# Technical Note

Project – **VISSIM Modelling – Newgate Lane**
Subject – **Base / Future Base / Future Proposed Model Supporting Note**

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# 1. Introduction

## Purpose/Scope

1.1. Red Wilson Associates (RWA) has been appointed by Pegasus Group to provide VISSIM modelling and design services in respect of Newgate Lane East with Newgate Lane in Hampshire.

1.2. The development of the land west of Newgate Lane includes 190 dwellings and will create additional traffic on the road network. This traffic is likely to use the junction of Newgate Lane East with Newgate Lane. Initial assessments of this junction and the proposal of signalising the junction have already been assessed however at the request of Hampshire County Council further assessments are being made.

1.3. The principal objective of Red Wilson Associates involvement in this scheme is to assess the impact of the development with the junction in its current form as a priority junction in VISSIM.

1.4. Hampshire County Council (HCC) do not have any specific modelling guidelines that relate to microsimulation modelling. Industry best practice was used to caveat and demonstrate validation of the modelling in the AM and PM peak periods against recently undertaken traffic turning counts and journey time data (November 2019). The final models developed are in accordance with the Design Manual for Roads and Bridges (DMRB) Modelling Guidelines and Transport for London Modelling Guidelines Version 3.

1.5. The VISSIM Modelling was undertaken in version 10.00-12 (static assignment) to develop base, future base and future proposed scenarios for the AM and PM 1-hour peak periods as part of the future development in the vicinity of Newgate Lane and Newgate Lane East B3385.

1.6. The existing base models were calibrated and validated in accordance with the available modelling guidelines for traffic turning counts and journey times. These models were considered fit for the purpose of being used as a base line for comparison vs. future base and future proposed modelling results.

1.7. The base modelled JYT difference vs. surveyed data was within the acceptable range/limit of under 60sec and/or 15% in both peaks.

1.8. The purpose of the VISSIM base models was to ensure that an accurate representation of the existing traffic network structure and network data have been applied. In addition, these VISSIM base models will form the basis for comparison against scheme proposals.

1.9. This technical note details the development and validation of the Base (2019), Future Base (2024) and Future Proposed (2024) VISSIM Modelling for AM and PM peak periods.

## Study Area

1.10. The site is located near B3385 Newgate Lane East / Newgate Lane in Gosport and is shown in Figure 1.0. The study site is comprised of a major/minor priority road junction.

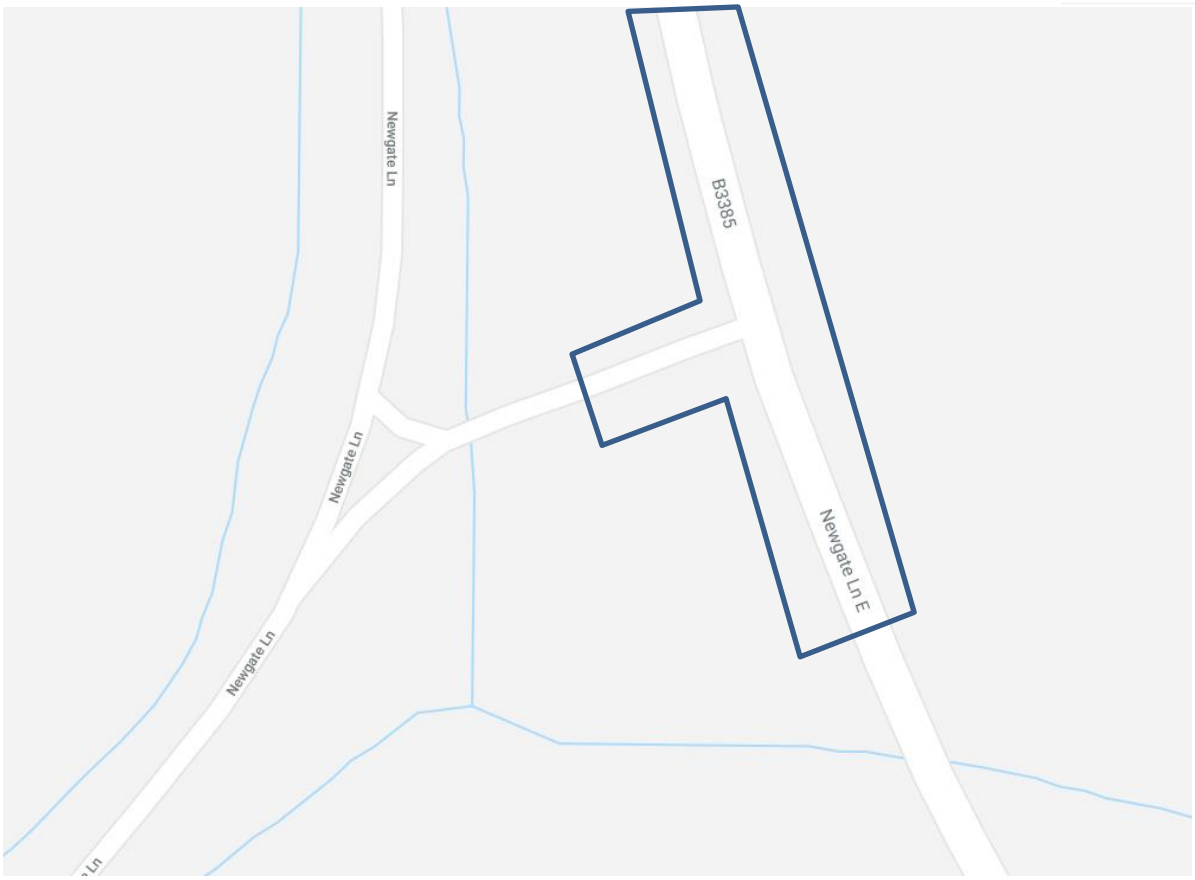



*Figure 1.0 – B3385 Newgate Lane East / Newgate Lane (priority junction)*

## 2. Traffic Data Collection

### Traffic Flow Survey

2.1. Data collection was undertaken to obtain traffic survey data in the AM and PM peak periods. The main surveys were undertaken on Thursday 28th November 2019 for the site mentioned in Figure 1.0.

2.2. The 1 hour time period for the surveys provided for modelling were as follows:

- AM (Thursday) – 08:00 – 09:00,
- PM (Thursday) – 17:00 – 18:00.

2.3. The vehicle classification in the traffic survey data was as follows:

- Car
- Taxi
- LGV
- Motor Cycle
- Pedal Cycle
- OGV1
- OGV2
- Coaches/Buses.

### General Traffic Journey Time Survey

2.4. In-Car journey time data was collected on the same day and for same time periods similar to the traffic survey data for sections shown in Figure 2.1.

2.5. There is a signalised junction and a signalised roundabout located on the north and south side of the study junction respectively. However, the north and southbound traffic has been modelled in free flowing conditions without including these signalised junctions. Hence, the AM & PM surveyed journey times was used as a reference to validate existing base VISSIM modelling journey times as per the modelling guidelines with a difference of 15% or ± 60sec modelled journey time data.


*Figure 2.1 – JYT Sections*

## 3. Calibrated Base Modelling

### Model Development

3.1. The existing base VISSIM models were developed using the November 2019 traffic data and TfL's VISSIM template, which were then used as a point of reference to test future base and proposed modelling scenarios.

3.2. VISSIM version 10.00-12 was used to code the outlined network in Figure 1.0 to calibrate VISSIM models and validate junction turning counts and journey times (Figure 2.1).

3.3. These base VISSIM models were adjusted with minor tweaks for priority rules to bring them within the acceptable limit for traffic flow and journey time validation against the traffic surveys where applicable.

3.4. An internal audit was undertaken on completion of the model development prior to submission.

### Simulation Parameters and Network Parameters

3.5. There were no changes made to the simulation and network parameters in the approved TfL's VISSIM template. The simulation period for the AM and PM peak models includes a 15 minute warm-up period at the start of the simulation and a 15 minute cool-down period at the end with a 1 hour peak period. These warm-up and cool-down periods were used to replicate the existing network conditions/congestion in the models prior to collecting the data for comparison against the surveyed data.

3.6. Details of the simulation periods are presented in Table 3.1.

| Peak Period | Start-up | Peak Hour | Cool-down |
|---|---|---|---|
| AM Peak | 07:45- 08:00 | 08:00 - 09:00 | 09:00 - 09:15 |
| PM Peak | 16:45 - 17:00 | 17:00 - 18:00 | 18:00 -18:15 |

*Table 3.1 – VISSIM base model simulation periods*

### Vehicle Types and Classes

3.7. VISSIM uses individual vehicle types instead of Passenger Car Unit (PCU), which are grouped into vehicle classes. The surveyed 1-hour peak period flows were inputted into the model for each type and in 15min intervals. These vehicular types were then grouped into the following classes: -

- Lights = Car + LGV + TAXI,
- Heavies = OGV1 + OGV2,
- Buses.

