SDC Reserve Housing Sites Assessment

South of Stratford Capacity Assessment

September 2020

VM205280.TN001

Introduction

1. This Technical Note has been produced by Vectos Microsim (VM) in response to a request from Stratford District Council (SDC) to identify the impact associated with the delivery of different development assumptions in the area to the south of Stratford-upon- Avon.

2. The testing is required to understand what the implications are of different or new development strategies being considered alongside those already and being brought forward through the Core Strategy.

3. SDC has requested VM undertake additional analysis to ascertain the impacts on the highway network to the south of Stratford, which are likely to occur as a result of different strategies for bringing forward additional development proposals in advance of the SWRR.

4. This Note documents the approach followed, development and scenario assumptions and outputs identified therefrom.

Background

5. An earlier study undertaken by VM has identified that the previously predicted cap on development related to the capacity of Clopton Bridge and adjacent junctions may have headroom due to changes in traffic conditions since the last assessment was undertaken. This is because previously predicted growth levels appear not to have been realised (see the accompanying study provided within **Appendix A**.

6. Within the earlier study work, an assessment of the potential additional number of dwellings that could be delivered in the south of Stratford area was undertaken. VM undertook this assessment in the form of a manual exercise, assessing the likely trip distribution of sites in this area, and therefore how many trips that route across the bridge different development locations, and quanta, may generate.

7. This assessment predicted that on top of already committed trips on the network, in theory, an additional 750 dwellings could be delivered at Long Marston Airfield (LMA) before the identified additional capacity at the bridge was reached. Further to this, the assessment demonstrated that alternative development strategies could be delivered, with similar impacts arising from a combination of additional dwellings at Long Marston Airfield, along with sites in the Quinton area and sites directly to the south of Stratford (e.g. at sites off Banbury Road, Shipston Road etc.), before the capacity was exceeded.

8. Following on from these findings, it was determined that a modelling assessment was required, which included this level of additional development within the Stratford upon Avon Wide Area (SuAWA) Reference Case models, with a view to quantifying the impacts predicted to occur at the Clopton Bridge, and other key areas of constraint on the network within the south of Stratford area.

9. In order to undertake this assessment in an appropriate model scenario, discussions were held between SDC, WCC and VM, to determine the likely future year in which an additional 750 dwellings at LMA (in addition to the committed 400 dwellings) could be delivered. SDC advised that given the projected build out rate of the site, this would be around 2029[1].

10. On this basis, a 2029 Reference Case model has been developed as a benchmark for this assessment, using the latest trajectory information provided by SDC. The development of this model is detailed in the following section.

Reference Case Model Development

11. The testing documented within this Note has been undertaken within the Stratford upon Avon Wide Area (SuAWA) models, specifically an assessment year of 2029 has been considered.

12. The 2029 Reference Case model has been developed by VM, based upon the calibrated and validated 2017 SuAWA Base model, inclusive of all committed developments and infrastructure.

13. The committed development included has been informed via the interrogation of the SDC Housing Trajectory (2018-2019) whilst the committed infrastructure has been included following discussions with WCC.

14. The resultant development and infrastructure included within the 2029 Reference Case model are outlined within the following section.

Committed Development Sites

15. The resultant development included within the 2029 Reference Case models are outlined within the following tables:

[1] This is predicated on a return to pre-Covid build out rates

Table 1 Committed Development Details – Residential Sites

Name	2029 No. of Dwellings
A. Land east of Birmingham Road	70
B. Land between 256 And 346, Birmingham Rd	20
C. Stratford Cattle Market	87
D. Meon Vale, Long Marston Depot	502
E. Land west of Birmingham Road, Bishopton	38
F. Land to the West of Shottery	537
G Warwick House, Birmingham Road	82
H. Home Guard Club, Main Street, Tiddington	32
I. Land off Oak Road, Tiddington	60
J. Codex Sims Metal	380
K. Land to the North Of Bishopton Lane	500
L. Long Marston Airfield	400
M. Arden Heath Farm, Loxley Road	270
N. Milestone Road, off Banbury Road	85
O. Long Marston Storage Depot	110
P. Lower Quinton Sites	74
R. Land South of Alcester Road	52
T. Wellesbourne Distribution Centre	22
U. Ettington Road, Wellesbourne	350
V. Wellesbourne House	40
W. Birmingham Road Sites	48
Y. Banbury Road Business Park	10
Z. Long Marston Village Sites	53
AA. Welford on Avon Village Sites	5
AB. Canal Quarter Redevelopment	400
Total	**4227**

*Lower Quinton Sites consist of Land off Main Road (30 dwellings) and Land at the Corner of Main Road and Goose Lane (44 dwellings). Long Marston Village Sites consist of the Site off Welford Road (20 dwellings), The Willows Welford Road (15 dwellings) and Land to the Rear of Troon and Chestnut Cottage (18 dwellings)

Table 2 Committed Development Details – Employment Sites

Name	2029 Floor Space (Land Use)
Q. Atherstone Airfield	2,810m^2 (B2)
S. Woodyard Atherstone	2,050m^2 (B8)
T. Wellesbourne Distribution Centre	5451m^2 (B2) and 5451^2 (B8)

Table 3 Committed Development Details – Other Sites

Name	2029 Details
X (i). Land East of Shipston Road	56 parking space care home extension
X (ii). Land East of Shipston Road	75 bed care home

SuA.2 Employment Development, South of Alcester Road

16. The SuA.2 site had been granted permission in 2020. For the purposes of this modelling it is assumed that the site will be fully built out and occupied by 2029.

Committed Highway Infrastructure

17. Following the inclusion of the committed development sites outlined within **Table 1-3**, committed schemes within the study area were included within the model network. These schemes, are listed in **Table 4**:

Table 4 Committed Schemes Included Within Model

Scheme	2029 Inclusion
West of Shottery Relief Road	Y
Clopton Bridge Signals	Y
Shipston Road/Clifford Lane/Waitrose Roundabout	Y
Birmingham Road Improvement Scheme	Y
A46/Bishopton Roundabout (Bishopton Lane widening)	Y
Bishopton Lane Signalised Crossings	Y
Campden Road/Freshfields Nurseries Access	Y
A46/Billesley Crossroads	Y
A46/Bishopton Island (SuA2 scheme)	Y
A46/Wildmoor (SuA2 scheme)	Y

18. Note that neither the South Western Relief Road (SWRR), nor any of the Stratford Transport Package schemes are included within the model network.

Reference Case Model TEMPRO Adjustments

19. Following the inclusion of the committed development sites and infrastructure detailed, it was necessary to make adjustments to the growth forecasts and background demand matrices within the model, to ensure the predicted level of growth assumed was reflective of an updated growth figure for the 2029 scenario.

Internal Growth

20. The 2029 Reference Case demands were forecast via the inclusion of the updated committed development demands only, before being compared against adjusted TEMPRO growth figures, to ensure that the forecast level of growth in TEMPRO was matched or exceeded in this assessment. The growth factors derived for the SuAWA study area are set out below:

- 2017 – 2029 AM Growth – 11.9%
- 2017 – 2029 PM Growth – 12.4%

21. Following the review of growth levels, the background traffic matrix has been capped, to ensure that growth levels within the model do not exceed those predicted by the adjusted TEMPRO factors.

22. Accordingly, the following demands have been identified as necessary for removal from Matrix Level 1 to ensure the overall level of growth within the model does not exceed NTEM adjusted growth predictions.

Table 5 Matrix 1 Demand Adjustments

	0700-0800	0800-0900	0900-1000	1600-1700	1700-1800	1800-1900
2029 Growth to Adjust (%)	-11.46%	-12.55%	-13.57%	-10.65%	-12.86%	-12.70%
Revised 2029 Demands	10886	14142	9740	13937	14400	11625

External Growth

23. Additional to the adjusted growth factors derived from TEMPRO, it has also been necessary to forecast all 'external' trips within the network. This has involved factoring all external to external zone movements across the network by an external NTM factor.

24. The growth factor applied for the external trips was taken from the 'Stratford' zone within TEMPRO. This was undertaken on the basis that the Stratford zone would capture the growth in trips from the wider district, rather than focused upon the town centre, which would provide a more suitable factor to apply to external to external trips.

25. This would account for trips travelling through the model network from the wider Warwickshire area, and beyond, for example trips from the Jaguar Land Rover site at Gaydon. The 'Stratford' factor was adjusted to account for the total number of residential completions to be built out by the end of 2029, which was obtained from the SDC Housing Trajectory.

26. On this basis the external growth factors to be applied are as follow:

- External Growth Factor – 2029 AM Period - 17.4%
- External Growth Factor – 2029 PM Period - 18.1%

Peak Spreading

27. Following the capping of demands to match but not exceed TEMPRO growth predictions, peak spreading has been applied to the background matrix, using the same proportions as the original model forecasting exercise, (see original forecasting report for further details[2]). The peak spreading proportions applied are outlined in **Table 6.**

[2] VM175117.TN002 SuAWA Forecasting Note

Table 6 Peak Spreading Assumptions

Hour	AM	PM
Pre Peak	65.17%	47.26%
Peak	8.23%	26.14%
Post	26.60%	26.60%

28. The pattern of spreading across the entire period was only applied to residual internal background growth. It was not applied to committed development traffic within the model as those trip totals have been derived directly from agreed trip rates and the developments have been included within the model to match, as closely as possible, the relevant Transport Assessment or planning application.

29. Following the steps undertaken within this report, **Table 7** outlines the demands assigned to the 2029 Reference Case model.

Table 7 2029 Reference Model Demands

Matrix Level	0700-0800	0800-0900	0900-1000	1600-1700	1700-1800	1800-1900
M1 - Background	11555	13198	10001	14151	14065	11737
M2 - HGV	556	615	561	435	300	241
M3 - Com Dev	1742	2664	1740	2111	2643	2227
M4 – External Growth	672	562	390	689	684	565
M5 –SuA2 Cars/LGV	259	599	593	689	675	431
M6 – SuA2 HGVs	16	28	30	21	14	11
Total Demands	**14800**	**17666**	**13315**	**18096**	**18381**	**15212**
Periodic Growth from 2017 (%)	**13.28%**			**12.69%**		

Development Scenarios

30. The previously undertaken manual assessment of potential additional capacity at the Clopton Bridge identified that around 750 dwellings at the LMA site, or similar number for sites in the South of Stratford area, could be delivered before the bridge reached its theoretical capacity, and the need for the SWRR was apparent.

