC and SDC, VM has identified the core objective of assessing the SAP sites within the Stratford-upon-Avon Wide Area (SuAWA) model, based on a scenario representative of the point prior to the delivery of the SWRR (and associated dependant development), and to provide commentary on the network operation prior to the full Core Strategy allocation being delivered, as well as to identify any additional highway measures which may be required in the interim.
10. The SuAWA 2031 Core Strategy model will be revised to account for the identified level of development at the Long Marston Airfield site prior to the requirement for the South Western Relief Road. Based upon previous assessment work undertaken by VM this has been identified as 750 dwellings south of the River Avon, of which SDC proposes 500 dwellings at LMA (in addition to the already committed 400 dwellings).

## Updated Core Strategy Model

11. This stage of the assessment focuses on the impacts of delivering the identified SAP sites that lie within or close to Stratford upon Avon. Accordingly, the Stratford upon Avon Wide Area (SuAWA) model has been utilised. The extent of this model network is demonstrated within **Figure 1**.

**Figure 1 SuAWA Model Network**



12. VM understands that in terms of assessing the impact of the SAP sites on the Stratford upon Avon network, there is now a requirement to assess conditions in a revised Core Strategy scenario whereby the delivery of the SWRR is delayed and there may be a need to bring forward housing sites to maintain the necessary supply of dwellings in the District.
13. A cap on development to the south of Stratford of up to 750 dwellings<sup>3</sup> (above the LMA 400 committed) has been previously identified, in advance of the SWRR being delivered. On this basis, the existing 2031 Core Strategy model scenario has been adjusted to reduce the number of dwellings at LMA to meet this cap, whilst also removing the SWRR from the model. This has formed the 'Interim Core Strategy' scenario.
14. In addition to this, schemes previously included within the 2031 Core Strategy model, directly related to the delivery of 3,100 dwellings at LMA have been removed, on the basis that they would not be delivered in any scenario without the SWRR/full build out of the LMA site. Accordingly the coding of the following junctions has been updated within the Core Strategy model:
- A46/Wildmoor Junction – coding reverted to match SuA2<sup>4</sup> approved scheme
  - A46/Bishopton Island Junction – coding reverted to match SuA2 approved scheme
  - A46/Marraway – coding reverted to reflect current junction arrangement
15. The resultant development inclusions within this updated Core Strategy model (over and above the committed inclusions in the Reference Case model) are:
- Stratford Regeneration Zone (SRZ) – 1,000 dwellings and 9,000m<sup>2</sup> B1 employment
  - Atherstone Airfield – 40,000m<sup>2</sup> B1/B2/B8 employment
  - Long Marston Airfield – 500 dwellings (in addition to committed 400 dwellings)
  - Land East of Shipston Road – 210 dwellings
- \* Long Marston Airfield (500 dwellings), Land East of Shipston Road (210 dwellings) and the Quinton area (40 dwellings) included to reflect the number of dwellings to be delivered to the south of Stratford-upon-Avon according to SDC's Site Allocations Plan Preferred Options, October 2020*
16. Further to this the Evesham Road/Evesham Place scheme (conversion of the existing roundabout into traffic signals) has been included within the updated Core Strategy model, in addition to any committed schemes included within the Reference Case, as it was originally identified as part of the Stratford Transport Package and is necessary to manage queueing in the area once all development assumptions have been added to the model.
17. The SAP sites have then been added to this model, the model performance reviewed, and the network conditions reported, against both the updated 2031 Core Strategy scenario and the 2031 Reference Case conditions, to establish the overall effect of the proposals.
18. The SAP sites within and close to Stratford upon Avon have been explicitly modelled, and are detailed in **Table 1**. WCC advised on the appropriate trip rates to assign to each site, which are documented in further detail in **Appendix A**. The trips generated by each site have been distributed using the WCC mobile network database (MND). The MND has been interrogated, with a distribution being derived dependant on the LSOA (Lower Super Output Area) and/or MSOA that each of the proposed site lie within.

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<sup>3</sup> SDC proposes that 500 of these dwellings will be delivered at the LMA site, with a further 250 at other sites south of the River Avon.

<sup>4</sup> Employment allocation to the south of Alcester Road

19. Each of the sites have been coded into the updated 2031 Core Strategy model, with access arrangements included to ensure that all traffic leaving each site accesses the wider highway network.

**Table 1 Stratford upon Avon Area SAP Sites Included within Modelling**

SAP Site	Dwellings Assumed	Trip Rates Assigned
North of Evesham Road	90	STA Resi
East of Shipston Road*	210	Land East of Shipston Road
South of Sid Courtney Road, Tiddington	25	STA Resi
East of Back Lane (north), Lower Quinton	10	South of SuA
East of Back Lane (north), Lower Quinton	15	South of SuA
West of Goose Lane, Lower Quinton	25	South of SuA
East of Goose Lane, Lower Quinton	30	South of SuA
East of Hunt Hall Lane (north), Welford-on-Avon	15	STA Resi
East of Hunt Hall Lane (south), Welford-on-Avon	30	STA Resi
North of Millers Close, Welford-on-Avon	10	STA Resi
East of Long Marston Road, Long Marston	10	STA Resi
North of Barley Fields, Long Marston	15	STA Resi
East of Rumer Close, Long Marston	20	STA Resi
West of Campden Road, Clifford Chambers	5	South of SuA
East of Campden Road (north), Clifford Chambers	10	South of SuA
East of Campden Road (south), Clifford Chambers	15	South of SuA
East of The Nashes, Clifford Chambers	25	South of SuA
East of Warwick Road, Wellesbourne	25	STA Resi
East of Mountford Close, Wellesbourne	65	STA Resi
East of Kineton Road, Wellesbourne	250	STA Resi
Adjacent Long Marston Depot (Meon Vale)	90	Long Marston Depot
North of Walton Road, Wellesbourne	15	STA Resi
Long Marston Airfield Phase 1b*	500	Airfield House Trip Rates

\*these dwellings have been included within the Updated Core Strategy model to reflect the number of dwellings that could be included to the South of SuA before the previously identified cap is met.

