Kenilworth Traffic Calming

Warwick Road Scheme Impacts

December 2019

VM195249.TN001

Introduction

1. Vectos Microsim (VM) has been commissioned by Warwick County Council (WCC) to test the impacts of a traffic calming scheme on Warwick Rd in Kenilworth.

2. The modelling focuses on the year 2029 and utilises the KSWA 2029 Local Plan model. The model scenarios included in this assessment are as follows:

   - KSWA 2029 Local Plan
   - KSWA 2029 Local Plan + Scheme

3. The aim of this note is to set out the methodology used to test the scheme impacts and present the local impacts of the traffic calming scheme along Warwick Road.

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Methodology

Warwick Rd Traffic Calming Scheme

4. The traffic calming scheme that is to be tested largely includes raised tables and speed bumps at various locations along Warwick Road in the centre of Kenilworth.

5. The figure below highlights the locations of the proposed raised tables and speed bumps.

Figure 1: Warwick Rd Traffic Calming Scheme

6. To represent the traffic calming scheme within the KSWA Local Plan model the link speeds have been lowered to 20 mph, with end speeds of 15mph, in the areas that feature a raised table or speed bump. This has been included into the KSWA 2029 LP + Scheme scenario.

Journey Paths and Queue Locations

7. For this analysis new queue locations and journey time paths have been defined to cover the area where the traffic calming measures. These measurement sites will allow a more focused analysis of the traffic calming measures.

8. The following figures display the locations of the queues and journey time paths.

Figure 2: Journey Time Routes

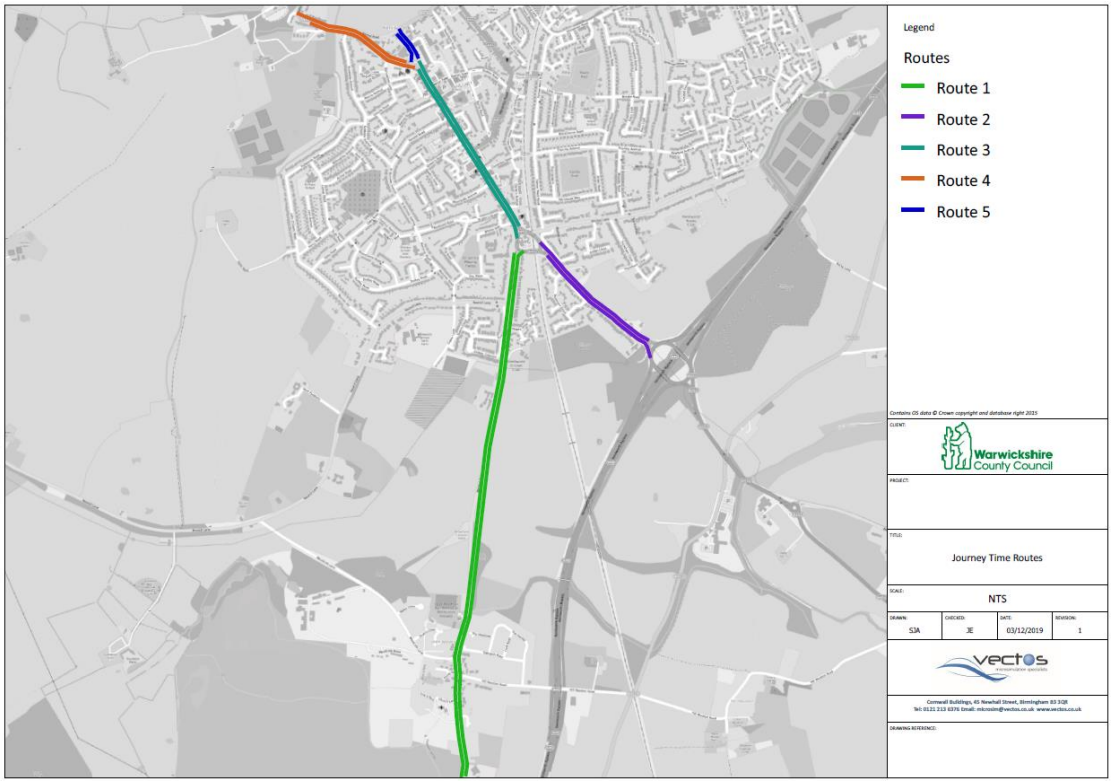


Figure 3: Queue Locations

Results

9. Both of the model scenarios have been run ten times to collect data for the AM peak period (0700-1000) and a further ten times to collect data for the PM peak period (1600 – 1900). Each set of the model runs have been analysed to check for failed runs and had outliers removed from the data sets.

10. This sections presents the peak hour Network Wide Statistics for the full extent of the models, as well as this the Average Maximum Queue Lengths and the Journey Times at key locations.

Network Wide Statistics

11. The network wide statistics presented in this section of the Note considers the peak hours only, the AM the peak hour is 0800-0900 and in the PM the peak hour is 1700-1800.

12. The following figures will present the total number of modelled vehicles that complete their journey within the peak hour, the average time that each journey takes in seconds and the average travelling speed of each vehicle in the model network.

