Technical Report

Project:	Newgate Lane, Fareham		
Client:	Pegasus		
Subject:	Proof of Evidence		
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FL&BH 3.1

Proof of Evidence by Miss Martha Hoskins

In Respect of

Outline Planning Application for Land at Newgate Lane (North), Fareham

and

Outline Planning Application for Land at Newgate Lane (South), Fareham

On Behalf of Fareham Land LP and Bargate Homes Limited (appointed by Pegasus Group)

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1. Personal Background

1.1. I, Martha Hoskins, am a Senior Consultant at Red Wilson Associates (RWA) with six years' experience in traffic engineering and modelling.

1.2. RWA is a Traffic Engineering consultancy focussing on local and microsimulation transport modelling and traffic signal junction design. We undertake work for a variety of local authorities and private developers.

1.3. My experience has included working in both the public sector at Transport for London (TfL), and in the private sector supporting the assessment of a variety of development proposals. This has included producing, auditing and reporting on the associated traffic models required to assess traffic impact.

1.4. I have undertaken extensive training in traffic modelling software (VISSIM, LinSig and TRANSYT) and in the relevant model auditing guidelines including TfL MAP Guidelines and Highways England WebTAG. I have experience in reviewing how traffic signalised junctions operate through observing on-street behaviour and traffic signal design through delivering improvement schemes.

1.5. I am a member of the Chartered Institution of Highways and Transportation (CIHT). I hold a BA (Hons) in Geography from Royal Holloway, University of London and chose to focus my studies on mobility and the urban environment.

1.6. I can confirm I have a full understanding of my duty to the Inquiry and have complied, and will continue to comply, with that duty. I confirm that the evidence which I have prepared identifies all facts which I regard as being relevant to the opinion that I have expressed and that the Inquiry's attention has been, or will be, drawn to any matter which would affect the validity of that opinion, irrespective of by whom I am instructed. I believe that the facts stated within this proof are true and that my opinions expressed are correct and in accordance with my professional skills and experience.

2. Scope of Evidence

2.1. RWA were appointed by Bargate Homes Ltd and Fareham Land LP on 8th November 2019 to undertake VISSIM and LinSig modelling assessments at the junction of Newgate Lane East and Old Newgate Lane in Fareham, Hampshire. This was to support the application by Fareham Land LP and Bargate Homes Ltd. for two housing developments; Newgate Lane (North) (LPA ref. P/18/1118/OA) and Newgate Lane (South) (LPA ref. P/19/0460/OA) respectively. I have been leading on the traffic modelling of the site since RWA's instruction.

2.2. My role in the planning application was to act as the modelling specialist to assist in understanding the impact of the two housing developments as a combined assessment and more recently independently of one another.

2.3. Although the planning applications were made separately, the traffic modelling at the junction of Newgate Lane and Newgate Lane East has always been a combined assessment. However, I am also currently assessing the developments in their individual form.

2.4. Prior to our appointment, Pegasus Group undertook PICADY modelling of the junction. Hampshire County Council (HCC) did not believe that the PICADY modelling accurately represented the existing network conditions at the junction and as such would not serve as a suitable tool for which to assess the impact of the proposed development.

2.5. Pegasus Group and HCC agreed to progress the assessment of the scheme using VISSIM modelling at which point RWA were appointed to commission traffic surveys and undertake an assessment of the scheme in VISSIM.

2.6. The following Proof of Evidence (PoE) outlines the base model validation and the future modelled scenarios tested in VISSIM. It explains how the models were constructed as well as how data has been sourced. It also provides details of the LinSig modelling and the signalised options that were tested.

2.7. The appropriateness of the physical design improvements of both the right turn lane and signalised junction between the Newgate Lane East junction with Old Newgate Lane is addressed in the Statement of Common Ground on Transport (SCOGT) and within Mr Anthony Jones' Proof of Evidence. This Proof of Evidence demonstrates that the models are set up in accordance with best practice to accurately represent existing base conditions and the future layout in the drawings provided by Pegasus Group. This PoE also sets out the appropriate justification and evidence to support the modelling of the proposed signalised junction including for appropriateness of using an indicative arrow stage on the right turn manoeuvres into the Old Newgate Lane minor arm. My PoE also summarises the results of the modelling. However, the interpretation of the results in terms of compliance with both national and local policy is addressed by Mr Jones in his PoE.

2.8. The VISSIM modelling has been created in accordance with Transport for London's Traffic Modelling Guidelines and Highways England's WebTAG which are widely known as the leading guidelines for modelling within the industry.

2.9. These guidelines go above and beyond what is typically expected for a non-TfL scheme and as such allow for a robust assessment of the development.

3. Reasons for Refusal

3.1. The reasons for refusal associated with highways matters are as follows:

> *f) Insufficient information has been submitted to adequately assess the highways impacts arising from the proposed development;*
> *g) The proposed access is inadequate to accommodate the development safely;*
> *h) The proposed development would have an unacceptable impact on the junction of old Newgate Lane / Newgate Lane East resulting in a severe impact on the road safety and operation of the local transport network;*
> *i) The proposed development provides insufficient support for sustainable transport options.*

3.2. My PoE will be in response to item H. In his PoE, Mr Anthony Jones will address the compliance with national and local policy issues.

