

Highgate*Transportation*

Pagham South

**Proposed Residential Development and Community Hub
Pagham Road, Pagham**

**Transport Assessment 02/A
P/140/16/OUT and Cumulative Assessment**

TA/02/Revision A

August 2017

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Common Statement of Cumulative Assessments

Pagham Residential Developments

1.0 Introduction

- 1.1 This Common Statement of Cumulative Assessments (CSCA) sets out the parameters used for the cumulative transport assessment work carried out on behalf of three of the sites in Pagham that are currently the subject of planning applications submitted to Arun District Council. These are:

Hallam Land – Land North of Hook Lane (P/6/17/OUT) - consultants RPS

Hanbury Properties – Pagham South (P/140/16/OUT) - consultants HTp

Taylor Wimpey – Land North of Sefter Road (P/134/16/OUT) - consultants C&A

- 1.2 Each consultant has carried out a cumulative study of the traffic impact of the three sites on the local and strategic highway network for an agreed future year of 2031. Whilst the reports are standalone documents submitted in support of their respective planning applications, each consultant has shared information and the parameters used and therefore the overall conclusions of each report reflect this joint approach. Inevitably, given the different site locations there are some minor differences in the modelling results and as agreed with highway officers at West Sussex County Council (WSCC) and Highways England (HE) this CSCA has been provided to identify why these differences have occurred, and to summarise the obligations arising from the cumulative assessment work.

- 1.3 The studies confirmed that the following mitigation based on cumulative impact is required:

- i. Nyetimber Lane signalised junction with Grosvenor Gardens and Gossamer Lane – Proposed alterations to signal timings.
- ii. Rose Green Road priority junction with Grosvenor Gardens – An additional exit lane from Rose Green Road.
- iii. Lower Bognor Road junction – A contribution will be made to sustainable transport measures on the wider highway network as development traffic from the Pagham sites will displace existing traffic from this junction to the wider highway network.
- iv. B2166 roundabout junction with Vinnetrow Road – Proposed widening of the entry onto the roundabout from the western B2166 arm.
- v. B2166 roundabout junction with B2145 – Proposed widening of the three approaches to this junction.
- vi. A27 Whyke Hill junction – The provision of an additional lane for both eastbound and westbound A27 traffic based on the HE proposals for signalising this junction.

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- vii. In order to create a cycle link from Pagham to the Pagham Harbour to Chichester cycle route a contribution will be provided to upgrade the surfaces of Footpaths 100, 106 and 104 and convert to bridleways to permit cycling.
- 1.4 The contributions are to be based on 980 dwellings, split between the three developers.
 - 1.5 WSCC have requested that the three junction mitigation schemes proposed on their highway network are to be provided by the developers. Therefore the developers have agreed to take a junction each as part of their individual Section 106 contributions package. However, as each junction has a different cost, in order to ensure that no developer is unfairly treated contributions towards the sustainable travel measures would be adjusted as appropriate.
 - 1.6 The cumulative contributions are set out in **Table 1.1** below and the obligations arising for the three sites are summarised in **Table 1.2**.

Table 1.1 – Cumulative Obligations - Contributions

Contribution Requirement	Value
Highways England - Contribution to improve the capacity at the A27 Whyke Hill junction, with the provision of an additional lane for A27 through-traffic in both directions.	£342,000
West Sussex County Council - Contribution to sustainable transport measures on the wider highway network.	£373,000
West Sussex County Council - Additional contribution to off-site sustainable travel for upgrading the surfaces of Footpaths 100, 106 and 104 to bridleways to permit cycling.	£100,000
Total	£815,000

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Table 1.2 – Individual Development Site Obligations

S106 Highway Mitigation	Works or Contribution
Pagham South	
B2166 junction with B2145 proposed widening works to all arms.	Works
Upgrading surface of Footpath 101 (contribution to WSCC).	£65,000
The provision of two site access junctions with Pagham Road, associated pedestrian refuge facilities either side of each access and associated dropped kerbs, 2m wide footways and a new pedestrian crossing over Pagham Road to the immediate north of the Village Hall access.	Works
Provision of a replacement bus stop with layby, shelter, raised kerbs and timetable information.	Works
Land North of Hook Lane	
B2166 junction with Vinnetrow Road widening of western entry arm.	Works
Upgrade of local bus stops on Pagham Road at Hook Lane junction to provide northbound bus stop with raised kerbs and bus timetable information and southbound bus stop with new layby, raised kerbs and timetable information. Upgrade of local bus stops on Hook Lane near Hook Lane Close and on Lodsworth Road to include raised kerbs.	Works
Provision of two new site accesses, one on Hook Lane and one on Pagham Road. Both accesses will include 2m wide footways and associated dropped kerbs.	Works
Land North of Sefter Road	
Rose Green Road priority junction improvement scheme.	Works
Provision of a single all-purpose access to Sefter Road incorporating 2m footways.	Works
Provision of a pedestrian, cycle and emergency access to Rose Green Road.	Works

- 1.7 The breakdown of the contributions and cost of the junction mitigation works for the individual developments is set out in **Tables 7.1, 7.2 and 7.3** at the end of this statement.

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2.0 Description of Submitted Applications

2.1 Each application is described as follows:

P/6/17/OUT – Outline application with some matters reserved for construction of up to 300No. new homes, Care home of up to 80No. beds, D1uses of up to 4000sqm including a 2 form entry Primary School, formation of new means of access onto Hook Lane & Pagham Road, new pedestrian & cycle links, the laying out of open space, new strategic landscaping, habitat creation, drainage features & associated ground works & infrastructure.

P/140/16/OUT – Outline application for access only - mixed use development comprising of up to 400 dwellings, a care home with up to 70 beds, a Local Centre comprising up to 2000sqm of A1/A2/A3/D1/sui generis floor space, provision of land for a 1FE primary school (with sufficient space to ensure that it is expandable to 2FE), provision of land for a scout hut, safeguarding of land to help link the site to the Pagham Harbour Cycle Route & other community uses including public open space & allotments with some matters reserved.

P/134/16/OUT – Outline application for the development of up to 280 dwellings (including affordable homes), land for a replacement scout hut, land for an Ambulance Community Response Post Facility and land for either a 1FE primary school or care home. Provision of a primary vehicular access from Sefter Road and demolition of No. 80 Rose Green Road and creation of a pedestrian and emergency only access. Provision of Public Open Spaces including associated children's play areas, landscaping, drainage and earthworks.

During the application process, Taylor Wimpey modified their application and their consultants C&A have modelled for 280 dwellings in place of the one form entry Primary School.

3.0 Methodology

3.1 This CSCA confirms that whilst there are minor differences in the flows and model parameters used, these do not materially affect any of the consultant's overall conclusions or the mitigation measures proposed. All consultants have worked constructively and collaboratively and this report presents our joint conclusions.

3.2 This statement provides clarification as follows:

- i. Common parameters.
- ii. Why slight differences have arisen within the cumulative assessments.
- iii. Proposed mitigation.
- iv. Conclusions.

Common Statement of Cumulative Assessments

4.0 Common Parameters

4.1 At an early stage the three consultants agreed the general approach in conjunction with highway officers.

4.2 The cumulative assessments have been based on the standalone transport assessments submitted by each consultant to support the respective planning application. Common parameters are:

- i. Trip Rates – Residential, care home and primary school trip rates were agreed with WSCC and shared.
- ii. 2016 Base Flows – Generally the same, minor differences based on individual survey results.
- iii. Future Year Flows – The use of the Arun Saturn Data (as agreed with HE and WSCC) for the junctions north of Lower Bognor Road (inclusive) and the use of surveyed flows with local growth factors for junctions within Pagham.
- iv. Traffic Models – The models used have been based on each consultant's review of the junctions, any differences are negligible and do not impact on conclusions or need for mitigation arising.
- v. Committed Development – All three assessments include for the two agreed committed developments (Land at Summer Lane 90 dwellings, ref: P/58/15 and 251 Pagham Road 40 dwellings, ref: P/125/14) and also the background growth used includes an allowance for an additional circa 150 dwellings (90 for Church Barton on land west of Pagham South plus 60 on the Osborne Refrigeration site at Land North of Seftor Road respectively), taking the total number of dwellings proposed in Pagham to circa 1,200 in line with Local Plan Proposed Main Modifications April 2016.
- vi. A27 Traffic Models – These were provided by the HE and used as instructed.
- vii. Development Content – The school has been modelled on the Pagham South site with 400 dwellings, 70-bed care home and a local centre; 300 dwellings plus an 80-bed care home on Land North of Hook Road.

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5.0 Why Slight Differences Have Arisen within the Cumulative Assessments

5.1 There are some slight differences between the figures used and these are:

- i. Development Content – HTp and RPS have modelled for 250 dwellings on the Land North of Sefter Road site as per the original description of the Taylor Wimpey planning application (NB development content updated 23rd June 2017). C&A have modelled for 280 dwellings on their site on the local highway network in order to provide a sensitivity test in the event that the other potential on site land uses are not taken forward for development. HTp have also tested the mitigation works for 280 dwellings on Land North of Sefter Road as a sensitivity test.
- ii. Local Traffic Distribution – The distribution of traffic within Pagham itself from each site is determined by each site location for all land uses. This cannot be a 'one-distribution-fits-all' approach.
- iii. Traffic Distribution over the Wider Area – The general distribution of traffic across the wider area i.e. 50% of traffic travelling north to A27 based on journey to work census data (an agreed 10% remaining within Pagham and 40% travelling east to Bognor) has been distributed as per the census destinations as agreed with highway officers. Minor differences arose with C&A distributing 55% travelling north and RPS distributing residential traffic on a pro-rata basis for each junction north of Lower Bognor Road.
- iv. Growth Rates – The Temprow database was updated during the production of the cumulative reports from version 7.1 to version 7.2. Version 7.2 provides lower growth figures for this area of Arun. By the time the new version came out HTp had generally completed their cumulative impact work i.e. based on the slightly higher growth figure. Whereas RPS and C&A allowed for version 7.2 within their assessments. Therefore it was agreed with WSCC that the use of version 7.1 would be used as a sensitivity test.
- v. Junction Models – All of the capacity assessments undertaken have been carried out using Junctions 9 software or LINSIGv3.

5.2 Some of the flow diagrams refer to PCUs and some refer to vehicles. However, this has no material impact on the result arising from the modelling.

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6.0 Proposed Mitigation

6.1 Based on their assessments, the consultants have identified the following junctions at which there will be an impact and proposed mitigation measures to manage this, and highlighted additional cumulative contributions:

- i. Nyetimber Lane signalised junction with Grosvenor Gardens and Gossamer Lane – Proposed alterations to signal timings.
- ii. Rose Green Road priority junction with Grosvenor Gardens – As part of their standalone site transport assessment C&A have proposed an improvement scheme for this junction to include for an additional exit lane from Rose Green Road. This has been subject to a Road Safety Audit and supplied with vehicle tracking for a bus, and has been demonstrated to operate within capacity with all three Pagham developments (with traffic growth) for a future year of 2031. This scheme is acceptable to officers at WSCC. These works are estimated to cost £81,000. *See attached plan ref: 12-018-036/A.*
- iii. Sefter Road junction with Pagham Road – C&A proposed minor kerb realignment works at this junction as part of their standalone site transport assessment and demonstrated that this would increase capacity through the junction.
RPS provided a sensitivity test that demonstrated with their site open, any approaching traffic on Sefter Road would divert though Hook Lane and the Hallam Land site; there being plenty of capacity at both the site access and at the Hook Lane junction with Pagham Road, thereby reducing any queues and delay at the Sefter Road site. Therefore no works at this junction are proposed as part of the cumulative assessments.
- iv. Lower Bognor Road priority junction with Pagham Road – It is not practical to carry out works at this junction due to the existing constraints of the highway network. Therefore it has been agreed with WSCC that a contribution will be made to sustainable transport measures on the wider highway network as development traffic from the Pagham sites will displace existing traffic from this junction to the wider highway network. A total contribution of £373,000 is proposed.
- v. B2166 roundabout junction with Vinnetrow Road – Proposed widening of the entry onto the roundabout from the western B2166 arm. This has been subject to a Road Safety Audit and has been demonstrated to operate within capacity with all three Pagham developments (with traffic growth) for a future year of 2031. This scheme is acceptable to officers at WSCC. These works are estimated to cost £23,000. *See attached plan ref: 1616/14/A.*

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- vi. B2166 roundabout junction with B2145 – Proposed widening of the three approaches to this junction. This has been subject to a Road Safety Audit and supplied with tracking for a max legal length articulated vehicle, and has been demonstrated to operate satisfactorily with all three Pagham developments (with traffic growth) for a future year of 2031. This scheme is acceptable to officers at WSCC. These works are estimated to cost £68,000. *See attached plan ref: 12-018-045/B.*
- vii. A27 Whyke Hill junction – As agreed with HE, based on their Chichester Free School Scheme, a package of mitigation measures has been proposed that has focused on retention of the pedestrian footbridge and the provision of an additional lane for both eastbound and westbound A27 traffic. An RSA is being carried out on the signal scheme. A total contribution of £342,000 is proposed. *See attached plan JNY8840-19/A.*
- viii. WSCC have requested that the three developments also contribute to the provision of a link to the Pagham Harbour to Chichester cycle route from Pagham, to upgrade the surfaces of Footpaths 100, 106 and 104 and convert to bridleways to permit cycling.

6.3 The total costs of the proposed contributions and mitigation measures can therefore be summarised as set out in **Table 6.1** and **Table 6.2** below (reproduced **Tables 1.1** and **1.2**).

Table 6.1 – Cumulative Obligations - Contributions

Contribution Requirement	Value
Highways England - Contribution to improve the capacity at the A27 Whyke Hill junction, with the provision of an additional lane for A27 through-traffic in both directions.	£342,000
West Sussex County Council - Contribution to sustainable transport measures on the wider highway network.	£373,000
West Sussex County Council - Additional contribution to off-site sustainable travel for upgrading the surfaces of Footpaths 100, 106 and 104 to bridleways to permit cycling.	£100,000
Total	£815,000

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Table 6.2 – Individual Development Site Obligations

S106 Highway Mitigation	Works or Contribution
Pagham South	
B2166 junction with B2145 proposed widening works to all arms.	Works
Upgrading surface of Footpath 101 (contribution to WSCC).	£65,000
The provision of two site access junctions with Pagham Road, associated pedestrian refuge facilities either side of each access and associated dropped kerbs, 2m wide footways and a new pedestrian crossing over Pagham Road to the immediate north of the Village Hall access.	Works
Provision of a replacement bus stop with layby, shelter, raised kerbs and timetable information.	Works
Land North of Hook Lane	
B2166 junction with Vinnetrow Road widening of western entry arm.	Works
Upgrade of local bus stops on Pagham Road at Hook Lane junction to provide northbound bus stop with raised kerbs and bus timetable information and southbound bus stop with new layby, raised kerbs and timetable information. Upgrade of local bus stops on Hook Lane near Hook Lane Close and on Lodsworth Road to include raised kerbs.	Works
Provision of two new site accesses, one on Hook Lane and one on Pagham Road. Both accesses will include 2m wide footways and associated dropped kerbs.	Works
Land North of Sefter Road	
Rose Green Road priority junction improvement scheme.	Works
Provision of a single all-purpose access to Sefter Road incorporating 2m footways.	Works
Provision of a pedestrian, cycle and emergency access to Rose Green Road.	Works

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7.0 Contribution Basis

- 7.1 The contributions are based on 980 dwellings, split between the three developers.
- 7.2 WSCC have requested that the three junction mitigation schemes proposed on their highway network are to be provided by the developers. Therefore the developers have agreed to take a junction each as part of their individual Section 106 contributions package. However, as each junction has a different cost, in order to ensure that no developer is unfairly treated contributions towards the sustainable travel measures would be adjusted as appropriate.
- 7.3 It is proposed that the triggers for the off-site highway works and cumulative contributions will be on the competition of the 200th dwelling for that respective development.
- 7.4 Based on **Table 6.1** the contribution values are to be split between the developers as set out in **Table 7.1** below based on 980 dwellings coming forward from the three sites.

Table 7.1 – Cumulative Contributions per Development

Contribution Requirement	Value	Land North of Sefter Road	Land North of Hook Lane	Pagham South
Contribution to HE to improve the capacity at the A27 Whyke Hill junction, with the provision of an additional lane for A27 through-traffic in both directions.	£342,000	£97,714	£104,694	£139,592
Total Contribution to HE	£342,000	£97,714	£104,694	£139,592
Contribution to WSCC for sustainable transport measures on the wider highway network.	£373,000	£106,571	£114,184	£152,245
Additional contribution to WSCC for off-site sustainable transport measures - Upgrading surface of Footpaths 100, 106 and 104 to bridleways to permit cycling.	£100,000	£28,572	£30,612	£40,816
Contribution to WSCC	£473,000	£135,143	£144,796	£193,061

- 7.5 The estimated civil engineering cost of the mitigation works also proposed on the local highway network (see **Table 6.2**) are set out in **Table 7.2** below.

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Table 7.2 – Junction Mitigation Works

Development Site	Junction & Proposed Mitigation Works	Estimated Junction Mitigation Costs
Land North of Sefter Road (280 dwellings)	Rose Green Road priority junction – Widening of minor arm entry to form two lanes.	£81,000.00
Land North of Hook Lane (300 dwellings)	B2166 junction with Vinnetrow Road - Widening of western entry arm.	£23,000.00
Pagham South (400 dwellings)	B2166 junction with B2145 - Widening works to all arms.	£68,000.00
Total		£172,000

- 7.6 However, based on the costs of the respective junction works set out in **Table 7.2**, the contribution values to WSCC (of £482.653 per dwelling based on a total requested contribution of £473,000 as set out in **Table 7.1**) are to be adjusted to reflect the cost borne by each Developer in respect of the mitigation engineering works, as set out in **Table 7.3** below.
- 7.7 It should be noted that the figures set out in this statement are part of a wider Section 106 package for each development site and as such could be subject to a future viability assessment.

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Table 7.3 – Cumulative Contributions Readjustments

Development Site	Unadjusted Contribution Value (a)	Estimated Junction Mitigation Costs (b)	Junction Costs Apportioned Value (c) (£172,000/total no.dwellings*)	Adjustment to be made to Contribution Value (d) (c-b)	Adjusted Total Contribution to WSCC per Development (a+d)
Land North of Sefter Road (280 dwellings)	£135,143.00	£81,000.00	£49,142.86	-£31,857.14	£103,285.86
Land North of Hook Lane (300 dwellings)	£144,796.00	£23,000.00	£52,653.06	+£29,653.06	£174,449.06
Pagham South (400 dwellings)	£193,061.00	£68,000.00	£70,204.08	+£2,204.08	£195,265.08
Totals	£473,000	£172,000	£172,000		£473,000

Notes:

The total contribution required to be made to WSCC is £473,000 plus the delivery of three junction mitigation schemes.

The junction costs result in a cumulative contribution value of £175.51 per dwelling, based on a total of 980 dwellings.

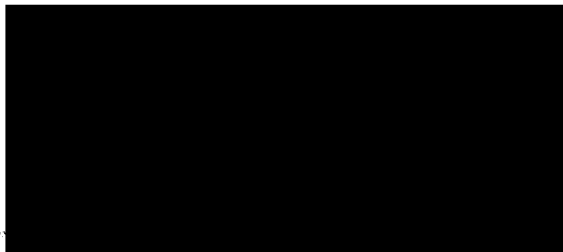
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8.0 Conclusions

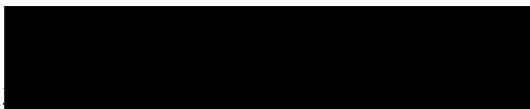
8.1 The following is concluded:

- i. Where differences exist within the three cumulative reports they are too insignificant to affect the mitigation measures required.
- ii. The Pagham developments sites can cumulatively be accommodated on the highway network with the implementation of the proposed mitigation schemes.

Signed

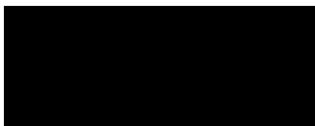


On behalf of RPS transportation (on behalf of Hallam Land Management)



On behalf of Highgate Transportation (on behalf of Hanbury Properties)

On behalf of C & A Consulting Engineers Ltd. (on behalf of Taylor Wimpey)



Dated 23rd August 2017

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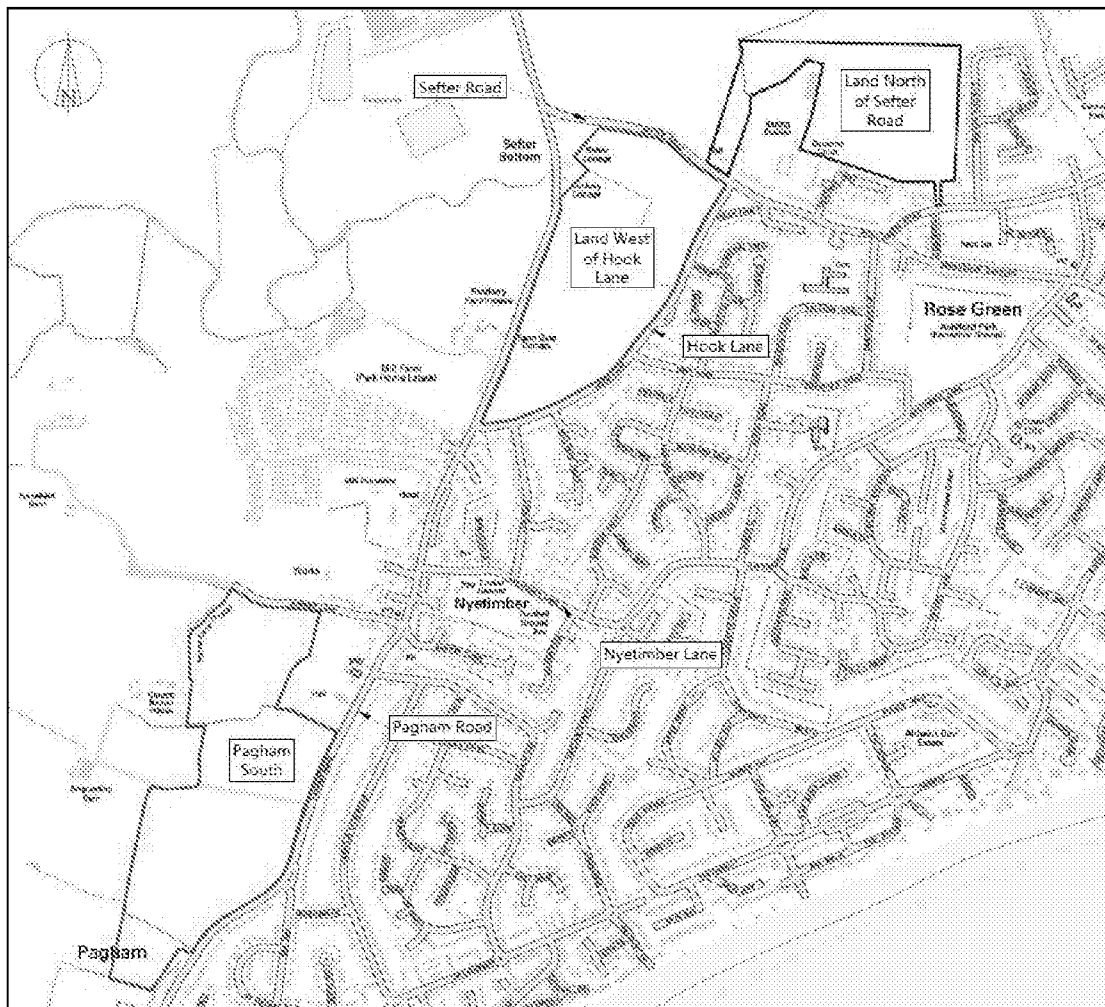
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1.0 Introduction

- 1.1 Highgate Transportation Limited have been appointed by Hanbury (PM) Limited to prepare the Transport Assessment work in support of their planning application for residential development and creation of a community hub on land at Pagham South and which lies to the west of Pagham Road. The planning application (ref: P/140/16/OUT) was submitted in outline with all matters reserved except for access.
- 1.2 Prior to the submission of the planning application discussion were held with highway officers and as a result the impact and mitigation arising from Pagham South was largely agreed.
- 1.3 Since the application was submitted in December 2016 there have been discussions and meetings held with the highway officers at West Sussex County Council (WSSC) and Highways England (HE) and the planning officer at Arun District Council (ADC) to discuss this application and the cumulative impact of the traffic arising from the housing sites currently being promoted in Pagham at Hook Lane and Sefter Road, and those earmarked in line with the Local Plan Proposed Main Modifications April 2016. There has also been collaborative working with the transport consultants of the other promoted sites within Pagham to provide cumulative assessment work with common conclusions and an agreed overarching package of mitigation measures. The locations of the Pagham South, Sefter Road and Hook Lane sites are shown in **Figure 1.1 on page 2** below.
- 1.4 In summary, each development site proposes the following:
 - i. Pagham South – up to 400 residential dwellings, a 2,000sqm GFA local centre including a 500 sqm GFA convenience store, a 70 bed care home and a single form entry primary school. Vehicular access is via two new priority junctions onto Pagham Road.
 - ii. Hook Lane – up to 300 residential dwellings and an 80 bed care home. The proposal includes the option of accommodating a two form entry primary school instead of some of the housing. Vehicular access is from three new priority junctions – one onto Pagham Road and two onto Hook Lane. Transport consultants RPS.
 - iii. Sefter Road – it is understood that a revision to the planning application description was submitted late June 2017 to: up to 280 dwellings with the option of accommodating a single form entry school or care home. Vehicular access from a new priority junction onto Sefter Road. Transport consultants C&A. However, for the purpose of the assessments contained in this report the previously used figure of up to 250 dwellings will be used as per the information supplied on the planning portal.

Figure 1.1 – Pagham and site locations



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- 1.5 This report is Revision A of the updated report TA/02 (dated July 2017) further to a cumulative team meeting with HE, WSCC and Arun District Council on 31st July 2017 and subsequently supersedes all previous reports; Transport Assessment Revision A (TA/01/A dated March 2017) that considered the application site and the development traffic impact arising from the development proposals at Pagham South; Addendum Transport Assessment 02 Revision A (ATA/02/A dated March 2017) that considered the cumulative impact of the promoted sites in Pagham on the local highway network; and Addendum Transport Assessment 03 Revision A (ATA/03/A dated March 2017) that considered the cumulative impact of the promoted sites in Pagham on the wider highway network to the north of Pagham, including the A27 which forms part of the strategic highway network. All of these previous reports were updated and consolidated into one report (TA/02) to provide ease of reference for ADC, WSCC and HE to review.

- 1.6 Consultation responses have been received from WSCC (dated 27th January 2017 and 26th April 2017) and the access proposals were updated accordingly. The WSCC highways consultation responses and our subsequent responses are included in **Appendix 1** for reference.
- 1.7 Agreed meeting minutes from the cumulative impact meeting with HE and WSCC highway officers to discuss the cumulative assessment work on 24th April 2017 are contained in **Appendix 2** for reference.
- 1.8 The agreed meeting minutes from the cumulative impact meeting with Arun District Council, HE and WSCC on 31st July 2017 are also contained in **Appendix 2**.
- 1.9 The Pagham South proposal is to provide:
 - iv. Up to 400 residential dwellings.
 - v. A care home with up to 70 beds.
 - vi. A Local Centre comprising up to 2,000sqm GFA, with food sales limited to a 500sqm GFA convenience store.
 - vii. A single form entry primary school (210 pupils).
 - viii. Other community uses – sports pitches and a scout hut.
 - ix. An area for allotments with up to 20 plots.
 - x. Access to the development from two new priority junctions with Pagham Road and associated pedestrian facilities.
 - xi. The safeguarding of land to help link the existing cycle route between Pagham Harbour and Chichester with Pagham Road via the site.
- 1.10 The key changes from TA/02 are as follows:
 - i. Updated Common Statement of Cumulative Assessment (CSCA).
 - ii. Provision of a sensitivity test for each of the three off-site junction mitigation schemes to account for up to 280 dwellings being provided on Land North of Sefter Road.
 - iii. Provision of a sensitivity test for the B2166/Vinnetrow junction mitigation scheme with CATM flow data provided by WSCC.
 - iv. Removal of detailed reference to the Church Barton site planning application.
 - v. Updated mitigation and modelling for the B2145/B2166 junction.
 - vi. Updated junction layout and modelling for the proposed A27 Whyke Hill signalised junction arrangement.
 - vii. Inclusion of Road Safety Audits and associated documents for the proposed off-site mitigation schemes.
 - viii. Updated list of Section 106 obligations.
- 1.11 Key changes for TA/02 from TA/01/A were as follows:
 - i. Relocation of the uncontrolled pedestrian crossing to the north of the site to the immediate north of the Village Hall access and provision of associated footway.
 - ii. Provision of a 2.0m wide pedestrian crossing refuge at the previously proposed traffic splitter island north of the northern access junction.

- iii. Provision of a revised model for the Nyetimber Lane signalised junction with Grosvenor Gardens and Gossamer Lane (C&A modelling parameters) demonstrating that a change in the signal cycle timings can create additional capacity.
- iv. Updated modelling for the Rose Green Road junction with Grosvenor Gardens (C&A modelling parameters).
- v. Updated modelling for the Hook Lane junction with Pagham Road.
- vi. Updated highway-related draft Section 106 contributions.