### Route Assignment

3.8. Local routing was used due to the simplicity of the modelled network to validate the traffic flows against the traffic surveyed data.

### Public Transport

3.9. Bus route 21 was modelled as per the actual timetables, where bus dwell times were assumed

as 20sec..20 seconds has been used in the absence of recorded dwell times as it is typically used as best practice for dwell times in London which is also a worst-case scenario.

3.10. Due to the limited number of buses in the model an amendment to the dwell time is unlikely to affect the modelling results.

Priority Rules/Conflict Areas

3.11. Priority rules at the Newgate Lane East / Newgate Lane were continuously adjusted in order to achieve traffic flow and journey time validation in the base models to reflect on-street behaviour.

3.12. At the far extents of the model on Newgate Lane are signalised junctions. To replicate the fact that vehicles entering the network have just left a signalised junction, Reduced Speed Areas have been used.

3.13. It is important to know that due to the location of the signals, traffic is more likely to arrive at the junction in waves due to the discharge from the junction. The continuous flow that has been modelled in all scenarios can be seen as worst case. In practice there would be gaps in flow, making it easier for vehicles to enter and exit the side road.

3.14. Reduced Speed Areas (RSA) between 20mph to 30mph was used on the start of Newgate Lane East link south and northbound. This is to replicate lower speeds during the signalised discharge rate to calibrate through puts in both directions.

3.15. Network desired speed distribution used was 40mph, which is the existing speed limit at the study area.

## 4. Validated Base Modelling

### Base Model Validation

4.1. The VISSIM modelling results represent an average of 20 random seeds in the AM and PM peak periods.

4.2. Each seed in VISSIM represents different vehicular arrival times in the network, the stochastic variability of their driving behaviour and also selection of a certain distribution value e.g. speeds, dwell times etc. if applicable. None of the SEEDs replicate 'real life' better than another. It's more comparable to the daily changes of the traffic patterns at the same location. The VISSIM Base modelling parameters were reviewed and adjusted continuously to better fit the observed driving behaviour during the calibration and validation process where applicable.

4.3. New counts were conducted at the junction to ensure the journey times and count surveys were undertaken on the same day. In order to validate the model, journey times and traffic counts were undertaken on 28th November 2019.

### Traffic Flow GEH Statistic

4.4. The GEH statistic is a standard way of comparing observed and modelled flows as defined in the DMRB Volume 12, Chapter 4. It is used to remove the bias that exists when comparing flows of different magnitudes using percentages. For example, a difference of 10 in a flow of 100 vehicles per hour (VPH) is less significant (GEH = 3.0) than a difference of 100 in a 1000 VPH flow (GEH = 11.5), even though they both show a percentage difference of 10%.

4.5. The GEH statistic is calculated as follows:

$$GEH = \sqrt{\frac{(M-C)^2}{0.5 \times (M+C)}}$$

Where:
GEH.....is the GEH statistic;
M.....is the modelled flow; and
C.....is the observed flow.

4.6. In summary, the following set of acceptable ranges and limits have been used to assess model validation based upon all turning movements within the study area:

- GEH value: ≤5.0 in at least 85% of cases (< 3 for all critical links);

4.7. The AM peak modelled traffic flow vs. surveyed data comparison shows that these models meet the validation criteria, where 100% of all the GEH values are less than 5 for all turning movements. Out of 6 turning counts, the highest GEH is 0.3 from Newgate Lane North to Local Access, which is not deemed significant.

4.8. Similarly, the PM peak modelled traffic flow vs. surveyed data comparison shows that it meets the validation criteria, where all the GEH values are less than 5 (100%) for all turning movements. In summary, both models are considered to validate well to the observed traffic flows. GEH comparison for the AM and PM peak periods are shown in Table 4.1 & 4.2.

| | | | General Traffic Hour (0800 - 0900) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Survey Data | | | Base Model | | | GEH |
| | | | Lights | Heavies | Survey Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 27 | 8 | 35 | 25 | 8 | 33 | 0.3 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 858 | 23 | 881 | 859 | 22 | 881 | 0.0 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 24 | 1 | 25 | 25 | 1 | 26 | 0.2 |
| | B3385 Newgate Lane East - North | Left (1.3) | 28 | 4 | 32 | 28 | 4 | 32 | 0.0 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 1588 | 22 | 1610 | 1582 | 22 | 1604 | 0.1 |
| | Local Access | Left (1.1) | 20 | 2 | 22 | 21 | 1 | 22 | 0.0 |

*Figure 4.1 – AM Traffic Flow comparison – Base vs. Survey*

| | | | General Traffic Hour (1700 - 1800) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Survey Data | | | Base Model | | | GEH |
| | | | Lights | Heavies | Survey Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 29 | 1 | 30 | 29 | 1 | 30 | 0.0 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 1642 | 6 | 1648 | 1629 | 6 | 1635 | 0.3 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 23 | 0 | 23 | 23 | 0 | 23 | 0.0 |
| | B3385 Newgate Lane East - North | Left (1.3) | 24 | 2 | 26 | 24 | 2 | 26 | 0.0 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 929 | 3 | 932 | 936 | 3 | 939 | 0.2 |
| | Local Access | Left (1.1) | 16 | 0 | 16 | 17 | 0 | 17 | 0.2 |

*Figure 4.2 – PM Traffic Flow comparison – Base vs. Survey*

## Car Journey Times

4.9. In car Journey Time (JYT) survey data was undertaken on a weekday for the AM & PM peak periods.

4.10. A summary of the Journey Time (JYT) modelled vs. surveyed data comparison for the AM and PM peak periods is shown in Tables 4.3 & 4.4. The JYTs differences for all validated routes between surveyed vs. base modelled is within 60sec.

| | | | | Survey (Avg) | Base Model (Ave) | Actual Diff | %age Diff |
|---|---|---|---|---|---|---|---|
| Route Name | Map | Direction | Length (meter) | JYT (sec) | JYT (sec) | Survey vs. Base | Survey vs. Base |
| Green Route | C to B | NB | 861 | 105 | 93 | -13 | -12% |
| | B to A | NB | 634 | 63 | 65 | 2 | 4% |
| | C to A | NB | 1495 | 168 | 158 | -10 | -6% |
| Red Route | A to B | SB | 663 | 101 | 57 | -43 | -43% |
| | B to C | SB | 873 | 85 | 79 | -7 | -8% |
| | A to C | SB | 1536 | 186 | 136 | -50 | -27% |
| Purple Route | A to B | SB | 677 | 77 | 99 | 22 | 29% |
| | B to D | SB | 51 | 6 | 5 | -2 | -25% |
| | A to D | SB | 727 | 84 | 104 | 20 | 24% |
| Yellow Route | D to B | SB | 72 | 53 | 70 | 16 | 31% |
| | B to C | SB | 872 | 69 | 74 | 4 | 6% |
| | D to C | SB | 943 | 123 | 143 | 21 | 17% |

*Table 4.3 – AM Base VISSIM JYT validation results comparison vs surveyed data*

| | | | | Survey (Avg) | Base Model (Ave) | Actual Diff | %age Diff |
|---|---|---|---|---|---|---|---|
| Route Name | Map | Direction | Length (meter) | JYT (sec) | JYT (sec) | Survey vs. Base | Survey vs. Base |
| Green Route | C to B | NB | 861 | 54 | 75 | 21 | 40% |
| | B to A | NB | 634 | 47 | 62 | 15 | 32% |
| | C to A | NB | 1495 | 100 | 136 | 36 | 36% |
| Red Route | A to B | SB | 664 | 115 | 76 | -39 | -34% |
| | B to C | SB | 873 | 79 | 85 | 6 | 8% |
| | A to C | SB | 1537 | 194 | 161 | -33 | -17% |
| Purple Route | A to B | SB | 685 | 101 | 86 | -15 | -15% |
| | B to D | SB | 48 | 9 | 5 | -4 | -45% |
| | A to D | SB | 733 | 110 | 91 | -19 | -17% |
| Yellow Route | D to B | SB | 74 | 26 | 35 | 9 | 34% |
| | B to C | SB | 871 | 71 | 82 | 11 | 15% |
| | D to C | SB | 945 | 97 | 117 | 20 | 20% |

*Table 4.4 – PM Base VISSIM JYT validation results comparison vs surveyed data*

Error Logs

4.11. Error logs were produced for both peak periods. There were no critical and/or a significant number of unacceptable errors produced at the end of each simulation run.

## 5. Summary and Conclusions - Base Models

5.1. The VISSIM Modelling was undertaken in version 10.00-12 (static assignment) to develop calibrated and validated base models for AM and PM 1-hour peak periods as part of the future development in the vicinity of Newgate Lane and Newgate Lane East B3385.

5.2. These models were developed for Pegasus Group against November 2019 traffic survey flows and in-car journey times for the morning and evening peak periods.