31. Accordingly, it was determined that this would form the basis for the scenario testing undertaken within this study, given that this scenario would likely represent the highest number of dwellings that the network could accommodate without the SWRR.

32. On this basis the following two development scenarios have been tested:

- 2029 Reference + 750 LMA
- 2029 Reference + 300 LMA + 250 South of Stratford + 200 Quinton Area

33. The 2029 Reference + 300 LMA + 250 South of Stratford + 200 Quinton Area scenario, (henceforth referred to as the 2029 Reference + LMA + SSuA + Quinton Area), has been selected for a more detailed assessment in this study, as this was identified by SDC as one of the potential options for delivering the highest amount of additional housing, whilst remaining below the threshold capacity at the Clopton Bridge identified in the previous study work undertaken by VM. As stated earlier, it therefore serves as a proxy for other potential development options.

34. For both scenarios, the trip rates used in the assessment have been agreed with WCC (documented within **Appendix B**) and the distribution assigned based upon the Mobile Network Database output used in the previous reserve sites testing undertaken by VM[3].

35. The development assumptions have been included within the 2029 Reference Case model network, and run to identify relative changes compared to the 2029 Reference Case. The results of this analysis are presented within the following section.

Model Results Analysis

36. The following model scenarios have been visually reviewed and results collected, with the analysis presented within the following section of this note.

- 2029 Reference Case
- 2029 Reference + LMA
- 2029 Reference + LMA + SSuA + Quinton Area

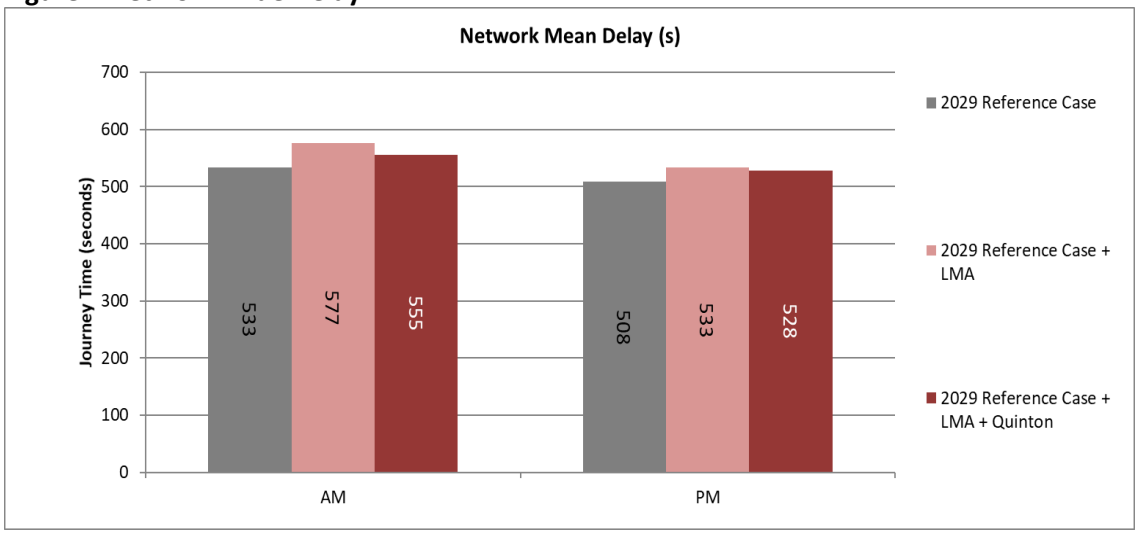
Network Wide Delay

37. The initial analysis of the impact of including additional development to the south of Stratford focuses on the network wide delay results, which are presented in **Figure 1**.

38. 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 conditions.

[3] VM185174.TN002.SDC_Reserve Sites_Stratford upon Avon Assessment

Figure 1 Network Wide Delay



39. The results presented in **Figure 1** demonstrate the impact on average journey times across the network once the additional dwellings are included to the south of Stratford.

40. The results demonstrate that during the AM period average journey times increase by around 34 seconds with the inclusion of the additional development at the LMA site, over 2029 Reference Case conditions, whilst average journey times increase by around 23 seconds in the scenario with a mix of development to the south of the town.

41. During the PM period, the impact is less noticeable, with a 25 second increase in average journey times in the additional LMA scenario, and 20 second increase in the scenario containing mix of additional development to the south of the town.

42. These results indicate that generally network wide conditions are predicted to worsen relative to the Reference Case with the inclusion of the additional development, with the impact most noticeable in the additional LMA scenario. In order to ascertain the specific locations of impact, further analysis has been undertaken in the form of queue length assessments.

Queue Length Analysis

43. The queue analysis presents the changes in average hourly maximum queue lengths across each junction within the model, once the additional development trips are added to the 2029 Reference Case network.

44. 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.

45. 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)

46. The classifications detailed above are based upon best practice and the approach adopted in similar studies elsewhere within the County.

47. The queue results for the 2029 Reference + 750 LMA scenario have been presented in **Figure 2** and **Figure 3**, with the queue results for the 2029 Reference + 300 LMA + 250 South of Stratford + 200 Quinton Area scenario presented in **Figure 4** and **Figure 5.**

48. In each instance, the queue lengths have been compared against queue levels in the 2029 Reference Case scenario for the AM and PM peak hours respectively.

Figure 2 Queue Length Analysis – 2029 Reference Case vs 2029 Reference Case + LMA 750 (AM Peak Hour)

49. The queue analysis presented within **Figure 2** indicates that with the inclusion of the additional 750 dwellings at the LMA site, there are two instances of significant queue increases occurring at the Shipston Road/Banbury Road roundabout, and Evesham Road/Evesham Place roundabout.

50. The queues modelled at the Shipston Road/Banbury Road roundabout, which is located directly to the south of the Clopton Bridge, form on the Shipston Road northbound approach to the junction, and occur as a result of blocking back from the signals on the Clopton Bridge.

51. The modelling indicates that the impact of additional queueing at the Evesham Road/Evesham Place roundabout leads to blocking back through the Seven Meadows Road/Wetherby Way roundabout at the busiest point in the peak hour.

52. The results also indicate there will be queue increases occurring at the A46/Warwick Road, A46/Red Hill and Alcester Road/Station Access junctions. In each location increased queues form as a result of development trips routing away from the development site to destinations either to the north of Stratford (M40 etc) or west of Stratford (A46)

Figure 3 Queue Length Analysis – 2029 Reference Case vs 2029 Reference Case + LMA 750 (PM Peak Hour)

53. The queue analysis presented within **Figure 3** indicates that, with the inclusion of the additional 750 dwellings at the LMA site, there is only one instance of significant queue increases, which occurs on the Shipston Road NB approach to the Shipston Road/Clifford Lane roundabout.

54. This is a result of the increased volume of traffic right turning traffic travelling from the north of the junction towards Clifford Lane, which in turn restricts the gaps in flow for vehicles waiting to enter the roundabout on the Shipston Road entry arm.

55. Aside from the impacts modelled at this location, there are no other areas of notable queue increases during the PM period in this scenario, although minor increases in queues are predicted to occur at the Warwick Road entry arm to the Stratford Gyratory, along with at the A46/Red Hill junction.

Figure 4 Queue Length Analysis – 2029 Reference Case vs 300 LMA + 250 South of Stratford + 200 Quinton Area (AM Peak Hour)

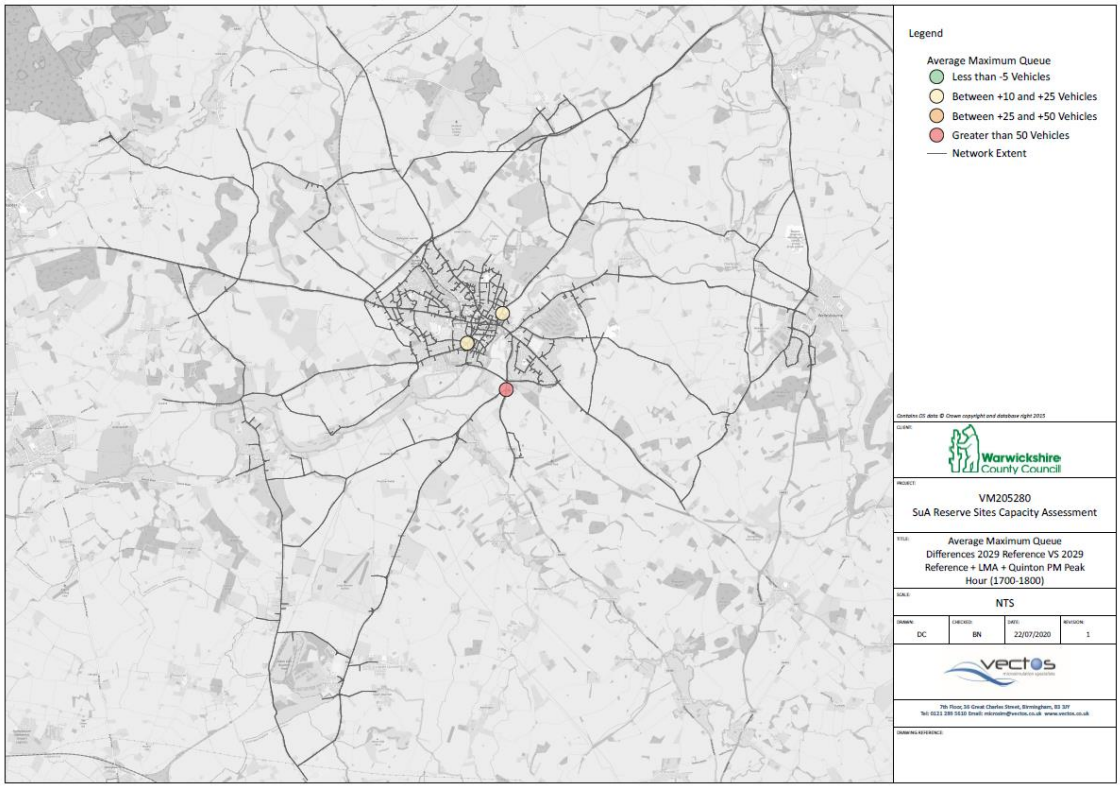
56. The queue analysis presented within **Figure 4** largely reflects the results presented within **Figure 2**, whereby during the AM period, once the mix of development South of Stratford is included within the model, there is a significant impact at the Shipston Road/Banbury Road roundabout, directly to the south of the Clopton Bridge.