1.12 Key changes for TA/02 from ATA/02/A were as follows:

- i. To update the model for the Rose Green Road junction with Grosvenor Gardens (as above).
- ii. To update the model for the Nyetimber Lane signalised junction with Grosvenor Gardens and Gossamer Lane (as above).
- iii. The replacement of the proposed mini roundabout mitigation scheme at the Rose Green Road junction with Grosvenor Gardens for the widening improvement works to facilitate a second entry lane on the Rose Green Road arm.

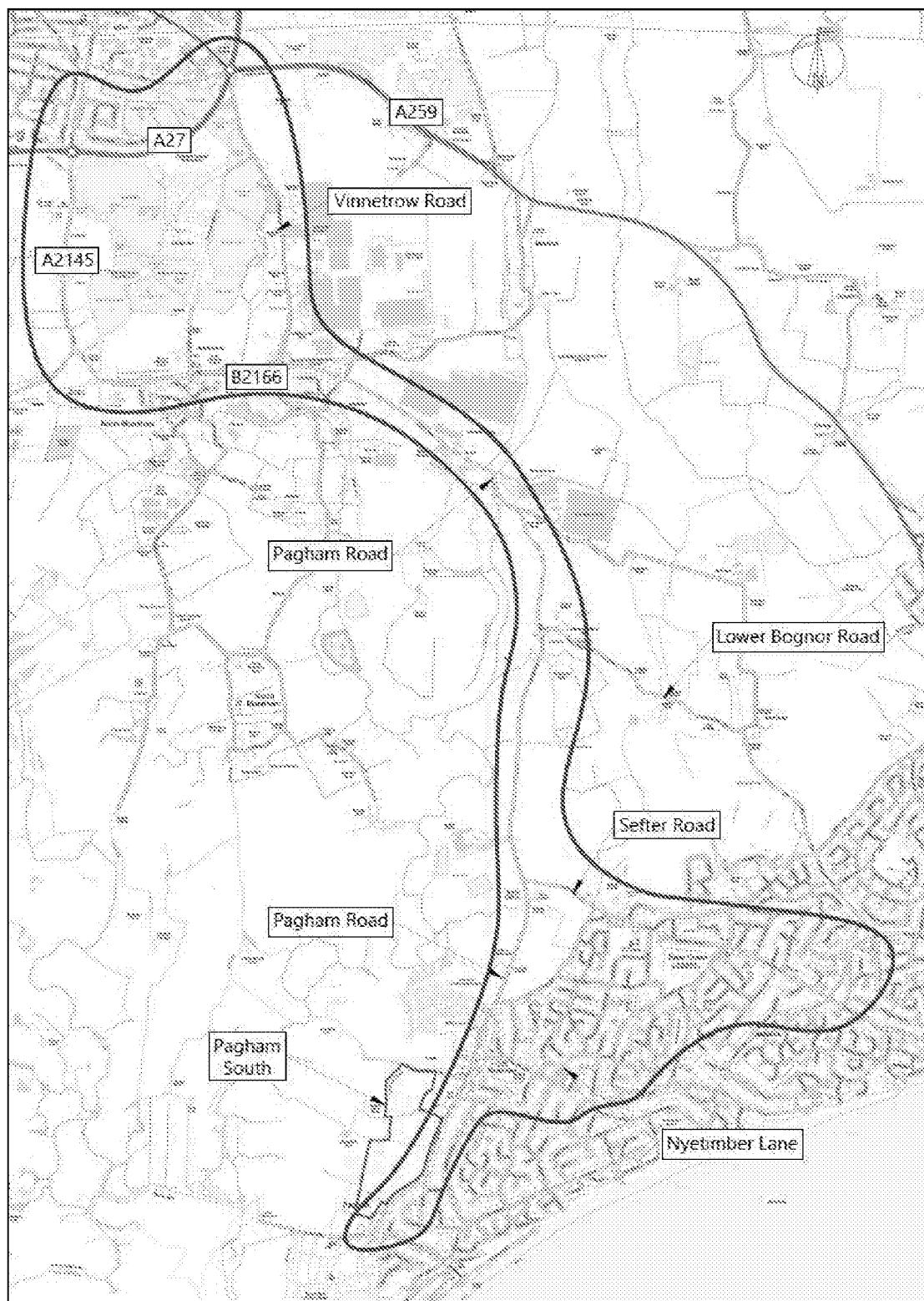
1.13 Key changes for TA/02 from ATA/03/A were as follows:

- i. The provision of contributions for sustainable transport measures on the wider highway network to offset the cumulative impact of the Pagham development sites at the Lower Bognor Road junction with Pagham Road.
- ii. Updated model parameters for the B2145 junction with the B2146 and subsequent mitigation package.
- iii. The use of HE MAX SE and SE data for the modelling of the A27 Whyke Hill junction.
- iv. A revised package of mitigation works for the A27 Whyke Hill junction layout based on the Chichester Free Schools signalised junction design, with the introduction of a third lane for A27 traffic in both directions and alterations to the stacking capacity for turning movements.

1.14 The scope of the assessments for Pagham South and the cumulative work has been agreed with officers at WSCC and HE, including the study area which is shown in **Figure 1.2 on page 5**.

1.15 The illustrative masterplan for Pagham South has been updated to show the revised access proposals that have been agreed with highway officers at WSCC, and also to demonstrate that a vehicular link to the Church Barton site can be accommodated. One of the guiding principles has been to ensure that the development has an appropriate level of connectivity between the proposed and the adjacent uses. The internal layout follows the guidance set out in Manual for Streets to ensure a development that encourages walking and cycling. The masterplan confirms that one of the proposed access locations is to the south of Summer Lane and the other to the south of Sea Way. The updated illustrative masterplan is contained in **Appendix 3**, with an extract shown below in **Figure 1.3 on page 6**.

Figure 1.2 - The Pagham South study area



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Figure 1.3 – Illustrative masterplan extract



1.16 The purpose of this study is to:

- i. Confirm that the Pagham South development proposal is appropriate and can be accommodated in highway terms, and as such has been agreed with highway officers at WSCC.
- ii. That the cumulative developments in Pagham can be accommodated on the local highway network and that an appropriate package of mitigation measures has been proposed.
- iii. That the cumulative developments in Pagham can be accommodated on the wider highway network, including the A27, and that an appropriate package of mitigation measures has been proposed.
- iv. Set out the draft Section 106 Heads of Terms.

1.17 It should be noted that the mitigation measures proposed on the local and wider highway network, including the A27, have been agreed and put forward in collaboration with the transport consultants for the Hook Lane (P/6/17/OUT) and Sefter Road (P/134/16/OUT) development sites.

1.18 This Transport Assessment concludes that there are no transport related reasons why the development at Pagham South should be refused planning permission.

2.0 Transport Network

Highway Network

2.1 From the Chichester Bypass (A27T) to the north, Pagham is served by the B2145 and the B2166 (Pagham Road). The B2166 also provides access to Bognor Regis (via Lower Bognor Road), which is accessed from the site via Nyetimber Lane or Hook Lane and Sefter Road, into Aldwick Road. To the north and east of Bognor, the area is served by the A249 and the A29. Pagham Road links the B2166 to the north with the harbour to the south.

2.2 **Figure 2.1** below is a plan of the site location within the wider highway network.

Figure 2.1 – Site location plan



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Local Highway Network

- 2.3 Opposite the site, Pagham Road is residential in character with accesses to individual properties and a 2.0 metre wide footway, reducing to around 1.5 metres south of the junction with Sea Way. It is 7.3 metres wide, lit and subject to a 30mph speed restriction.
- 2.4 There is also widening of the carriageway to allow on street car parking on Pagham Road opposite the site, to the north of the junction with Sea Way. The photographs below provide views of Pagham Road in the vicinity of the proposed site access junctions.

Photograph 1 – view north on Pagham Road, from proposed northern site access location



Photograph 2 – view south on Pagham Road, from proposed northern site access location



Photograph 3 – view north on Pagham Road, towards the junction with Sea Way



Photograph 4 – view south on Pagham Road, looking towards the proposed southern access from the opposite side of the road



2.5 Summer Lane is a narrow cul-de-sac providing access to a small number of existing residential properties. As part of the recent planning consent on land to the north, modifications to Summer Lane at its junction with Pagham Road are proposed in order to accommodate an additional 90 dwellings.

2.6 Traffic survey results and existing highway conditions within Pagham and beyond are considered in detail in **Section 3.0**.

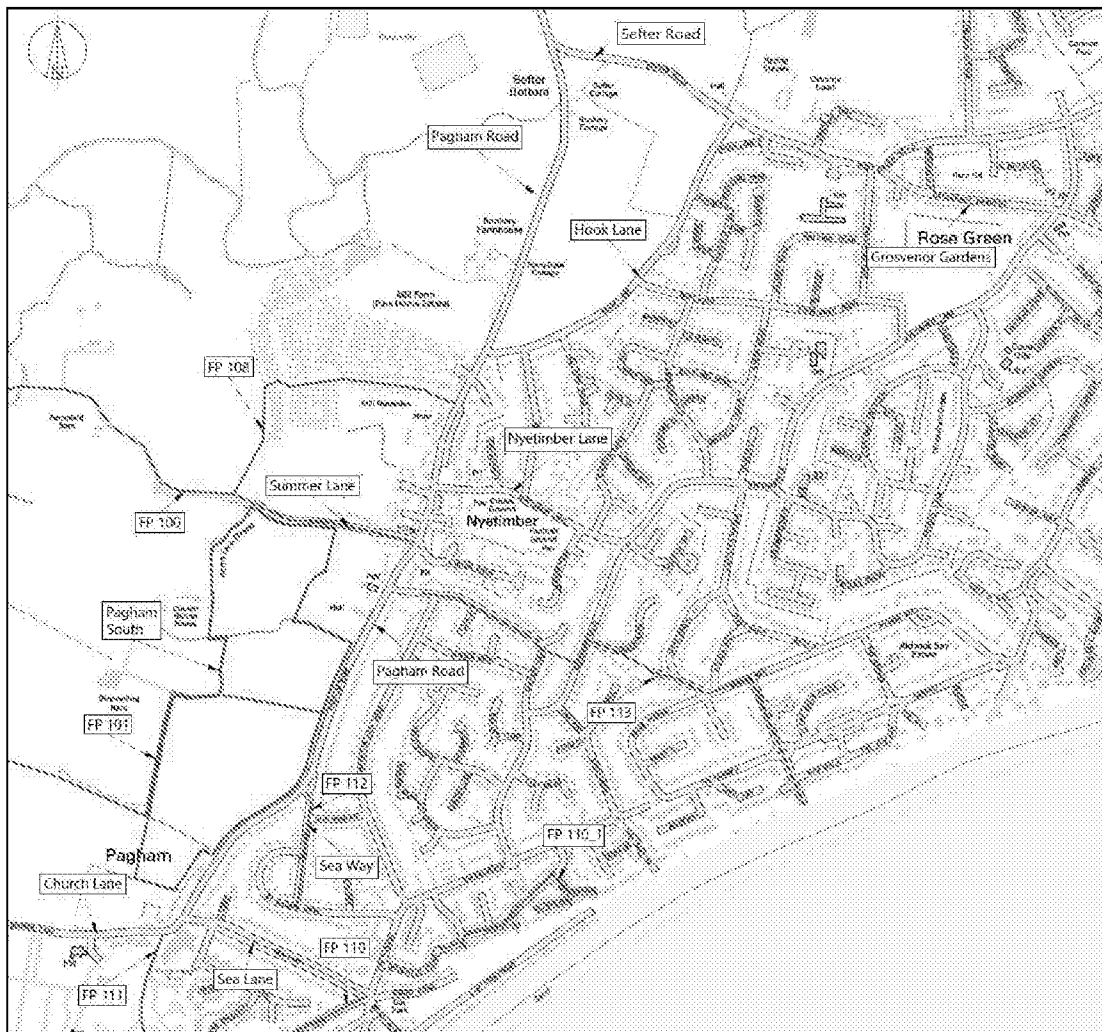
Pedestrian and cycle facilities

2.7 Summer Lane also forms Public Right of Way (PRoW) FP 100 which connects to FP 108 to the north and to the south is FP101, which bisects the application site and has an access point with Pagham Road.

2.8 Because of the extensive provision of the local pedestrian network, this location is considered to be well connected by existing footways to the wider Pagham area and beyond. Proximity to local services and amenities is considered in detail in **Section 4.0**.

2.9 **Appendix 4** contains a copy of the highway records, including the PRoW in the vicinity of the site. **Figure 2.2** below shows the Pagham South site in the context of the local highway network including the existing PRoW.

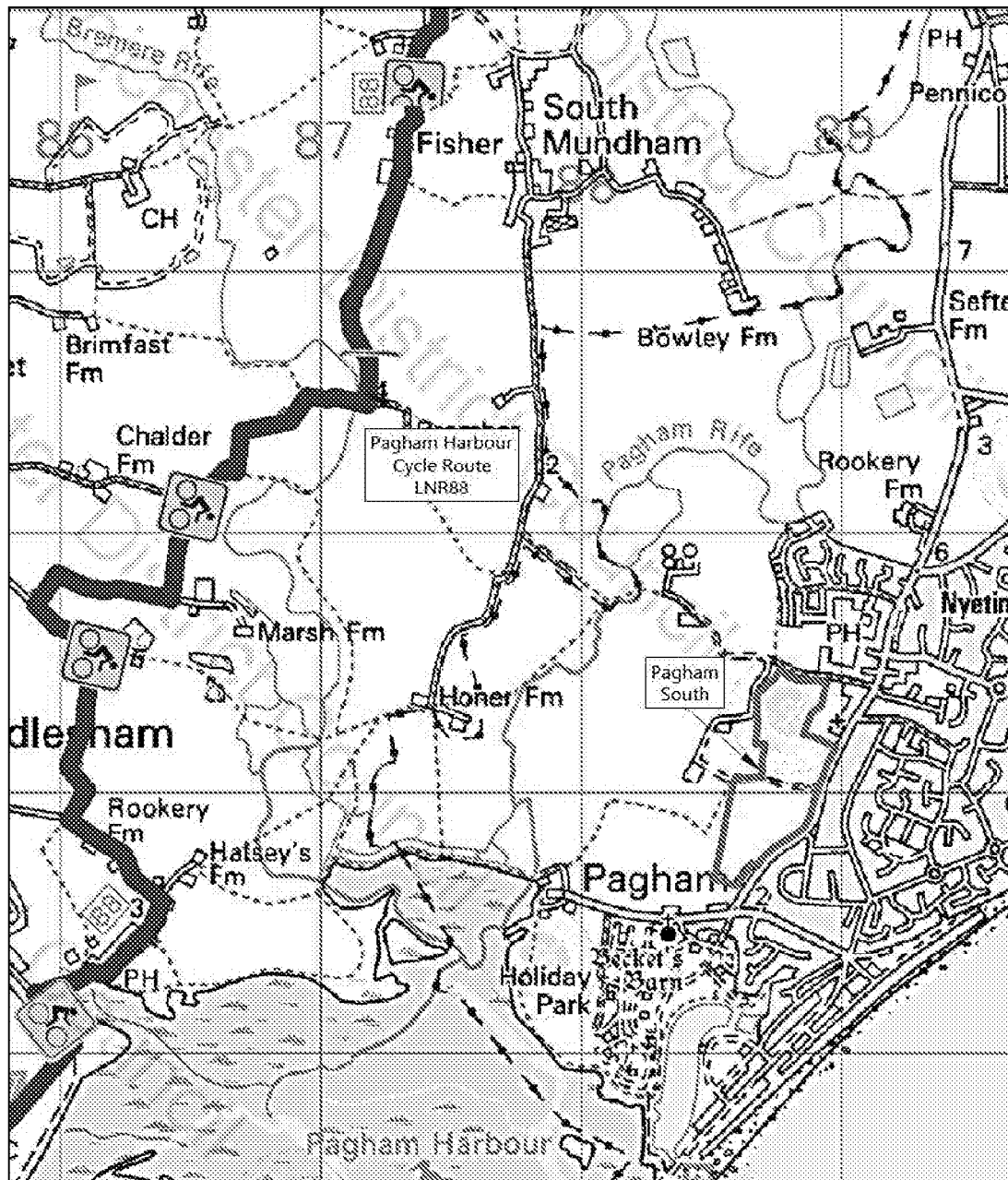
Figure 2.2 – Pagham South and local highway network



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- 2.10 Whilst there are no dedicated cycle facilities in Pagham, the roads are lit, generally of a flat gradient and subject to a 30mph speed limit, which would encourage cycling within the village and out towards Bognor Regis.
- 2.11 In terms of cycling from Pagham towards Chichester the route is currently on-road and generally unlit between the Hook Road junction with Pagham Road and the A27 (7.0 km) with various speed limits. However, the Pagham Harbour cycle route, which is classified as LNR 88, links Pagham Harbour with Chichester via North Mundham and provides an alternative to the B2145 and B2166 route which is also narrow in places. It is located approximately 1.2 kilometres from the Pagham South site.
- 2.12 The Pagham Harbour Cycle Route plan is contained in **Appendix 5** and an extract also showing the location of the Pagham South site forms **Figure 2.3** below.

Figure 2.3 – Pagham Harbour Cycle Route extract

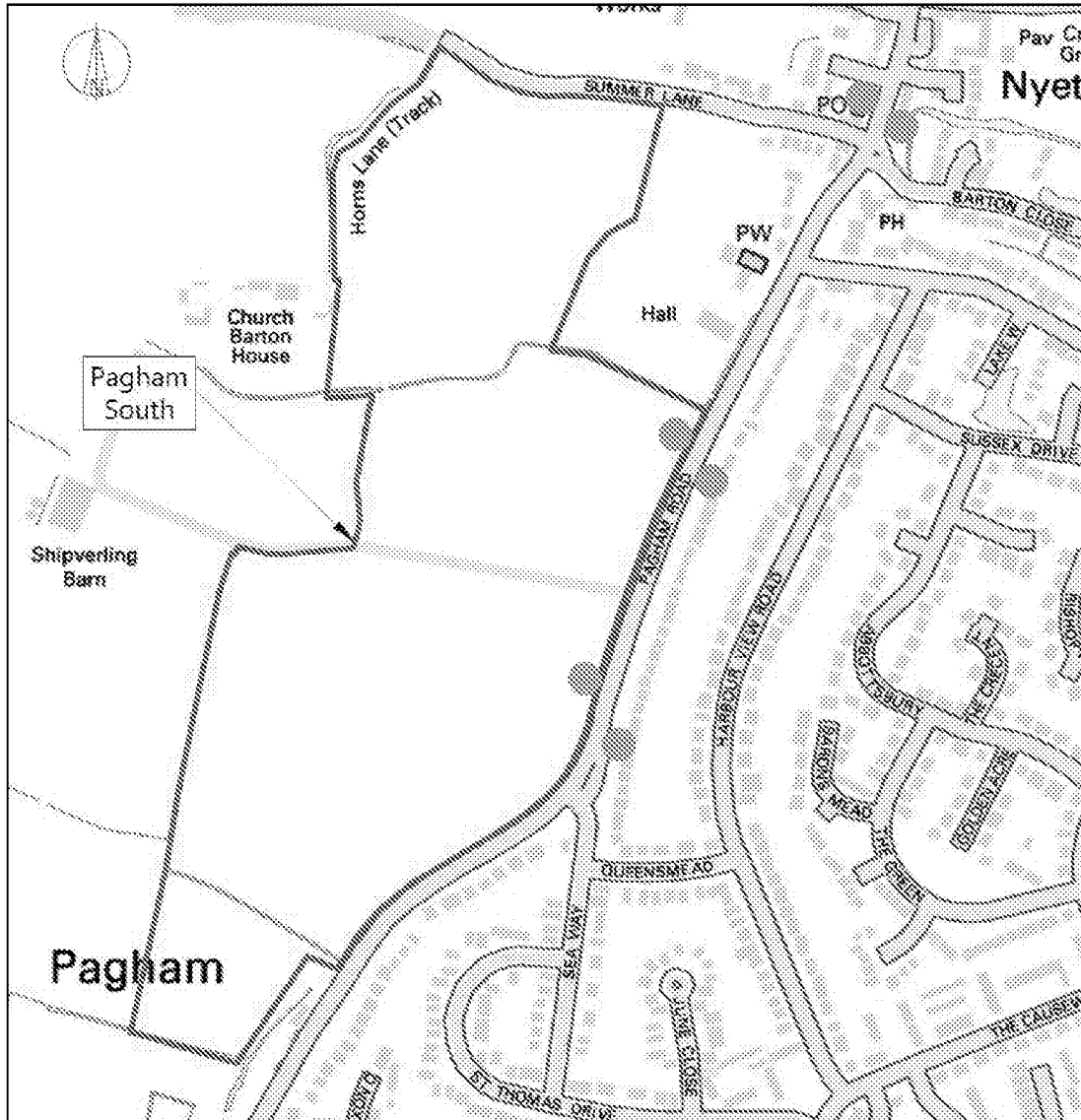


Public Transport Network

- 2.13 Pagham Road is a bus route with existing bus stops close to the junction with Summer Lane as well as south of the Village Hall and north of the junction with Sea Way, as shown on **Figure 2.4** below. These bus stops are served by route number 600, operated by Stagecoach as a new, comprehensive and high quality service between Chichester and Bognor Regis. A route plan and timetables are contained in **Appendix 6**. Service 600 operates from early morning into the evening at 20 minute intervals Monday to Saturday, with an hourly service after 1900 hours. It also operates as an hourly service on Sundays.

- 2.14 Bus route 600 also provides access to Chichester rail station, which includes direct services to a number of locations including London, Gatwick, Brighton, Portsmouth and Southampton. There is also a rail station at Bognor Regis, which is within easy cycling distance of the application site.

Figure 2.4 – Existing bus stops on Pagham Road in the vicinity of the site frontage (shown blue):



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- 2.15 It is therefore reasonable to conclude that the Pagham South site is already well served by public transport.
- 2.16 In summary, it is considered that the location of the Pagham South development would give future residents a realistic choice of travel mode for all journeys, reducing reliance on the private car.

Accident Records

- 2.17 Accident records have been obtained for the whole study area (see **Figure 1.2**) for the five year period of July 2011 to June 2016, and updated to include the 13-month period of July 2016 to July 2017. **Appendix 7** contains a copy of the accident plots for reference. This shows that there were 211 collisions recorded (276 casualties), 82% of which were slight and only one accident (2011) was recorded as a fatal (one casualty). A further summary is provided as follows:
- i. Of the 211 collisions, 69% occurred at a junction (66% at a Give Way arrangement).
 - ii. 8% of collisions involved pedestrians.
 - iii. The weather was recorded as 'fine' in 83% of collisions.
 - iv. 78% of collisions occurred during daylight hours.
 - v. 11% of casualties were pedal cyclists.
- 2.18 No vehicle collisions have been recorded along the site frontage on Pagham Road, although one collision (slight) was recorded to the south of the site on Pagham Road.
- 2.19 The fatal accident occurred on the A27 approximately 125 metres west of the roundabout junction with the B2145 in December 2011 during the hours of darkness, when a vehicle travelling westbound hit a pedestrian crossing the dual carriageway. The report states that the pedestrian was impaired by alcohol and wearing dark clothes.
- 2.20 Two collisions occurred at the junction of Nyetimber Lane and Pagham Road, one serious and one slight, both involving pedestrians.
- 2.21 Two collisions occurred at the junction of Hook Lane and Pagham Road, both recorded as slight; one when a northbound vehicle collided with the rear of a stationary vehicle waiting to turn right into Hook Lane, and one when a vehicle turned right into Hook Lane into the path of a southbound vehicle.
- 2.22 Two collisions occurred at the junction of Hook Lane with Sefter Road, one recorded as slight when a vehicle turned right out of Hook Lane onto Sefter Road into the path of an oncoming vehicle, and the other was serious where the driver of a car experienced a medical episode at the wheel and lost control of the vehicle.
- 2.23 Two collisions were recorded at the junction of Sefter Road with Pagham Road; one which was slight and involved a vehicle loss of control following a failure to stop for a police car, the other was recorded as serious and occurred when a pedestrian stepped out into the carriageway in front of a vehicle.
- 2.24 Four collisions have been recorded at the junction of Sefter Road with Rose Green Road; three slight collisions (one medical episode) and one serious collision involving a pedestrian, when a young child ran into the road from between parked vehicles.

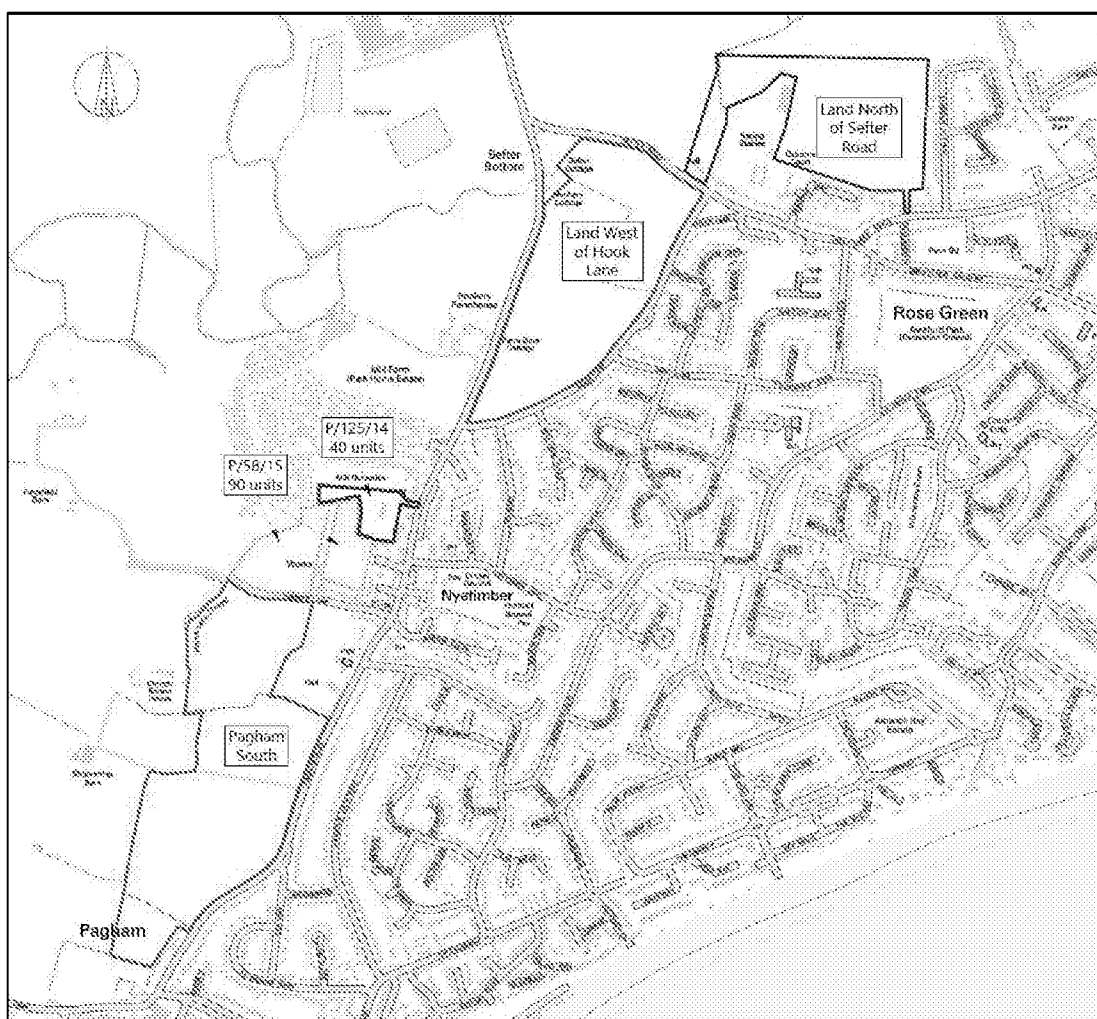
- 2.25 Three (slight) collisions have been recorded at the junction of Nyetimber Lane with Grosvenor Gardens, one involving a pedestrian who walked out into the road into an oncoming car. One (serious) collision was recorded on the Rose Green Road arm of this junction and involved a pedestrian on the footway.
- 2.26 There were 11 collisions recorded on the roundabout junction of Gossamer Lane with Aldwick Street, four of which were recorded as serious. The majority of collisions recorded at this roundabout junction involved a vehicle hitting a pedal cyclist.
- 2.27 Three collisions occurred at the junction of Aldwick Road and Lower Bognor Road, one recorded as serious, and all involved a pedal cyclist. It is recognised that there may be an issue with awareness of pedal cycles at this roundabout junction and that of Aldwick Street with Aldwick Road to the southwest.
- 2.28 Seven collisions occurred at or near the Lower Bognor Road junction with Pagham Road generally through loss of control type incidents; one of which was recorded as serious resulting from a head-on collision. One of the slight injury accidents was as a result of a medical episode and one involved a pedal cyclist.
- 2.29 18 (slight) collisions were recorded on Pagham Road (B2166) on the 1.2 kilometre section north of the Lower Bognor Road junction towards Runcton. These were related to right-turning vehicle manoeuvres at side roads/accesses or loss of control type collisions.
- 2.30 Five (slight) collisions occurred at the Pagham Road junction with Vinnetrow Road resulting from misjudged vehicle speeds and paths, one of which involved a pedal cycle.
- 2.31 Two collisions have been recorded at the junction of the B2166 with the B2145, one of which was serious and involved a motorcycle stationary at the roundabout hit by a vehicle from behind. A further eight accidents were recorded on the B2145 between the B2166 and the A27, three of which was recorded as serious and three involved pedestrians.
- 2.32 It is considered that the accident record detailed above is typical for this type of highway network during a five year period, and that generally no patterns highlighting an accident black-spot or underlying road safety issue are evident. The accident record for the B2166 is no exception and it is not considered necessary at this time to consider a route treatment study for this area.
- 2.33 It is noted in **paragraphs 2.26** and **2.27** that there may be an issue with awareness of pedal cyclists at some junctions. This may require education and advertising to tackle the road safety issue, rather than hard engineering measures.
- 2.34 Therefore, it is considered that the proposed development at Pagham South should not be refused on the grounds of road safety within the wider highway network.