5.3. Car Journey Times are validated within 15% or ± 60 seconds when compared to the surveyed journey times for both peak periods, which is in accordance with the DMBR and TfL's Modelling Guidelines.

5.4. The highest journey time difference between modelled vs. surveyed data in the AM peak is from B3385 Newgate Lane East-north to south (actual diff: -50s), followed by B3385 Newgate Lane East-north to Newgate Lane (actual diff: 20s). This difference shows that the model is slightly fast southbound whilst slower from north to Newgate Lane. However, these differences are still within 60s and are not considered significant due to the length of the journey time sections.

5.5. As per the guidelines for traffic flow validation, 85% of all the traffic flows in the network should be validated to less than 5 GEH. Hence, the traffic flow in the network is validated to a limit within 5 GEH compared to the surveyed data for both peak period models.

5.6. The highest difference between base modelled vs. surveyed traffic flow that fails to clear in the AM peak is from B3385 Newgate Lane East-south to north (approx. 6 vehicles, GEH. 0.1) followed by B3385 Newgate Lane East-north to Newgate Lane (approx. 2 vehicles, GEH. 0.3). However, such low GEH values are not considered significant.

5.7. Similarly, the highest difference between modelled flow vs. surveyed flow failing to clear in the PM peak is from B3385 Newgate Lane East-north to south (approx. 13 vehicles, GEH. 0.3), followed by B3385 Newgate Lane East-south to north (approx. 7 vehicles, GEH. 0.2).

5.8. This demonstrates that there is no excessive queuing at the junction with vehicles easily accessing and egressing the minor arm with no significant delay.

5.9. Overall the VISSIM models in both peaks based on the 2019 traffic flows and car journey time information represents that there is no existing significant capacity issue in the network. All vehicles easily access and egress the minor arm and there was no queuing on the main arm.

5.10. These calibrated and validated Base VISSIM models are therefore considered fit to test any future scenario(s).

## 6. Future Base Models- DS1

### Traffic Flows and Routes

6.1. Future Base traffic flows were calculated to include all the development in the vicinity of the study area in 2024 excluding the proposed development in question for the AM and PM peak periods. The Future Base 2024 was used for each peak to build the future base models.

6.2. The percentage change for HGVs was applied to the proportion of MGV & HGV used in the base model to calculate the Future Base heavies (MGV+HGV). In addition, absolute change was applied to lights from Base to Future Base along with routing adjustments as per the calculations to produce future base modelling.

6.3. Therefore, a total number of additional flows was applied to the 2019 to get the 2024 traffic data for each vehicle compositions, except buses which remained unchanged.

6.4. The traffic flow comparison is provided in Appendix A.

6.5. Calibrated and validated Base VISSIM models (in section 5) were used as the basis to model the future base scenario for 2024 incorporating traffic growth and all local committed development flows.

6.6. Vehicle inputs and local routes were updated/amended to reflect the calculated growth in both peak VISSIM models.

### Layout Changes

6.7. The network layout remains un-changed in the Future Base modelling.

### Modelling Results Comparison

6.8. Traffic flow statistics is provided in Appendix A and shown in Tables 6.1 & 6.2, where traffic flows are compared against future base modelled flows (2024) for the AM & PM peak periods.

### Traffic Flow GEH Statistic- DS1

#### AM Peak

6.9. The highest GEH in the AM future base calculated vs. modelled flow comparison is from Newgate Lane to B3385 Newgate Lane East north and Newgate Lane East north to Newgate Lane (GEH: 0.4, 1 vehicle failed to clear) followed by B3385 Newgate Lane East south to Newgate Lane (GEH: 0.3, 1 vehicle1 failed to clear).

#### PM Peak

6.10. The highest GEH in the PM future base calculated vs. modelled flow comparison is from B3385 Newgate Lane East south to Newgate Lane (GEH: 0.3) where 1 vehicle failed to clear.

| | | | General Traffic Hour (0800 - 0900) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Future Base_SC_9 Calculated Data | | | Future Base_SC_9 Model | | | GEH |
| | | | Lights | Heavies | Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 23 | 1 | 24 | 21 | 1 | 22 | 0.4 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 731 | 53 | 783 | 728 | 50 | 778 | 0.2 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 26 | 0 | 26 | 25 | 0 | 25 | 0.2 |
| | B3385 Newgate Lane East - North | Left (1.3) | 18 | 2 | 20 | 17 | 1 | 18 | 0.4 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 1551 | 48 | 1599 | 1544 | 46 | 1590 | 0.2 |
| | Local Access | Left (1.1) | 18 | 1 | 19 | 19 | 1 | 20 | 0.3 |

*Table 6.1 – AM Future Base Traffic Flow comparison – Calculated vs. modelled*

| | | | General Traffic Hour (1700 - 1800) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Future Base_SC_10 Calculated Data | | | Future Base_SC_10 Model | | | GEH |
| | | | Lights | Heavies | Survey Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 24 | 0 | 24 | 24 | 0 | 24 | 0.0 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 1332 | 10 | 1342 | 1327 | 8 | 1335 | 0.2 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 29 | 0 | 29 | 29 | 0 | 29 | 0.0 |
| | B3385 Newgate Lane East - North | Left (1.3) | 24 | 0 | 24 | 23 | 0 | 23 | 0.2 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 904 | 8 | 913 | 910 | 7 | 917 | 0.1 |
| | Local Access | Left (1.1) | 18 | 0 | 18 | 19 | 0 | 19 | 0.3 |

*Table 6.2 – PM Future Base Traffic Flow comparison – Calculated vs. modelled*

## Journey times- DS1

6.11. Base vs. future base VISSIM Modelled Journey times comparison is provided in Tables 6.3 & 6.4 for the AM & PM peak periods.

6.12. The AM base and future base journey time result comparison indicates that there will be no significant change in the journey times on B3385 Newgate Lane East and Newgate Lane in all directions. The most notable change will be from Newgate Lane to B3385 Newgate Lane East south (-22s, -15%).

6.13. Similarly, the PM base and future base modelling result comparison indicates that the journey times will have less or no increase to journey time throughout the network. The notable change will be from Newgate Lane to B3385 Newgate Lane East south (-16s, 13%).

| | | | | Base Model (Ave) | Future Base_SC_9 Model (Ave) | Actual Diff | %age Diff |
|---|---|---|---|---|---|---|---|
| Route Name | Map | Direction | Length (meter) | JYT (sec) | JYT (sec) | Base vs. FB SC_9 | Base vs. FB SC_9 |
| Green Route | C to B | NB | 861 | 93 | 92 | 0 | -1% |
| | B to A | NB | 634 | 65 | 65 | 0 | 0% |
| | C to A | NB | 1495 | 158 | 158 | 0 | 0% |
| Red Route | A to B | SB | 663 | 57 | 56 | -1 | -2% |
| | B to C | SB | 873 | 79 | 77 | -1 | -1% |
| | A to C | SB | 1536 | 136 | 133 | -2 | -2% |
| Purple Route | A to B | SB | 677 | 99 | 93 | -6 | -6% |
| | B to D | SB | 51 | 5 | 5 | 0 | -1% |
| | A to D | SB | 727 | 104 | 98 | -6 | -6% |
| Yellow Route | D to B | SB | 72 | 70 | 51 | -19 | -27% |
| | B to C | SB | 872 | 74 | 71 | -3 | -4% |
| | D to C | SB | 943 | 143 | 121 | -22 | -15% |

*Table 6.3 – AM VISSIM JYT results comparison - Base vs Future Base*

| | | | | Base Model (Ave) | Future Base_SC_10 Model (Ave) | Actual Diff | %age Diff |
|---|---|---|---|---|---|---|---|
| Route Name | Map | Direction | Length (meter) | JYT (sec) | JYT (sec) | Base vs. FB SC_10 | Base vs. FB SC_10 |
| Green Route | C to B | NB | 861 | 75 | 75 | 0 | 0% |
| | B to A | NB | 634 | 62 | 62 | 0 | 0% |
| | C to A | NB | 1495 | 136 | 136 | 0 | 0% |
| Red Route | A to B | SB | 664 | 76 | 64 | -12 | -16% |
| | B to C | SB | 873 | 85 | 83 | -2 | -3% |
| | A to C | SB | 1537 | 161 | 147 | -14 | -9% |
| Purple Route | A to B | SB | 685 | 86 | 72 | -14 | -16% |
| | B to D | SB | 48 | 5 | 5 | 0 | 1% |
| | A to D | SB | 733 | 91 | 77 | -14 | -15% |
| Yellow Route | D to B | SB | 74 | 35 | 23 | -12 | -35% |
| | B to C | SB | 871 | 82 | 78 | -3 | -4% |
| | D to C | SB | 945 | 117 | 101 | -16 | -13% |

*Table 6.4 – PM VISSIM JYT results comparison – Base vs Future Base*

## Traffic Flow GEH Statistic- DS2

### AM Peak

6.14. The highest GEH in the AM future base calculated vs. modelled flow comparison is from the Newgate Lane to B3385 Newgate Lane East north (GEH: 0.6, 3 vehicles fail to clear) followed by B3385 Newgate Lane East south to north (GEH: 0.2, 9 vehicles fail to clear).