3.3. In terms of item H, I will detail the modelling assessments undertaken for the planning application and state how they align with best guidance and existing policies.

3.4. At the time of writing, HCC currently indicate that the implementation of the developments will have a negative impact on the junction in that they will result in excessive queueing on Newgate Lane eastbound (the minor arm) due to an increase in the volume of traffic using the junction. They are concerned that the current proposed methods of mitigation are not suitable.

3.5. As modelling is ongoing it is anticipated that some of these concerns will be overcome in advance of the inquiry. The base model has been approved by Atkins, the auditors acting on behalf of HCC.

4. VISSIM Modelling

4.1. The principal objective of RWA's involvement in this scheme was to assess the impact of the development with the junction in its current form as a priority junction in VISSIM.

4.2. VISSIM is a microsimulation traffic modelling software that models vehicles behaviour depending on their classification and produces journey time results as an output.

4.3. VISSIM is traditionally used to model complex and congested road networks. It models each vehicle type individually allowing a more realistic representation of driver behaviour including how vehicles behave at give way approaches when compared to local junction models such as PICADY.

4.4. VISSIM allows for traffic flows to be inputted and routed in 15-minute intervals to further accurately demonstrate the network conditions. It is typically used for larger signalised networks but as previously mentioned it was used as a way of assessing existing and future conditions at this junction at the request of HCC.

4.5. 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.

4.6. The VISSIM modelling was first submitted to HCC on 6th February 2020. This included base, future base and proposed VISSIM modelling. Comments were provided on the VISSIM model on 2nd July 2020.

4.7. On review of their comments we produced a response to their review that can be found in Appendix A. Appendix A contains correspondence with HCC demonstrating their stance on the VISSIM model and the associated model Technical Notes.

4.8. On the 19th August, following a meeting with HCC and the auditing engineers at Atkins we agreed the required amendments to the base model. This model was re-submitted to HCC on 9th September.

Base Modelling

4.9. Base Modelling is undertaken to ensure there is a fit for purpose baseline representation of the 'in scope traffic' network in which to compare future year and future proposed scenarios. Base models are validated against on-street conditions typically for a single surveyed day or an average of several days to demonstrate its robustness.

4.10. In order to validate a base VISSIM model and ensure it accurately represents existing traffic conditions, the journey times and turning counts are compared with those obtained as part of a traffic survey.

4.11. The base model scope solely includes the junction of Newgate Lane with Newgate Lane East and its approaches.

4.12. 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 (28th November 2019). The final models developed are in accordance with the Design Manual for Roads and Bridges (DMRB) Modelling Guidelines and TfL Modelling Guidelines Version 3.

4.13. Journey times were originally obtained for the same date as the traffic surveys (28th November 2019) via method of floating car. This provided a small sample size and as such it was deemed that a comparison against this data would not provide us with a robust base model. TomTom data was subsequently collated of the area.

4.14. TomTom journey time data was obtained from Streetwise for both of the assessed hours as an average between September to November 2019 in order to accumulate a suitable sample size. The data has been collated as an average over all Tuesdays, Wednesdays and Thursdays in this period avoiding public holidays and school holiday periods. It has been agreed with HCC and Atkins that this is an appropriate method in which to collect journey time data.

4.15. The base modelled journey time difference versus the surveyed data was within the acceptable limit of under 15% in both peaks.

4.16. 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, the VISSIM base models form a basis for comparison against the proposed development.

4.17. The technical notes associated with the model can be found in Appendix A.

4.18. I believe that the VISSIM base models accurately represent existing conditions and driver behaviour at the junction.

Future Base Modelling

4.19. Flow scenarios were produced by Pegasus Group for two different future scenarios; the first discounted the Stubbington Bypass (DS1) and the seconded included this proposal (DS2).

4.20. As requested, by HCC, we are only testing flow scenarios that include the Stubbington Bypass, DS2.

4.21. The future flow scenarios, both with and without the proposed development, were produced by Pegasus Group and translated into VISSIM inputs and routes by RWA.

4.22. On completion of the validated base model, the flows were updated to represent the 2024 opening year scenario without the proposed development at Newgate Lane. This includes all committed development in the local area that would result in a change in the volume of traffic at the junction.

4.23. This provides a basis in which to assess the impact of the Bargate Homes Ltd. development. The development is being tested individually as the north and south development and as a combined development of 190 dwellings.