Committed Development

2.35 Planning approval was obtained for the following developments in Pagham, which are shown on **Figure 2.5** and the highway officer requested that the traffic from these developments be included in the transport assessment work:

- i. P/58/15 – Land at Summer Lane (90 residential units).
- ii. P/125/14 – 251 Pagham Road (42 residential units).

Figure 2.5 – Location of committed developments and other Local Plan housing sites within Pagham



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Other Local Plan Housing Sites in Pagham

2.36 Two other large housing sites within Pagham identified in the emerging Local Plan are Hook Lane and Seftor Road, as also shown on **Figure 2.5**. Both sites and their cumulative impact are assessed in **Sections 12.0** and **13.0** of this report.

A27 (T) - Chichester Bypass

- 2.37 It has been agreed with highway officers at HE that the two junctions on the A27 bypass likely to be used directly by Pagham South development traffic are the B2145 Whyke Hill junction directly north of the site and the A259 Bognor Road junction to the east of this.
- 2.38 At present HE are in the process of developing improvement schemes for this section of the A27, but at this stage there are no specific proposals approved or funding allocated. Therefore it has been agreed that the two A27 schemes approved within the Chichester Local Plan are to be used for assessment purposes on the A27 Whyke Hill and Bognor Road junctions.

3.0 Traffic Survey Results and Existing Highway Conditions

Traffic Survey Results - Pagham Road along the Site Frontage

- 3.1 An automatic traffic survey was carried out on Pagham Road to the south of Summer Lane in June 2014 and this showed peak hour weekday two-way traffic flows of around 450 vehicles and 85th percentile speeds of around 33mph. **Table 3.1** below summarises the survey results and the ATC survey location is shown indicatively on **Figure 3.1** for ease of reference.

Table 3.1 – ATC survey results at Pagham Road south of Summer Lane

	0800-0900 (vehicle flow)	1700-1800 (vehicle flow)	85 th Percentile Speeds
Northbound	258	182	33mph
Southbound	159	346	33mph
Two-way Total	417	528	-

Figure 3.1 – 2014 ATC survey location, Pagham Road south of Summer Lane

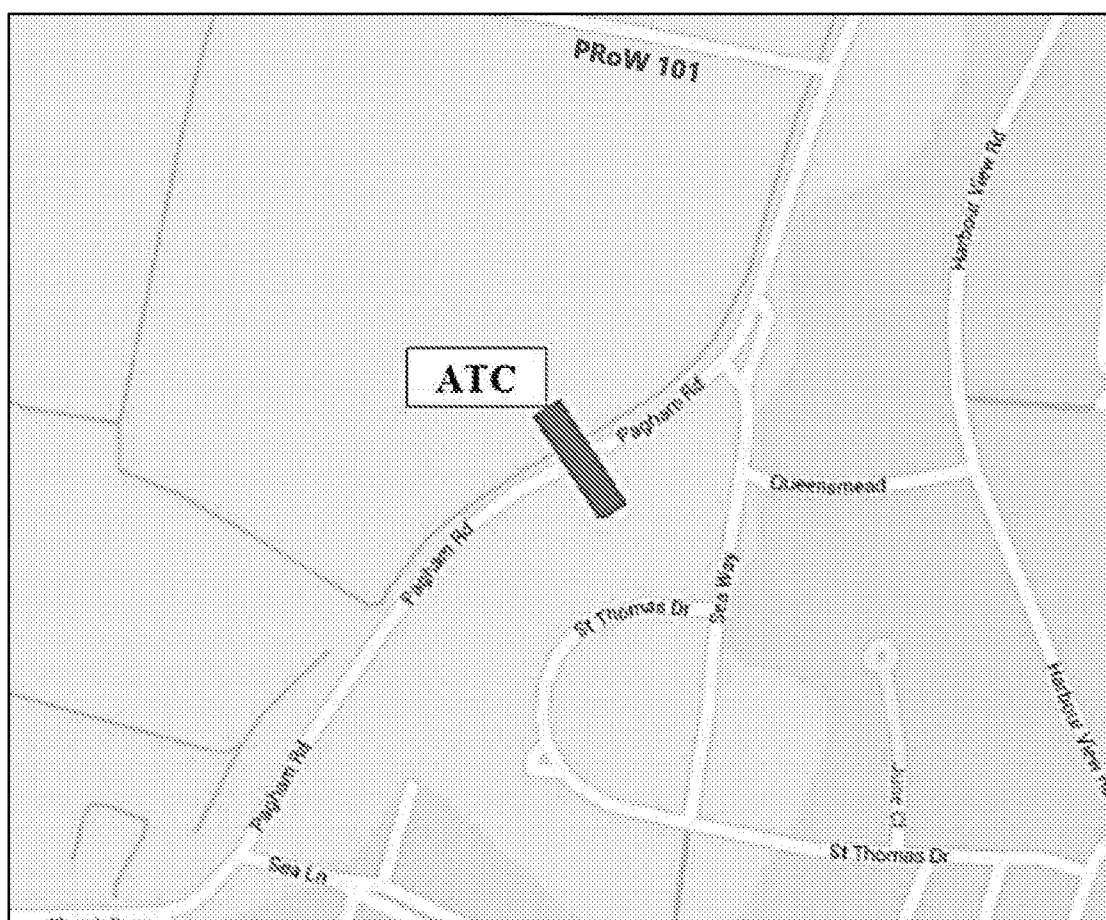


- 3.2 In addition, an automatic traffic survey was carried out on Pagham Road to the south of Sea Way in June 2016 and this also showed peak hour weekday two-way traffic flows of around 450 vehicles and 85th percentile speeds of around 33mph. **Table 3.2** below summarises the survey results and the location is illustrated in **Figure 3.2**.

Table 3.2 – ATC survey results at Pagham Road south of Sea Way

	0800-0900 (vehicle flow)	1700-1800 (vehicle flow)	85 th Percentile Speeds
Northbound	218	243	33mph
Southbound	159	282	33mph
Two-way Total	377	525	-

Figure 3.2 – 2016 ATC survey location, Pagham Road south of Sea Way



- 3.3 The results of these surveys are contained in **Appendix 8**.

Traffic Survey Results – The Wider Study Area

- 3.4 Traffic conditions are typically free flowing on the wider highway network with congestion sometimes occurring within the peak periods at the A27 Chichester Bypass junctions and within Bognor Regis.
- 3.5 As part of the scoping discussions with officers it was agreed to have peak period turning count surveys carried out at the following junctions:
- i. Pagham Road j/w Nyetimber Lane.
 - ii. Pagham Road j/w Hook Lane.
 - iii. Pagham Road j/w Sefter Road.
 - iv. Sefter Road j/w Hook Lane.
 - v. Nyetimber Lane j/w Gossamer Lane/Gossamer Gardens.
 - vi. Gossamer Lane j/w Aldwick Road/Barrack Lane.
 - vii. Aldwick Road j/w B2166 Lower Bognor Road.
 - viii. B2166 Lower Bognor Road j/w Pagham Road.
 - ix. B2166 j/w Vinnetrow Road.
 - x. B2166 j/w B2145.
 - xi. A27 j/w B2145.
 - xii. A27 j/w Vinnetrow Road/Bognor Road.
 - xiii. Nyetimber Lane j/w Tabard Gate/Cardinal's Lane.
- 3.6 This study area is shown on **Figure 1.2** above (see **Section 1.0**).
- 3.7 The surveys were carried out in July 2016 and the results of the AM and PM peak hour flows are summarised in **Table 3.3** below. The peak period turning count survey data is contained in **Appendix 9** for reference and peak hour turning movement diagrams for each of the 13 junctions are contained in **Appendix 10**.

Table 3.3 – Traffic flow data within the study area (2016)

Road	Peak Hour Two-Way Flow			
	AM 0800-0900		PM 1700-1800	
	Total 2-Way Flow	HGV & PSV	Total 2-Way Flow	HGV & PSV
Pagham Road south of Nyetimber Lane	401	27	952	22
Nyetimber Lane west	136	5	278	1
Pagham Road north of Nyetimber Lane	439	28	910	21
Pagham Road south of Hook Lane	510	23	694	22
Hook Lane west	309	7	361	5
Pagham Road north of Hook Lane	401	16	433	16
Pagham Road south of Sefter Road	401	16	433	17
Sefter Road	332	9	432	9
Pagham Road north of Sefter Road	717	23	839	26
Sefter Road west of Hook Lane	332	8	432	14
Hook Lane east	334	6	437	11
Sefter Road east of Hook Lane	622	12	799	15
Goassamer Lane north	737	22	796	19
Nyetimber Lane east	631	29	607	19
Grosvenor Gardens	394	5	514	8
Rose Green Road (eastbound only)	218	5	167	4
Gossamer Lane south	877	24	966	22
Aldwick Road west	553	29	604	20
Aldwick Street	569	18	695	13
Barrack Lane	307	15	301	7
Pagham Road south of Lower Bognor Road	707	21	799	22
Lower Bognor Road	546	6	711	6
Pagham Road north of Lower Bognor Road	1,249	27	1,502	26
B2166 Lagness Road east of Vinnetrow Road	1,361	60	1,502	37
Vinnetrow Road	591	27	610	18
B2166 Lagness Road west of Vinnetrow Road	1,310	52	1,371	43
Mill Lane	78	1	69	0
Junctions:				
Aldwick Road j/w Lower Bognor Road	932	32	1,097	24
B2166 j/w B2145	2,072	99	2,105	57
B2145 j/w A27 - Whyke Roundabout	4,224	431	4,304	187
Bognor Road j/w A27 - Bognor Road Roundabout	4,285	311	4,521	189

Existing Highway Conditions

- 3.8 From the above surveys and from observation, existing local highway conditions close to the Pagham South site can generally be described as not busy during traditional highway network peak times, but get busier further away from the site.

4.0 Local Services and Amenities

- 4.1 A range of services and amenities are found close to the application site and these are set out in **Table 4.1** below and shown in the plan that forms **Appendix 11**.

Table 4.1 – Services and amenities

Amenities/Facilities	Distance
The Village Pre-School	280m
Pagham Village Hall	280m
Pagham United Reformed Church	340m
The Lamb Inn	450m
Crown Racing (bookmakers), Post Office, Nyetimber Stores (newsagents)	500m
Indian and Chinese Takeaway	530m
The Bear Inn	550m
Tesco Express, Hair Salon, Tea Shop	610m
The Lion	620m
Pagham Cricket Club	630m
The Co-operative food, Dentist, Barber, Cafe	650m
Inglenook Hotel	680m
Pagham Football Club	700m
Fish and Chip Cafe	900m
Rose Green Primary Schools	1.9km
Craigweil News (newsagents), Hair Studio, Beauty Salon	2.4km
The Southern Co-Operative, Florists	2.5km
The Co-operative food, Lloyds Pharmacy, Rose Green Post Office	2.5km
Vaaru Cycles	4.7km
Bognor Regis Rail Station	5.9km
Chichester Rail Station	9.8km

- 4.2 It can be seen from **Table 4.1** that there is a wide range of services and amenities within walking and cycling distance of the Pagham South application site, including the village hall, and that Pagham is well served by a range of facilities including a variety of small shops, primary schools, leisure and sports facilities and post offices.
- 4.3 Walking and cycling isochrones for Pagham South are provided in **Appendix 12** and **Appendix 13** respectively.
- 4.4 From this it can be concluded that the Pagham South site is well served by local services and amenities, which can be accessed by walking, cycling and through public transport services (see **paragraphs 2.7 to 2.16**).

5.0 Proposed Development and Access Strategy

- 5.1 For the purposes of this Transport Assessment study the proposed development and access strategy at Pagham South is assumed to comprise:
- i. 400 residential dwellings.
 - ii. A care home with 70 beds.
 - iii. A Local Centre comprising 2,000sqm GFA with food sales limited to a 500sqm GFA convenience store. The other local centre uses are typically expected to include a doctor's surgery, a day nursery, a restaurant/café and other small retail units. However, as the small retail units are most likely to give the highest trip rates during the traditional highway network peak hours, the remaining 1,500sqm will be assumed to be small retail units (A1, A2, A3) for the purpose of the transport assessment work.
 - iv. A single form entry primary school (210 pupils).
 - v. Other community uses – sports pitches and scout hut.
 - vi. An area for allotments with up to 20 plots.
 - vii. Access to the development from two new priority junctions with Pagham Road and associated pedestrian refuges.
 - viii. The safeguarding of land to help link the existing cycle route between Pagham Harbour and Chichester with Pagham Road via the site.
 - ix. An access strategy that is a Manual for Streets based development which includes a high level of permeability through the site for pedestrians and cyclists and good connections to the existing footway and PRow network as well as an internal layout that encourages walking and cycling.
 - x. An access strategy that also includes a local centre, primary school and other facilities as part the proposals to encourage walking and cycling trips from within the development and from the adjacent residential area.
- 5.2 The proposed northern site access junction is located to the south of Summer Lane and will provide vehicular access to the land to the north of footpath 101. It is assumed to serve 170 dwellings, the 70 bed care home, the local centre, the primary school and the sports pitch.
- 5.3 The proposed southern site access junction is located to the south of Sea Way and will provide vehicular access to the land south of Footpath 101. It is assumed to serve 230 dwellings, the scout hut and the allotments.
- 5.4 It should be noted that apart for pedestrian, cycle and emergency access there will be no vehicular access from the development to Footpath 101.
- 5.5 The planning application is submitted in outline with all matters reserved except for access. The illustrative masterplan forms **Appendix 3** and for ease of reference **Figure 5.1** is provided below which demonstrates the pedestrian, cycle and public transport links through the site. The internal movement strategy is set out further on the plan contained in **Appendix 14**, along with a plan demonstrating access from the site to the wider PRow network.

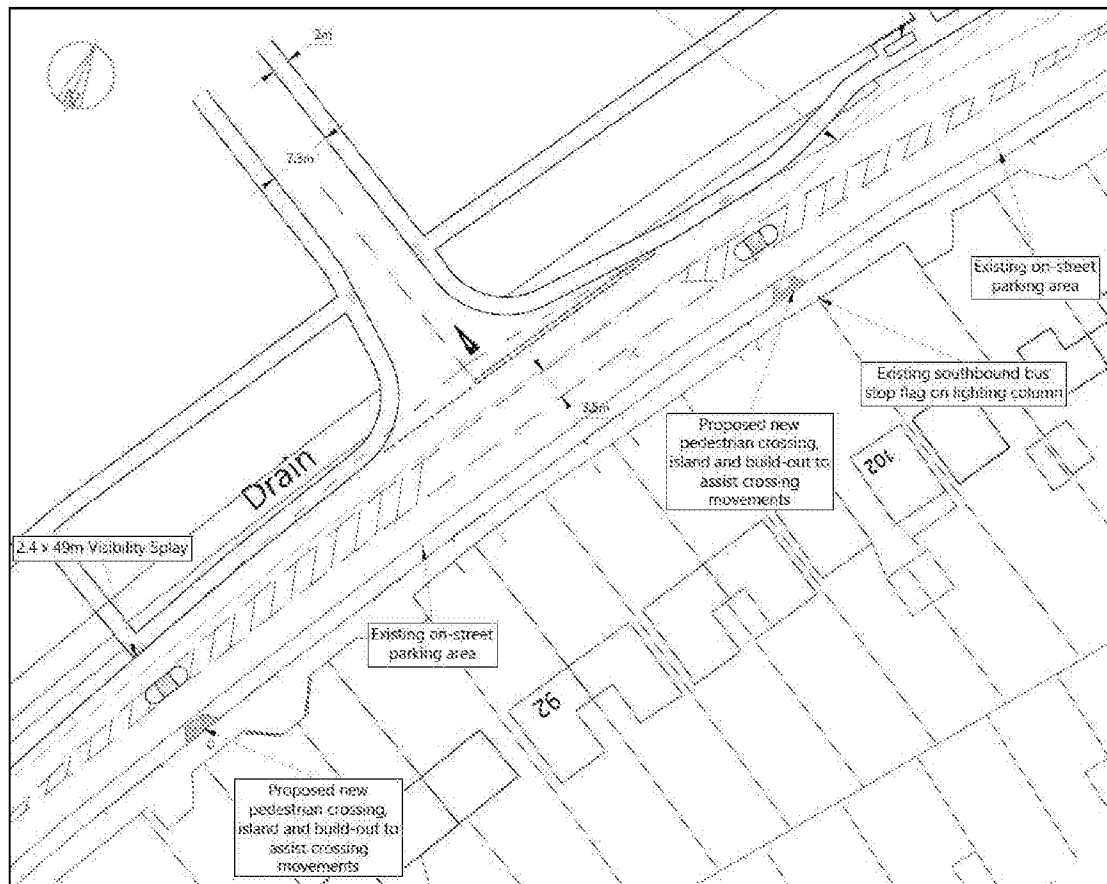
Figure 5.1 – Illustrative masterplan extract with movement strategy



5.6 From this it can be seen that the internal layout follows the guidance set out in Manual for Streets to ensure a development that encourages walking and cycling.

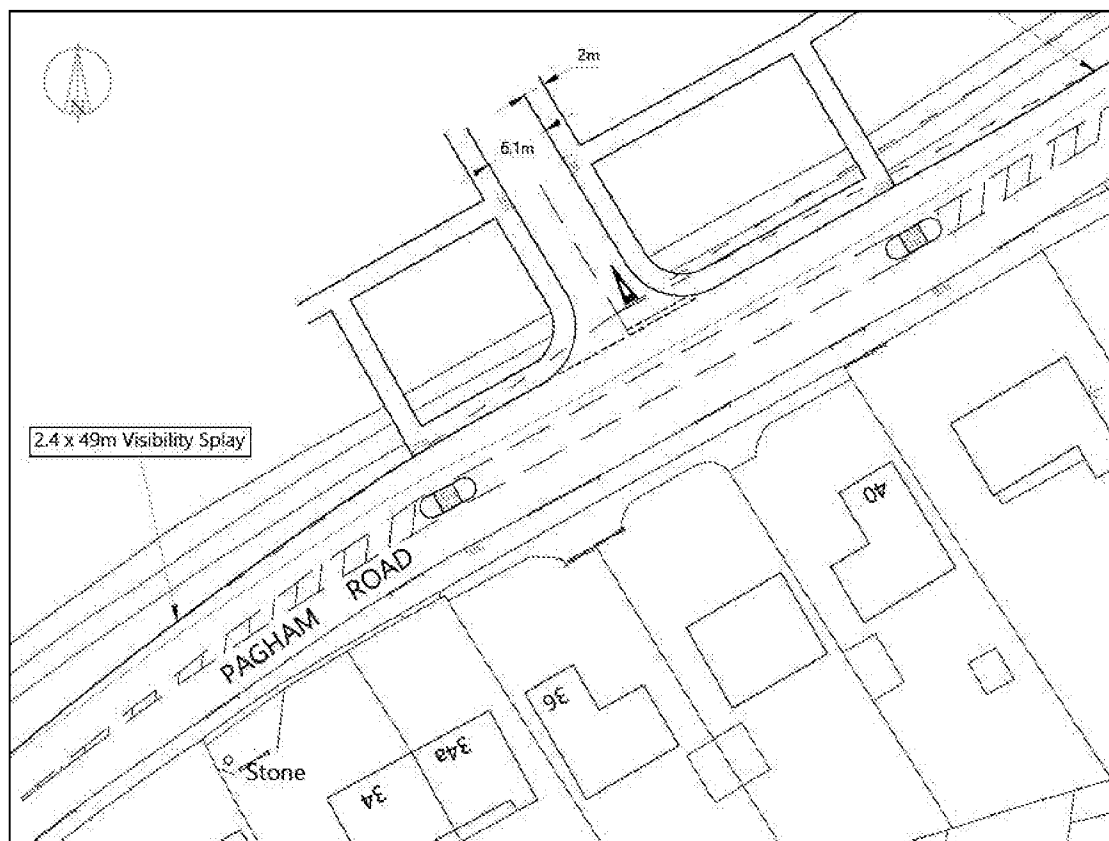
- 5.7 One of the guiding principles during its preparation of the masterplan has been to ensure that the development has an appropriate level of connectivity between the proposed and the adjacent uses and this is evident from the layout.
- 5.8 It can be seen from the above that links for non-motorised users have been provided through the site to the permitted development on land north of Summer Lane. These links are conveniently located and provide direct access to the proposed school and local centre. Furthermore, a cycle link has also been proposed to the scout hut, to the south of the site.
- 5.9 As part of the development, WSCC are seeking contributions for upgrading the surface of Footpath 101 (as referred to by point 3 in the consultation response received from the WSCC Public Rights of Way team, contained at **Appendix 15**), to improve pedestrian accessibility. This is set out in more detail in **Section 14.0**.
- 5.10 It is acknowledged from the WSCC consultation response that a form of traffic management would be required on the access road to the school, given its straight alignment. It is considered that this can be addressed as part of the reserved matters application(s) once the siting of the school has been confirmed.
- 5.11 **Appendix 16** contains plans showing the layout of the proposed site access junctions with Pagham Road and the associated pedestrian facilities and **Figures 5.2** and **5.3** show extracts below on **page 28** and **page 29** respectively.

Figure 5.2 – Proposed northern site access junction



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Figure 5.3 – Proposed southern site access junction



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- 5.12 The proposed site access junctions have been the subject of an independent Stage 1 Road Safety Audit, and this is contained in **Appendix 17** together with the designer's response.
- 5.13 The access junctions have evolved from the original designs through the public consultation process, Road Safety Audit and discussions with WSCC and can be summarised as:

i. Pagham Road (North) – HTp/1616/01/L

This priority junction has been designed with a ghost island right turn lane and to accommodate the HGV manoeuvres that would be associated with a convenience store.

The site access road is provided with a width of 7.3 metres and two 2.0 metre footways. From this plan (**Appendix 16**) it can be seen that based on the measured speeds of 33mph as set out in **Table 3.1**, a visibility splay of 2.4 metres by 49 metres can be achieved, but also that visibility splays in excess of this could be achieved if required. This level of visibility has been agreed with the highway officer.

Proposed 2.0 metre wide pedestrian refuge islands are also shown in **Figure 5.2** to the north and south of the site access road, with proposed build-outs within the on-street parking area to facilitate both new pedestrian movements and existing pedestrian movements to Footpath 101 safely.

A dropped kerb crossing point with tactile paving is also shown on the full plan contained in **Appendix 16** to the north of the site access and relocated bus stop, to assist pedestrian desire lines to the north in the vicinity of the Village Hall.

ii. Pagham Road (South) – HTP/1616/02/J

This priority junction has been designed to accommodate pedestrian desire lines, with two 2.0 metre wide pedestrian refuge islands. The site access road is provided with a width of 6.1 metres and two 2.0 metre footways.

From this plan (**Figure 5.3** and **Appendix 16**) it can be seen that based on the measured speeds of 33mph, as set out in **Table 3.2**, a visibility splay of 2.4 metres by 49 metres can be achieved, but also that visibility splays in excess of this could be achieved if required. As set out above, this level of visibility has also been agreed with the highway officer.

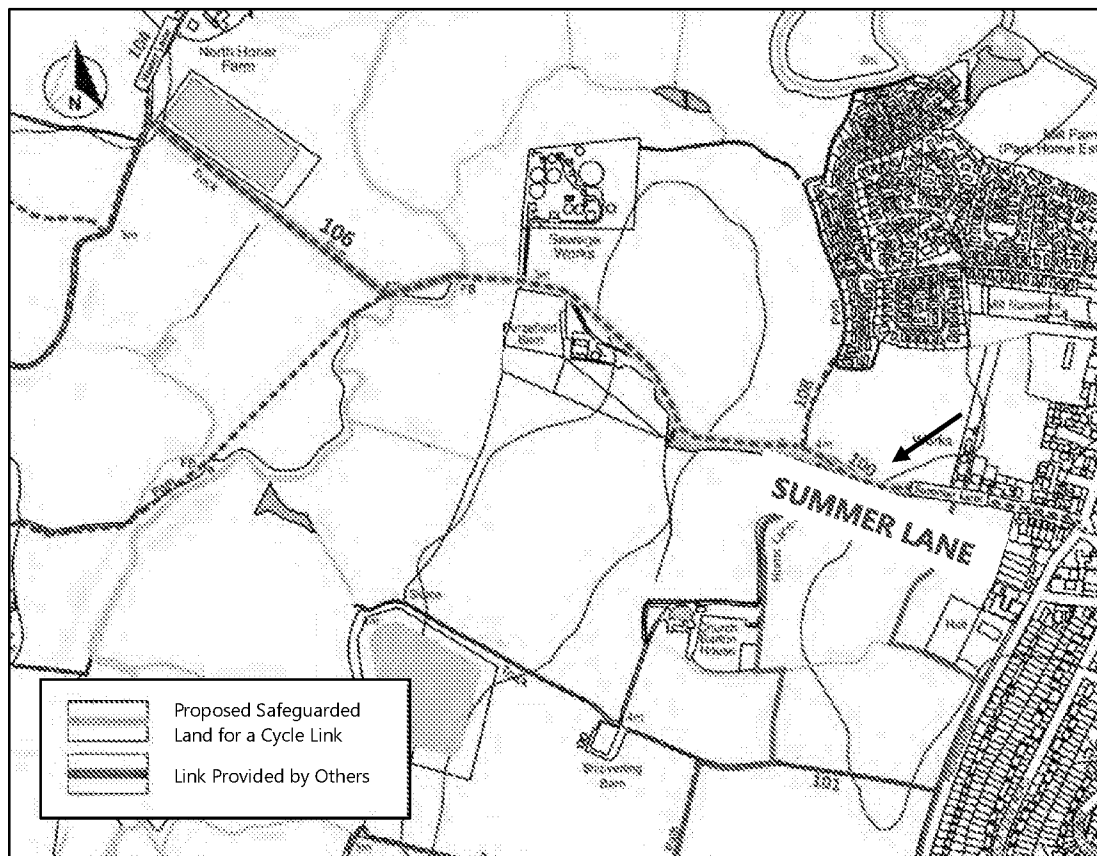
iii. The plans contained in **Appendix 16** also show pedestrian linkages from the site to the local bus stops.

- 5.14 The updated Design Audit is contained in **Appendix 18** that references relevant design guidance and sets out the design evolution and reasoning behind the design of the access junctions. This document also contained swept path analysis of the pedestrian refuge islands; HTP/1616/TR05 for the southern access and HTP/1616/TR06/A for the northern access and crossing point to the north at the Village Hall.
- 5.15 **Appendix 19** contains the swept path analysis of site access junctions and also of the modified bus layby at the northern junction. A further visibility splay plan (HTP/1616/10/A) is contained in **Appendix 20**, which demonstrates that even with a bus parked in the bus layby adjacent to the northern access a 90 metre visibility splay can still be achieved.
- 5.16 The access arrangements for Pagham South have been agreed with highway officers at WSCC.
- 5.17 Therefore it can be concluded that the proposed site access junctions are deliverable, can be provided with sufficient junction visibility, and are suitable for all users.

Cycle Link

- 5.18 It is a WSCC aspiration to secure cycling to Chichester from Pagham via lightly-trafficked roads or off-road tracks. The route is envisaged to run between the site and LNR 88 via South Mundham, and would require converting Footpaths 100, 106 and 104 to bridleways (see **paragraph 5.19** below). Securement of land for upgrading the whole route is not within the applicant's control.
- 5.19 However, as part of this application the safeguarding of land within the applicant's control is proposed to help link the existing cycle route between Pagham Harbour and Chichester with Pagham Road via the site, and will comprise around an 800m length of the 1.8km gap as shown in yellow on **Figure 5.4** below (main plan contained in **Appendix 21**).

Figure 5.4 – Link to Pagham Harbour cycle route



- 5.20 Contributions are sought by WSCC for upgrading the surface of Footpaths 100, 106 and 104 to bridleways to enable cycling. This is set out in more detail in **Section 14.0**.

Parking Strategy

- 5.21 As the planning application is in outline it is anticipated that one of the planning conditions will refer to the council's parking requirements. The development's parking strategy is to allow for these requirements and to have a local centre car park that is of sufficient capacity to allow for drop off and pick up for the primary school and for the sports pitch use.
- 5.22 Where-ever possible, private parking will be served from the ends of turning heads in order to deter parking within areas provided for turning.

Travel Plan Measures

- 5.23 Travel Plan Measures are discussed in detail in **Section 10.0**.

6.0 Trip Generation and Distribution

Trip Generation

- 6.1 The development trip generation has been identified for the following land uses:
- Residential – houses privately owned (400).
 - A care home with 70 bedrooms.
 - A single-form entry primary school (210 pupils).
 - A convenience store of 500sqm GFA.
 - Small retail units (A1, A2, A3) of up to 1,500sqm.
- 6.2 The scouts hut, sports pitches and allotments have not been included in the trip generation assessment as they are not expected to generate trips on the local highway network during weekday peak hours. This has been agreed with highway officers at WSCC.
- 6.3 The trip rates used have been agreed with highway officers at WSCC either as part of the cumulative traffic impact assessment work being carried out jointly by the three consultants, or as part of individual discussions where uses are particular to our individual site.
- 6.4 The full TRICS reports are contained in **Appendix 22** and the vehicular trip rates and resultant development traffic associated with each land use is summarised in **Table 6.1** below.
- 6.5 From the masterplan it is assumed that the local centre, school, care home and 170 houses will be accessed from the northern site access with Pagham Road, as set out in **Table 6.1**. The remaining 230 houses will be accessed via the southern site access junction with Pagham Road. There will be no vehicular through-route across the site, although pedestrian and cycle links will be created.

