Technical Note

Project – **VISSIM Modelling – Newgate Lane**
Subject – **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 is comprised of two housing developments; the north is comprised of 75 dwellings and the south of 115 dwellings. The proposed developments, whether assessed independently of one another or combined 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 (Autumn 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 journey time difference vs. surveyed data was within the acceptable range/limit of 15% in both peaks. HCC are currently in possession of this model.

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 of the Future Base (2024) and Future Proposed (2024) VISSIM Modelling for AM and PM peak periods.

1.10. As agreed with HCC, we are only assessing DS2 which accounts for the proposed Stubbington Bypass.

1.11. Journey Time, maximum queue lengths and average delay per light vehicle have been presented in this technical note. Figure 1 shows the locations for the queue and delay results. The journey

time routes correlate with those presented in the base model submission.

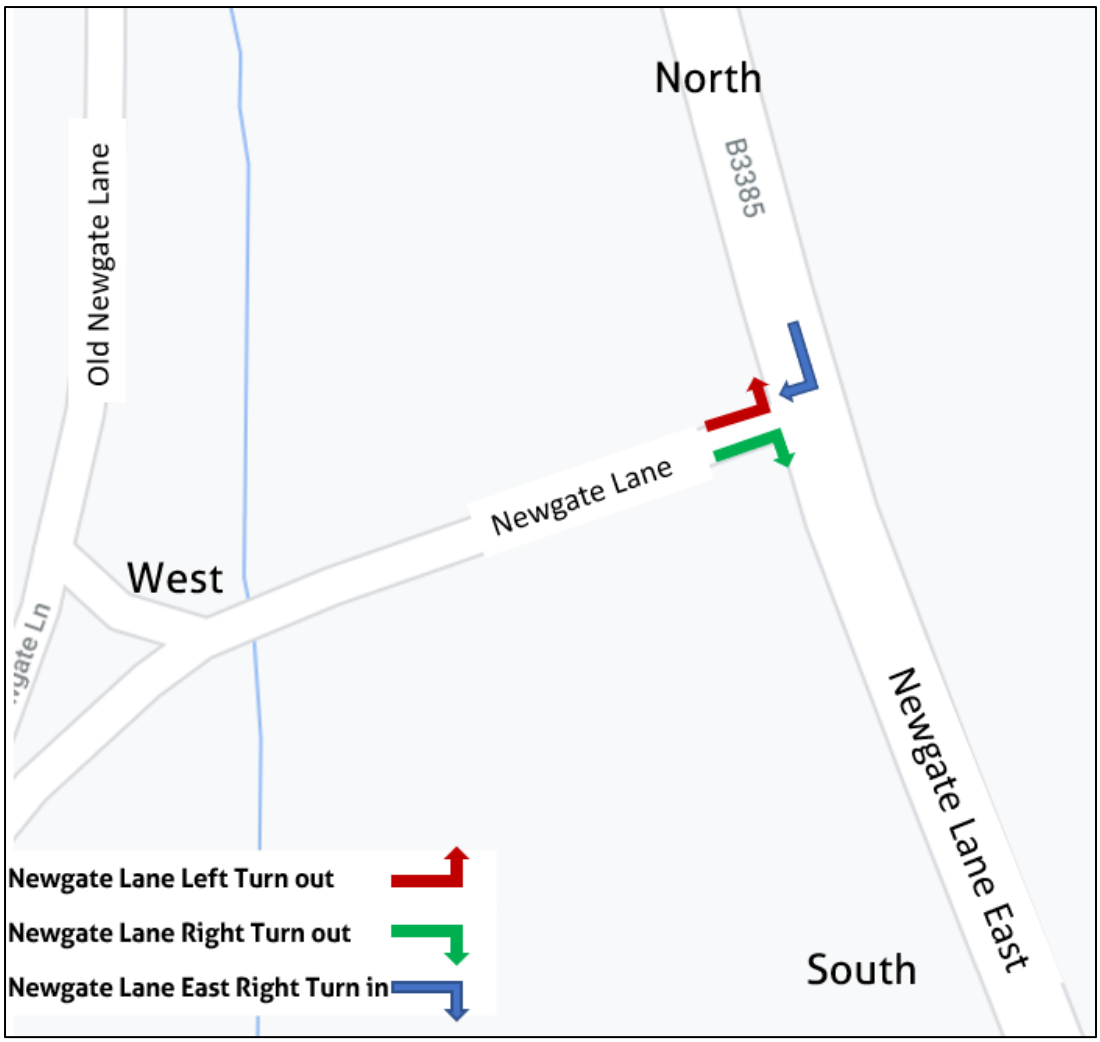

Figure 1 - Queue Length and Delay Results Map

2. Future Base Layout Models- DS2

Traffic Flows and Routes

2.1. 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. Within the base layout we also assessed the impact of the two developments independently of one another and together.

2.2. Pegasus Group calculated the traffic flows and issued them to RWA for the purpose of traffic modelling. These flows have been approved by HCC as part of the planning application.

2.3. The future flows were provided as an hourly total of lights and HGVs. Vehicle inputs and local routes were updated/amended to reflect the calculated growth in both peak VISSIM models.

2.4. The same input and routing 15-minute proportions were applied to the flows. The split of HGV and MGVs were proportioned as per the base flows.

Layout Changes

2.5. The network layout remains unchanged in the Future Base modelling.

Traffic Flow GEH Statistic- DS2

2.6. A comparison between the Future Base turning counts and modelled turning counts has been undertaken for each modelled scenario to demonstrate the positive correlation between the flows. Flow analysis is detailed in Appendix A and shows all turning movements, across all peaks and scenarios has a GEH below 0.5.

Journey times- DS2