57. Again, the queues form on the Shipston Road northbound approach to the junction, and occur as a result of blocking back from the signals on the Clopton Bridge.

58. The impact at the Evesham Place junction appears to be slightly less than that identified within **Figure 2**.

59. Further to the junctions outlined above, there are also predicted to be minor queueing impacts at the A46/Alcester Road junction, where a significant volume of development trips route away from the development site to destinations to the west of Stratford.

Figure 5 Queue Length Analysis – 2029 Reference Case vs 300 LMA + 250 South of Stratford + 200 Quinton Area (PM Peak Hour)



60. The queue analysis presented within **Figure 5** indicates that with the inclusion of the additional development mix to the South of Stratford, there are two instances of minor queue increases, one of which, as per the additional LMA scenario, occurs on the Shipston Road NB approach to the Shipston Road/Clifford Lane roundabout.

61. Again, this is a result of the increased volume of traffic right turning traffic travelling from the north of the junction towards Clifford Lane, which in turn restricts the gaps in flow for vehicles waiting to enter the roundabout on the Shipston Road entry arm. It is notable that the impact on this junction is lower than that modelled in the additional LMA scenario.

62. In addition to this, there is a minor impact modelled on the Warwick Road approach to the Stratford Gyratory, and Evesham Place roundabout.

Detailed Queue Length Assessment

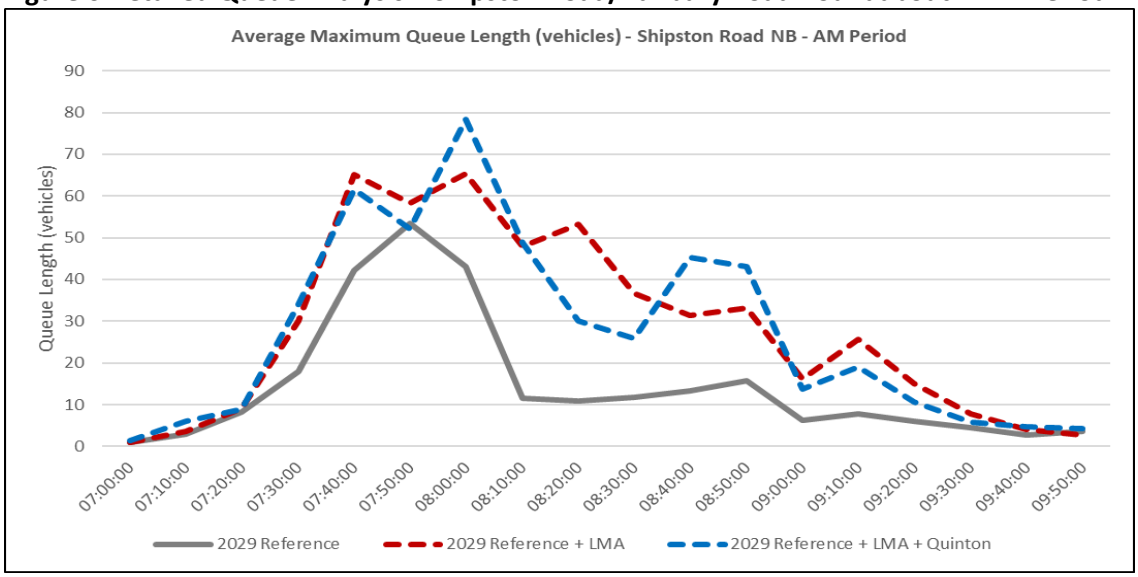
63. The queue results presented thus far demonstrate the impact on queue lengths as a result of including the additional development to the South of Stratford. The results have indicated that the following locations are predicted to experience significant queue impacts:

- Banbury Road/Shipston Road roundabout (Shipston Road NB) – AM Period
- Evesham Place roundabout (Seven Meadows Road approach) – AM period
- Shipston Road/Clifford Lane roundabout (Shipston Road NB approach) – PM Period

64. Notably the queue impacts are reduced in the scenario containing the mix of development to the South of Stratford when compared against the additional LMA 750 scenario. This is due to the more dispersed nature of the development traffic within the mixed scenario, leading to slightly lower impacts in the areas of constraint.

65. In order to present the extent and the time period in which this queueing impact is predicted to occur, queue length analysis at 10 minute intervals has been undertaken, which is presented on the approach arms identified in the above list for the relevant time periods, in the following figures.

Figure 6 Detailed Queue Analysis – Shipston Road/Banbury Road Roundabout – AM Period

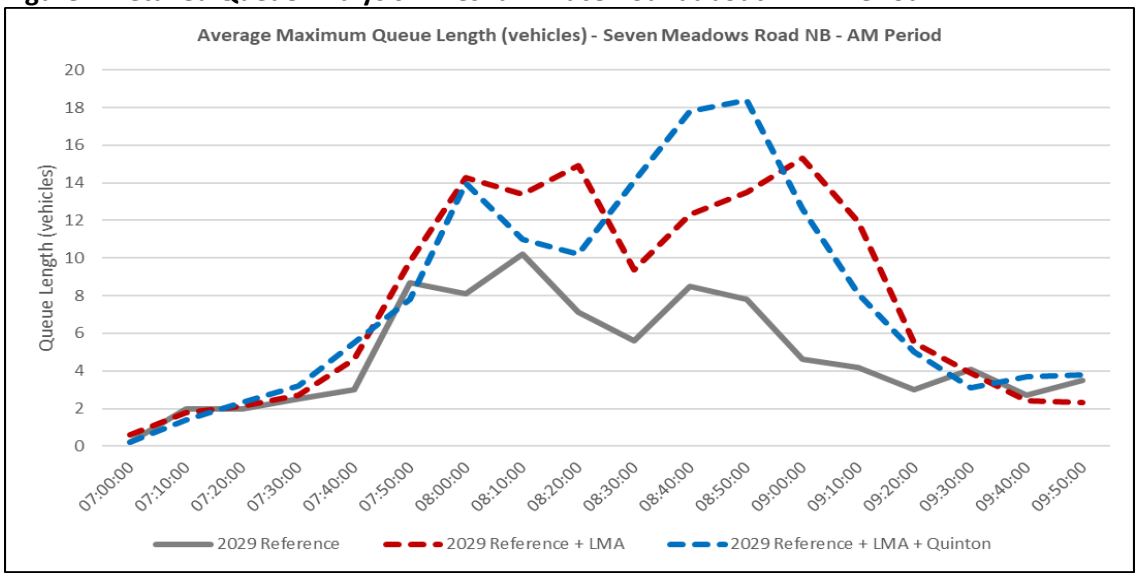


66. The queue results in **Figure 6** present the modelled queue lengths in each of the 2029 scenarios on the Shipston Road NB approach to the Shipston Road/Banbury Road junction, identified as a junction experiencing significant queue impacts during the AM period.

67. The detailed queue results demonstrate that in both 'With Development' scenarios, the queue peak at around 0800 on this approach to the junction. At this point queues are around 20 vehicles higher than the 2029 Reference Case in the LMA 750 scenario, and around 30 vehicles higher than the Reference Case in the mix of development scenario. There is then a decline in queue lengths through the peak hour.

68. These results demonstrate that although the queues on this approach are generally higher in both development scenarios, the peak in the queue lengths is generally short lived, lasting around 10 minutes. Beyond this point the queues in both development scenarios are generally around 10-20 vehicles higher than the Reference Case queues throughout the remainder of the peak hour.

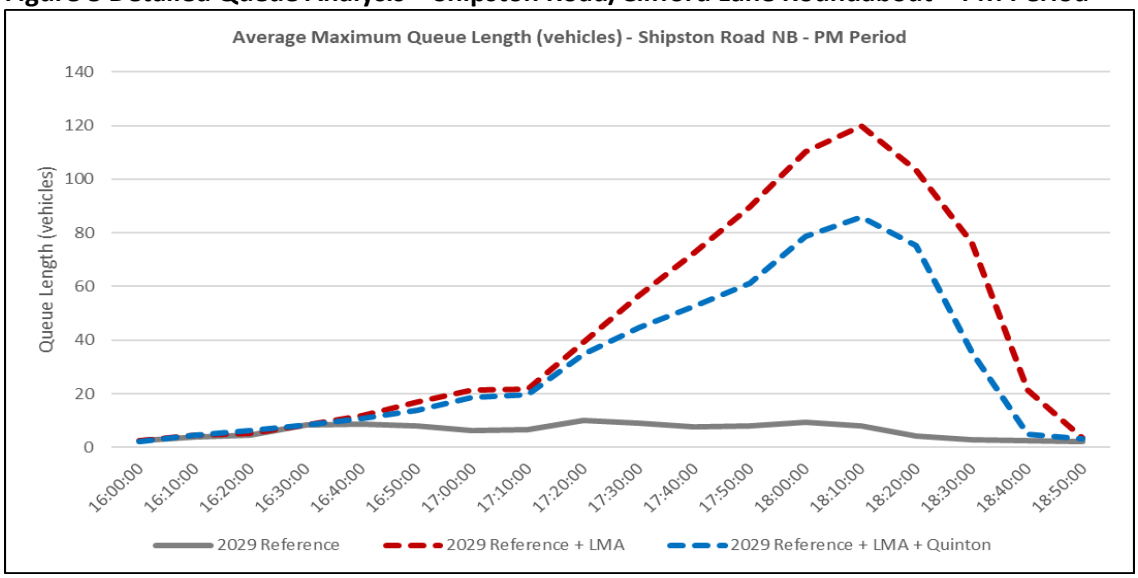
Figure 7 Detailed Queue Analysis –Evesham Place Roundabout – AM Period



69. The queue results in **Figure 7** present the modelled queue lengths in each of the 2029 scenarios on the Seven Meadows Road approach to the Evesham Road/Evesham Place junction, identified as a junction experiencing significant queue impacts during the AM period. The detailed queue results demonstrate that in the development scenarios, the queues peak at around 0840 on this approach to the junction. At this point queues are around 10 vehicles higher than the 2029 Reference Case.