4.24. The following future scenarios have been tested in the existing base layout:

1. 2024 AM DS2 Future Base including committed development and Stubbington Bypass
2. 2024 PM DS2 Future Base including committed development and Stubbington Bypass
3. 2024 AM DS2 Future Base (1.) plus the addition of the proposed development of 75 dwellings

4. 2024 PM DS2 Future Base (2.) plus the addition of the proposed development of 75 dwellings
5. 2024 AM DS2 Future Base (1.) plus the addition of the proposed development of 115 dwellings
6. 2024 PM DS2 Future Base (2.) plus the addition of the proposed development of 115 dwellings
7. 2024 AM DS2 Future Base (1.) plus the addition of the proposed development of 190 dwellings
8. 2024 PM DS2 Future Base (2.) plus the addition of the proposed development of 190 dwellings

4.25. Tables 4-1, 4-2 and 4-3 demonstrate the journey times, queue lengths and average delay per light vehicle collected in the VISSIM model for each of the aforementioned scenarios. It is acknowledged that queuing is subjective however the same model parameters have been used in each scenario to provide consistency.

Table 4-1 - Journey Time Comparison (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

Table 4-2 - Maximum Queue Length Comparison (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

Table 4-3 - 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

4.26. When compared with the 2024 without development scenarios, the journey time results demonstrate that the introduction of 75 dwellings results in an increase in the journey time for vehicles exiting Newgate Lane particularly in the AM peak. The journey time increases from 57 to 75 seconds.

4.27. It is my professional opinion that as the queuing on the approach does not reach the junction with Old Newgate Lane it is not excessive. However, as indicated in table 4-1 as the journey time increases, mitigation is required.

4.28. There is not a significant difference between the results for the 75 dwellings and 115 dwellings with queues similarly not reaching the junction with Old Newgate Lane. Similarly, as the journey times increase from 57 to 100 seconds alterations to the junction are required to mitigate against the impact the development has on journey times.

4.29. When compared with the 2024 without development scenarios, the journey time results demonstrate that 190 dwellings will have a significant impact on the junction and as such suitable mitigation is required to ensure the junction operates within capacity. The journey time for those turning out of Newgate Lane increases to almost three minutes (166 seconds).

4.30. With 190 dwellings the queueing becomes excessive, surpassing the Old Newgate Lane junction.

4.31. Table 4-3 also shows that delay increases as additional vehicles are added to the network. Delay for all turning movements increases with the mainline delay (north to south and south to north) not being impacted.

Priority Junction Option

4.32. RWA were originally appointed to assess the impact of Option 1 at the junction of Newgate Lane and Newgate Lane East. This option endeavoured to minimise the impact on vehicles turning right out of Newgate Lane by effectively giving them priority over those turning right into Newgate Lane from Newgate Lane East. The proposed junction improvement options are showing in Figures AHJ/1 and AHJ/2 of Mr A Jones' Proof of Evidence.

4.33. Pegasus Group also produced an Option 2 design however as the differences between Option 1 and 2 would have been negligible in terms of the modelling results, Option 2 was not modelled. Options 1 and 2 differ from Option 3 in that vehicles turning right into Newgate Lane give way to those turning right out of Newgate Lane.

4.34. The VISSIM modelling of Option 1 showed that the impact of the development could be mitigated by making amendments to the road layout at the junction.

4.35. HCC however rejected the Option 1 and 2 proposals after stating that they required more space in the junction for HGVs and as such Option 3 was developed.

4.36. The aforementioned proposed scenarios for 75, 115 and 190 dwellings have been tested in the proposed Option 3 layout to assess the improvements it has on the existing layout. However, the modelling demonstrated that the development cannot be mitigated using a priority design at the junction. The results for these modelled scenarios can be found in Appendix B within the Future Base and Future Proposed Technical Note.

4.37. We have also assessed discounted trip rates in line with the travel plan. This included discounted trip rates across all three scenarios; 75, 115 and 190 dwellings. We additionally assessed affordable housing figures for 190 dwellings. These results can be found in Appendix C.

4.38. As such a signalised junction is proposed at the junction of Newgate Lane and Newgate Lane East. This is detailed in the next section.

5. Signalised Junction Proposal

5.1. RWA were appointed by Pegasus to review the LinSig modelling of the potential signalised junction option they had developed for the Newgate Lane access onto Newgate Lane East. We were also appointed to assess the viability of a signalised junction.

5.2. It is my understanding that HCC have two remaining concerns regarding the signalisation of the junction:

- Firstly, the provision of an indicative arrow meaning that vehicles turning right would be expected to gap accept until the illumination of the right turn arrow if demanded;
- Secondly, HCC do not agree with the assumptions made regarding the merging on the northbound exit of the junction.

Indicative Arrow

5.3. I have reviewed the validity of the LinSig modelling and the appropriateness of the signalised junction design from safety perspective given current and future site conditions.

5.4. The proposed signalised junction option incorporates a right turn indicative arrow for those turning right into Newgate Lane from Newgate Lane East as part of the sequencing of the traffic signals. This method of controlling traffic is shown in Figure 3-6 of Chapter 6 in the Traffic Signs Manual, and further described in section 8.3.

