



Technical Note

Project: **Newgate Lane**
Client: **Pegasus Group**
Subject: **LinSig Modelling**

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1. Introduction

Purpose/ Scope

- 1.1. Red Wilson Associates (RWA) has been appointed by Pegasus Group to provide LinSig modelling services in respect of Newgate Lane East with Newgate Lane in Hampshire.
- 1.2. The development of the land west of Newgate Lane includes two developments of 75 dwellings and 115 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 signalling the junction have already been assessed however at the request of Hampshire County Council further assessments are being made.
- 1.3. It is understood that the LinSig models have been approved by HCC. They have been updated to demonstrate both the combined impact of 75 dwellings and 115 dwellings and the two developments individually.
- 1.4. The principal objective of Red Wilson Associates involvement in this scheme is to develop the previous signalised assessment to assess the impact of the development.
- 1.5. Hampshire County Council (HCC) do not have any specific modelling guidelines that relate to local junction modelling. Industry best practice was used to regarding the parameters used within the model. 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.
- 1.6. The LinSig modelling was undertaken in version 3 and utilised flows provided to us by Pegasus Group which formed part of the previously submitted TA.
- 1.7. This modelling has been undertaken in support of the Transport Technical Note provided to RWA by Pegasus Group on 16th December 2019.

Study Area

- 1.8. The site is located near B3385 Newgate Lane East / Newgate Lane in Gosport and is shown in Figure 1. The study site is comprised of a major/minor priority road junction.



Figure 1 - B3385 Newgate Lane East / Newgate Lane (priority junction)

2. Modelled Scenarios

- 2.1. The flows provided to RWA were for the following four scenarios:
- 2024 Base and Development AM DS2 – 08:00 – 09:00 75 Dwellings;
 - 2024 Base and Development PM DS2 – 17:00 – 18:00 75 Dwellings;
 - 2024 Base and Development AM DS2 – 08:00 – 09:00 115 Dwellings;
 - 2024 Base and Development PM DS2 – 17:00 – 18:00 115 Dwellings;
 - 2024 Base and Development AM DS2 – 08:00 – 09:00 190 Dwellings; and
 - 2024 Base and Development PM DS2 – 17:00 – 18:00 190 Dwellings.
- 2.2. Flows were provided as raw traffic flows and as such a PCU factor has been applied. Comparisons were drawn between the surveyed total flows and PCU flows. A PCU factor was then applied to each turning movement. We do not have any reason to believe that the proportion of vehicle type will change in the future scenarios.

3. Proposed Options

Option 1- Indicative Arrow

- 3.1. Pegasus Group provided RWA with the LinSig model submitted to HCC as part of the Transport Technical Note.
- 3.2. Amendments were made to these models to ensure the same model was used for each vehicle split tested.
- 3.3. Further amendments were also made to try to achieve an efficient design and get the most from the available capacity at the junction.
- 3.4. The following design changes are proposed:

- Traffic to merge from the left on the northbound exit of the junction;
 - The northbound approach left lane to become the flare lane to hold the left turners and the lower proportion of the split traffic;
 - The flare lane on the northbound approach to be extended to 100 metres.
- 3.5. An indicative arrow has been provided for southbound right turning vehicles however as per the Transport Technical Note submitted in June it does not appear that this stage will be required due to the low number of vehicles turning right.
- 3.6. An indicative arrow is introduced as a demand dependent stage to provide priority to any right turners who were unable to clear the junction by gap accepting through the opposing traffic or in the intergreen period.
- 3.7. Right turning vehicles would be encouraged to enter the junction with approximately two to three vehicles waiting in advance of the stop line. It is anticipated that all vehicles in advance of the stop line will clear during the intergreen period and as such the indicative arrow will not be demanded.
- 3.8. Due to the low number of right turners at this junction it is assumed that this will be the case and that right turners will clear the junction in the intergreen period.
- 3.9. Table 3-1, 3-2 and 3-3 shows the results for option 1 for all scenarios assuming the 70:30 split:

Table 3-1 – Option 1 Degree of Saturation Results for 70:30 Vehicle Split

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Newgate Lane East Northbound	88.2	88.2	88.4
Newgate Lane East Southbound	56.7	65	80
Newgate Lane	37.1	47	63.7
PM			
Newgate Lane East Northbound	50.6	50.9	51.4
Newgate Lane East Southbound	56.8	57.1	57.7
Newgate Lane	34.9	39.5	48.8

Table 3-2 – Option 1 Maximum Queue Length Results for 70:30 Vehicle Split (PCUs)