Figure 4: Total Number of Vehicles, Peak Hour

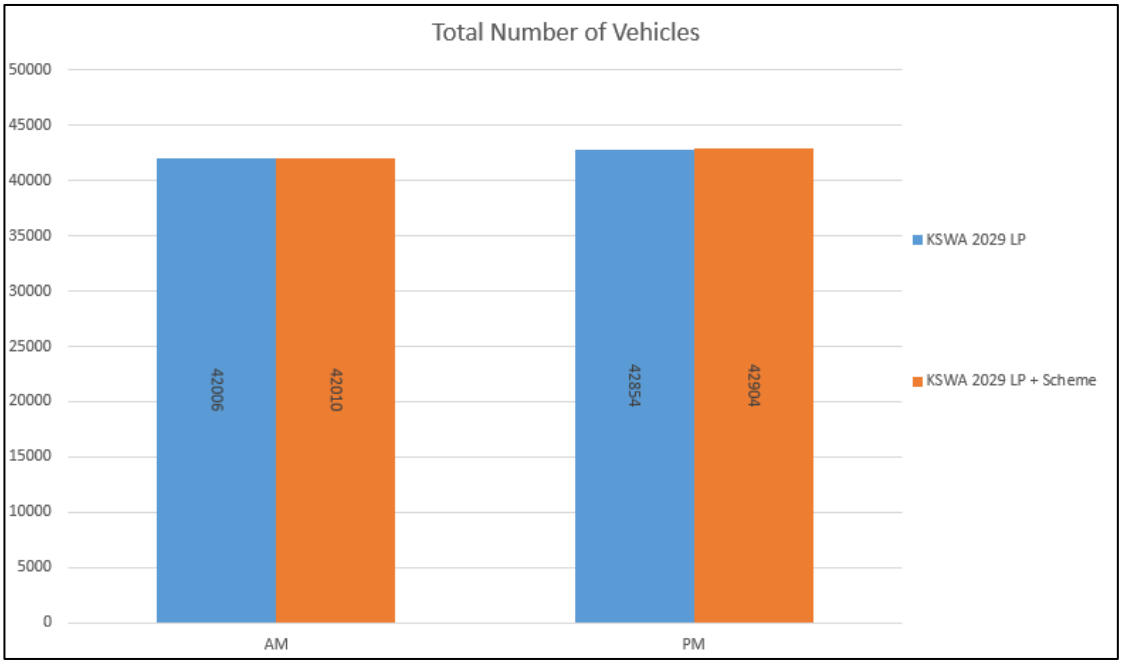


Figure 5: Average Network Journey Time (s), Peak Hour

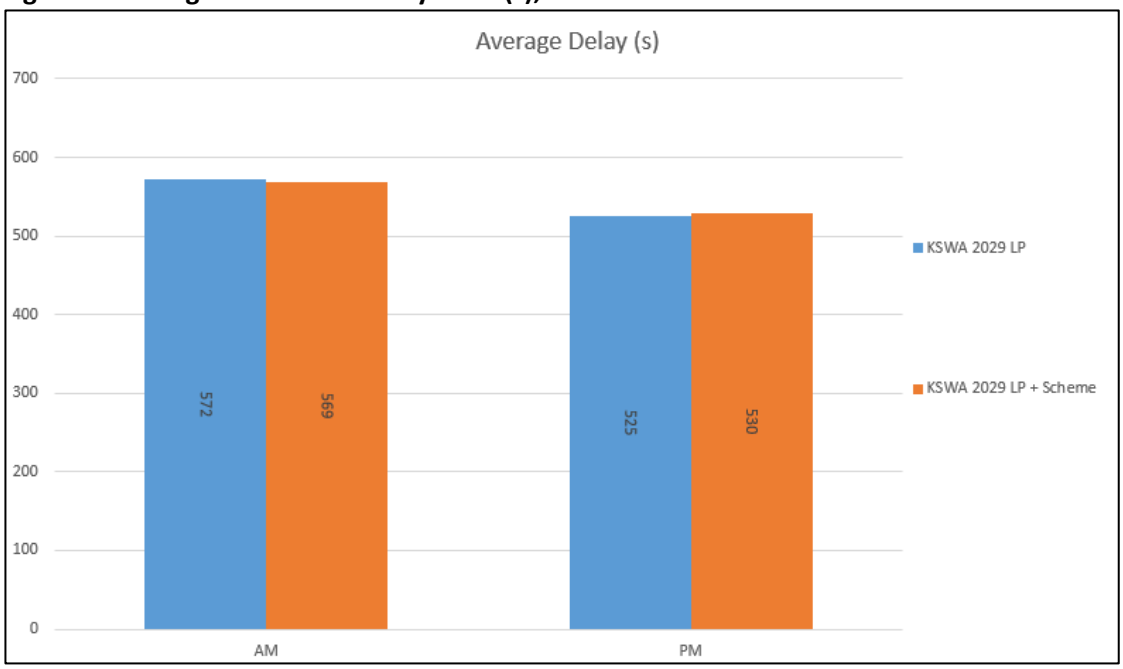
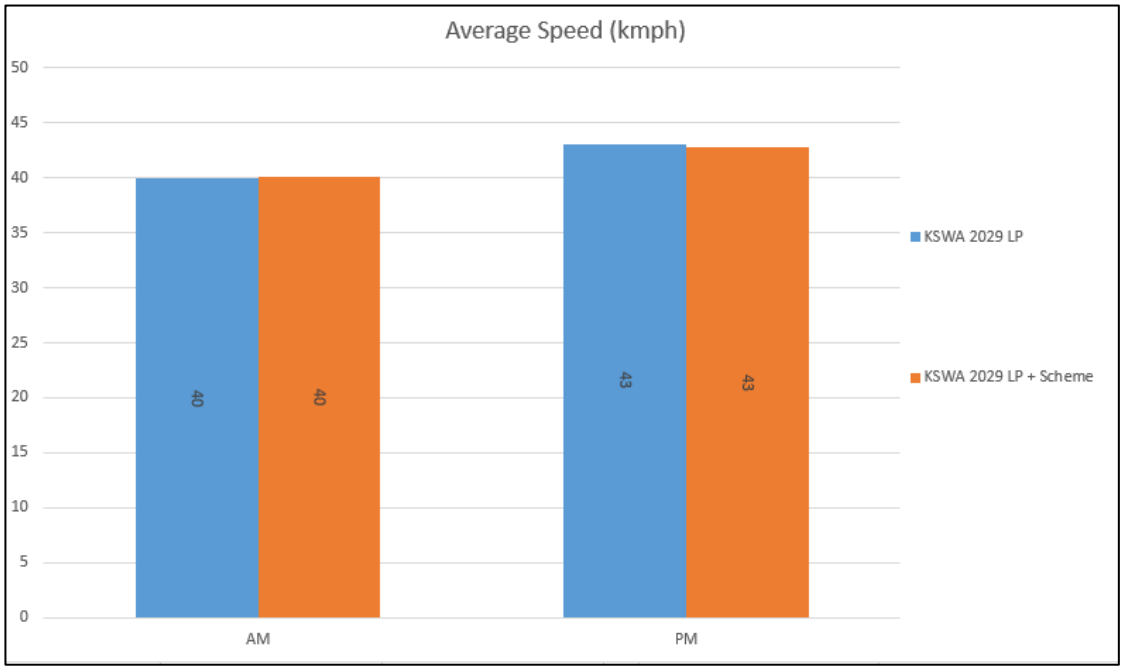


Figure 6: Average Vehicle Speed, Peak Hour



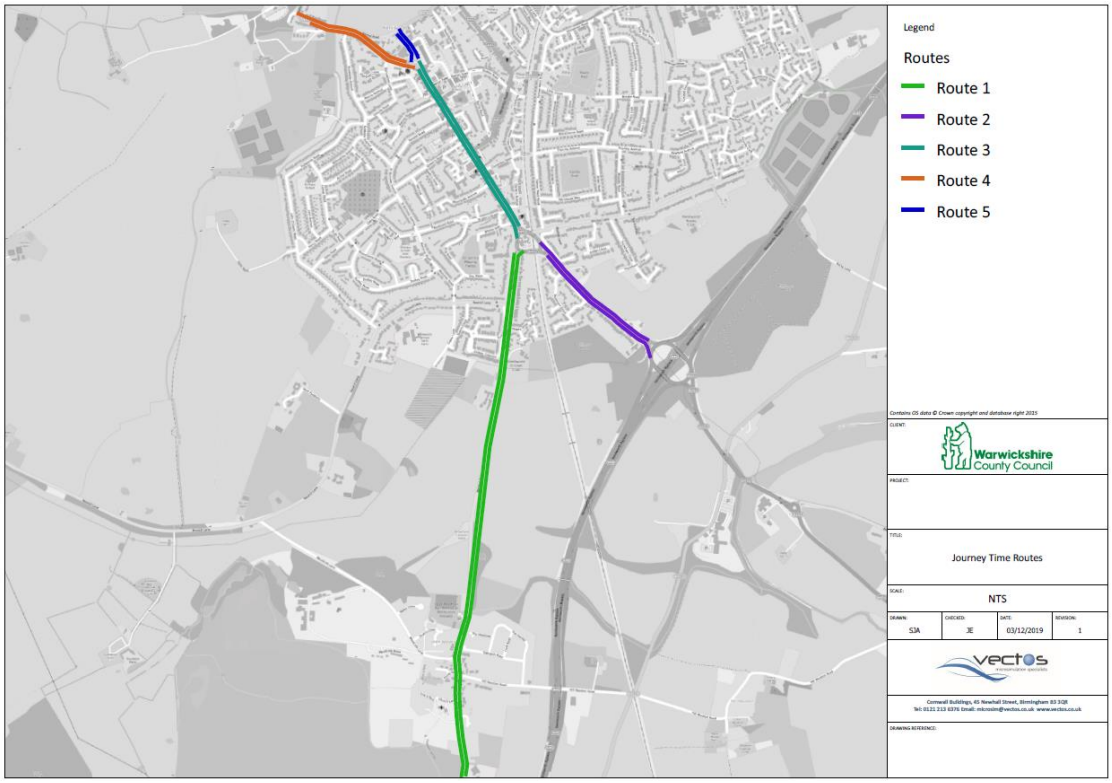
13. The figures above show no notable change between scenarios. This is to be expected as the scheme only directly impacts a small part of the network i.e. Warwick road, where the model itself covers a very large area i.e. Kenilworth and Stoneleigh.

14. The small differences in the statistics are more likely caused by the model 'noise' and the inherent variance between model runs.

Journey Time Analysis

15. The journey times have been assessed for the key routes in the vicinity of the traffic calming scheme. The following routes have been defined for this assessment, journey time data has been collected along these routes.

Figure 7: Journey Time Routes



16. The proposed traffic calming scheme is planned to be delivered largely along Warwick Road, as such Route 3 has been defined to cover the full length of Warwick Road to capture the impacts of the scheme in this area. The following figures present the journey times along Route 3.