70. These results demonstrate that although the queues on this approach are generally higher in both development scenarios, they are never more than around 8-10 vehicles higher than those recorded in the Reference Case. On this basis, although the queue analysis plots have indicated that the queues at this junction fall into a category that is flagged in the analysis, it appears that over the peak hour the queue impact on this approach is not significant.

Figure 8 Detailed Queue Analysis – Shipston Road/Clifford Lane Roundabout – PM Period



71. The queue results in **Figure 8** present the modelled queue lengths in each of the 2029 scenarios on the Shipston Road NB approach to the Shipston Road/Clifford Lane junction, identified as a junction experiencing significant queue impacts during the PM period.

72. The detailed queue results demonstrate that in both of the 'With Development' scenarios, significant queue impacts are modelled on this approach during the PM period, particularly after 1800, whereby queues increase from around 10 vehicles in the 2029 Reference Case to 120 vehicles in the LMA 750 scenario and 80 vehicles in the mix of development scenario.

73. 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 and Quinton sites. The model predicts that the majority of development traffic returning to the LMA and Quinton sites would be travelling through this junction towards the end of the PM peak hour.

74. Accordingly, even though the total increase in flows through this junction is not significant, it is enough to reduce the gaps in traffic to a point whereby there is a severe impact on traffic waiting to enter the roundabout from the Shipston Road NB approach. The impact is slightly lessened in the mix of development scenario given that 250 dwellings to the South of Stratford of Avon are not accessed off Clifford Road, and therefore do not add to the pressures modelled on this movement at the junction.

75. Despite the fact that this impact looks severe, VM believe 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 development trips returning from the direction of the town centre towards the development areas.

76. If this profile of development trips was smoothed across the peak hour, it is likely that the queues recorded in this location would be more consistent with the Reference Case.

Clopton Bridge Detailed Analysis

77. As detailed at the outset of this report, it is anticipated that the main barrier to the delivery of additional trips over and above the committed development allocations would be the capacity constraints at the Clopton Bridge. The original capacity at the bridge was assumed to be met once 400 dwellings at LMA had been delivered (i.e. in the 2029 Reference Case scenario).

78. However, more recent study work undertaken by VM has identified that in fact, due to lower than originally predicted traffic growth, there may be additional capacity over and above that previously identified cap. This has been documented in a separate study, which should be read in conjunction with this Note[4].

[4] VM185174.TN001.SDC_Reserve Sites_Data Review and Bridge Assessment

79. The study concluded that there may, in fact, 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.

80. Accordingly, the following section presents a review of the change in two-way traffic flows at the Clopton Bridge once the additional development associated with the two scenarios has been included within the South of Stratford area, with a specific focus on whether the potential additional capacity at the bridge is met or exceeded. The resultant AM and PM peak period flows are presented in **Table 8** & **Table 9**.

Table 8 Clopton Bridge Two Way Flows – LMA 750 Assessment

	2029 Reference	2029 Reference + LMA	Additional Trips
AM Peak Period (0700-1000)	5480	5839	359
PM Peak Period (1600-1900)	5780	6060	280

Table 9 Clopton Bridge Two Way Flows – LMA + South of Stratford + Quinton Area Assessment

	2029 Reference	2029 Reference + LMA + SSuA + Quinton Area	Additional Trips
AM Peak Period (0700-1000)	5480	5805	325
PM Peak Period (1600-1900)	5780	6042	262

81. The analysis indicates that the inclusion of the additional development to the South of Stratford within the 2029 Reference Case model results in fewer than 400 additional two-way trips across the bridge during the AM period and PM periods, for both development scenarios tested.

82. This analysis would indicate that the quantum of development tested within this assessment could be delivered before the revised theoretical cap at the bridge would be met or exceeded.

83. It would appear that the additional 750 dwellings at LMA would result in traffic flows close to the cap, with an additional 359 two way flows during the AM period. However, the flows presented for the mix of development sites scenario suggest that the two-way flows fall notably below the cap, suggesting that there remains capacity at the bridge with this mix of development included within the network.

84. To further support this analysis, the routing of development trips has been extracted from the LMA 750 model, the scenario predicted to have the highest flow of traffic on the bridge, in order to ascertain the predicted split of traffic routing between the LMA site/South of Stratford and north of the network.

85. A particular focus is on the balance of trips routing between Clopton Bridge and Seven Meadows Road, the two main available routes between the south/north of the town. These

routing patterns are presented for trips travelling to/from the LMA site in both the AM and PM periods in **Figure 9** and **Figure 10**.

Figure 9 AM Period – Development Trip Routing Patterns

86. **Figure 9** demonstrates the routing of all LMA additional development trips during the AM peak hour across the southern part of the model network. The routing patterns demonstrate that the model predicts a significant proportion of development trips travelling south/north through the network will do so via Clopton Bridge, with a smaller proportion routing via Seven Meadows Road. An interrogation of the flow totals reveals that during the AM period, 38% of all LMA additional trips leaving the site will route across the bridge, whilst 23% will route via Seven Meadows Road.

Figure 10 PM Period – Development Trip Routing Patterns

87. **Figure 10** demonstrates the routing of all LMA additional development trips during the PM peak hour across the southern part of the model network. The routing patterns demonstrate

that the model predicts a significant proportion of development trips travelling south/north through the network will do so via Clopton Bridge, however, during the PM period, the balance between Clopton Bridge and Seven Meadows Road appears to be more evenly split.

88. An interrogation of the flow totals reveals that during the PM period, 28% of all LMA additional trips returning to the site will route across the bridge, whilst 23% will route via Seven Meadows Road.

89. This stage of the analysis has demonstrated that the modelling predicts that both development scenarios tested could be delivered without exceeding the theoretical capacity at the bridge.

90. During the AM period, this is achieved despite a high proportion of development trips routing across the bridge. During the PM period the flows are notably lower than the theoretical cap, when compared with the AM period, which in some part appears to be attributable to the more equal balance of trips split between Clopton Bridge and Seven Meadows Road when routing between the north and south of the model network.

Campden Road Detailed Analysis

Journey Time Analysis

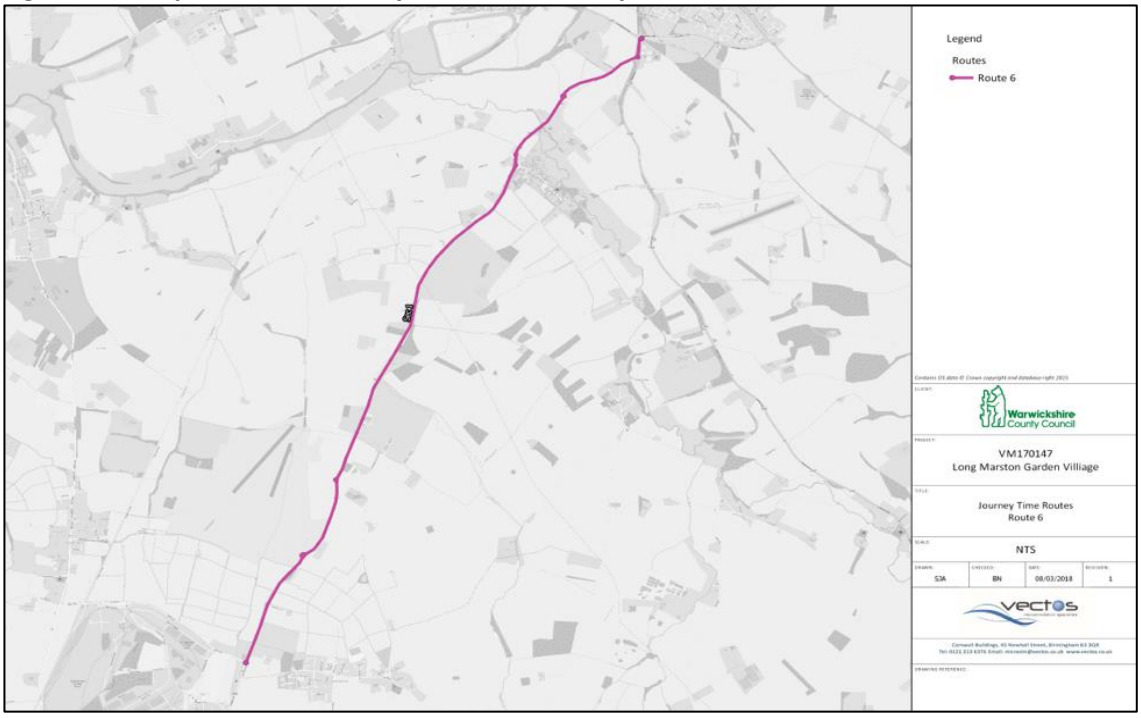
91. To further assess the impacts arising from the inclusion of the additional development within the model network, analysis in the form of journey time impacts on the network between the LMA development area, and the junction of the A3400 Shipston Road/Clifford Lane has been undertaken.

92. The analysis of this route captures Campden Road through Clifford Chambers, which will be used by the vast majority of development trips from the LMA area, as vehicles route along this road, through Clifford Chambers, towards Stratford upon Avon town centre.

93. It is understood that in addition to the constraints at the bridge, the available capacity for additional traffic on Campden Road is a key constraint to further development in the South of Stratford area.

