Transport Assessment of the South Downs Local Plan

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Glossary

AAP	Area Action Plan
EIP	Examination in Public
ESCC	East Sussex County Council
HCC	Hampshire County Council
HE	Highways England
HS	Hampshire Services
JCS	Joint Core Strategy
LHA	Local Highway Authority
NDP	Neighbourhood Development Plan
NPPF	National Planning Policy Framework
NTS	National Travel Survey
PIA	Personal Injury Accidents
PNP	Petersfield Neighbourhood Plan
RC	Reference Case
RFC	Ratio of Flow to Capacity
RTP	Residential Travel Plan
SCW	Shoreham Cement Works
SDNP	South Downs National Park
SDNPA	South Downs National Park Authority
SHLAA	Strategic Housing Land Availability Assessment
SRN	Strategic Road Network
TA	Transport Assessment
TEMPro	Trip End Model Presentation Program
TRADS	Traffic Flow Data System
TRICS	Trip Rate Information Computer System
TS	Transport Statement
vph	Vehicles per hour
WSCC	West Sussex County Council
WSCTM	West Sussex County Transport Model

1 Executive Summary

Hampshire Services (HS) was commissioned by South Downs National Park Authority (SDNPA) to undertake a Transport Assessment (TA) as part of the emerging South Downs Local Plan Evidence Base. The purpose of this was to assess the traffic impact that proposed levels of Local Plan development could have on settlements within the South Downs National Park (SDNP) boundary. Hampshire County Council (HCC) and West Sussex County Council (WSCC) as the Local Highway Authorities (LHA) for the roads within the area of the SDNP, where the majority of development is focused, have been involved in development of a robust methodology for quantifying and assessing the traffic related impacts of development on junctions. East Sussex County Council (ESCC) were content that work already undertaken as part of the Lewes Joint Core Strategy was sufficient and therefore no further TA work was undertaken in this area of the SDNP. Brighton and Hove City Council, were also contacted as part of the duty to co-operate, but no response was provided.

The main objectives of this TA are to:

- Collate information to identify the baseline position with regards to traffic levels;
- Estimate the quantum and distribution of vehicular trips resulting from background growth and the additional development in the future;
- Assess traffic impacts and junction performance in the defined highway network and identify key junctions requiring mitigations;
- Propose mitigation measures and ,where possible, advise on their effectiveness;
- Report findings on the main traffic impacts on the highway network and how these can be managed with the identified mitigation measures.

The SDNPA is the local planning authority for the SDNP. There are two statutory purposes for national parks as specified in the Environment Act 1995:

1. To conserve and enhance the natural beauty, wildlife and cultural heritage of the area;
2. To promote opportunities for the understanding and enjoyment of the special qualities of the national park by the public

The SDNPA also has a duty when carrying out the purposes to:

- Seek to foster the economic and social well-being of the local communities within the National Park.
- In addition, Section 62 of the Environment Act 1995 also requires all relevant authorities, including statutory undertakers and other public bodies, to have regard to these purposes. Where there is an irreconcilable conflict between the statutory purposes, statute requires the Sandford Principle to be applied and the first purpose of the National Park will be given priority.

Paragraph 115 in the National Planning Policy Framework (NPPF) reaffirms this, setting out that:

"…great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to landscape and scenic beauty. The conservation of wildlife and cultural heritage are important considerations in all these areas, and should be given great weight in National Parks and the Broads."

The potential for mitigation measures has been assessed in this TA with due regard to the National Park purposes and duty.

For the purpose of this TA, only settlements where development of over 80 residential units have been proposed as part of either the relevant Strategic Housing Land Availability Assessment (SHLAA) or Neighbourhood Plan (NP) have been tested. The following settlements have therefore been assessed;

- Liss (Hampshire);
- Petersfield (Hampshire);
- Midhurst (West Sussex);
- Fernhurst (West Sussex); and
- Petworth (West Sussex).

In addition to testing the impacts of residential developments, employment allocations proposed in Petersfield and Petworth have also been considered.

Two development scenarios have been tested. Table 1.1 summarises the development scenarios.

Table 1.1 Development Scenarios

Settlement / Strategic Site	***Residential*** *Scenario 1*	*Scenario 2*	***Employment[1] (sqm)***
Liss	150	220	N/A
Petersfield	805	805	9,160
Midhurst	150	240	N/A
Former Syngenta Site, Fernhurst	200	200	N/A
Petworth	150	240	4,275
Total	1455	1705	13,435

A spreadsheet model for each settlement was developed to quantify the traffic impacts of the development scenarios on the local highway network. The development scenarios considered the network AM and PM peaks for;

[1] Useable Land

- Base year 2016;
- Reference case (RC) 2032
- Scenario 1: 2032 RC + Local Plan Preferred Options; and
- Scenario 2: 2032 RC + Medium Housing Target plus 60%.

The TA applied a robust methodology, which was developed in conjunction with and approved by the LHAs, to assess the transport impacts of the allocation proposals on the local highway network based on the following principles;

- vehicle trip rates;
- no reassignment of traffic onto either sustainable modes of transport or alternate routes i.e. no dynamic routing; and
- the application of a fixed demand response i.e. did not consider the potential for peak spreading to occur.

Highways England (HE) was also consulted on the likely impacts of development on the Strategic Road Network (SRN), namely the A3.

Where the development scenarios resulted in a 10% increase in traffic per junction arm above the RC, the junction was progressed for capacity modelling. The impacts of the development scenarios in comparison to the RC were then assessed in terms of their impact on delay and to a lesser extent the ratio of flow to capacity (RFC).

A key aspect of the TA was quantifying the level at which the impacts of development over and above the RC could be classified as severe. To this end the following modelling outputs were defined.

Table 1.2 Parameters for Defining Impact of Development

	Acceptable	Over capacity	Severe
Delay (seconds)	<120	> 120 – 180	> 180
RFC (%)	<0.85	> 0.85 – 1.0	> 1.0

A summary of the modelling results is provided in Table 1.3.

Table 1.3 Summary of Junction Assessments

Settlement	Junction	2016		2032 RC		2032RC +S1		2032RC +S2	
		AM	PM	AM	PM	AM	PM	AM	PM
Petersfield	A3 / Winchester Road / Bedford Road / Winchester Road	<10% impact on 2032 RC							
	Bell Hill / Residential Road / Station Road / Winchester Road	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Dragon Street / Sussex Road / The Causeway / Hylton Road	Acceptable	Acceptable	Over capacity	Over capacity	Severe	Severe	Severe	Severe
	London Road / Pulens Lane / Inmans Lane	<10% impact on 2032 RC							
Midhurst	Rumbolds Hill / West Street / Bepton Road / Petersfield Road	Acceptable	Acceptable	Over capacity	Over capacity	Severe	Severe	Severe	Severe
Fernhurst	Easebourne Lane / Cowdray Park Access / North Street / Dodsley Lane	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Petworth	Pound Street / Station Road / Tillington Road	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Borderline	Borderline	Severe
	East Street / Angel Street / Middle Street / New Road	Over capacity	Over capacity	Over capacity	Over capacity	Severe	Severe	Severe	Severe
	Horsham Road / New Street / London Road	Acceptable	Acceptable	Acceptable	Acceptable	Severe	Acceptable	Severe	Acceptable

The scope for physical mitigation is extremely limited at the junctions where the impact is assessed as “over capacity” or “severe”.

The findings from the traffic impact assessment have highlighted the significant role that background traffic growth, as forecasted by TEMPro software, will have on the operation of the highway network in the future year (2032). In some cases, for example Petersfield, Midhurst and Petworth, the level of background traffic growth predicted is such that it pushes junction performance "over capacity" before any development traffic is taken into account. Consequently, when the Local Plan development traffic is added, junction performance deteriorates into the "severe" category, even though the level of traffic generated by the Local Plan proposals is much less than that forecast by TEMPro.

Where physical infrastructure improvement measures were not available to mitigate the 'severe' impact of the development traffic in Midhurst and Petworth, a further sensitivity test was undertaken to assess the effect of traffic management measures to reassign longer distance trips away from the 'severely' affected junctions. The level of reassignment was informed by the West Sussex County Transport Model, and a low (10%) and medium (20%) scenario were assessed. Although the reassignment of traffic did not completely alleviate delays at the junctions, the sensitivity testing did, in all instances, reduce the level of delay to beneath the level of delay estimated in the 2032 RC, and subsequently was deemed to be 'acceptable' by West Sussex County Council, particularly when the medium level of reassignment was applied. It is therefore concluded that developments coming forward in the vicinity of Midhurst and Petworth, should be asked to contribute towards the implementation of traffic management measures.

The recommendations from the outcomes of this study are that further work is jointly undertaken with the respective highway authority to, where applicable, refine the proposed junction arrangements and potentially consider further traffic management / behavioural change measures. Provision should be made to ensure that contributions continue to be taken from developments forthcoming in the vicinity of development sites to fund the evolving mitigation measures required.

2 Introduction

Overview

The South Downs National Park Authority (SDNPA) is preparing its Local Plan, which will shape growth and new development within the National Park up to 2032. Hampshire Services (HS) have been commissioned to undertake a Transport Assessment (TA) of the housing, employment and strategic site allocations, in order to determine the traffic impacts that the proposed development scenarios would have on the surrounding highway network.

This TA is a strategic level exercise to identify the cumulative transport impact assessment of delivering the SDNPA housing and employment targets. The TA has been prepared to be a robust assessment of the possible transport impacts of the allocation proposals. It has therefore;

- Used vehicle trip rates (as opposed to person trip rates) to produce a robust assessment of traffic generation terms;
- Not included the reassignment of traffic i.e. to sustainable modes of transport due to the lack of public transport opportunities within the SDNP which would be difficult to evidence at Examination in Public (EIP); and;
- Applied a fixed demand response i.e. taking no account of the potential, or lack thereof, for peak spreading of traffic to occur.

Background and Scope

This TA is aimed at identifying the potential strategic traffic impacts from development allocations and exploring potential mitigation measures to alleviate severe impacts where necessary. It considers a base year of 2016 and a forecast year of 2032, covering both the AM and PM peak hours.

The developments assessed in this TA are focussed solely on settlements where 80 units or more are proposed consisting of;

- Liss – Hampshire;
- Petersfield – Hampshire;
- Midhurst - West Sussex;
- The former Syngenta site near Fernhurst - West Sussex; and
- Petworth – West Sussex

Shoreham Cement Works (SCW) is identified as a strategic site within the emerging Local Plan, but is not located within close proximity to the other strategic sites or settlements identified within this TA. A separate Area Action Plan (AAP) will be prepared for Shoreham Cement Works. This will set out the parameters for development. A separate TA will be produced to evaluate the potential traffic impacts arising from the proposed large mixed use development at this site. This TA will form part of the evidence base for the AAP.

The emerging Local Plan also identifies a strategic site in Lewes - North Street Quarter and the adjacent Eastgate area, within East Sussex. A TA of this site was undertaken as part of the Lewes Joint Core Strategy. This site, along with further residential development at Old Malling Farm was also considered as part of the Lewes Town Transport Study (2011) which considered a broader level of development within the town, assessing the transport impacts of a maximum of 870 dwellings, and 10,000sqm² of B1a. East Sussex County Council (ESCC) has confirmed that, given the levels of development proposed within their jurisdiction, they are content that their transport evidence base adequately takes account of this. Consequently, no further assessment work of the strategic site in Lewes has been considered. Brighton and Hove City Council, were also contacted as part of the duty to co-operate.

As the SDNP is an important tourist destination, an assessment of the seasonal traffic impacts is also provided.

Objectives

The main objectives of this TA are to:

- Collate information to identify the baseline position with regards to traffic levels;
- Estimate the quantum and distribution of vehicular trips resulting from background growth and the additional development in the future;
- Assess traffic impacts and junction performance in the defined highway network and identify key junctions requiring mitigation;
- Propose mitigation measures and advise where possible on their effectiveness;
- Report findings on the main traffic impacts on the highway network and how these can be managed with the identified mitigation measures.

Report Structure

The TA is structured as follows;

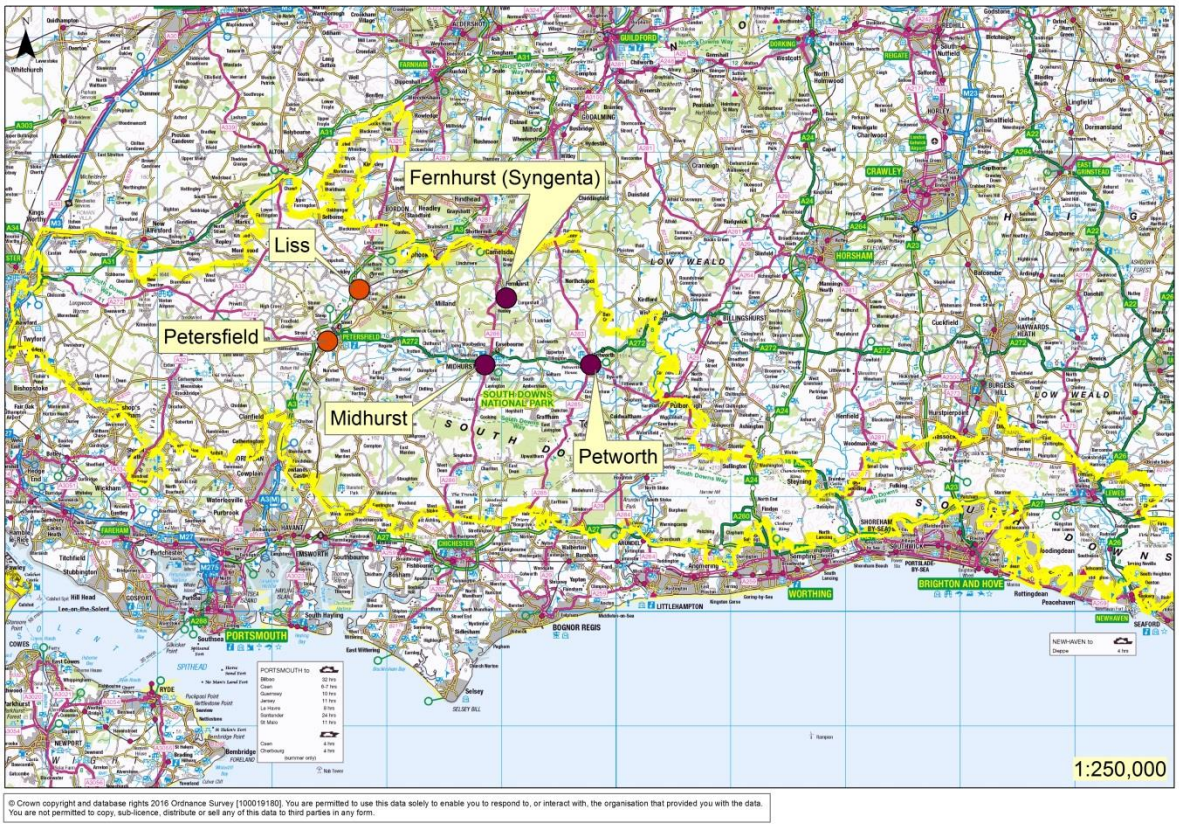
- Chapter 3: an overview of the study area and proposed level of development;
- Chapter 4: outlines the methodology and assumptions;
- Chapters 5 and 6: provides the transport assessment for Liss and Petersfield within Hampshire;
- Chapter 7: provide an assessment of the transport impact on the strategic road network;
- Chapters 8 to 10: provides the transport assessment for Midhurst, Fernhurst and Petworth within West Sussex;
- Chapter 11: provides analysis of the impact of removing long distance trips from network within Midhurst and Petworth;
- Chapter 12: comments on the effects of seasonality on traffic levels within the SDNP; and
- Chapter 13: summarises and concludes the study.

3 Local Context

Study Area

The TA considers the impact of developments in settlements and strategic sites in the Hampshire and West Sussex parts of the National Park where requirements to allocate 80 dwellings or more are identified. The assessment focuses on the settlements of; Petersfield, Liss, Midhurst, Petworth and the strategic site known as 'Syngenta', near Fernhurst. The aforementioned settlements are located within a c.12.5km radius along the A272 (see Figure 3.1).

Figure 3.1 Study Area



Policy Context

National Policy

Paragraphs 150 to 154 of the National Planning Policy Framework (NPPF) sets out that Local Plans are key to delivering sustainable development[2] that reflects the vision and aspirations of local communities. NPPF states that Local Plans must be prepared with the objective of contributing to the achievement of sustainable development and that local planning authorities should seek opportunities to achieve each of the dimensions of sustainable development, aiming to achieve net gains across all three aspects.

[2] Sustainable development in terms of social, economic and environmental factors.

Any significant adverse impacts should be avoided and, wherever possible options to reduce or eliminate such impacts should be pursued. Where adverse impacts are unavoidable, measures to mitigate the impact should be considered, and where adequate mitigation can not be achieved, compensatory measures may be required. Crucially, NPPF states that Local Plans should be aspirational but realistic.

In specific reference to Transport, paragraph 32 provides the guidance that development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe, after mitigation has been employed. Paragraph 34 also states that plans should ensure developments that generate significant movements are located where the need to travel will be minimised and the use of sustainable transport maximised. It does, importantly for the SDNPA, note for the context of this TA, that in rural areas that other policies in the Framework would need to be considered.

South Downs National Park Policy

The Government has provided two statutory purposes for National Parks in England, which are;

- Purpose 1: To conserve and enhance the natural beauty, wildlife and cultural heritage of the area.
- Purpose 2: To promote opportunities for the understanding public bodies and utility companies, when undertaking any activity which may have an impact on the designated area, have a duty to have regard to these purposes.

The Government has also placed a social and economic duty upon National Park Authorities, that should be considered when delivering the two purposes which is;

- To seek to foster the social and economic wellbeing of the local communities within the National Park in pursuit of our purposes.

The Purposes and the Duty as described above are the guiding principles at the forefront of any decisions made by the SDNPA.

There are various policy documents covering the SDNP including, of relevance to this study, including;

- Partnership Management Plan 2014-2019 (2013);
- Transport Study Phase 1 (March 2013).
- Local Plan Options Consultation Document (Feb 2014);
- Strategic Housing Land Availability Assessment (April 2014);
- Preferred Options Local Plan (Sept 2015)
- Infrastructure Delivery Plan;
- Settlement Facilities Assessment (2015);
- Community Infrastructure Levy Draft Charging Schedule (Sept 2015); and
- Employment Land Review (September 2015).

Local Policy

In April 2014 the East Hampshire and South Downs National Park Authority Joint Core Strategy (JCS) was approved, which establishes the level of housing and employment development for the settlements of Liss and Petersfield. The numbers proposed in the JCS are therefore effectively fixed.

The Chichester Local Plan was formally approved in July 2015. This document did not however cover the area within the SDNPA boundary, but did estimate a potential future development rate of 70 dwellings per annum in the Chichester part of the National Park, on the basis of past trends.

Residential Development Sites

The level of development to be tested was provided by the SDNPA. Table 3.1 sets out the number of residential dwellings for each settlement in the "Preferred Option" (herein referred to as Scenario 1) and the "Medium Housing Target plus 60%" (herein referred to as Scenario 2) scenarios.

Table 3.1 Residential Development Numbers per Settlement

Settlement / Strategic Site	*Scenario 1*	*Scenario 2*
Liss	*150*	*220*
Petersfield	*805*	*805*
Midhurst	*150*	*240*
Former Syngenta Site, Fernhurst	*200*	*200*
Petworth	*150*	*240*
Total	*1455*	*1705*

Plans showing sites and broad locations reflecting the sites within each settlement published in the Preferred Options draft of the South Downs Local Plan or neighbourhood plans are included within the relevant chapters of the TA. The assessment in this TA has been prepared on the basis that this pattern of development within each settlement will continue to be pursued. The final housing numbers at each broad location or site, are however subject to change and further development sites may come forward.

Employment Development Sites

The SDNPA determined the level of employment development to be tested (see Table 3.2).

Table 3.2 Employment Development per Settlement

Settlement / Strategic Site	*Land Use*	*Total Land Area (sqm)*	*Useable Land Area (sqm)*
Buckmore Farm. Petersfield	*B1c / B2 / B8*	*12,000*	*5,160*
The Domes, Petersfield	*B1a*	*7,000*	*3,500*
Frenchmans Road, Petersfield	*B1a*	*1,000*	*500*
Petworth	*B1c / B2 / B8*	*9,500*	*4,275*
Total		*29,500*	*13,435*

Plans showing the location of development sites within each settlement are included in the relevant chapters of the TA. This TA assesses these locations and the sites are subject to possible change.

4 Transport Assessment Methodology

Introduction

The purpose of this strategic TA is to test the potential impact of the proposed level of residential and employment development on the local and strategic highway network. This has been undertaken through the use of a bespoke set of spreadsheet models, an approach which has been agreed with both affected Highway Authorities (HCC and WSCC). The assessment identifies specific junctions where capacity / operational problems may occur and recommends an appropriate mitigation package within the SDNP policy parameters[3].

This chapter outlines the assumptions and the methodology applied to create the TA, as agreed with the SDNPA and the Local Highway Authorities through a series of technical notes.

Forecasting Years and Development Scenarios

The TA considers a base year of 2016 and a future year of 2032, testing 3 development scenarios;

- 2032 Reference Case (RC);
- Scenario 1: 2032 RC + Local Plan Preferred Options; and
- Scenario 2: 2032 RC + Medium Housing Target plus 60%.