Figure 8: Route 3 Journey Times, AM

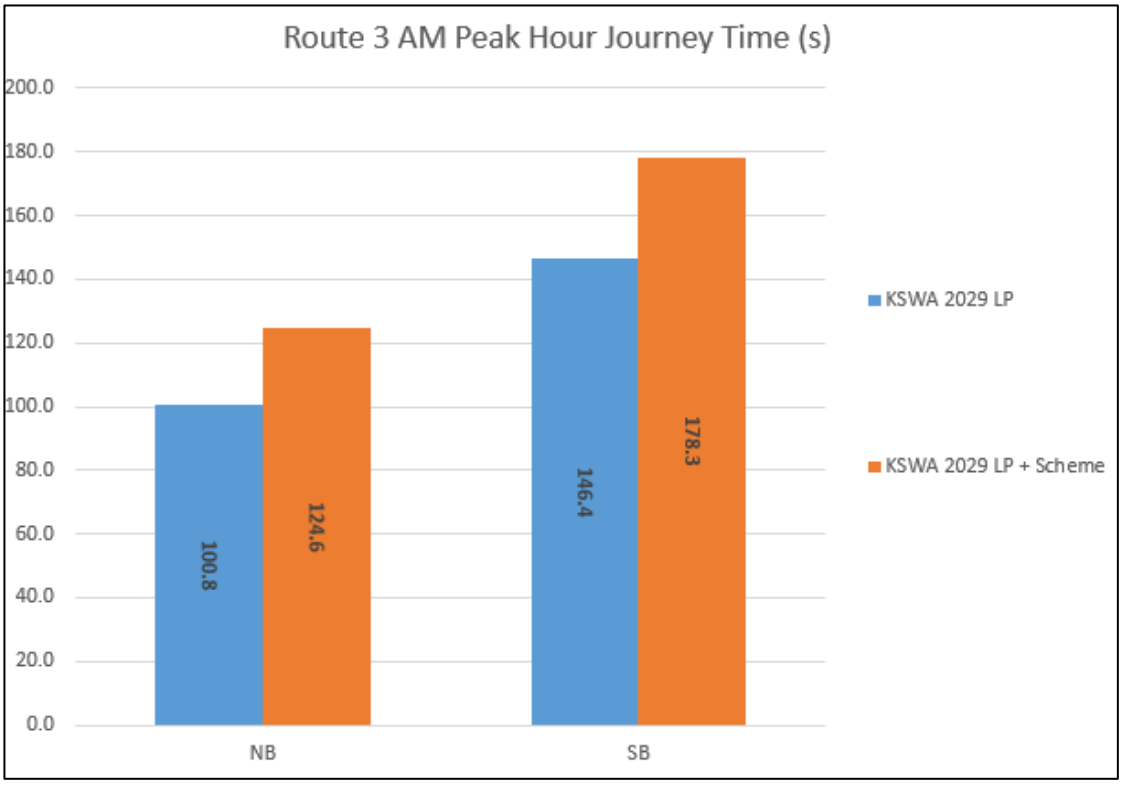
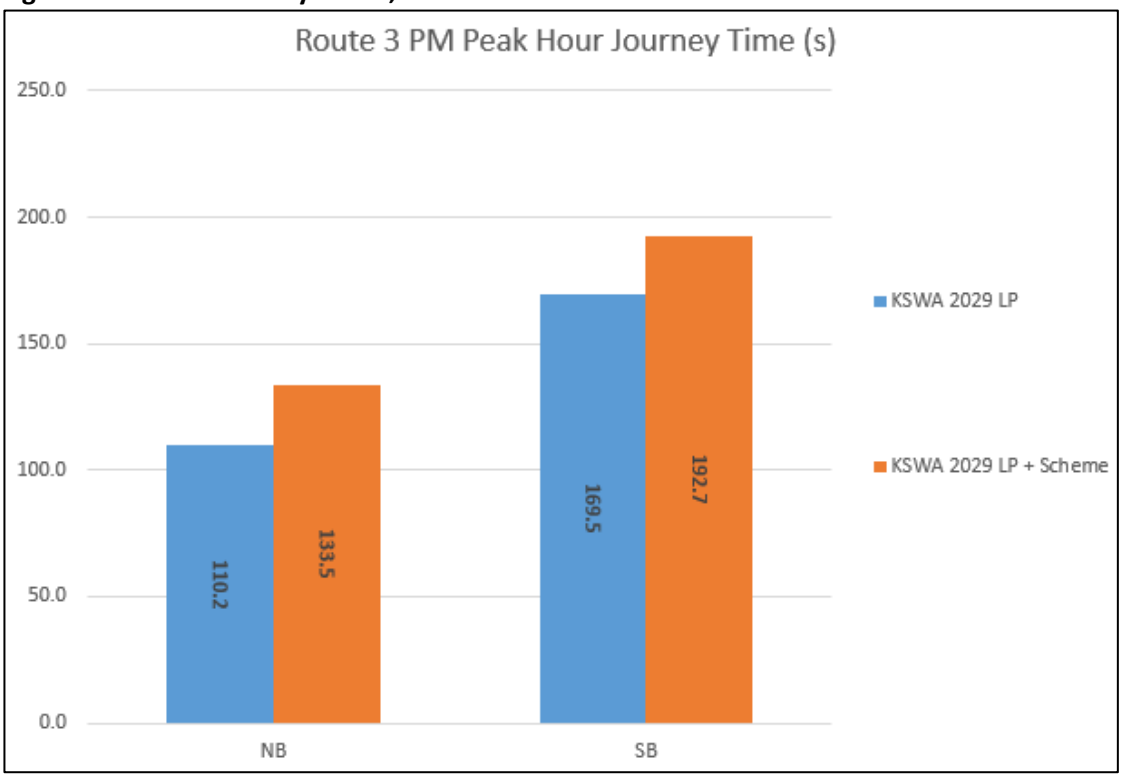


Figure 9: Route 3 Journey Times, PM



17. No notable impact was recorded on the other routes. The graphs presenting the journey times on the other routes is provided in **Annex A**.

Average Maximum Queue Analysis

18. Queue assessment locations have been selected for this analysis to cover the scheme area. The following figure displays the queue locations that were assessed.

Figure 10: Queue Junctions

19. The key junctions that will be displayed in this section are Junctions 1 and 9. No notable impact is recorded at the other junctions.