### PM Peak

6.15. The highest GEH in the PM future base calculated vs. modelled flow comparison is from B3385 Newgate Lane East south to Newgate Lane (GEH: 0.3) where 1vehicle failed to clear.

| | | | General Traffic Hour (0800 - 0900) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Future Base_SC_37 Calculated Data | | | Future Base_SC_37 Model | | | GEH |
| | | | Lights | Heavies | Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 19 | 1 | 20 | 18 | 1 | 19 | 0.2 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 485 | 35 | 520 | 486 | 33 | 519 | 0.1 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 21 | 0 | 21 | 21 | 0 | 21 | 0.1 |
| | B3385 Newgate Lane East - North | Left (1.3) | 22 | 3 | 25 | 20 | 2 | 22 | 0.6 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 1553 | 48 | 1600 | 1545 | 46 | 1591 | 0.2 |
| | Local Access | Left (1.1) | 21 | 1 | 23 | 22 | 1 | 23 | 0.1 |

*Table 6.5 – AM Future Base Traffic Flow comparison – Calculated vs. modelled*

| | | | General Traffic Hour (1700 - 1800) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Future Base_SC_38 Calculated Data | | | Future Base_SC_38 Model | | | GEH |
| | | | Lights | Heavies | Survey Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 20 | 0 | 20 | 19 | 0 | 19 | 0.2 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 811 | 6 | 817 | 810 | 4 | 814 | 0.1 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 24 | 0 | 24 | 24 | 0 | 24 | 0.0 |
| | B3385 Newgate Lane East - North | Left (1.3) | 32 | 0 | 32 | 31 | 0 | 31 | 0.2 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 882 | 8 | 890 | 887 | 7 | 894 | 0.1 |
| | Local Access | Left (1.1) | 23 | 0 | 23 | 22 | 0 | 22 | 0.3 |

*Table 6.6 – PM Future Base Traffic Flow comparison – Calculated vs. modelled*

## Journey times- DS2

6.16. Base vs. future base VISSIM Modelled Journey times comparison is provided in Tables 6.7 & 6.8 for the AM & PM peak periods.

6.17. The AM base and future base journey time result comparison indicates that there will be no significant change in the journey times on B3385 Newgate Lane East and Newgate Lane in all directions. The most notable change will be from Newgate Lane to B3385 Newgate Lane East south (-31s, 21%).

6.18. Similarly, the PM base and future base modelling result comparison indicates that the journey

times will have less or no increase to journey time throughout the network. The most notable change will be from B3385 Newgate Lane East north to Newgate Lane (-23s, -34%).

| | | | | Base Model (Ave) | Future Base_SC_37 Model (Ave) | Actual Diff | %age Diff |
|---|---|---|---|---|---|---|---|
| **Route Name** | **Map** | **Direction** | **Length (meter)** | **JYT (sec)** | **JYT (sec)** | **Base vs. FB SC_37** | **Base vs. FB SC_37** |
| | | | | | | | |
| **Green Route** | C to B | NB | 861 | 93 | 92 | 0 | 0% |
| | B to A | NB | 634 | 65 | 65 | 0 | 0% |
| | C to A | NB | 1495 | 158 | 158 | 0 | 0% |
| | | | | | | | |
| **Red Route** | A to B | SB | 663 | 57 | 53 | -5 | -8% |
| | B to C | SB | 873 | 79 | 73 | -5 | -7% |
| | A to C | SB | 1536 | 136 | 126 | -10 | -7% |
| | | | | | | | |
| **Purple Route** | A to B | SB | 677 | 99 | 88 | -11 | -11% |
| | B to D | SB | 51 | 5 | 5 | 0 | 0% |
| | A to D | SB | 727 | 104 | 93 | -11 | -11% |
| | | | | | | | |
| **Yellow Route** | D to B | SB | 72 | 70 | 45 | -25 | -36% |
| | B to C | SB | 872 | 74 | 68 | -6 | -8% |
| | D to C | SB | 943 | 143 | 113 | -31 | -21% |

*Table 6.7 – AM VISSIM JYT results comparison - Base vs Future Base*

| | | | | Base Model (Ave) | Future Base_SC_38 Model (Ave) | Actual Diff | %age Diff |
|---|---|---|---|---|---|---|---|
| Route Name | Map | Direction | Length (meter) | JYT (sec) | JYT (sec) | Base vs. FB SC_38 | Base vs. FB SC_38 |
| Green Route | C to B | NB | 861 | 75 | 75 | 0 | -1% |
| | B to A | NB | 634 | 62 | 61 | 0 | -1% |
| | C to A | NB | 1495 | 136 | 136 | -1 | -1% |
| Red Route | A to B | SB | 664 | 76 | 56 | -20 | -35% |
| | B to C | SB | 873 | 85 | 78 | -7 | -9% |
| | A to C | SB | 1537 | 161 | 134 | -27 | -20% |
| Purple Route | A to B | SB | 685 | 86 | 63 | -23 | -36% |
| | B to D | SB | 48 | 5 | 5 | 0 | 1% |
| | A to D | SB | 733 | 91 | 68 | -23 | -34% |
| Yellow Route | D to B | SB | 74 | 35 | 16 | -19 | -118% |
| | B to C | SB | 871 | 82 | 72 | -9 | -13% |
| | D to C | SB | 945 | 117 | 89 | -28 | -32% |

*Table 6.8 – PM VISSIM JYT results comparison – Base vs Future Base*

## 7. Proposed Modelling

7.1. Traffic flow methodology remained the same as described in Section 6.1 to 6.3.

### Layout Changes

7.2. The network layout remains un-changed in the Future Base modelling.

### Modelling Results Comparison

7.3. Traffic flow statistics is provided in Appendix A, where traffic flows are compared among base flows (2019), future base flows (2024) and future proposed flows (2024) for the AM & PM peak periods.

### Traffic Flow GEH Statistic- DS1

#### AM Peak

7.4. Traffic flow comparison is shown in Tables 7.1 & 7.2 for the AM & PM peak periods.

7.5. The highest GEH in the AM proposed calculated vs. modelled flow comparison is from B3385 Newgate Lane East south to northbound (GEH: 0.3, 12 vehicles fail to clear), which is not significant. This tells us that all the traffic flow calculated vs. modelled clears out across each arm of the junction.

7.6. It should be noted that the traffic flows in the Future Proposed has increased from B3385 Newgate Lane East-north to south by 58 vehicles and 156 vehicles when compared against base and future base scenarios, followed by 56 vehicles from Newgate lane to B3385 Newgate Lane East-south.

#### PM Peak

7.7. Similarly, the highest GEH in the PM proposed calculated vs. modelled flow comparison is from B3385 Newgate Lane East-north to Newgate Lane (GEH: 0.3, 2 vehicles fail to clear) and Newgate Lane East south to Newgate Lane (GEH: 0.3, 2 additional vehicles).

7.8. The junction does cope with this additional demand without having any significant impact on journey times.

### Journey times- DS1

7.9. Journey time comparison is shown in Tables 7.3 & 7.4 for the AM & PM peak periods.

7.10. The AM future base and proposed modelling result comparison indicates that the journey time will not be affected from south to north (4sec, 2%), and north to south (4sec, 3%) on B3385 Newgate Lane East.

7.11. However, traffic from Newgate Lane to B3385 Newgate Lane East-south would be delayed by approx. 136s.

7.12. The PM future base and proposed modelling result comparison indicates that the journey time will result in less/no significant change throughout the network. The highest difference will be from Newgate Lane to B3385 Newgate Lane East-south (18sec, 18%) followed by B3385 Newgate Lane East-north to Newgate Lane (11sec, 14%).

| | | | General Traffic Hour (0800 - 0900) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Future Proposed_SC_21 Calculated Data | | | Future Proposed_SC_21 Model | | | GEH |
| | | | Lights | Heavies | Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 44 | 1 | 45 | 42 | 1 | 43 | 0.2 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 886 | 53 | 939 | 887 | 51 | 938 | 0.0 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 82 | 0 | 82 | 81 | 0 | 81 | 0.1 |
| | B3385 Newgate Lane East - North | Left (1.3) | 43 | 2 | 45 | 42 | 1 | 43 | 0.2 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 1587 | 48 | 1634 | 1576 | 46 | 1622 | 0.3 |
| | Local Access | Left (1.1) | 28 | 1 | 29 | 30 | 1 | 31 | 0.3 |