20. Once the demands had been derived, and in line with Reserve Sites testing previously undertaken, a modal shift allowance was made for all SAP Sites of a 10% car reduction. The mode shift factor has been applied on the basis that site promoters will be tasked with achieving this target through the delivery process and, on that basis, was considered an appropriate assumption for this stage of testing. These adjustments have been applied only to the SAP Sites included within the modelling and are consistent with earlier phases of Core Strategy transport assessments.
21. No assumptions have been applied to account for the potential shift in background traffic in response to the delivery of enhancements to existing and provision of new sustainable transport services/measures. As a result, when assessed in the context of the overall demands assigned within the model, these adjustments affect less than 1% of the assigned demand totals within the model.
22. The cumulative hourly trip generation for the SAP sites demands is summarised in **Table 2**. Note, this does not include the demands for the Land East of Shipston Road and Long Marston Airfield Phase 1b sites, as these have been included within the 'Updated Core Strategy' model to make up the 750 dwellings to the South of Stratford that have previously been identified as deliverable prior to the need for the SWRR.

**Table 2 SAP Sites Net Trip Generation**

Hour	Total Trips	Periodic
0700-0800	264	882
0800-0900	391	
0900-1000	227	
1600-1700	303	1007
1700-1800	390	
1800-1900	314	

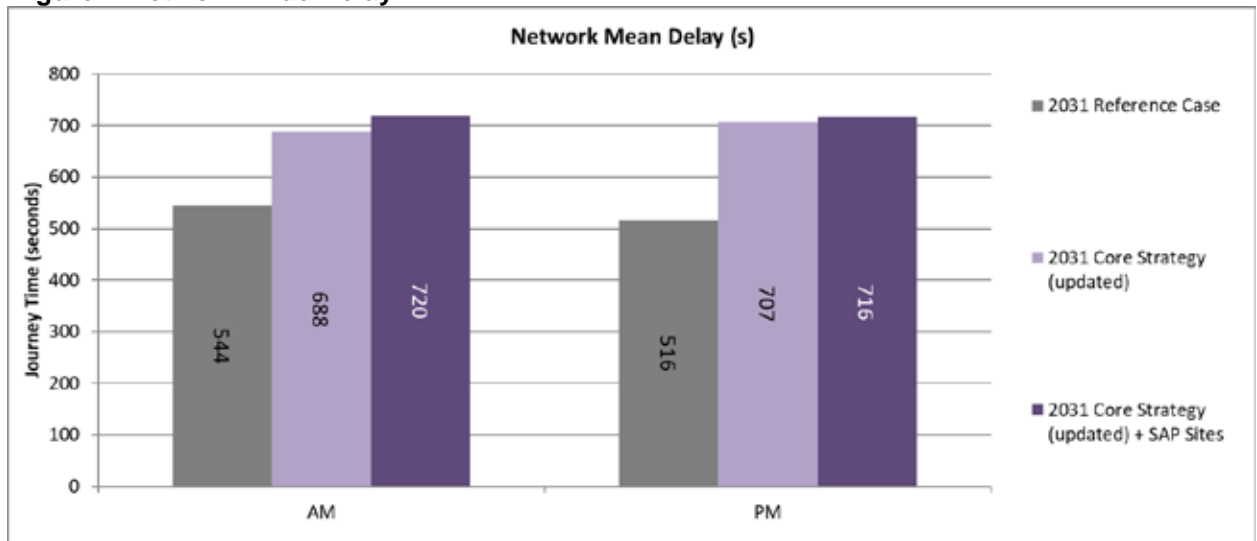
## Model Results Analysis

23. Based upon the above details, for this stage of the assessment, the following model scenarios have been created and reported upon:
- . 2031 SuA Reference Case
  - . 2031 SuA Updated Core Strategy model – *adjusted to remove SWRR and cap dwellings at LMA at 750 (in addition to the already committed 400)*
  - . 2031 SuA Core Strategy model + SAP Sites – *as per the scenario above plus the inclusion of the SAP sites*
24. Although the assessment focuses on the relative change against the Core Strategy scenario, the benchmark for acceptability has also considered the 2031 Reference Case conditions, on the basis that this scenario reflects committed development inclusions and therefore is indicative of anticipated network conditions prior to further development coming forward through either the existing Core Strategy or SAP.
25. By adding the Core Strategy development and infrastructure, this demonstrates how the network performs if the remaining allocations are delivered, whilst the SAP assessment demonstrates the incremental/additional impact specifically related to the SAP sites.

### Network Wide Delay

26. The initial analysis of the impact of including the SAP sites focuses on the network wide delay results, which are presented in **Figure 2**.
27. The network wide delay records the average journey time of every single vehicle in the model network, and therefore allows a comparison of the strategic level impacts in terms of additional delay incurred in each development scenario relative to the Reference Case and Core Strategy conditions.

**Figure 2 Network Wide Delay**



- 28. The results presented in **Figure 2** demonstrate that during the AM period average journey times increase by around 32 seconds with the inclusion of the SAP sites, over 2031 Core Strategy conditions, whilst average journey times increase by around 9 seconds when comparing the same scenarios in the PM period.
- 29. These results indicate that generally network wide conditions are predicted to worsen relative to the Core Strategy scenario with the inclusion of the SAP sites. However impacts appear less significant within the PM period relative to the AM period changes.
- 30. The results indicate a worsening of network conditions in both Core Strategy scenarios (ie. identified in para 22 above), tested relative to the Reference Case conditions.
- 31. A visual review of the model performance has indicated that this is largely due to the additional traffic within the town centre in the Core Strategy scenario, as a result of the delivery of the SRZ development, along with traffic to/from the Core Strategy south of the town routing through the town centre when travelling towards the A46/M40. The result of this is a worsening of network conditions across the town generally, along with the Birmingham Road corridor and A4390, Rother Street and Arden Street. These are impacts which it is expected would, to some extent, be reduced once the SWRR is delivered as this will provide relief to the town centre in the form of an additional means for development traffic to cross the river and avoid the town centre.
- 32. In order to ascertain the specific locations of impact, further analysis has been undertaken in the form of queue length assessments.