The 2032 RC demonstrates the anticipated traffic impact from growth in car use as a result of background growth and committed developments in the SDNP / adjoining districts (where relevant) without the addition of any Local Plan development.

For each of the development scenarios the typical peak network hours of 08:00-09:00 and 17:00-18:00 for the AM and PM respectively were assessed.

As part of the duty to co-operate, consultation was undertaken with the relevant Local Highway Authorities, Planning Authorities and Highways England. The principal purpose of this was to identify any committed, planned, or proposed highway improvements or developments over the Local Plan period, which may need to be considered in the future year scenarios. The consultation did not reveal any highway improvements that would affect the study area road network. Where the consultation revealed that future housing allocations in surrounding planning authorities may have an impact on the junctions within the study area, these are discussed within the relevant chapters. A summary of the consultation responses is provided in Appendix A.

Trip Rates

The Trip Rate Information Computer System (TRICS) version 7.2.4 has been used to derive the projected trip generation for the proposed land uses. The TRICS database is the industry standard tool for predicting the likely number of trips arising from a new development by

[3] SDNP 'Roads in the South Downs' (2015)

comparing the proposed site with existing developments of a similar size, location and characteristic within the UK.

A summary of the trip rates used for each proposed land use is presented in Table 4.1 and the full TRICS output reports are included as Appendix B. The trip rates have been agreed with the Local Highway Authorities.

Table 4.1 Local Plan Trip Rates

Land Use	*Unit*	*AM Arrivals*	*AM Departures*	*AM Total*	*PM Arrivals*	*PM Departures*	*PM Total*
C3 Housing (Privately Owned)	*Per dwelling*	0.177	0.424	0.601	0.406	0.212	0.618
C3 Affordable Housing	*Per dwelling*	0.116	0.252	0.368	0.254	0.164	0.418
B1a Offices	*Per 100sqm GFA*	1.752	0.257	2.009	0.248	1.526	1.774
B1c / B2 Manufacturing / Light Industrial	*Per 100sqm GFA*	2.13	0.241	2.371	0.113	1.573	1.686
B8 Warehousing	*Per 100sqm GFA*	0.199	0.149	0.348	0.065	0.218	0.283

In line with Strategic Policy S23 it was agreed with the SDNPA and the Local Highway Authorities that the TA assesses a 60:40 private dwelling to affordable dwelling ratio. The ratio of commercial land use is on a site by site basis.

Trip Distribution and Assignment

The trip distribution and assignment methodology was approved by the Local Highway Authorities. For residential trips the 2011 Census Travel to Work dataset (WU03EW) for car drivers was used and for employment trips the 2001 Census UK travel flows (ward) dataset was used. A summary flow diagram of the methodology is provided in Appendix C along with the distribution diagrams for from each settlement.

Links between Development Sites

It was acknowledged that the proposed employment sites could attract trips from the proposed residential developments, which would lead to double counting. A reduction factor to take this into account and avoid double counting was therefore agreed with the Local Highway Authorities. The reduction factors (see Table 4.2)) are calculated by applying the percentage of commuter trips in the AM and PM peaks (14% and 15%) from the National Travel Survey (Table NTS0503) to the proportion of development traffic generated by a relevant output area.

Table 4.2 Trip Generation Reductions

Employment Site	*AM Reduction*	*PM Reduction*
Land East of Hampers Common, Petworth	*6.30%*	*6.75%*
Frenchmans Road, Petersfield	*3.93%*	*4.21%*
Land at Buckmore Farm, Petersfield	*3.93%*	*4.21%*
The Domes, Petersfield	*4.91%*	*5.26%*

Traffic Surveys

Based on the traffic assignment and distribution exercise priorities for the turning movement surveys were determined in conjunction with the SDNPA and the Local Highway Authorities.

To determine whether a traffic survey and or further assessment was required, a threshold of 50 vehicles or more entering into a junction was set for the Local Highway Authority roads, in line with West Sussex County Councils draft guidance on Transport Assessments. The traffic surveys were required at the following junctions (see Table 4.3).

Surveys were undertaken on Thursday 10 March 2016 over the AM and PM peak periods of (06:30 – 09:30 and 15:30 to 18:30). Third party traffic survey data was used at two locations, after discussions with the relevant Local Highway Authority confirmed its appropriateness for use[4].

[4] i.e. No more than three years old in line with DfT guidance* and were deemed representative / fit for purpose by local highway officers.
*https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263054/guidance-transport-assessment.pdf

Table 4.3 Traffic Data Locations

Settlement	*Junction*	*New Survey/ 3rd Party Survey*
Petersfield	*A3 / Winchester Road / Bedford Road / A272 Winchester Road*	*New*
	Winchester Road / Bell Hill / Station Road	*New*
	A272 London Road / Pulens Lane / Inman Lane	*New*
	Dragon Street / B2146 Sussex Road / B2070 The Causeway / Hylton Road (SDNP/13/04617/FUL)	*3rd Party (May 2013)*
Midhurst	*A272 Petersfield Road / A286 High Street / West Street / A286 Bepton Road*	*New*
Easebourne	*A272 Easebourne Lane / A286 North Street / A286 Dodsley Lane / Un-named Road (SDNP/15/02213/FUL).*	*3rd Party (July 2013)*
Petworth	*A283 New Street / A283 Angel Street / East Street / Middle Street*	*New*
	A272 Tillington Road / Pound Street / A285 Station Road	*New*
	A283 London Road A283 / A272 Horsham Road A272 / North Street	*New*

No new traffic surveys were conducted on HE Strategic Road Network (SRN). Link flow data for the A3 between Petersfield and Liss has therefore been taken from HE Traffic Information database (TRADS), which provides access to traffic count data from the SRN.

Traffic Growth (TEMPro)

Derivation of growth factors for 2013 to 2016

Traffic data from 2013 was factored to a base year of 2016, using TEMPro growth factors, approved by the Highway Authorities. For a robust analysis the National Traffic Model (NTM) AF09 and TEMPro NTEM 6.2 datasets have been used to calculate growth based on housing and employment projections for the local area for and summarised in

Table 4.4. This work was undertaken prior to the release of TEMPro NTEM 7.0 in July 2016; it is not considered necessary to retrospectively revise this work to the new version of NTEM, as this would not affect the net impacts of development identified through this study.

Table 4.4 TEMPro Background Growth Factors 2013 to 2016

Location	Growth Period	AM Growth Factor	PM Growth Factor
Petersfield (24UC6)	2013 - 2016	1.0146	1.0166
Easebourne (45UD6)	2013 - 2016	1.0269	1.0285

Derivation of growth factors for 2016 and 2032

TEMPro Adjustments Residential Growth

TEMPro has also been used to apply background traffic growth from the base year (2016) to the future year of 2032. The methodology follows the guidance set out in WebTAG Unit M4 "Forecasting and Uncertainty" and WebTAG Unit 3.15.2 "Use of TEMPro Data".

TEMPro growth rates account for all growth, therefore the proposed future housing growth in the SDNP has been removed from the relevant geographical areas within TEMPro, using the "alternative assumptions" function, to prevent double counting. Once a RC growth factor has been obtained[5], the development traffic is added back into the model based on its own distribution and assignment, thus providing a robust assessment of the impact on the highway network, specifically at Fernhurst and Midhurst.

All completed and committed sites (within and in close proximity to the SDNP) have been retained with the exception of the King Edward VII Estate in Fernhurst, which has been added in manually to provide a more detailed assessment of the impact at junctions within close proximity.

Table 4.5 summarises the alternative assumptions applied within TEMPro for residential sites.

Table 4.5 Residential Alternative Assumptions

Location	TEMPro Geographical Area	Growth Scenario	Baseline Households in TEMPro	TEMPro Assumptions of Future Households	Manual Adjustment TEMPro	Future Households following alternative assumptions in TEMPro 2016 -2032
Liss	Liss (main) (24UC7)	S1	2,745	2,862	Removal of 117 future dwellings	2,745
		S2	2,745	2,862	Removal of 117 future dwellings	2,745
Petersfield	Petersfield (24UC6)	S1	6,549	6,836	Removal of 287 future dwellings	6,549
		S2	N/A	N/A	N/A	N/A
Midhurst	Midhurst (45UD6)	S1	3,508	4,099	Removal of 150 future	3,949

[5] The level of background growth within TEMPro is sufficient to cover windfall developments not linked to specific locations / settlements at this time, therefore growth is spread across the highway network.

Location	TEMPro Geographical Area	Growth Scenario	Baseline Households in TEMPro	TEMPro Assumptions of Future Households	Manual Adjustment TEMPro	Future Households following alternative assumptions in TEMPro 2016 -2032
					dwellings	
		S2	3,508	4,099	Removal of 240 future dwellings	3,859
Petworth and Fernhurst	Rural (Chichester) (45UD0)	S1	8,298	9,084	Removal of 750 future dwellings (150 in Petworth + 200 at Syngenta + 400 at King Edward Estate)	8,334
		S2	8,298	9,084	Removal of 840 future dwellings (240 in Petworth + 200 at Syngenta + 400 at King Edward Estate)	8,298

TEMPro Adjustments Employment Future Growth

The number of jobs in Petworth and Petersfield were deduced from the land areas and land uses. To calculate the number of jobs created the methodology employed in GL Hearn Employment Land Review Update (2015) was applied.

Future employment growth (composed principally of B1, B2 and B8 commercial and business growth) is treated in the same manner as residential future growth (as shown in Table 4.6).

The remaining employment development not removed from TEMPro forms the basis of the background traffic growth.

Table 4.6 Employment Alternative Assumptions

Location	TEMPro Geographical Area	Baseline Employment in TEMPro	TEMPro Assumptions of Future Employment	Manual Adjustment TEMPro	Future Employment following alternative assumptions in TEMPro 2016 -2032
Petersfield	Petersfield (24UC6)	10,138	10,479	-341 jobs	10,138
Petworth	Rural (Chichester) (45UD0)	8441	8642	-87 jobs	8555

Alternative Assumption Growth Rates

The growth factors for 2016 to 2032, derived from the alternative assumptions for households and jobs, are shown in Table 4.7.

Table 4.7 TEMPro Adjusted Growth Factors 2016 to 2032

Location	TEMPro Geographical Area	Growth Scenario	AM Growth Factor	PM Growth Factor
Liss	Liss (main) (24UC7)	S1	1.1400	1.1470
		S2	1.1400	1.1470
Petersfield	Petersfield (24UC6)	S1	1.1231	1.1356
		S2	N/A	N/A
Midhurst	Midhurst (45UD6)	S1	1.2346	1.2458
		S2	1.2207	1.2305
Petworth and Fernhurst	Rural (Chichester) (45UD0)	S1	1.1461	1.1552
		S2	1.1436	1.1525

Determining the Need for Junction Capacity Assessments

Percentage Impact Assessment

A percentage impact assessment was first undertaken to determine the proportional level of impact that the development traffic would have over the 2032 RC.

The threshold for the percentage impact was set at a 10% increase of total traffic, although if the Local Highway Authority raised other concerns or there were other overriding factors to consider, for example the presence of a level crossing, then a lower figure could be carried forward to the capacity assessment.

Junction Modelling

To determine future operational performance of the junctions in terms of delay, queues and spare capacity the “Junctions 8” modelling software has been used. “Junctions 8” is the industry accepted suite of traffic modelling programs to assess operational performance of junctions; ARCADY for the roundabouts and PICADY for priority junctions / crossroads.

To ensure a robust assessment, traffic flow profiles for the peak periods were assessed and the appropriate demand profile (one hour or direct) was selected. The purpose of this was to ensure that if there was spare capacity over the peak hour, that peak spreading could occur to mimic driver behaviour.

Where direct input was used for the Midhurst and Petworth junctions, the observed HGV proportions were tabulated. For one hour input, (Petersfield and Fernhurst), the default setting in Junctions 8 of 10% HGV movements on all arms was applied.

Model Outputs

For the purpose of this TA the following parameters, based on the results of the junction modelling, will be assessed to established when the impact of development (i.e. the difference between the reference case and the reference case + Scenario 1 or 2) results in a severe highway impact.

Where the junction modelling predicts;

- **Ratio of Flow to Capacity (RFC) of over 0.85;** the junction is described as being over operational capacity, but still considered to be acceptable;
- **RFC of over 1.0;** the junction is described as being over theoretical capacity, as such the modelling results become increasing unstable resulting in queues and delays increasing exponentially;
- **Delays of 120 seconds (2 minutes);** are described as having a greater negative effect on driver state of mind and tolerance;
- **Delays of over 180 seconds (3 minutes);** are detrimental to driver state of mind and tolerance and could lead to an increased accident risk, increased use of inappropriate routes or through driver frustration;

As a result of the development proposals, significant increases over and above the levels quoted above, will be used to determine a severe impact. For example if a development proposal results in an increase in delay of over 180 seconds this will be defined as severe.

Junction Mitigation

Where the junction modelling predicts a severe impact, investigation into potential highway mitigation measures has been undertaken. It is considered that due to the rural location of the allocation sites, particularly those in West Sussex which do not benefit from a nearby railway station, there are limited realistic opportunities to generate mode shift away from the car to more sustainable modes of transport. This assessment therefore makes no concession to the application of mode shift or smarter travel choices, which as agreed with the Local Highway Authorities, would be difficult to defend at Examination in this rural context.

That is not to say, that initiatives such as Travel Plans (residential and workplace), and infrastructure measures to support a switch to more sustainable modes of transport should not be considered as appropriate mitigation measures for individual development sites coming forward. It has simply not been applied as part of this methodology.

As the junctions are situated within the SDNP, it is crucial that the mitigation measures proposed are sympathetic to their environment and support the principal purposes of the SDNPA; **to conserve and enhance the natural beauty, wildlife and cultural heritage of the area and minimize the impact of traffic on the built and natural environment,** in line with the guidance set out in ‘Roads in The South Downs’ (2015).

The severity of impact and potential mitigation measures are both discussed in chapters 5 to 10 for each settlement.

5 Liss

Introduction

This chapter provides an overview of the existing and future transport and traffic situation within the settlement of Liss. It consists of an outline of the transport network, proposed development scenarios and the traffic impact of the Local Plan development scenarios.

Context

Local Highway Authority	Hampshire County Council (HCC)
Key Planning Policy	• East Hampshire and South Downs National Park Joint Core Strategy (approved 2014) • Liss Village Neighbourhood Development Plan pre-submission consultation draft (2016)
Population	5,121 (2011)
Households	2,063 (2011)
Amenities	Railway station, small selection of convenience shops, primary school

Highway Network

The settlement of Liss is located to the east of the A3 corridor, approximately 5km to the north of Petersfield (as shown in Figure 3.1).

Liss is served by two junctions onto the A3; the northern junction (referred to as the Ham Barn roundabout) is the only at grade roundabout on the A3, whilst the southern junction is a grade separated junction.

Ham Barn is a 4 arm roundabout serving the B3006 and the A3. The B3006 forms the minor arms, providing access to Selborne and Alton to the north and Liss to the south.

The roundabout has been subject to a number of studies and schemes to reduce accidents, improve capacity, and reduce delays. The roundabout was improved in 2013/14 as part of the DfTs Pinch Point Scheme. The works undertaken included;

- Widening the northbound A3 approach from 2 lanes to 3 for a distance of 100m;
- Widening the northbound exit onto the B3006 to allow easier access for HGVs;
- Improvements for non-motorised users including a shared footway / cycleway on the north west side of the roundabout and new drop kerbs and tactile paving provided at crossing points; and
- Improvements were also made to the road markings, lighting, signing and safety barriers.

The B3006 is a local distributor road and routes through Liss in an approximate north west to south east direction. The road is subject to a 30mph speed limit and forms the major arm of

a number of priority junctions with smaller residential access roads. In the centre of Liss, the B3006 forms two arms of a three arm mini-roundabout; the third arm being Mill Road.

Discussions with Officers at HCC and HE did not reveal any concerns with regards to the current capacity / operation of any junctions within Liss. Furthermore, a review of recent planning applications did not reveal any developments which would generate significant traffic levels.

The Transport Statement for East Hampshire (2012)[6] and Infrastructure Delivery Plan (2015)[7] do not show any significant highway infrastructure schemes save for the improvements to Ham Barn roundabout (EHC0001) which have been completed.

Rail Network

Liss has a mainline rail station which is managed by South West Trains with services operating between Portsmouth and London Waterloo via Haslemere. There are hourly services during the day time and half hourly service in the peak hours.

Within the settlement there are two level crossings; on Andlers Ash Road to the east of the River Rother, and at the Station itself on Station Road (B3006). It is understood from the Liss' Draft Neighbourhood Plan Document that the level crossing on Andlers Ash Road is quicker than the level crossing at the Station, making it a more favourable route for traffic.

Local Plan Allocations

Two housing scenarios have been tested for Liss;

Scenario 1	150 dwellings
Scenario 2	220 dwellings

There is no employment allocation proposed for Liss.

Information provided by SDNP on committed developments and recent completions has been reviewed and it was determined there were no significant developments which needed to be considered in this study in more detail.

In March 2016, Liss Parish Council produced the Liss Village Neighbourhood Development Plan pre-submission consultation draft. The draft proposes the allocation of a minimum of 150 dwellings to be delivered between 2011 and 2028 as set out in the 2014 East Hampshire and South Downs National Park Joint Core Strategy (JCS). The location of the proposed housing allocation sites is presented in Figure 5.1 and the number of proposed dwellings at each site is presented in Table 5.1.

[6] http://documents.hants.gov.uk/transport-statements/easthants/EHDCTransportStatementPostAdoptionLiveSchemesDecember2013.pdf

[7] http://www.easthants.gov.uk/sites/default/files/documents/IDP%2B2015.pdf

Figure 5.1 Liss Proposed Draft Housing Allocations

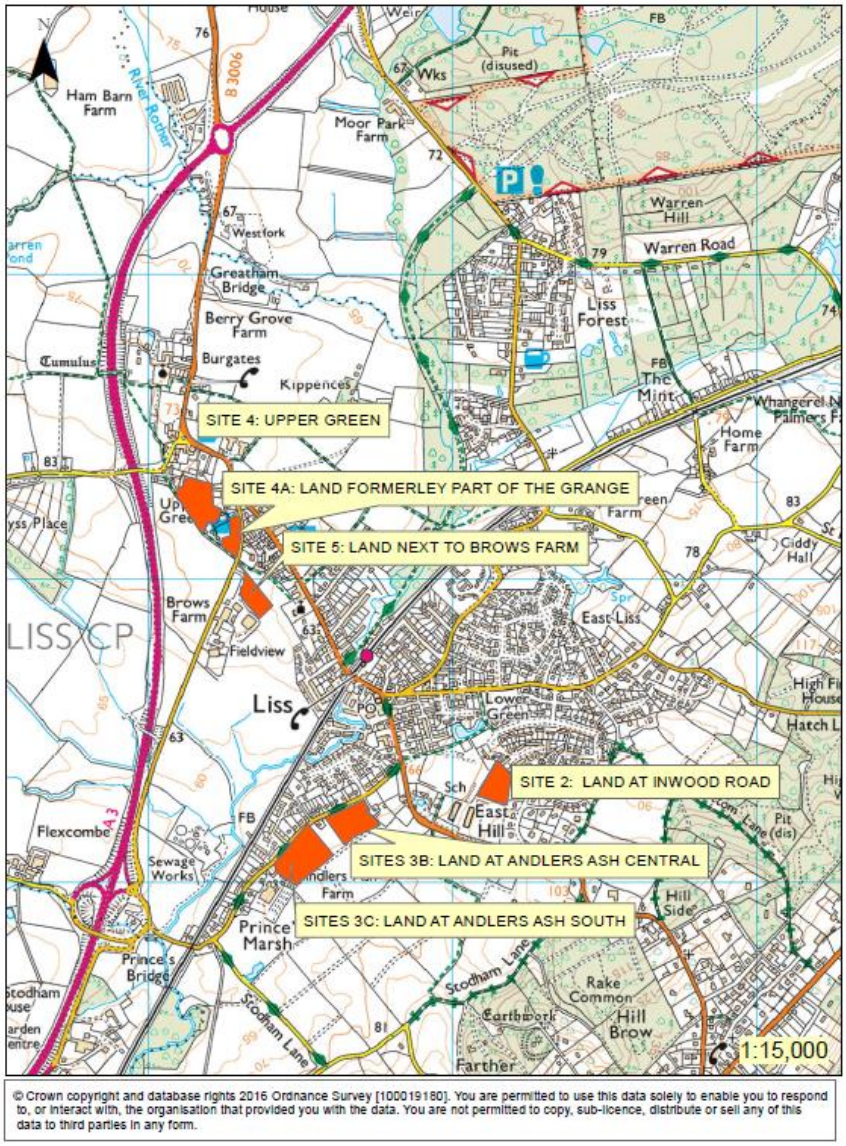


Table 5.1 Liss Draft Neighbourhood Plan Document Housing Allocations

Site Ref	Site Address	Min No. of Dwellings	Max No. of Dwellings
2	Land at Inwood Road	25	25
3b	Land at Hilliers Nurseries, Andlers Ash Road (central)	30	35
3c	Land at Hilliers Nurseries, Andlers Ash Road (south)	30	35
4	Upper Green	30	35
4a	The Grange	5	5
5	Brows Farm	15	25
TOTAL		**135**	**160**

As the housing numbers proposed in the Draft Neighbourhood Plan are slightly different to that in Scenario 1, the numbers have been factored for assessment purposes (see Table 5.2).

The proposed development sites in Table 5.2 have been grouped according to their approximate entry point onto the local highway network.