94. Journey times were recorded from each model scenario on Campden Road, on the route outlined in **Figure 6**.

Figure 11 Campden Road Journey Time Route Analysed



95. Journey times for each scenario have been collected for comparison, to demonstrate the impact of additional development to the South of Stratford has along this route.

Figure 12 Campden Road Journey Time Analysis - AM Peak Hour

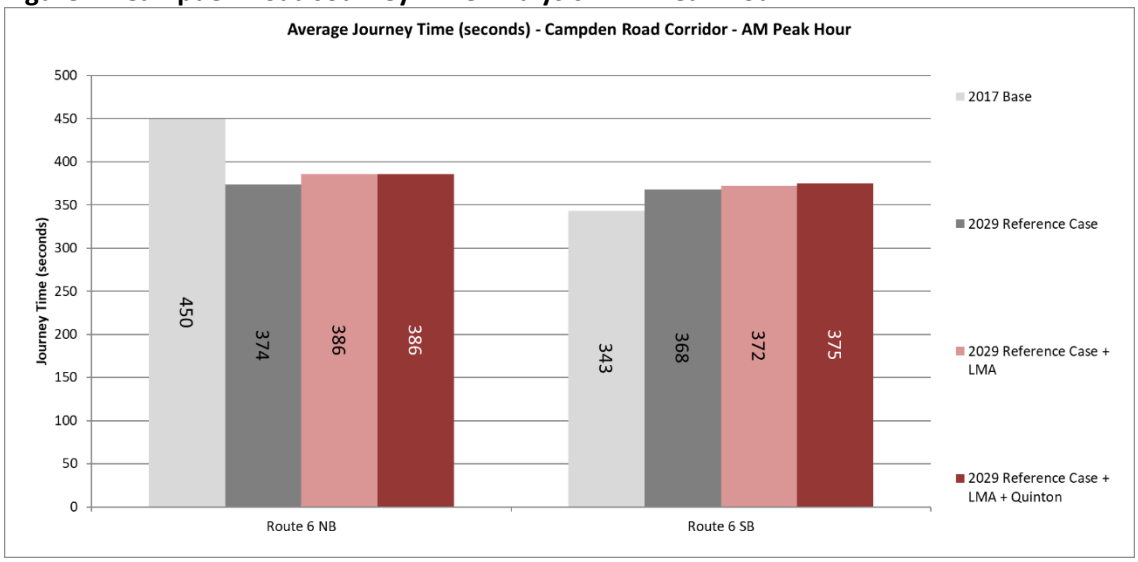
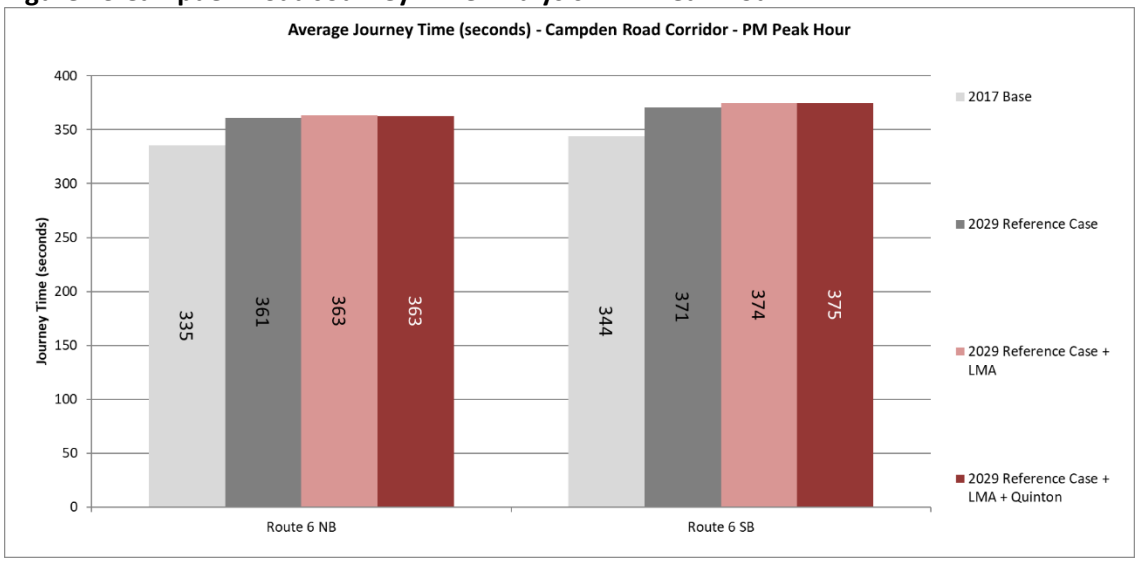


Figure 13 Campden Road Journey Time Analysis - PM Peak Hour



96. **Figure 7** and **Figure 8** present the AM and PM peak hour journey times on Campden Road (as per the route outlined in **Figure 6**) respectively, in each of the scenarios tested. The 2017 Base model journey times have also been included for comparative purposes.

97. The results demonstrate that with the inclusion of the additional development trips, there is only a minor increase in journey times on the route along Campden Road during the AM in a northbound direction. The PM results suggest that there will be negligible differences in journey times on this section of the network once the additional development trips are included.

98. It is notable that northbound journey times in each future year scenario remain below journey times recorded in the Base model. This is due to the introduction of the schemes at the Shipston Road/Seven Meadows Road and Shipston Road/Clifford Lane roundabouts in the future year models. These are schemes which will be delivered as part of the conditions for bringing forward the LMA 400 development proposals, and are expected to deliver significant journey time savings on the Clifford Lane approach over current on street conditions.

99. The journey time results presented demonstrate the impact on Campden Road of including the additional development at the LMA/South of Stratford/Quinton area. The results indicate that the inclusion of the additional development quantum tested in this assessment does not appear to have any significant impact on journey times on the Campden Road corridor.

100. In all instances, journey times on this route are lower than those recorded in the base model, due to the presence of the committed schemes at the Shipston Road roundabouts.

Campden Road Capacity Assessment

101. The results presented thus far, along with a visual review of the model operation, identify that Campden Road does not appear to be adversely affected by the delivery of additional dwellings in the LMA and South of Stratford area. This has been quantified by reporting the impact on journey times along this route, which suggests that there is no significant impact.

102. Further to this analysis, it has been determined that a capacity assessment should be undertaken, to determine whether the theoretical link capacity on Campden Road is exceeded following the inclusion of additional development at LMA.

103. The WebTAG guidance available for link capacity assessments[5] has been interrogated, which provides 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. 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).

104. 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.

105. 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.

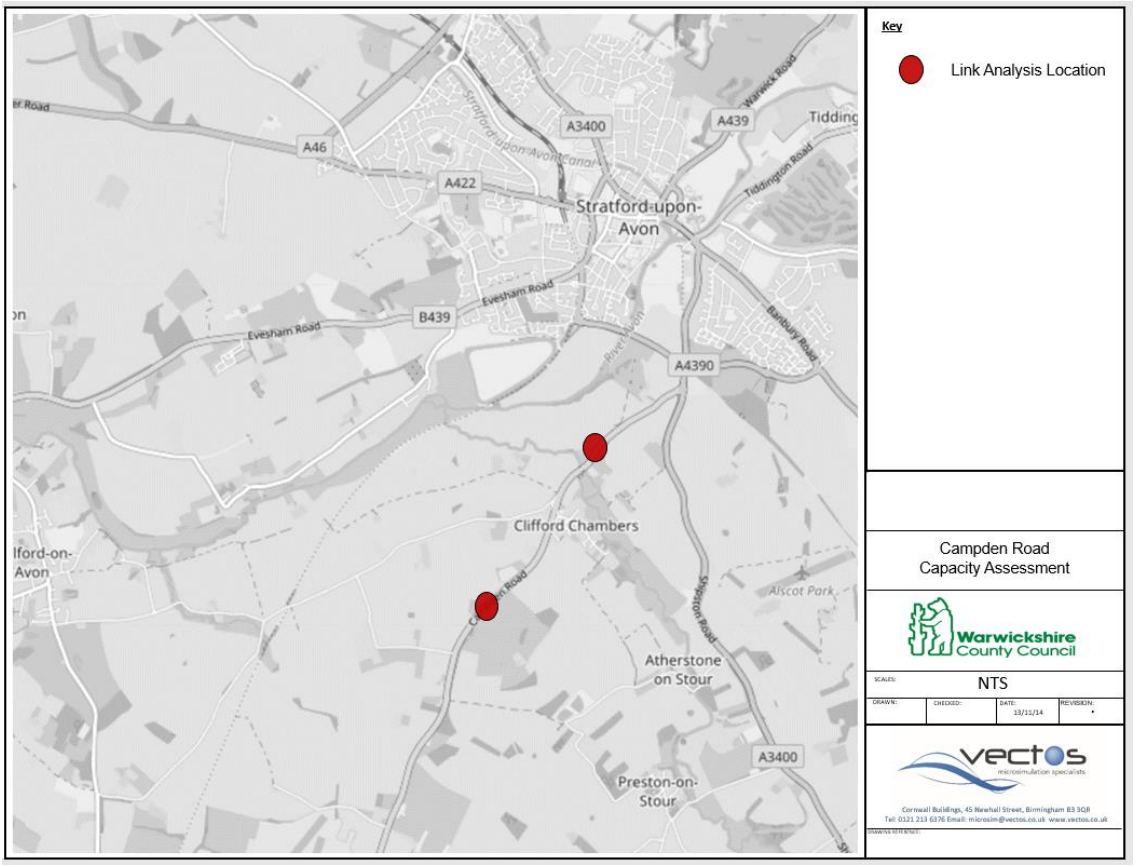
106. In order to assess whether Campden Road operates within theoretical capacity, the modelled flows have been extracted at two locations on Campden Road, one just to the north of Clifford Chambers, and a second to the south of Clifford Chambers.

107. The link locations considered are presented within **Figure 14**, and the outputs have been extracted and reported in **Table 10** and **Table 11.**

108. Analysis at these locations captures all flows on Campden Road generated by the additional development inclusions at LMA and the Quinton area, along with already committed sites to the south of the town.