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Newgate Lane East Northbound	18	18	18.1
Newgate Lane East Southbound	5.1	5.1	5.1
Newgate Lane	1.8	2.4	3.6
PM			
Newgate Lane East Northbound	5.6	5.6	5.6
Newgate Lane East Southbound	9.3	9.3	9.3
Newgate Lane	1.7	1.9	2.5

Table 3-3 – Option 1 Delay Results per PCU for 70:30 Vehicle Split (seconds)

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Newgate Lane East Northbound	10.9	11	11
Newgate Lane East Southbound	6.3	6.7	7.4
Newgate Lane	64.8	67.8	75.7
PM			
Newgate Lane East Northbound	4	4	4
Newgate Lane East Southbound	4.7	4.7	4.7
Newgate Lane	64.6	65.8	68.7

3.10. Figures 2 and 3 show a comparison of the Practical Reserve Capacity for all three scenarios and all vehicle splits.

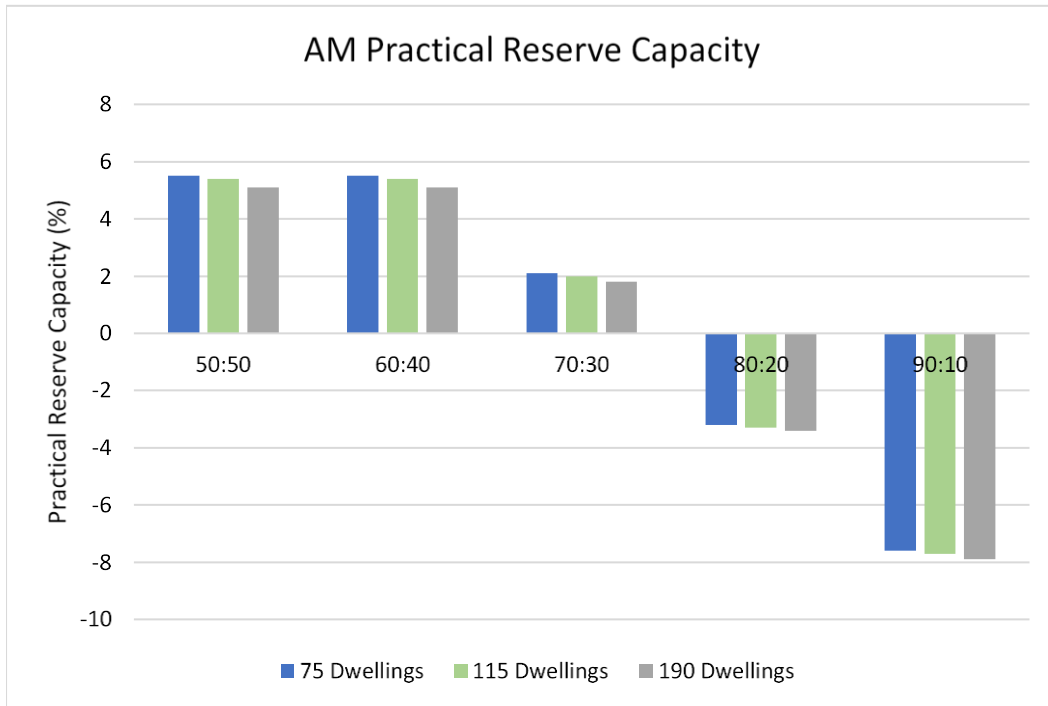


Figure 2- Option 1 AM Practical Reserve Capacity

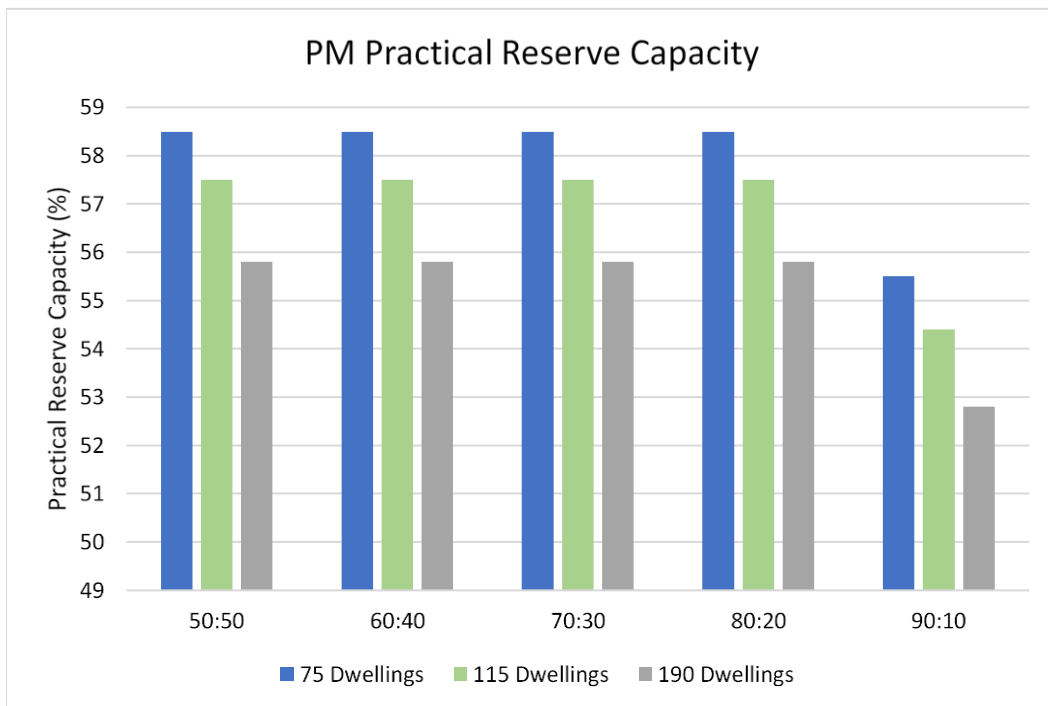


Figure 3- Option 1 PM Practical Reserve Capacity

- 3.11. The results demonstrate that across all scenarios all approaches have a degree of saturation below 100%. The full results for all other vehicle splits can be found in Appendix A.
- 3.12. Due to the extensive length of the merge on the exit, it is likely that the queues will balance on the approach to the junction and that vehicles will merge in turn on the exit.
- 3.13. For similar studies, with shorter merge lengths on the exit, we typically assume a 70/30.
- 3.14. RWA would recommend that islands are installed at the junction at either end of the right turn pocket in order to provide protection to waiting right turning vehicles.