**Queue Impacts**

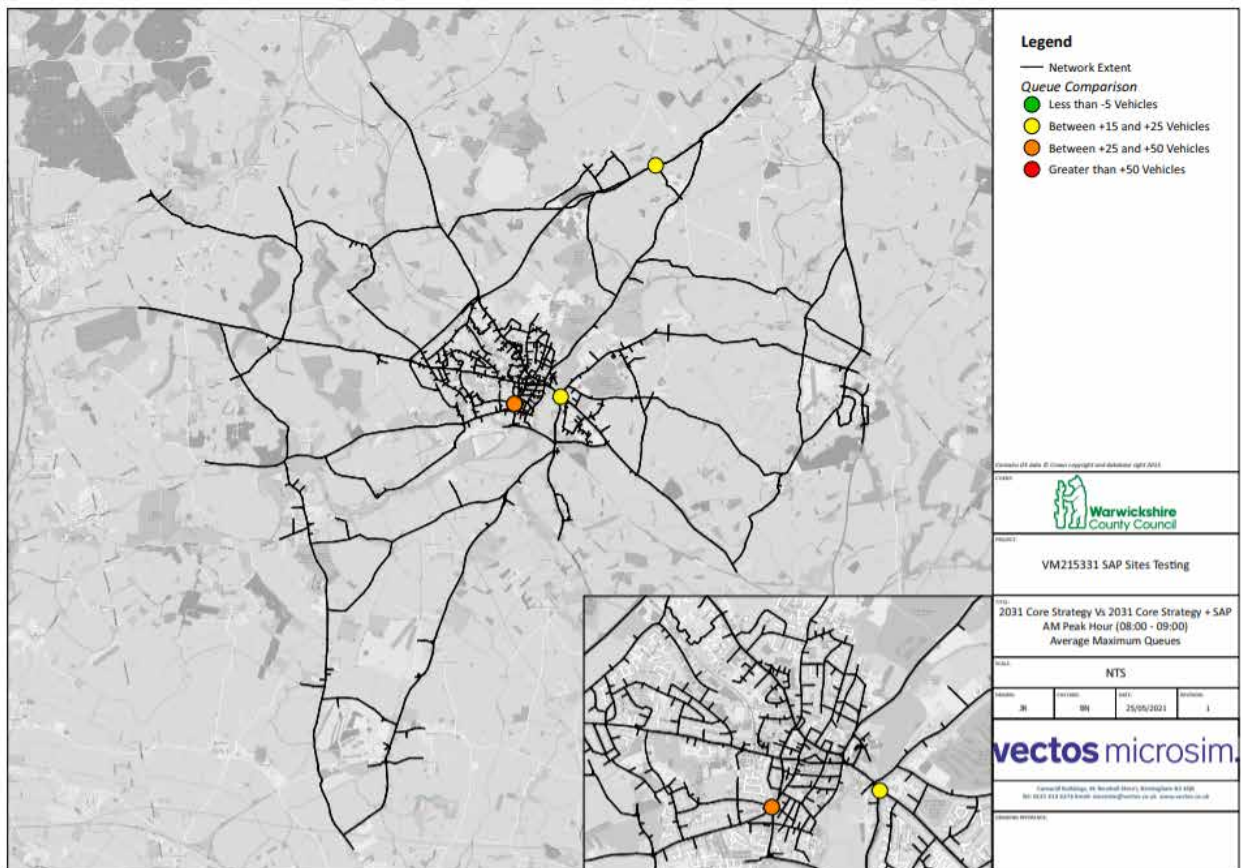
- 33. The queue analysis presents the changes in average hourly maximum queue lengths across each junction within the model, once the SAP sites are added to the 2031 Core Strategy network.
- 34. Junctions where queue differences have not been presented on the maps simply represent junctions that did not trigger any of the assessment criteria across any one approach.
- 35. The classifications for the queue length analysis within these plots are outlined as follows:



- **Queue Reduction** (a reduction in queue lengths of greater than 5 vehicles)
- **Moderate Increase** (an increase in queue lengths of between 10 and 25 vehicles)
- **Significant Increase** (an increase in queue lengths of between 25 and 50 vehicles)
- **Very Significant Increase** (an increase in queue length of over 50 vehicles)

36. The classifications detailed above are consistent with the approach adopted during the previous Core Strategy and subsequent Reserve Sites assessment stages. In each instance, the queue lengths have been compared against queue levels in the 2031 Core Strategy scenario for the AM and PM peak hours respectively.