5.5. For context, the full sequencing of the proposed method of control at the junction is shown in Figure 1 and can be described as follows:

- Stage 1 – Newgate Lane East north and southbound traffic movements, southbound traffic turning right into Newgate Lane is able to proceed into the centre of the junction, if a gap in the northbound traffic flow appears this right turning traffic is permitted to turn.
- Stage 2 – The indicative arrow appears for southbound right turning vehicles allowing them to turn un-opposed by northbound traffic, which has been stopped. The southbound ahead traffic continues to run in this stage.

- Stage 3 – All movements on Newgate Lane terminate and traffic waiting in Newgate Lane East is given a green signal.

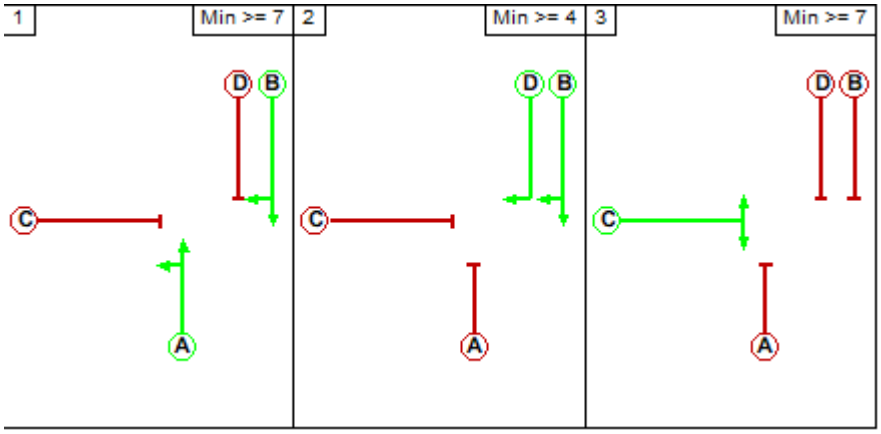

Figure 1 - Proposed Method of Control

5.6. This method of controlling traffic gives vehicles wishing to turn right from Newgate Lane East into Newgate Lane the opportunity to clear the junction when they have not been able to gap accept when the opposing movement has been running.

5.7. The use of this traffic signal design method is clearly described in Sections 3.5 and 8.3 of Chapter 6 of the Traffic Signs Manual. In which section 8.3.1 specifically states that the method is common (see core document CDH.7 for Chapter 6 of Traffic Signs Manual).

5.8. Chapter 6 of the Traffic Signs Manual continues to then state in section 8.4 that HCC's preferred method of signalising right turners, which is to separately signal them, should be considered where making opposed right turns maybe unsafe, for example on roads where 85th percentile speeds are above 45mph.

5.9. The Traffic Signs Manual offers advice to traffic authorities, their contractors and traffic designers in the United Kingdom on the correct use of traffic signs and road markings on the network. Chapter 6 specifically contains advice recommended for those designing traffic signal junctions on roads with a speed limit of 40mph or under like Newgate Lane East.

5.10. CD123 is the geometric design guide of at-grade priority and signal controller junctions (see core document CDH.3 for CD123). This design document is part of the Design Manual for Roads and Bridges (DMRB) which details standards relating specifically to motorway and all-purpose trunk roads in the United Kingdom.

5.11. The recommendations set out in CD123 are to be implemented on all schemes involving geometric design changes to at grade priority and/ or signal controlled junctions at all purpose trunk roads.

5.12. The assertion in Chapter 6 of the Traffic Signs Manual, is supported in CD 123 which states in section 7.16.2 that on roads with design speeds of 72 kph (45mph) right turns should be separately signalled. Above this value there is an increased chance of accidents when the approach speed of the opposing movement is above 45mph.

5.13. In the example of Newgate Lane, the 85th percentile design speed of the northbound traffic would need to be below 45mph.

5.14. Data collected on vehicle speeds on Newgate Lane by HCC was provided to Pegasus Group for the period of Monday 24th February 2020 to Sunday 1st March 2020 to the south of the junction and 26th September 2018 to 4th October 2018 (see Appendix D for speed survey data). ATC data was collected at two locations either side of the junction as shown in Figure 2.