20. The figures that will follow show the peak hour average maximum queue lengths for the junctions.

Figure 11: Junction 1 Average Maximum Queue Lengths, AM

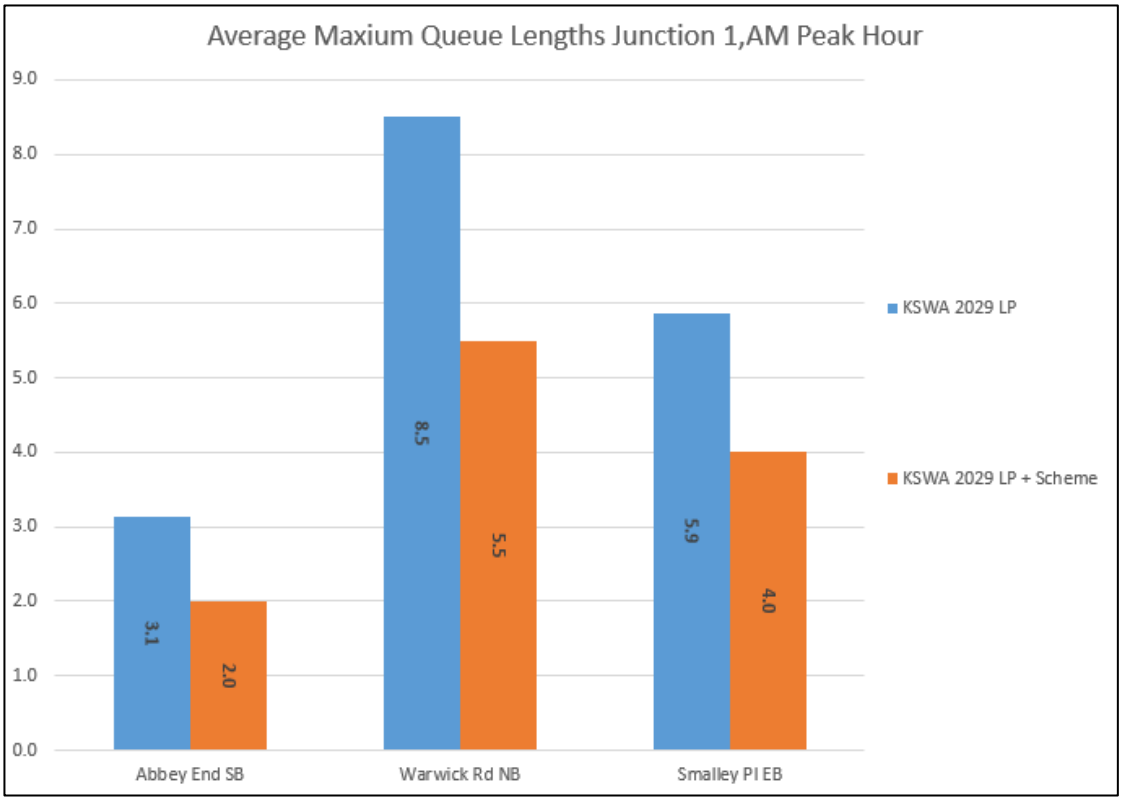


Figure 12: Junction 1 Average Maximum Queue Lengths, PM

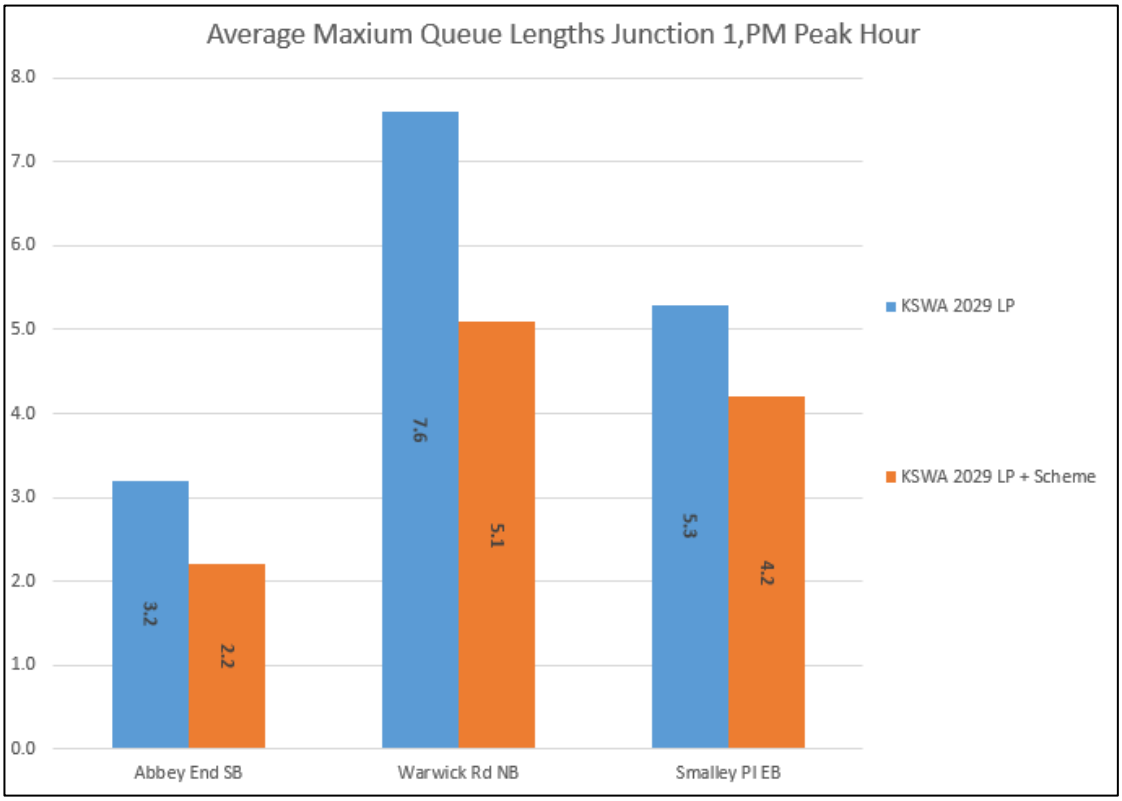


Figure 13: Junction 9 Average Maximum Queue Lengths, AM

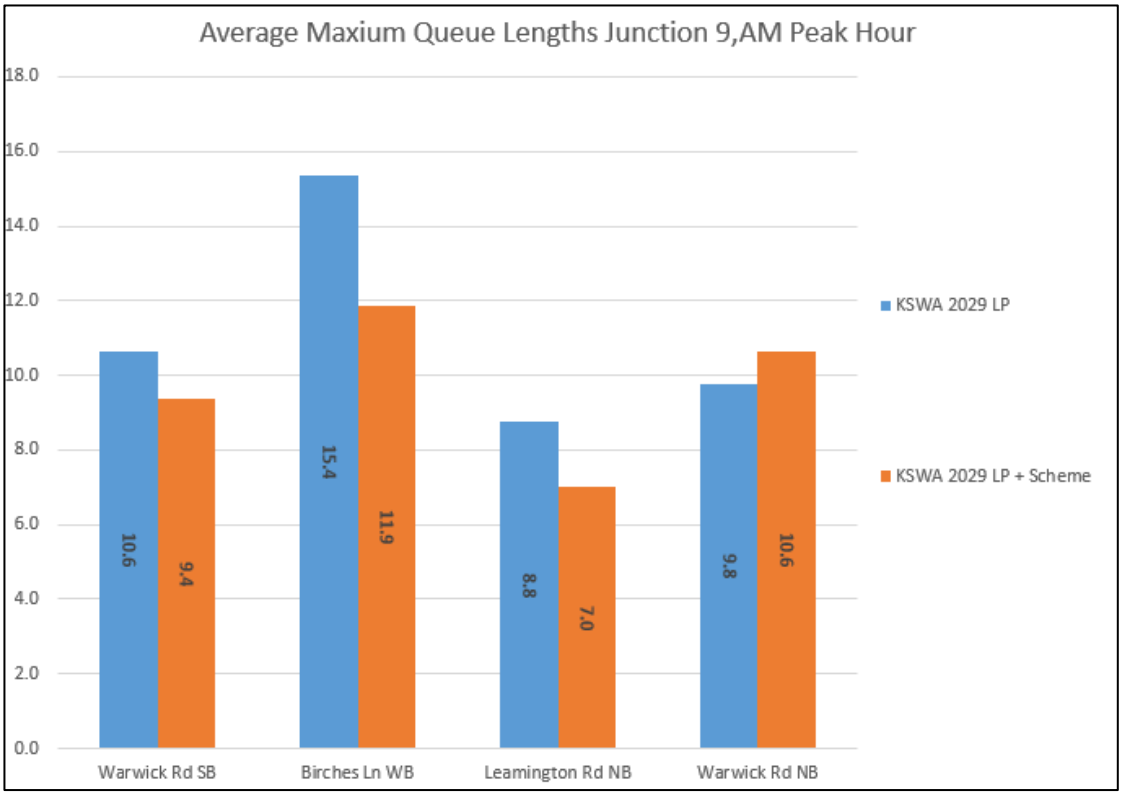
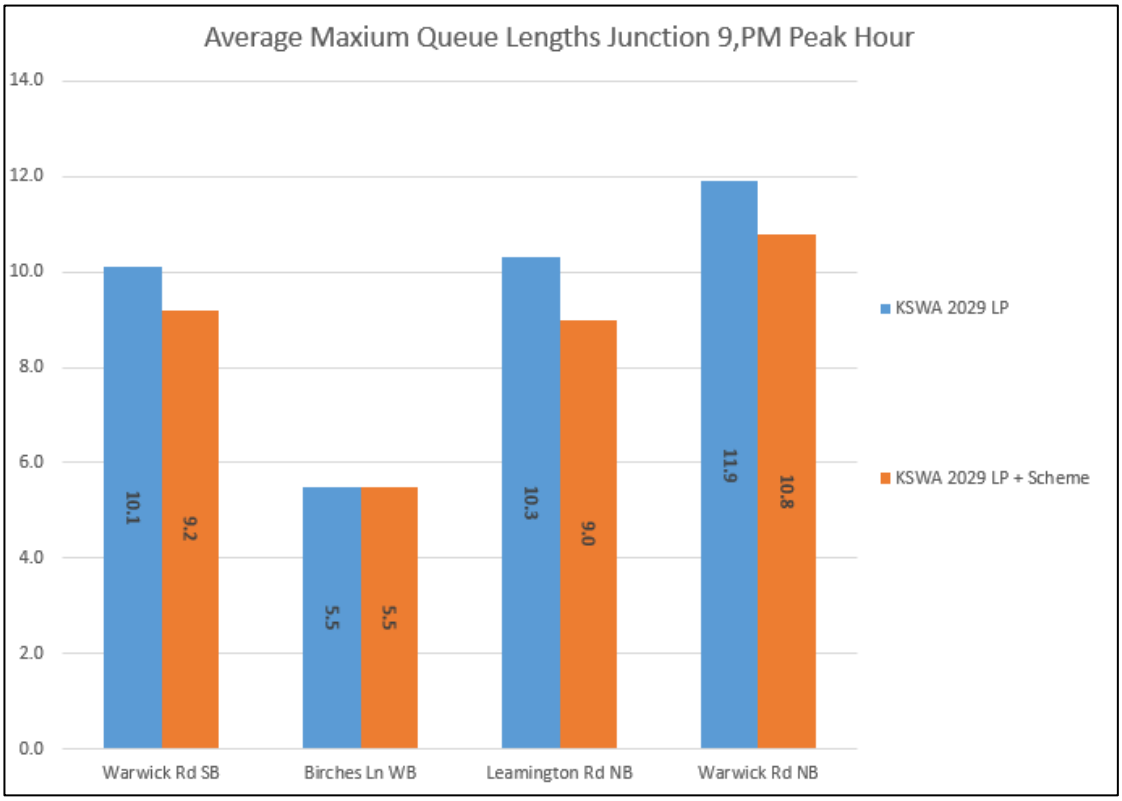


Figure 14: Junction 1 Average Maximum Queue Lengths, PM



21. The average maximum queue length figures show that overall queueing at these junctions is reduced, in both periods. This is the case for almost all of the measured junctions. This is evidence that the traffic calming scheme is reducing the number of cars using Warwick Rd.