Table 5.2 Liss Housing Numbers Scenarios 1 and 2

Site Ref	Development Sites	Max. yield	% of Total Dwellings	S1	S2
2	Land at Inwood Road	25	16%	23	34
3b / 3c	Andlers Ash South and Central	70	44%	66	96
4 / 4a / 5	Upper Green / The Grange / Brows Farm	65	40%	61	89
	TOTAL	**160**	**100%**	**150**	**220**
	***Errors may occur due to rounding**				

Development Traffic Flows

A summary of the total trip generations for the proposed sites for both development scenarios is presented in Table 5.3.

Table 5.3 Liss Total Trip Generation

Vehicle Trips	AM Peak (0800-0900)		PM Peak (1700-1800)	
	S1	**S2**	**S1**	**S2**
Arrivals	23	33	51	75
Departures	53	78	29	42
Total (Two-way)	**76**	**111**	**80**	**117**
**Errors may occur due to rounding*				

Development Traffic Distribution and Assignment

Applying the methodology described in Section 4, 2011 Census data was used to distribute and assign the development traffic onto the highway network. The Traffic Flow Diagrams are presented in Appendix D with a summary of movements into the junctions presented in Table 5.4.

Where the destination remained within Liss, traffic was distributed from each site to the centre of the village. This totalled 10% of traffic.

Table 5.4 Liss Traffic Flows into Junctions

Junction	Scenario 1		Scenario 2	
	AM	PM	AM	PM
Hill Brow Road / Mill Road / Station Road	18	15	25	21
Hill Brow Road / London Road	22	23	30	31
Station Road / Farnham Road	30	31	42	44
Hill Brow / Andlers Ash Road	23	22	32	30
A3 / Farnham Road / Andlers Ash Road	18	21	26	46
A3 / Farnham Road / Petersfield Road	186	188	201	201

With the exception of A3 / Farnham Road / Petersfield Road roundabout, Table 5.4, shows that no junctions within Liss will experience an increase in traffic movements taking it over the 50 vehicle per hour threshold. The relatively low level traffic impact within Liss can be attributed to the location of the proposed allocations, which are predominantly located on the periphery of the settlement, consequently resulting in less traffic routing through junctions which occupy a more central position within the settlement.

Based on these findings, it has been agreed that no further assessment of the traffic impact within Liss is required at this stage. It is however a requirement that any future development proposals within the settlement are supported by either a Transport Statement (TS) or Transport Assessment (TA) as appropriate to identify the traffic impacts on the local highway network and develop appropriate mitigation measures as required by HCC. The TS or TA should also be accompanied with a Residential Travel Plan (RTP) to promote sustainable modes of transport and encourage behavioural change.

6 Petersfield

Introduction

This chapter provides an overview of the existing and future transport and traffic situation within the settlement of Petersfield. It consists of an outline of the transport network, proposed development scenarios and the findings of the traffic impacts of the Local Plan development scenarios.

Context

Local Highway Authority	Hampshire County Council (HCC)
Key Planning Policy	• East Hampshire and South Downs National Park Authority Joint Core Strategy (2014) • Petersfield Neighbourhood Plan (adopted 2015)
Population	14,974 (2011)
Households	6,525 (2011)
Amenities	Railway station, High Street, several supermarkets, Hospital, industrial estate, primary schools, secondary school, East Hampshire District Council Offices

Highway Network

The settlement of Petersfield is located immediately east of the A3. Petersfield is situated approximately 27km to the east of Winchester, 25km to the south west of Farnham, and 27km to the north of Portsmouth.

There are three junctions onto the A3 within close proximity of Petersfield. The southern junction provides access to outlying villages to the south of Petersfield, namely Buriton, but also provides access to the town centre via B2070 The Causeway (signed from the A3 for northbound traffic). The central A3 junction provides the access (via a five arm grade separated roundabout) to the Bedford Road employment area, the A272 west and the Town Centre (via the level crossing). The northern A3 junction is the signed route from the A3 to the Town Centre for southbound traffic, and also provides access to the A272 east.

The A272 follows an approximate East-West route from Heathfield, East Sussex to the city of Winchester, Hampshire and bisects the SDNP from Winchester to Billingshurst. In the vicinity of Petersfield, the A272 multiplexes with the A3 for approximately 8km between the central and northern junctions.

A review of recent planning applications within the settlement revealed that the Dragon Street / Sussex Street / The Causeway / Hylton Road priority cross-road junction is approaching its operational capacity and is likely to exceed theoretical capacity in the future. The Petersfield Neighbourhood Plan (PNP) also identifies this junction as already experiencing congestion. Discussions with officers at HCC requested that investigation of the interaction between the Bell Hill roundabout and the level crossing be undertaken.

Rail Network

Petersfield has a mainline rail station which is managed by South West Trains with services operating between Portsmouth and London Waterloo. There are frequent services during the day time; with 3 trains per hour to Portsmouth and 3 trains per hour to London which increases to 4 per hour in the peak periods for services to London in the AM and services from London in the PM. The car park has capacity for 154 vehicles and cycle parking is provided at the station for 164 bicycles.

Within the settlement there is a level crossing on Station Road; which if travelling through the town along Winchester Road / Station Road / Ramshill corridor, causes tail-backs, particularly during peak hours[8]. There is an alternative route to using the level crossing for cars, light vans and small lorries via Swan Street under a (height restricted) bridge.

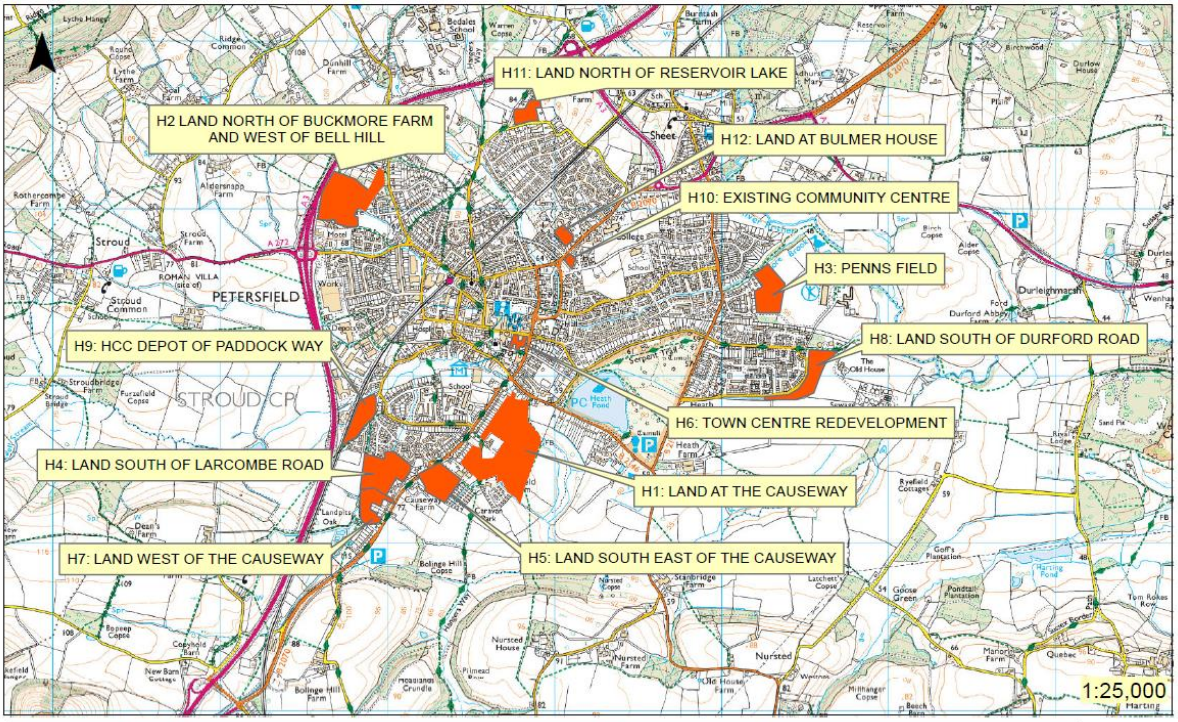
Local Plan Allocations

Housing Allocations

One housing scenario has been identified by the SDNP for Petersfield, consisting of 805 dwellings, which accords with the PNP.

The location of the proposed housing allocations are presented in Figure 6.1 and the number of proposed dwellings is presented in Table 6.1.

Figure 6.1 Petersfield Housing Allocations



[8] As noted by the PNP, and observed first hand.

Table 6.1 Petersfield Neighbourhood Plan Housing Allocations

Site Ref	Site Address	No. of Dwellings
H1	Land at Causeway Farm	200
H2	Land north of Buckmore Farm and west of Bell Hill	101
H3	Penns Field	89
H4	Land south of Larcombe Road	71
H5	Land south east of the Causeway	71*
H6	Town centre redevelopment opportunities	58
H7	Land west of the Causeway	64
H8	Land south of Durford Road	Min. 48
H9	Hampshire County Council Depot off Paddock Way	42
H10	Existing Community Centre	10
H11	Land north of Reservoir Lane	11
H12	Land at Bulmer House Site, off Ramshill	40
TOTAL		**805****

** Planning permission has already been granted for 71 dwellings, of which approximately 50% of the dwellings are occupied. Vehicle trips associated with these dwellings were captured in the baseline survey, thus 35 dwellings have been removed from the trip generation calculations for this site.*
***Whilst there are 805 dwellings in total, 770 have been taken into account when calculating the anticipated trip generation as 35 dwellings are already generating trips on the highway network.*

Employment Allocation Sites

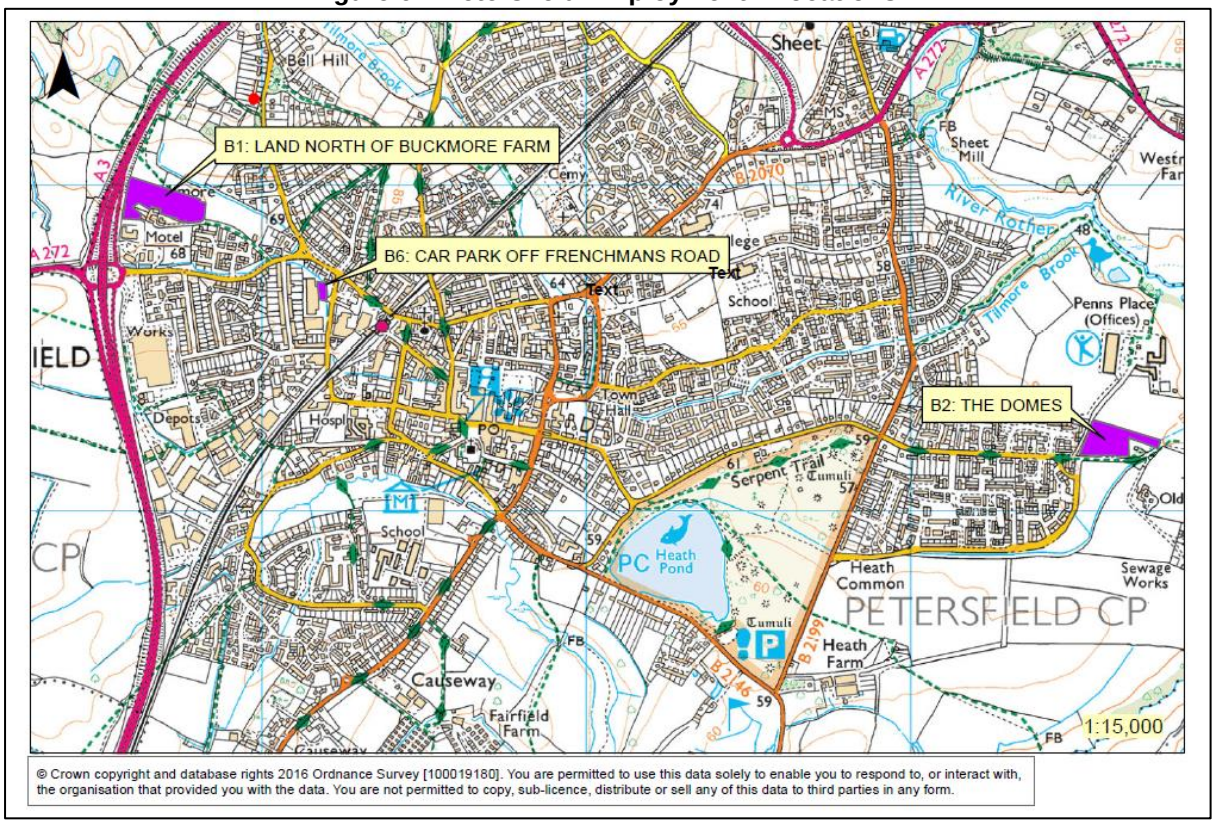
Three new employment allocations in Petersfield have been tested in this TA. Whilst the location of the employment sites accords with the PNP, the developable area differs slightly from the total area. The total land areas used within this TA were provided by the SDNP.

The total area and amount of developable land is presented in Table 6.2 and the location of the allocations can be seen in Figure 6.2.

Table 6.2 Petersfield Neighbourhood Plan Employment Allocations

Site Ref	Site Address	Total Area (Sqm)	Developable Area (Sqm)
B1	Land north of Buckmore Farm	12,000	5,160
B2	Land at The Domes	7,000	3,500
B6	Car park off Frenchmans Road	1,000	500
TOTAL		20,000	9,000

Figure 6.2 Petersfield Employment Allocations



Development Traffic Flows

A summary of the total trip generate for the allocated housing and employment sites are presented in Table 6.3.

Table 6.3 Petersfield Total Residential and Employment Trip Generation

	Residential		Employment	
Type of Vehicle Trips	AM Peak (0800-0900)	PM Peak (1700-1800)	AM Peak (0800-0900)	PM Peak (1700-1800)
Arrivals	117	265	147	21
Departures	273	148	23	123
Total (Two-way)	**390**	**413**	**170**	**144**
**Errors may occur due to rounding*				

Development Traffic Distribution and Assignment

Applying the methodology described in Section 4, 2011 Census data was used to distribute the traffic associated with the housing and employment sites. The Traffic Flow Diagrams are presented in Appendix E and a summary of the movements into the junctions is presented in Table 6.4.

Table 6.4

Where the destination remained within Petersfield, traffic was distributed from each site to the centre of the town, Bedford Road industrial area and Penns Place as the key employment areas within the town. This totalled 15% of traffic. Although there is only one development scenario for Petersfield, two scenarios are presented in Table 6.4 to take account of the fact that Petersfield will receive some traffic from other settlements where different scenarios have been applied'.

Table 6.4 Petersfield Traffic Flows into Junctions

Junction	Scenario 1		Scenario 2	
	AM	PM	AM	PM
A3 / A272 (North East of Petersfield Town Centre)	127	130	133	137
A3 / Winchester Road / Bedford Road / Winchester Road	201	214	206	224
London Road / Ramshill / A272	178	139	184	190
London Road / Pulens Lane / Inmans Lane	146	146	152	153
Bell Hill / Residential Road / Station Road / Winchester Road	155	157	155	128
Station Road / Ramshill / Tor Way	106	115	107	117
Dragon Street / Sussex Road / The Causeway / Hylton Road	172	183	172	183
The Causeway / Kennet Road / Foxfield Grove	132	124	132	124
A3 / B2070 / B2070 / The Causeway / Greenway Lane	110	115	110	115

As shown in Table 6.4 all the junctions identified within Petersfield are expected to have an increase in vehicle movements over the 50 vehicle threshold identified in the methodology. Due to budget constraints and based on AM peak hour observations and discussions with Local Highway Officers the following junctions were identified for further assessment;

- A3 / Winchester Road / Bedford Road / A272 Winchester Road;
- Bell Hill / Residential Road / Station Road / Winchester Road;
- A272 London Road / Pulens Lane / Inmans Lane; and
- Dragon Street / B2146 Sussex Road / B2070 The Causeway / Hylton Road.

A3 / Winchester Road / Bedford Road / Winchester Road Junction Assessment

Overview

This is a 5 arm grade separated roundabout with the A3 passing over the A272 (Winchester Road). The southbound off slip from the A3 also provides the egress from the petrol filling station / services which is accessed from Winchester Road (east). Both the off slips are two lanes wide.

The A272 Winchester Road forms the western arm of the junction and provides access to Winchester, Winchester Road forms the eastern arm of the junction and provides a route into Petersfield Town Centre, with the Bedford Road arm providing access to the Industrial Estate. The circulating carriageway is two lanes wide and there is footway provision around

the southern perimeter linking the Winchester Road east with the A272 Winchester Road west.

Accident Analysis

Plans showing the location of the personal injury accidents (PIAs) within a 50m radius of the junction are provided in Appendix F.

One PIA, which was slight in nature, occurred on the roundabout at midday on 23/07/2013 when a car travelling north west on the roundabout, in the vicinity of the A272 Winchester Road and A3 northbound slip road stopped before exiting onto Winchester Road due to traffic. The car following was unable to stop in time and collided into its rear, resulting in a shunt.

Two other collisions, also both slight in nature, were included within the extent of this junction however, neither can be attributed to the roundabout junction and therefore have not been considered in more detail.

The analysis of the PIAs indicate that there was a low number of collisions at this location, and the one collision which did occur was a result of driver error and does not highlight any overriding highway deficiencies or safety concerns that would be exacerbated by the proposed level of traffic associated within the SDNP Local Plan.

Junction Assessment

A percentage impact assessment comparing the total development traffic against the 2032 reference case was undertaken to determine whether a more detailed junction capacity assessment was required for the roundabout.

Table 6.5 A3 / Winchester Road / Bedford Road Roundabout Percentage Impact

		Scenario 1			Scenario 2		
		Total Dev. Traffic	2032	2032 % Impact	Total Dev. Traffic	2032	2032 % Impact
A3 Southbound Off Slip	AM	29	861	3%	30	861	4%
	PM	27	734	4%	30	734	4%
Winchester Road East	AM	49	742	7%	49	742	7%
	PM	69	810	9%	69	810	9%
Bedford Road	AM	0	125	0%	0	125	0%
	PM	0	371	0%	0	371	0%
A3 Northbound Off Slip	AM	23	914	3%	23	914	3%
	PM	23	385	6%	23	385	6%
Winchester Road West	AM	27	710	4%	28	710	4%
	PM	41	604	7%	43	604	7%

The results presented in Table 6.5 indicate that Winchester Road arm is expected to experience the largest percentage increase (9%) in the PM peak. As the results show that the percentage impact is less than 10% no further assessment has been undertaken for this junction.

Any developments coming forward in the vicinity of this junction should undertake and submit as part of a planning application an appropriate TA / TS, supported by a Travel Plan. The purpose of which is to identify whether mitigation works are required and for the Highway Authority to secure an appropriate financial contribution towards such measures.

Bell Hill / Station Road / Winchester Road Roundabout

Overview

This is a 4 arm roundabout, with the arm between Bell Hill and Station Road a minor access road to residential properties set back from the highway. The main arms are;

- Bell Hill providing a route to Steep and Froxfield;
- Station Road providing a route to the Town Centre; and
- Winchester Road providing a route to the A272 and A3.

The entry arms on to the roundabout are one lane wide with minimal flaring, and the circulating carriageway two lanes wide. Footways are present around the perimeter of the roundabout.

The level crossing in Petersfield is located c.300m to the east of the junction on Station Road, and the PNP notes that, traffic can queue back on Station Road to the roundabout when the level crossing is down.

Level Crossing Assessment

To determine whether vehicles queueing at the level crossing creates an adverse effect at the roundabout, video footage from Thursday 10 March (AM peak 08:00 – 09:00) has been analysed.

As a result of vehicles queuing back from the level crossing, the Station Road exit arm was blocked on 4 occasions (a total of 5minutes 9seconds or 8.6% of the peak hour). Each queue lasted an average of 77.25 seconds (1minute 17seconds). The queues however dissipated quickly once the barrier was raised. Data from Network Rail shows that on the 10 March, the barrier;

- Closed 5 times during the peak hour;
- The total downtime was 17minutes and 56seconds (30% of the peak hour); and
- The average barrier downtime was 215 seconds (3mins 35seconds).

When the barrier closed during the AM peak, traffic flows of 718 vehicles onto Station Road are sufficient to cause blocking back, however, blocking only occurred for c. 28% of the time that the barrier was down on day of the traffic survey. Pre peak data showed there were no

queues back to the roundabout and post peak data showed that there was only once instance on queuing back to the roundabout.

The increase in traffic on Station Road as a result of the proposed level of development is predicted as +44 (Scenario 1) and +64 (Scenario 2) in the AM peak. For Scenario 1 this equals one additional vehicle every 1.4minutes and for Scenario 2 one additional vehicle every 0.94minutes. As a result of the proposed level of development, Therefore during each barrier downtime there will be three to four additional vehicles queuing at the roundabout.

The PM peak survey data does not show any queuing back to the roundabout.

In conclusion although traffic does queue back to the roundabout in the AM peak hour the duration of these queues are less than that widely considered to have a negative impact on driver state of mind and tolerance (2 minutes), and once the level crossing is raised queues dissipate quickly. The addition of the development traffic will have a small impact on the length of the queue but not sufficient to create a severe impact.

Accident Analysis

The latest three year PIA records (see Appendix F) show that one slight PIA has occurred at this junction. The collision occurred on 23/12/2015 at 08:50 when a car travelling south along Bell Hill entered the roundabout and collided with the nearside of another car travelling east on the roundabout.