Residential

- 6.6 The trip rate agreed with highway officers is based on the following search criteria for privately owned houses:
- 03 – Residential, A – Houses privately owned.
 - All multi-modal weekday surveys in England, Scotland and Wales, excluding greater London.
 - From 50 to 491 units.
 - In Edge of Town Centre, Suburban Area and Edge of Town locations.
 - One survey was excluded on the bequest of HE as it had an unrepresentative peak hour trip rate.
- 6.7 It was also agreed with WSCC to use the higher AM peak hour arrival trip rate of 0900-1000 in place of the surveyed 0800-0900 trip rate.

Care Home

- 6.8 The search criteria for the care home trip rates was:
- i. 05 – Health, F – Care Home (elderly residential).
 - ii. All multi-modal weekday surveys for sites in England, excluding Greater London.
 - iii. For care homes with between 40 and 90 bedrooms.

Primary School

- 6.9 The trip rate agreed with highway officers is based on the following search criteria for a primary school:
- i. 04 – Education, A – Primary.
 - ii. All multi-modal weekday UK surveys excluding Greater London.
 - iii. For schools with up to 447 pupils.
 - iv. Sites in Suburban Area, Edge of Town and Neighbourhood Centre areas.

Convenience Store

- 6.10 The search criteria for the convenience store trip rates was:
- i. 01 – Retail, O – Convenience Store.
 - ii. Multi-modal weekday surveys for sites in England, excluding Greater London.
 - iii. For stores with up to 550sqm GFA.
 - iv. Sites in Suburban Area, Edge of Town and Neighbourhood Centre areas.

Small Retail Units

- 6.11 The search criteria for the small retail units trip rates was:
- i. 01 – Retail, I – Shopping Centre (Local Shops).
 - ii. All multi-modal weekday surveys for sites in England, excluding Greater London.
- 6.12 The resultant TRICS sites for small retail units were then assessed for representative rates with reference to the person trip rates used in the Arun Transport Study. Survey TW-01-I-02 was therefore selected.

Table 6.1 – Vehicular trip assessment associated with each development access

Land Use		Units	Forecast Trip Attraction (per unit)			
			AM Peak Hour		PM Peak Hour	
			Arrival	Departure	Arrival	Departure
Northern access onto Pagham Road						
Proposed Houses	Trip Rates	/unit	0.144	0.359	0.299	0.179
	Total Trips	170	25	61	51	30
Local Centre - Convenience Store	Trip Rates	/100sq m GFA	8.382	7.666	11.415	10.826
	Total Trips	500sqm	42	38	57	54
Local Centre – small shops (A1/A2/A3)	Trip Rates	/100sq m GFA	4.074	3.519	3.333	5.926
	Total Trips	1,500 sqm	61	53	50	89
Care Home	Trip Rates	/bed	0.071	0.045	0.071	0.115
	Total Trips	70	5	3	5	8
Primary School – (210 pupils)	Trip Rates	/Pupil	0.267	0.195	0.071	0.076
	Total Trips	210	56	41	15	16
Total Northern Access			189	196	178	197
Southern access onto Pagham Road						
Proposed Houses	Trip Rates	/unit	0.144	0.359	0.299	0.179
	Total Trips	230	33	83	69	41
Overall Total (North + South)			222	279	247	238

6.13 From this it can be seen that development traffic is expected to be in the order of around 500 vehicles in the busiest peak hour (AM); with around 485 vehicle movements in the PM peak hour. This has been agreed with the highway officer at WSCC (see correspondence contained in **Appendix 1**).

Local Centre Trips

- 6.14 Further to **Table 6.1** above, it is generally accepted and has been agreed with the highway officer that retail development generates very few new vehicular trips on the local highway network. In reality the trips associated with the local centre would already be on the local network and diverted or transferred to the site instead of heading elsewhere; giving rise to an increase in trips through junctions in the immediate vicinity of the site, but no increase would result on the wider network. This is recognised in the TRICS Research Report 14/1 (Pass-By and Diverted Trips), which sets out that convenience stores, as proposed on site, are more likely to produce pass-by trips rather than generate new trips on the network.
- 6.15 Currently there are no prescriptive discount rates that can be applied for linked, pass-by and diverted trips within transport modelling, and regard must instead be given to a site by site analysis and justification. This is now set out below.
- 6.16 The local centre has been proposed as part of this scheme in order to serve the future residents of the site, and as such increase the sustainability of the residential development. It is therefore considered that a fair proportion of the car trips forecast using the TRICS database will be internal to the site i.e. not present on the local highway network, and also likely to be replaced by walking and cycling.
- 6.17 It is considered likely that there will be a high level of linked trips associated with the local centre uses i.e. trip purpose for more than one land use/on-site destination, for example such as convenience store and bakery or dry-cleaners (or primary school). Thereby using the TRICS assessment without discounting would be double-counting the likely number of vehicular trips. The prevalence of linked trips in a situation as presented by the mixed land-uses proposed on the Pagham South site is also supported by the TRICS Research Report 14/1.
- 6.18 In terms of catchment area of the site's proposed local centre, the walking isochrones contained in **Appendix 12** demonstrate that there is a fair level of existing dwellings located within 500 metres and 1.0 kilometres of the proposed local centre. As set out in **Table 4.1**, there are a number of existing local retail opportunities within Pagham as close as 500 metres from the site. As such, it is further demonstrated that there will be limited scope for new or diverted vehicular trips on the local highway network based on the catchment areas of existing facilities. Furthermore, the presence of existing, well-served bus stops within close proximity to the site access and local centre, with dedicated pedestrian routes facilitating direct access, provides more confidence in the sustainability and accessibility of the site and proposed land uses.
- 6.19 Therefore, for the purposes of this assessment, it has been agreed with the highways officer that a reduction of 60% in vehicular trips associated with the local centre retail land uses (convenience store and local shops) will be allowed for in the peak hours to take account of containment within the development and linked trips, as well as the likely increase in walking and cycling modal share to/from these land uses from the residential areas on site and in the surrounding area.

- 6.20 In terms of the remaining vehicular trips (40%), 75% of these are anticipated to be pass-by and therefore already on the local highway network. Consequently, 10% of the originally forecast vehicular trips (25% of remaining vehicular trips) are proposed to be added onto the local highway network as new trips, within an agreed catchment area immediately surrounding the site, and distributed at the site access junction using the ATC distribution of traffic, as per recent agreement with the highway officer. Distribution of the local centre trips on the wider highway network is set out in **Section 9.0**. It is considered that this 10% for new vehicular trips during peak hours will be suitable to account for the range of uses that could be part of the resultant local centre development.
- 6.21 The resulting trips are set out in **Table 6.2** below and have been agreed with the highway officer.

Table 6.2 – Reduction in retail traffic

Land Use	AM Peak Hour (0800-0900)		PM Peak Hour (1700-1800)	
	Arrival	Departure	Arrival	Departure
Convenience Store	42	38	57	54
Local Shops	61	53	50	89
(a) Total	103	91	107	143
(b) Discount (60%) – containment/ linked trips	62	55	64	86
(c) Total Trips = (a)-(b)	41	36	43	57
(d) Pass-by Trips 75% of (c)	31	27	32	43
New Trips on Network = (c) - (d)	10	9	11	14

- 6.22 It can be seen from **Table 6.2** above that 19 vehicle trips will be added to the local highway network traffic during the AM peak hour associated with the proposed local centre land uses, with 58 existing vehicle trips on Pagham Road past the site access diverted to/from the northern site access during that peak hour.
- 6.23 It can also be seen from **Table 6.2** above that 25 vehicle trips will be added to the local highway network traffic during the PM peak hour associated with the proposed local centre land uses, with 75 existing vehicle trips on Pagham Road past the site access diverted to/from the northern site access during that peak hour.
- 6.24 In summary, the retail trips associated with this convenience store and small retail units will be contained locally within the Pagham area. It is considered that these retail trips will not travel north beyond the Nyetimber Lane junction with Pagham Road. This has been agreed with the highway officer at WSCC (see correspondence contained in **Appendix 1**).

Primary School Trips

6.25 For the purposes of this assessment, it is considered that a reduction in vehicle trips associated with the on-site school can also be allowed for, as agreed with officers at WSCC, to take account of containment within the development and to ensure no double-counting with the residential trip rates.

6.26 It is proposed that the trip discount for primary school traffic is based on the WSCC primary school contributions calculation in terms of working out additional child places using the following criteria:

Dwelling size	Occupancy	
	Houses	Flats
1 bed	1.5	1.3
2 bed	1.9	1.9
3 bed	2.5	2.4
4+ bed	3.0	2.8

6.27 WSCC set out that, *"According to 2011 census data, there are 14 persons per 1000 population in each school year group for houses and 5 persons per 1000 population in each school year group for flats. There are 7 year groups for primary (years R to 6)..."*

6.28 On this basis it can be calculated that the Pagham South development of 400 dwellings could on average generate around 1,000 people (if considering an average mix of 2, 3 and 4+ bed houses).

6.29 If 14 children per 1,000 population are expected per year group and a one-form entry primary school is provided on site, it could be expected that the Pagham South site will generate a need for circa 98 school places; 14 x 7 (the number of year groups within a one-form entry primary school), which is around 47% of school places when compared to a 210 pupil intake.

6.30 Therefore, it has been agreed with the highway officer to discount the primary school vehicular trips by 50% to reflect the calculation set out in **paragraph 6.29** above, which also reflects the central location of the primary school within the Pagham South site.

6.31 Therefore the resulting vehicular trips based on a 50% reduction in the AM peak hour (0800-0900) are set out in **Table 6.3** below.

Table 6.3 – Reduction in primary school traffic

Land Use	AM Peak Hour (0800-0900)		PM Peak Hour (1700-1800)	
	Arrival	Departure	Arrival	Departure
(a) Primary School	56	41	15	16
(b) Discount (50% AM)	28	21	-	-
Total Trips (a)-(b)	28	20	15	16

6.32 Further to the trip discounting set out in **Table 6.2** and **Table 6.3** above, the resultant forecast peak hour traffic flows for the proposed development are summarised in **Table 6.4** below.

Table 6.4 – Vehicular trip generation summary

Land Use	AM Peak Hour (0800-0900)		PM Peak Hour (1700-1800)	
	Arrival	Departure	Arrival	Departure
Northern access				
Residential (170 dwellings)	25	61	51	30
Local Centre - retail	10	9	11	14
Care Home (70 beds)	5	3	5	8
Primary School	28	20	15	16
Total Northern Access	69	93	82	68
Southern access				
Residential (230 dwellings)	33	83	69	41
Overall Total (North and South)	102	176	151	109

6.33 From applying a discount to the forecast development traffic for the local centre and primary school land uses, it can be seen that development traffic associated with the northern site access junction is expected to be in the order of around 160 vehicles in the AM peak hour and 150 in the PM peak hour. When taking into account **Table 6.2**, there will also be 58 and 75 of the existing vehicle movements on Pagham Road diverted through the site access junction in the AM and PM peak hours respectively.

- 6.34 Therefore, the Pagham South development traffic is forecast to total around 278 and 260 vehicular movements associated with the proposed land uses in the AM and PM peak hours respectively. This has been agreed with the highway officer at WSCC (see correspondence contained in **Appendix 1**).

Pedestrian Trip Generation Review

- 6.35 Further to the WSCC consultation comments (contained in **Appendix 1**), a TRICS assessment using the data contained in **Appendix 22** has been carried out to demonstrate the level of pedestrian movements across Pagham Road likely to be associated with the Pagham South residential development. This is set out in **Table 6.5** below.

Table 6.5 – Residential Trips

Mode of Travel		Units	Forecast Trip Attraction (per unit)			
			AM Peak Hour		PM Peak Hour	
			Arrival	Departure	Arrival	Departure
Walk	Trip Rates	/unit	0.039	0.158	0.083	0.039
	Total Trips	400	16	63	33	16

- 6.36 Further to **Table 6.5** above, it can be seen that there may be typically around 80 pedestrian trips during the AM peak hour and typically 50 pedestrian movements in the PM peak hour respectively.
- 6.37 Whilst it is not expected that all of these pedestrian movements will cross Pagham Road or even in the same location, it can nevertheless still be concluded that the level of pedestrian movements anticipated over Pagham Road and the existing level of proposed and forecast traffic in this location (see **Section 3.0** and **Section 7.0**) is appropriate for uncontrolled crossing points. This has been agreed with highway officers at WSCC.
- 6.38 Therefore, it is concluded that pedestrian movements over Pagham Road arising from the site and existing desire lines (i.e. to Footpath 101) will be suitably accommodated for by the proposed pedestrian refuge islands (see **Appendix 16**) and the uncontrolled crossing with dropped kerbs and tactile paving to the north of the site proposed by the Village Hall.

Trip Distribution – Site Access Junctions

- 6.39 The trip distribution at each of the proposed site accesses has been based on the following, as represented diagrammatically below in **Figure 6.1** to **Figure 6.4**:
- Residential – as per the agreed methodology for the consented scheme to the north of Summer Lane, using the 2011 journey to work census data, with 98% of development trips to/from the north and 2% to/from the south during both AM and PM peak hours.
 - Care Home – it is considered that the trip distribution at the access points would reflect that of the residential distribution set out above.

- iii. Retail Use – further to **paragraphs 6.14 to 6.24**, it is considered that the trip distribution during peak hours at the northern site access would broadly reflect the existing traffic flow distribution on Pagham Road, as set out in **Section 3.0**, with an AM peak split of 58% north and 42% south and a PM peak split of 46% north and 54% south, which has been distributed using 2011 census data. This has since been agreed with highways officers as a fair representation at the site access due to the location of the site and existing facilities in Pagham.
- iv. Primary School – in the immediate vicinity of the site, in consideration of the existing housing density in Pagham and a review of household census data, it is considered that a split of 12.4% south and 87.6% north on Pagham Road is likely to be representative of trip generation for this land use during both peak hours.

6.40 The relevant census data is contained in **Appendix 23** for reference.

Figure 6.1 – AM & PM residential peak hour distribution diagram

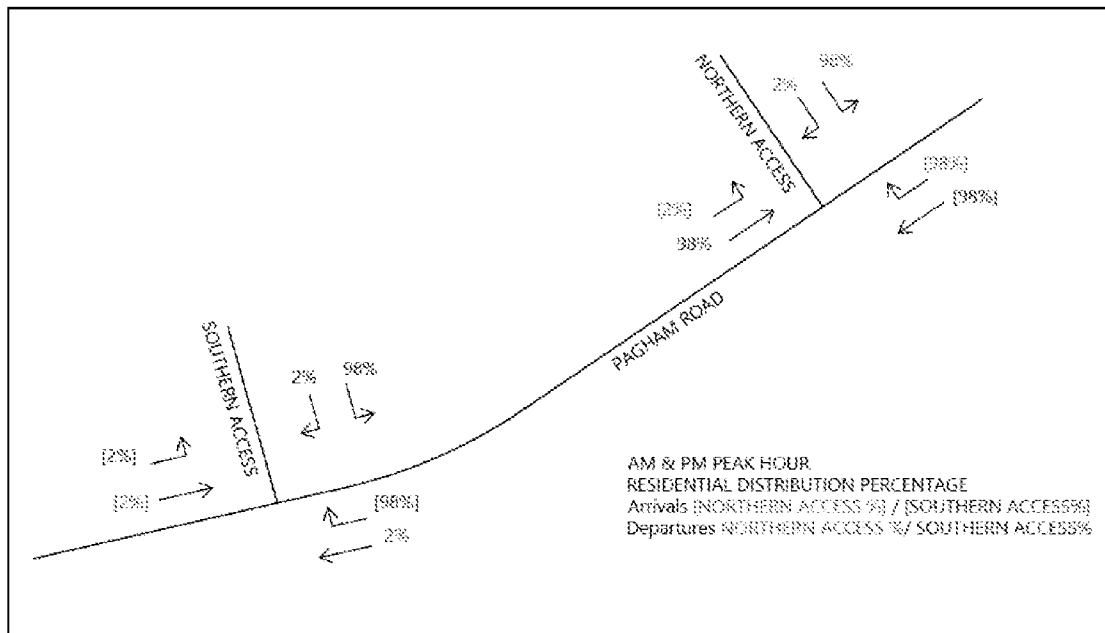


Figure 6.2 – AM & PM retail peak hour distribution diagram

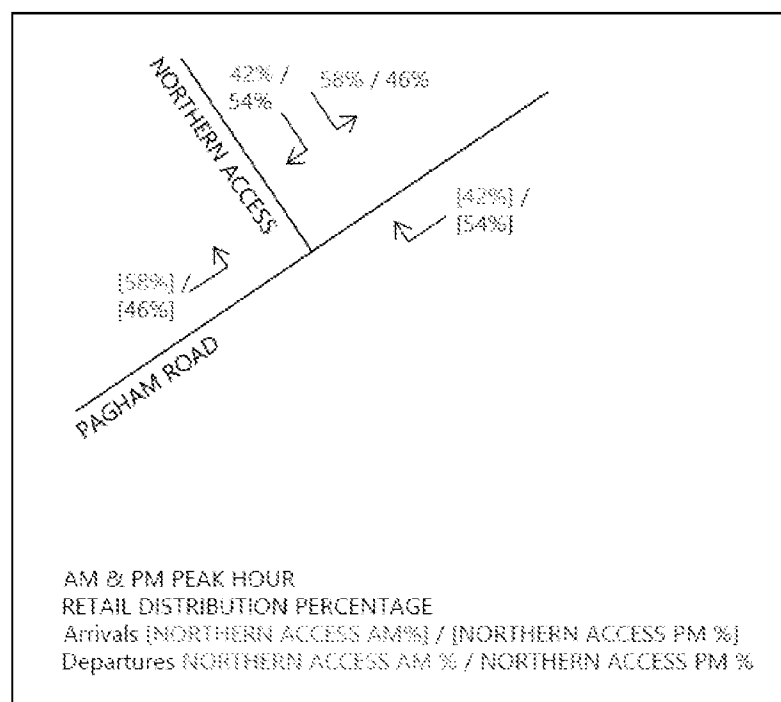


Figure 6.3 – AM & PM care home peak hour distribution diagram

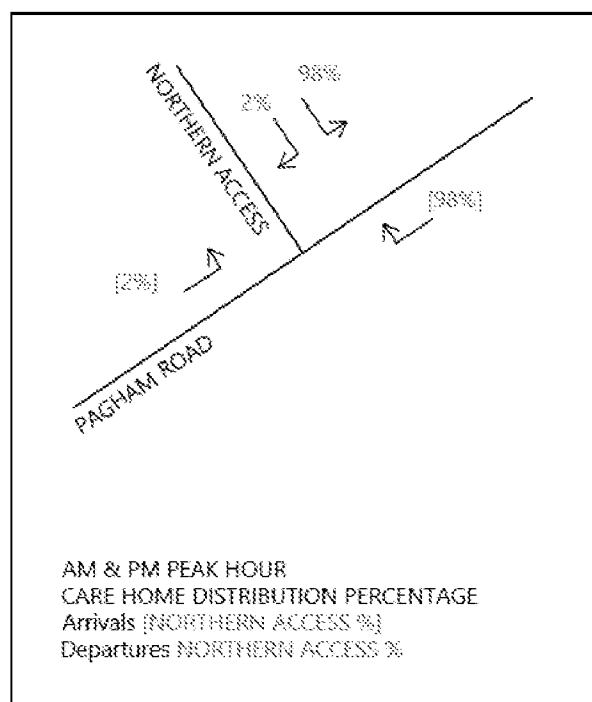
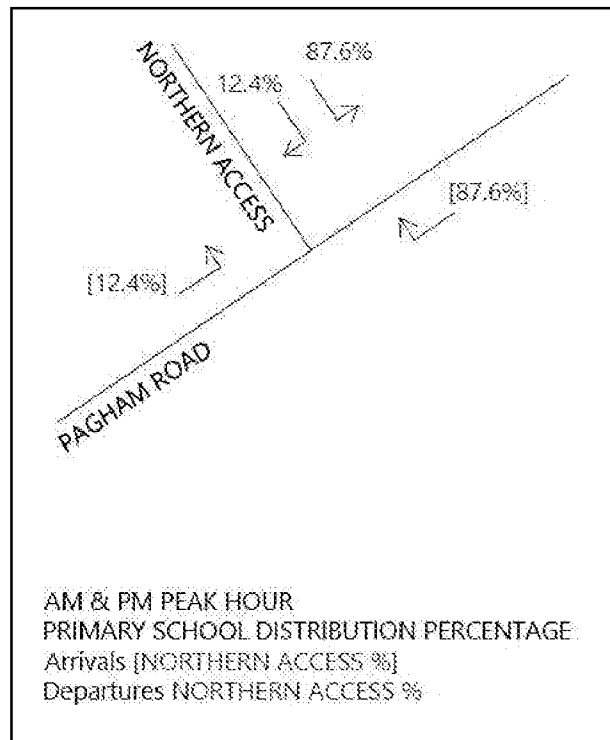


Figure 6.4 – AM & PM primary school peak hour distribution diagram



6.41 These distributions have been applied to the development traffic and illustrated in the following **Figure 6.5** to **Figure 6.8**.

Figure 6.5 – AM & PM residential peak hour traffic movements

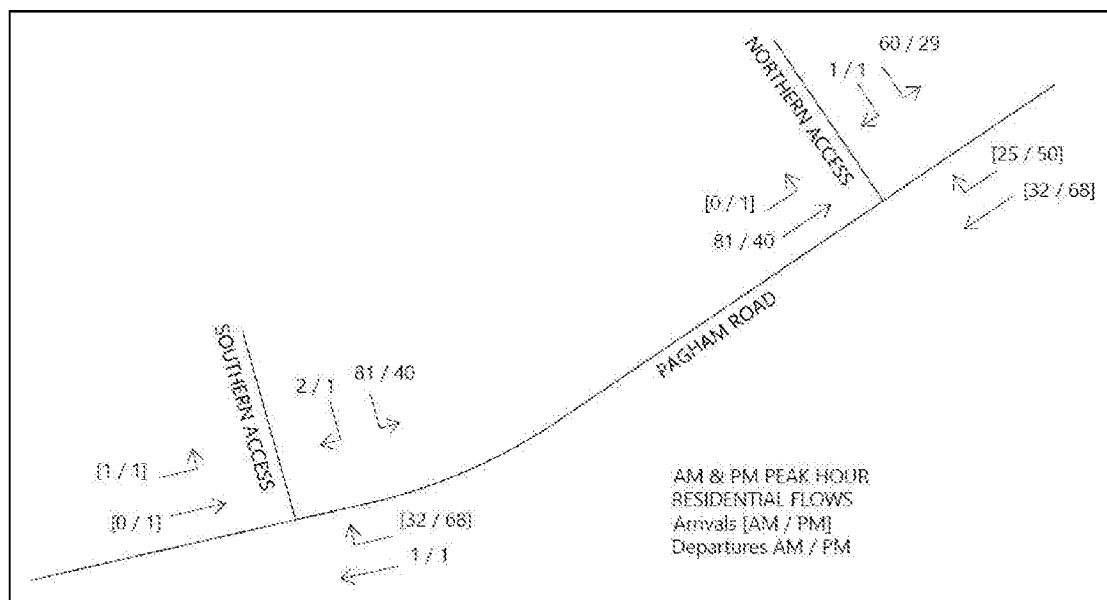
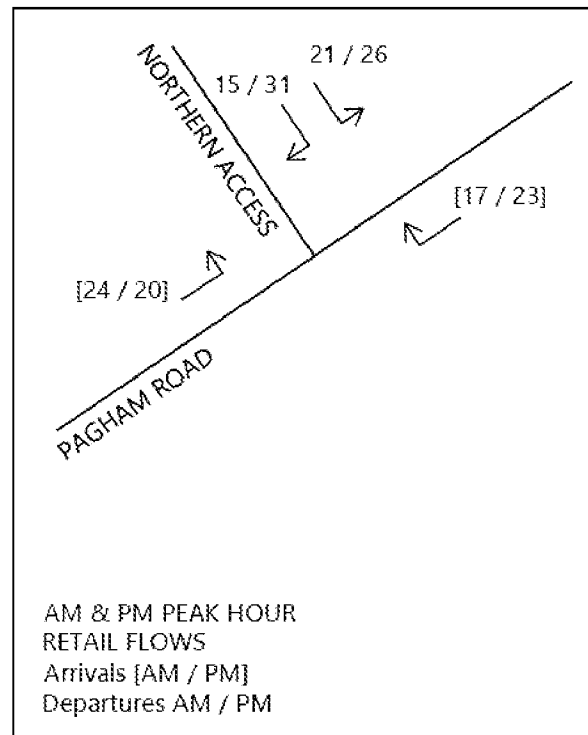


Figure 6.6 – AM & PM retail peak hour traffic movements



6.42 The above turning movement flows include for pass-by trips i.e. vehicles already on the Pagham Road, and as such these will not be added onto the local highway network as new trips, but be a redistribution of existing traffic flows past the site. These pass-by trips can be summarised as:

- i. AM Departures
11 to the south and 16 to the north
- ii. AM Arrivals
18 from the south and 13 from the north.
- iii. PM Departures
23 to the south and 20 to the north
- iv. PM Arrivals
15 from the south and 17 from the north.

Figure 6.7 – AM & PM care home peak hour traffic movements

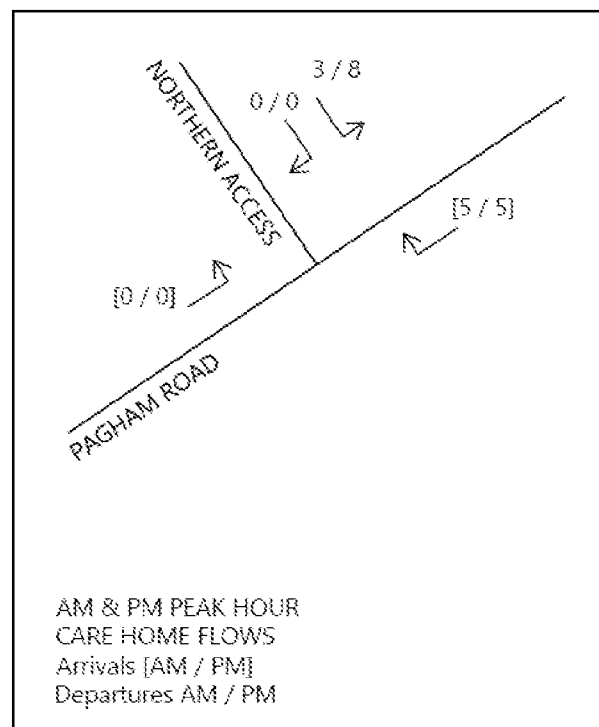
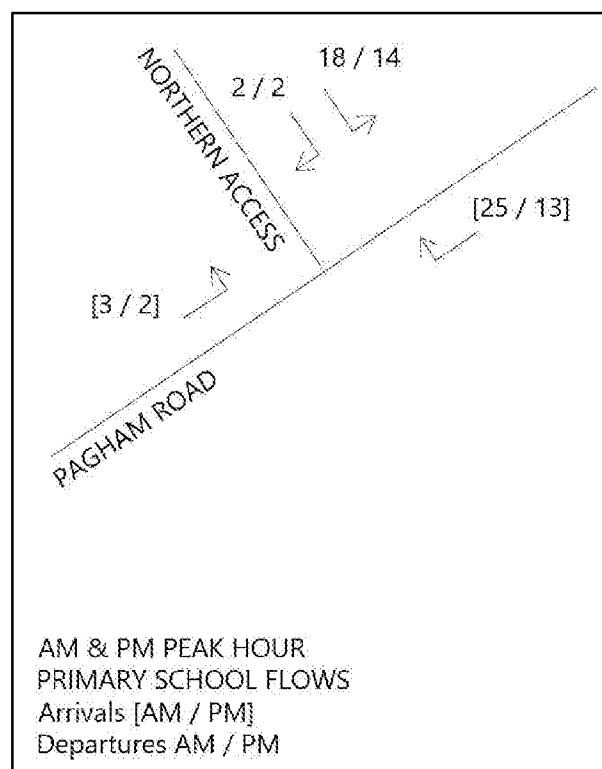


Figure 6.8 – AM & PM primary school peak hour traffic movements



- 6.43 These traffic flows have been combined to present development traffic diagrams for both site access junctions with Pagham Road in **Figure 6.9** and **Figure 6.10** below for the AM and PM peak hours respectively. As set out in **paragraph 6.42** above, the flows diagrams below include for pass-by trips as part of the development flows, but these will be diverted from the Pagham Road flows as appropriate.