*Table 7.1 – AM VISSIM Traffic Flow results comparison Future Base vs Future Proposed*

| | | | General Traffic Hour (1700 - 1800) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Future Proposed_SC_22 Calculated Data | | | Future Proposed_SC_22 Model | | | GEH |
| | | | Lights | Heavies | Survey Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 53 | 0 | 53 | 51 | 0 | 51 | 0.3 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 1489 | 10 | 1500 | 1483 | 8 | 1491 | 0.2 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 51 | 0 | 51 | 51 | 0 | 51 | 0.0 |
| | B3385 Newgate Lane East - North | Left (1.3) | 51 | 0 | 51 | 50 | 0 | 50 | 0.2 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 940 | 8 | 948 | 942 | 7 | 949 | 0.0 |
| | Local Access | Left (1.1) | 62 | 0 | 62 | 64 | 0 | 64 | 0.3 |

*Table 7.2 – PM VISSIM Traffic Flow results comparison Future Base vs Future Proposed*

| | | | | Base Model (Ave) | Future Base_SC_9 Model (Ave) | Future Pro_SC_21 Model (Ave) | Actual Diff | %age Diff |
|---|---|---|---|---|---|---|---|---|
| Route Name | Map | Direction | Length (meter) | JYT (sec) | JYT (sec) | JYT (sec) | FB_SC_9 vs. FP_SC_21 | FB_SC_9 vs. FP_SC_21 |
| Green Route | C to B | NB | 861 | 93 | 92 | 96 | 3 | 4% |
| | B to A | NB | 634 | 65 | 65 | 66 | 0 | 0% |
| | C to A | NB | 1495 | 158 | 158 | 161 | 4 | 2% |
| Red Route | A to B | SB | 663 | 57 | 56 | 58 | 2 | 4% |
| | B to C | SB | 873 | 79 | 77 | 79 | 2 | 3% |
| | A to C | SB | 1536 | 136 | 133 | 138 | 4 | 3% |
| Purple Route | A to B | SB | 677 | 99 | 93 | 112 | 19 | 20% |
| | B to D | SB | 51 | 5 | 5 | 5 | 0 | 0% |
| | A to D | SB | 727 | 104 | 98 | 117 | 19 | 19% |
| Yellow Route | D to B | SB | 72 | 70 | 51 | 183 | 132 | 261% |
| | B to C | SB | 872 | 74 | 71 | 74 | 4 | 5% |
| | D to C | SB | 943 | 143 | 121 | 258 | 136 | 112% |

*Table 7.3 – AM VISSIM Journey Time results comparison Future Base vs Future Proposed*

| Route Name | Map | Direction | Length (meter) | Base Model (Ave) JYT (sec) | Future Base_SC_10 Model (Ave) JYT (sec) | Future Pro_SC_22 Model (Ave) JYT (sec) | Actual Diff FB_SC_10 vs. FP_SC_22 | %age Diff FB_SC_10 vs. FP_SC_22 |
|---|---|---|---|---|---|---|---|---|
| Green Route | C to B | NB | 861 | 75 | 75 | 76 | 2 | 2% |
| | B to A | NB | 634 | 62 | 62 | 61 | -1 | -1% |
| | C to A | NB | 1495 | 136 | 136 | 137 | 1 | 1% |
| Red Route | A to B | SB | 664 | 76 | 64 | 69 | 5 | 8% |
| | B to C | SB | 873 | 85 | 83 | 84 | 1 | 1% |
| | A to C | SB | 1537 | 161 | 147 | 153 | 6 | 4% |
| Purple Route | A to B | SB | 685 | 86 | 72 | 82 | 11 | 15% |
| | B to D | SB | 48 | 5 | 5 | 5 | 0 | 0% |
| | A to D | SB | 733 | 91 | 77 | 87 | 11 | 14% |
| Yellow Route | D to B | SB | 74 | 35 | 23 | 39 | 16 | 72% |
| | B to C | SB | 871 | 82 | 78 | 80 | 2 | 2% |
| | D to C | SB | 945 | 117 | 101 | 119 | 18 | 18% |

*Table 7.4 – PM VISSIM Journey Time results comparison Future Base vs Future Proposed*

Traffic Flow GEH Statistic- DS2

AM Peak

7.13. Traffic flow comparison is shown in Tables 7.5 & 7.6 for the AM & PM peak periods.

7.14. The highest GEH in the AM proposed calculated vs. modelled flow comparison is from B3385 Newgate Lane East south to northbound (GEH: 0.3, 12 vehicles fail to clear), which is not significant. This tells us that all the traffic flow calculated vs. modelled clears out across each arm of the junction.

7.15. It should be noted that the traffic flows in the Future Proposed has increased from B3385 Newgate Lane East-north to south by 155 vehicles when compared against future base scenarios, followed by 63 vehicles from Newgate lane to B3385 Newgate Lane East-south.

PM Peak

7.16. Similarly, the highest GEH in the PM proposed calculated vs. modelled flow comparison is from B3385 Newgate Lane East-north to Newgate Lane (GEH: 0.4, 2 vehicles fail to clear) and Newgate Lane East South to Newgate Lane (GEH: 0.3, 2 additional vehicles).

7.17. The junction does cope with this additional demand without having any significant impact on journey times.

Journey times- DS2

7.18. Journey time comparison is shown in Tables 7.7 & 7.8 for the AM & PM peak periods.

7.19. The AM future base and proposed modelling result comparison indicates that the journey time

will not be affected from south to north (5sec, 4%), and north to southbound (4sec, 3%) on B3385 Newgate Lane East.

7.20. However, traffic from Newgate Lane to B3385 Newgate Lane East-south would be delayed by approx. 121s.

7.21. Similarly, the PM future base and proposed modelling result comparison indicates that the journey time will result in less/no significant change throughout the network. The highest difference will be from B3385 Newgate Lane East-north to Newgate Lane (7sec, 10%) followed by Newgate Lane to B3385 Newgate Lane East-south (6sec, 6%).

| | | | General Traffic Hour (0800 - 0900) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Future Proposed_SC_45 Calculated Data | | | Future Proposed_SC_45 Model | | | GEH |
| | | | Lights | Heavies | Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 40 | 1 | 40 | 40 | 1 | 41 | 0.1 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 640 | 35 | 675 | 638 | 33 | 671 | 0.2 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 84 | 0 | 84 | 84 | 0 | 84 | 0.0 |
| | B3385 Newgate Lane East - North | Left (1.3) | 47 | 3 | 50 | 47 | 2 | 49 | 0.1 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 1588 | 48 | 1636 | 1578 | 46 | 1624 | 0.3 |
| | Local Access | Left (1.1) | 29 | 1 | 31 | 31 | 1 | 32 | 0.2 |

*Table 7.5 – AM VISSIM Traffic Flow results comparison Future Base vs Future Proposed*

| | | | General Traffic Hour (1700 - 1800) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Future Proposed_SC_46 Calculated Data | | | Future Proposed_SC_46 Model | | | GEH |
| | | | Lights | Heavies | Survey Total | Lights | Heavies | Model Total | |
| B3385 Newgate Lane East - North | Local Access | Right (1.6) | 49 | 0 | 49 | 47 | 0 | 47 | 0.4 |
| | B3385 Newgate Lane East - South | Ahead (1.5) | 967 | 6 | 974 | 968 | 4 | 972 | 0.0 |
| Local Access | B3385 Newgate Lane East - South | Right (1.4) | 47 | 0 | 47 | 47 | 0 | 47 | 0.0 |
| | B3385 Newgate Lane East - North | Left (1.3) | 60 | 0 | 60 | 59 | 0 | 59 | 0.1 |
| B3385 Newgate Lane East - South | B3385 Newgate Lane East - North | Ahead (1.2) | 917 | 8 | 925 | 922 | 7 | 929 | 0.1 |
| | Local Access | Left (1.1) | 68 | 0 | 68 | 70 | 0 | 70 | 0.3 |

*Table 7.6 – PM VISSIM Traffic Flow results comparison Future Base vs Future Proposed*

| Route Name | Map | Direction | Length (meter) | Base Model (Ave) JYT (sec) | Future Base_SC_37 Model (Ave) JYT (sec) | Future Pro_SC_45 Model (Ave) JYT (sec) | Actual Diff FB_SC_37 vs. FP_SC_45 | %age Diff FB_SC_37 vs. FP_SC_45 |
|---|---|---|---|---|---|---|---|---|
| Green Route | C to B | NB | 861 | 93 | 92 | 97 | 4 | 5% |
| | B to A | NB | 634 | 65 | 65 | 66 | 0 | 0% |
| | C to A | NB | 1495 | 158 | 158 | 162 | 4 | 3% |
| Red Route | A to B | SB | 663 | 57 | 53 | 55 | 2 | 4% |
| | B to C | SB | 873 | 79 | 73 | 76 | 3 | 4% |
| | A to C | SB | 1536 | 136 | 126 | 131 | 5 | 4% |
| Purple Route | A to B | SB | 677 | 99 | 88 | 108 | 20 | 22% |
| | B to D | SB | 51 | 5 | 5 | 5 | 0 | 0% |
| | A to D | SB | 727 | 104 | 93 | 113 | 20 | 21% |
| Yellow Route | D to B | SB | 72 | 70 | 45 | 162 | 117 | 261% |
| | B to C | SB | 872 | 74 | 68 | 71 | 3 | 5% |
| | D to C | SB | 943 | 143 | 113 | 233 | 121 | 107% |