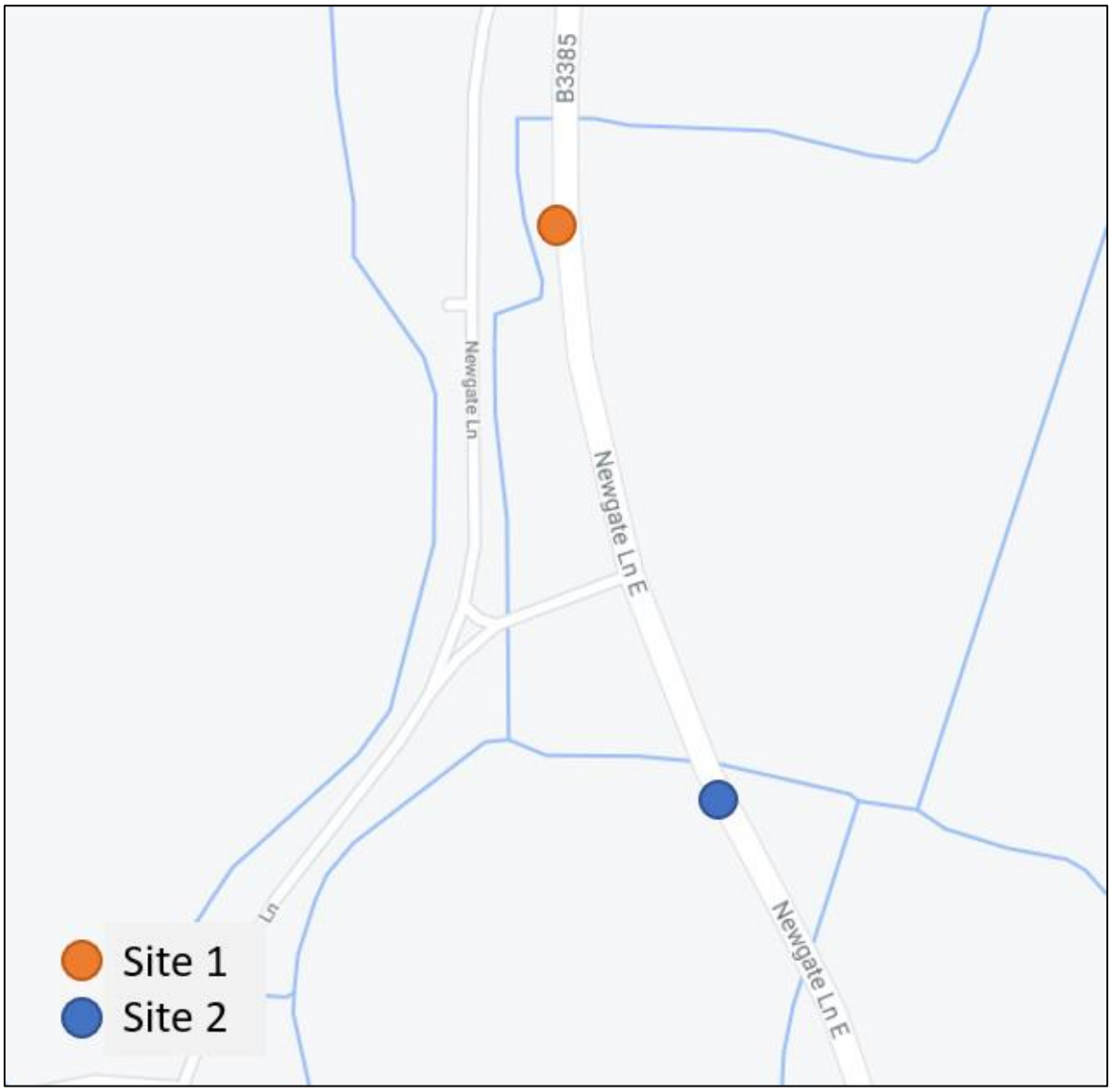

Figure 2 - Northbound ATC Speed Survey Locations

5.15. Table 5-1 shows the 85th percentile speed across the seven-day survey period.

Table 5-1 - ATC Speed Survey Results

Direction of travel	24 hour 85th percentile speed	Period in which 85th percentile vehicle speeds exceed 45mph
Site 1		
Northbound	39.8mph	23:00 to 05:00 ranging between 45.4mph and 47.9mph
Site 2		
Northbound	42.2mph	23:00 to 05:00 ranging between 45.6mph and 50.1mph

5.16. As the 24 hour 85th percentile design speeds are below 45mph and appear to be reasonably consistent in speed travelling past Old Newgate Lane, it is not a requirement to have a separately signalled right turn at this junction. This factor combined with the fact that anyone waiting to turn right in the centre of the junction will be afforded with excellent forward visibility of on-coming traffic means that it is my professional opinion that, it is appropriate for the junction to be designed with an indicative right turn arrow.

5.17. The table demonstrates that although the 24 hour 85th percentile design speeds are below 45mph, overnight they exceed this. It is my view however that it is still not necessary to separately signal the right turn movement for the following reasons;

- The speed of the road will be naturally reduced with the introduction of traffic signals as vehicles will approach them more cautiously;
- In the absence of any demands overnight, the signals will revert to an all-red stage which will further slow the speeds of vehicles.

5.18. HCC have raised concerns regarding the introduction of a junction with indicative arrow method of control and deem it not acceptable in safety terms, therefore stating that the option should not be considered further and discarded. This is principally due to the there being an unacceptable risk of collisions between northbound vehicles and vehicles turning right into Newgate Lane East. HCC state in addition that "Irrespective of northbound vehicle speeds, allowing drivers to gap seek across two lanes of on-coming traffic is not acceptable in safety terms".

5.19. HCC state that allowing drivers to gap seek across two lanes of on-coming traffic is not acceptable in safety terms. In my professional opinion, I dispute this statement.