[5] Webtag Unit 3.1 Appendix D Highway Assignment Modelling

Figure 14 Campden Road Link Analysis Locations



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

Table 10 Campden Road (North of Clifford Chambers) Modelled Link Flows

Scenario	AM Peak Hour Busiest One Way Flow	% of Capacity Taken Up	PM Peak Hour Busiest One Way Flows	% of Capacity Taken Up
2017 Baseline	672	51%	700	53%
2029 Ref	1249	94%	1044	79%
2029 Ref + LMA	1473	111%	1200	91%
2029 Ref + LMA + SSuA + Quinton	1383	104%	1142	87%

Table 11 Campden Road (South of Clifford Chambers) Modelled Link Flows

Scenario	AM Peak Hour Busiest One Way Flow	% of Capacity Taken Up	PM Peak Hour Busiest One Way Flows	% of Capacity Taken Up
2017 Baseline	501	38%	437	33%
2029 Ref	1023	77%	776	58%
2029 Ref + LMA	1280	97%	949	72%
2029 Ref + LMA + SSuA + Quinton	1198	91%	889	67%

110. The flows presented in **Table 10** demonstrate the significant increase in trips predicted to occur along Campden Road in each of the 2029 scenarios, compared to the 2017 Baseline modelled conditions. The 2017 Baseline flows are well within the capacity limit of 1315 indicated within the WebTAG guidance.

111. The flows presented in **Table 10** however indicate that in the future year + development scenarios, the AM peak hour flows are in excess of the theoretical capacity of this link, albeit the flows in the development mix scenario during the AM peak hour being only approximately 60 vehicles in excess of the identified capacity threshold, and within the +/- 10% tolerance.

112. In reality, should the capacity of Campden Road be exceeded during the AM peak hour, a demand response in the form of a retiming of trips would likely occur, which should result in at least the development mix scenario (with only 60 vehicles above the capacity threshold) seeing a reduction in peak hour trips below the identified limit. The PM peak hour flows do not present any capacity issues at this location.

113. The flows presented in **Table 11** however indicate that in all future year scenarios, the AM and PM peak hour flows to the south of Clifford Chambers are within the theoretical capacity of this link, albeit the flows in the additional LMA scenario during the AM peak hour being close to capacity (97% of capacity taken up in this scenario).

114. The analysis presented within this section has highlighted that although the development scenarios do not appear to have an impact on journey times on Campden Road, the impact on link capacity is as follows:

- To the north of Clifford Chambers, during the AM peak hour, theoretical link capacity is exceeded in the LMA750 scenario, whilst the mix of development scenario falls within the likely level of acceptable capacity levels. At this location no capacity issues are reported during the PM peak hour.
- To the south of Clifford Chambers, during both the AM and PM peak hours, both scenarios fall within the levels of acceptability in terms of the predicted impact on capacity levels.
- In order to address the potential capacity issues highlighted the proposed junction improvement schemes at Clifford Chambers village may be required, but it is anticipated that the need for this would be considered through the planning application process.
- The analysis presented clearly demonstrates that the mix of development scenario would present a lesser impact on capacity on Campden Road, whilst the LMA 750 scenario results indicate that capacity is close to being met, and/or exceeded across each modelled period.

Summary and Conclusions

Summary

115. This Note has been produced by Vectos Microsim (VM) in response to a request from Stratford District Council (SDC) to identify the impact associated with the delivery of different development assumptions in the area to the south of Stratford-upon-Avon.

116. SDC has requested VM to undertake additional analysis to ascertain the impacts on the highway network to the south of Stratford, which are likely to occur as a result of different strategies for bringing forward additional development proposals in advance of the SWRR.

117. Following discussions with SDC, and informed by an earlier manual assessment undertaken by VM, it was determined that an additional 750 dwellings at LMA (above the already committed 400 dwellings) could potentially be included within the network before the capacity available at the bridge was exceeded, and the need for additional mitigation triggered. Accordingly, this volume of additional development would be included within the model to quantify the impacts arising of such a quantum of housing.

118. SDC informed VM that based upon the latest trajectory information; the likely future year in which 750 dwellings would be delivered above the committed 400 dwellings was 2029. Accordingly, VM have developed a 2029 Reference Case model for use in this assessment.

119. Using the 2029 Reference Case model as a benchmark, the following two development scenarios have been run and assessed:

- 2029 Reference + 750 LMA (in addition to the LMA 400)
- 2029 Reference + 300 LMA + 250 South of Stratford + 200 Quinton Area

120. 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 Journey Times
- Campden Road Theoretical Capacity

Conclusions

121. Based upon the criteria outlined above, the two development scenarios have been assessed against the 2029 Reference Case conditions. The resultant analysis has identified that including the additional development within the network results in the following:

- Significant queue increases occurring on the Shipston Road NB approach to the Shipston Road/Banbury Road roundabout (blocking back from the Clopton Bridge signals) and Seven Meadows Road approach to the Evesham Place roundabout during the AM peak hour, particularly with the Reference Case + LMA scenario.
- Significant queue increases on the Shipston Road NB approach to the Shipston Road/Clifford Lane roundabout during the PM peak hour, as a result of increases in right turning traffic from Shipston Road SB to Clifford Lane, particularly with the Reference Case + LMA scenario.
- Despite the queue impacts modelled, two-way traffic flows across Clopton Bridge remain below the identified potential additional capacity threshold in both development scenarios.
- The impact on Campden Road journey times is minimal with the addition of the development trips, with the delivery of the roundabout schemes at the Shipston Road roundabout in the Reference Case models resulting in lower journey times on Campden Road NB when compared with baseline conditions.
- The inclusion of the additional development trips, in both 2029 development scenarios indicate that the flows on Campden Road will become over the identified theoretical capacity for a road of this type, albeit the flows in the development mix scenario are only 60 vehicles higher than the theoretical capacity in the peak hour, a number which would likely be offset by a demand response retiming of trips to avoid the busiest hour.

122. Based upon the analysis presented within this report, and the conclusions drawn above, the modelling indicates that the two development scenarios tested in this assessment could be delivered with only limited impacts on the model performance, and critically without exceeding the additional capacity identified at the Clopton Bridge.

123. The results indicate that the mix of development sites to the south of Stratford scenario performs better in terms of impacts on the bridge, and the network in this area in general, than the scenario whereby all additional development is focused at the LMA site. It would appear that the additional 750 dwellings at LMA would result in traffic flows close to the cap, with an additional 359 two way flows during the AM period. However, the flows presented for the mix of development sites scenario suggest that the two-way flows fall notably below the cap, suggesting that capacity remains at the bridge with this mix of development included within the network.

124. On this basis, the modelling indicates that there is the potential that a higher number of additional housing numbers could be delivered in the south of the town, if spread over different sites, rather than all focused at LMA.

125. In addition to the above, one of the most notable impacts identified by this study occurs at the Evesham Place roundabout, which could largely be mitigated by the delivery of the previously identified improvement scheme at this location.

126. Further to this, the impacts identified in terms of queue increases at the Shipston Road/Banbury Road roundabout and Shipston Road/Clifford Lane roundabout occur only for short periods during the AM and PM peak hours respectively. As such, it is anticipated that demand responses would likely occur with vehicles setting off earlier or later to avoid the short-lived queues modelled which would potentially reduce this impact identified.

127. The analysis presented within this report has also highlighted that although the development scenarios do not appear to have an impact on journey times on Campden Road, the link capacity is exceeded in both development scenarios.

128. In order to address this the proposed junction improvement schemes at Clifford Chambers village may be required, but it is anticipated that the need for this would be considered through the planning application process.

APPENDIX A

Data Review and Bridge Capacity Assessment Study

SDC Reserve Housing Sites Assessment

Historic Data Review and Clopton Bridge Impact Assessment

April 2019

VM185174.TN001

Introduction

1. This Note forms part of a series produced by Vectos Microsim (VM) in response to a request from Stratford District Council (SDC) for assistance in assessing the potential implications for the delivery of a strategy for the identification of Reserve Sites which may be necessary to bridge any potential shortfall that has arisen in the housing delivery profile for Stratford District, post adoption of the Core Strategy.

2. This Note sets out the review of historic traffic count data around the Clopton Bridge area, before outlining the steps undertaken to ascertain the likely impact on the bridge of each of the potential Reserve Sites within the Stratford area.

Background

3. The original Stratford-upon-Avon Wide Area (SuAWA) model that was used to assess the impacts of the Core Strategy was developed from 2007 data. By 2013 the next model update had been scheduled which was completed by 2015. However, at that time the base model was still representative of a 2013 year and, as there were a number of large scale developments expected to come forward by 2018, it was decided the model should be subject to a further targeted update to ensure it is as reflective of current network conditions as possible. Accordingly, the model has been updated in 2017.

4. The updated model was also further extended to ensure Wellesbourne was included in more detail given its close functional relationship (and since this is an area previously promoted for potential development), and the network around Long Marston was also extended and calibrated to a higher level of detail.

5. Since the time of the original Core Strategy work, additional work has been undertaken on a number of sites which are allocated within the Strategy, this included the assumptions pertaining to Long Marston Airfield and Land South of Alcester Road (SUA2). Therefore, separate to this stage of the assessment, the Core Strategy Sensitivity test model has been update to reflect the latest assumptions related to these sites.

Objective

6. Through discussions between WCC and SDC, VM have identified a primary objective which is to be assessed by this stage of the work.

7. The assessment summarised within this note addresses the following objective:

    - To complete a review of the data pertaining to the housing cap applied on Long Marston Airfield (LMA) and other developments which prevent further development to the south of Stratford before the South Western Relief Road (SWRR) is delivered.

8. In order to address the above objective, the following stages of assessment have been undertaken, which are summarised within the remainder of this note.