2.7. A comparison of the VISSIM modelled journey times has been undertaken for each modelled assessment to truly understand the impact of the proposed developments on the junction of Newgate Lane East and Newgate Lane. A comparison is provided in Table 2.1 for the AM & PM peak periods.

2.8. The journey time results demonstrate that if no changes were made at the junction, the introduction of the developments will result in an increase in the journey time for those turning out of Newgate Lane onto Newgate Lane East.

2.9. In the PM peak this increase in journey time is negligible. It is more severe in the AM peak when not only is more traffic anticipated to use the side road but there is a greater volume of traffic travelling northbound on Newgate Lane East than in the PM.

2.10. The impact on the journey time of the other assessed routes is negligible.

2.11. Full journey time results can be found in Appendix B.

Table 2-1 - Future Base Layout Journey Time Results (seconds)

	Future Base	75 Dwellings	115 Dwellings	190 Dwellings
AM				
Newgate Lane East Northbound	103	103	104	104
Newgate Lane East Southbound	83	83	84	84
Newgate Lane Eastbound	57	75	100	166
Newgate Lane Westbound	29	28	28	29
PM				
Newgate Lane East Northbound	86	86	87	87
Newgate Lane East Southbound	86	85	86	86
Newgate Lane Eastbound	32	32	33	34
Newgate Lane Westbound	28	29	29	29

Queue Lengths- DS2

2.12. A comparison of the VISSIM modelled maximum queue lengths has been undertaken for each modelled assessment to demonstrate the increase in queuing as a result of the proposed developments on the junction of Newgate Lane East and Newgate Lane. A comparison is provided in Table 2.2 for the AM & PM peak periods.

2.13. Queues were measured at the three points that vehicles give-way in the model; turning left out of Newgate Lane, turning right out of Newgate Lane and turning right into Newgate Lane from Newgate Lane East.

2.14. The results demonstrate that if no changes were made at the junction, the introduction of the developments will result in an increase in queue lengths particularly for those turning out of Newgate Lane onto Newgate Lane East.

2.15. Queue lengths increase most significantly for those turning right out of Newgate Lane onto Newgate Lane East. In the AM 115 dwellings scenario queues are expected to reach the junction with Old Newgate Lane and when 190 dwellings were assessed the maximum queue length is anticipated to pass Old Newgate Lane, blocking access in and out of this road.