5.20. Gap seeking across two lanes of on-coming traffic is common-place in the U.K on both trunk roads and in urban areas, with and without traffic signal control. Rule 180 of the Highway Code states that drivers turning right should wait until there is a safe gap between themselves and any oncoming vehicle.

5.21. Typically, when assessing whether conditions are acceptable for gap seeking, consideration would be given to the speed of the road, forward visibility, and the number of opportunities to turn.

5.22. As already mentioned, the design speed of the road is appropriate with the 85th percentile speeds falling below the recommendations set out in Chapter 6.

5.23. In terms of forward visibility vehicles who would wait to turn right at the proposed junction would be afforded a good opportunity to see oncoming vehicles. The junction sits on a very slight bend.

5.24. The forward visibility of vehicles waiting to turn right would be un-obscured, as there would be no right turners turning in the opposite direction due to the fact it is a T-junction.

5.25. Opportunities to turn would be readily presented to drivers either by the appearance of the indicative arrow, or if the arrow was not called, drivers would, as is normal, turn right in the gap between the main road terminating and the side road receiving green.

5.26. In the case of Newgate Lane with Newgate Lane East the volume of traffic turning into Newgate Lane is low in the proposed scenarios with just 39 in the AM and 49 in the PM when 190 dwellings are introduced. This would mean there would be an average of one to two vehicles turning right each cycle. If the indicative arrow detector is positioned correctly then these vehicles will not demand the indicative arrow stage and instead will clear in the intergreen if they have not had another opportunity in the cycle to gap accept. This equates to seven seconds in the model providing enough time for three vehicles to clear before the side road (stage 3) receives a green signal. The design produced by Pegasus Group currently demonstrates space for three vehicles to wait within the junction in front of the stop line. This can be confirmed at the detailed design stage in agreement with HCC.

5.27. If there were vehicles that had not been able to clear the stop line in the cycle then the degree of saturation for the Newgate Lane East southbound link would be greater than 90%. The results in table 5.2 demonstrate that this is not the case.

5.28. The LinSig model predicts when in the cycle the vehicles are expected to turn right. The full results are shown in the model reports that can be found in Appendix G. Table 5-2 shows when the vehicles are expected to turn for each scenario.

Table 5-2 - LinSig Predictions for Vehicles Turning Right into Newgate Lane (70:30 Vehicle Split)- PCUs

	75 Dwellings	115 Dwellings	190 Dwellings
AM			
Total Right Turners	34	39	48
Average no. of Right Turners per Cycle	1.1	1.3	1.6
Turners in Gaps	0	0	0
Turners in Intergreen	34	39	48
PM			
Total Right Turners	33	40	51
Average no. of Right Turners per Cycle	1.1	1.3	1.7
Turners in Gaps	32	39	50
Turners in Intergreen	1	1	1

5.29. It is my professional view that based on all of the above and the guidance set out in Chapter 6 of the Traffic Signs Manual and CD 123 – Geometric design of at grade priority and signal-controlled junctions, a signalised junction with an indicative arrow facility is appropriate at this location.

Merging Traffic on Northbound Exit

5.30. The concerns owing to the merging on the northbound exit of the junction regard the imbalance in the volume of flow that will use the two ahead lanes at the junction and merge on the exit. HCC have stated that they consider a realistic vehicle split would be 90:10. They have not produced any evidence to show this. However, as the merge is situated approximately 110 metres downstream of the junction, it's my professional opinion that assuming 70:30 would be a cautious approach.

5.31. 100m is a considerable merge length with lots of merges, where we would assume the same vehicle split as this case, being situated within or just after the junction.

5.32. In saturated conditions vehicles will find the path of least resistance and balance more evenly as queues build.

5.33. Therefore, when the ahead movement is at its highest the proportional split of vehicles is going to be more equal than when the ahead flow is lower. It is my view that during the AM peak the flare lane will be fully utilised and as such the split of traffic will be closer to 70:30.

5.34. It is my view that vehicles will likely queue equally on the approach to the junction and that cycle by cycle the lane usage is likely to vary. It is effectively a self-regulating situation whereby when road users are queuing, if they see an empty lane next to them, they are likely to use this in order to reduce their journey time and the delay they experience.

5.35. A study was undertaken by Green Signals Consulting Limited in 2015 entitled 'Merging Traffic at Signalled Junctions'. The paper was initially presented at the JCT Traffic Signal Symposium in 2012 and endeavoured to provide traffic modellers and designers with a methodology in which to assume how vehicles queue on the approach to a junction when they merge afterwards.

5.36. The study established that when junctions are more saturated, vehicles will queue more evenly (see Appendix E for 'Merging Traffic at Signalled Junctions'). The study states that traffic flow in the nearside lane can be reasonably predicted as 0.735 of the total flow.

LinSig Modelling Results

5.37. LinSig modelling of the proposed option has been undertaken by Pegasus Group and audited by RWA.

5.38. This has been undertaken for the AM and PM peak scenarios with 75, 115 and 190 dwellings. This assumes 100% private dwellings and as such the assessments are robust and can be perceived as a worst case.