Air Quality Analysis

22. In February 2019 VM conducted an air quality analysis of the Warwick Rd traffic calming scheme using the KSWA 2029 Local Plan model.

23. The air quality assessment was conducted using the Paramics air quality analysis tool, AIRE. This assessment involved measuring the tail pipe emissions in both the KSWA Local Plan model with and without the Warwick Rd traffic calming scheme.

24. Completion of the AIRE assessment has enabled a comparison of the level of the following outputs to be made between each scenario:

- Nitrogen
- Particulate Matter (PM10)
- Carbon

25. The Air Quality outputs for the 2029 Local Plan assessment are presented in Table 2 below.

Table 1: KSWA 2029 Local Plan Air Quality Outputs

Output		2029	2029 + Scheme	*Diff*
Nitrogen Emissions (g)	AM	68879553	69387587	0.73%
	PM	63342642	62765312	-0.92%
PM10 Emissions (g)	AM	1932673	1943457	0.55%
	PM	1793498.674	1778087	-0.87%
Carbon Emissions (g)	AM	11833744887	11794457288	-0.33%
	PM	11164736671	11106899233	-0.52%

26. The assessment has revealed that the scheme does not trigger a significant change in the emissions recorded on Warwick Road in Kenilworth, as all changes in emissions are less than 1% and can be considered negligible

27. The full air quality analysis can be read in **Annex B**.

Summary

28. WCC have requested that VM test the impacts of a proposed traffic calming scheme in Kenilworth.

29. The scheme will be tested in the KSWA 2029 Local Plan model, resulting in the following two scenarios:

- Scenario 1 – KSWA 2029 LP
- Scenario 2 – KSWA 2029 LP + Scheme

30. The proposed traffic calming scheme includes a series of raised tables and speed bumps along Warwick Rd and on all arms of the Warwick Rd/Abbey End Roundabout.

31. Network wide statistics showed that the scheme has no notable impact on the wider network due to the small scale nature of the proposed scheme.

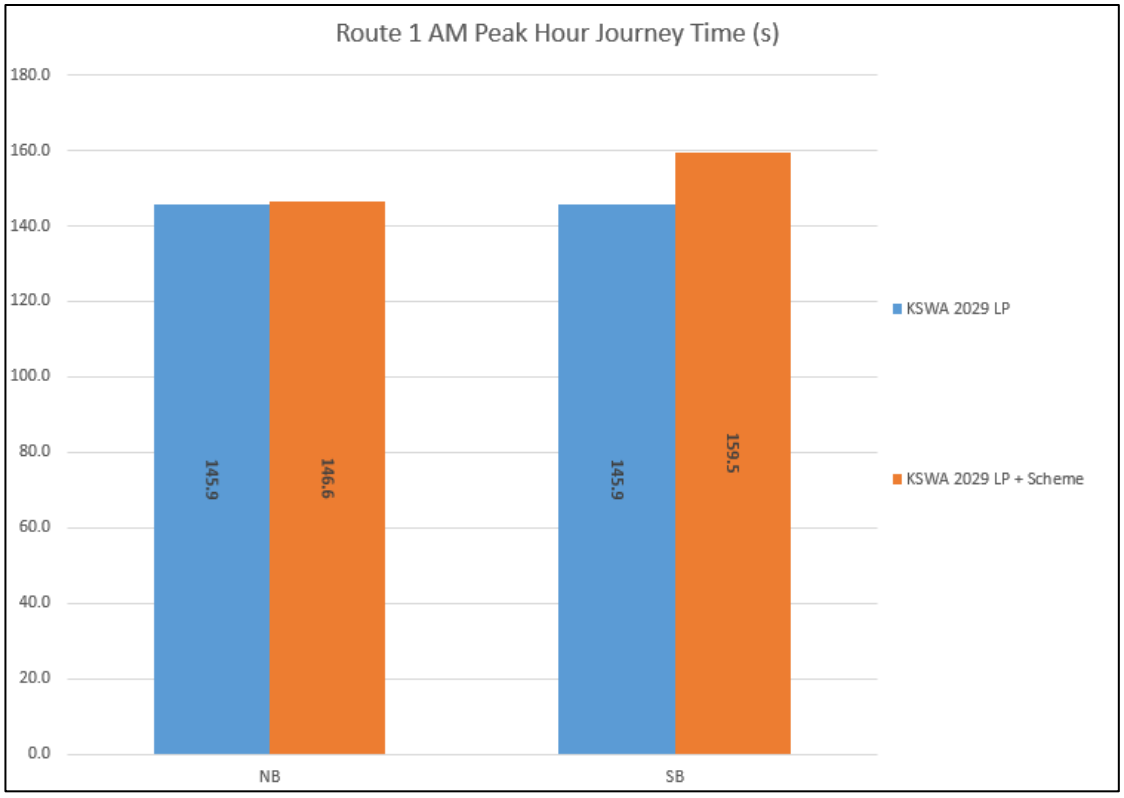
32. The journey time analysis showed that along Warwick Rd the average journey time increases with the introduction of the scheme. Routes in an out of the area also showed minimal changes, which is more likely attributable to model variance.

33. It was shown in the analysis of the average maximum queue lengths that, overall, the queues were reduced in the area surrounding the traffic calming.

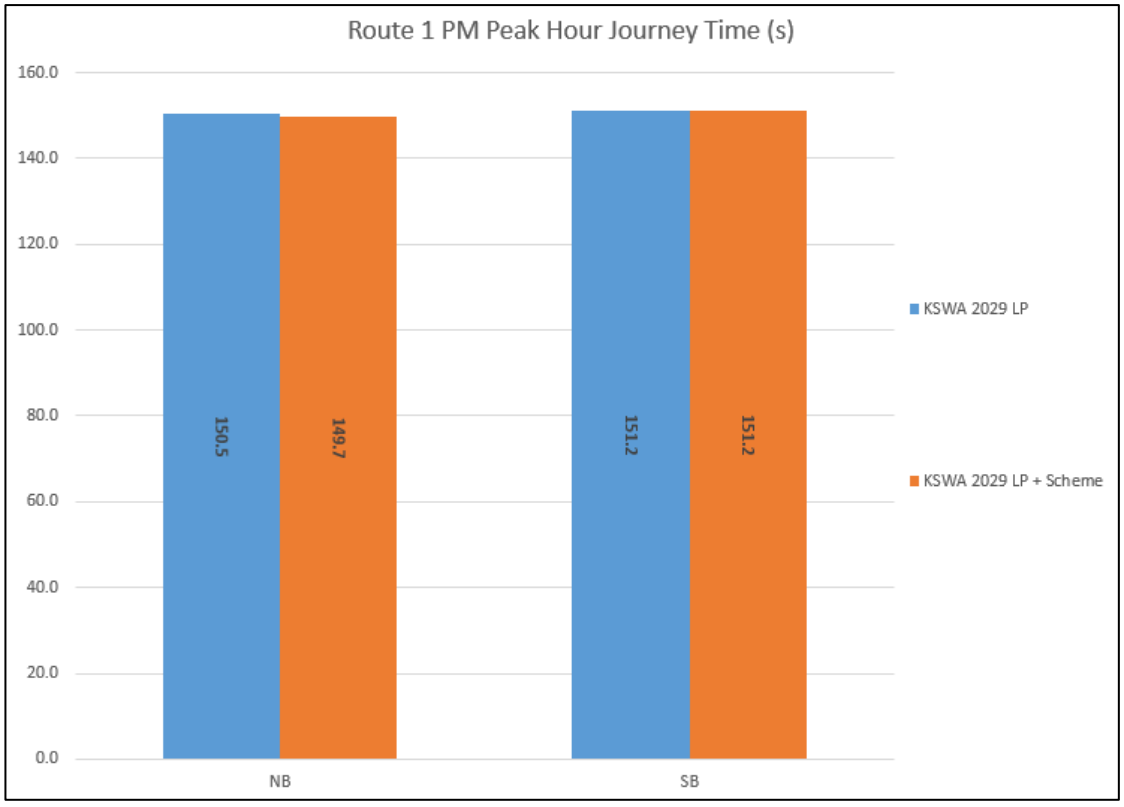
34. Air quality analysis, using the Paramics tool AIRE, showed that the traffic calming scheme does not notably affect the recorded tailpipe emissions.