As a result of the low number of collisions at this location, and as the collision which did occur can be attributed to driver error, it is concluded that there is no discernible trend that is likely to be exacerbated by the proposed level of development traffic.

Junction Assessment

A percentage impact assessment comparing the total development traffic against the 2032 reference case was undertaken to determine whether a more detailed junction capacity assessment was required for the roundabout.

Table 6.6 Bell Hill / Station Road / Winchester Road Percentage Impact

		Scenario 1			Scenario 2		
		Total Dev. Traffic	2032	2032 % Impact	Total Dev. Traffic	2032	2032 % Impact
Bell Hill	AM	53	467	11%	53	467	11%
	PM	39	468	8%	39	468	8%
Station Road	AM	69	647	11%	69	647	11%
	PM	51	806	6%	51	806	6%
Winchester Road	AM	32	820	4%	32	820	4%
	PM	67	528	13%	68	528	13%

The results presented in Table 6.6 indicate that Bell Hill and Station Road will experience an 11% increase in traffic in the AM peak and Winchester Road will see a 13% increase in traffic in the PM peak. As the results indicate more than a 10% impact, and because of the close proximity of the junction to the level crossing, further assessment has been undertaken.

Table 6.7 present the results of the ARCADY modelling to demonstrate the change in junction performance in the future year both with and without the proposed developments scenarios. Full details are provided in Appendix G.

Table 6.7 Bell Hill / Station Road / Winchester Road Roundabout Junction Capacity

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - 1. BASE 2016							
RESIDENTIAL ROAD	0.05	15.52	0.05	C	0.00	0.00	0.00	A
STATION ROAD	1.22	6.98	0.55	A	2.31	10.74	0.70	B
WINCHESTER ROAD	1.57	7.05	0.61	A	0.64	4.47	0.39	A
BELL HILL	0.71	5.59	0.42	A	0.60	4.80	0.38	A
	A1 - 2. BASE 2032							
RESIDENTIAL ROAD	0.07	20.23	0.07	C	0.00	0.00	0.00	A
STATION ROAD	1.67	8.53	0.63	A	4.16	17.34	0.81	C
WINCHESTER ROAD	2.29	9.19	0.70	A	0.58	4.38	0.37	A
BELL HILL	0.94	6.61	0.49	A	0.79	5.50	0.44	A
	A1 - 3. BASE + PO DEV 2032							
RESIDENTIAL ROAD	0.09	25.25	0.08	D	0.00	0.00	0.00	A
STATION ROAD	2.37	11.01	0.71	B	6.13	24.50	0.87	C
WINCHESTER ROAD	2.73	10.62	0.74	B	1.05	5.78	0.52	A
BELL HILL	1.21	7.64	0.55	A	0.95	6.17	0.49	A
	A1 - 4. BASE + MID+60% DEV 2032							
RESIDENTIAL ROAD	0.09	25.25	0.08	D	0.00	0.00	0.00	A
STATION ROAD	2.37	11.01	0.71	B	6.14	24.55	0.87	C
WINCHESTER ROAD	2.73	10.62	0.74	B	1.06	5.78	0.52	A
BELL HILL	1.21	7.64	0.55	A	0.95	6.17	0.49	A

Base 2016 Results

The model results show that the junction is currently operating well within capacity, with a maximum RFC of 0.61 in the AM peak on the Winchester Road arm and a maximum RFC of 0.70 in the PM peak on the Station Road arm. During both peaks no more than 3 vehicles are queuing on any arm and the average delay does not exceed 16 seconds.

Base 2032 Results

The model results show that the junction is still expected to operate within capacity, with a maximum RFC of 0.70 in the AM peak on the Winchester Road arm and a maximum RFC of

0.81 in the PM peak on the Station Road arm. Whilst there is an increase in both vehicle queues and delays in both peak periods, the levels remain within those widely considered acceptable; with no more than 5 vehicles are queuing on any arm and the average delay does not exceed 21 seconds.

Base 2032 + Scenario 1 Results

With the addition of the preferred option development traffic there is some reduction in junction performance predicted in the AM peak, with RFCs on Station Road and Winchester Road increasing by 0.08 and 0.04 and delay increasing by 2.48 and 1.43 seconds respectively over the 2032 reference case. In the PM peak the Station Road arm is expected to exceed operational capacity by 0.05, with an increase of 2 queuing vehicles and increased delay of 7.16 seconds. All other arms are however expected to work well within accepted parameters.

Base 2032 + Scenario 2 Results

As there is no Scenario 2 residential option for Petersfield, there is no difference between the results presented for Scenario 1.

Summary

The results of the assessment show that the roundabout is predicted to be able to accommodate the expected level of development traffic without the need for mitigation measures.

In accordance with NPPG any developments[9] coming forward as part of the planning process, should enter into early discussions with the Local Planning Authority to agree whether a TA / TS, and Travel Plan is required. The purpose of which is to identify whether mitigation works are required and for the LHA to secure an appropriate financial contribution towards such measures.

Dragon Street / B2146 Sussex Road / B2070 The Causeway / Hylton Road

Overview

This is a 4 arm crossroads to the south of Petersfield Town Centre, with Dragon Street / The Causeway forming the major arm, and Sussex Road and Hylton Road forming the minor arms of the junction, giving way to the major arm flows. The minor arms are one lane wide and have very minimal flaring. Footways are present around the junction.

This section presents the findings of the accident analysis and junction assessment focusing on changes in their performance, in terms of RFC, delay and queuing values, across the different scenarios.

[9] The threshold / scale of development, should be considered on a case by case basis.

Accident Analysis

There was one slight PIA recorded in the last three years (see Appendix F) which occurred when a car travelling in a south east direction on Hylton Road failed to give way and entered the crossroads into the path of cyclist who was travelling south west on Dragon Street.

This collision occurred as a result of driver error, and it is not expected that this trend would be exacerbated by the proposed level of development traffic.

Junction Assessment

A percentage impact assessment comparing the total development traffic against the 2032 RC was undertaken to determine whether a more detailed junction capacity assessment was required.

Table 6.8 Dragon Street / Sussex Road / The Causeway / Hylton Road Percentage Impact

		Scenario 1			Scenario 2		
		Total Dev. Traffic	2032	2032 % Impact	Total Dev. Traffic	2016	2016 % Impact
Dragon Street	AM	24	514	5%	24	514	5%
	PM	40	649	6%	40	649	6%
Sussex Road	AM	30	374	8%	30	374	8%
	PM	21	285	7%	21	285	7%
The Causeway	AM	91	834	11%	91	834	11%
	PM	60	610	10%	60	610	10%
Hylton Road	AM	27	153	18%	27	153	18%
	PM	61	217	28%	61	217	28%

Table 6.8 indicates that The Causeway and Hylton Road will experience significant increases in traffic in both peak periods. As the results indicate a more than 10% change, and as the junction had been identified in the PNP and in previous Planning Applications as requiring future remedial measures, further capacity assessments are deemed necessary for this junction.

Table 6.9 presents the results of the PICADY modelling to demonstrate the change in junction performance in the future year both with and without the proposed developments scenarios. Full details are provided in Appendix G.

Table 6.9 Dragon Street (A) / Sussex Road (B) / The Causeway (C)/ Hylton Road (D) Junction Capacity Assessment[10]

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	A1 - 1. 2016 BASE					
Stream B-ACD	17.01	167.07	1.04	2.58	35.21	0.73
Stream A-BCD	0.15	5.30	0.08	0.24	4.79	0.11
Stream D-ABC	1.26	31.20	0.57	2.30	41.54	0.71
Stream C-ABD	2.23	8.30	0.54	1.09	7.26	0.38
	A1 - 2. 2032 BASE					
Stream B-ACD	52.59	472.53	1.29	7.08	87.62	0.92
Stream A-BCD	0.21	5.25	0.10	0.37	4.69	0.14
Stream D-ABC	2.82	65.05	0.77	6.55	105.79	0.92
Stream C-ABD	4.03	11.48	0.68	1.65	8.24	0.47
	A1 - 3. 2032 BASE + PO DEV					
Stream B-ACD	91.65	937.47	1.54	21.09	217.05	1.10
Stream A-BCD	0.29	5.28	0.12	0.45	4.66	0.16
Stream D-ABC	18.03	314.79	1.24	44.90	538.67	1.37
Stream C-ABD	7.59	18.54	0.80	2.37	9.53	0.56
	A1 - 4. 2032 BASE + MID+60% DEV					
Stream B-ACD	90.95	931.96	1.53	21.09	217.05	1.10
Stream A-BCD	0.29	5.28	0.12	0.45	4.66	0.16
Stream D-ABC	17.94	313.01	1.24	44.90	538.67	1.37
Stream C-ABD	7.61	18.59	0.81	2.37	9.53	0.56

Base 2016 Results

The model results show that the junction is currently operating over capacity in the AM peak on the Sussex Road Arm with an RFC value of 1.04 and delays of 167 seconds, which is greater than the two minute threshold, beyond which is considered to have a negative effect on driver state of mind and tolerance.

In the PM peak, the junction operates within capacity; however, delays on the Hylton Road arms marginally exceed the average delay threshold of 36 seconds but are still below the time considered detrimental to driver state of mind.

Base 2032 Results

The model results show that the junction is anticipated to operate over capacity in the AM peak. An RFC value of 1.29 is predicted for the Sussex Road arm of the junction, which is a 0.25 increase from the 2016 base. Considerable delays and queues are also expected on

[10] Stream A = Dragon Street
Stream B = Sussex Road
Stream C = The Causeway
Stream D = Hylton Road

Sussex Road. The level of delay expected on Hylton Road is also shown to be in excess of the average recommendation.

In the PM peak the junction is anticipated to be approaching capacity with an RFC value of 0.92 on both the Sussex Road and Hylton Road arms, with queues predicted to increase by 4 or 5 vehicles respectively, delay is expected to increase more significantly.

Base 2032+ Scenario 1 Results

The model results show that the junction is anticipated to operate over capacity on both Sussex Road and Hylton Road in the AM peak. An RFC value of 1.54 is predicted for the Sussex Road arm of the junction, which is a 0.25 increase from the 2032RC, and an increase of 0.47 from the 2032RCis expected for Hylton Road (1.24). As the RFCs have exceeded 1.0, the results are considered unstable.

In the PM peak the junction is anticipated to also exceed capacity with an RFC value of 1.10 on Sussex Road and 1.37 on Hylton Road and increase of 0.18 and 0.45 respectively.

Base 2032+ Scenario 2 Results

As there is no Scenario 2 residential option for Petersfield and very little impact from other settlements within the Scenario 2 options, the modelling results show only minor changes from the Base 2032 + Scenario 1 results.

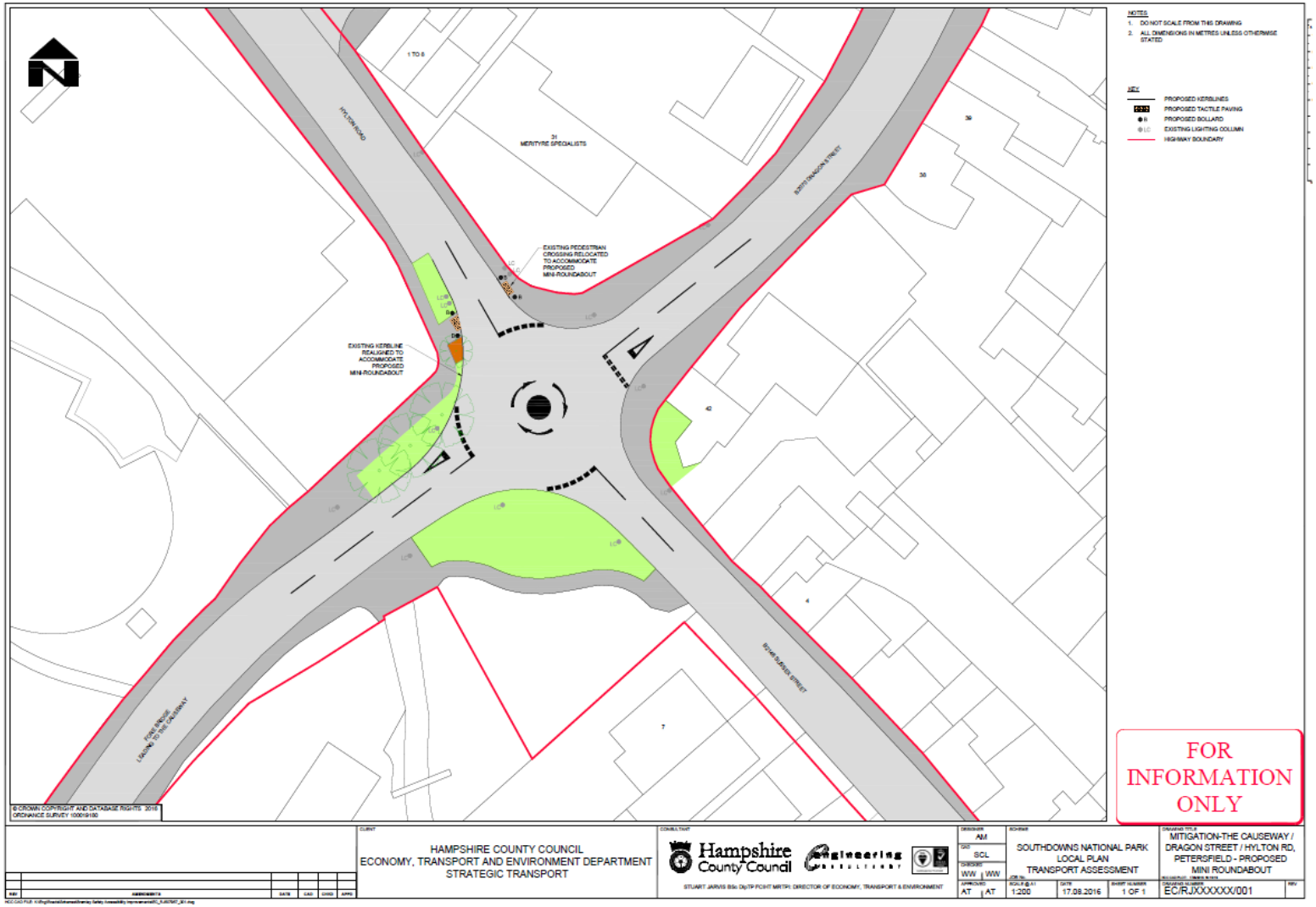
Modelling Summary

The results of the junction modelling demonstrate that the impact of development on this junction is severe in terms of NPPF. Therefore mitigation measures will need to be assessed to ensure that the junction will be able to operate within acceptable parameters for the expected level of development traffic.

Mitigation measures

In its current arrangement traffic travelling on Dragon Street / The Causeway has priority over the minor arms of Sussex Road and Hylton Road. Due to the high level of demand expected on the major arm in 2032, the frequency of gaps in the major arm traffic flow will reduce, limiting the opportunities for vehicles on the minor arms to pull out, consequently resulting in excessive queues and delays and potentially creating a safety concern. Following the investigation and analysis of the above junction, to the introduction of a mini roundabout, within the extents of the highway boundary, has been considered (see Figure 6.3).

Figure 6.3 Dragon Street / Sussex Street / The Causeway / Hylton Road Redesign Proposals



The installation of a mini roundabout would require amendments to the existing kerb alignment in order to accommodate it and provide the necessary turning circle for large vehicles. This amended kerb alignment would result in the partial loss of an area of verge at the junction of The Causeway and Hylton Road. The area of verge which would be affected contains trees and also a lighting column, however it is within the highway boundary.

The analysis undertaken considered a swept path analysis of the proposed mini roundabout as well as ensuring the necessary stopping sight distances and visibility distances are met. The swept path analysis was modelled by a refuse vehicle and demonstrated that there is sufficient turning capacity on all potential arms of the mini roundabout. The analysis also demonstrated that there is sufficient stopping sight distance on each of the potential arms to provide a mini roundabout. The forward visibility distance can be achieved on most of the potential arms; however there is an issue with the visibility at the junction of Sussex Road and Dragon Street due to the location of the convenience shop/fuel station.

Based on the feasibility design, prepared inline with current standards, the revised layout has been modelled and the results presented in Table 6.10, and Appendix G

Table 6.10 Dragon Street / Sussex Road / The Causeway / Hylton Road Mitigation Works

	AM			PM		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
	A1 - 1. 2016 BASE					
Dragon St	2.70	19.97	0.74	9.59	58.70	0.93
Sussex Rd	1.24	12.45	0.56	0.92	12.18	0.48
Causeway	9.22	43.47	0.92	1.75	10.81	0.64
Hylton Rd	0.63	15.36	0.39	0.75	13.02	0.43
	A1 - 2. 2032 BASE					
Dragon St	4.91	33.19	0.85	40.29	190.87	1.09
Sussex Rd	1.88	16.94	0.66	1.27	14.89	0.57
Causeway	36.08	133.76	1.05	2.67	14.69	0.73
Hylton Rd	0.87	18.95	0.47	1.12	17.23	0.53
	A1 - 3. 2032 BASE + PO DEV					
Dragon St	7.17	46.79	0.90	82.61	443.75	1.24
Sussex Rd	2.77	23.29	0.75	1.57	17.12	0.62
Causeway	90.24	349.28	1.19	4.00	20.35	0.81
Hylton Rd	1.10	20.47	0.53	2.42	29.71	0.72
	A1 - 4. 2032 BASE + MID+60% DEV					
Dragon St	7.20	46.94	0.90	82.61	443.75	1.24
Sussex Rd	2.75	23.18	0.74	1.57	17.12	0.62
Causeway	90.26	349.26	1.19	4.00	20.35	0.81
Hylton Rd	1.10	20.47	0.53	2.42	29.71	0.72

The results of the initial feasibility assessment demonstrate that a mini-roundabout at Dragon Street / Sussex Road / The Causeway / Hylton Road offers a potential solution to reduce the delays predicted on the minor arms (Sussex Road / Hylton Street) of the junction. The conversion of the cross roads to a mini-roundabout would however introduce queueing delay on the major arms (Dragon Street / The Causeway) which is not present with the existing arrangement, as there is no impediment to north / south movements. The overall level of delay created by the mini-roundabout is however, less than that predicted for the existing junction arrangement.

The arms most affected by the queueing delay, for example The Causeway in the AM peak, is indicative of the large volume of traffic currently traveling into Petersfield from this direction, as with unimpeded movement through the junction. This route presents a logical route choice for drivers originating from south of the town. There are however, other possible routing options available e.g. the central and northern A3 junctions, which drivers may choose to switch to, if this route were to become less favourable. Furthermore, there are also considered to be opportunities for peak spreading to occur. The impact is, therefore, likely to be less severe than this modelling predicts.

Further study work undertaken jointly with the respective highway authority to refine the proposed junction arrangement and potentially consider in conjunction further traffic management / behavioural change measures should be investigated. Contributions should continue to be taken from developments forthcoming in the local area to fund the evolving mitigation measures required at this junction.

A272 London Road / B2199 Pulens Lane / Inmans Lane

Overview

This junction is a staggered priority junction with A272 London Road forming the major arm, the B2199 Pulens Lane forming the minor arm to the south of the A272 and Inmans Lane forming the minor arm on the northern side of the A272. Pulens Lane provides access to residential properties and also employment opportunities e.g. East Hampshire District Council Offices, whereas Inmans Lane is a residential street.

Right turn lanes from the A272 into both Pulens Lane and Inmans Lane are provided to maintain the free flow of traffic on the major arm. Pulens Lane also has right and left turn lanes marked on its approach to the A272 to guide traffic movements into the junction and maximise capacity.

There are pedestrian refuge islands provided at the extremities of the junction to aid crossing of London Road and to also indicate to drivers where the right turn lane commences.

Accident Analysis

No PIAs have been recorded over the last three year period (see Appendix F) within 50m of this junction. It is therefore concluded that there are no overriding highway deficiencies or

existing safety concerns that would be exacerbated by the proposed level of traffic associated within the SDNP Local Plan.

Junction Assessment

To determine whether further junction capacity assessments are required, a percentage impact assessment was undertaken to compare the increase in development traffic for both residential and employment options (Scenarios 1 and 2) per arm against the 2032 RC. The results are presented in Table 6.11.

Table 6.11 London Road / Pulens Lane / Inmans Lane Percentage Impact

		Scenario 1			Scenario 2		
		Total Dev. Traffic	2032	2032 % Impact	Total Dev. Traffic	2032	2032 % Impact
London Road (East)	AM	32	1484	2%	37	1484	2%
	PM	37	2325	2%	40	2325	2%
Pulens Lane	AM	33	985	3%	33	985	3%
	PM	57	958	6%	57	958	6%
London Road (West)	AM	81	2401	3%	83	2401	3%
	PM	52	2707	2%	56	2707	2%
Inmans Lane	AM	0	209	0%	0	209	0%
	PM	0	209	0%	0	209	0%

The results presented in Table 6.11 demonstrate that the addition of the development on the junction will have a minimal impact, with the maximum increase of 6% on Pulens Lane in 2032 PM peak. On further inspection of the turning movements from Pulens Lane, it is apparent that the majority of movements (80%) are left turns onto London Road, which does not require turning across the main flow of traffic causing less disruption to traffic.

Based on the results in Table 6.11 and considering there is highway land available to undertake mitigation measures should they be required in the future, no further capacity assessments are proposed at this junction.

Any developments coming forward in the vicinity of this junction should undertake and submit as part of a planning application an appropriate TA / TS, supported by a Travel Plan. The purpose of which is to identify whether mitigation works are required and for the Highway Authority to secure an appropriate financial contribution towards such measures.