5.39. Tables 5-3, 5-4 and 5-5 show the Degree of Saturation, Mean Maximum Queue (MMQ) in PCUs and delay per PCU results for all three scenarios assuming a vehicular split of 70:30 in the two lanes at the stop line. The full LinSig modelling results can be found in Appendix F.

Table 5-3 - 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	37.1	47	63.7
Newgate Lane East Southbound	56.7	65	80
PM			
Newgate Lane East Northbound	50.6	50.9	51.4
Newgate Lane	34.9	39.5	48.8
Newgate Lane East Southbound	56.8	57.1	57.7

Table 5-4 - 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	1.8	2.4	3.6
Newgate Lane East Southbound	5.1	5.1	5.1
PM			
Newgate Lane East Northbound	5.6	5.6	5.6
Newgate Lane	1.7	1.9	2.5
Newgate Lane East Southbound	9.3	9.3	9.3

Table 5-5 - 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	64.8	67.8	75.7
Newgate Lane East Southbound	6.3	6.7	7.4
PM			
Newgate Lane East Northbound	4	4	4
Newgate Lane	64.6	65.8	68.7
Newgate Lane East Southbound	4.7	4.7	4.7

5.40. Figures 3 and 4 show the Practical Reserve Capacity (PRC) for each of the aforementioned model scenarios and for each different vehicular split that was tested; 50:50, 60:40, 70:30, 80:20, 90:10.

5.41. PRC is calculated by assessing the link with the highest degree of saturation. It is a measure of how much additional traffic could pass through the junction whilst maintaining a degree of saturation of 90% on every lane. A degree of saturation above 90% would result in queues not clearing on every cycle.

5.42. Where traffic has the opportunity to split across two lanes it is believed that it will do so to avoid instances with latent queuing.

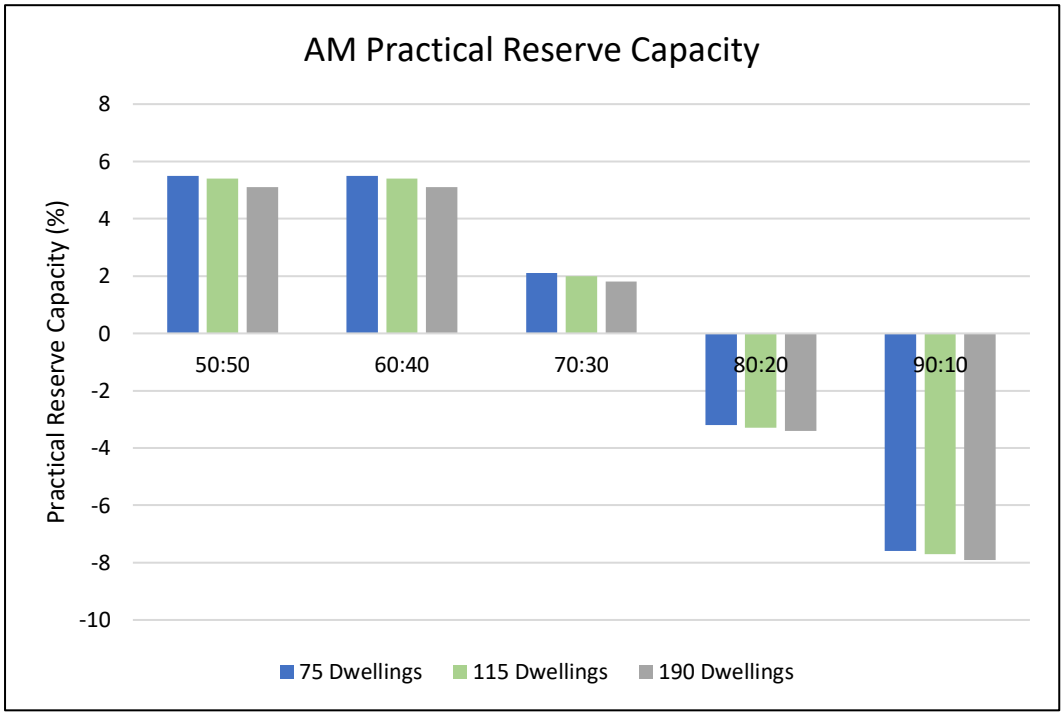

Figure 3 - AM Practical Reserve Capacity for each Vehicle Split (%)