*Table 7.7 – AM VISSIM Journey Time results comparison Future Base vs Future Proposed*

| Route Name | Map | Direction | Length (meter) | Base Model (Ave) JYT (sec) | Future Base_SC_38 Model (Ave) JYT (sec) | Future Pro_SC_46 Model (Ave) JYT (sec) | Actual Diff FB_SC_38 vs. FP_SC_46 | %age Diff FB_SC_38 vs. FP_SC_46 |
|---|---|---|---|---|---|---|---|---|
| Green Route | C to B | NB | 861 | 75 | 75 | 76 | 2 | 2% |
| | B to A | NB | 634 | 62 | 61 | 61 | -1 | -1% |
| | C to A | NB | 1495 | 136 | 136 | 137 | 1 | 1% |
| Red Route | A to B | SB | 664 | 76 | 56 | 59 | 2 | 4% |
| | B to C | SB | 873 | 85 | 78 | 79 | 2 | 2% |
| | A to C | SB | 1537 | 161 | 134 | 138 | 4 | 3% |
| Purple Route | A to B | SB | 685 | 86 | 63 | 70 | 7 | 11% |
| | B to D | SB | 48 | 5 | 5 | 5 | 0 | 0% |
| | A to D | SB | 733 | 91 | 68 | 74 | 7 | 10% |
| Yellow Route | D to B | SB | 74 | 35 | 16 | 20 | 4 | 26% |
| | B to C | SB | 871 | 82 | 72 | 74 | 2 | 2% |
| | D to C | SB | 945 | 117 | 89 | 94 | 6 | 6% |

*Table 7.8 – PM VISSIM Journey Time results comparison Future Base vs Future Proposed*

## 8. Option Assessment

8.1. In light of the anticipated increase in journey time as a result of the increase in opposing traffic, amendments to the existing give-way junction have been made in the model.

8.2. The primary purpose of these amendments is to reduce proposed journey times for vehicles utilising the minor arm without significantly compromising the journey times for traffic on Newgate Lane East.

8.3. The amendments to the junction can be found in Appendix B. The design was provided to RWA by Pegasus Group.

8.4. Both option 1 and 2 look to allow right turners from Newgate Lane to give way in two movements.

8.5. Southbound traffic from Newgate Lane East wishing to turn right into Newgate Lane will wait in the middle of junction, keeping clear of a space in the junction to allow right turners from Newgate Lane to continue their journey southbound if a gap becomes available.

8.6. In order to facilitate this there is some widening of the Newgate Lane East carriageway as well as the formalisation of a flare lane on Newgate Lane which is approximately 40 metres in length.

8.7. Both DS1 and DS2 proposed scenarios have been modelled in the proposed layout. The base and future base results have then been compared against those in the proposed layout including the development traffic.

8.8. The results for AM DS1 scenario shown in table 8.1 and figure 8.1 show a significant improvement in the journey time for vehicles travelling southbound from Newgate Lane minor arm. When comparing the proposed flows in the base layout and proposed layout a reduction in journey time of over 1 minute 30 seconds has been observed.

8.9. When comparing the future base and future proposed in the proposed layout, the journey time can be seen to increase by 44 seconds across the whole length of the route. Coupled with the queuing shown in figure 8.1. the junction is perceived to operate well in this proposed layout with no significant queuing or excessive delay.

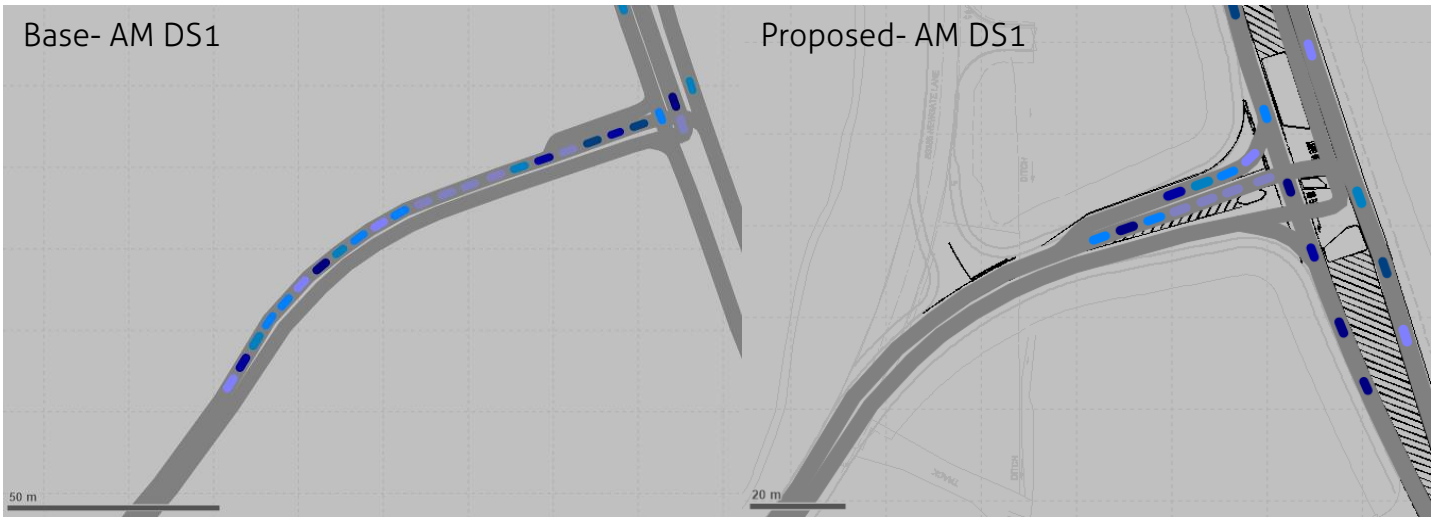
8.10. Table 8.2 and figure 8.2. show a similar pattern in the AM scenario for DS2. When comparing the proposed flows in the base layout and proposed layout a reduction in journey time of just under 1 minute 30 seconds has been observed.

8.11. When comparing the future base and future proposed in the proposed layout, the journey time can be seen to increase by 34 seconds across the whole length of the route. Coupled with the queuing shown in figure 8.2. the modelling shows that the junction will operate well in this proposed layout with no significant queuing or excessive delay.

| Route Name | Map | Direction | Length (meter) | Future Base_DS 1 (Ave) Base Layout JYT (sec) | Future Pro_DS1 (Ave) Base Layout JYT (sec) | Future Pro_DS1 (Ave) Proposed Layout JYT (sec) | Dif FB and Pro DS1 JYT (sec) | % Difference |
|---|---|---|---|---|---|---|---|---|
| Green Route | C to B | Northbound | 861 | 92 | 96 | 95 | 3 | 3% |
| | B to A | Northbound | 634 | 65 | 66 | 66 | 0 | 0% |
| | C to A | Northbound | 1495 | 158 | 161 | 161 | 3 | 2% |
| Red Route | A to B | Southbound | 663 | 56 | 58 | 58 | 2 | 3% |
| | B to C | Southbound | 873 | 77 | 79 | 79 | 2 | 3% |
| | A to C | Southbound | 1536 | 133 | 138 | 137 | 4 | 3% |
| Purple Route | A to B | Southbound | 677 | 93 | 112 | 101 | 8 | 9% |
| | B to D | Southbound | 51 | 5 | 5 | 4 | 0 | -7% |
| | A to D | Southbound | 727 | 98 | 117 | 105 | 8 | 8% |
| Yellow Route | D to B | Southbound | 72 | 51 | 183 | 92 | 41 | 81% |
| | B to C | Southbound | 872 | 71 | 74 | 73 | 3 | 4% |
| | D to C | Southbound | 943 | 121 | 258 | 166 | 44 | 36% |

*Table 8.1 – AM DS1 VISSIM Journey Time results comparison Future Base vs Future Proposed Proposed Layout*