Figure 6.9 – AM development traffic turning movement diagram

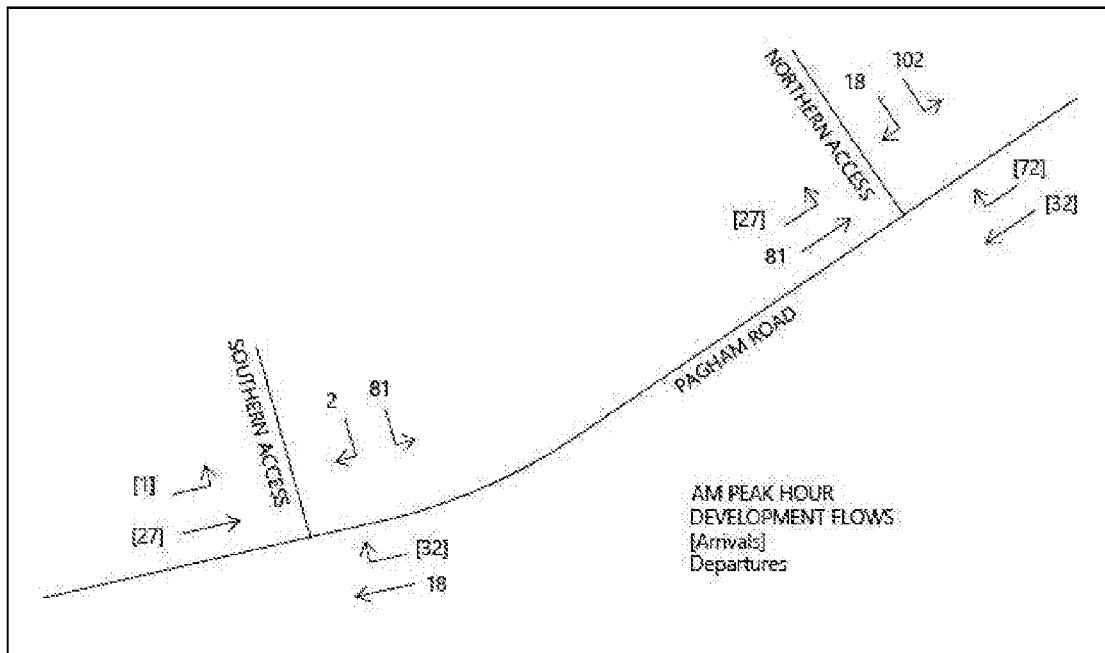
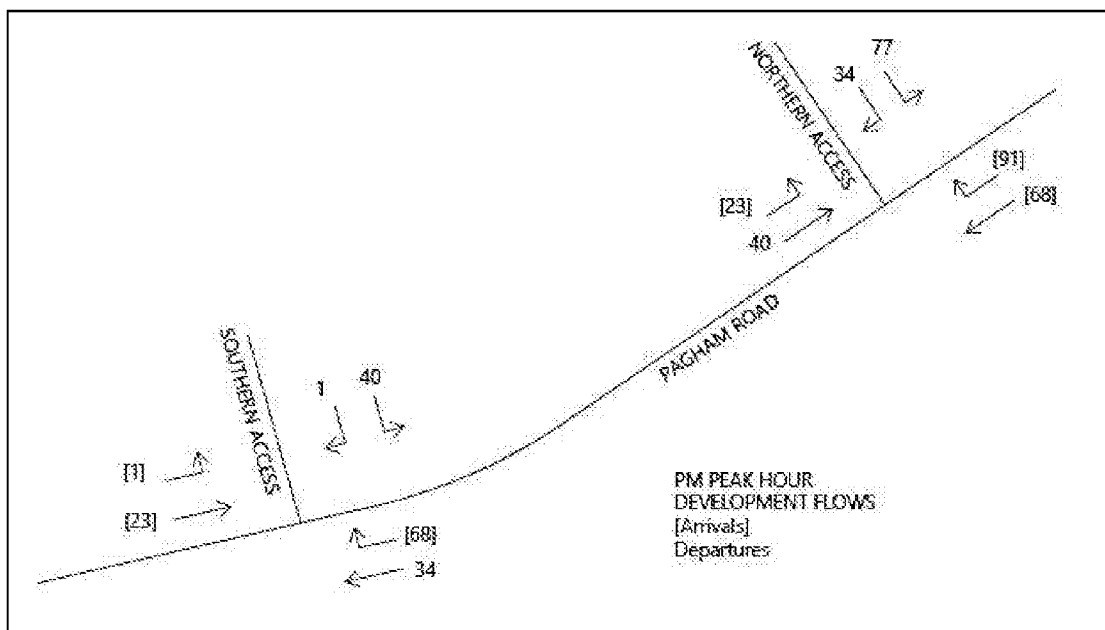


Figure 6.10 - PM development traffic turning movement diagram



Trip Distribution – Wider Highway Network

- 6.44 The distribution of vehicular traffic on the wider highway network associated with the Pagham South development is discussed in detail in **Section 9.0**.

7.0 Forecast Traffic Flows

Forecast Traffic Flows at the Proposed Site Access junctions

- 7.1 It has been agreed with the highway officer that a future year of 2022 is suitable for assessing the impact of the Pagham South development on the local highway network. It has been further agreed that no additional uplift in the growth rate for Arun will be required as part of this assessment that focuses on the local highway network of Pagham as the Pagham network is effectively contained to Pagham traffic. Furthermore, whilst it is appreciated that the emerging Arun Local Plan includes an increased level of uplift in housing supply, it is considered that by 2022 these additional dwellings will not have come forward. In terms of including the other two large sites in Pagham, land north of Hook lane and land north of Sefter Road, these are accounted for within the cumulative assessment contained in **Sections 12.0** and **13.0**, as these are not yet committed development.
- 7.2 A growth factor has been applied to the peak hour traffic flow information for Pagham Road set out in **Table 3.2** using the TEMPRO dataset (version 7.0) for Urban Principal roads in Arun 19 (E02006560), as agreed with the highway officer at WSCC, to forecast 2022 traffic flows using the NTM Version AF15 2010-2040 for adjusted growth factors.
- 7.3 The local growth figures and traffic flows are set out in **Table 7.1** below. The TEMPRO data is contained in **Appendix 24** for reference.

Table 7.1 – Traffic growth factors and resultant traffic flows on Pagham Road

Traffic Growth Factors (2016-2022)		2016 Measured Flows		2022 Forecast Flows	
		Northbound	Southbound	Northbound	Southbound
AM	1.0976	218	243	239	267
PM	1.0981	159	282	175	310

Committed development

- 7.4 The two committed development sites, Land at Summer Lane (90 dwellings, ref: P/58/15) and 251 Pagham Road (40 dwellings, ref: P/125/14), are to be added to the 2022 traffic flows for the purposes of this assessment. It is however recognised that these sites may have been included for within the background growth rates from TEMPRO. **Figure 7.1** below sets out the turning movements for the Land at Summer Lane site and **Figure 7.2** sets out those turning movements associated with the Land at 251 Pagham Road site (based on the trip rates set out in the Transport Assessment for the Land at Summer Lane).

Figure 7.1 – Committed development P/58/15 turning movement diagram (AM/PM peak hour)

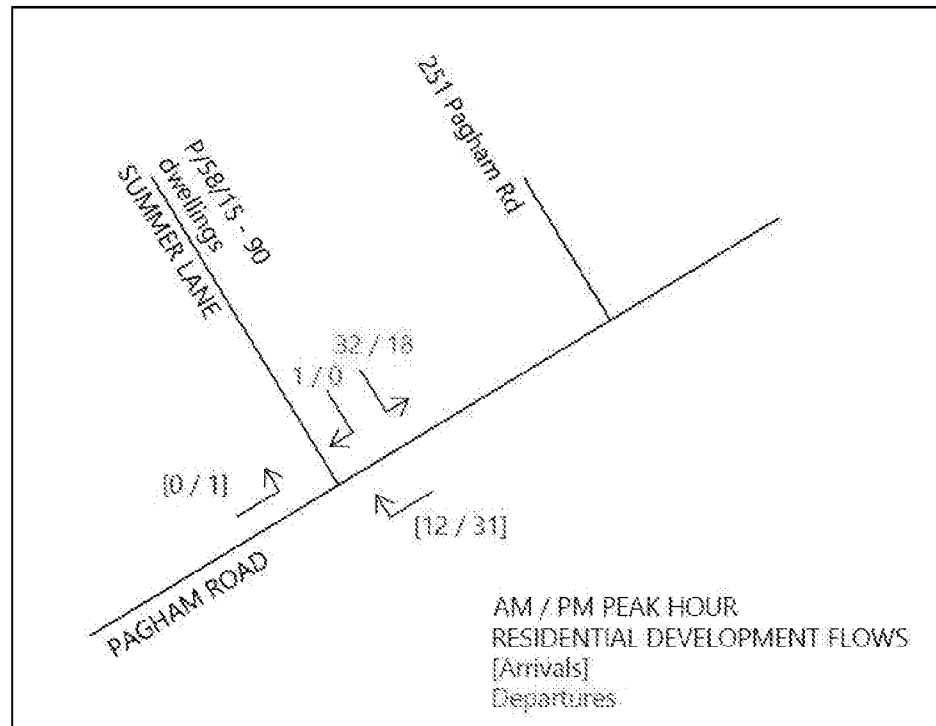
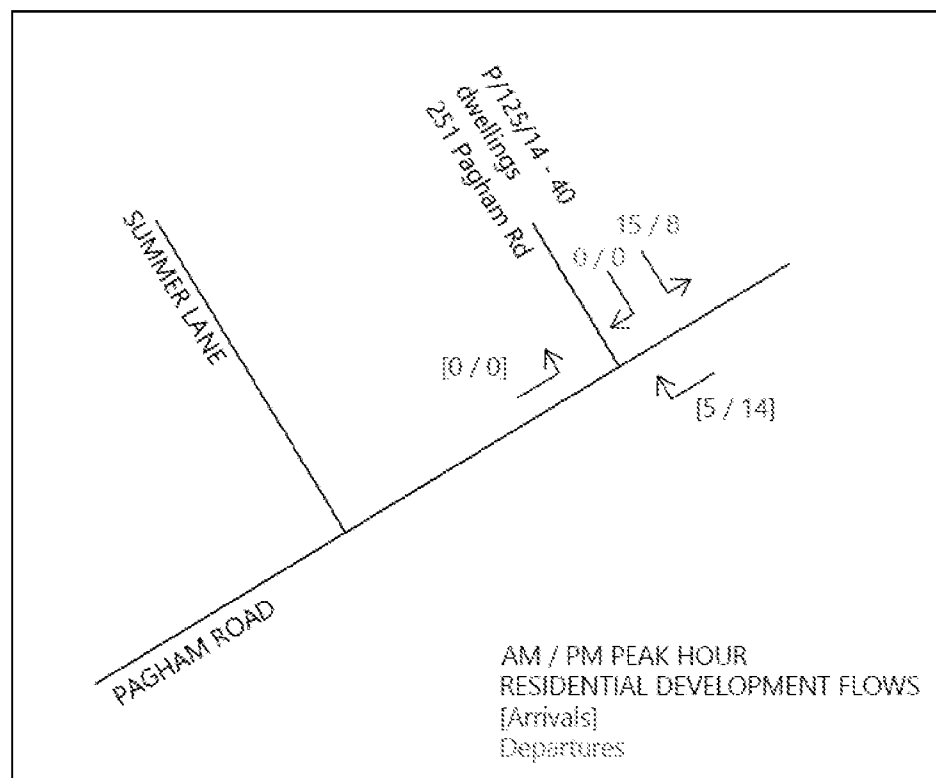


Figure 7.2 – Committed development P/125/14 turning movement diagram (AM/PM peak hour)



2022 Traffic Flows

- 7.5 The information for 2022 flows on Pagham Road from **Table 7.1** has been combined with the committed development trips shown in **Figure 7.1** and **Figure 7.2** above to provide 2022 forecast base flows past the site accesses on Pagham Road. The forecast base 2022 flows are set out in **Figure 7.3** and **Figure 7.4** below.

Figure 7.3 – 2022 forecast turning movement diagram (AM peak hour)

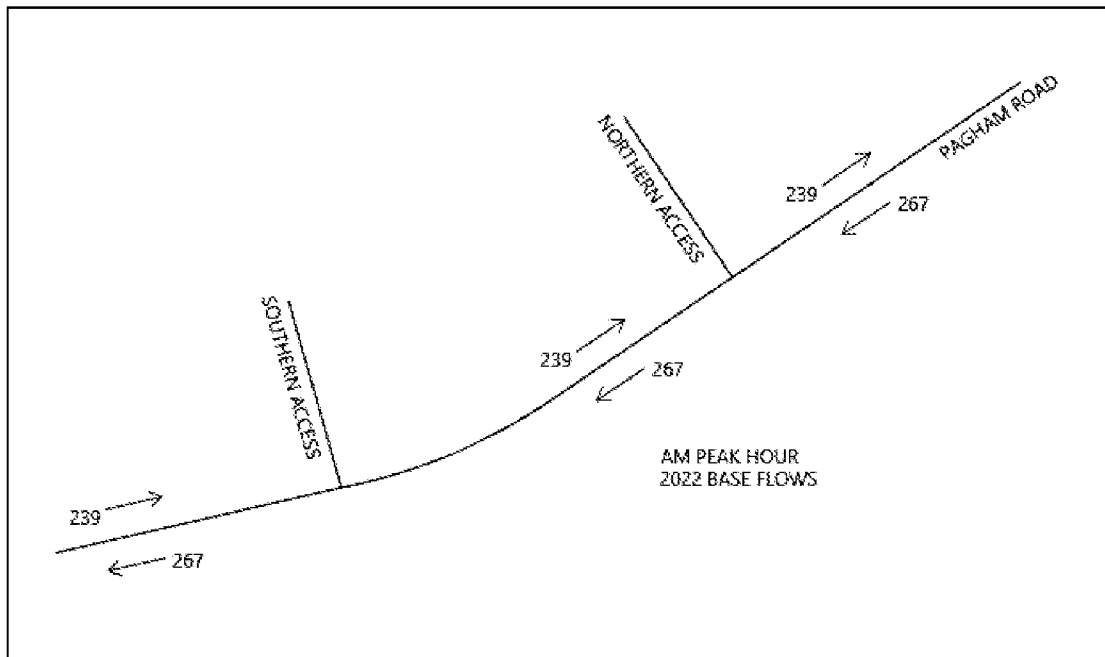
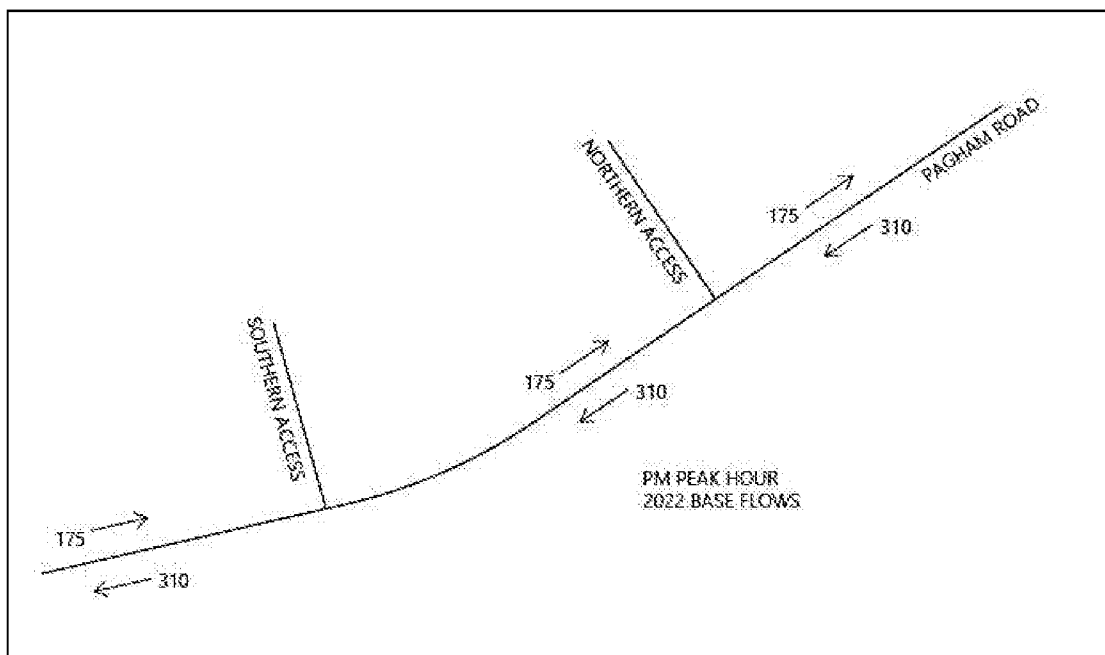


Figure 7.4 – 2022 forecast turning movement diagram (PM peak hour)



- 7.6 These forecast Pagham Road flows shown above are presented in **Figure 7.5** and **Figure 7.6** below to take account of the diversion of pass-by trips associated with the Pagham South development (see **Section 6.0, paragraphs 6.20 to 6.23**).

Figure 7.5 – 2022 turning movement diagram for pass-by trips (AM peak hour)

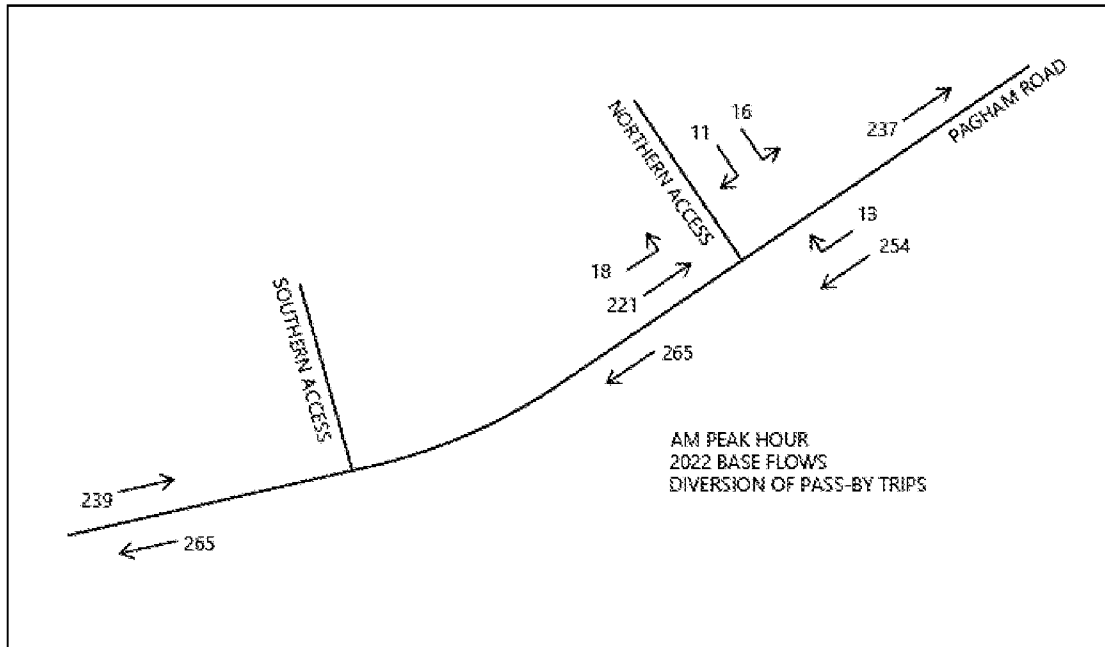
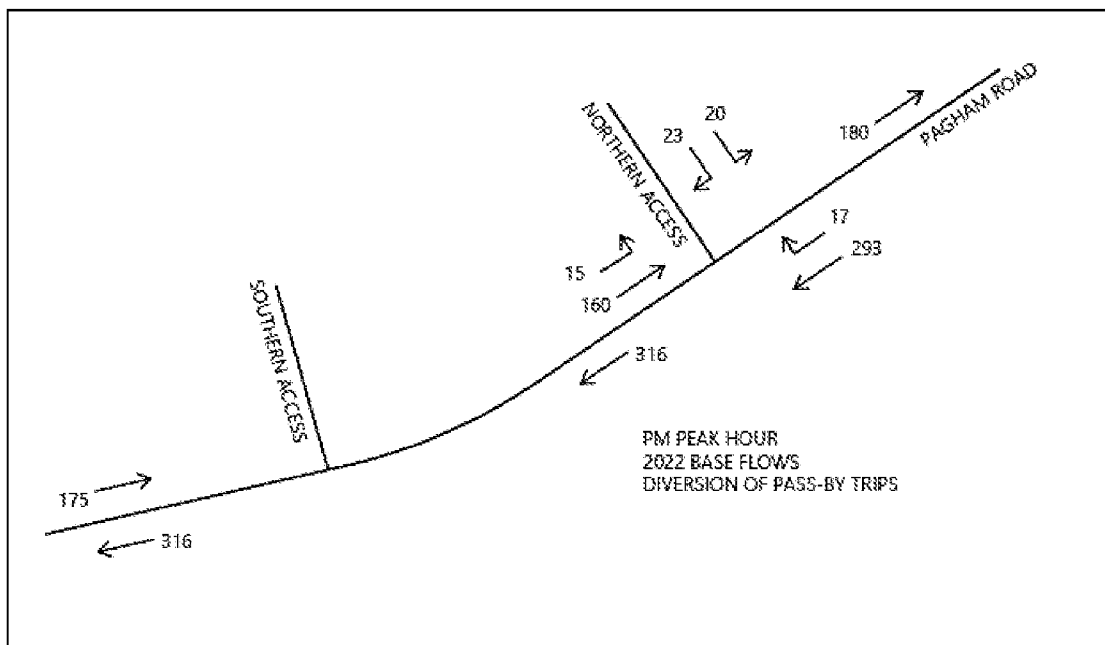


Figure 7.6 – 2022 turning movement diagram for pass-by trips (PM peak hour)



2022 Traffic Flows with Development Traffic

- 7.7 The information from **Figures 7.3 to 7.6** has been combined with the development trip distribution figures shown in **Figure 6.9** and **Figure 6.10** to give the forecast traffic flows for a 2022 'with development' scenario. This is set out diagrammatically below for the AM and PM peak hours in **Figure 7.7** and **Figure 7.8** respectively.

Figure 7.7 – 2022 forecast turning movement diagram (AM peak hour) with development

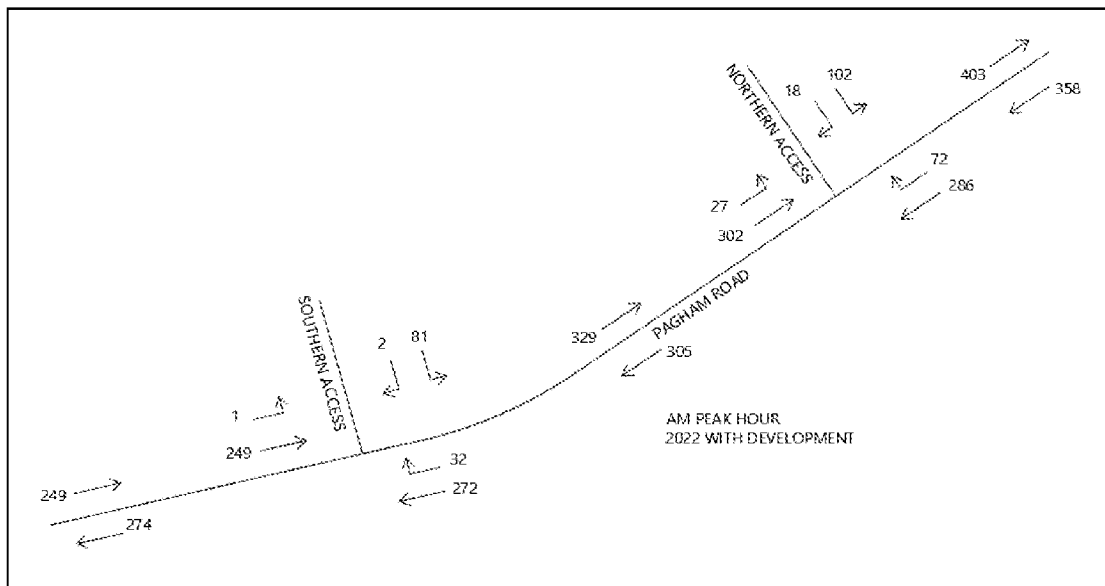
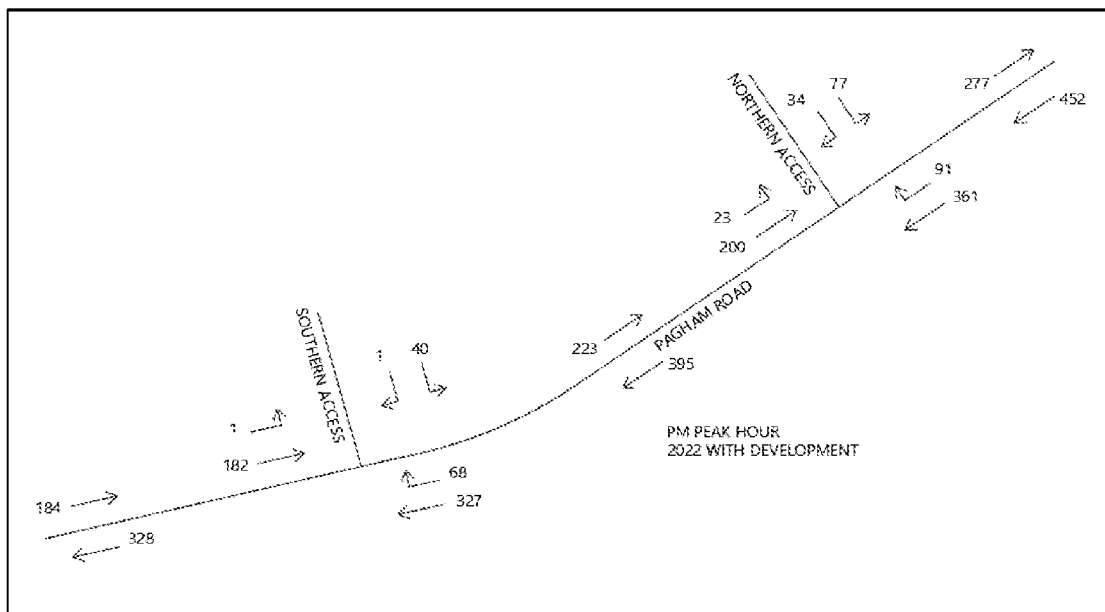


Figure 7.8 – 2022 forecast turning movement diagram (PM peak hour) with development



Forecast Traffic Flows – Wider Highway Network

- 7.8 The forecast traffic flows on the wider highway network associated with the Pagham South development are considered in **Section 9.0**.

8.0 Impact Appraisal – Local Highway Network

- 8.1 The highway capacity of the proposed site access junctions has been assessed for a 'with development' scenario in 2022 using PICADY software and the results are contained in **Appendix 25** and summarised for each junction in **Tables 8.1** and **8.2** below.

Table 8.1 – Northern site access 'with development' PICADY results 2022

Arm	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
Site Access	0.21	0	7	0.20	0	8
Pagham Road	0.11	0	6	0.13	0	6

Table 8.2 – Southern site access 'with development' PICADY results 2022

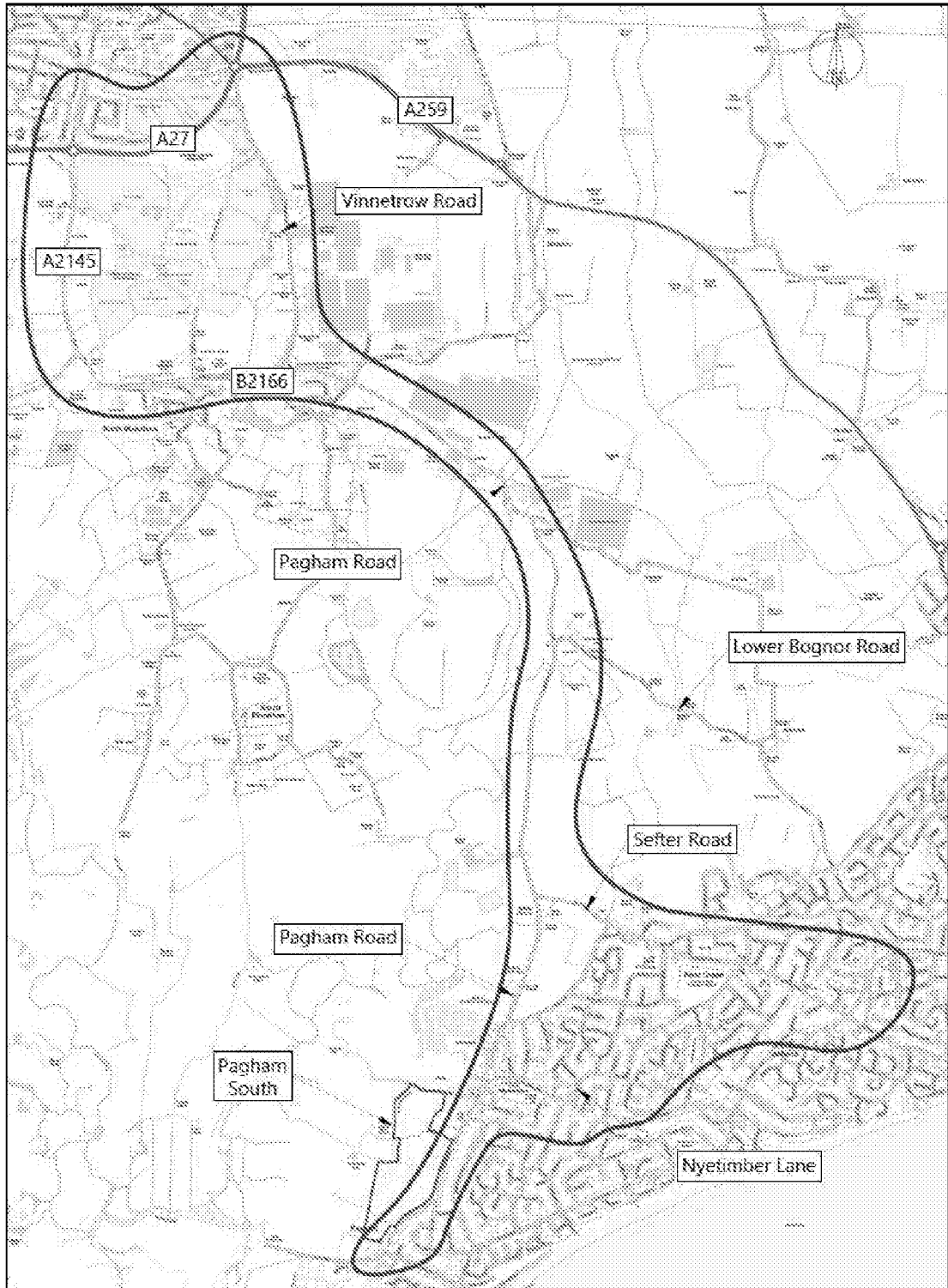
Arm	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
Site Access	0.14	0	7	0.07	0	6
Pagham Road	0.07	0	5	0.16	0	5

- 8.2 These tables show that both of the proposed site access junctions work well within capacity in a design year of 2022. This modelling includes for the modifications to the access junctions, i.e. the removal of the ghost right turn lane from the southern access.