Summary

Junction	2016		2032 RC		2032RC +S1		2032RC +S2	
	AM	PM	AM	PM	AM	PM	AM	PM
A3 / Winchester Road / Bedford Road / Winchester Road	<10% impact on 2032 RC							
Bell Hill / Residential Road / Station Road / Winchester Road	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Dragon Street / Sussex Road / The Causeway / Hylton Road (Existing)	Acceptable	Acceptable	Over capacity	Over capacity	Severe	Severe	Severe	Severe
Dragon Street / Sussex Road / The Causeway / Hylton Road (Mitigation)	Acceptable	Acceptable	Borderline	Borderline	Severe	Severe	Severe	Severe
London Road / Pulens Lane / Inmans Lane	<10% impact on 2032 RC							

The results of the traffic impact assessment in Petersfield indicate that there is one junction (Dragon Street / Sussex Road / The Causeway / Hylton Road) which has a severe impact.

7 Strategic Road Network Assessment

Introduction

An assessment of the impact of the proposed level of development traffic on the SRN has been undertaken. Based on the traffic distribution and assignment for each settlement, only developments in Petersfield and Liss are expected to have an impact on the strategic road network (SRN).

Through the consultation process the HE advised that there were no known capacity issues on the A3 between the south of Petersfield and Ham Barn roundabout. They were also able to advise of a number of schemes on the A27 / M3 and M27, including;

- A27 Arundel bypass;
- A27 Worthing and Lancing capacity improvements;
- A27 East of Lewes capacity improvements;
- M27 Smart Motorway;
- M3 Junction 9-14 Smart Motorway;
- M3 Junction 9 improvement to allow free movement from the A34 to the M3; and
- M3 Junctions 10-14 improved slip roads.

The traffic distribution and assignment for Petersfield and Liss does not indicate a significant level of traffic travelling to or from the A27 in the vicinity of the aforementioned schemes, so for the purpose of this assessment these schemes have not been considered.

M3 Traffic

The traffic distribution and assignment for Petersfield indicates that 26% of development traffic[11] using the A272 to the west of Petersfield has origins / destinations which require the M3. Of which 21% has an origin / destination which would use M3 northbound and 79% has a southbound origin / destination.

Using the development flows for the A272 to the west of Petersfield (see Appendix E) we have factored the figures to demonstrate the level of traffic which uses the M3 for their journey.

Table 7.1 M3 Impact Assessment

		Scenario 1		Scenario 2	
		From M3	Towards M3	From M3	Towards M3
AM	Northbound	6	9	6	10
	Southbound	21	36	22	37
PM	Northbound	9	7	9	7

[11] Not including Winchester

Southbound	21	25	34	28

The information in Table 7.1 demonstrates that the development proposed in the SDNP will not have a material impact on the M3 or the affect the highway schemes proposed as part of the Government's Investment Strategy.

A3 Junctions

As part of the adopted East Hampshire JCS a minimum requirement of 700 homes and 3ha employment land were proposed in Petersfield and a minimum requirement of 150 homes in Liss. The assessment is therefore looking at an additional development, over those that have previously been tested / approved, consisting of;

- 105 homes in Petersfield in Scenario 1; and
- a net increase of 70 homes in Scenario 2 for Liss.

There are five points of entry / exit for the A3 considered within the study, these are (south to north);

- B2070 (The Greenway) south Petersfield;
- A272 Winchester Road Petersfield;
- A272 north Petersfield (Sheet);
- Andlers Ash Road / Farnham (south Liss); and
- B3006 Ham Barn roundabout (north Liss).

Appendix E shows the total (not net) level of development traffic predicted to have an impact on the above junctions.

B2070 (The Greenway) south Petersfield: The expected level of development traffic during the peak hours in all development scenarios is below 50 movements per on slip / off slip. Therefore no further assessment of this junction is considered necessary.

A272 Winchester Road Petersfield: The expected level of development traffic during the peak hours in all development scenarios is below 50 movements per on slip / off slip. The level of development traffic on the mainline over the junction with the A272, peaks at an additional 58vehicles in the AM peak Scenario 2. With the potential for vehicles to queue on the off-slips at this junction potentially posing a safety risk on the A3, a further assessment has been undertaken. The assessment of the off slips (Appendix H) demonstrates that the SDNP development traffic will have a minimal impact. It is also worth reiterating that all the development trips assessed are car based and therefore present a worst case scenario in terms of traffic impact. If demand management and sustainable transport choices are taken into consideration this figure would be expected to be lower.

A272 north Petersfield (Sheet): The expected level of development traffic is under the 50 vehicles threshold. Consequently we do not propose any further consideration of this junction.

Andlers Ash Road / Farnham Road junction (south Liss): The level of development traffic at the Andlers Ash Road / Farnham Road is expected to be well below the 50 vehicle threshold (maximum 26 vehicles), therefore no further assessment is considered necessary.

B3006 Ham Barn roundabout (north Liss): Ham Barn roundabout is expected to carry higher volumes of development traffic and exceeds the 50 vehicle threshold. This is because it is subject to more external pressures from the trip generations to / from the other settlements in the assessment, namely the housing and employment allocations in Petersfield, and because it is "at grade".

To determine whether the additional development traffic will have a significant impact on the Ham Barn roundabout a percentage impact on the A3 approaches has been undertaken using HE TRADS data. The results, based on 2015 data, are presented in Table 7.2.

Table 7.2 Ham Barn Roundabout Percentage Impact on A3 approaches

5 day Average (23-27 Feb 2015)		Scenario 1		Scenario 2	
		AM	PM	AM	PM
North of Ham Barn	Northbound (3/30012784)	4%	4%	4%	5%
	Southbound (3/30012785)	4%	4%	4%	4%
South of Ham Barn	Northbound (3/30012782)	4%	5%	4%	5%
	Southbound (3/30012783)	4%	4%	4%	4%

The results presented in Table 5.4 show that in absolute terms the amount of traffic travelling into Ham Barn roundabout is large in comparison to the other junctions assessed as part of this TA. However, when considered in relative terms (as presented in Table 7.2) and in terms of the overall size / capacity of the junction, the development traffic is expected to result in only a modest increase in traffic (no greater than 5% uplift from 2015). This increase in both relative and absolute terms is not considered to be severe in terms of NPPF, consequently no further assessment of Ham Barn roundabout will be undertaken as part of this assessment.

Based on the data presented above, which uses total trips and not the net increase above the level of development approved in the JCS, it has been demonstrated that SDNPA development proposals will not have a material impact on the efficiency and safety of the A3.

8 Midhurst

Introduction

This chapter provides an overview of the existing and future transport and traffic situation within the settlement of Midhurst. It consists of an outline of the transport network, proposed development scenarios and the findings of the traffic impacts of the Local Plan development scenarios.

Context

Local Highway Authority	West Sussex County Council (WSCC)
Key Planning Policy	• No Neighbourhood Plan
Population	4,914 (2011 Census)
Households	2,434 (2011 Census)
Amenities	High Street, supermarket, hospital, primary school, college, leisure centre, South Downs Centre

Highway Network

The settlement of Midhurst is located on the A272 / A286 corridor. Midhurst is situated approximately 14km to the east of Petersfield, 9km to the west of Petworth, and 17km to the north of Chichester.

The A272 follows an approximate East-West route from Heathfield (East Sussex) to Winchester (Hampshire) and bisects the SDNP from Winchester to Billingshurst. Traffic travelling from the west of the town on the A272 Petersfield Road arrives at the four-arm mini roundabout to the south of the high street with A286 Rumbolds Hill, West Street and A286 Bepton Road forming the remaining arms. At Easebourne to the north of the town centre, the A272 and A286 diverge at a four-arm mini-roundabout junction; with the A272 Easebourne Lane heading off in a north easterly direction towards Petworth, and the A286 Dodsley Lane taking a north westerly route towards Fernhurst.

Discussions with Local Highway Officers highlighted potential concerns with regards to the operation of the;

- A272 Petersfield Road / A286 Rumbolds Hill / West Street / A286 Bepton Road mini-roundabout

Local Plan Allocations

Housing Allocations

Two housing scenarios have been tested for Midhurst;

Scenario 1	150 dwellings
Scenario 2	240 dwellings

Information provided by SDNP on committed developments and recent completions has been reviewed and it was determined that the development traffic from the King Edward VII development near Fernhurst should be fully considered, i.e. by dwellings removed from the background growth and the development traffic movements added back in separately for a more robust assessment. No further developments were considered to have a significant impact on the settlement.

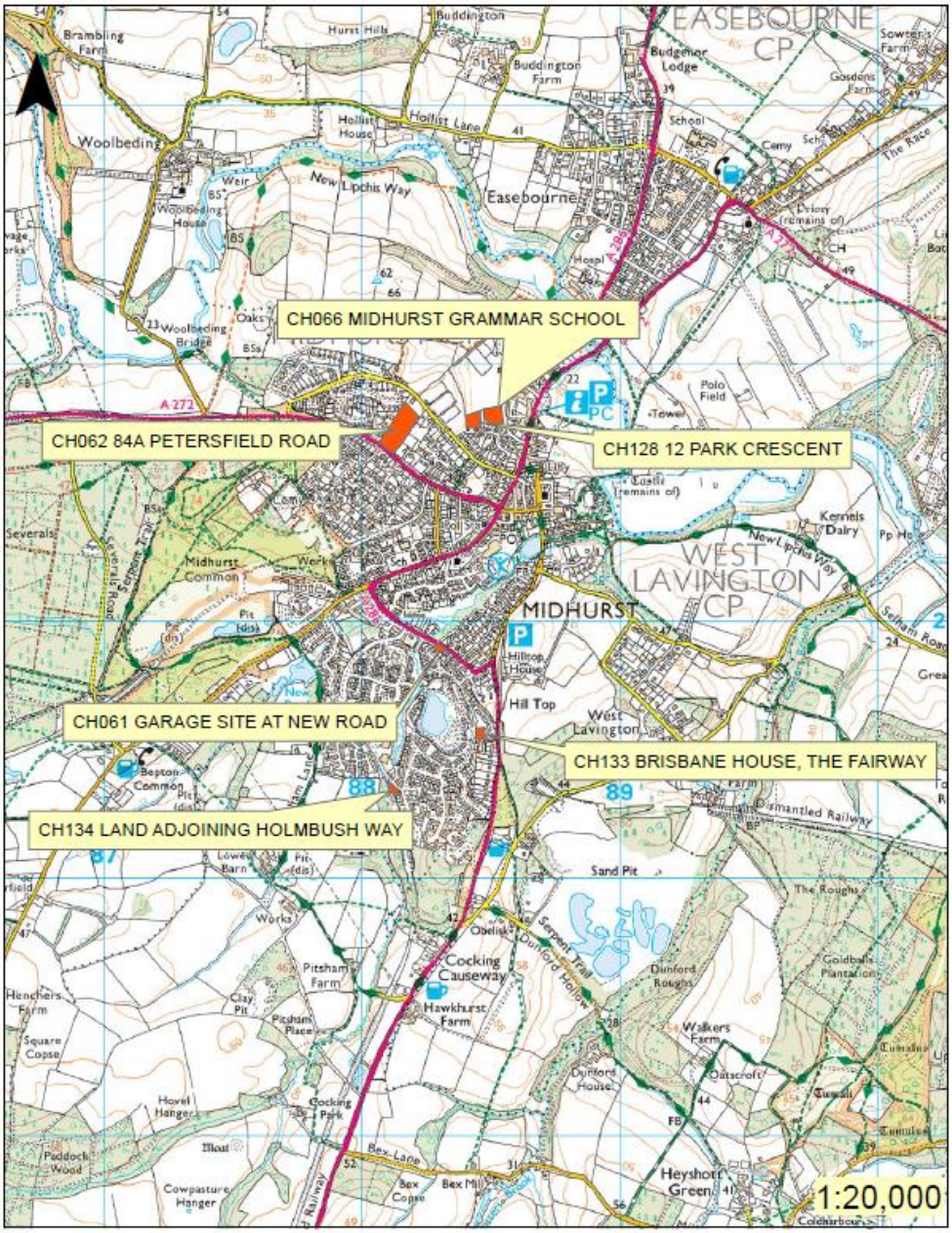
The location of the proposed housing allocations taken from the Strategic Housing Land Availability Assessment (SHLAA) for the SDNPA is presented in Figure 8.1. It is understood that Midhurst Town Council is not preparing a Neighbourhood Plan.

For the purpose of this TA the housing numbers proposed for the individual sites, as identified in the SHLAA, have been factored to reflect the total level of development which the SDNP scenarios require to be tested for Midhurst (Table 8.1). The number of dwellings shown on each site in the two scenarios should not be seen as proposals. They are simply a tool to estimate what proportion of the total proposed development in the town (i.e. 150 dwellings) might come forward in which broad area of the town, on the basis of the distribution of sites found suitable in the 2015 SHLAA.

Table 8.1 Midhurst Number of Dwellings

SHLAA Ref	Development Site Name	Dwellings in SHLAA	% of Total Dwellings	Dwellings in Scenario 1	Dwellings in Scenario2
CH061	Garage Site at New Road	5	6%	9	14
CH062	84A Petersfield Road	40	47%	71	113
CH066	Midhurst Grammar School	15	18%	26	42
CH128	12 Park Crescent	10	12%	18	28
CH133	Brisbane House, The Fairway	10	12%	18	28
CH134	Land Adjoining Holmbush Way	5	6%	9	14
TOTAL		**85**	**100%**	**150**	**240**
**Errors may occur due to rounding*					

Figure 8.1 Midhurst Housing Allocations



No employment allocations are proposed for Midhurst.

Development Traffic Flows

A summary of the total trip generations for the proposed sites for both development scenarios is presented in Table 8.2.

Table 8.2 Midhurst Total Trip Generation

Vehicle Trips	AM Peak (0800-0900)		PM Peak (1700-1800)	
	S1	**S2**	**S1**	**S2**
Arrivals	23	36	51	82
Departures	52	84	28	46
Total (Two-way)	**75**	**120**	**79**	**128**
**Errors may occur due to rounding*				

Development Traffic Distribution and Assignment

Applying the methodology described in Section 0, 2011 Census data was used to create the traffic distribution for the draft proposed housing sites in Midhurst. The Traffic Flow Diagrams are presented in Appendix I and a summary of movements into the junctions presented in Table 8.3.

Where the destination remained within Midhurst, traffic was distributed from each site to the centre of the town. This totalled 23% of traffic.

Table 8.3 Local Plan Traffic Flows through Midhurst Junctions

Junction	Scenario 1		Scenario 2	
	AM	**PM**	**AM**	**PM**
Petersfield Road / Rumbolds Hill / West Street / Bepton Road	86	86	121	120

The development traffic flows presented in Table 8.3 are cumulative and include all vehicle movements generated by the proposed level of development in the SDNP, not just within Midhurst. As a result of these additional movements, the junction is expected to experience an increase in traffic flows, over the 50 vehicle threshold.

Based on the findings presented in Table 8.3, it was determined that the junction capacity should be assessed to determine whether the proposed level of development can be accommodated by the junction.

Petersfield Road / Rumbolds Hill / West Street / Bepton Road

Overview

This is a four arm mini roundabout in a highly constrained location, with the A272 forming the western arm (Petersfield Road) and A286 forming the northern and southern arms of the junction (Rumbolds Hill and Bepton Road). West Street forms the eastern arm of the roundabout. All approaches are single lanes with minimal flaring, and the circulating carriageway is one lane.

There is a signal controlled crossing on Bepton Road (A286) to the south of the junction, but no further pedestrian crossing facilities are provided.

Rumbolds Hill (A286) is a narrow link, as too is West Street, although the volume of traffic using West Street is minor in comparison.

Accident Analysis

One PIA record (see Appendix J), which was slight in nature, was recorded on the southbound exit of the Bepton Road arm. The collision occurred when a cyclist ignored a pedestrian crossing, resulting in the pedestrian and cyclist colliding.

Junction Assessment

To determine whether further junction capacity assessments are required, a percentage impact assessment was undertaken to compare the increase in development traffic for both residential and employment options (Scenarios 1 and 2) per arm against the 2032 reference case. The results are presented in Table 8.4 and Appendix K.

Table 8.4 Midhurst Percentage Impact

		Scenario 1			Scenario 2		
		Total Dev. Traffic	2032	2032 % Impact	Total Dev. Traffic	2032	2032 % Impact
Rumbolds Hill	AM	31	624	5%	42	624	7%
	PM	42	729	6%	57	729	8%
West Street	AM	0	80	0%	0	80	0%
	PM	0	82	0%	0	82	0%
Bepton Road	AM	17	545	3%	25	545	5%
	PM	21	551	4%	30	551	5%
Petersfield Road	AM	39	552	7%	55	552	10%
	PM	23	599	4%	33	599	5%

The results presented in Table 8.4 demonstrate that the addition of the development traffic onto the junction will have a discernible impact, with the maximum increase of 10% on Petersfield Road in 2032 PM peak, and Rumbolds Hill also experiencing a 7-8% increase in traffic. Based on the above findings, and as WSCC Officers had requested further assessment, junction modelling was undertaken.

Table 8.5 presents the results of the ARCADY modelling to demonstrate the change in junction performance in the future year both with and without the proposed developments scenarios.

Table 8.5: Rumbolds Hill / West Street / Bepton Road / Petersfield Road Junction Capacity Assessment

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - 1. BASE 2016							
A286 Rumbolds Hill	2.97	24.97	0.76	C	8.82	53.30	0.94	F
West Street	0.34	12.42	0.25	B	0.33	13.81	0.25	B
A286 Bepton Road	8.73	75.31	0.94	F	6.50	59.87	0.91	F
A272 Petersfield Road	3.92	27.66	0.82	D	2.05	16.83	0.68	C
	A1 - 2. BASE 2032							
A286 Rumbolds Hill	43.92	231.02	1.13	F	117.32	567.87	1.28	F
West Street	0.70	20.41	0.41	C	0.53	18.49	0.35	C
A286 Bepton Road	97.88	712.87	1.35	F	112.45	840.25	1.39	F
A272 Petersfield Road	20.16	97.26	1.06	F	9.92	60.26	0.95	F
	A1 - 3. BASE + DEV PO 2032							
A286 Rumbolds Hill	61.03	315.51	1.18	F	156.10	756.84	1.35	F
West Street	0.67	20.09	0.40	C	0.54	18.81	0.36	C
A286 Bepton Road	118.91	857.39	1.38	F	136.70	1014.32	1.46	F
A272 Petersfield Road	31.13	139.82	1.11	F	12.72	74.01	0.98	F
	A1 - 4. BASE + DEV MID+60% 2032							
A286 Rumbolds Hill	60.09	306.45	1.19	F	166.28	818.82	1.36	F
West Street	0.67	20.06	0.40	C	0.54	18.85	0.36	C
A286 Bepton Road	164.91	995.15	1.46	F	140.22	1046.61	1.47	F
A272 Petersfield Road	32.49	145.18	1.11	F	13.21	75.64	0.99	F

Base 2016 Results

The model results show that in the AM peak the junction is already operating over operational capacity on Bepton Road with a predicted RFC value of 0.94. A delay of 1.25 minutes and a queue of 9 vehicles is predicted. All other arms are within acceptable parameters.

In the PM peak, Rumbolds Hill and Bepton Road are both shown to have RFC values exceeding operational capacity, returning values of 0.94 and 0.91 respectively, and predicted delays of less than 1 minute. Therefore although the junction demonstrates some warning signs, it is still operating within acceptable parameters.

Base 2032 Results

By 2032 the operation of the junction worsens with the three major arms, all predicted to have RFCs in excess of 1.0, in both the AM and PM peaks. As the junction is predicted to be operating over capacity, the queuing results are considered unreliable. Delay is expected to be in excess of 2 minutes on the 2 of the 3 main arms in the AM peak and in the PM peak, severe delays over 3 minutes are predicted for Rumbolds Hill and Bepton Road.

Base 2032+ Scenario 1 Results

In comparison the difference between the 2032 RC and the 2032 RC plus Scenario 1, shows a relatively minor reduction in junction performance with RFCs increasing by between 0.01 and 0.05 in the AM peak. In the PM peak RFCs are expected to increase by between 0.03 and 0.07.

The difference between the 2032 RC and the 2032 RC plus Scenario 1 predicts;

- Rumbolds Hill, increase in delay of 85 seconds in the AM peak and 189 seconds in the PM peak;
- West Street: no impact on delay
- Bepton Road; an increase in delay of 144 seconds in the AM peak and 174 seconds in the PM peak; and
- Petersfield Road; an increase in delay of 43 seconds in the AM peak and 14 seconds in the PM peak.

The results demonstrate that both arms of the A286 will experience a severe impact in the peak periods. The increase in delay is less significant on the A272 particularly in the PM peak, where the RFC is less than 1.0. For the County strategic network, the level of delay expected as a result of the development proposals is classified as severe and mitigation measures should therefore be investigated.

Base 2032+ Scenario 2 Results

The 2032 RC plus Scenario 2 predicts a further - albeit minor - reduction in junction capacity / operation when compared to the Scenario 1 results, with RFCs increasing by 0.08 in the AM peak and by 0.01 in the PM peak.

The difference between the 2032 RC and the 2032 RC plus Scenario 2 predicts;

- Rumbolds Hill, increase in delay of 75 seconds in the AM peak and 251 seconds in the PM peak;
- West Street: no impact on delay
- Bepton Road; an increase in delay of 282 seconds in the AM peak and 207 seconds in the PM peak; and
- Petersfield Road; and increase in delay of 48 seconds in the AM peak and 16 seconds in the PM peak.