*Figure 8.1 – AM DS1 Pro Flows- Base layout vs. Proposed layout VISSIM depiction of queuing*



| Route Name | Map | Direction | Length (meter) | Future Base_DS 2 (Ave) Base Layout JYT (sec) | Future Pro_DS2 (Ave) Base Layout JYT (sec) | Future Pro_DS2 (Ave) Proposed Layout JYT (sec) | Dif FB Base and Pro Pro DS2 JYT (sec) | % Difference |
|---|---|---|---|---|---|---|---|---|
| Green Route | C to B | Northbound | 861 | 92 | 97 | 96 | 4 | 4% |
| | B to A | Northbound | 634 | 65 | 66 | 66 | 0 | 0% |
| | C to A | Northbound | 1495 | 158 | 162 | 162 | 4 | 2% |
| Red Route | A to B | Southbound | 663 | 53 | 55 | 55 | 2 | 4% |
| | B to C | Southbound | 873 | 73 | 76 | 76 | 3 | 4% |
| | A to C | Southbound | 1536 | 126 | 131 | 131 | 5 | 4% |
| Purple Route | A to B | Southbound | 677 | 88 | 108 | 98 | 10 | 11% |
| | B to D | Southbound | 51 | 5 | 5 | 4 | 0 | -7% |
| | A to D | Southbound | 727 | 93 | 113 | 102 | 9 | 10% |
| Yellow Route | D to B | Southbound | 72 | 45 | 162 | 76 | 31 | 69% |
| | B to C | Southbound | 872 | 68 | 71 | 71 | 3 | 4% |
| | D to C | Southbound | 943 | 113 | 233 | 147 | 34 | 30% |

*Table 8.2 – AM DS2 VISSIM Journey Time results comparison Future Base vs Future Proposed Proposed Layout*

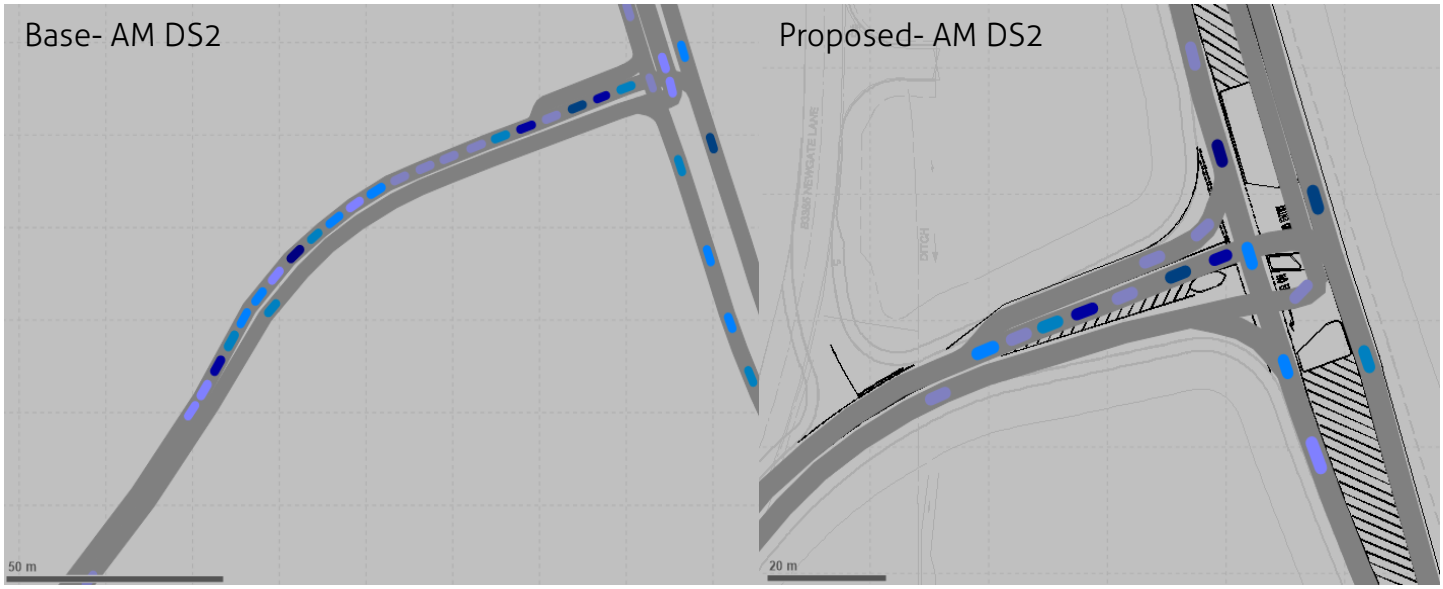



*Figure 8.2 – AM DS2 Pro Flows- Base layout vs. Proposed layout VISSIM depiction of queuing*

8.12. Although the addition of the development did not appear to have a significant impact in the PM peak, the PM proposed flows for DS1 and DS2 have also been tested in the proposed layout.

8.13. Table 8.3. and Figure 8.3. show the results for the PM DS1 scenario. The journey time changes in the PM are seen to be insignificant. There is a small (6 second) increase in journey time for vehicles travelling from Newgate Lane to Newgate Lane southbound between the base and proposed layout. This can be attributed to traffic now giving way at two points.

8.14. Table 8.4 and Figure 8.4 show the results for the PM DS2 scenario. Similarly to the PM DS1 scenario, the proposed layout does not have a significant impact on the journey times within the network. The impact of journey times within the network are no greater than six seconds.

| Route Name | Map | Direction | Length (meter) | Future Base_DS 1 (Ave) Base Layout JYT (sec) | Future Pro_DS1 (Ave) Base Layout JYT (sec) | Future Pro_DS1 (Ave) Proposed Layout JYT (sec) | Dif FB and Pro DS1 JYT (sec) | % Difference |
|---|---|---|---|---|---|---|---|---|
| Green Route | C to B | Northbound | 861 | 75 | 76 | 76 | 1 | 2% |
| | B to A | Northbound | 634 | 62 | 61 | 61 | 0 | -1% |
| | C to A | Northbound | 1495 | 136 | 137 | 137 | 1 | 1% |
| Red Route | A to B | Southbound | 663 | 64 | 69 | 69 | 5 | 8% |
| | B to C | Southbound | 873 | 83 | 84 | 84 | 2 | 2% |
| | A to C | Southbound | 1536 | 147 | 153 | 153 | 7 | 5% |
| Purple Route | A to B | Southbound | 677 | 72 | 82 | 78 | 7 | 9% |
| | B to D | Southbound | 51 | 5 | 5 | 4 | -1 | -12% |
| | A to D | Southbound | 727 | 77 | 87 | 83 | 6 | 8% |
| Yellow Route | D to B | Southbound | 72 | 23 | 39 | 45 | 22 | 97% |
| | B to C | Southbound | 872 | 78 | 80 | 80 | 1 | 2% |
| | D to C | Southbound | 943 | 101 | 119 | 125 | 24 | 23% |

*Table 8.3 – PM DS1 VISSIM Journey Time results comparison Future Base vs Future Proposed Proposed Layout*

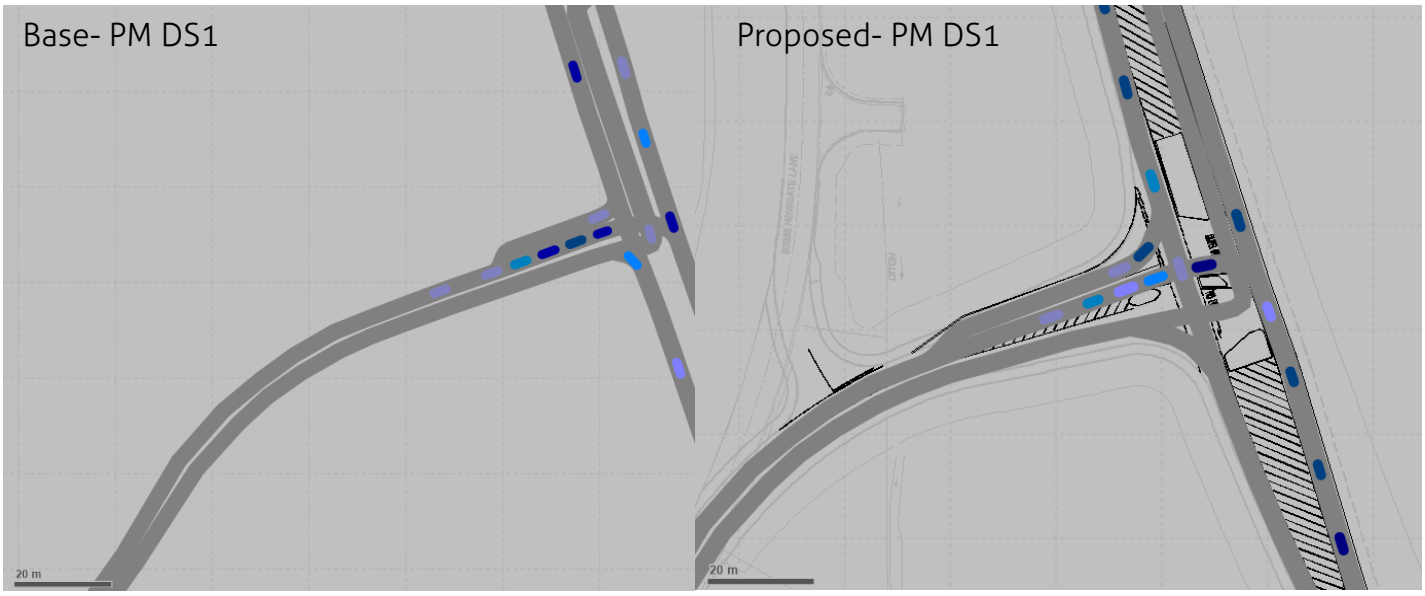



*Figure 8.3 – PM DS1 Pro Flows- Base layout vs. Proposed layout VISSIM depiction of queuing*