2.16. In the PM peak the increase in queue lengths is negligible.

Table 2-2 - Future Base Layout Maximum Queue Length Results (metres)

	Future Base	75 Dwellings	115 Dwellings	190 Dwellings
AM				
Newgate Lane Left Turn out	20	35	51	112
Newgate Lane Right Turn out	18	42	69	123
Newgate Lane East Right Turn in	17	21	25	34
PM				
Newgate Lane Left Turn out	9	11	13	14
Newgate Lane Right Turn out	10	13	13	17
Newgate Lane East Right Turn in	11	12	14	16

Delay- DS2

2.17. A comparison of the VISSIM modelled average vehicle delays has been undertaken for each modelled scenario to demonstrate the increase in delay as a result of the proposed developments on the junction of Newgate Lane East and Newgate Lane. A comparison is provided in Table 2.3 for the AM & PM peak periods. The results are shown for light vehicles. The results for heavies can be found in Appendix C.

2.18. As anticipated the increase in delay is incremental when additional dwellings are accounted for in the model. The AM peak also shows a greater increase and more severe levels of delay than the PM.

2.19. Delay is only significant and felt by vehicles giving way at the junction with the those turning out of Newgate Lane onto Newgate Lane East being most severely impacted. Of the two movements, the right turners experience the greatest level of delay.

Table 2-3 - Future Base Layout Average Lights Vehicle Delay Results (seconds)

	Future Base	75 Dwellings	115 Dwellings	190 Dwellings
AM				
North to West	37	43	48	58
North to South	1	1	1	2
West to South	49	69	98	161
West to North	31	41	57	113
South to North	4	4	4	4
South to West	3	3	3	3
PM				
North to West	5	5	6	7
North to South	2	2	2	2
West to South	8	9	10	11
West to North	4	4	4	5
South to North	2	2	2	2
South to West	2	2	2	2

3. Proposed Layout Modelling- Option 3- DS2

3.1. 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.

3.2. 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.

3.3. Pegasus Group have produced three priority option designs with the aim to mitigate the journey time impacts.

3.4. Option 1 and 2 have since been discounted.

3.5. Option 3 has previously been presented to HCC and incorporates amendments to the priority junction with the aim to increase capacity at the junction and mitigate the impact of the development.

3.6. The option involves widening the centre of the junction to increase the waiting space for vehicles turning right out of Newgate Lane onto Newgate Lane East.

Layout Changes

3.7. The aforementioned widening of the central island is the primary change to the layout in the VISSIM model. Priority models have also been accordingly tweaked to ensure there are no collisions in this central waiting area between the opposing right turn movements.

3.8. Those turning into Newgate Lane from Newgate Lane East have priority over those turning right out. As such those turning right give-way to those turning into Newgate Lane.

3.9. If vehicles waiting to turn out of Newgate Lane onto Newgate Lane East have already progressed through the junction and are filling the central area before a vehicle turning right into Newgate Lane has arrived, then those turning in must give-way as demonstrated with priority rule 7 in the model.

Traffic Flow GEH Statistic- DS2

3.10. A comparison between the Future Base turning counts and modelled turning counts has been undertaken for each modelled scenario to demonstrate the positive correlation between the flows. Flow analysis is detailed in Appendix A and shows all turning movements, across all peaks and scenarios has a GEH below 0.5.

Journey times- DS2

3.11. A comparison of the future base VISSIM modelled journey times has been undertaken against the proposed dwelling scenarios tested in the Option 3 layout.. A comparison is provided in Table 3.1 for the AM & PM peak periods.

3.12. The journey time results demonstrate that even if Option 3 were to be introduced, the developments will still result in an increase in the journey time for those turning out of Newgate Lane onto Newgate Lane East. There is little difference between the journey time results in the future base layout (Table 2.1) and in the option 3 layout (Table 3.1).

3.13. In the PM peak this increase in journey time remains negligible. It is more severe in the AM peak

when not only is more traffic anticipated to use the side road but there is a greater volume of traffic travelling northbound on Newgate Lane East than in the PM. It appears that in order to assist vehicles in existing the minor arm, some control of the opposing flows is required.