The results demonstrate that both arms of the A286 will experience a severe impact in the peak periods. The increase in delay is less significant on the A272 particularly in the PM peak, where the RFC is less than 1.0. For the County strategic network the level of delay expected as a result of the development proposals is classified as severe and mitigation measures should therefore be investigated.

Results of this severity could lead to unwanted increases in through traffic using unsuitable routes to avoid the junction at congested times of the day. Routes potentially vulnerable to unsuitable additional traffic include June Lane, Hollist Lane and Woolbeding Lane, all of which are narrow country lanes.

Scope for Highway Mitigation Measures

There is potentially some scope to widen the Petersfield Road arm, but this would result in the loss of footways to the detriment of pedestrians. Furthermore, the amount of carriageway gained by widening into the footway would be minimal and not sufficient to have any significant impact on the operation of the mini-roundabout. There is limited scope to undertake meaningful mitigation on the Bepton Road arm, due to the presence of the existing signalised crossing, which would be undesirable to take out. It is also not feasible to widen the carriageway through Rumbolds Hill, due to a lack of available land, for example the footways are already narrow and the building line abuts the back of the footway. Any widening of the carriageway through this link would be to the detriment of pedestrian safety.

Consequently after investigation it is concluded that there is not a deliverable physical method of mitigation for this junction.

Summary

Junction	2016		2032 RC		2032RC +S1		2032RC +S2	
	AM	PM	AM	PM	AM	PM	AM	PM
Rumbolds Hill / West Street / Bepton Road / Petersfield Road	Acceptable	Acceptable	Over capacity	Over capacity	Severe	Severe	Severe	Severe

The TA has identified a severe impact at the junction in the future year scenario which is the impact of the background growth and the committed development at the King Edwards VII Estate near Fernhurst. The addition of development traffic associated with the Local Plan allocations, thereby worsens the traffic congestion at this junction.

The potential for direct mitigation at this location is considered to be extremely limited due to the urban environment and the need to maintain facilities for non-motorised users. It is therefore recommended that further discussions with WSCC are undertaken to agree commonly agreed priorities, recognising that the methodology employed for the TA reflects a worst case position.

As noted in the introduction and methodology sections, this TA is based on a robust evidence base using vehicle trips and observed traffic profiles. The modelling work undertaken has not therefore take account of behavioural change responses, such as peak spreading, route choice and modal choice. Should the levels of delay predicted for the development scenarios come to fruition, then it is likely that a proportion of drivers will modify their behaviour by leaving earlier or later, to avoid the most severe impacts. Furthermore if drivers are undertaking relatively short journeys, there may also be the potential for modal shift, through the introduction on new infrastructure / services and by marketing measures. This TA does not quantify these changes in percentage terms, due to a lack of empirical evidence from comparable locations. It has however been able to quantify, through the use of the WSCC Strategic Model the potential impact that re-routing of longer distance trips may

have on junction performance. Sensitivity testing of the effects of re-routing longer distance through traffic away from Midhurst is discussed in Chapter 11 of this report.

9 Fernhurst (former Syngenta Strategic Site)

Introduction

This chapter provides an overview of the existing and future transport and traffic situation in the vicinity of the former Syngenta strategic site located to the south of Fernhurst. It consists of an outline of the transport network, proposed development scenarios and the findings of the traffic impacts of the Local Plan development scenarios.

Context

Local Highway Authority	West Sussex County Council (WSCC)
Key Planning Policy	Fernhurst Neighbourhood Plan (referendum version December 2015)
Population	5,334 (2011 Census)
Households	2,094 (2011 Census)
Amenities	Primary school, community centre, grocery store.

Highway Network

The former Syngenta site is situated approximately 1.5km to the south of the village of Fernhurst and 5.5km to the north of Midhurst. The strategic site is adjacent to the A286, which is aligned in an approximate north south direction. Within the SDNP the A286 routes from Kingsley Green in the north to East Lavant in the south and in the vicinity of the site, provides access to Haslemere in Surrey and the A3 to the north, and Midhurst and the A272 corridor to the south.

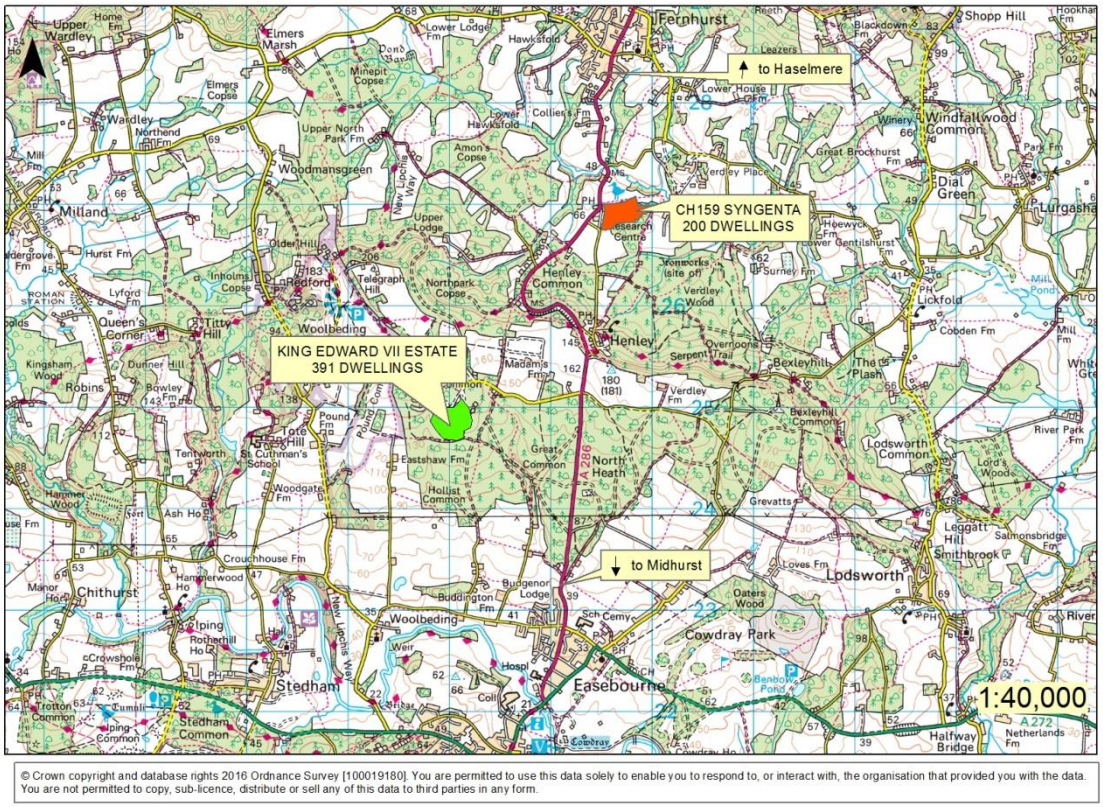
In recent years, a number of planning applications (and scoping requests) have been submitted, a number of which have been accompanied by either a TS or a TA. A review of these planning applications revealed that the A272 Easebourne Lane / Cowdray Park Access / A272 North Street / A286 Dodsley Lane junction situated approximately 5km to the south of the site at Easebourne (to the north of Midhurst) is approaching operational capacity and is expected to exceed theoretical capacity in the future. These findings in combination with discussions with WSCC officers indicated that this junction should be considered in more detail. WSCC officers had no further concerns with regards to the operation of other junctions within the vicinity of this site.

Local Plan Allocations

Housing Allocations

One housing led scenario has been allocated in the Fernhurst NDP for the former Syngenta Site, consisting of 200 dwellings. The location of the former Syngenta site is shown in Figure 9.1.

Figure 9.1 Former Syngenta Site, Fernhurst



It was determined that the consented development at the King Edward VII Estate would need to be considered in this study in more detail, i.e. dwelling numbers removed from the background growth and development traffic added back in separately.

The King Edward VII Estate is located approximately 2.5km to the south east of the former Syngenta site. The site was originally consented permission (planning ref: 11/03635/FULNP) for;

- 337 apartments / houses;
- 79 assisted care living units (use Class 2 (C2)[12]);

The trip generation associated with the Estate[13] has been incorporated on top of the base traffic flows for the future year scenarios.

Development Traffic Flows

A summary of the total trip generation for the proposed site is provided in Table 9.1.

12 The permission was amended (planning ref: SDNP/15/02213/FUL) to change the C2 land use to 54 residential units (C3).
13 As set out in TS produced by Bellamy Roberts LLP accompanying the Planning Applications

Table 9.1 Former Syngenta Site Fernhurst Total Trip Generation

Vehicle Trips	AM Peak (0800-0900)	PM Peak (1700-1800)
Arrivals	30	69
Departures	71	38
Total (Two-way)	**101**	**107**
**Errors may occur due to rounding*		

Development Traffic Distribution and Assignment

Applying the methodology described in Section 3, 2011 Census data was used to create the traffic distribution for the draft proposed housing sites in Fernhurst. The Traffic Flow Diagrams are presented in Appendix L and summarised in Table 9.2.

Where the destination remained within Fernhurst, traffic was distributed from the site to the north, towards Fernhurst village. This totalled 12% of traffic.

Table 9.2 Former Syngenta Site Fernhurst Traffic Flows into Junction

Junction	Scenario 1		Scenario 2	
	AM	PM	AM	PM
Easebourne Lane / Cowdray Park Access / North Street / Dodsley Lane	76	78	101	106

Although there is only one development scenario for the former Syngenta site, two scenarios are shown in Table 9.2 to account for traffic routing through this junction from other allocation sites within the SDNP i.e. Petworth and Midhurst.

Table 9.2 demonstrates that this junction will experience an increase of over 50 vehicle movements in each peak period for both development scenarios.

Based on the findings presented in Table 9.2 from information noted in previous scoping responses for development at the site[14] and from discussions with Local Highway Officers, junction capacity assessments were considered necessary to determine whether the proposed cumulative level of development would have a severe impact on junction performance.

[14] SDNP/15/01966/SCOPE

Easebourne Lane / Cowdray Park access / North Street / Dodsley Lane

Accident Analysis

A total three PIA records (see Appendix M) have been recorded over the latest three year period of which two were slight in nature and one was fatal.

The fatal collision occurred on 19/05/2013 at 16:55, when a car travelling east on the A272 failed to negotiate left hand bend/kink in the road causing it to cross into the path of an oncoming car.

One of the slight collisions occurred when two cars entered the roundabout at the same time from different directions. The first car continued on its intended path and subsequently collided with another vehicle, waiting to enter the roundabout.

The remaining slight collision was a shunt type, occurring when a car stopped on the bridge to allow a bus to come through safely and another vehicle drove into its rear.

The analysis of the PIAs indicate that all of the accidents occurred as a result of driver error and does not highlight any overriding highway deficiencies or safety concerns that would be exacerbated by the proposed level of traffic associated within the SDNP Local Plan.

Junction Assessment

To determine whether further junction capacity assessments are required, a percentage impact assessment was undertaken to compare the increase in development traffic for both residential and employment options (Scenarios 1 and 2) per arm against the 2032 RC. The results are presented in Table 9.3 and Appendix N.

Table 9.3 Former Syngenta Site Fernhurst Percentage Impact

		Scenario 1			Scenario 2		
		Total Dev. Traffic	2032 (Inc. Committed Development)	% Impact	Total Dev. Traffic	2032 (Inc. Committed Development)	% Impact
Easebourne Lane	AM	19	413	5%	25	412	6%
	PM	28	519	5%	36	517	7%
Cowdray Park	AM	0	5	0%	0	5	0%
	PM	0	39	0%	0	39	0%
North Street	AM	44	883	5%	60	881	7%
	PM	34	922	4%	47	920	5%
Dodsley Lane	AM	13	433	3%	16	432	4%
	PM	16	411	4%	23	410	6%

The results presented in Table 9.3 demonstrate that the addition of the development traffic results in an increase of between 3 to 5% in Scenario 1 and a 4 to 7% increase for Scenario 2. The results show a less than 10% impact, however, the overall impact of the proposed

Local Plan development traffic has been reduced due to the inclusion of the committed development traffic for the King Edward VII site in the 2032 reference case. As junction capacity had already been raised as an issue, it was therefore considered necessary to undertake further modelling.

Table 9.4 presents the results of the ARCADY modelling to demonstrate the change in junction performance in the future year both with and without the proposed developments scenarios.

Table 9.4 Easebourne Lane /Cowdray Park / North Street / Dodsley Lane roundabout Junction Capacity

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - 1. 2016 BASE							
Easebourne Lane	0.87	7.78	0.47	A	1.47	10.52	0.60	B
Cowdray Park	0.00	0.00	0.00	A	0.23	22.71	0.19	C
North Street	4.73	21.37	0.83	C	4.95	22.39	0.84	C
Dodsley Lane	1.22	13.20	0.55	B	1.70	16.92	0.64	C
	A1 - 2. 2032 BASE PO							
Easebourne Lane	1.27	10.23	0.56	B	2.30	14.84	0.70	B
Cowdray Park	0.00	0.00	0.00	A	0.51	44.42	0.35	E
North Street	16.60	64.04	0.98	F	30.75	105.50	1.03	F
Dodsley Lane	3.78	30.20	0.80	D	3.66	30.73	0.80	D
	A1 - 3. 2032 BASE PO + DEV							
Easebourne Lane	1.44	11.08	0.59	B	2.83	17.50	0.75	C
Cowdray Park	0.00	0.00	0.00	A	0.70	62.57	0.43	F
North Street	29.48	101.19	1.02	F	45.39	144.70	1.07	F
Dodsley Lane	4.67	36.53	0.84	E	4.48	36.51	0.83	E
	A1 - 5. 2032 BASE MID+60% + DEV							
Easebourne Lane	1.49	11.36	0.60	B	3.03	18.52	0.76	C
Cowdray Park	0.00	0.00	0.00	A	0.80	71.90	0.47	F
North Street	34.57	114.89	1.04	F	51.20	160.14	1.08	F
Dodsley Lane	4.89	38.04	0.85	E	4.87	39.21	0.85	E

Base 2016 Results

The model results show that in the AM peak the junction is operating within capacity, although the RFC on North Street is approaching operational capacity of 0.85. All other arms are expected to operate well within capacity with queues and delay all within acceptable parameters.

In the PM peak, the junction capacity is still within operational capacity although performance is expected to be slightly worse than the AM peak.

Base 2032 Results

By 2032 the operation of the junction worsens with the North Street predicted to exceed capacity in both the AM and PM peak hours, with delays expected to be below two minutes.

The capacity of Dodsley Lane, although within operational capacity (RFC of 0.80), has however worsened significantly from the 2016 base model with an increase in delay of 17 seconds in the AM peak and 14 seconds in the PM peak.

Base 2032+ Scenario 1 Results

In the AM peak, the RFC for North Street increases to 1.02, delay increases by 37 seconds and queues are predicted to increase by 13 vehicles. Dodsley Lane is shown to be approaching operational capacity although queues are still acceptable, however the delay experienced (c.37seconds) is resulting in a reduction in performance on this arm.

In the PM peak North Street's RFC worsens by 0.04, queues increase by 15 vehicles and delay increases by a further 36 seconds, taking the total delay on this arm 2.4 minutes, which is over what is generally accepted to be the recommended wait time. The access to Cowdray Park shows a minimal queue, but due to extra traffic circulating around the roundabout therefore reducing the gaps in the traffic, the delay experienced is over 1 minute.

Although the RFC has risen above operational capacity on North Street, the level of delay created by the Scenario 1 development traffic equates to 37 seconds in the AM peak and 40 seconds in the PM peak. This is not considered to be a significant impact. All other arms are shown to be operating within capacity, therefore, the cumulative impacts of development above the 2032 reference case are not considered to be severe. This assessment has been agreed with the Local Highway Authority.

Base 2032+ Scenario 2 Results

Compared to the Scenario 1 results there is a slight but not significant deterioration in the performance of the junction when a higher level of development traffic is added to the junction, with all arms, except North Street, still within operational capacity and delays within acceptable limits, i.e. less than 2 minutes. Therefore based on the modelling results it is concluded that the cumulative impacts of development are not severe. Again this assessment has been agreed with the Local Highway Authority.

Highway Mitigation Measures

Following the investigation and analysis of the junction it is concluded that there is no requirement for highway mitigation measures.

Summary

Junction	2016		2032 RC		2032RC +S1		2032RC +S2	
	AM	PM	AM	PM	AM	PM	AM	PM
Easebourne Lane / Cowdray Park Access / North Street / Dodsley Lane	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable

The summary of the traffic impacts demonstrates that the junction is able to accommodate the proposed level of development without the requirement for mitigation.

10 Petworth

Introduction

This chapter provides an overview of the existing and future transport and traffic situation within the settlement of Petworth. It consists of an outline of the transport network, proposed development scenarios and the findings of the traffic impacts resulting from different Local Plan development scenarios.

Context

Local Highway Authority	West Sussex County Council (WSCC)
Key Planning Policy	Neighbourhood Plan under construction (expected 2017)
Population	4,742 (2011 Census)
Households	2,114 (2011 Census)
Amenities	High Street , supermarket, cafes, primary school, Petworth House

Highway Network

Petworth is a small town located at the junction of the A272 (an east-west road from Heathfield to Winchester), the A283 (linking Milford to Shoreham-by-Sea) and the A285 (linking Petworth to the east of Chichester). Petworth is situated approximately;

- 21 km to the north-east of Chichester;
- 29km to the north west of Shoreham-by-Sea;
- 9km to the east of Midhurst accessed along the A272; and
- 14km to the south east of Haslemere in Surrey.

There is a one-way system through the centre of Petworth, for traffic travelling;

- North (i.e. eastbound on the A272 or north-west bound on the A283) traffic routes via Pound Street, Park Street and Church Street.
- South through the town (i.e. westbound on the A272 or south-eastbound on the A283) will route along East Street.

The roads through the town centre are narrow and on-street parking is permitted in certain locations. The main car park is located at the southern end of Market Square and therefore only accessible by negotiating the one way system. The one way system comes into operation to the north of the Park Road / Saddler's Row / Pound Street crossroads, and affects the following roads; Park Road → Church Road → East Street → New Street → Golden Square -→ Market Square → Saddler's Row.

There is also a 7.5 tonne weight restriction covering the town centre. The diversion route for HGVs is to the south of the town via;

- A285 Station Road to Haslingbourne Lane - to reconnect with the A283 at Egham to the south east of the town centre; and
- A285 Station Road to Haslingbourne Lane to Kingspit Lane - to connect with the A272 Horsham Road to the north east of the town centre.

The A283 and A272 multiplex for the entire one-way system though the town. To the north of the town centre both roads continue to a mini-roundabout junction. The A283 then continues north, whilst the A272 continues east.

A review of recent planning applications within the settlement did not reveal any developments which would generate significant levels of traffic and whilst a number of TS were produced for developments within the town, no junction capacity assessments were undertaken.

Discussions with officers at WSCC highlighted potential concerns with regards to the operation of the following junctions within Petworth:

- A272 Tillington Road / Pound Street / A285 Station Road;
- A283 New Street / A283 Angel Street / East Street / Middle Street; and,
- A283 London Road / A272 Horsham Road / A272 North Street.

Petworth Transport Advice Study (2016)

This study was undertaken for the Parish Council to assist with the preparation of the Petworth Neighbourhood Plan. The Study focused on existing issues and potential solutions and therefore did not take into account the impact that the proposed housing and employment allocations could potentially have on the Town and its surrounding highway network.