    - Stage 1 –Data Review
    - Stage 2 – Reserve Sites Clopton Bridge Impact

Stage 1 –Data Review

Methodology

9. The focus of this assessment is based around the assumption that the development of housing to the south of Stratford is currently restricted until such time as the South Western Relief Road (SWRR) is in place. The Core Strategy Policy for the Long Marston Airfield site (LMA) stipulates that there is a specific requirement for:

    Completion of a south-western relief road before more than 400 dwellings can be occupied, unless a transport assessment demonstrates a higher threshold is appropriate.

10. As a result of this, there has been a position adopted by WCC which requires the SWRR to be delivered before any further development would be approved within the area. At the time of completing the Core Strategy assessment and subsequent to that this position has been considered reasonable based on the evidence available at the time.

11. However, it is important to note that this evidence was based on traffic forecasts derived from a series of counts which were collected between 2007 and 2015. Furthermore, the 2015 assessment was completed within a cordon model which focussed on the gyratory area in isolation, thus the potential for reassignment away from Clopton Bridge was omitted within the bespoke modelling of this area.

12. Therefore, this stage of the assessment involves a review of the traffic data and changes that have occurred in the area around Clopton Bridge. This analysis focuses on how the pattern of traffic growth between years has occurred and how this compares to what has previously been assumed within the modelling.

13. As part of this review the following data sources/models have been reviewed:

- Historic Cordon Count data for flows in and out of Stratford at Clopton Bridge
- 2031 Reference Tiddington Model
- 2031 Core Strategy Tiddington Model
- 2031 SuA Reference Case (following recent update)
- 2031 Core Strategy Model (following recent update)

14. It is anticipated that a review of the above data sources and modelled flows, will help establish any level of relief predicted to occur through the reassignment of traffic away from the development area.

Cordon Count Data Review

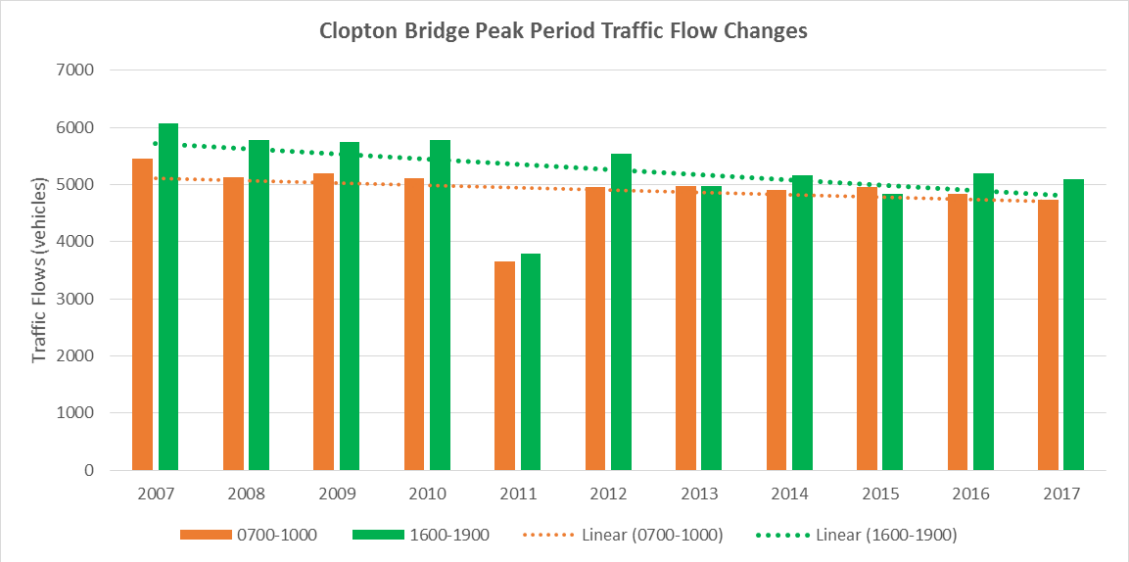
15. The first stage of the data review focuses on cordon count data provided to VM by WCC for the Clopton Bridge area. Historic ATC data has been provided for traffic flows both into and out of Stratford town centre, at the location highlighted in **Figure 1**.

Figure 1 Clopton Bridge Cordon Count Location

16. WCC have provided annual count data from 1998 up until 2017. However, for the purposes of this assessment it was deemed appropriate to review only 10 years' worth of data, from 2007 to 2017, on the basis that this volume of data should be sufficient to identify any underlying trends, but also the original SuA Base model was calibrated and validated to 2007 data.

17. The annual data has been reviewed, specifically focusing on the average Monday-Friday data. The inbound and outbound traffic flows have been combined to provide an average peak period (0700-1000 and 1600-1900) two way flow at the Clopton Bridge, for week day's data collected between 2007 and 2017. The resultant flows are presented in the following **Figure 2**.

Figure 2 Clopton Bridge Two Way Traffic Flows



18. The data presented within **Figure 2** demonstrates a general reduction in traffic using the Clopton Bridge year on year.

19. This pattern of reduced flows is most significant in the PM period, where two way flows have reduced by around 16% between 2007 and 2017. Across the AM peak period traffic flows have reduced by 13%.

Traffic Model Future Year Flow Review

20. The reduction in traffic flows reflected in the cordon count data would suggest that the conclusions of any previously modelling assessment undertaken may now be subject to adjustment, on the basis that the underlying data used in this modelling has been superseded by lower traffic flows in subsequent years.

21. The previous modelling assessments undertaken within Stratford, as detailed in this note, are based upon either 2007 or 2013 traffic count data. The 2007 and 2013 count data was used to develop the relevant Base models, which were then factored by TEMPro growth assumptions and the relevant housing trajectory information to derive agreed future year scenarios.

22. The previous growth cap identified as a restraint on growth within the study area was based upon flows extracted from the bespoke traffic model for the Clopton Bridge/Stratford Gyratory model, named the Tiddington model. This model was developed for a 2031 Reference Case (inclusive of all known committed developments at the time including 400 dwellings at Long Marston Airfield). This model was also developed to represent a 2031 Core

Strategy scenario which included the additional 3,100 dwellings at Long Marston, and an allowance for re-routing away from the bridge as a result of the delivery of the SWRR.

23. Each of the future year Tiddington models were based upon the 2015 Tiddington Base Model. On the basis that these future year scenarios were developed by factoring baseline data that has now been proven to have reduced in volume between current levels and those assumed in any previous modelling, then previous conclusions may now be subject to revision, and there may in fact be additional capacity at the bridge in the future year scenarios than previously thought.

24. It is therefore considered pertinent to review the future year traffic flows within these models at the Clopton Bridge, to review whether the latest models (which are based upon 2017 count data) suggest that capacity exists at this location on the network, which the previous modelling predicted would not be available.

25. The following table demonstrates the changes in predicted traffic flows between the previously developed Tiddington models, and the most recent SuAWA models, developed using 2017 traffic count data. The data presented compares traffic flows travelling towards the town centre during the AM peak period, and traffic flows travelling away from the town centre during the PM peak period.

Figure 3 Clopton Bridge Flow Analysis - Model Differences

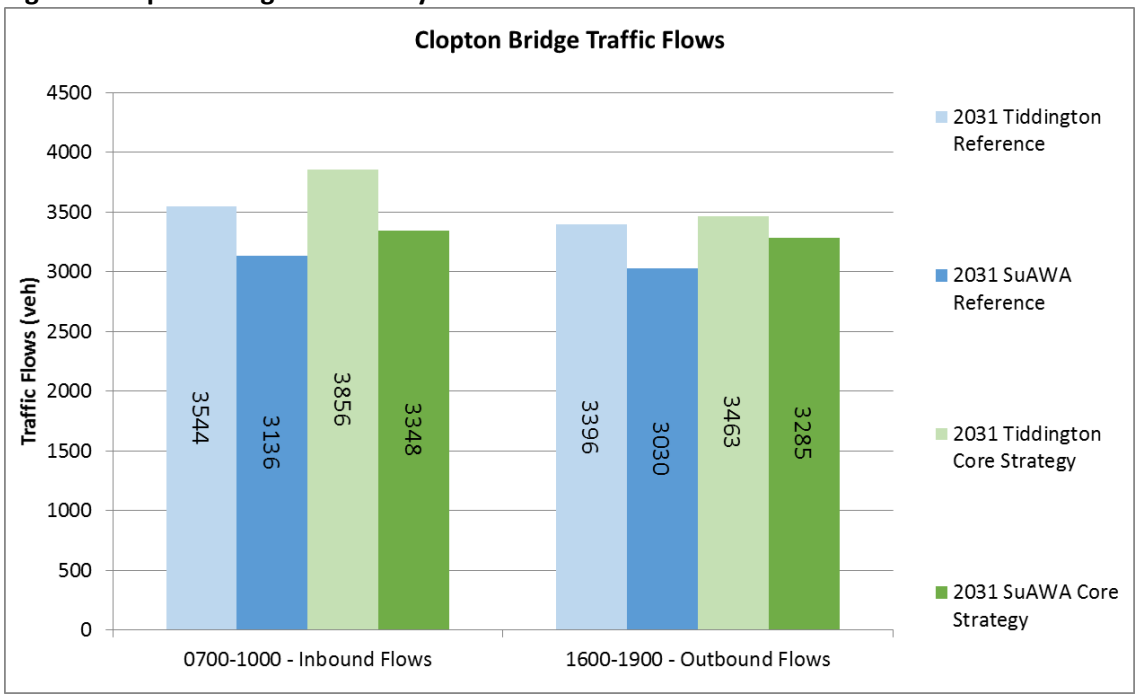


Table 1 Clopton Bridge Flow Analysis

	2031 Tiddington Ref	2031 SuAWA Ref	Difference
0700-1000	3544	3136	-408
1600-1900	3396	3030	-366
	2031 Tiddington Core Strategy	**2031 SuAWA Core Strategy**	**Difference**
0700-1000	3856	3348	-508
1600-1900	3463	3285	-178

26. The analysis presented in **Figure 3** and **Table 1** demonstrates that the flows extracted from the 2031 Reference and 2031 Core Strategy Tiddington models, for the AM and PM peak periods, are consistently higher than those extracted from the recently updated 2031 SuAWA Reference and 2031 SuAWA Core Strategy scenarios.