ANNEX A – Journey Time Impact

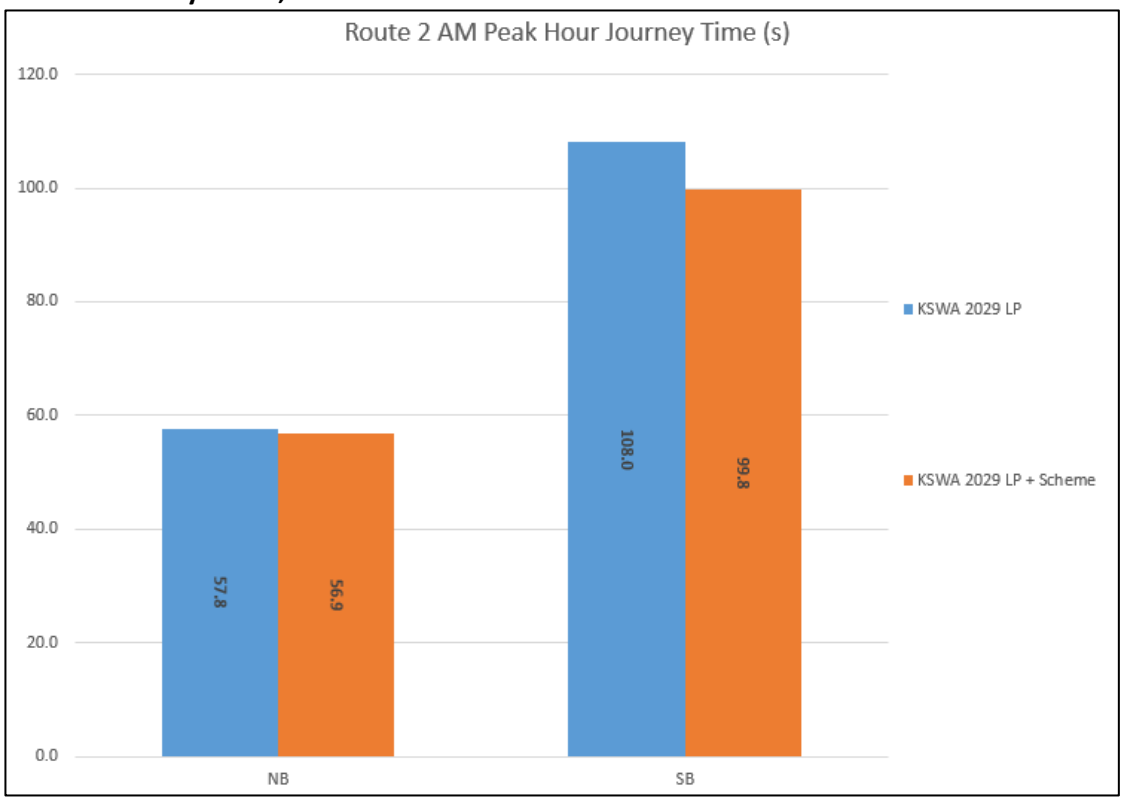
Route 1 Journey Times, AM



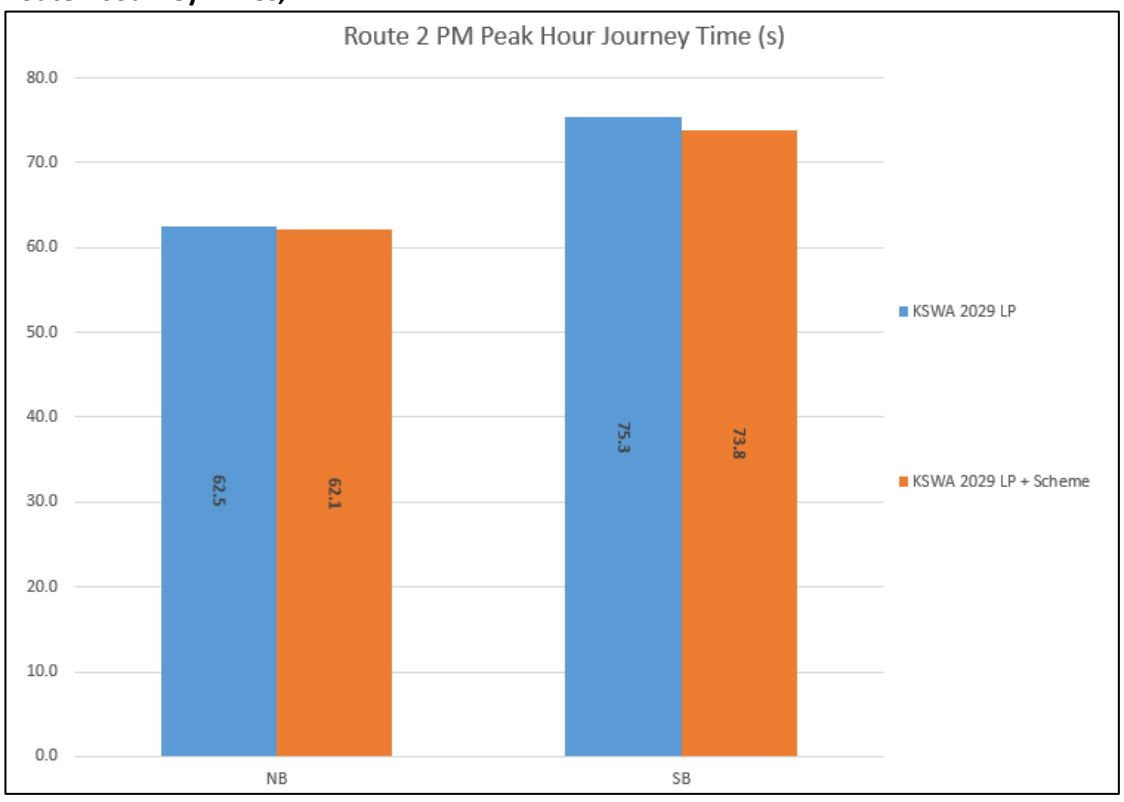
Route 1 Journey Times, PM



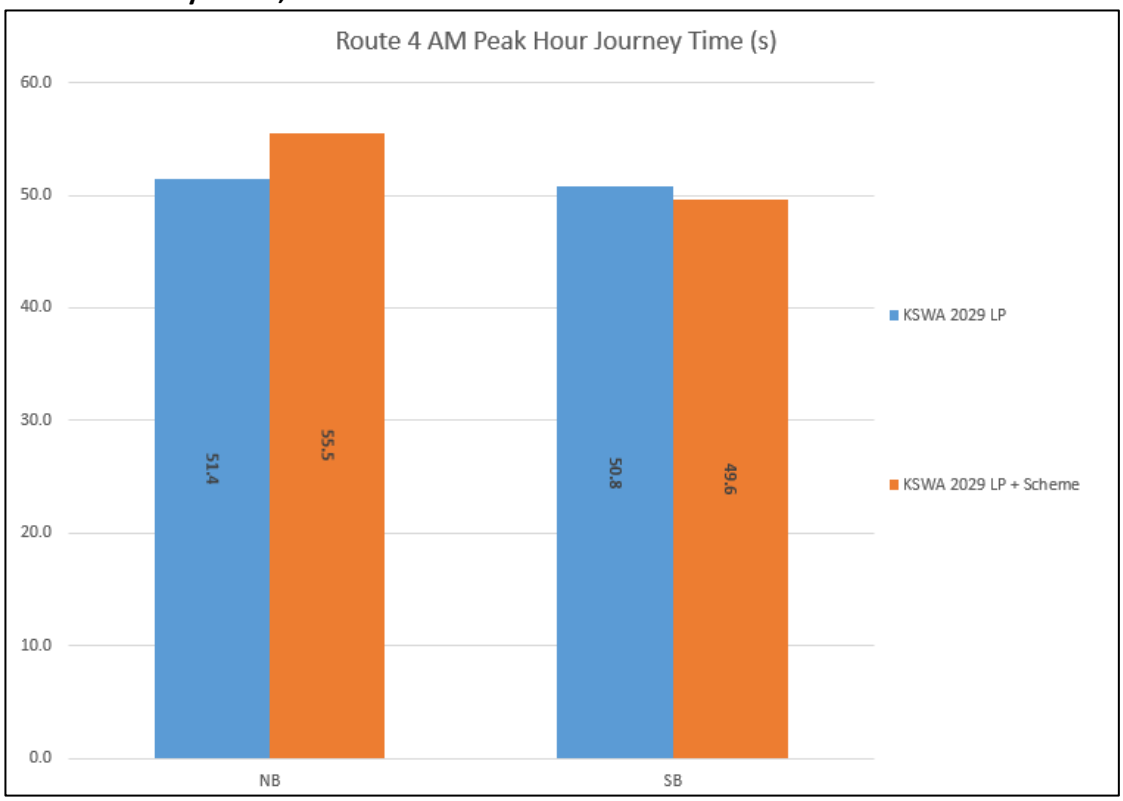
Route 2 Journey Times, AM



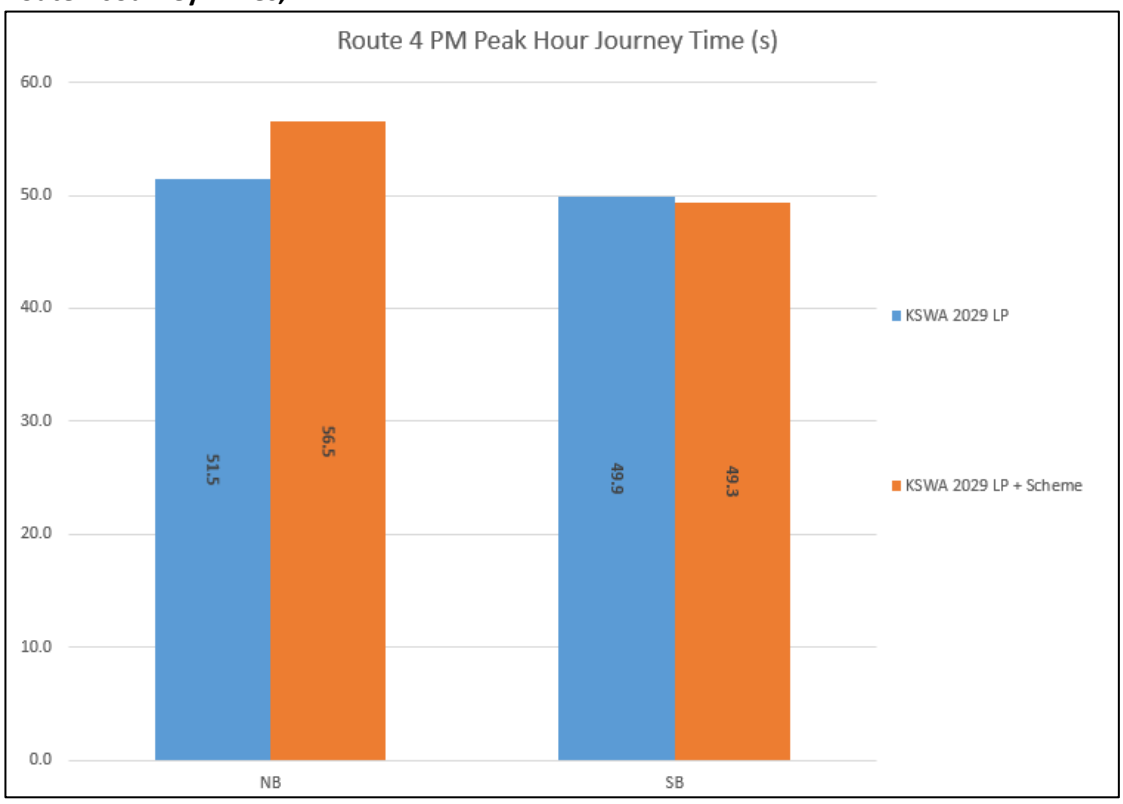
Route 2 Journey Times, PM



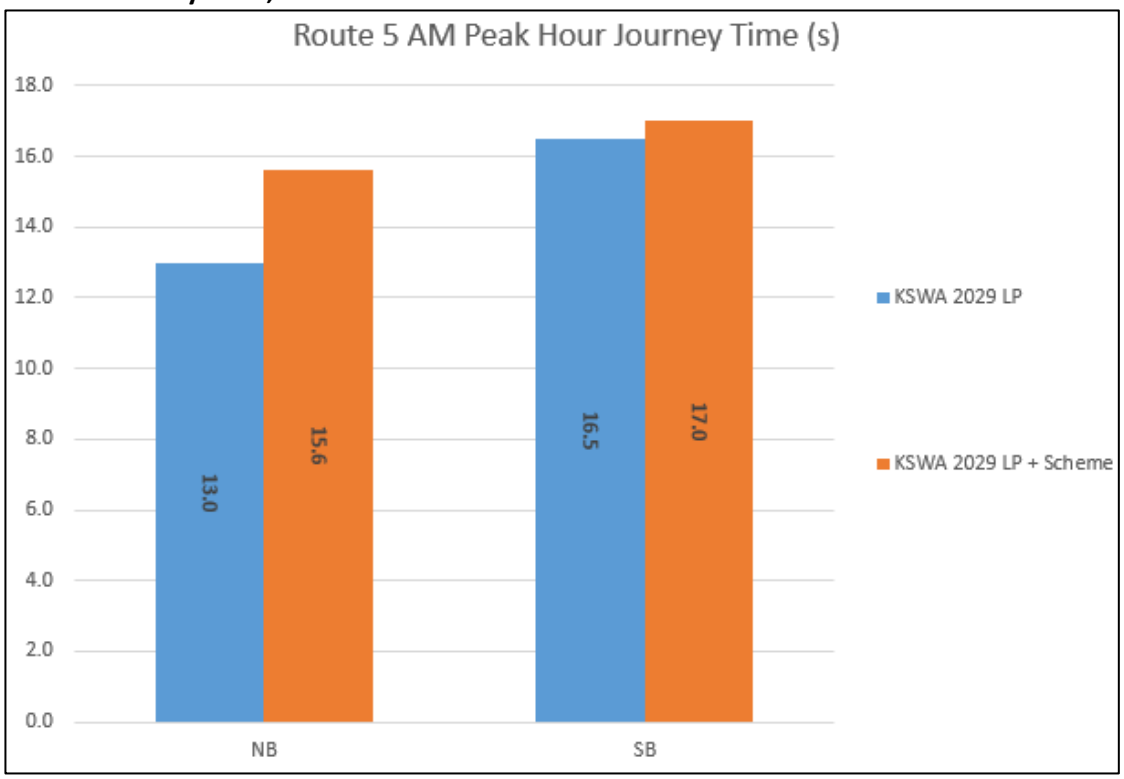
Route 4 Journey Times, AM



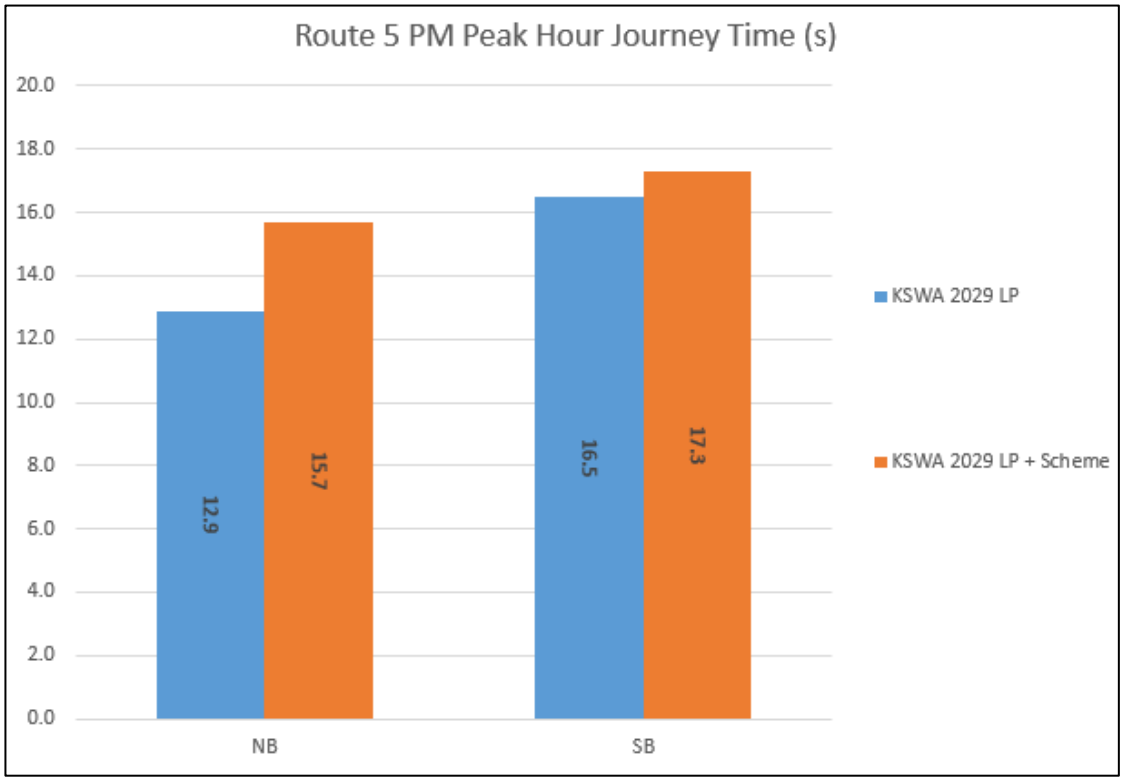
Route 4 Journey Times, PM



Route 5 Journey Time, AM



Route 5 Journey Times, PM



ANNEX B – Journey Time Impact

Warwick Road Scheme: Air Quality

Modelling Assessment Results

February 2019

VM195214.TN001

Introduction

1. Vectos Microsim (VM) has been commissioned by Warwickshire County Council (WCC) to assess the impact on tail pipe emissions of the proposed Warwick Road scheme. The testing has been undertaking using WCC's Kenilworth and Stoneleigh Wide Area (KSWA) model.