| Route Name | Map | Direction | Length (meter) | Future Base_DS 2 (Ave) Base Layout JYT (sec) | Future Pro_DS2 (Ave) Base Layout JYT (sec) | Future Pro_DS2 (Ave) Proposed Layout JYT (sec) | Dif FB Base and Pro Pro DS2 JYT (sec) | % Difference |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| Green Route | C to B | Northbound | 861 | 75 | 76 | 76 | 1 | 2% |
| | B to A | Northbound | 634 | 61 | 61 | 61 | 0 | -1% |
| | C to A | Northbound | 1495 | 136 | 137 | 137 | 1 | 1% |
| | | | | | | | | |
| Red Route | A to B | Southbound | 663 | 56 | 59 | 58 | 2 | 3% |
| | B to C | Southbound | 873 | 78 | 79 | 80 | 2 | 2% |
| | A to C | Southbound | 1536 | 134 | 138 | 138 | 4 | 3% |
| | | | | | | | | |
| Purple Route | A to B | Southbound | 677 | 63 | 70 | 67 | 5 | 7% |
| | B to D | Southbound | 51 | 5 | 5 | 4 | -1 | -12% |
| | A to D | Southbound | 727 | 68 | 74 | 72 | 4 | 6% |
| | | | | | | | | |
| Yellow Route | D to B | Southbound | 72 | 16 | 20 | 21 | 4 | 27% |
| | B to C | Southbound | 872 | 72 | 74 | 74 | 1 | 2% |
| | D to C | Southbound | 943 | 89 | 94 | 94 | 6 | 6% |

*Table 8.4 – PM DS2 VISSIM Journey Time results comparison Future Base vs Future Proposed Proposed Layout*

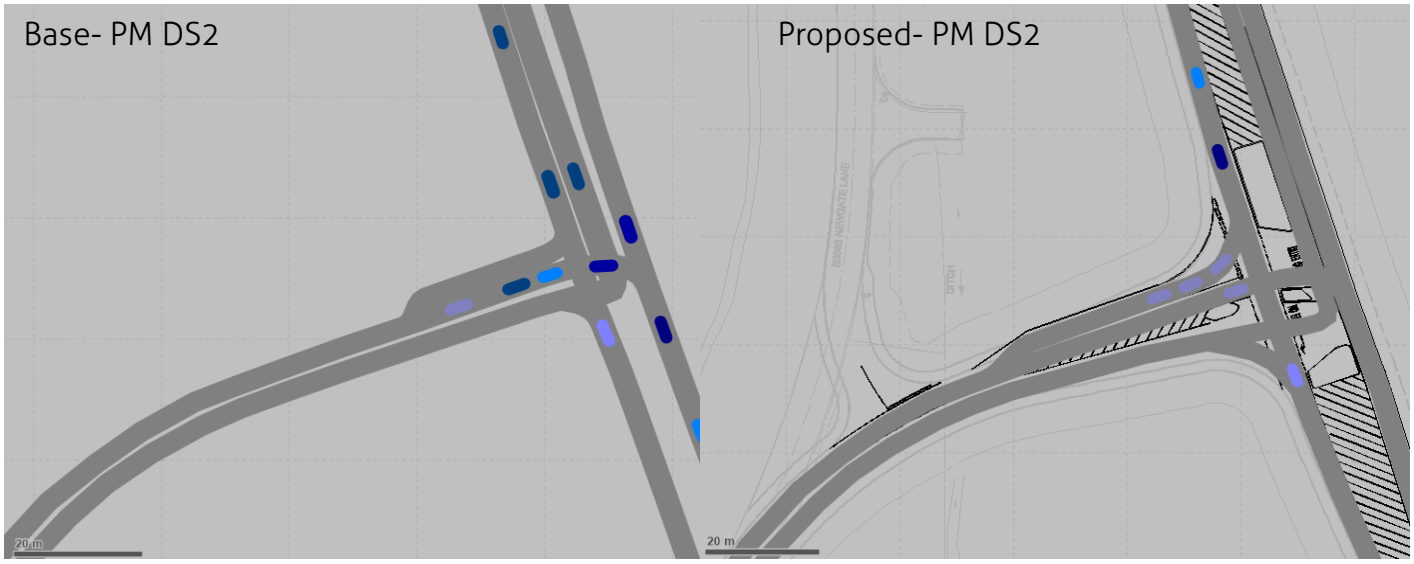



*Figure 8.4 – PM DS2 Pro Flows- Base layout vs. Proposed layout VISSIM depiction of queuing*

## 9. Summary and Conclusion

9.1. Existing base VISSIM models were developed in VISSIM version 10.00-12 using November 2019 traffic and journey time data. The difference between surveyed and base modelled journey time were within ± 60sec as well as GEH well below 5 for all movements as per the DMRB and TfL's modelling guidelines.

9.2. These base VISSIM models were therefore considered best fit for the purpose and to provide a benchmark for assessing the impact of the future demand in regards to the scheme and committed development within the vicinity of the study area, as the base modelling results compared to observed values was a close match for both traffic flows and journey times in the AM and PM peak periods.

9.3. Future base and future proposed modelling has been undertaken for both the DS1 and DS2 scenarios for 2024.

9.4. The future base modelling included all the committed developments in the vicinity of the study area in 2024, whilst the future proposed was to test the development of 190 dwellings using the B3385 Newgate Lane East / Newgate Lane priority junction. These tests were initially carried out without any physical network changes but with the calculated/forecasted traffic growth for 2024. This was done to understand the impact of proposed development flows against the base layout.

9.5. It should be noted that there is a reduction in calculated traffic turning counts in the future base, hence resulting in no/reduced journey times for future base vs. base modelling.

9.6. The future base vs. proposed result comparison indicates that there will not be any significant change in the PM peak journey time in both the DS1 and DS2 scenarios, with vehicles experiencing low levels of queuing. This can be attributed to a lower level of traffic travelling northbound when comparing with the AM, making it easier for vehicles leaving Newgate Lane to seek gaps.

9.7. The AM future base and proposed modelling result comparison for both DS1 and DS2 scenarios shows an increase in delay and journey time for those exiting Newgate Lane. The change in journey time for those travelling on B3385 Newgate Lane East however is minimal with the development showing no significant increase in journey time.

9.8. This increase in delay on Newgate Lane results in queues of up to 15 vehicles in DS1 and 20 vehicles in DS2 (scenario 45). As previously mentioned, due to the location of signals either side of the study area, it is likely that the model underestimates the number of gaps available for right turning vehicles. As such the assessment can be seen as robust and a worst-case assumption.

9.9. The GEH flow statistic check demonstrates however that in all AM PM scenarios there is a good level of convergence showing that vehicles clear the junction in the peak hour.

9.10. Following the increase in queuing in the base situation when the development flow is added, we have assessed the impact of the proposed give way design provided to us by Pegasus Group.

9.11. The proposed layout at the junction reduces journey times for vehicles travelling southbound after turning right from the minor arm of Newgate Lane. This intends to alter the give-way

parameters as such that vehicles wishing to turn right will give way on to occasions, once to northbound traffic at the give way line of the side road and once to southbound traffic in the centre of the junction.

9.12. The results show a significant improvement in journey time when they the proposed scenarios are compared against the same scenarios in the base layout.

9.13. The proposed layout also significantly reduces the impact that the proposed development will have on the capacity at the junction by only increasing journey times by 44 seconds in AM DS1 and 34 seconds in AM DS2. The images of the VISSIM model also demonstrate that no excessive queuing is expected.

9.14. Across both DS1 and DS2 the PM scenario operates well experiencing no significant increase in journey time in either the base or proposed layout.

9.15. During the first seed the queues were observed on Newgate Lane in the model and their approximate max queue lengths are shown in table 9.1. The results demonstrate that following the introduction of the proposed layout, the maximum queue length is anticipated to half on Newgate Lane.

| | Future Base- Base layout | Future Proposed- Base layout | Future Proposed- Proposed layout |
|---|---|---|---|
| AM DS1 | 3 PCUs | 20-21 PCUs | 10 PCUs |
| AM DS2 | 2 PCUs | 20-21 PCUs | 7 PCUs |
| PM DS1 | 2 PCUs | 6 PCUs | 4 PCUs |
| PM DS2 | 3 PCUs | 3 PCUs | 3 PCUs |

*Table 9-1 Approximate maximum queue lengths in the first seed for Newgate Lane*

## 10. Appendix A – Base/Future Base/Future Pro Modelling Results

AM & PM Peak 1 Hour Flow Validation / Comparison

## AM & PM Peak 1 Hour Journey Time Validation / Comparison