9.0 Impact Appraisal – Wider Highway Network

- 9.1 This section of the study considers the impact arising on the wider highway network identified within the study area shown in **Figure 1.2** which is replicated below for ease of reference.

Figure 1.2 – The study area



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- 9.2 In the first instance the trip generation and distribution figures discussed in **Section 6.0** have been expanded to cover the study area. A comparison has then been made with the existing traffic flows (growthed to the design year of 2022) at the junctions identified in **paragraph 3.5** in order to confirm the locations where the change in traffic flow due to the application proposals requires capacity analysis to quantify the impact.

Expanded Trip Distribution and Development Traffic Flows

- 9.3 The residential trip distribution has been based on 2011 journey to work census data, which sets out that 56% of work journeys travel northward on to Pagham Road towards and beyond Chichester and 44% travel to/from the east towards the Bognor direction. It is agreed that an allowance of 10% can be made to account for an element of residential trips being retained in Pagham i.e. not work related. As such, the distribution northward is proposed at 50%, with 40% to/from the east towards Bognor.
- 9.4 The wider trip distribution for the residential element can be summarised as follows:
- i. B2166 50%
 - ii. Nyetimber Lane 24% (into Gossamer Lane east 19.6%)
 - iii. Hook Lane 24% (Rose Green Road east 19.6%)
 - iv. Pagham Road south 2%
- 9.5 The wider trip distribution for the retail element is based on a review of housing numbers from census 2011 data (KS401UK for the 2011 super output area – lower layer Arun ward 019A-F), a breakdown of which is contained in **Appendix 23** for reference, and the percentage of traffic turning to/from the site access is as follows:
- i. AM peak hour south on Pagham Road – Arrival 58%, Departure 42%
 - ii. PM peak hour south on Pagham Road – Arrival 46%, Departure 54%
 - iii. AM peak hour north on Pagham Road – Arrival 42%, Departure 58%
 - o Nyetimber Lane – Arrival 15%, Departure 18.5%
 - o Nyetimber Lane junction with Cardinals Drive – Arrival 4.5%, Departure 9%
 - iv. PM peak hour north on Pagham Road – Arrival 54% Departure 46%
 - o Nyetimber Lane – Arrival 17%, Departure 14%
 - o Nyetimber Lane junction with Cardinals Drive – Arrival 9%, Departure 7.5%
- 9.6 The wider trip distribution for the primary school element is also based on housing numbers, but includes the Arun 18A, D and E wards, and can be summarised is as follows for all traffic (see data contained in **Appendix 23** for reference):
- i. Pagham Road north 87.6%
 - o Nyetimber Lane 56.4% (into Gossamer Lane east 22.8%)
 - o Hook Lane 20.2% (Rose Green Road east 9.9%)
 - ii. Pagham Road south 12.4%

- 9.7 The wider peak hour traffic distribution diagrams are contained in **Appendix 26** and the resulting turning movement flow diagrams for a 2022 scenario are contained in **Appendix 27** for reference.
- 9.8 It can be seen from the flow diagrams contained in **Appendix 26** that Pagham South development trips will result in the following during the traditional highway network peak hours:
- i. B2166 junction with the B2145 (81/80 trips AM/PM respectively).
 - ii. B2166 junction with Vinnetrow Road (104/102 trips AM/PM respectively).
 - iii. Lower Bognor Road junction with Pagham Road (104/102 trips AM/PM respectively).
 - iv. Nyetimber Lane (82/72 trips AM/PM respectively).
 - v. Hook Lane (60/55 trips AM/PM respectively).
 - vi. Rose Green Road east (46/43 trips AM/PM respectively).
 - vii. Gossamer Lane east (52/47 trips AM/PM respectively).
- 9.9 From the original modelling in TA/01, it could be seen that the Gossamer Lane junction with Aldwick Street operated well within capacity and therefore has not been re modelled in subsequent TA's; development trips through this junction have been marginally reduced in any event (see **Section 6.0**). Furthermore, the traffic flows at the Nyetimber Lane junction with Tabard Gate and Cardinal's Drive and the modelling results were low, as set out in ATA/02, and therefore have also not been remodelled in subsequent assessments.
- 9.10 TA/01 (December 2016) concluded that the impact of the Pagham South development traffic on the operation of the B2166/B2145 junction and the two A27 junctions (i.e. not taking into account cumulative impact) was too low to be material as set out in **Table 9.1** below (extracted from Table 9.1 of TA/01).

Table 9.1 – Forecast traffic flow data within the study area (2022)

Road	Peak Hour Two-Way Flow							
	AM 0800-0900				PM 1700-1800			
	Total 2-Way Flow	HGV & PSV	Devel. Traffic	% Impact	Total 2-Way Flow	HGV & PSV	Devel. Traffic	% Impact
B2166 j/w B2145	2,298	109	78	3	2,349	63	72	3
B2145 j/w A27 - Whyke Hill Roundabout	4,660	475	78	2	4,759	206	72	2
Bognor Road j/w A27 - Bognor Road Roundabout	4,711	343	25	1	4,965	208	35	1

- 9.11 It can be seen that the impact of development traffic is up to three percent only.

- 9.12 In summary, the following junctions have been modelled and set out in this section of the report for the Pagham South assessment:
- i. Nyetimber Lane priority junction with Pagham Road.
 - ii. Hook Lane priority junction with Pagham Road.
 - iii. Sefter Road priority junction with Pagham Road.
 - iv. Lower Bognor Road priority junction with Pagham.
 - v. Rose Green Road junction with Grosvenor Gardens.
 - vi. B2166 roundabout junction with Vinnetrow Road.
 - vii. Nyetimber Road signalised junction with Grosvenor Gardens.
- 9.13 These junctions have been modelled in the respective modelling programmes, PICADY, ARCADY (both Junctions 9) and LINSIG (version 3), and the results are summarised below in **Table 9.2** for both 2022 base and 2022 'with development' scenarios. The full modelling reports are contained in **Appendix 28** for reference.
- 9.14 It should be noted that the previous assessments for the Nyetimber Lane junction were based on signal timing information provided by WSCC and only included a pedestrian demand stage every other cycle. The model has now updated to reflect on site observations by C&A, and now demonstrates that a pedestrian stage could be called each cycle (although observed not to at present).

Table 9.2 – Junction modelling results 2022

Junction	Test Scenario	AM Peak (0800-0900)			PM Peak (1700-1800)		
		RFC (%)	Queue (Veh)	Delay (s)	RFC (%)	Queue (Veh)	Delay (s)
PICADY							
Pagham Road j/w Nyetimber Lane	2022	0.22	0	9	0.38	1	14
	2022 + Dev.	0.30	0	11	0.52	1	19
	Difference	+0.08	0	+2	+0.14	0	+5
Pagham Road j/w Hook Lane	2022	0.27	1	12	0.40	1	12
	2022 + Dev.	0.38	1	13	0.48	1	13
	Difference	+0.09	0	+1	+0.08	0	+1
Pagham Road j/w Sefter Road	2022	0.66	2	24	0.40	1	16
	2022 + Dev.	0.69	2	28	0.41	1	16
	Difference	+0.03	0	+4	+0.01	0	0
Pagham Road j/w Lower Bognor Road	2022	1.12	31	247	0.90	6	94
	2022 + Dev.	1.18	41	330	0.99	10	148
	Difference	+0.06	+10	+83	+0.09	+4	+54
Rose Green Road j/w Grosvenor Gds	2022	0.95	10	85	1.07	27	182
	2022 + Dev.	0.98	13	103	1.12	39	246
	Difference	+0.03	+3	+18	+0.05	+12	+64
ARCADY							
B2166 j/w Vinnetrow Road	2022	0.71	2	9	0.81	4	26
	2022 + Dev.	0.75	3	10	0.86	5	37
	Difference	+0.04	+1	+1	+0.05	+1	+11
LINSIG							
Nyetimber Lane j/w Grosvenor Gds	2022	0.83	11	62	0.88	13	56
	2022 + Dev.	0.88	13	62	0.92	14	73
	Difference	+0.05	+2	0	+0.04	+1	+17

9.15 It can be seen from the above that:

- i. The Nyetimber Lane junction with Pagham Road will continue to work well within capacity in the future year of 2022 with the addition of Pagham South traffic.
- ii. The Hook Lane junction with Pagham Road will continue to work well within capacity in the future year of 2022 with the addition of Pagham South traffic.
- iii. The Sefter Road junction with Pagham Lane will continue to operate well within capacity in 2022 with the addition of Pagham South traffic.
- iv. The Lower Bognor Road junction with Pagham Road will operate over capacity in the 2022 AM peak hour and reach capacity in the PM peak hour. However, it can be seen that, with the development traffic added on, there is only a minimal increase in RFC of 0.06 and 0.09 during the AM and PM peak hours respectively.

It has been discussed and agreed with the highway officer that queuing on the Lower Bognor Road priority junction is all on the minor arm (Lower Bognor Road) and that the drivers using this arm realistically have earlier opportunities to choose a different route and therefore there is an expectation that some of the traffic on this arm in the future will choose a different part of the network to get to their destinations and as such the Lower Bognor Road arm of the junction will not materially change in terms of queueing and delay.

- v. The Rose Green Rose junction results in **Table 9.2** reflect the northern Rose Green Road arm, which is shown to be operating at capacity. However, the queue results contained in **Appendix 9** demonstrate that in reality there are very limited queues on this arm of three vehicles in the AM peak and up to seven in the PM peak. Therefore the above results should be treated with caution as the junction is obviously working more efficiently in reality than can be demonstrated theoretically.
 - vi. The B2166 junction with Vinnetrow Road will continue to operate within capacity in 2022 with the addition of Pagham South traffic.
 - vii. The Nyetimber Lane junction with Grosvenor Gardens signalised junction will approach capacity in the future year of 2022 with and without the addition of Pagham South traffic. However, it can be seen that with the development traffic added on, there is only a minimal increase in RFC of 0.05 and 0.04 during the AM and PM peak hours respectively, with additional queue lengths of up to only two vehicles in the busiest peak hour. This demonstrates that the Pagham South traffic will not have a significant impact on the operation of this junction. Furthermore, it is unlikely that the pedestrian stage will be called each cycle as modelled, and therefore there will be additional capacity within the junction that shown by the modelling results.
- 9.16 Therefore it is concluded that the Pagham South development traffic will not create a highway safety issue and can be accommodated on the local and wider highway network without detriment.
- 9.17 Engineering-type mitigation measures on the wider highway network are not proposed as a result of the Pagham South development. It is considered that the measures set out in the proposed Residential Travel Plan aimed at reducing car travel will assist in further reducing traffic impact in any event.
- 9.18 However, the cumulative impact of development traffic from the emerging sites in Pagham are reviewed in **Sections 12.0** and **13.0** of this report, and subsequent mitigation measures are proposed and costed; as summarised in **Section 14.0**.

10.0 Travel Plan Measures

- 10.1 It is agreed that the location of the development will give future residents a realistic choice about how they chose to travel, without reliance upon the use of the private car.
- 10.2 Travel plan measures have been included as part of the development proposals, in line with WSCC's Travel Plan guidance for the residential element of the site further to discussion with the highway officer, such as:
- i. Cycle storage at a ratio to meet or exceed the Council's minimum parking ratio.
 - ii. Ensure the provision of good connectivity to walking and cycling links and permeability through the site to the wider highway network.
 - iii. Ensure the provision of good connectivity to public transport links in the surrounding area.
 - iv. Provision of up to date public transport timetable information on noticeboards in communal areas and in the Welcome Pack.
 - v. Provision of a travel vouchers offered for each residential unit to the value of £150, which will cover a range of sustainable travel incentive such as contribution towards a new bike and/or accessories, contribution towards a bus season ticket, cycle training, etc. These will be made available for take-up for a period of 12 months following first occupation.
 - vi. The provision of a second and final promotion of the £150 travel vouchers for residents of the development to claim if the trip rate target is missed.
- 6.41 The Residential Travel Plan was developed further in collaboration with WSCC officers during the planning application process to ensure the development of a good quality and effective document. The Residential Travel Plan to accompany the development is a standalone document ref: HTp/1616/TP/01/A, which has been agreed with highway officers at WSCC (see correspondence contained in **Appendix 1**).
- 10.3 Individual Travel Plans will also be required for the care home and primary school, and it is expected that an umbrella Travel Plan Statement will be sought to cover the local centre land uses. However, the developer will accept a planning condition for the provision of these documents; it is assumed that these Travel Plans will follow the same ethos as the Residential Travel Plan.
- 10.4 Key elements of the Travel Plan documents will be:
- i. To reduce the need to travel, especially by car.
 - ii. Sustainable accessibility.
 - iii. To deal with residual trips.
 - iv. Mitigation measures.

11.0 Transport Policy Background

11.1 The policy background for development in Pagham is found in:

- i. National Planning Policy Framework (NPPF), March 2012.
- ii. West Sussex Local Transport Plan 2011 to 2026.
- iii. Arun Local Plan.
- iv. Pagham Neighbourhood Plan.

National Policies

11.2 The government have set out their planning policies for England, and how these are to be applied, in the National Planning Policy Framework (NPPF, 2012). In transport terms paragraph 32 of the NPPF sets out that, "Development should only be prevented where the residual cumulative impacts of development are severe".

11.3 This Transport Assessment has shown that committed development and development traffic from Pagham South can be accommodated on the highway network, and that the residual cumulative impacts are not severe.

11.4 The Addendum Transport Assessment will take account of development at the two other sites in the emerging Arun Local Plan and will show that the Pagham South development can be accommodated on the local highway network without detriment to local highway safety.

Local Policies

11.5 The main thrust of the West Sussex Local Transport Plan, the Arun Local Plan and the Pagham Neighbourhood Plan in respect of a development such as proposed at Pagham South include:

- i. Helping to reduce the need for travel.
- ii. Encouraging the use of sustainable modes of transport.
- iii. Locating development where it will be close to a range of services and facilities.
- iv. Supporting development with Travel Plan measures.
- v. Ensuring that access provision is safe for all users.
- vi. Ensuring parking provision is appropriate and facilities are available for delivery vehicles.

11.6 From **Sections 4.0, 5.0 and 6.0** it has been shown that the proposed development will promote sustainable travel and accessibility and safety for all.

Conclusions

11.7 It is therefore reasonable to conclude that:

- i. The proposed development at Pagham South is sustainably located and will provide future residents with a realistic alternative choice to the private car.
- ii. The proposals are compliant with national and local transport related planning policies.

12.0 Local Highway Network Cumulative Assessment

- 12.1 This section of the report is taken from our previously submitted assessment ATA/02/A, which was provided to summarise the forecast traffic impact on the local highway network of the cumulative developments in 2031. The future year of 2031 was requested by highway officers at WSCC and HE.
- 12.2 The key changes from ATA/02/A further to collaborative working with the transport consultants for the Sefter Road and Hook Lane development sites are as follows:
- To update the model for the Rose Green Road junction with Grosvenor Gardens.
 - To update the model for the Nyetimber Lane signalised junction with Grosvenor Gardens and Gossamer Lane.
 - The replacement of the proposed mini roundabout mitigation scheme at the Rose Green Road junction with Grosvenor Gardens for the widening improvement works to facilitate a second entry lane on the Rose Green Road arm, in line with the proposals set out by C&A that are agreed with WSCC.
- 12.3 The modelling within this Section will cover the following junctions:
- Pagham Road junction with Nyetimber Lane.
 - Pagham Road junction with Hook Road.
 - Pagham Road junction with Sefter Road.
 - Nyetimber Lane junction with Grosvenor Gardens and Gossamer Lane.
 - Rose Green Road junction with Grosvenor Gardens.
- 12.4 The flow diagrams for the Hook Lane (Hallam) and Sefter Road (Taylor Wimpey) development sites are contained in **Appendix 29**. The flow diagrams for the three sites have been combined and cumulative traffic flow diagrams have been provided in **Appendix 30** of this report.
- 12.5 A growth factor has been applied to the peak hour traffic flow survey information to forecast traffic in 2031, using the industry standard TEMPRO program with NTEM adjustment factors. The calculation parameters of Arun (019) Principal Urban Roads were selected based on previous modelling work, as agreed with highway officers at WSCC.
- 12.6 The growth rates from the TEMPRO programme are set out below in **Table 12.1** for 2016 survey data (see report TA/01/A) and the TEMPRO output data is contained in **Appendix 24** for reference.

Table 12.1 – Urban growth rates (2016-2031)

	Road Type	Growth Rate
AM Peak	Principal Roads	1.1959
PM Peak	Principal Roads	1.2001

- 12.7 TEMPRO v7.2 was released earlier this year. However, this has been found to have slightly lower growth rates (1.5% lower). Therefore for the purposes of this assessment v7 will be used for continuity with previous work and to provide a worst case assessment. The growth rates have been adjusted to remove the three developments and committed developments in order to avoid double counting, as set out below.
- 12.8 TEMPRO includes for additional households and jobs as part of the above growth. The housing proposed is likely to be in the region of 950 dwellings (400 Pagham South, 300 Hook Road and 250¹ Sefter Road), and a further circa 130 dwellings that are currently committed schemes (P/58/15 and P/125/14, see **Section 7.0**) plus employment. As such, in order to avoid overestimating the increase of housing numbers in the local area an element of the assumed growth in households between 2016 and 2031 is to be reduced.
- 12.9 It can be seen from the output in **Appendix 24** that there are an additional 708 households accounted for in the Arun 19 ward in 2031 from 2016. It is proposed that, in line with the emerging Arun Local Plan that sets out around 1,200 new dwellings to be provided in Pagham, and removing the committed and proposed schemes, this leaves a 120 dwelling shortfall.
- 12.10 As part of the cumulative study it has been agreed between consultants that the projected housing level in TEMPRO will be reduced from 708 to 150 to test the impact of the three emerging sites on the local highway network. The committed developments in Pagham are accounted for in the adjusted base flows also (see **Section 7.0**). Furthermore, this approach will ensure that the cumulative assessments also take into account traffic growth on the local and wider highway network associated with other emerging and potential sites to come forward in Pagham (i.e. in line with the circa 1,200 dwellings highlighted in the Local Plan Proposed Main Modifications April 2016).
- 12.11 The TEMPRO alternative assumptions have been applied and the subsequent growth rates for 2016-2031 are set out below in **Table 12.2**, which are to be applied to the base 2016 traffic flows for this report.

Table 12.2 – Alternative Assumptions urban growth rates (2016-2031)

	Road Type	Growth Rate
AM Peak	Principal Roads	1.1244
PM Peak	Principal Roads	1.1176

- 12.12 The future year traffic flow diagrams 'without development' are included in **Appendix 31**, which include the two committed sites within the base flows as per **Section 7.0** post application of growth rates, and the future year traffic flow diagrams 'with development' for the three cumulative sites are contained in **Appendix 32**.

¹ It is noted that the application description for the Sefter Road application is being altered to 'up to 280 dwellings'

12.13 The modelling will include for the following scenarios for both the AM and PM peak periods:

- i. 2031 without development.
- ii. 2031 with cumulative development.

12.14 The junction modelling has been carried out in the respective modelling programmes, PICADY (Junctions 9) and LINSIG (version 3) and the results are summarised below in **Table 12.3** for the future year of 2031 'without development' and 'with cumulative development'. The full modelling reports are contained in **Appendix 33** for reference.

12.15 As set out in **paragraph 9.14**, the Nyetimber Lane signalised junction modelling has been carried out in line with C&A's model, which is based on observations. The model for 2031 also includes alterations to the cycle times to improve the operation of the junction. Unlike the previous modelling in ATA/02/A, this LINSIG file now includes for the pedestrian crossing to be called each cycle.

Table 12.3 – Cumulative impact junction modelling results 2031

Junction	Test Scenario	AM Peak (0800-0900)			PM Peak (1700-1800)		
		RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
PICADY							
Pagham Road j/w Nyetimber Lane	2031	0.22	0	9	0.39	1	14
	2031 + Dev.	0.30	1	11	0.54	1	20
	Difference	+0.08	+1	+2	+0.15	0	+6
Pagham Road j/w Hook Lane	2031	0.28	1	12	0.41	1	12
	2031 + Dev.	0.40	1	14	0.49	1	14
	Difference	+0.12	0	+2	+0.08	0	+2
Pagham Road j/w Sefter Road	2031	0.68	2	26	0.41	1	16
	2031 + Dev.	0.89	6	70	0.56	1	25
	Difference	+0.21	+4	+44	+0.15	0	+9
Rose Green Rd j/w Grosvenor Gds	2031	0.98	13	105	1.10	33	217
	2031 + Dev.	1.09	30	207	1.24	65	462
	Difference	+0.11	+17	+102	+0.14	+32	+245
LINSIG							
Nyetimber Lane j/w Grosvenor Gds	2031	0.85	11	66	0.90	14	59
	2031 + Dev.	0.88	15	63	0.92	19	74
	Difference	+0.03	+4	-3	+0.02	+5	+15

12.16 It can be seen from the above **Table 12.3** that:

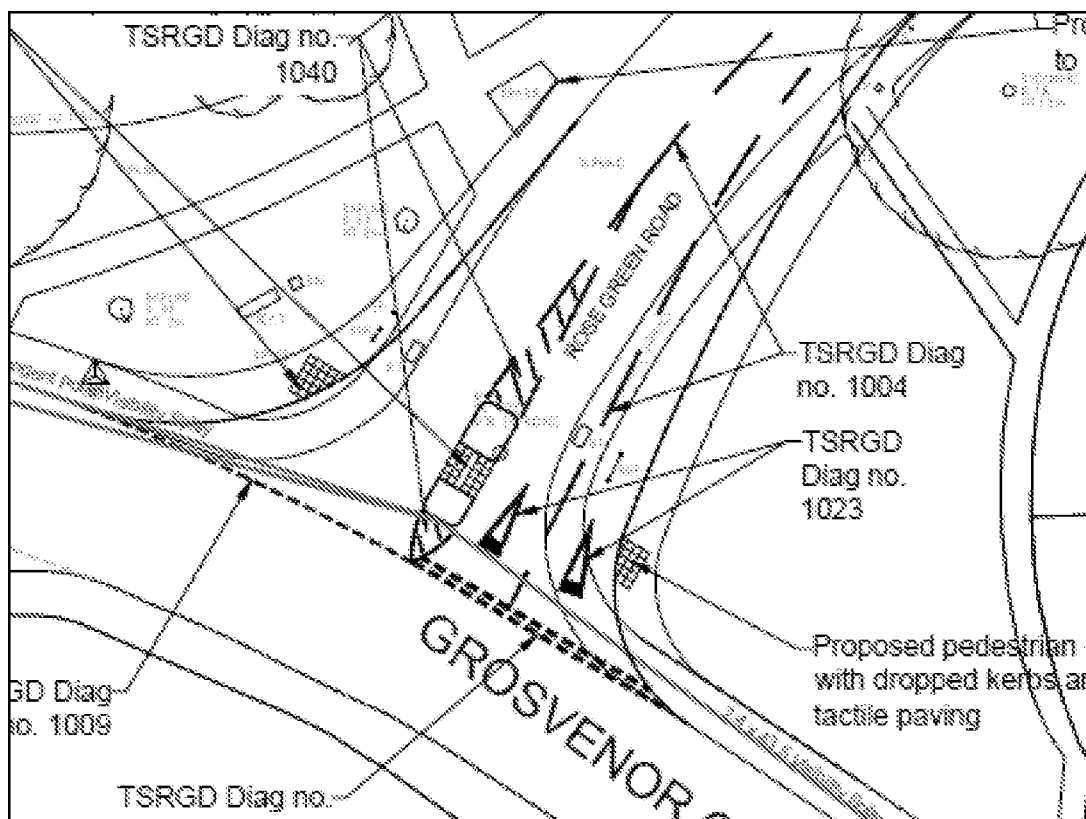
- i. Nyetimber Lane junction with Pagham Road will continue to work well within capacity in the future year of 2031 with the addition of all the promoted sites.
- ii. The Hook Lane junction with Pagham Road will continue to work well within capacity in the future year of 2031 with the addition of all the promoted sites.

- iii. The Sefter Road junction with Pagham Lane will approach capacity in the AM peak hour in 2031 with the addition of all the promoted sites, but continue to work well within capacity in the PM peak hour.
RPS have provided a sensitivity test that demonstrated with their site open, any approaching traffic on Sefter Road would divert through Hook Lane and the Hallam Land site; there being plenty of capacity at both the site access and at the Hook Lane junction with Pagham Road, thereby reducing any queues and delay at the Sefter Road site. Therefore no works at this junction are proposed as part of the cumulative assessments.
- iv. The Rose Green Road junction with Grosvenor Gardens is shown to be operating at or above capacity in all scenarios modelled.
- v. The Nyetimber Lane signalised junction with Grosvenor Gardens will approach capacity in the future year of 2031. The modelling demonstrates that the RFC will increase by only 0.02 in the PM peak hour with the addition of the cumulative development traffic, with only 15 seconds increase in delay and five additional vehicles queued. This is not considered to be a significant impact and it is concluded that the signalised junction will operate within capacity with all the committed developments and traffic growth as a result of changes to the signal timings.
Furthermore, the above results are considered to present a robust case as higher growth rates have been used in this assessment (see **paragraphs 12.5 to 12.7**). Furthermore, it is unlikely that the pedestrian stage will be called each cycle as modelled, and therefore there will be additional capacity within the junction that shown by the modelling results.
The justification provided by C&A for the alterations to the signal timings is set out in **Appendix 34**. It is therefore concluded that MOVA will not be required and hence this is not offered as part of the mitigation package.

Mitigation - Rose Green Road Junction with Grosvenor Gardens

- 12.17 The junction modelling results above indicate that the Rose Green Road junction with Grosvenor Gardens will require mitigation to offset the impact of the cumulative development traffic.
- 12.18 C&A in their original Transport Assessment proposed a mitigation scheme to widen the Rose Green Road exit to two lanes. This scheme has been demonstrated to operate within capacity with the cumulative development traffic and traffic growth in the future year of 2031.
- 12.19 The proposed mitigation scheme for the Rose Green Road junction with Grosvenor Gardens is set out on the C&A layout (ref: 12-018-036/A) contained in **Appendix 35**, and an extract is provided below in **Figure 12.1**. The WSCC agreement to the scheme is also included in **Appendix 35** for reference, with the Road Safety Stage 1 Audit, Designer's Response and Design Audit.

Figure 5.1 – Proposed mitigation at the Rose Green Road junction with Grosvenor Gardens



- 12.20 This proposed layout has been subject to a Road Safety Audit and a Design Audit and vehicle tracking for a bus has also been supplied by C&A (also contained in **Appendix 35**).
- 12.21 The proposed mitigation scheme for the Rose Green Road junction with Grosvenor Gardens set out above has been modelled in PICADY (Junctions 9) for the 'with cumulative development' scenario. The results are summarised in **Table 12.4** and the modelling output file is contained in **Appendix 36**.

Table 12.4 – 2031 Rose Green Road junction with Grosvenor Gardens

Arms	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
Rose Green Rd North	0.91	8	67	0.96	12	158
Grosvenor Gardens	0.01	0	7	0.02	0	6
Carlton Avenue	0.70	3	39	0.51	1	25
Rose Green Rd West	0.12	1	5	0.13	1	5

- 12.22 It can be seen from **Table 12.4** that the proposed mitigation scheme for the widening of the Rose Green Road arm to provide two lanes presents an improvement to the operation of the junction, significantly reducing queuing and delay to below the 2031 'without development' scenario. Therefore this proposed junction scheme is shown to provide a positive benefit to the local road network beyond mitigating the cumulative impact.
- 12.23 The preliminary estimated cost of the mitigation works are circa £81,000 and a Highway Infrastructure Costing spreadsheet for the works associated with the widening of the Rose Green Road arm is contained in **Appendix 37** for reference. The implementation of these works is discussed further in **Section 14.0**.

Sensitivity Test – 280 Dwellings on Land North of Sefter Road

- 12.24 The application description for the Land North of Sefter Road was changed in June 2017 to propose up to 280 dwellings. This resulted from the potential to replace the proposed school on their site with 30 dwellings.
- 12.25 The C&A highway network peak hour distribution diagrams for 280 dwellings are contained in **Appendix 38** for reference.
- 12.26 In order to ensure that the mitigation measures proposed assess the potential traffic impact of the site for up to 280 dwellings on Land North of Sefter Road as well as the 300 dwellings on Land North of Hook Lane and 400 dwellings from Pagham South, the trips associated with an additional 30 dwellings have been added to the cumulative development highway network peak hour distribution diagrams (contained in **Appendix 39**). The resultant local highway network traffic flow diagrams for a 'with cumulative development' scenario are contained in **Appendix 40**.
- 12.27 The proposed mitigation scheme for the Rose Green Road junction with Grosvenor Gardens has again been modelled in PICADY (Junctions 9) for the 'with cumulative development' scenario to account for the additional 30 dwellings on the Land North of Sefter Road site. The results are summarised in **Table 12.5** and the modelling output file is contained in **Appendix 41**.