The Study acknowledged that key challenges for Petworth include;

- Maintain its status as an economic hub;
- Tourist attraction e.g. Petworth House and Antiques Shops;
- High proportion of car journeys e.g. 76% residents from Petworth travel to work by car compared to 71% in Chichester District and 69% in the South East Region;
- Limited public transport opportunities e.g. closest rail stations are Haslemere (11 miles) and Pulborough (5 miles), hourly at best bus services;
- Sparseness of major roads, resulting in traffic concentrated to A272 / A283;
- Narrow streets and on-street parking within the Town Centre creates problems for traffic, especially HGVs;
- Inconsistent signing on routes into Town Centre and inadequate signing within the Town Centre, e.g. directions to main car park

In response to the existing challenges, the Study proposed a set of ‘Concept Improvement Options’, which consisted of;

- Market Square – options to create shared space;

- Gateways and Links – options to create more features on the key routes into the Town Centre;
- HGV Routing – options to increase the extent of current HGV restrictions;
- Parking Signage – options to improve the signage to car parks;
- Through Traffic Restrictions – consideration or trailing; and
- Public Transport Improvements – Hoppa services and frequency improvement

Local Plan Allocations

Housing Allocations

Two housing scenarios have been tested for Petworth;

Scenario 1	150 dwellings
Scenario 2	240 dwellings

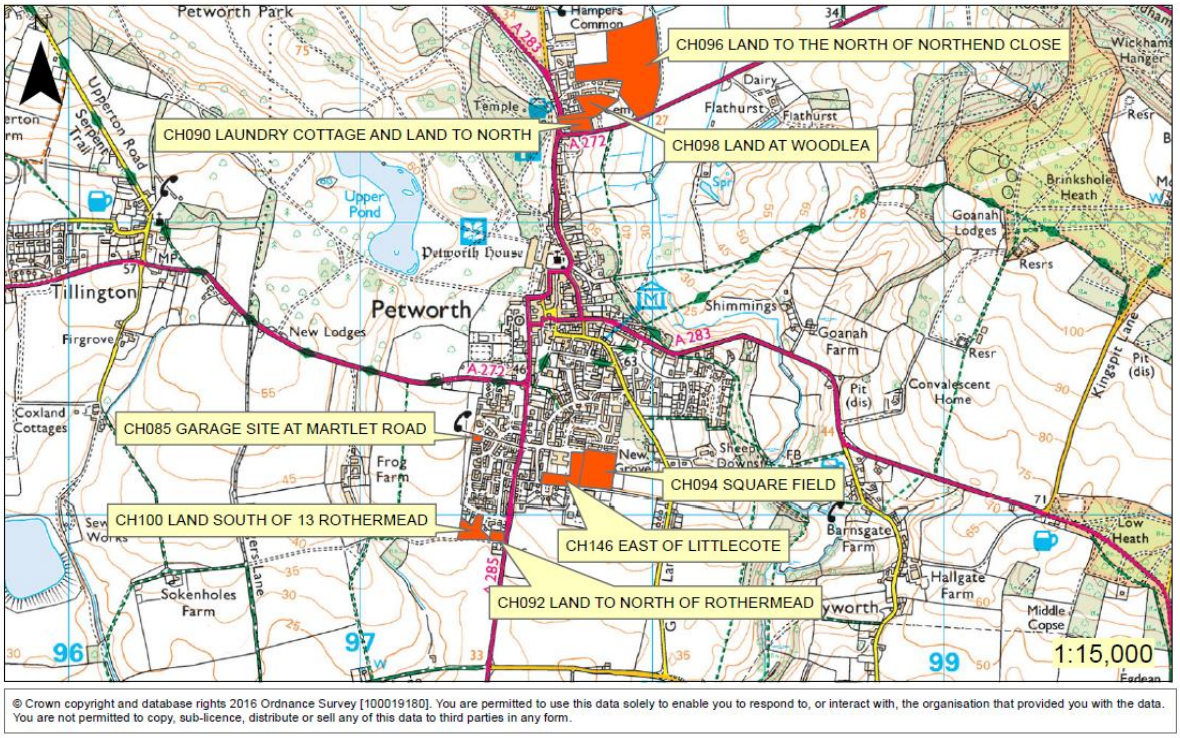
The location of the proposed housing allocation sites is presented in Table 10.1 and Figure 10.1 has been taken from the SHLAA for the SDNPA. Petworth Town Council are currently preparing a Neighbourhood Plan, with consultation on the vision, objectives and policy ideas between June and July 2016.

As the housing numbers proposed in the SHLAA differ slightly to those in Scenario 1 and 2, the numbers presented in the SHLAA have been factored to represent the scenarios set by the SDNP, as shown in Table 10.1. The number of dwellings shown on each site in the two scenarios should not be seen as proposals. They are simply a tool to estimate what proportion of the total proposed development in the town (i.e. 150 dwellings) might come forward in which broad area of the town.

Table 10.1 Petworth Number of Dwellings

SHLAA Ref	Development Site Name	Dwellings in SHLAA	% of Total Dwellings	Dwellings in Scenario 1	Dwellings in Scenario2
CH085	Garage Site at Martlet Road	5	3%	5	8
CH090	Laundry Cottage and Land to North	7	5%	7	11
CH092	Land to North of Rothermead	6	4%	6	9
CH094	Square Field	70	45%	68	109
CH096	Land to the North of North End Close	20	13%	19	31
CH098	Land at Woodlea	13	8%	13	20
CH100	Land South Of 13 Rothermead	8	5%	8	12
CH146	East of Littlecote	25	16%	24	39
TOTAL		**154**	**100%**	**150**	**240**
**Errors may occur due to rounding*					

Figure 10.1 Petworth Housing Allocations



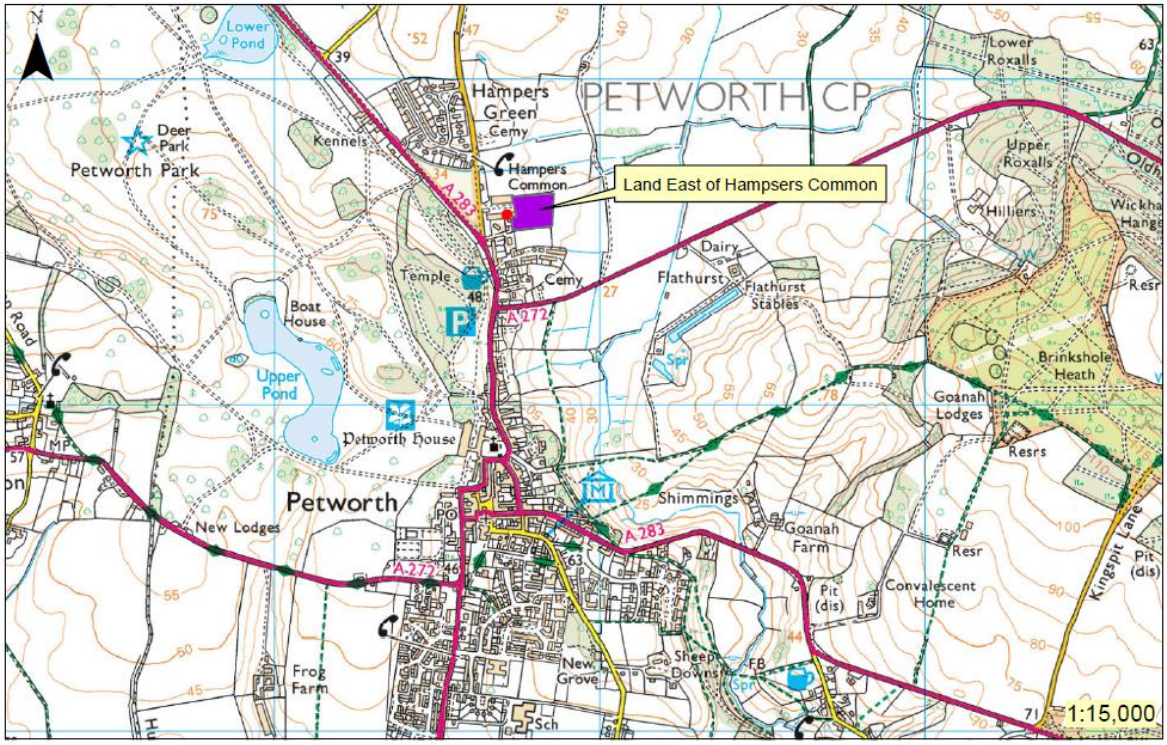
Employment Allocation Sites

One employment allocation, located to the north of Petworth, has been tested in this TA. The total area and developable area of the employment allocation in Petworth is presented in Table 10.2 and the location of the allocated site can be seen in Figure 10.2. An equal split between B2 and B8 employment uses has been applied.

Table 10.2 Petworth Employment Allocation

Site Name	Total Area (Ha / Sqm)	Developable Area (Ha / Sqm)
Land East of Hampers Common	0.95 / 9,500	0.43 / 4,275

Figure 10.2 Petworth Employment Allocation



Development Traffic Flows

A summary of the total trip generation for the proposed housing and employment allocation sites for both scenarios is presented in Table 10.3.

Table 10.3 Petworth Total Trip Generation

Vehicle Trips	AM Peak (0800-0900)		PM Peak (1700-1800)	
	S1	**S2**	**S1**	**S2**
Arrivals	68	82	56	87
Departures	61	93	64	81
Total (Two-way)	**129**	**175**	**120**	**168**
**Errors may occur due to rounding*				

Development Traffic Distribution and Assignment

Applying the methodology described in Section 0, 2011 Census data was used to create the traffic distribution for the draft proposed housing sites in Petworth. The Traffic Flow Diagrams are presented in Appendix O and a summary of the movements into the junctions is presented in Table 10.4.

Where the destination remained within Petworth, traffic was distributed from each site to the centre of the town. This totalled 13% of traffic.

Table 10.4 Local Plan Traffic Flows into Petworth Junctions

Junction	Scenario 1		Scenario 2	
	AM	PM	AM	PM
Tillington Road / Pound Street / Station Road	92	88	126	124
New Street / Angel Street / East Street / Middle Street	47	58	61	76
London Road / Horsham Road / North Street	94	84	117	110

The development traffic flows presented in Table 10.4 are cumulative and include all vehicle movements generated by the proposed level of development in the SDNP, not just within Petworth.

Table 10.4 demonstrates that all the junctions within Petworth (where capacity assessments were undertaken) are expected to experience a considerable increase in traffic flows as a result of the proposed housing allocation sites over the 50 vehicle threshold.

Based on the findings presented in Table 10.4, and in conjunction with WSCC Officers, it was agreed that the junction capacity should be assessed to determine whether the proposed level of development traffic would have a severe impact on the junction performance. To take account of the weight limit restrictions through Petworth town centre, HGVs flows have been directly inputted into the models, rather than relying on a default proportion of traffic.

Tillington Road / Pound Street / Station Road mini- roundabout

Overview

This junction is a three arm mini-roundabout on the western approach to Petworth, with Tillington Road (A272) forming the western arm, Pound Street forming the northern arm and Station Road (A285) forming the southern arm. All three arms are single lane entry with a small amount of flaring on the Tillington Road and Station Road arms. The mini-roundabout is positioned on a slight incline, with a high brick wall on the northern side of Tillington Road.

There is a signal controlled pedestrian crossing on Station Road, c.35m south of the mini-roundabout. There are narrow footways around the perimeter of junction, however the footway adjacent to the northbound carriageway on Pound Street terminates c.20m north of the junction.

Accident Analysis

One slight PIA record (see Appendix P) was recorded at the mini-roundabout. The accident occurred when a vehicle travelling south on Pound Street indicated to turn right onto

Tillington Road, however a vehicle, travelling north on the Station Road failed to give way, causing the collision.

As a result of the low number of PIAs at this location, and given that the recorded PIA can be attributed to driver error, it is concluded that there is no discernible trend likely to be exacerbated by the proposed level of development traffic.

Junction Assessment

To determine whether further junction capacity assessments are required, a percentage impact assessment was undertaken to compare the increase in development traffic for both residential and employment options (Scenarios 1 and 2) per arm against the 2032 reference case. The results are presented in Table 10.5 and Appendix Q.

Table 10.5 Tillington Road / Pound Street / Station Road Percentage Impact

		Scenario 1			Scenario 2		
		Total Dev. Traffic	2032 (Inc. Committed Development)	% Impact	Total Dev. Traffic	2032 (Inc. Committed Development)	% Impact
Pound Street	AM	24	457	5%	34	457	8%
	PM	51	639	8%	68	639	11%
Station Road	AM	44	586	7%	60	586	10%
	PM	20	420	5%	30	420	7%
Tillington Road	AM	24	481	5%	32	481	7%
	PM	18	451	4%	26	451	6%

Table 10.5 shows that Pound Street and Station Road are expected to have a 10% or greater impact in the Scenario 2, therefore further capacity assessments are required for this junction.

This section is focused on changes in the performance of individual junctions in terms of RFC, delay and queuing values in different forecasting scenarios based upon unconstrained travel demand growth.

Table 10.6 presents RFC, delay and queuing values forecasted for all development scenarios to demonstrate the change in junction performance.

Table 10.6 Tillington Road / Pound Street / Station Road Junction Capacity Assessment

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - 1. BASE 2016							
POUND STREET	1.89	15.72	0.67	C	4.27	28.45	0.83	D
STATION ROAD	3.22	19.99	0.78	C	1.36	12.42	0.59	B
TILLINGTON ROAD	1.43	12.27	0.60	B	0.99	8.62	0.50	A
	A1 - 2. BASE 2032							
POUND STREET	3.27	24.15	0.79	C	15.27	88.31	0.98	F
STATION ROAD	6.85	34.88	0.91	D	2.13	16.93	0.69	C
TILLINGTON ROAD	2.34	17.66	0.71	C	1.43	10.79	0.60	B
	A1 - 3. BASE+DEV 2032 PO							
POUND STREET	4.05	28.66	0.82	D	34.37	174.58	1.05	F
STATION ROAD	11.01	54.10	0.98	F	2.49	19.23	0.73	C
TILLINGTON ROAD	3.02	21.93	0.77	C	1.59	11.66	0.62	B
	A1 - 5. BASE+DEV 2032 MID+60%							
POUND STREET	4.57	31.64	0.85	D	45.62	223.44	1.08	F
STATION ROAD	13.21	65.38	1.01	F	2.68	20.14	0.74	C
TILLINGTON ROAD	3.33	23.67	0.79	C	1.65	12.01	0.63	B

Base 2016 Results

The ARCADY model demonstrates that during the AM peak hours the junction is operating well within operational capacity. The busiest arm is Station Road with a queue of 3 vehicles and a delay of 20 seconds.

In the PM peak, Pound Street is the worst performing arm, however its RFC is still less than operational capacity, with delay less than 30 seconds and a queue of 5 vehicles. The other arms are all performing well within acceptable parameters, with the average delay significantly lower than the average delay threshold of 36 seconds as set by 'Junctions 8'.

Base 2032 Results

In the AM peak hours, the RFC on Station Road exceeds operational capacity (0.91), and the queuing delay is 35 seconds, therefore just within average delay threshold set by Junctions 8. Compared to 2016, average delay on Station Road delay has increased by 15 seconds, and the number of vehicles queueing increased from 4 to 7. Pound Street and Tillington Road are both still within capacity although queuing delay, has increased by 8 seconds on Pound Street and 6 seconds on Tillington Road.

In the PM peak hours, only Pound Street is predicted to be operating over operational capacity with an RFC of 0.98, and a delay of 1.5 minutes, an increase of 1 minute. Tillington Road and Station Road are expected to perform within capacity with minimal queues and acceptable levels of delay i.e. less than 30 seconds.

Base 2032 Results + Scenario 1

With the addition of the Scenario 1 development traffic the performance of the mini-roundabout declines further, with increases in queues and delay on all of the arms, compared to the 2032 RC. On Pound Street the RFC has increased to 0.82 and delay risen to 29 seconds from 24 seconds. On Station Road, the RFC now is approaching 1.0, delay has increased by 19 seconds to 54 seconds, and the number of vehicles in the queue has increased by 4. Tillington Road is still operating well within capacity: average delay has increased by only 4 seconds from the 2032 RC.

In the PM peak, Pound Street is the only arm expected to exceed capacity. It is however apparent that the modelling results are becoming unstable as the increase in RFC of only 0.07 has resulted in a 1.5 minute increase to the average delay, taking the average delay to almost 3 minutes, which is considered to be a severe impact.

As a severe impact is only demonstrated on one arm in one of the peak periods it is concluded that on balance the junction can accommodate the development traffic associated with the 2032 RC plus Scenario 1. It is considered likely that behavioural change responses to the PM peak delay on Pound Street, for example peak spreading or the re-routing of trips to avoid travelling through Petworth would inevitably occur to compensate for this. Therefore capacity improvements at the roundabout are not considered necessary. This assessment has been agreed with the LHA.

Base 2032 Results + Scenario 2

With the addition of the Scenario 2 traffic, the AM peak results show that Station Road will be over capacity, and that Pound Street has approached operational capacity. Delay on Station Road is still however within acceptable limits.

In the PM peak, Pound Street is still the only arm expected to exceed capacity. The average delay is expected to be approaching 4 minutes with a 45 vehicles queuing. Given the constrained nature of Pound Street, this level of queueing could create severe network problems blocking back to the junction with Park Street and Saddler's Way.

It is therefore concluded that the impact of the Scenario 2 development on this junction will be severe and would potentially require mitigation measures if this development scenario were to be pursued. This assessment has been agreed with the LHA.

Highway Mitigation Measures

Following the investigation and analysis of the junction it is concluded that as there is only a severe impact on the Pound Street entry arm in the PM peak, the junction is considered to perform acceptably with the addition of the Scenario 1 development traffic.

Mitigation works would therefore be beneficial to the Pound Street arm. It is not however possible to provide physical engineering solutions at this junction without adversely affecting provision for pedestrians and or worsening visibility for motorists. Mitigation would therefore be limited to traffic management measures, for example reducing the amount of through

traffic through the Town Centre, a measure proposed in the Petworth Transport Advice Study (2016). This would however be subject to further testing to assess the effects of additional traffic volumes on Tillington Road and Station Road.

East Street / Angel Street / Middle Street / New Street

Overview

This junction is a four arm crossroads, occupying a central position within Petworth town centre. East Street forms the northern arm, with Angel Street (A283) forming the eastern arm, Middle Street the southern arm and New Street the western arm. The major arm flow is Angel Street to New Street, requiring vehicles on East Street (carrying the highest volume of traffic) and Middle Road to give way.

East Street and New Street form part of the one way system through the town, with traffic routed in a southbound direction on East Street and in a westbound direction on New Street. Angel Street and Middle Street both operate as two way streets, although both roads are narrow, and there in a notable pinch point on Angel Street, c.50m from the centre of the junction.

There is footway provision around the junction, it is however, very narrow i.e. less than 1m wide and there is no scope to widen it with properties directly abutting.

Accident Analysis

Only one PIA (see Appendix P) has been recorded during the latest three year period. The collision was slight in nature and occurred when a car failed to give way to another. The results do not therefore indicate any highway deficiencies or trends which could be worsened with the addition of the proposed level of development.

Junction Assessment

To determine whether further junction capacity assessments are required, a percentage impact assessment was undertaken to compare the increase in development traffic for both residential and employment options (Scenarios 1 and 2) per arm against the 2032 reference case. The results are presented in Table 10.7 and Appendix Q.

Table 10.7 East Street / Angel Street / Middle Street / New Street Percentage Impact

		Scenario 1			Scenario 2		
		Total Dev. Traffic	2032 (Inc. Committed Development)	% Impact	Total Dev. Traffic	2032 (Inc. Committed Development)	% Impact
East Street	AM	34	572	6%	48	572	8%
	PM	56	814	7%	72	814	9%
Angel Road	AM	6	195	3%	6	195	3%
	PM	0	129	0%	0	129	0%
Middle Street	AM	7	6	115%	7	6	120%
	PM	3	24	11%	4	24	17%
New Street	AM	0	0	0%	0	0	0%
	PM	0	0	0%	0	0	0%

Table 10.7 indicates that there will be a proportionately large impact on the Middle Street arm in the AM peak, due in part to the very low baseline levels of traffic, although the absolute increase is low. The impact on East Street is less than 10%. It was agreed with WSCC that the junction should have further capacity assessments.

Table 10.8 presents RFC, delay and queuing values forecasted for all development scenarios to demonstrate the change in junction performance.

Table 10.8 Angel Street (A)/ Middle Street (B) / New Street (C) / East Street (D) Junction Capacity Assessment[15][16]

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - 1. BASE 2016							
Stream B-ACD	0.02	9.77	0.02	A	0.08	12.53	0.08	B
Stream A-BCD	0.00	0.00	0.00	A	0.00	0.00	0.00	A
Stream D-ABC	33.77	195.84	1.12	F	174.56	1064.70	1.46	F
Stream C-ABD	0.00	0.00	0.00	A	0.00	0.00	0.00	A
	A1 - 2. BASE 2032							
Stream B-ACD	0.02	10.29	0.02	B	0.13	17.68	0.12	C
Stream A-BCD	0.00	0.00	0.00	A	0.00	0.00	0.00	A
Stream D-ABC	82.36	580.14	1.30	F	287.32	1759.75	1.70	F
Stream C-ABD	0.00	0.00	0.00	A	0.00	0.00	0.00	A
	A1 - 3. BASE + DEV PO 2032							
Stream B-ACD	0.04	8.35	0.04	A	0.17	19.49	0.15	C
Stream A-BCD	0.00	0.00	0.00	A	0.00	0.00	0.00	A
Stream D-ABC	111.99	812.67	1.38	F	343.21	2106.61	1.81	F
Stream C-ABD	0.00	0.00	0.00	A	0.00	0.00	0.00	A
	A1 - 4. BASE + DEV MID+60% 2032							
Stream B-ACD	0.04	8.42	0.04	A	0.18	20.32	0.15	C
Stream A-BCD	0.00	0.00	0.00	A	0.00	0.00	0.00	A
Stream D-ABC	126.86	904.67	1.41	F	357.78	2198.08	1.84	F
Stream C-ABD	0.00	0.00	0.00	A	0.00	0.00	0.00	A

Base 2016 Results

The PICADY model demonstrates that during the AM peak hour East Street has already exceeded its capacity with an RFC value of 1.12, and vehicles experiencing an average delay of 3.3minutes, over the level normally considered acceptable to driver state of mind. As the RFC on East Street has exceeded capacity, the modelling results become increasingly unrepresentative. The other arms of the junction are however expected to operate with minimal delays and queues.

The PM peak results also show that East Street is the worst performing arm. The results are also significantly worse than the AM peak, with a delay of nearly 18 minutes calculated within the model, 14.5 minutes greater than in the AM. The modelling delays are clearly greater than actual delays experienced driving through the junction in 2016, so forecast delays for this junction should be interpreted in this light.

[15] Stream A = Angel Street
Stream B = Middle Street
Stream C = New Street
Stream D = East Street

[16] The movements which report no impact e.g Stream A-BCD and Stream C-ABD are due to the one way system restrictions.

It is therefore concluded that the East Street arm of the junction is already over capacity and given that it carries the majority of traffic the addition of further development traffic on top of the existing situation will only result in a worsening of performance, to the potential detriment of the surrounding local road network and environment.