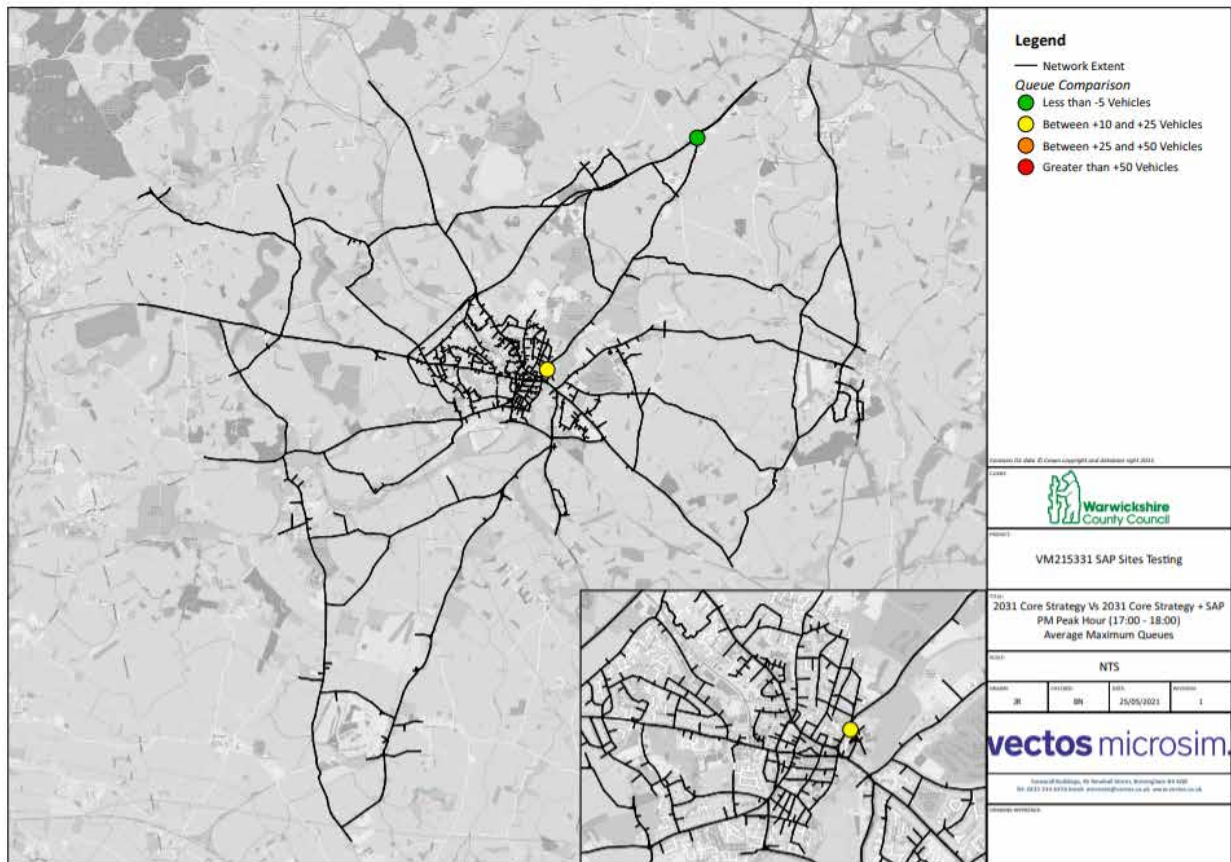
**Figure 3 - 2031 Core Strategy vs 2031 Core Strategy + SAP Sites (AM Peak Hour)**



37. The queue analysis presented within **Figure 3** demonstrates the impact of including the SAP sites within the 2031 Core Strategy model, during AM peak hour. The results indicate one instance of notable increases in queue lengths, predicted to occur on the Evesham Road northbound approach to the Evesham Place junction. The results also indicate two instances of more minor queue increases, at the Shipston Road/Banbury Road roundabout and on the A46 to the south of the Marrayway junction (Sand Barn Lane).

38. The queue increases at the Evesham Place junction are related to increases in traffic from SAP sites to the south of Stratford routing through this junction, along with traffic related to the Land North of Evesham Road site. The queue increases at the Shipston Road/Banbury Road roundabout are also linked to an increase in traffic now travelling north towards the town centre and the A46 from sites to the south of the town.

**Figure 4 - 2031 Core Strategy vs 2031 Core Strategy + SAP Sites (PM Peak Hour)**



39. The queue analysis presented within **Figure 4** demonstrates that with the inclusion of the SAP sites within the 2031 Core Strategy model, the PM peak hour results show only one instance of minor increases in queue lengths, on the northern arm of the Bridgefoot gyratory.
40. The queue impact results indicate that during this period, the SAP sites can be accommodated within the Core Strategy network, without any worsening of the network performance.

**Detailed Queue Assessment**

41. The analysis presented thus far has focused on the impact of including the SAP sites within the Core Strategy model, and reported this impact relative to Core Strategy (without SAP sites) conditions. These modelling outputs have indicated that any impacts are likely to be limited predominantly to the AM period, and focused around the Clopton Bridge and junctions immediately to the south, as well as the Evesham Road/Evesham Place junction (where the STP scheme<sup>5</sup> is currently included within the modelling). This impact is relatively localised, and in the case of the Clopton Bridge and nearby junctions, only minor in nature.
42. The results presented thus far do not provide an indication of the level of delay at the critical parts of the network to the south of Stratford town centre, relative to the Reference Case conditions. Upon a visual review of the model performance (both Core Strategy and Core Strategy + SAP sites), Shipston