Option 2- Separately Signalled Right Turn

- 3.15. On behalf of Pegasus Group, RWA have also assessed the provision of a separately signalled right turn on the approach of Newgate Lane North.
- 3.16. The same principles for the northbound approach have been applied however the staging now assumes that the right turn has its own stage as can be seen in figure 4 below.

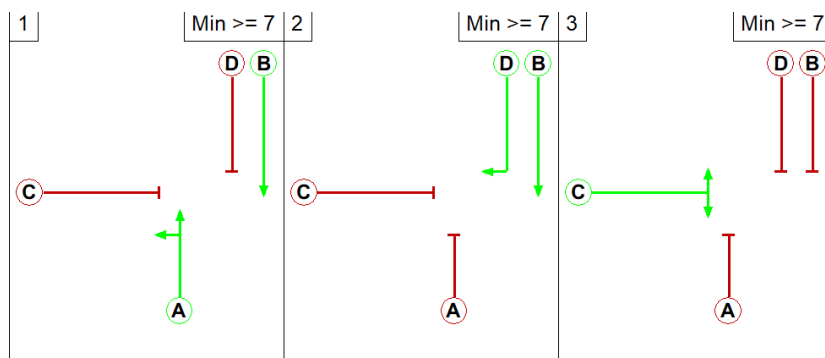


Figure 4 - Option 2 Method of Control

- 3.17. As with option 1, RWA have assessed the scheme with various splits of traffic in the nearside and offside lanes of the northbound approach.
- 3.18. Tables 3-4, 3-5 and 3-6 show the results for option 2 for all scenarios assuming a 70:30 vehicle split:

Table 3-4 – Option 2 Degree of Saturation Results for 70:30 Vehicle Split

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Newgate Lane East Northbound	98.4	98.4	98.6
Newgate Lane East Southbound	41.1	41.4	41.9
Newgate Lane	41.8	52.9	71.6
PM			
Newgate Lane East Northbound	56.3	56.6	57.2
Newgate Lane East Southbound	57.3	57.7	58.3
Newgate Lane	39.2	44.5	54.9

Table 3-5 - Option 2 Maximum Queue Length Results for 70:30 Vehicle Split (PCUs)

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Newgate Lane East Northbound	57.1	57.3	58.3
Newgate Lane East Southbound	5.3	5.3	5.3
Newgate Lane	1.9	2.6	3.9
PM			
Newgate Lane East Northbound	8.9	8.9	9
Newgate Lane East Southbound	9.9	10	10
Newgate Lane	1.8	2	2.6