3.14. The impact on the journey time of the other assessed routes is negligible.

Table 3-1 – Future Base vs. Option 3 Layout Journey Time Results (seconds)

	Future Base	75 Dwellings	115 Dwellings	190 Dwellings
AM				
Newgate Lane East Northbound	103	103	104	104
Newgate Lane East Southbound	83	83	88	83
Newgate Lane Eastbound	57	75	83	141
Newgate Lane Westbound	29	28	28	29
PM				
Newgate Lane East Northbound	86	86	87	87
Newgate Lane East Southbound	86	85	85	85
Newgate Lane Eastbound	32	32	33	33
Newgate Lane Westbound	28	29	29	29

Queue Lengths- DS2

3.15. A comparison of the VISSIM modelled maximum queue lengths has been undertaken between the future base and the Option 3 proposed scenarios. The results demonstrate that Option 3 is not able to mitigate the increase in queuing as a result of the proposed developments on the junction of Newgate Lane East and Newgate Lane. A comparison is provided in Table 3.2 for the AM & PM peak periods.

3.16. The when comparing the results in Table 3.2 against the future base layout results in Table 2.2 it demonstrates that the introduction of Option 3 would have little impact on the maximum queuing lengths at the junction.

Table 3-2 - Future Base vs. Option 3 Layout Maximum Queue Length Results (metres)

	Future Base	75 Dwellings	115 Dwellings	190 Dwellings
AM				
Newgate Lane Left Turn out	20	33	46	100
Newgate Lane Right Turn out	18	42	65	115
Newgate Lane East Right Turn in	17	22	27	31
PM				
Newgate Lane Left Turn out	9	12	13	14
Newgate Lane Right Turn out	10	11	12	16
Newgate Lane East Right Turn in	11	12	14	16

Delay- DS2

3.17. The delay results shown in Table 3.3 support the queuing and journey time data by demonstrating that an increase in delay at the junction is still expected if Option 3 were to be introduced.

Table 3-3 - Future Base vs. Option 3 Layout Average Lights Vehicle Delay Results (seconds)

	Future Base	75 Dwellings	115 Dwellings	190 Dwellings
AM				
North to West	37	44	49	57
North to South	1	1	1	1
West to South	49	68	84	137
West to North	31	41	48	93
South to North	4	4	4	4
South to West	3	3	3	3
PM				
North to West	5	5	6	7
North to South	2	1	1	1
West to South	8	9	9	11
West to North	4	4	4	4
South to North	2	2	2	2
South to West	2	2	2	2

4. Summary and Conclusion

4.1. Existing base VISSIM models have been submitted to HCC and Atkins, the auditing engineer. These base models validate against surveyed journey time data and replicate the existing on-street conditions.

4.2. Future base and future proposed modelling has been undertaken for the DS2 scenarios for 2024 only as agreed with HCC. The flows used in the modelling have been provided to RWA by Pegasus Group and have previously been approved by HCC.

4.3. 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 impact of the 75 dwellings and 115 dwellings independently of another and as a combined 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.

4.4. Assessing the developments in the future base layout demonstrate the development will have an adverse impact on vehicles exiting Newgate Lane. It is anticipated that there would be an increase in maximum queue length, journey time and delay at the junction.

4.5. The junction is most severely impacted when 190 dwellings are introduced and due to excessive queuing on the minor arm the junction will operate over capacity.

4.6. On discussing proposed amendments with HCC it is understood that their preference would be for any mitigation proposed to be in keeping with the existing priority layout.

4.7. Pegasus Group produced a priority layout of the junction, Option 3. This looked to widen the capacity in the centre of the junction, therefore increasing the queuing space for right turners and formalising the two stage give-way movement that vehicles currently undertake at the junction.

4.8. When testing the impact of Option 3 on the junction, the results demonstrate that the proposed development will still have a significant impact on the junction. Due to the heavy northbound flow, not as a result of the development, in the future year it becomes increasingly difficult for vehicles to exit the minor arm onto Newgate Lane East.

4.9. Improvements to the priority junction without controlling the northbound flow will not suffice to mitigate the impact of the development.

5. Appendix A – Flow Analysis

6. Appendix B- Journey Time Analysis

7. Appendix C- Delay Results