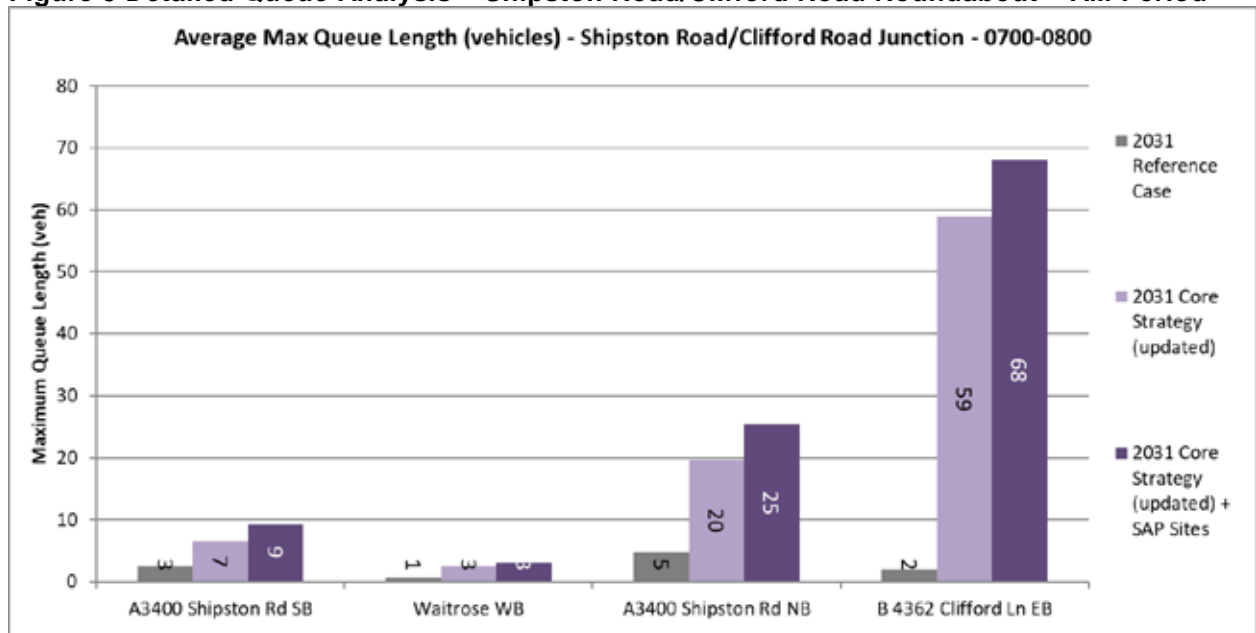
<sup>5</sup> Existing roundabout replaced by traffic signal scheme



Road and Clifford Lane approaches to the town centre (from the south of the town) are flagging as particularly congested in both scenarios, which is important in the context of the removal of the SWRR from the Core Strategy model.

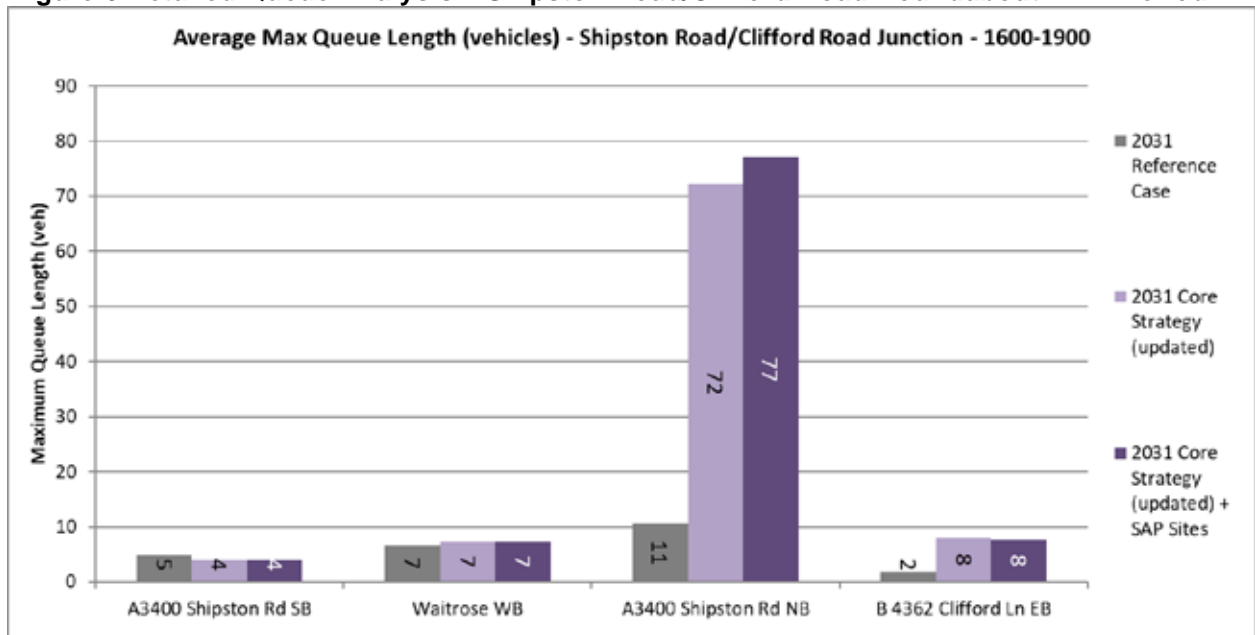
- 43. Accordingly, detailed hourly maximum queue length results for the Shipston Road/Clifford Lane roundabout have been presented, comparing the 2031 Reference Case conditions against the updated Core Strategy scenarios, on the basis that this junction appears to be most impacted upon when comparing Reference Case vs Core Strategy conditions.
- 44. The visual review of the model has indicated that this area of the network becomes particularly constrained in the Core Strategy scenarios, most notably in the AM period.

**Figure 5 Detailed Queue Analysis – Shipston Road/Clifford Road Roundabout – AM Period**



- 45. The queue results presented within **Figure 5** demonstrate the levels of queuing at the Shipston Road/Clifford Lane junction across the AM period. The results clearly indicate a significant worsening of queues on the Clifford Lane approach to the junction in the Core Strategy scenarios, when compared with the 2031 Reference Case.
- 46. The modelling suggests that the inclusion of Core Strategy sites and associated traffic growth, along with the removal of the SWRR, results in significant impacts at this junction, despite the cap on development of 750 dwellings to the south of Stratford.
- 47. The modelling indicates that the additional background traffic, along with development trips included at the Land East of Shipston Road and Atherstone Airfield site increases the Shipston Road south to north movement through the roundabout, which in turn restricts the gaps in traffic for vehicles from Clifford Lane to enter the junction. The result is that queues quickly form on this approach which quickly back up to the levels reflected in **Figure 5**.
- 48. It is notable that the introduction of the SAP sites only slightly worsens this reported level of queuing, suggesting that these additional sites do not have a particularly noticeable impact on the operation of this junction during the AM period.