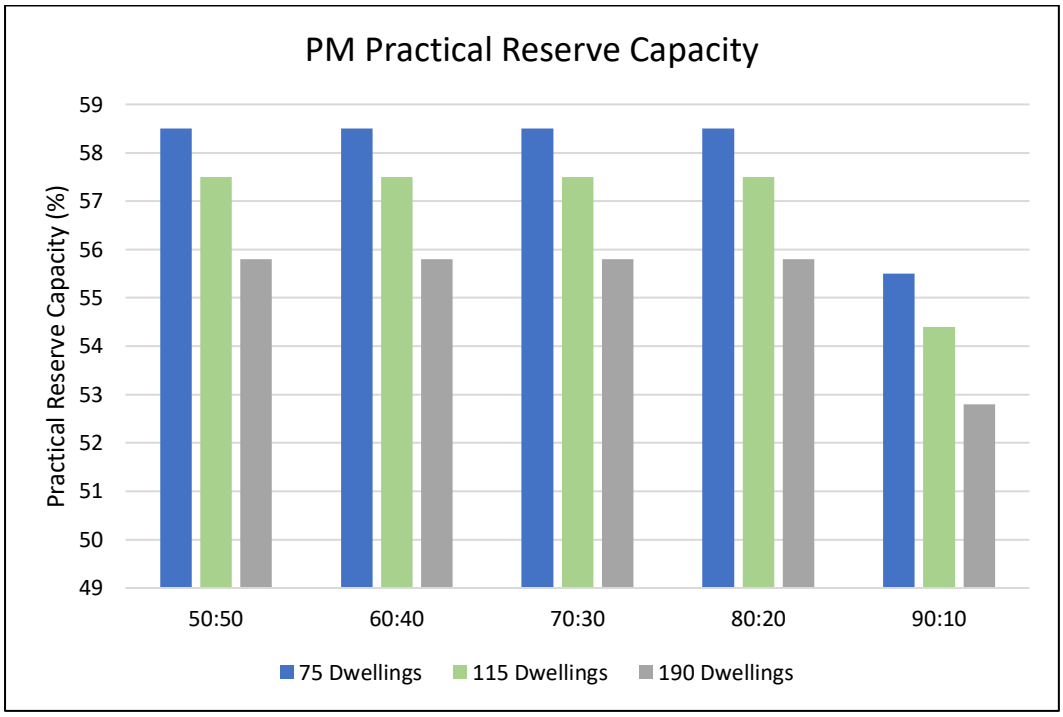

Figure 4 - PM Practical Reserve Capacity for each Vehicle Split (%)

Summary

5.43. In my professional opinion a signalised junction with right turning traffic giving way and vehicles merging on the exit would be a suitable and acceptable solution to mitigate the impact of the development.

5.44. The design of the junction completed by Pegasus Group is in accordance with Chapter 6 of the Traffic Signs Manual, and CD 123 – Geometric design of at-grade priority and signal-controlled junctions design standards. The layout is extremely common across the UK.

5.45. With regards to the merging of traffic, it is my belief that road users will regulate the system by utilising the other lane when there is a large volume of traffic travelling northbound.

6. Summary and Conclusion

6.1. Red Wilson Associates were appointed by Bargate Homes Ltd and Fareham Land LP to provide microsimulation modelling and traffic signal design support as part of the planning application for the two developments at the site of Newgate Lane, Fareham.

6.2. The work undertaken solely addresses the junction of Newgate Lane East with Newgate Lane.

6.3. This Proof of Evidence has addressed the following reason for refusal by HCC;

h) The proposed development would have an unacceptable impact on the junction of old Newgate Lane / Newgate Lane East resulting in a severe impact on the road safety and operation of the local transport network;

6.4. VISSIM modelling has been undertaken of this junction and a robust and validated model of the existing layout has been produced. This model has then been used as a baseline to assess the impact of the developments both individually and together.

6.5. The AM peak period is of the greatest concern regarding capacity, with the queue surpassing the junction with Old Newgate Lane when 190 dwellings are implemented.

6.6. A variety of designs have been explored of a priority junction design at the junction as we are aware that this would be the preference for HCC. However, it is not possible to mitigate the impact of the development with a priority design as it does not allow control of the most significant movement at the junction; Newgate Lane East northbound.

6.7. A signalised junction is therefore being proposed at the location which includes an indicative arrow for vehicles turning right from Newgate Lane East to Newgate Lane.

6.8. This junction has been designed in accordance with the Traffic Signs Manual Chapter 6 and CD 123- Geometric design of at-grade and signal-controlled junctions design standards. This design is also common practice across the UK; as such it is my professional opinion that this is an appropriate junction design at this location.

6.9. HCC also expressed concerns regarding the unequal usage of lanes on the northbound approach of the junction where traffic merges 110metres upstream of the exit. It is my perception that although vehicles will have a preference to one lane, they are more likely to queue in a 70:30 vehicle split than the 90:10 suggested by HCC. Traffic will effectively regulate itself whereby vehicles will take the perceived quickest route through the junction.

6.10. It is my professional opinion that an indicative arrow is a safe method of mitigating the impact of the development at the junction of Newgate Lane with Newgate Lane East.

Appendix A. Base VISSIM Technical Note and Addendums

Appendix B. Future Base and Option 3 VISSIM Results

Appendix C. Travel Plan Discount VISSIM Results

Appendix D. Speed Surveys

Appendix E. Merging Traffic at Signalled Junctions

Appendix F. LinSig Results