Table 3-6 – Option 2 Delay Results per PCU for 70:30 Vehicle Split (seconds)

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Newgate Lane East Northbound	41.1	41.5	42.4
Newgate Lane East Southbound	6.2	6.5	7.2
Newgate Lane	68	72.6	85.7
PM			
Newgate Lane East Northbound	8	8	8
Newgate Lane East Southbound	6.6	7	7.6
Newgate Lane	68.0	69.6	73.9

- 3.19. The results demonstrate that with the addition of the stage to account for right turning traffic, the northbound approach is expected to operate close to 100% in the AM peak scenarios with a 70:30 vehicle split. This means that queues will not clear on the northbound approach every cycle.
- 3.20. As with option 1 all other approaches are expected to operate within capacity, the full results of which can be found in Appendix B.

Option 3- No merge on exit

- 3.21. The final option assessed, considers a single lane on the northbound exit.
- 3.22. As such it is assumed that all ahead traffic will queue in a single lane on the northbound approach to the junction.
- 3.23. As with options 1 and 2, a 100m flare length is assumed on the northbound approach of the junction.
- 3.24. The results for all scenarios for option 3 can be found below in tables 3-7, 3-8 and 3-9:

Table 3-7 – Option 3 Degree of Saturation Results

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Newgate Lane East Northbound	99.3	99.4	99.5
Newgate Lane East Southbound	56.7	65.0	80.0
Newgate Lane	41.8	52.9	71.6
PM			
Newgate Lane East Northbound	57	57.4	58.2
Newgate Lane East Southbound	56.2	56.6	57.2
Newgate Lane	34.9	39.5	48.8

Table 3-8 - Option 3 Maximum Queue Length Results (PCUs)

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Newgate Lane East Northbound	70.4	71.2	72.5
Newgate Lane East Southbound	4.7	4.7	4.8
Newgate Lane	1.9	2.6	3.9
PM			
Newgate Lane East Northbound	9.4	9.4	9.4
Newgate Lane East Southbound	8.7	8.7	8.8
Newgate Lane	1.7	2	2.5

Table 3-9 – Option 3 Delay Results per PCU (seconds)

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Newgate Lane East Northbound	46.3	47	48.5
Newgate Lane East Southbound	6	6.5	7.2
Newgate Lane	68.2	72.6	85.6
PM			
Newgate Lane East Northbound	5	5	5
Newgate Lane East Southbound	4.4	4.4	4.5
Newgate Lane	65.3	66.6	69.5

- 3.25. Table 3 demonstrates that is anticipated that Newgate Lane northbound will operate over capacity in the AM peak scenarios without a merge on the exit.
- 3.26. All other approach lanes operate well within capacity in option 3, the full results of which can be found in Appendix C.

4. Conclusion

- 4.1. RWA have undertaken modelling for three proposed signal options at the junction of Newgate Lane with Newgate Lane East with the flows subsequently updated by Pegasus Group.
- 4.2. Option 1 includes amendments to the option previously proposed by Pegasus Group; these amendments include lengthening the northbound flare lane to 100m and swapping the lanes so that the nearside lane is the flare lane.
- 4.3. Option 2 separately signals the right turning traffic from the Newgate Lane northern arm to give them a dedicated stage. The modelling assumes that this stage is demanded every cycle however this is deemed unlikely due to the low flow making that movement.
- 4.4. Option 3 assumes that there is no merge on the exit and that all traffic travelling north through the junction does so in one lane.
- 4.5. Options 1 and 2 have been run considering various different traffic flow splits between the nearside and offside lanes. This has been undertaken in multiples of 10 from 50/50 to 90/10.
- 4.6. Previous studies have been undertaken ([Chris Kennett, 2015](#)) which demonstrate when vehicles are experiencing delay and with a greater number of vehicles, they are more likely to split across the lanes more evenly. This will be a self-regulating system.
- 4.7. It is also our judgement that 70/30 would provide a robust assessment which shows that option 1 and option 2 would both operate within capacity with this vehicle split assumed.
- 4.8. Due to the low number of right turners from Newgate Lane South the provision of an indicative arrow is deemed appropriate although it is assumed that this will be very rarely demanded as vehicles will turn in the intergreen periods.
- 4.9. It is our view that an indicative arrow is a suitable form of traffic control at this junction.

Appendix A – Option 1 Modelling Results

Appendix B – Option 2 Modelling Results

Appendix C – Option 3 Modelling Results