**Figure 6 Detailed Queue Analysis – Shipston Road/Clifford Road Roundabout – PM Period**



49. The queue results presented within **Figure 6** provide an indication of the performance of the Shipston Road/Clifford Lane roundabout during the PM period, comparing the 2031 Reference Case with the two Core Strategy scenarios.
50. A significant queue increase is predicted to occur on the Shipston Road northbound approach during the PM period with the inclusion of the Core Strategy demands (inclusive of the 750 dwellings to the south of Stratford). The modelling predicts that this is only likely to get slightly worse once the SAP sites are included, with a 5 vehicle increase in the reported queue lengths.
51. Upon observation of the model performance it is apparent that this queue impact is a result of an increased number of right turning vehicles making the movement from Shipston Road to Clifford Lane, i.e. travelling from the direction of the town centre towards the LMA site. The model predicts that the majority of traffic returning to the LMA sites would be travelling through this junction towards the end of the PM peak hour.
52. Accordingly, the increase in flows through this junction is enough to reduce the gaps in traffic to a point whereby there is a severe impact on vehicles waiting to enter the roundabout from the Shipston Road NB approach. As previously reported, despite the fact that this impact looks severe, it is likely that driver behaviour changes in the form of earlier or delayed trip departure would have a significant impact in reducing these queue lengths, which only appear to form as there is a peak in the trips returning from the direction of the town centre towards the development areas south of the town.
53. If this profile of development trips was smoothed across the peak hour, it is likely that the queues recorded in this location could be reduced somewhat, however, given the volume of queues reported it is likely that further infrastructure, most likely in the form of part-signalisation, would be required alongside this to significantly reduce queues at this location.

**Clopton Bridge Capacity Analysis**

- 54. In line with the previous assessment stages, it is anticipated that one of the main barriers to the delivery of additional trips over and above the committed development allocations would be the capacity constraints at the Clopton Bridge. By 2031, the original capacity at the bridge was assumed to be met once 400 dwellings at LMA had been delivered (i.e. in the 2031 Reference Case scenario).
- 55. However, more recent assessments identified that, due to lower than originally predicted traffic growth, there may be additional capacity in excess of the previously identified cap. This has been documented in a separate study, which should be read in conjunction with this Note<sup>6</sup>.
- 56. That study concluded that there may be capacity for around an additional 400 trips across the AM and PM peak periods (0700-1000 and 1600-1900) above the level traffic assumed once 400 dwellings were delivered at LMA.
- 57. The following presents a review of the change in two-way traffic flows at the Clopton Bridge once the Core Strategy and SAP sites demands have been included within the models. The resultant AM and PM peak period flows are presented in **Table 3**.

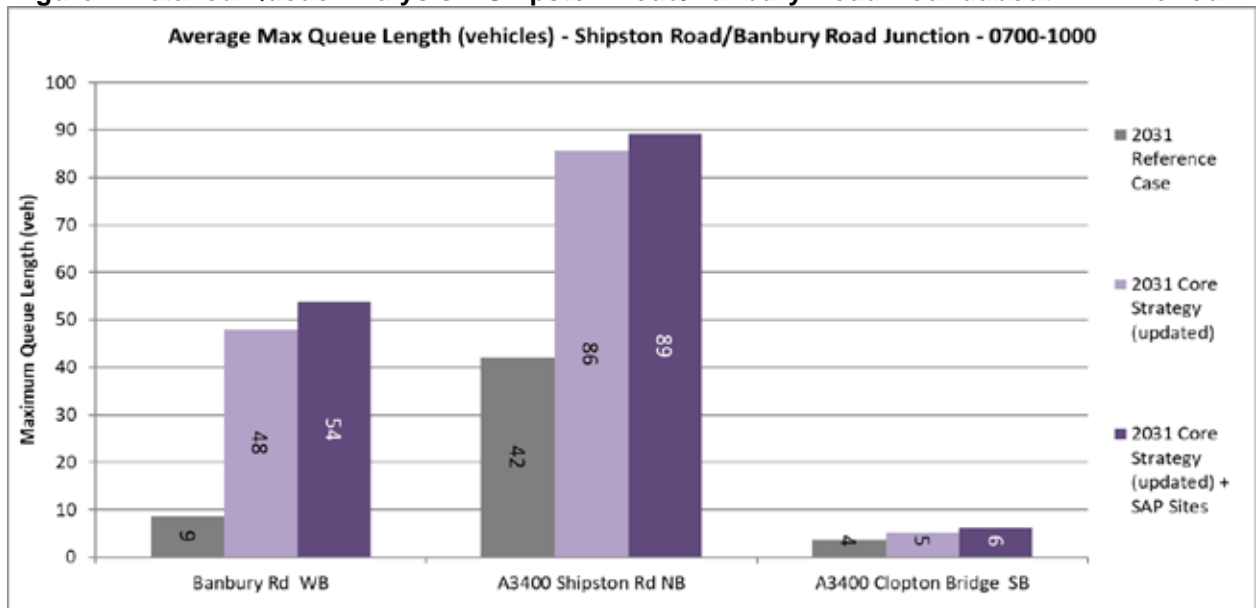
**Table 3 Clopton Bridge Two Way Flows**

	AM Peak Period (0700-1000)	PM Peak Period (1600-1900)
2031 Reference	5,526	5,897
2031 Updated Core Strategy	6,652	6,736
<b>Additional Trips</b>	<b>1,126</b>	<b>839</b>
2031 Updated Core Strategy + SAP Sites	6,743	6,795
<b>Additional Trips</b>	<b>1,217</b>	<b>898</b>