Table 12.5 – 2031 Rose Green Road junction with Grosvenor Gardens sensitivity test (+30 Dwellings)

Arms	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
Rose Green Rd North	0.92	8	69	0.97	12	165
Grosvenor Gardens	0.01	0	7	0.02	0	6
Carlton Avenue	0.70	3	39	0.51	1	25
Rose Green Rd West	0.12	1	5	0.13	1	5

- 12.28 It can be seen from **Table 12.5** that the proposed mitigation scheme for the widening of the Rose Green Road arm to provide two lanes is shown to continue to operate satisfactorily with the addition of another 30 dwellings on Land North of Sefter Road.

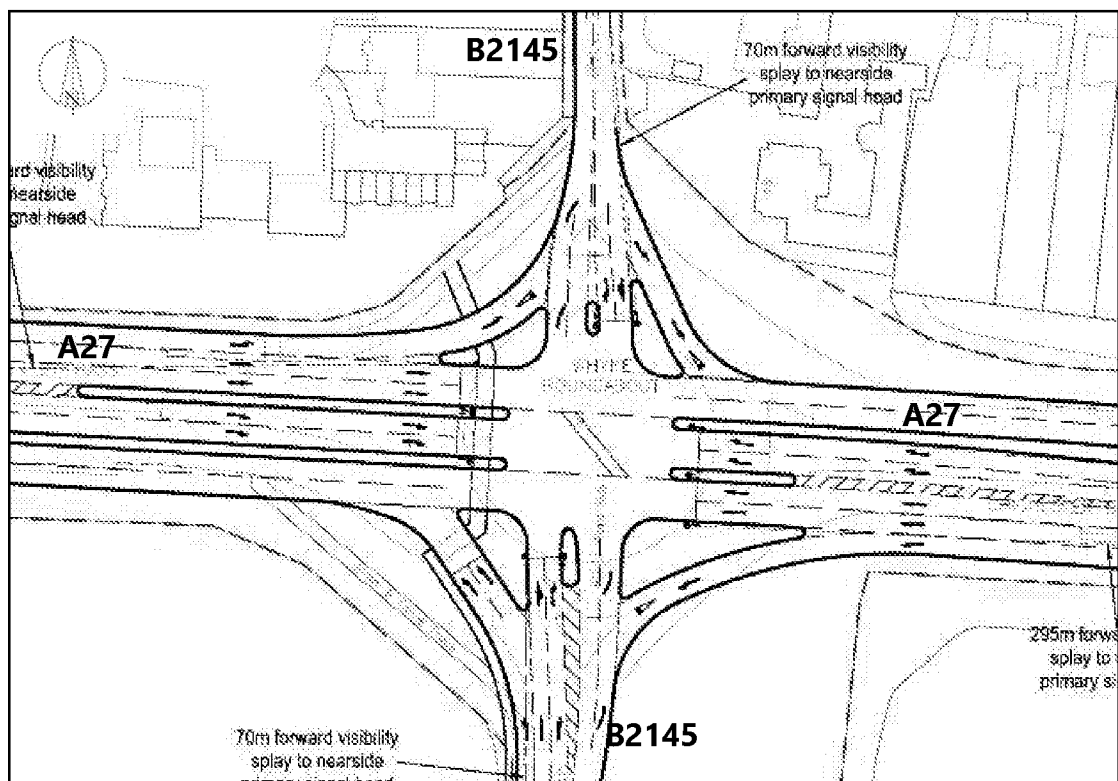
13.0 Wider Highway Network Cumulative Assessment

- 13.1 This section of the report is taken from our previously submitted assessment ATA/03/A, which was provided to summarise the forecast traffic impact of the cumulative developments on the wider highway network in 2031, including on the A27 strategic road network. The future year of 2031 was requested by highway officers at WSCC and HE.
- 13.2 The key changes from ATA/03/A further to collaborative working with the transport consultants for the Sefter Road and Hook Lane development sites are as follows:
- i. The provision of contributions for sustainable transport measures on the wider highway network to offset the cumulative impact of the Pagham development sites at the Lower Bognor Road junction with Pagham Road.
 - ii. Updated modelling for the B2145 junction with the B2146 and subsequent mitigation package.
 - iii. The use of HE MAX SE and SE data for the modelling of the A27 Whyke Hill junction.
 - iv. A revised package of mitigation works for the A27 Whyke Hill junction layout based on the Chichester Free Schools signalised junction design, with the introduction of a third lane for A27 traffic in both directions and alterations to the stacking capacity for turning movements.
- 13.3 The modelling within this Section will cover the following junctions:
- i. A27 Whyke Hill junction.
 - ii. A27 Bognor Road junction.
 - iii. B2166 roundabout junction with the B2145 (to the south of (i)).
 - iv. B2166 roundabout junction with Vinnetrow Road (to the south of (ii)).
 - v. Lower Bognor Road junction with Pagham Road and the B2166.
- 13.4 It has been agreed with officers at HE that the two A27 junctions are to be modelled based on the improvement schemes identified in the Chichester Local Plan as set out below. HE confirmed that the existing layouts for these junctions are not to be assessed and provided the base models to use for both the A27 junctions.

Strategic Road Network - A27 Whyke Hill Junction

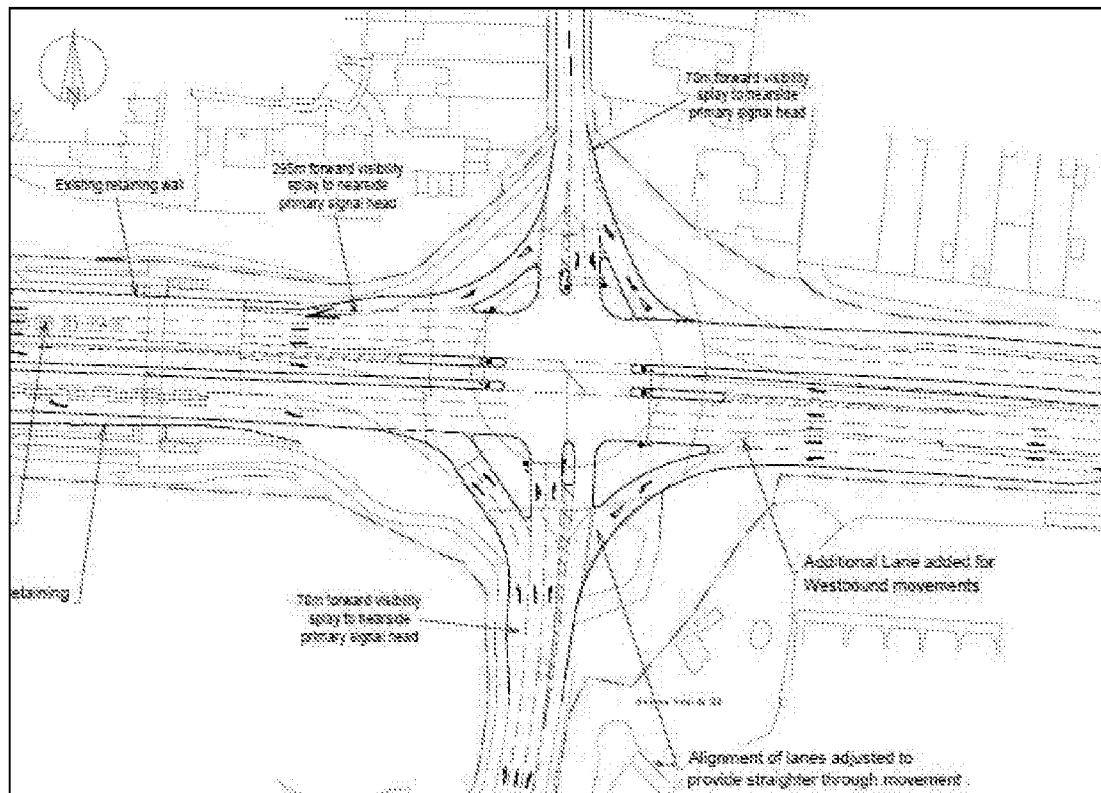
- 13.5 As part of the Chichester Free School application, proposals were put forward for alterations to the A27 Whyke Roundabout junction to create a four-armed signal control junction. A drawing of the Chichester Free School mitigation works is contained in **Appendix 42** and illustrated in **Figure 13.1** below.

Figure 13.1 – Chichester Local Plan A27 Whyke Hill junction proposals



- 13.6 Further to the two joint meetings with HE (see meeting minutes contained in **Appendix 2**) and subsequent discussions, the consultants from the three main emerging development sites in Pagham have revised the previously offered mitigation scheme and collaboratively suggested further mitigation measures to this proposed signalised junction. The mitigation includes the addition of a third through-lane on the A27 in both directions to increase capacity for A27 traffic and the design has been altered to ensure that the footbridge can be accommodated. Adjustments have also been made to the LINSIG model.
- 13.7 The newly proposed mitigation scheme has been set out in a Technical Note by RPS (contained at **Appendix 43**) and presented to officers at HE. An extract of the revised mitigation scheme is provided as **Figure 13.2** on **page 68**, with the full drawing (ref: JNY8840/19) contained in **Appendix 43**.
- 13.8 The RPS Technical Note provides a review of the existing, adjusted and revised design modelling and shows that the additional measures proposed to the A27 signalised scheme, *"will mitigate the impact of the traffic associated with the developments within Pagham and furthermore will also improve the junction's capacity well beyond that which would have been provided with the original layout proposed as part of the Chichester Free School development"* It is therefore concluded that with the measures proposed to the Chichester Free School junction layout and with the provision of additional MOVA (where needed for the new vehicular lanes provided above the provision included for within the Chichester Free School scheme) this mitigation scheme is appropriate.

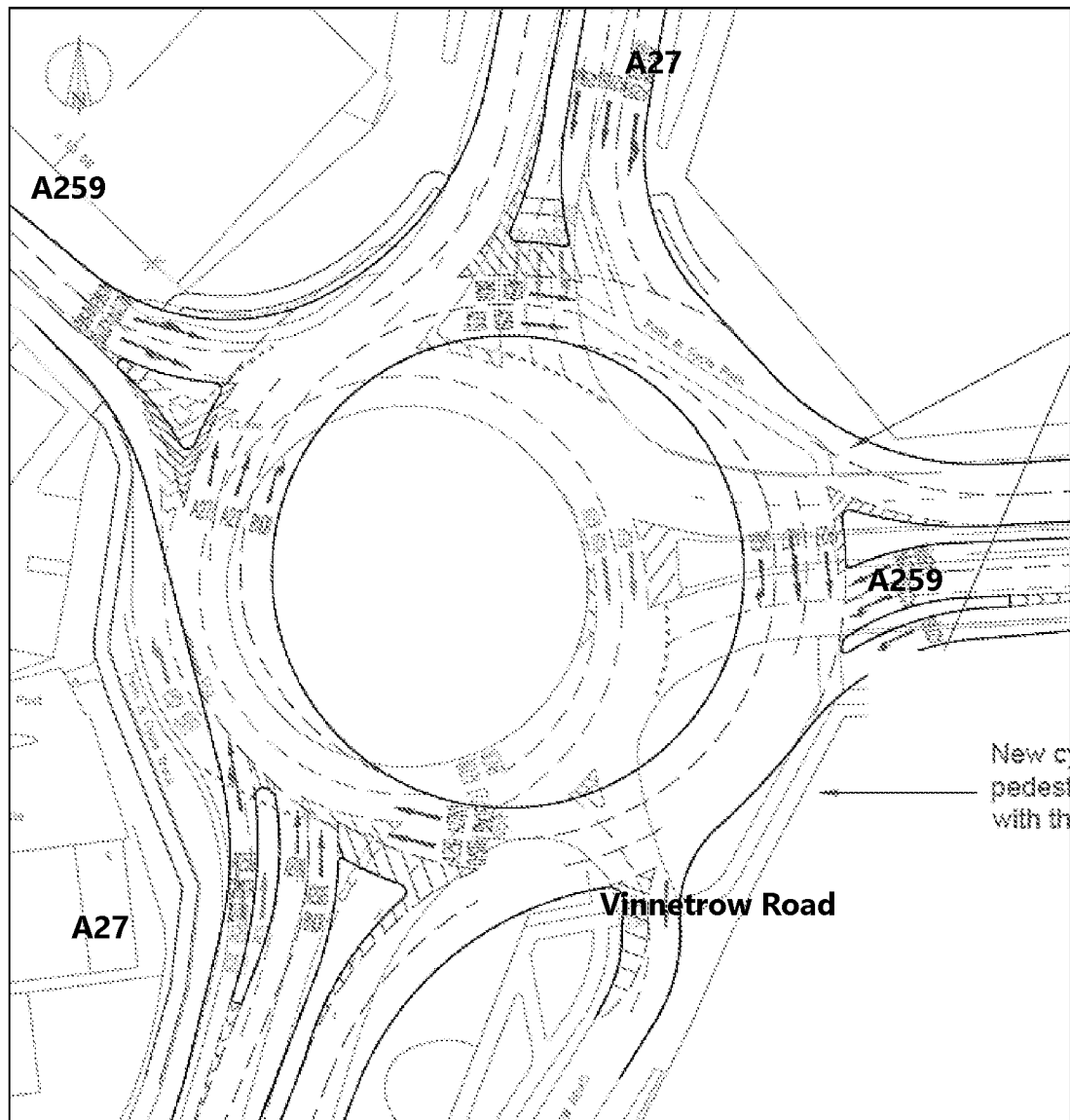
Figure 13.2 - A27 Whyke Hill junction mitigation scheme



Strategic Road Network - A27 Bognor Road Junction

- 13.9 The Chichester Local Plan contains alterations to the geometry of the Bognor Road Roundabout junction, which includes the modification of the Vinnetrov Road arm to an exit-only. A drawing of the proposed mitigation works is contained in **Appendix 42** and illustrated in **Figure 13.3** on **page 69** below. All existing northbound Vinnetrov Road traffic flows onto the A27 will be re-routed to the A259 Bognor Road southeast of the A27 junction.
- 13.10 As with previous assessments the 'No EMP' (lane widening) model for the A27/Bognor Road junction has been disregarded at this time as it does not match the geometry set out in the CAD plan supplied by HE.
- 13.11 The modelling provided here replicates that set out in Section 3.0 of ATA/03/A (dated March 2017). SATURN data from the Arun Transport Study was obtained from WSCC and is contained in **Appendix 44**. The impact arising on the wider highway network is identified for the following two 2031 Arun Transport Study scenarios for both 'with' and 'without' development traffic flows:
- i. Enterprise Bognor Regis + Local Plan with Mitigation.
 - ii. Enterprise Bognor Regis + Local Plan without Mitigation.
- 13.12 This information has been converted to flow diagrams for the five junctions identified in **paragraph 13.3**, which are contained in **Appendix 45**.

Figure 13.3 – Chichester Local Plan A27 Bognor Road junction proposals



13.13 The Local Plan reference to mitigation ('Local Plan with Mitigation' scenarios) are future schemes identified within the Arun Transport Study (Table 10) and included for within the 'with Mitigation' SATURN flows. The mitigation schemes are at the following junctions:

- i. A27/B2145 Whyke Roundabout – Chichester Free School mitigation measure.
- ii. A27/A259 Bognor Road Roundabout – Chichester District Council Local Plan mitigation measure.
- iii. A27/B2233 Nyton Road – Lengthening of acceleration/auxiliary lane for left turn from B2233 (NB).
- iv. A27/A29 Fontwell Western Roundabout – Fontwell application (WA/22/15) mitigation measure.
- v. A27/A29 Fontwell Eastern Roundabout – Widening and signalisation of A27 arms.

- vi. A27/A284 Ford Road, Arundel – Widening of A27 (EB).
- vii. A27/The Causeway (Arundel) – Road marking additions at A27 (EB and WB).
- viii. A27/A280 Patching Northern Roundabout – Widening of southern approach.
- ix. A29/A259 Rowan Way – Widening of EB, NB and SB arms.
- x. A29/A259 Felpham Relief Road – Widening of WB, NB and SB arms.
- xi. A259/B2132 Comet Corner – Safety improvements.
- xii. A259/B2233 Oystercatcher – Safety improvements (roundabout).
- xiii. A259/Church Lane (Climping) – Widening of WB arm.
- xiv. A259/B2187 Littlehampton West (Tesco) – Widening of A259 (EB).

13.14 It should be noted that the West of Burstard Link Road is included in the 'Local Plan with Mitigation' 2031 scenarios, as well as A29 realignment measures.

13.15 The 'with development' (i.e. Pagham South, Sefter Road and Hook Lane) modelling results for the Bognor Road junction are summarised in **Table 13.1** and **Table 13.2** below, for the Local Plan with and without mitigation scenarios respectively. The full modelling reports are contained in **Appendix 46**.

Table 13.1 – 2031 'with development' Enterprise Bognor Regis + Local Plan with Mitigation

Junction	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
A27 Bognor Road Junction	0.67	2	6	0.52	1	6

Table 13.2 – 2031 'with development' Enterprise Bognor Regis + Local Plan without Mitigation

Junction	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
A27 Bognor Road Junction	0.53	1	4	0.47	1	5

13.16 It can be seen from the above Tables that in the 2031 Local Plan scenarios the 'with development' cumulative modelling has shown that the A27 Bognor Road junction is shown to operate well within capacity in both 2031 scenarios.

13.17 To assess the 'without development' scenario, the cumulative trips associated with the Pagham South, Hook Lane and Sefter Road developments had to be manually removed from the SATURN data.

- 13.18 Trip distributions within the study area are based on those contained within the Transport Assessments submitted in support of each of the three development sites; Pagham South, Hook Lane and Sefter Road. As such, the cumulative traffic flow diagrams are contained in **Appendix 47** and demonstrate the level of trips to be removed from the 2031 'with development' flow diagrams contained in **Appendix 45**.
- 13.19 The resultant flow diagrams for the discounting of the cumulative vehicular trips from both the 2031 Local Plan scenarios (SATURN data) are contained in **Appendix 48** for reference. These are the 'without development' scenarios.
- 13.20 It should be noted that a small amount of rerouting of development trips had to occur around the A27 junctions to fit the SATURN flows; these are highlighted and explained on each of the flow diagrams as necessary.
- 13.21 The cumulative 'without development' modelling results for the A27 Bognor Road junction are summarised in **Table 13.3** and **Table 13.4** below, for the Local Plan with and without mitigation scenarios respectively. The modelling reports are contained in **Appendix 49**.

Table 13.3 – 2031 'without development' Enterprise Bognor Regis + Local Plan with Mitigation

Junction	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
A27 Bognor Road Junction	0.65	2	5	0.50	1	6

Table 13.4 – 2031 'without development' Enterprise Bognor Regis + Local Plan without Mitigation

Junction	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
A27 Bognor Road Junction	0.51	1	4	0.46	1	5

- 13.22 It can be seen from the above 'without development' summary results, in comparison to the 'with development' summary results in **Table 13.1** and **Table 13.2**, that the A27 Bognor Road junction is shown to operate well within capacity in all the scenarios tested and that the three developments in Pagham will have very little impact on queuing and delay.

Local Road Network

- 13.23 The SATURN data has been used to model the cumulative impact of the development sites in Pagham. The SATURN data is contained in **Appendix 44** and the flow diagrams are contained in **Appendix 45**.

- 13.24 The model for the B2145 roundabout junction with the B2166 has been updated to reflect on site measurements, which has led to subsequent changes to the PHI values.

Local Road Network - 2031 'With Development' Scenario Assessments

- 13.25 The 'with development' modelling results for all three junctions on the wider highway network are summarised in **Table 13.5** and **Table 13.6** below, for the Local Plan with and without mitigation scenarios respectively. The full modelling reports are contained in **Appendix 46**.

Table 13.5 – 2031 'with development' Enterprise Bognor Regis + Local Plan with Mitigation

Junction	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
PICADY						
B2166 j/w Lower Bognor Road and Pagham Road	1.18	40	326	1.02	15	150
ARCADY						
B2166 j/w Vinnetrow Road	0.75	3	9	0.90	8	26
B2166 j/w B2145	0.97	18	58	1.13	88	204

Table 13.6 – 2031 'with development' Enterprise Bognor Regis + Local Plan without Mitigation

Junction	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
PICADY						
B2166 j/w Lower Bognor Road and Pagham Road	1.19	43	341	1.43	86	800
ARCADY						
B2166 j/w Vinnetrow Road	0.79	4	12	0.91	9	29
B2166 j/w B2145	1.04	45	98	1.00	25	70

- 13.26 It can be seen from the above Tables that in the 2031 Local Plan scenarios the 'with development' cumulative modelling has shown the following:
- The Lower Bognor Road junction will be operating above theoretical design capacity in both scenarios, which is as expected given the previous modelling for this junction. However, it can be seen from the full report in **Appendix 46** as well as the flow diagrams in **Appendix 45** that the high RFC, queuing and delay values are associated with the additional flows on the Lower Bognor Road arm.

It has been discussed and agreed with the highway officer that there is no queuing on the main arm of this junction and that the drivers using the minor arm realistically have earlier opportunities to choose a different route.

Therefore, there is an expectation that some of the traffic on this arm in the future will choose a different part of the network to get to their destinations. Furthermore, queue and delay results must be viewed with caution when the RFC rises above 100% (a value of 1.0).

- ii. The Vinnetrow Road junction with the B2166 is shown to operate within theoretical capacity in both scenarios in the AM and PM peak hour for a future year of 2031. However, it is acknowledged that the junction reaches an RFC of around 90% in the PM peak hour.
- iii. The B2166 junction with the B2145 will operate over capacity in the future year of 2031 under both scenarios (RFC values of 1.04-1.13), with drivers experiencing up to around three minutes delay depending on the arm they are travelling on.

Local Road Network - 2031 'Without Development' Scenario Assessments

- 13.27 Trip distributions within the study area are based on those contained within the Transport Assessments submitted in support of each of the three development sites; Pagham South, Hook Lane and Sefter Road. The cumulative traffic flow diagrams are contained in **Appendix 47** and demonstrate the level of trips to be removed from the 2031 'with development' flow diagrams contained in **Appendix 45**.
- 13.28 The resultant flow diagrams for the discounting of the cumulative vehicular trips from both the 2031 Local Plan scenarios (SATURN data) are contained in **Appendix 48** for reference. These are the 'without development' scenarios.
- 13.29 The cumulative 'without development' modelling results for all three junctions on the wider highway network are summarised in **Table 13.7** and **Table 13.8** below, for the Local Plan with and without mitigation scenarios respectively. The modelling reports are contained in **Appendix 49**.

Table 13.7 – 2031 'without development' Enterprise Bognor Regis + Local Plan with Mitigation

Junction	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
PICADY						
B2166 j/w Lower Bognor Road and Pagham Road	1.03	18	153	0.87	5	58
ARCADY						
B2166 j/w Vinnetrow Road	0.62	2	6	0.80	4	13
B2166 j/w B2145	0.89	8	27	1.03	36	95

Table 13.8 – 2031 ‘without development’ Enterprise Bognor Regis + Local Plan without Mitigation

Junction	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
PICADY						
B2166 j/w Lower Bognor Road and Pagham Road	1.04	20	162	1.21	51	398
ARCADY						
B2166 j/w Vinnetrow Road	0.65	2	7	0.81	4	14
B2166 j/w B2145	0.93	12	40	0.90	9	28

13.30 It can be seen from the above ‘without development’ summary results, in comparison to the ‘with development’ summary results in **Table 13.5** and **Table 13.6**, that:

- i. The Lower Bognor Road is shown to be operating over capacity in 2031 in all scenarios tested apart from with mitigation in the PM peak hour. This is likely due to the mitigation schemes to the south east of this junction, such as the West Burstard bypass scheme.
- ii. The Vinnetrow Road junction with the B2166 is shown to operate close to theoretical capacity in all scenarios tested. There is around a 10% increase in RFC values between the scenarios for with and without cumulative Pagham developments.
- iii. The B2166 junction with the B2145 will operate at capacity in all scenarios tested. The increase in RFC values between with and without development testing is up to around 10%.

Local Highway Network - Summary

13.31 Arun District Council and HE would like the mitigation schemes agreed so that an appropriate level of contribution (i.e. cost per dwelling) can be provided by developments coming forward via an agreed mechanism.

13.32 From the junction assessments above it can be summarised that:

- i. The Lower Bognor Road junction operates above capacity in all scenarios tested. It is agreed that no physical mitigation measures can be provided at this junction within the highway boundary constraints that are feasible and appropriate. However, it is considered that if sustainable travel measures on the wider highway network, outside the scope of this study area, were to be carried out this would provide a benefit to the Lower Bognor Road junction by displacing traffic from the Lower Bognor Road arm; hence reducing the impact on this junction. This is set out further in **Section 14.0**.
- ii. The B2166 junction with Vinnetrow Road will require mitigation.
- iii. The B2166 junction with the B2145 will require mitigation.

Local Highway Network - Mitigation

13.33 The suggested mitigation measures that are being put forward in collaboration with the other developers are:

- i. B2166 junction with Vinnetrow Road – widening on the B2166 west arm.
- ii. B2145 junction with the B2166 – widening on all approach arms and adjustments to ensure DMRB compliant design.

13.34 The proposed mitigation works are set out on the layouts contained in **Appendix 50**, and shown for reference in **Figures 13.4** and **13.5** below for the B2166/Vinnetrow Road and B2145/B2166 junctions. These schemes have been provided in collaboration with Hook Lane and Sefter Road transport consultant (RPS and C&A respectively). The schemes have also been subject to Road Safety Stage 1 Audits, which are contained in **Appendix 50** with the designer's Response and also a Design Audit for each junction.

Figure 13.4 – Proposed mitigation at the B2166 junction with Vinnetrow Road

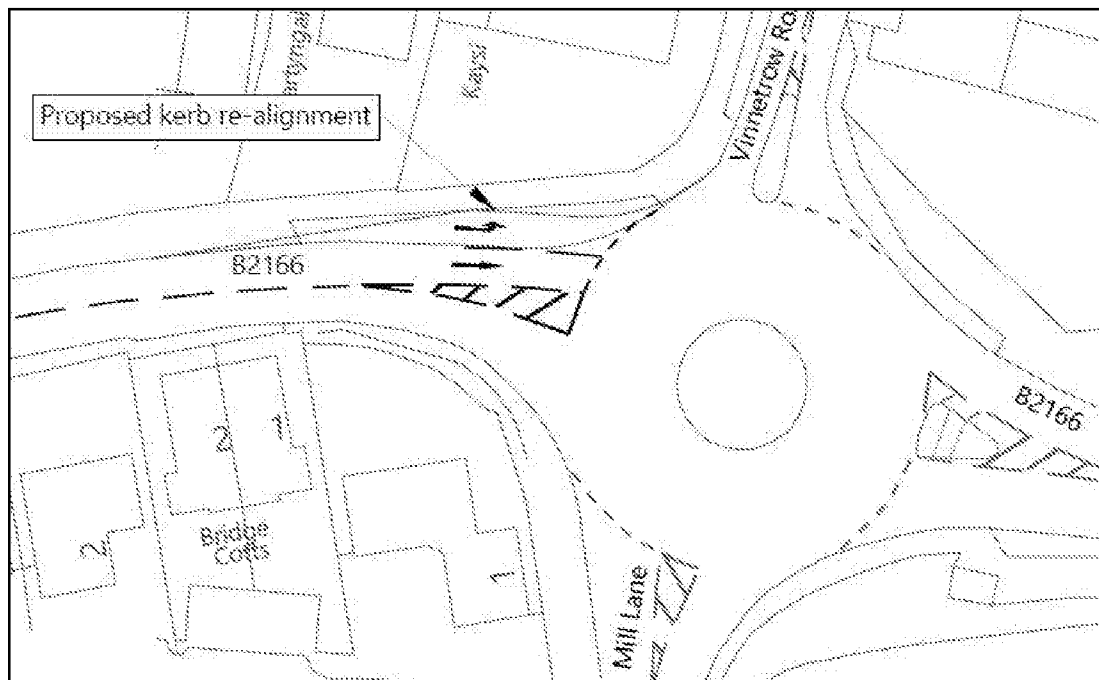
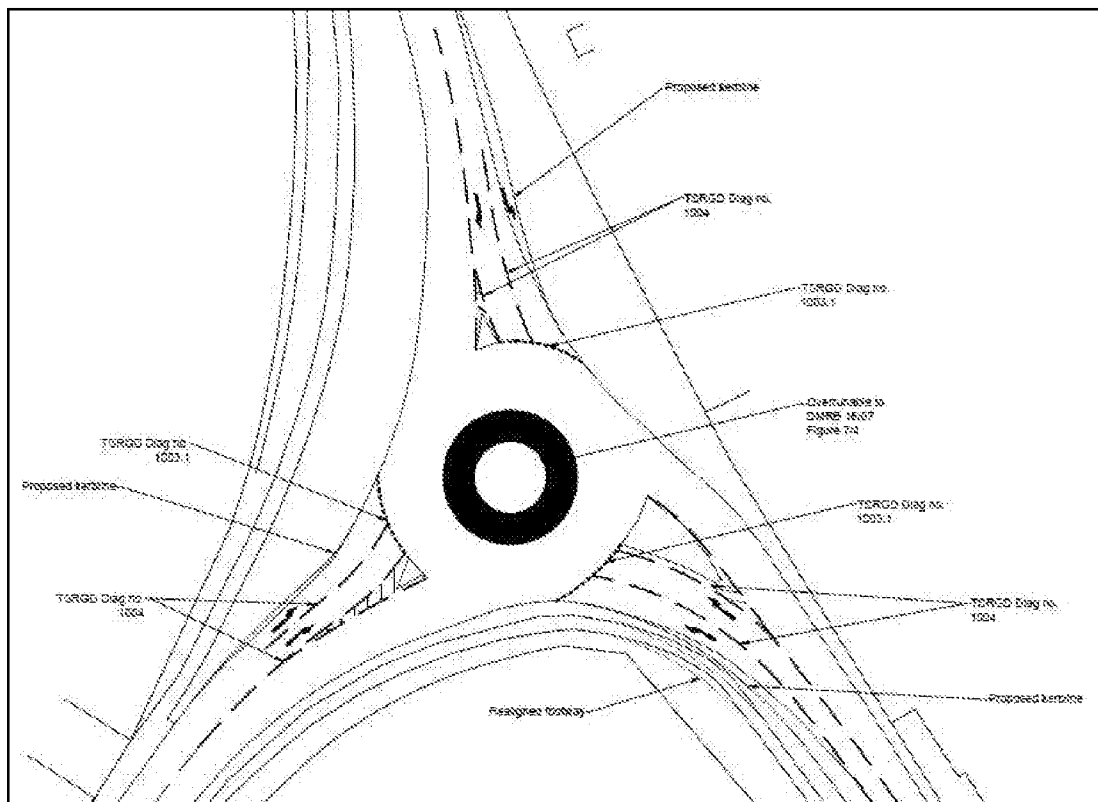


Figure 13.5 - Proposed mitigation at the B2166 junction with the B2145 (C&A plan ref: 12-018-045/B)



13.35 The proposed mitigation measures for the two B2166 junctions set out above have been modelled for the Local Plan 'with development' scenarios. The results are summarised in **Tables 13.9** and **13.10** and the modelling output files are contained in **Appendix 51**.