2. The proposed Warwick Road Scheme is intended to reduce the speed limit and introduce raised tables to manage traffic. The scheme is presented in Figure 1 below.

Figure 1: Warwick Road Scheme

Model Scenarios

3. The following scenarios have been used to inform the assessment summarised in this Note.

- M001 – KSWA 2021 Reference model
- M002 – KSWA 2021 Reference model + Scheme
- M003 – KSWA 2029 Local Plan model
- M004 – KSWA 2029 Local Plan model + Scheme

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4. A comparative Air Quality Assessment has been carried using the above scenarios, which is focussed on the emissions recorded within the two model scenarios. A comparison of a with and without Scheme position has been completed in the 2021 Reference model and the 2029 Local Plan model.

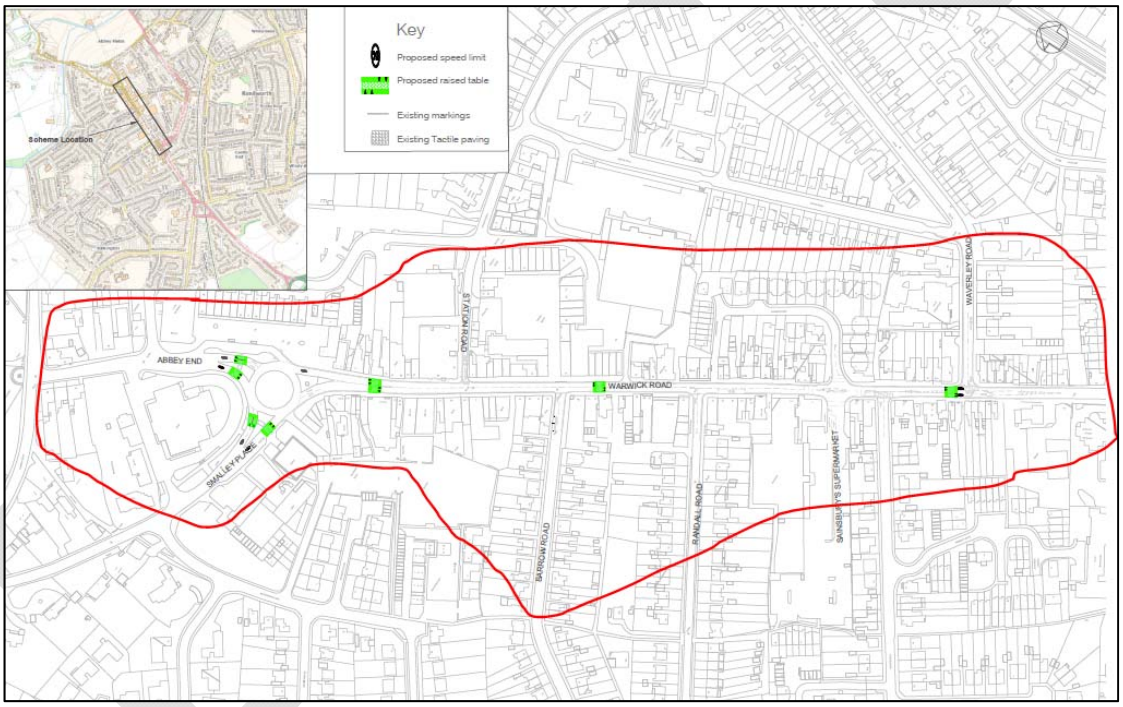
5. The results from the assessments are presented in the following sections.

Air Quality Assessment

6. The following section presents the air quality outputs that have been extracted from the KSWA scenarios and processed through the Analysis of Instantaneous Road Emissions (AIRE) programme, which was developed to work with the outputs from Paramics models.

7. The study area within the KSWA network has been defined using a filter (carposdefs file) that lists the links contained within the area outlined in the Figure below:

Figure 2: Air Quality Study Area



AIRE (Analysis of Instantaneous Road Emissions)

8. AIRE is an ancillary program specifically designed to process the outputs from traffic microsimulation models and calculate vehicle emissions. AIRE incorporates over 3,000 Instantaneous Emissions Modelling (IEM) tables, which are used to estimate tailpipe emissions from individual simulated road vehicles.

9. The IEM tables were derived from PHEM (Passenger car and Heavy duty Emissions Model), which was developed by the Technical University of Graz. PHEM is a vehicle dynamics model with engine maps, enabling emissions to be output for various engine speeds and engine loads.

10. AIRE produces estimates of the oxides of nitrogen, particulate matter and total carbon that result from the combustion of fuel throughout each simulated vehicle's journey. The estimates are produced on a simulated time step by time step basis, so the detail and quality of the resulting output emissions estimates are directly related to the adopted simulation's fidelity and robustness.

11. The estimates produced by AIRE are for tailpipe emissions and do not include the impact of dispersion within the atmosphere, ambient factors, such as weather and temperature, or the local built environment.

Results

12. Completion of the AIRE assessment has enabled a comparison of the level of the following outputs to be made between each scenario, at each of the AQMAs being assessed:

- Nitrogen
- Particulate Matter (PM10)
- Carbon

13. The outputs have been collected and compared between the four scenarios:

- M001 – KSWA 2021 Reference model
- M002 – KSWA 2021 Reference model + Scheme
- M003 – KSWA 2029 Local Plan model
- M004 – KSWA 2029 Local Plan model + Scheme

14. The results are presented below.

2021 Reference Assessment

15. The Air Quality outputs for the 2021 Reference assessment are presented in Table 1 below.

Table 1: 2021 Reference Results

Output	Period	2021	2021 + Scheme	*Diff*
Nitrogen Emissions (g)	AM	70191505	70332523	0.20%
	PM	63429822	64066996	0.99%
PM10 Emissions (g)	AM	1936652	1939142	0.13%
	PM	1789005	1803647	0.81%
Carbon Emissions (g)	AM	11698326184	11720556657	0.19%
	PM	11047676693	11026908817	-0.19%

16. The impact of the schemes on tailpipe emissions within the study are is shown to minimal, with changes in the emission particles being less than 1% in all cases.

17. From this assessment, it is fair to conclude that the inclusion of the proposed scheme on Warwick road has a negligible impact on tail pipe emissions along this corridor.

2029 Local Plan Assessment

18. The Air Quality outputs for the 2029 Local Plan assessment are presented in Table 2 below.

Table 2: 2029 Local Plan Results

Output		2029	2029 + Scheme	*Diff*
Nitrogen Emissions (g)	AM	68879553	69387587	**0.73%**
	PM	63342642	62765312	**-0.92%**
PM10 Emissions (g)	AM	1932673	1943457	**0.55%**
	PM	1793498.674	1778087	**-0.87%**
Carbon Emissions (g)	AM	11833744887	11794457288	**-0.33%**
	PM	11164736671	11106899233	**-0.52%**

19. As was shown in the 2021 Reference assessment, the impact on the tail pipe emissions following the inclusion of the Scheme is negligible and in all cases changes by less than 1%. It is, however, worth note that the majority of changes are highlighting redcutions in the particle emissions, albeit by marginal levels.

Air Quality Summary

20. The air quality assessment above presents results from the 2021 KSWA Reference model and the 2029 Local Plan model, with and without the Warwick Road scheme in place.

21. Air quality assessments have been undertaken using the Paramics air quality analysis tool, AIRE.

22. The assessment has revealed that the scheme does not trigger a significant change in the emissions recorded on Warwick Road in Kenilworth.