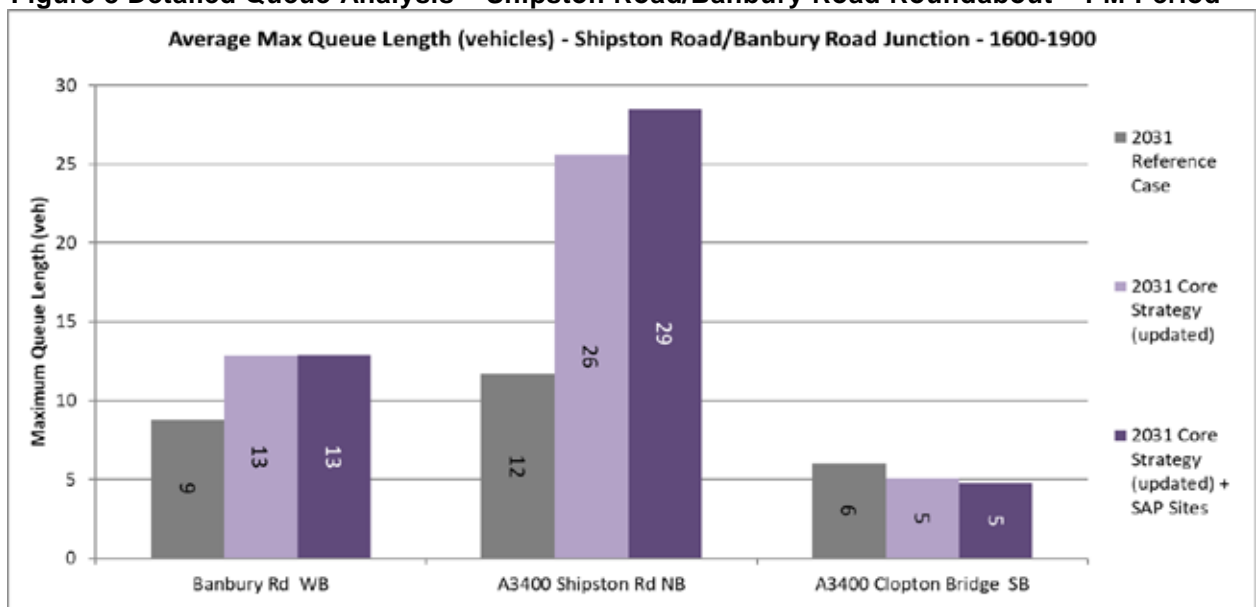
- 58. The analysis presented above demonstrates the difference in two way flows across Clopton Bridge between both Core Strategy scenarios tested and the Reference Case.
- 59. It is clear when comparing the Core Strategy and Core Strategy + SAP sites scenarios that the inclusion of the SAP sites within the models does not significantly increases flows across the bridge, with an additional 91 vehicles across the AM period, and 59 vehicles across the PM period.
- 60. However, the results clearly demonstrate that the inclusion of the Core Strategy demands results in a significant increase in trips across the bridge when compared with the Reference Case, with the previously identified capacity of an additional 400 trips likely to be exceeded in both the AM and PM period, both with and without the SAP sites included.
- 61. The modelling is clearly indicating that the level of development incorporated across the Core Strategy model, alongside the removal of the SWRR, will impact on the residual capacity of the Clopton Bridge area of the network.
- 62. This pattern is reflected in the queue results for the the Shipston Road/Banbury Road roundabout, whereby modelled queues are predicted to increase significantly compared to Reference Case conditions on both the Shipston Road NB and Banbury Road WB approaches to the roundabout. This impact is demonstrated within **Figure 7** and **Figure 8**

<sup>6</sup> VM185174.TN001.SDC\_Reserve Sites\_Data Review and Bridge Assessment

**Figure 7 Detailed Queue Analysis – Shipston Road/Banbury Road Roundabout – AM Period**



**Figure 8 Detailed Queue Analysis – Shipston Road/Banbury Road Roundabout – PM Period**



**Campden Road Capacity Analysis**

- 63. Further to the analysis presented thus far, it has been determined that a capacity assessment should be undertaken to determine whether the theoretical link capacity on Campden Road is likely to be exceeded following the inclusion of additional development to the south of Stratford along with the SAP sites. This is required given the large amount of development to be delivered off Campden Road and the capacity constraints on this route highlighted by WCC.

- 64. The WebTAG guidance available for link capacity assessments<sup>7</sup> has been interrogated and documents flows that typical roads can carry consistently within an hour. Based upon the criteria, Campden Road falls under the Rural Single Carriageway Road (Road Class 1) criteria.
- 65. For the purposes of this assessment all elements of the calculations have remained at default with the exception of the average carriageway width (set at 7.3 metres) and the proportion of HGV traffic, (based upon vehicle types OGV1, OGV2, and PSVs). The proportion of HGV traffic was set at 4.3%, based upon a review of observed MCC data on this route for the Shipston Road/Clifford Lane junction (data collected in 2017). The movements from/to Clifford Lane were analysed and a proportion of the total traffic made up of HGV trips calculated from the available 6 hourly (0700-1900) count data. For a road of this category (Road Class 1), with the criteria assigned, the WebTAG guidance states that the capacity when reviewing the busiest one-way flow during the peak hour would be 1316 vehicles. When considering this alongside modelled flows, a +/- 10% allowance should be made to account for a maximum level of tolerance related to the variation between model runs.
- 66. In order to assess whether Campden Road operates within theoretical capacity, the modelled flows have been extracted at two locations on Campden Road, one just to the north of Clifford Chambers, and a second to the south of Clifford Chambers. The link locations considered are presented within **Figure 9**, and the outputs have been extracted and reported in **Table 4** and **Table 5**. Analysis at these locations captures all flows on Campden Road generated by the development inclusions to the south of the town.