Table 13.9 – 2031 Vinnetrow Road junction with the B2166 with local widening

Scenario	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
LP Mitigation With Cumulative Developments	0.75	3	9	0.76	3	10
LP No mitigation With Cumulative Development	0.79	4	12	0.77	3	17

Table 13.10 – 2031 B2145 junction with the B2166 with local widening

Scenario	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
LP Mitigation With Cumulative Developments	0.93	12	38	1.08	63	145
LP No mitigation With Cumulative Development	0.98	17	60	0.96	15	44

- 13.36 It can be seen from **Table 13.9** that the proposed mitigation works to the kerb line on the western arm of the Vinnetrow Road roundabout provide an improvement to the operation of the roundabout in the PM peak hour under both scenarios tested, with a 14% reduction in RFC values.
- 13.37 It can be seen from **Table 13.10** that the proposed mitigation works to ensure the B2145 junction with the B2166 is DMRB compliant and to widen all the approach arms has improved the RFC, queue and delay values in both scenarios when compared to the results in **Table 13.5** and **Table 13.6**. It is considered that the increased stacking capacity on each approach lane with the proposed layout will mitigate for the forecast queue levels.
- 13.38 The Highway Infrastructure Costing spreadsheets are contained in **Appendix 52** for reference

Sensitivity Test – 280 Dwellings on Land North of Sefter Road

- 13.39 The application description for the Land North of Sefter Road was changed in June 2017 to propose up to 280 dwellings. This resulted from the potential to replace the proposed school on their site with 30 dwellings. The C&A highway network peak hour distribution diagrams for 280 dwellings are contained in **Appendix 38** for reference.
- 13.40 In order to ensure that the mitigation measures proposed assess the potential traffic impact of the site for up to 280 dwellings on Land North of Sefter Road as well as the 300 dwellings on Land North of Hook Lane and 400 dwellings from Pagham South, the trips associated with an additional 30 dwellings have been added to the 2031 wider highway network peak hour traffic flow diagrams (contained in **Appendix 53**).
- 13.41 The proposed mitigation scheme for the Vinnetrow Road junction with the B2166 has again been modelled in ARCADY (Junctions 9) for the 'with cumulative development' scenario to account for the additional 30 dwellings on the Land North of Sefter Road site. The results are summarised in **Table 13.11** and the modelling output file is contained in **Appendix 54**.

Table 13.11 – 2031 Vinnetrow Road junction with the B2166 with local widening sensitivity test (+30 dwellings)

Scenario	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
LP Mitigation With Cumulative Developments	0.75	3	10	0.77	4	10
LP No mitigation With Cumulative Development	0.79	4	12	0.78	4	17

13.42 It can be seen from **Table 13.11** that the proposed mitigation scheme for the Vinnetrow Road junction with the B2166 to provide lane widening on the B2166 western approach arm is shown to continue to operate satisfactorily with the addition of another 30 dwellings on Land North of Sefter Road.

13.43 The proposed mitigation scheme for the B2145 junction with the B2166 has also again been modelled in ARCADY (Junctions 9) for the 'with cumulative development' scenario to account for the additional 30 dwellings on the Land North of Sefter Road site. The results are summarised in **Table 13.12** and the modelling output file is contained in **Appendix 54**.

Table 13.12 – 2031 B2145 junction with the B2166 with local widening sensitivity test (+30 dwellings)

Scenario	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
LP Mitigation With Cumulative Developments	0.94	12	39	1.08	65	148
LP No mitigation With Cumulative Development	0.98	18	61	0.96	16	45

13.44 It can be seen from **Table 13.12** that the proposed mitigation scheme for the B2145 junction with the B2166 to provide lane widening on all approaches is shown to continue to operate satisfactorily with the addition of another 30 dwellings on Land North of Sefter Road.

Sensitivity Test – CATM Traffic Flows at B2166/Vinnetrow Road Junction

13.45 WSCC requested that the Vinnetrow Road junction with the B2166 be modelled for the CATM flows as a sensitivity test to assess the mitigation proposed. The 2031 CATM flows and highway network turning movement diagrams are contained in **Appendix 55** for reference. These are 'without development' flows.

13.46 The CATM flows do not include for the Mill Lane arm of this junction due to the strategic nature of the model. Therefore the Mill Lane arm arrivals and departures have been taken from the traffic surveys as set out on the SATURN traffic flow diagrams contained in **Appendix 45** and **Appendix 48**.

- 13.47 The CATM also includes for Vinnetrow Road to be stopped-up for northbound traffic to the A27, and therefore we have adjusted the Mill Lane flows to show all 'ahead' flows now turning left to B2166 westbound to travel to the A27 via the Whyke Hill junction. This is set out on the highway network traffic turning movement diagrams contained in **Appendix 55**.
- 13.48 The three Pagham South developments (tested with 280 dwellings on Land North of Sefter Road) have been added to the CATM turning movements for this junction. The B2166 'right turn' flows have been reassigned to 'ahead' to account for Vinnetrow Road being stopped-up to prevent northbound traffic accessing the A27. The base cumulative development flows were taken from the network diagrams contained in **Appendix 47**, with the additional traffic movements associated with the 30 dwellings on Land North of Sefter Road also taken into account (see network diagrams also contained in **Appendix 55**). The resultant highway network diagrams are also contained in **Appendix 55** and these have been used to provide the sensitivity test for the B2166 junction with Vinnetrow Road CATM flows models for 'with cumulative' and 'without cumulative' Pagham developments model.
- 13.49 The results are summarised in **Table 13.13** and the CATM modelling output files are also contained in **Appendix 55** for reference.

Table 13.13 – 2031 Vinnetrow Road junction with the B2166 with local widening sensitivity test (CATM Flows + 30 dwellings)

Scenario	AM Peak (0800-0900)			PM Peak (1700-1800)		
	RFC	Queue (Veh)	Delay (s)	RFC	Queue (Veh)	Delay (s)
CATM Flows Without Cumulative Developments	0.83	5	14	0.69	3	12
CATM Flows With Cumulative Developments	0.96	17	40	0.79	4	18

- 13.50 It can be seen from **Table 13.13** that the Vinnetrow Road junction with the B2166 is shown to continue to operate satisfactorily with the CATM flows for a 'without cumulative' and 'with cumulative' development scenario in a future year of 2031. The assessment includes for the additional 30 dwellings on Land North of Sefter Road (400 + 300 + 280 dwellings).
- 13.51 The highway officer at WSCC has agreed to the proposed mitigation measure (see email extract in **Appendix 55**).

Mitigation Summary – Wider Highway Network

- 13.50 The estimated cost of the mitigation works on the wider highway network are summarised below (see **Appendix 52** also):
- A27 Whyke Hill junction – c£342,000.
 - B2166 junction with Vinnetrow Road – c£23,000.
 - B2145 junction with the B2166 – c£68,000.

- 13.51 It is considered that the proposed mitigation measures are appropriate.
- 13.52 HE will require contributions apportioned from each of the developments being promoted in Pagham to offset cumulative impact based on number of dwellings; see **Section 14.0**.
- 13.53 WSCC will require the off-site junction mitigations schemes to be provided by the developers. This is discussed in more detail in **Section 14.0** also.
- 13.54 In addition to the above, contributions to sustainable transport measures on the wider highway network are sought from WSCC, as development traffic from the Pagham sites will displace existing traffic from the Lower Bognor Road junction to the wider highway network. A total contribution to WSCC of £373,000 is agreed; set out further in **Section 14.0**.

14.0 Section 106 Heads

- 14.1 This section of the report outlines the Section 106 contributions relating to the Pagham South development as well as the wider cumulative impacts.
- 14.2 The measures and contributions relate to offsetting traffic impact on the local and wider highway network including the strategic highway network, as well as improvements to, and facilitation for, pedestrian and cycle infrastructure and promotion of sustainable forms of travel.

Pagham South

- 14.3 The Section 106 obligations relating to the Pagham South site are being discussed with officers at WSCC and Arun District Council and it considered that the following is appropriate for inclusion:
- i. The safeguarding of land off-site within the land owners control to assist WSCC in their aspiration to create a cycle link to Chichester.
 - ii. Provision and implementation of the Residential Travel Plan and associated measures and monitoring.
 - iii. Contribution for surface improvements to Footpath 101. WSCC have confirmed that this has been costed at £65,000 - see **Table 14.1** below.
 - iv. Contributions to surface improvement works to upgrade existing Footpaths 100, 106 and 104 to bridleways to permit cycling, in order to create a cycle link to the Pagham Harbour Cycle Route to Chichester. WSCC have confirmed that this has been costed at £100,000 - see **Table 14.1** and **Paragraph 14.4 point (viii)** below, and contributions are to be shared with the three developments coming forward in Pagham (980 dwellings). The proportion of this contribution to be made by the Pagham South development is £40,816.33 (based on a per dwelling contribution of £102.04).

Cumulative Impact

- 14.4 In terms of the mitigation measures on the local and wider highway network arising from the cumulative impact, including the strategic highway network, these were set out in **Sections 12.0** and **13.0**, and can be summarised as:
- i. Nyetimber Lane signalised junction with Grosvenor Gardens and Gossamer Lane – Proposed alterations to signal timings. (See **Sections 9.0** and **12.0**).
 - ii. Rose Green Road priority junction with Grosvenor Gardens – As part of their standalone site transport assessment C&A have proposed an improvement scheme for this junction to include for an additional exit lane from Rose Green Road. This has been subject to a Road Safety Audit and supplied with vehicle tracking for a bus, and has been demonstrated to operate within capacity with all three Pagham developments (with traffic growth) for a future year of 2031. This scheme is acceptable to officers at WSCC. These works are estimated to cost £81,000. (See **Appendix 35** and **Appendix 37**).

- iii. Sefter Road junction with Pagham Road – C&A proposed minor kerb realignment works at this junction as part of their standalone site transport assessment and demonstrated that this would increase capacity through the junction.
RPS provided a sensitivity test that demonstrated with their site open, any approaching traffic on Sefter Road would divert through Hook Lane and the Hallam Land site; there being plenty of capacity at both the site access and at the Hook Lane junction with Pagham Road, thereby reducing any queues and delay at the Sefter Road site. Therefore no works at this junction are proposed as part of the cumulative assessments.
- iv. Lower Bognor Road priority junction with Pagham Road – It is not practical to carry out works at this junction due to the existing constraints of the highway network. Therefore it has been agreed with WSCC that a contribution will be made to sustainable transport measures on the wider highway network as development traffic from the Pagham sites will displace existing traffic from this junction to the wider highway network. A total contribution of £373,000 is agreed.
- v. B2166 roundabout junction with Vinnetrow Road – Proposed widening of the entry onto the roundabout from the western B2166 arm. This has been subject to a Road Safety Audit and has been demonstrated to operate within capacity with all three Pagham developments (with traffic growth) for a future year of 2031. This scheme is acceptable to officers at WSCC. These works are estimated to cost £23,000. (See **Appendix 50** and **Appendix 52**).
- vi. B2166 roundabout junction with B2145 – Proposed widening of the three approaches to this junction. This has been subject to a Road Safety Audit and supplied with tracking for a max legal length articulated vehicle, and has been demonstrated to operate satisfactorily with all three Pagham developments (with traffic growth) for a future year of 2031. This scheme is acceptable to officers at WSCC. These works are estimated to cost £68,000. (See **Appendix 50** and **Appendix 52**).
- vii. A27 Whyke Hill junction – As agreed with HE, based on their Chichester Free School Scheme, a package of mitigation measures has been proposed that has focused on retention of the pedestrian footbridge and the provision of an additional lane for both eastbound and westbound A27 traffic. An RSA is being carried out on the signal scheme. A total contribution of £342,000 is proposed. (See **Appendix 43**).
- viii. WSCC have requested that the three developments also contribute to the provision of a link to the Pagham Harbour to Chichester cycle route from Pagham, to upgrade the surfaces of Footpaths 100, 106 and 104 and convert to bridleways to permit cycling. WSCC have confirmed that this has been costed at £100,000.

Summary of Mitigation and Contributions

- 14.5 The total costs of the proposed contributions and mitigation measures can therefore be summarised as set out in **Table 14.1** and **Table 14.2** below (reproduced from the CSCA).

Table 14.1 – Cumulative Obligations - Contributions

Contribution Requirement	Value
Highways England - Contribution to improve the capacity at the A27 Whyke Hill junction, with the provision of an additional lane for A27 through-traffic in both directions.	£342,000
West Sussex County Council - Contribution to sustainable transport measures on the wider highway network.	£373,000
West Sussex County Council - Additional contribution to off-site sustainable travel for upgrading the surfaces of Footpaths 100, 106 and 104 to bridleways to permit cycling.	£100,000
Total	£815,000

- 14.6 The contributions are to be based on 980 dwellings, split between the three developers.
- 14.7 WSCC have requested that the three junction mitigation schemes proposed on their highway network are to be provided by the developers. Therefore the developers have agreed to take a junction each as part of their individual Section 106 contributions package (see **Table 14.2** following). However, as each junction has a different cost (see **Table 14.3**), in order to ensure that no developer is unfairly treated the contributions towards sustainable travel measures are to be adjusted.
- 14.8 The contributions to be paid to WSCC by each developer are therefore set out in the summary **Table 14.4** (see full breakdown in Table 7.3 of the CSCA). This is based on the costs of the respective junction works set out in **Table 14.3**, number of dwellings and the total requested contribution of £473,000 to WSCC.
- 14.9 The breakdown for the cumulative contributions to HE are set out for each development on **Table 14.5** below.

Table 14.2 – Individual Development Site Obligations

S106 Highway Mitigation	Works or Contribution
Pagham South	
B2166 junction with B2145 proposed widening works to all arms.	Works
Upgrading surface of Footpath 101 (contribution to WSCC).	£65,000
The provision of two site access junctions with Pagham Road, associated pedestrian refuge facilities either side of each access and associated dropped kerbs, 2m wide footways and a new pedestrian crossing over Pagham Road to the immediate north of the Village Hall access.	Works
Provision of a replacement bus stop with layby, shelter, raised kerbs and timetable information.	Works
Land North of Hook Lane	
B2166 junction with Vinnetrow Road widening of western entry arm.	Works
Upgrade of local bus stops on Pagham Road at Hook Lane junction to provide northbound bus stop with raised kerbs and bus timetable information and southbound bus stop with new layby, raised kerbs and timetable information. Upgrade of local bus stops on Hook Lane near Hook Lane Close and on Lodsworth Road to include raised kerbs.	Works
Provision of two new site accesses, one on Hook Lane and one on Pagham Road. Both accesses will include 2m wide footways and associated dropped kerbs.	Works
Land North of Sefter Road	
Rose Green Road priority junction improvement scheme.	Works
Provision of a single all-purpose access to Sefter Road incorporating 2m footways.	Works
Provision of a pedestrian, cycle and emergency access to Rose Green Road.	Works

Table 14.3 – Junction Mitigation Works Estimated Costs

Development Site	Junction & Proposed Mitigation Works	Estimated Junction Mitigation Costs
Land North of Sefter Road (280 dwellings)	Rose Green Road priority junction – Widening of minor arm entry to form two lanes.	£81,000.00
Land North of Hook Lane (300 dwellings)	B2166 junction with Vinnetrow Road - Widening of western entry arm.	£23,000.00
Pagham South (400 dwellings)	B2166 junction with B2145 - Widening works to all arms.	£68,000.00
Total		£172,000

Table 14.4 – Cumulative Contributions Readjustments

Development Site	Adjusted Total Contribution to WSCC per Development
Land North of Sefter Road (280 dwellings)	£103,285.86
Land North of Hook Lane (300 dwellings)	£174,449.06
Pagham South (400 dwellings)	£195,265.08
Totals	£473,000

Table 14.5 – Cumulative Contributions per Development to Highways England

Contribution Requirement	Value	Land North of Sefter Road	Land North of Hook Lane	Pagham South
Contribution to HE to improve the capacity at the A27 Whyke Hill junction, with the provision of an additional lane for A27 through-traffic in both directions.	£342,000	£97,714	£104,694	£139,592

14.10 It is proposed that the triggers for the off-site highway works and cumulative contributions will be on the competition of the 200th dwelling for that respective development.

14.11 It can therefore be summarised that the contributions to be made by the developers of the Pagham South development on land west of Pagham Road are:

- i. £139,592.00 to HE.
- ii. £260,265.08 to WSCC (*inclusive of the £65,000.00 contribution to upgrading the surface of Footpath 101 and the £40,816.33 contribution to the future cycle link to facilitate cycling between Pagham and Chichester*).

14.12 Therefore, with the above obligations in place it can be concluded that the proposed development at Pagham South will be appropriately mitigated, together with the proposed developments at Land North of Hook Lane and Land North of Sefter Road.

15.0 Summary and Conclusions

Summary

- 15.1 This Transport Assessment has been prepared to support the planning application for residential development and creation of a community hub on land at Pagham South. The planning application (ref: P/140/16/OUT) is submitted in outline with all matters reserved except for access.
- 15.2 The objective has been to provide a clear overall summary of the assessments, impact and mitigation, and includes the Common Statement of Cumulative Assessments that has been agreed by the transport consultants of the three main development sites in Pagham.
- 15.3 For the purposes of this Transport Assessment study the proposed development and access strategy at Pagham South is assumed to comprise:
- i. 400 residential dwellings.
 - ii. A care home with 70 beds.
 - iii. A Local Centre comprising up to 2,000sqm GFA, with food sales limited to a 500sqm GFA convenience store.
 - iv. A single form entry primary school (210 pupils).
 - v. Other community uses – one sports pitch and scout hut.
 - vi. An area for allotments with up to 20 plots.
 - vii. Access to the development from two new priority junctions with Pagham Road and associated pedestrian refuges.
 - viii. The safeguarding of land to help link the existing cycle route between Pagham Harbour and Chichester with Pagham Road via the site.
 - ix. An access strategy that is a Manual for Streets based development which includes a high level of permeability through the site for pedestrians and cyclists and good connections to the existing footway and PRow network as well as an internal layout that encourages walking and cycling.
 - x. An access strategy that also includes a local centre, primary school and other facilities as part the proposals to encourage walking and cycling trips from within the development and from the adjacent residential area.
- 15.4 This report is Revision A of the updated report TA/02 (dated July 2017) further to a cumulative team meeting with HE, WSCC and Arun District Council on 31st July 2017 and subsequently supersedes all previous reports; Transport Assessment Revision A (TA/01/A dated March 2017) that considered the application site and the development traffic impact arising from the development proposals at Pagham South; Addendum Transport Assessment 02 Revision A (ATA/02/A dated March 2017) that considered the cumulative impact of the promoted sites in Pagham on the local highway network; and Addendum Transport Assessment 03 Revision A (ATA/03/A dated March 2017) that considered the cumulative impact of the promoted sites in Pagham on the wider highway network to the north of Pagham, including the A27 which forms part of the strategic highway network. All of these previous reports were updated and consolidated into one report (TA/02) to provide ease of reference for ADC, WSCC and HE to review.

15.5 The purpose of this study is to:

- i. Confirm that the Pagham South development proposal is appropriate and can be accommodated in highway terms, and as such has been agreed with highway officers at WSCC.
- ii. That the cumulative developments in Pagham can be accommodated on the local highway network and that an appropriate package of mitigation measures has been proposed.
- iii. That the cumulative developments in Pagham can be accommodated on the wider highway network, including the A27, and that an appropriate package of mitigation measures has been proposed.
- iv. Set out the draft Section 106 Heads of Terms.

15.6 The key changes from TA/02 are as follows:

- i. Updated Common Statement of Cumulative Assessment (CSCA).
- ii. Provision of a sensitivity test for each of the three off-site junction mitigation schemes to account for up to 280 dwellings being provided on Land North of Sefter Road.
- iii. Provision of a sensitivity test for the B2166/Vinnetrow junction mitigation scheme with CATM flow data provided by WSCC.
- iv. Removal of detailed reference to the Church Barton site planning application.
- v. Updated mitigation and modelling for the B2145/B2166 junction.
- vi. Updated junction layout and modelling for the proposed A27 Whyke Hill signalised junction arrangement.
- vii. Inclusion of Road Safety Audits and associated documents for the proposed off-site mitigation schemes.
- viii. Updated list of Section 106 obligations.

15.7 Key changes for TA/02 from TA/01/A were as follows:

- i. Relocation of the uncontrolled pedestrian crossing to the north of the site to the immediate north of the Village Hall access and provision of associated footway.
- ii. Provision of a 2.0m wide pedestrian crossing refuge at the previously proposed traffic splitter island north of the northern access junction.
- iii. Provision of a revised model for the Nyetimber Lane signalised junction with Grosvenor Gardens and Gossamer Lane (C&A modelling parameters) demonstrating that a change in the signal cycle timings can create additional capacity.
- iv. Updated modelling for the Rose Green Road junction with Grosvenor Gardens (C&A modelling parameters).
- v. Updated modelling for the Hook Lane junction with Pagham Road.
- vi. Updated highway-related draft Section 106 contributions.

15.8 Key changes for TA/02 from ATA/02/A were as follows:

- i. To update the model for the Rose Green Road junction with Grosvenor Gardens (as above).
- ii. To update the model for the Nyetimber Lane signalised junction with Grosvenor Gardens and Gossamer Lane (as above).
- iii. The replacement of the proposed mini roundabout mitigation scheme at the Rose Green Road junction with Grosvenor Gardens for the widening improvement works to facilitate a second entry lane on the Rose Green Road arm.

15.9 Key changes for TA/02 from ATA/03/A were as follows:

- i. The provision of contributions for sustainable transport measures on the wider highway network to offset the cumulative impact of the Pagham development sites at the Lower Bognor Road junction with Pagham Road.
- ii. Updated model parameters for the B2145 junction with the B2146 and subsequent mitigation package.
- iii. The use of HE MAX SE and SE data for the modelling of the A27 Whyke Hill junction.
- iv. A revised package of mitigation works for the A27 Whyke Hill junction layout based on the Chichester Free Schools signalised junction design, with the introduction of a third lane for A27 traffic in both directions and alterations to the stacking capacity for turning movements.

Conclusions – Pagham South Development

- 15.10 The proposed site access junctions can be provided with sufficient junction visibility and capacity, and are suitable for all users.
- 15.11 The masterplan demonstrates that the new development is permeable for pedestrians and cyclists, and has good connectivity to the surrounding transport network.
- 15.12 The impact of the Pagham South development on the local highway network is not significant, and is able to be accommodated.
- 15.13 It is considered that the Residential Travel Plan and travel plan measures and monitoring proposed to support the Pagham South development are suitable, and will help to improve sustainability of the site by encouraging new and existing residents to walk, cycle and reduce car miles travelled.
- 15.14 As part of the development proposals, the safeguarding of land off-site within the land owners control will be carried out to assist WSCC in their aspiration to create a cycle link to Chichester. A contribution will also be made to WSCC for the future cycle link of £40,816.33 as set out in **Paragraphs 14.3 point (iv) and 14.11 point (ii)**.
- 15.15 A contribution of £65,000.00 has been requested by WSCC for upgrading the surface of Footpath 101.
- 15.16 This study confirms that no further mitigation measures are required on the local and wider highway network as a result of the Pagham South development.

Conclusions – Cumulative Development

15.17 From this report it is clear what the cumulative impacts are, and the summary of joint mitigation measures and contributions to be shared between the development sites in Pagham is as follows:

- i. Nyetimber Lane signalised junction with Grosvenor Gardens and Gossamer Lane – Proposed alterations to signal timings. (See **Sections 9.0** and **12.0**).
- ii. Rose Green Road priority junction with Grosvenor Gardens – As part of their standalone site transport assessment C&A have proposed an improvement scheme for this junction to include for an additional exit lane from Rose Green Road. This has been subject to a Road Safety Audit and supplied with vehicle tracking for a bus, and has been demonstrated to operate within capacity with all three Pagham developments (with traffic growth) for a future year of 2031. This scheme is acceptable to officers at WSCC. These works are estimated to cost £81,000 and will be provided by the Land North of Sefter Road developers. (See **Appendix 35** and **Appendix 37**).
- iii. Sefter Road junction with Pagham Road – C&A proposed minor kerb realignment works at this junction as part of their standalone site transport assessment and demonstrated that this would increase capacity through the junction.
RPS provided a sensitivity test that demonstrated with their site open, any approaching traffic on Sefter Road would divert though Hook Lane and the Hallam Land site; there being plenty of capacity at both the site access and at the Hook Lane junction with Pagham Road, thereby reducing any queues and delay at the Sefter Road site. Therefore no works at this junction are proposed as part of the cumulative assessments.
- iv. Lower Bognor Road priority junction with Pagham Road – It is not practical to carry out works at this junction due to the existing constraints of the highway network. Therefore it has been agreed with WSCC that a contribution will be made to sustainable transport measures on the wider highway network as development traffic from the Pagham sites will displace existing traffic from this junction to the wider highway network. A total cumulative contribution of £373,000 is agreed.
- v. B2166 roundabout junction with Vinnetrow Road – Proposed widening of the entry onto the roundabout from the western B2166 arm. This has been subject to a Road Safety Audit and has been demonstrated to operate within capacity with all three Pagham developments (with traffic growth) for a future year of 2031. This scheme is acceptable to officers at WSCC. These works are estimated to cost £23,000 and will be provided by the Land North of Hook Lane developers. (See **Appendix 50** and **Appendix 52**).

- vi. B2166 roundabout junction with B2145 – Proposed widening of the three approaches to this junction. This has been subject to a Road Safety Audit and supplied with tracking for a max legal length articulated vehicle, and has been demonstrated to operate satisfactorily with all three Pagham developments (with traffic growth) for a future year of 2031. This scheme is acceptable to officers at WSCC. These works are estimated to cost £68,000 and will be provided by the Pagham South developers as part of their Section 106 obligations. (See **Appendix 50** and **Appendix 52**).
 - vii. A27 Whyke Hill junction – As agreed with HE, based on their Chichester Free School Scheme, a package of mitigation measures has been proposed that has focused on retention of the pedestrian footbridge and the provision of an additional lane for both eastbound and westbound A27 traffic. An RSA is being carried out on the signal scheme. A total contribution of £342,000 is proposed. (See **Appendix 43**).
 - viii. WSCC have requested that the three developments also contribute to the provision of a link to the Pagham Harbour to Chichester cycle route from Pagham, to upgrade the surfaces of Footpaths 100, 106 and 104 and convert to bridleways to permit cycling. WSCC have confirmed that this has been costed at £100,000.
- 15.18 It has been proposed that the contribution values to HE and WSCC will be based on 980 dwellings, split between the three developers.
- 15.19 This assessment confirms that all emerging and future sites in Pagham have been included for within the assessments (circa 1,200 dwellings).
- 15.20 It is also proposed that the triggers for the off-site highway works and cumulative contributions will be on the competition of the 200th dwelling for that respective development.
- 15.21 It can be summarised that the contributions to be made by the developers of the Pagham South development on land west of Pagham Road are:
- iii. £139,592.00 to HE.
 - iv. £260,265.08 to WSCC (*inclusive of the £65,000.00 contribution to upgrading the surface of Footpath 101 and the £40,816.33 contribution to the future cycle link to facilitate cycling between Pagham and Chichester*).
- 15.22 Therefore it can be concluded that with the proposed obligations in place the development at Pagham South will be appropriately mitigated, together with the proposed developments at Land North of Hook Lane and Land North of Seftor Road.
- 15.23 Finally, this Transport Assessment concludes that in transport terms the proposed development at Pagham South should be granted planning permission.