27. The analysis highlights the large differences being between the 2031 Reference Case scenarios, with the most recent SuAWA model predicting around 408 fewer inbound trips across the Clopton Bridge than previously predicted by the 2031 Reference Tiddington model during the AM period.

28. A reduction in flows is also modelled in the Core Strategy scenarios, with this reduction in the region of 500 inbound trips during the AM peak periods, and 200 outbound trips in the Pm.

29. It is likely that this reduction in flows is a result of the lower baseline flows used to develop the update SuAWA models, but also due to the ability of the SuAWA model to capture any reassignment of traffic away from the bridge.

30. This analysis demonstrates that the previously predicted cap on development to the south of Stratford, which was based upon capacity constraints highlighted by the Tiddington models, may be subject to adjustment, as the more recently updated models predicted less traffic to be routing via the bridge.

31. This analysis has indicated that there may in fact be more capacity available at the Clopton Bridge, in the future year scenarios, than has previously been predicted.

Stage 2 – Reserve Sites Clopton Bridge Impact

Methodology

32. Following the analysis of traffic data for the Clopton Bridge area outlined in Stage 1 of this assessment, along with an identification that the growth in traffic flows previously predicted is not currently being realised, it is now considered pertinent to assess the relative impact that each of the potential Reserve Sites would have on the Clopton Bridge area of the Stratford-upon-Avon road network.

33. In order to achieve this, the demand equivalent to 100 dwellings have been assigned to each of the sites within the 2023 Interim Core Strategy Sensitivity Test Scenario (i.e. the scenario without the SWRR).

34. The purpose of assigning 100 dwellings to each area is that it enables equivalent values to be derived. This means that the assessment identifies the equivalent number of houses in each area that will elicit the same impact on Clopton Bridge.

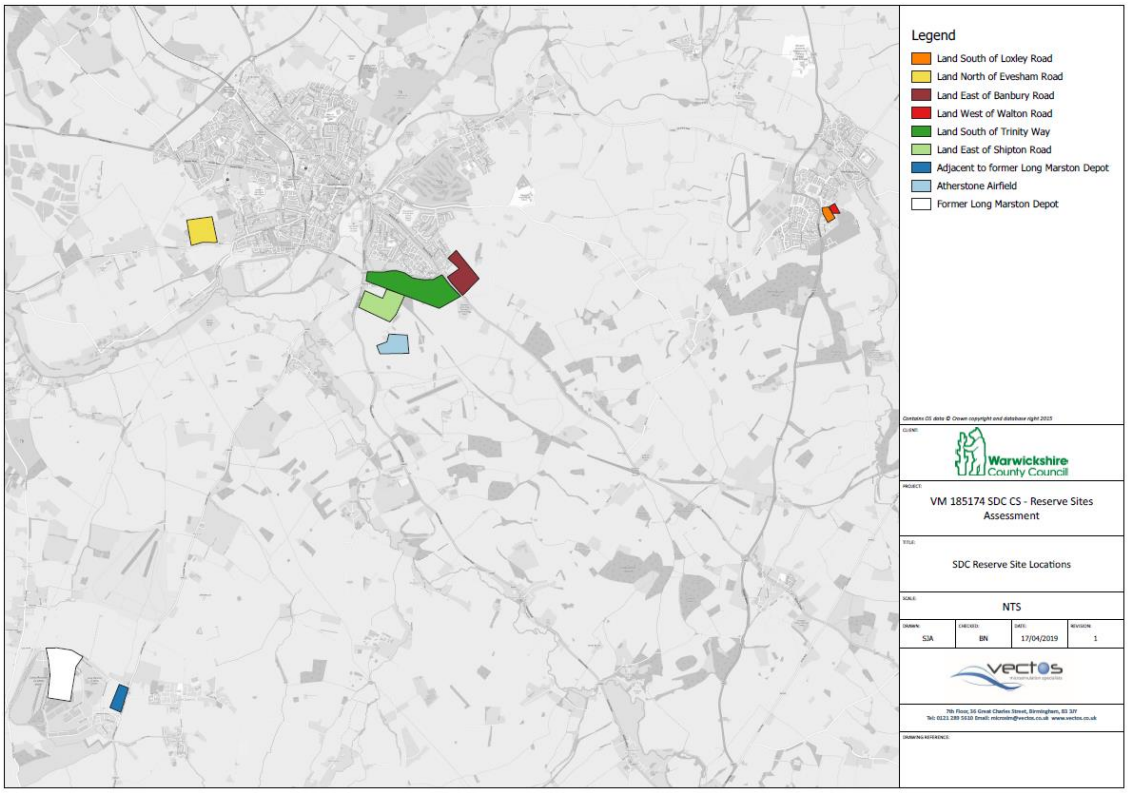
35. The analysis will then determine the areas where it is preferential for potential Reserve Sites to be prioritised before delivery of a SWRR, on the basis that they are least likely to affect the operation of the network in the area of Clopton Bridge.

36. The model scenario containing the sites has been run for the AM and PM peak periods and an assessment of proportion of trips generated by each site which will impact on the Clopton Bridge area has been undertaken.

SDC Reserve Sites for Modelling

37. Following discussions between VM, WCC and SDC a list of potential Reserve Sites was provided for inclusion within the model. These sites are outlined in **Figure 4**.

Figure 4 Reserve Site Locations



38. Two additional potential Reserve Sites at Wellesbourne have been included within the modelling. However, these sites, Land East of Kineton Road and Land West of Kineton Road, lie outside of the model extent. Any trips predicted to enter the model from these zones have been assigned to the closest external zone to these sites, which in this case is Zone 923.

39. As detailed above, for the purposes of the impact on the bridge assessment, the trips equivalent to 100 dwellings were included within each of the sites. These trips were then distributed using the WCC mobile network database distribution which have been derived for each site.

40. These trips have been included within the 2023 Interim Year Core Strategy model, which does not contain the SWRR, with the intention of capturing the likely impact on the bridge of each site.

41. The following section sets out the proportion of trips generated by each site which will travel across the Clopton Bridge. Alongside this the following categories have been applied to each development site, dependant on the likely impact:

- Category 1 – 0-10% of trips generated to route via Clopton Bridge
- Category 2 – 11-20% of trips generated to route via Clopton Bridge
- Category 3 – 21-30% of trips generated to route via Clopton Bridge
- Category 4 – 30% + of trips generated to route via Clopton Bridge

Table 2 Reserve Sites Predicted Impact on Clopton Bridge

Reserve Site Location	% of Trips Generated to travel via Bridge	Category
Land North of Evesham Road	3%	1
Land East of Banbury Road	39%	4
Land South of Trinity Way	31%	4
Land West of Walton Road	13%	2
Land South of Loxley Road	13%	2
Atherstone Airfield	28%	3
Former Long Marston Depot	28%	3
Adjacent to former Long Marston Depot	29%	3
Land East of Shipston Road	30%	4

* The reserve sites at the Land East of Kineton Road and Land West of Kineton Road sites have been included within the modelling. However, no trips related to these sites were predicted to route via the bridge

42. The analysis presented above demonstrates that the modelling predicts that prior to the delivery of the SWRR, the Land East of Banbury Road, Land South of Trinity Way and Land East of Shipston Road sites will have the most significant impact on the Clopton Bridge, with over 30% of development trips generated by these sites predicted to route via the bridge. The analysis also demonstrates that the two sites adjacent to the Long Marston Airfield will also result in almost 30% of all trips generated travelling via the bridge.

43. Conversely the Land North of Evesham Road, along with the Land West of Walton Road and Land South of Loxley Road sites are predicted to have the smallest impact on the bridge.

44. As this Note has detailed that there may be some additional capacity at the Clopton Bridge compared to that predicted in previous modelling assessments, then the results from **Table 2** outline that the Land North of Evesham Road would be the site within Stratford upon Avon least likely to impact on this additional capacity at the bridge.

Summary and Conclusions

45. This Note forms part of a series produced by Vectos Microsim (VM) in response to a request from Stratford District Council (SDC) for assistance in assessing the potential implications for the delivery of a strategy for the allocation of Reserve Sites, which may be necessary to bridge any shortfall that has arisen in the housing delivery profile for Stratford District, post adoption of the Core Strategy.

46. This Note sets out the review of historic traffic count data around the Clopton Bridge area, before outlining the steps undertaken to ascertain the likely impact on the bridge of each of the proposed reserve sites within the Stratford area.

47. The historic traffic count data has revealed that over the last 10 years, traffic flows at the Clopton Bridge have actually reduced year on year, particularly in the PM period, whereby weekday flows between 1600-1900 were around 16% lower in 2017 than those for the same period in 2007, whilst AM flows were around 13% lower in 2017 compared to 2007.

48. This pattern indicates that the previously predicted cap on development related to the Bridge capacity may have potential to be altered, on the basis that previously predicted growth is unlikely to have been realised due to lower underlying base flows at the bridge than previous modelling assessments have assumed.

49. The second stage of the assessment focuses on the inclusion of the identified potential Reserve Sites on the network, and a review of the potential impact on the Clopton Bridge. This part of the assessment ranked the sites in order of the predicted impact on the bridge, and indicated which sites would be least likely to impact the bridge, and thus least likely to take away from any existing capacity at this location.

APPENDIX B

Trip Rates Assigned

Long Marston/Quinton Area Trip Rates Applied (vehicle trips per dwelling)

	Arrivals	Departures	Total
0700-0800	0.098	0.370	0.468
0800-0900	0.151	0.540	0.691
0900-1000	0.154	0.249	0.403
1600-1700	0.318	0.181	0.499
1700-1800	0.438	0.188	0.626
1800-1900	0.333	0.184	0.517

South of Stratford Area Trip Rates Applied (vehicle trips per dwelling)

	Arrivals	Departures	Total
0700-0800	0.053	0.379	0.432
0800-0900	0.116	0.393	0.509
0900-1000	0.172	0.176	0.348
1600-1700	0.290	0.136	0.426
1700-1800	0.328	0.174	0.502
1800-1900	0.317	0.179	0.496