**Figure 9 Campden Road Link Analysis Locations**



<sup>7</sup> Webtag Unit 3.1 Appendix D Highway Assignment Modelling



67. The resultant modelled flows in this location, for each scenario, are presented in the following tables:

**Table 4 Campden Road (north of Clifford Chambers) Modelled Flows Capacity Assessment**

Scenario	AM Peak Hour Busiest One Way Flow	% Capacity Taken Up	PM Peak Hour Busiest One Way Flow	% Capacity Taken Up
2017 Base	672	51%	700	53%
2031 Reference	1,245	95%	1,047	80%
2031 Updated Core Strategy	1,492	113%	1,478	112%
2031 Updated Core Strategy + SAP sites	1,574	120%	1,524	115%

**Table 5 Campden Road (south of Clifford Chambers) Modelled Flows Capacity Assessment**

Scenario	AM Peak Hour Busiest One Way Flow	% Capacity Taken Up	PM Peak Hour Busiest One Way Flow	% Capacity Taken Up
2017 Base	501	38%	437	33%
2031 Reference	1,015	77%	785	60%
2031 Updated Core Strategy	1,228	93%	1,010	77%
2031 Updated Core Strategy + SAP sites	1,276	97%	1,048	79%

68. The flows presented in **Table 4** demonstrate an increase in flows on Campden Road (to the north of Clifford Chambers) within the Core Strategy models, to the point at which the flows exceed the theoretical capacity available. This is reported for both the AM and PM period.
69. It is notable that the flows are close to capacity in the Reference Case, and the relatively small increase in flows in this area in the Core Strategy scenario (approx. 250 vehicles) results in the capacity being exceeded. This is exacerbated in the Core Strategy + SAP scenario with a small increase in the number of trips over the Core Strategy scenario (approx. 80 additional trips).
70. The flows presented in **Table 5** however indicate that in both Core Strategy scenarios, the AM and PM peak hour flows are below the theoretical capacity of this link, suggesting that this part of Campden Road will continue to operate in a reasonable manner.
71. The previous Reserve Sites assessment work outlined that in reality, should the capacity of Campden Road be exceeded, a demand response in the form of a retiming of trips would likely occur, which would have the potential to result in a reduction in peak hour trips below the identified limit. This is applicable again in this case, albeit the identified flows are higher than previous assessment work, suggesting that a bigger shift in the trips would be required.

## Summary and Conclusions

### Summary

72. This Technical Note has been produced by Vectos Microsim (VM) in response to a request from Stratford District Council (SDC), and Warwickshire County Council (WCC) to assess the impacts, on the highway network, associated with the delivery of additional residential sites identified in SDC's Site Allocations Plan (SAP)

73. The testing is required to understand what the implications are of delivering such sites, which may be necessary to bridge any shortfall in the allocated housing delivery rates within the Stratford District, post adoption of the Core Strategy.
74. This Note focuses upon the additional analysis undertaken to ascertain the impacts on the highway network within Stratford upon Avon, which are likely to occur as a result of bringing forward the SAP development proposals.
75. The assessment has been based around an updated 2031 Core Strategy model scenario, whereby the SWRR has been removed from the model, and development to the south of Stratford capped at 750 dwellings. Accordingly, the following scenarios have been run and assessed:
- 2031 Reference Case
  - 2031 Updated Core Strategy
  - 2031 Updated Core Strategy + SAP Sites
76. Once these models had been developed, the model performance has been assessed in terms of the following assessment criteria:
- Network Wide Delay
  - Queue Length Analysis
  - Clopton Bridge Two-Way Flows
  - Campden Road Theoretical Capacity

## Conclusions

77. Based upon the scenarios and model outputs outlined above, the inclusion of the SAP sites within the Updated Core Strategy model has been assessed, and the impacts compared with both the Core Strategy and Reference Case conditions. The resultant analysis has identified the following:
- The SAP sites can be incorporated within the Core Strategy network without any notable worsening of the Core Strategy conditions. The modelling has indicated one instance of queue increases (Evesham Place junction) which is predicted to occur in the AM period, with the PM period flagging no notable impacts
  - Despite this, the analysis has indicated a significant worsening of network conditions in the Core Strategy model relative to the Reference Case, regardless of whether the SAP sites are delivered. The analysis has demonstrated significant worsening of queue conditions at the Shipston Road/Clifford Lane roundabout, and Shipston Road/Banbury Road roundabout, along with routes across the town centre.
  - In addition to this, the capacity analysis undertaken for Clopton Bridge and Campden Road suggests that at both locations, the identified capacity available is exceeded in both Core Strategy scenarios.
78. On the basis of the results presented within this Note it can be concluded that the inclusion of the SAP sites within the Core Strategy model are unlikely to elicit any notable impact or worsening of the network performance relative to the updated Core Strategy conditions.
79. However, it is important to note that the updated Core Strategy model, with the SWRR removed, demonstrates a number of residual congestion issues at key areas of constraint on the network, prior to the SAP sites being included. This differs from the conclusions drawn from the previous Reserve Sites assessment work, which was focused on the impact on the Clopton Bridge area of the model,

and reported the impacts of delivering each site in Reference Case conditions, or in a Core Strategy scenario inclusive of the SWRR.

80. The analysis clearly indicates that the delivery of all Core Strategy sites, without the SWRR, results in significant impacts on the network performance across the town centre and junctions to the south of Stratford. It is important to highlight at this stage, that this assessment has assumed that all Core Strategy proposals are delivered, and thus the impacts being reported should be considered robust.
81. The impacts being reported within this assessment are largely focused on the town centre, and as such if the SAP sites are to come forward in advance of the SWRR it is likely that contributions by developers towards town centre measures would be required. This is also likely to be applicable to some of the existing Core Strategy sites.
82. Previous assessment work has identified the SWRR and Stratford Transport Package cumulatively. If the delivery of the SWRR is delayed, then it should be recognised that further measures may be necessary to ensure that the development impacts can be successfully mitigated.
83. The identified areas of impacts are locations at which, when the SWRR is constructed, a reduced impact will occur. As such, care should be taken to ensure that further mitigation is not identified to specifically overcome the issues identified in this Note, if these schemes are likely to become redundant once the SWRR is delivered.