Base 2032 Results

As demonstrated in the 2016 base scenario the East Street arm has already exceeded capacity therefore the addition of further traffic, in this case associated with background traffic growth, results in a further deterioration in performance. In the PM peak a 5 second increase in delay is predicted for vehicles waiting to turn out of Middle Street, however total delay on this arm is still predicted to be below 30 seconds, which is acceptable. There are no other notable changes at Angel Street or New Street. Due to the impact on East Street it is considered that the effects of background growth will have a severe impact.

Base 2032 Results + Scenario 1

Based on the modelling results it is concluded that the 2032 reference case plus Scenario 1 traffic demonstrates a severe impact and would require mitigation.

Base 2032 Results + Scenario 2

Based on the modelling results it is concluded that the junction modelling for the 2032 reference case plus Scenario 2 traffic demonstrates a severe impact and would require mitigation.

Highway Mitigation Measures

Following the investigation and analysis of the junction the following options have been considered;

- **Changing the priority from Angel Street to East Street**: The rationale for this is that East Street carries a higher volume of traffic than Angel Street; therefore by switching the priorities, traffic on East Street would incur less delay. The assessment indicated that the required visibility distances cannot be achieved from Angel Street into East Street to permit this change and therefore this option has been discounted on safety grounds;
- **Signalisation:** The assessment concluded that there is insufficient space within the highway boundary, due to very narrow footways to accommodate the required equipment. Furthermore, signalisation would be contrary to the ‘Roads in the South Downs Guidance’ Document.
- **Increasing the width of East Street:** It was concluded that to increase the width of East Street, would be to the detriment of non-motorised road users and to the expense of the on-street parking bays, with very little benefit achieved.
- It is therefore concluded that there is no scope to increase capacity at this junction, due to existing constraints affecting all arms. Therefore it will be necessary to explore

alternative measures such as vehicle signing and re-routing to reduce the through traffic using East Street to access A283 Angel Street, as per the recommendations of the Petworth Transport Advice Study (2016). An assessment of wider traffic management measures to reassign longer distance trips away from Petworth has been undertaken and the results are presented and discussed in Chapter 11.

London Road / Horsham Road / North Street mini-roundabout

Overview

This junction is a three arm mini-roundabout to the north of Petworth town centre, with London Road (A283) forming the northern arm, Horsham Road (A272) forming the eastern arm and North Street forming the southern arm. All three arms are single lane entry, there is hatching on the carriageway between Horsham Road and North Street to tighten the entry radius and there is a small amount of flaring on the arms. The mini-roundabout is positioned on a slight incline, with North Street rising up to the give way line.

There is a kerbed central island on North Street which may help to facilitate pedestrians crossing the carriageway. There are footways, albeit narrow, provided around the junction with the exception of the northern side of the carriageway between the A283 to A272.

Accident Analysis

During the latest three year review period, there was one PIA recorded at the junction (see Appendix P). The collision was recorded as slight in nature and occurred when a vehicle used its horn to admonish a vehicle in front. As a consequence the driver suffered a loss of concentration and control, causing the vehicle to cross onto the opposite side of the carriageway where it collided with an oncoming vehicle.

The results of the accident analysis do not demonstrate any trends or highway deficiencies which could be exacerbated by the addition of future growth.

Junction Assessment

To determine whether further junction capacity assessments are required, a percentage impact assessment was undertaken to compare the increase in development traffic for both residential and employment options (Scenarios 1 and 2) per arm against the 2032 reference case. The results are presented in Table 10.9 and Appendix Q.

Table 10.9 London Road / Horsham Road / North Street Percentage Impact

		Scenario 1			Scenario 2		
		Total Dev. Traffic	2032 (Inc. Committed Development)	% Impact	Total Dev. Traffic	2032 (Inc. Committed Development)	% Impact
Horsham Road	AM	21	275	8%	27	275	10%
	PM	19	269	7%	27	269	10%
North Street	AM	58	688	8%	70	688	10%
	PM	22	506	4%	33	506	7%
London Road	AM	15	372	4%	21	372	6%
	PM	43	563	8%	50	563	9%

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Table 10.9 demonstrates that the impact of development traffic is expected to have a 10% impact on Horsham Road, and North Street under Scenario 2, therefore further capacity assessments are considered necessary.

This section is focused on changes in the performance of individual junctions in terms of RFC, delay and queuing values in different forecasting scenarios based upon unconstrained travel demand growth.

Table 10.10 presents RFC, delay and queuing values forecasted for all development scenarios to demonstrate the change in junction performance.

Table 10.10 London Road / Horsham Road / North Street Junction Capacity Assessment

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	A1 - 1. BASE 2016							
A283 London Road	1.06	10.92	0.52	B	2.89	19.76	0.76	C
A272 HORSHAM ROAD	0.55	6.84	0.36	A	0.57	7.25	0.37	A
NORTH STREET	10.54	47.01	0.97	E	1.81	14.07	0.65	B
	A1 - 2. BASE 2032							
A283 London Road	1.43	13.05	0.59	B	6.42	37.03	0.90	E
A272 HORSHAM ROAD	0.71	7.69	0.42	A	0.76	8.46	0.44	A
NORTH STREET	26.26	103.20	1.11	F	2.91	19.86	0.76	C
	A1 - 3. BASE + DEV PO 2032							
A283 London Road	1.61	14.13	0.62	B	10.93	56.14	0.97	F
A272 HORSHAM ROAD	0.82	8.25	0.45	A	0.86	9.08	0.47	A
NORTH STREET	65.80	268.72	1.22	F	3.46	22.66	0.79	C
	A1 - 4. BASE + DEV MID+60% 2032							
A283 London Road	1.66	14.74	0.63	B	11.74	59.85	0.98	F
A272 HORSHAM ROAD	0.83	8.36	0.46	A	0.92	9.39	0.49	A
NORTH STREET	76.29	313.40	1.24	F	3.74	24.23	0.81	C

Base 2016 Results

The ARCADY model demonstrates that during the AM peak hours the North Street arm is over its operational capacity, with a RFC value of 0.97. Delay is however still within acceptable limits i.e. 47seconds with an associated queue of 11 vehicles. London Road and Horsham Road are however predicted to be operating well within capacity.

In the PM peak, all arms are shown to be working well within operational capacity. The worst performing arm is predicted to be London Road, although the delay is less than 30 seconds and the queue is only 3 vehicles.

Base 2032 Results

In the AM peak hour the performance of North Street has deteriorated as the RFC has exceeded 1.0, delay is less than 2 minutes, however the queue is predicted to be 27 vehicles, which could create problems with blocking back in the centre of Petworth. London Road and Horsham Road are still expected to work within acceptable parameters, and compared to the 2016 results, queuing delay is only expected to rise by 2seconds on London Road and 1second on Horsham Road.

In the PM peak hour, only London Road is predicted to be operating over operational capacity with an RFC of 0.90, the delay of 37seconds is considered to be acceptable (+17 seconds over the 2016 base) and only 4vehicles have been added to the queue (7 vehicles). North Street and Horsham Road are both still expected to work well within capacity.

Base 2032 Results + Scenario 1

With the addition of the Scenario 1 development traffic in the AM peak, London Road and Horsham Road are still expected to perform within acceptable parameters and within operational capacity. The performance of North Street is shown to decline further from the 2032 RC with the RFC increasing to 1.22 and delay increasing by 166 seconds to 269 seconds (c.4.5 minutes).

In the PM peak, London Road is the only arm expected to exceed operational capacity, increasing from 0.90 to 0.97, delay increasing by 19 seconds to 56 seconds and an additional 4 vehicles in the queue (11 in total). Horsham Road and North Street both show minimal changes from the 2032 RC with queues and delays well within acceptable limits.

It is therefore concluded that the modelling work for the 2032 RC plus Scenario 1 traffic demonstrates a severe impact in the AM peak, but an acceptable impact in the PM peak. This assessment has been agreed by the LHA.

Base 2032 Results + Scenario 2

With the addition of the Scenario 2, the AM peak results show minor reductions to the performance of London Road and Horsham Road. It is however apparent that the modelling results are becoming unstable as the increase an increase in RFC of 0.02 on North Street has resulted in an 44 second increase to the average delay, taking total delay to 5.2 minutes and an increase of 11 vehicles in the queue.

In the PM peak, the Scenario 2 development traffic has a minimal effect on Horsham Road and North Street when compared to the Scenario 1 findings. The RFC value for London Road is shown to increase by 0.1 over the Scenario 1 results however, the RFC is still less than 1.0 and the delay of 1 minute, is considered to be acceptable.

It is therefore concluded that the impact of development on this junction is severe in the AM peak, but acceptable in the PM peak. This assessment has been agreed by the LHA.

Highway Mitigation Measures

The results of the assessment have indicated that mitigation works would be beneficial on the North Street arm to alleviate to congestion experienced in the AM peak. There is considered to be no scope for engineering works within the highway boundary, due to existing constraints on all arms. Therefore further consideration should be given to the reduction of through traffic movements as proposed by the Petworth Transport Advice Study (2016).

Summary

Junction	2016		2032 RC		2032 RC+S1		2032 RC+S2	
	AM	PM	AM	PM	AM	PM	AM	PM
Pound Street /	Accept-able	Accept-able	Accept-able	Accept-able	Accept-able	Border-line	Border-line	Severe

Station Road / Tillington Road								
East Street / Angel Street / Middle Street / New Road	Over capacity	Over capacity	Over capacity	Over capacity	Severe	Severe	Severe	Severe
Horsham Road / New Street / London Road	Accept-able	Accept-able	Accept-able	Accept-able	Severe	Accept-able	Severe	Accept-able

The TA has identified that the East Street junction in the town centre is already over capacity, with no scope to improve the highway network to better accommodate the future year traffic. Consequently, further consideration and investigation of the effect of traffic management measures to reassign longer distance trips away from Petworth has been undertaken and is presented in Chapter 11.

The performance of the Pound Street roundabout in the future year with preferred development traffic added, is classified as acceptable in the AM peak but borderline in the PM peak as one of the arms is predicted to be over capacity. Similarly the Horsham Road roundabout is expected to experience a severe impact in the AM peak but an acceptable impact in the PM peak when the preferred development traffic option is added to the 2032 RC. As with the East Street junction, engineering solutions to tackle the traffic impacts are very limited without detriment to facilities for non-motorised users, however the level of delay could be reduced if traffic can successfully be reassigned away from the town.

11 Traffic Management Assessment

Introduction

The junction modelling assessments for the Rumbolds Hill / West Street / Bepton Road / Petersfield Road roundabout in Midhurst and the Angel Street / Middle Street / New Street / East Street cross roads in Petworth, were both shown to be operating 'over capacity' in the 2032 reference case scenario and operating with 'severe' delays, i.e. delays of greater than 180 seconds (3 minutes), when the local plan development traffic, both scenario 1 and scenario 2 were added.

Infrastructure measures to mitigate the expected increase in traffic growth / development traffic were investigated; however, the opportunity to increase junction capacity was constrained by the limited highway boundary and urban realm (for example building frontages abutting the back of the kerb line). The results of the earlier junction modelling were therefore considered to represent a very worst case scenario.

It was consequently decided that sensitivity tests to assess the effect of traffic management measures on the wider highway network (i.e. beyond the settlements) should be investigated, specifically to understand whether alternative signing, to re-route longer distance trips away from these constrained locations, would result in the necessary level of improvement to within acceptable operational parameters. To inform the appropriate level of trips to transfer away from the junctions (and hence from the respective junctions) WSCC interrogated the West Sussex County Transport Model (WSCTM).

The remainder of this chapter explains the methodology for identifying long distance trips, presents a summary of the revised junction modelling results taking account of the traffic management measures and offers analysis and concluding remarks.

Methodology

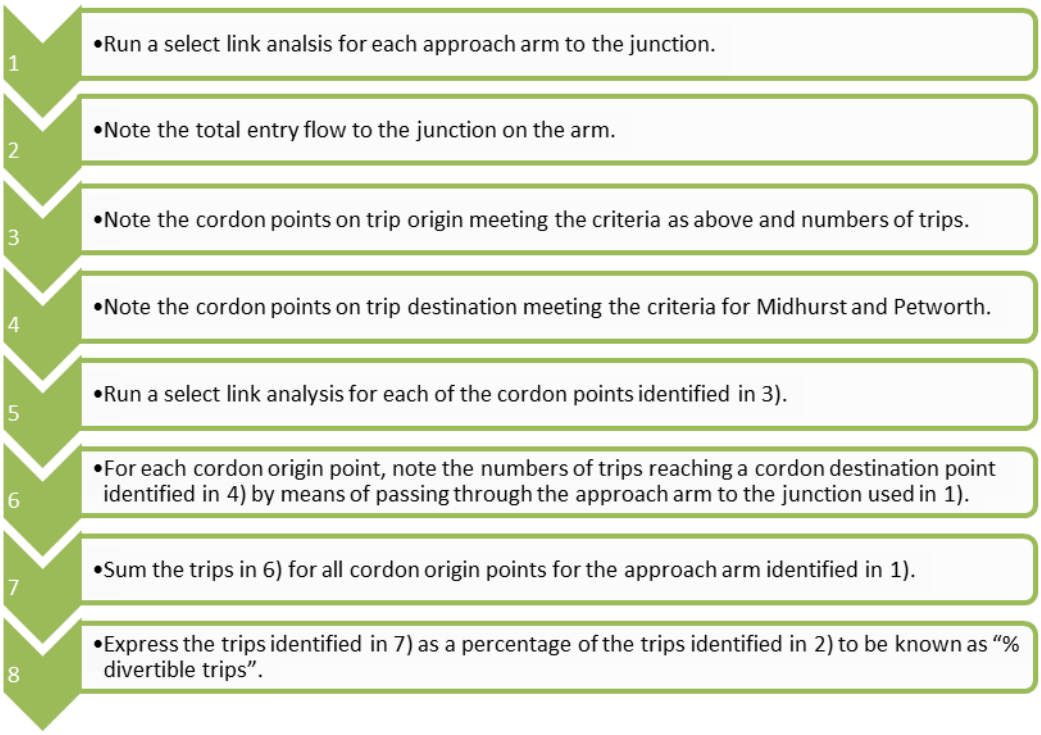
To inform the appropriate level of trips to transfer away from the respective junctions, WSCC interrogated the WSCTM. The version of the WSCTM used was that from the Horsham District Transport and Development Study representing the Horsham District Planning framework in 2031. This includes Local Plan development and mitigation. This is now an adopted Local Plan. All work pertaining to the WSCTM was undertaken by WSCC officers and provided to HS for use on this project.

Identification of Trips

The trips were identified from the WSCTM using the process presented in Figure 11.1. A copy of the outputs from the WSCTM are provided in Appendix R. Based on the origins and destinations identified from the WSCTM, there may be a need for the SDNPA to work with the Highway Authorities of Hampshire, Surrey and West Sussex in order to agree changes

to route signing in order to achieve a reassignment of longer distance traffic away from Midhurst and Petworth.

Figure 11.1: Identification of Trips



The outputs from the model resulted in a maximum percentage adjustment factor, which when applied to the 2016 base traffic spreadsheet for the AM and PM peaks, took off the traffic that was identified as capable of being reassigned if enhanced traffic management measures were implemented. The adjustments made to the 2016 base year, have subsequently amended the 2032 reference case and both development scenarios (preferred option (S1) and mid-option + 60% (S2)).

WSCC provided maximum percentage adjustment factors for the AM peak only. For the purposes of this modelling exercise, HS has assumed that the same adjustments apply for the PM peak in the reverse direction, and WSCC has confirmed that it is happy with this approach.

The resultant reductions in traffic flow were then derived for individual arms of the junctions being tested. The WSCTM identifies potential for reductions in the range 13-42% in Midhurst and 41-48% on affected arms (note that some arms do not benefit from projected traffic reduction as they are not covered by the WSCTM – this is referenced in the text). These figures were used as the basis for the sensitivity tests described below.

Midhurst

Using the WSCTM, WSCC defined the trips which could reassign away from Midhurst and onto other routes as;

"Trips crossing, joining or reaching close enough to use: A3, A27, A29 at both ends of the journey, whilst passing through the junction of A272 Petersfield Road / A286 Rumbolds Hill and Bepton Road (A286)."

The adjustment factors have not been applied to traffic either entering or exiting the West Street arm of the roundabout as it is not included within the WSCTM. Table 11.1 shows the adjustment factors for Midhurst.

Table 11.1: Parameters for Defining Impact of Development (Midhurst)

Approach Arm	WSCTM Model Output	Sensitivity Tests	
		Low Adjustment	Medium Adjustment
Rumbolds Hill (SB)	28%	10%	20%
West Street	N/A	N/A	N/A
Bepton Road (NB)	42%	10%	20%
Petersfield Road (EB)	13%	10%	20%

Petworth

Using the WSCTM, WSCC defined the trips which could reassign away from Petworth junctions and onto other routes as;

"Trips crossing, joining or reaching close enough to use: A3, A27, A24 at both ends of the journey, whilst passing through the junction of A272 East Street / A283 Angel Street / New Street (exit only)"

The adjustment factors have not been applied to traffic either entering or exiting the Middle Street arm of this junction as it is not included within the WSCTM. Similarly, as New Street is one way in a westerly direction, no further adjustments are required as the necessary changes have already been applied to Angel Street and East Street. Table 11.2 shows the adjustment factors for Petworth.

Table 11.2: Parameters for Defining Impact of Development (Petworth)

Approach Arm	WSCTM Model Output	Sensitivity Tests	
		Low Adjustment	Medium Adjustment
Angel Street (WB)	41%	10%	20%

Approach Arm	WSCTM Model Output	Sensitivity Tests	
		Low Adjustment	Medium Adjustment
Middle Street	N/A	N/A	N/A
New Street (WB)	N/A	N/A	N/A
East Street (SB)	48%	10%	20%

Modelling

The first column in Table 11.1 and 11.2 shows the projected level of adjustment for the reassignment of longer distance trips as taken directly from the WSCTM. It was agreed amongst the project team that adjustments of over 40% were potentially overly ambitious, as this does not take into account the relative length of the alternative routes for all origin to destination pairs, nor the changes in delays which would occur on the alternative routes due to the re-assigned traffic; therefore a low (10%) and medium (20%) adjustment scenarios were applied to the base traffic and subsequently re-tested in the junction models (ARCADY and PICADY).

The types of intervention / traffic management measures has not been considered as part of this study, However, it is likely that in order to achieve the medium level of reassignment a combination of positive and negative traffic management techniques will be required to discourage traffic from travelling through Petworth and encourage traffic to use the alternative routes away from the town.

The following paragraphs describe the results of the junction modelling after the low / medium adjustments for long distance traffic reassignment have been applied. Table 11.3, defines the colour banding used in the summary tables.

Table 11.3: Parameters for Defining Impact of Development

	Acceptable	Over capacity	Severe
Delay (seconds)	<120	> 120 – 180	> 180

For ease of reference the modelling results from previous assessment are presented under the heading Stage 1 in the upcoming tables.

Midhurst

The results of the junction modelling previously demonstrated that the roundabout currently (2016) performs within acceptable parameters. However, when background traffic growth and the committed development traffic for King Edward VII Estate was added for the future assessment year (2032 reference case), the operation of the junction declined and was performing 'over capacity', with delays of over 120 seconds (2 minutes) on Rumbolds Hill

and Bepton Road and RFCs over 1.0 in the AM peak on the three main arms, and in the PM peak RFCs over 1.0 on Rumbolds Hill and Bepton Road. Consequently when the development traffic was added on top of the 2032 reference case the junction performance declined to unacceptable ('severe') levels i.e. delays of over 180 seconds (3 minutes). Modelling outputs for the sensitivity testing are presented in Appendix S.

AM Peak

Table 11.4: Summary of AM Junction Performance within Midhurst through Reassignment

Delay (secs)	2032RC			2032RC + S1			2032RC + S2		
	Stage 1	10% Sensitivity	20% Sensitivity	Stage 1	10% Sensitivity	20% Sensitivity	Stage 1	10% Sensitivity	20% Sensitivity
Rumbolds Hill	231	77	37	316	109	49	306	119	52
West Street	20	18	15	20	18	16	20	18	16
Bepton Road	713	294	111	857	385	151	995	422	159
Petersfield Road	97	61	33	140	78	45	145	84	51

Table 11.4 shows that there are significant benefits expected in relation to the level of delay incurred at the roundabout brought about by the reassignment of longer distance traffic. In the 2032 reference case, the greatest improvements is on Bepton Road, where the predicted delay reduces from 713 seconds (c. 12 minutes), to 294 seconds (c.5minutes) when the low level of reassignment is applied or to 111 seconds (c.2 minutes) with the application of the medium level of reassignment. If the medium level of reassignment can be achieved this will reduce the delay in the 2032 AM reference case to within acceptable levels.

When the preferred option (S1) development traffic is added on top of the 2032 reference case, junction performance does decline. This is however, only a cause for concern on the Bepton Road arm. If however, 20% of traffic can be reassigned, the level of delay on Bepton Road increases by only 40 seconds above the reference case. Whilst the level of delay on Bepton Road is therefore described as 'over capacity' in the context of the overall junction operation is considered to be acceptable.

PM Peak

Table 11.5: Summary of PM Junction Performance within Midhurst through Reassignment

Delay (secs)	2032RC			2032RC + S1			2032RC + S2		
	Stage 1	10% Sensitivity	20% Sensitivity	Stage 1	10% Sensitivity	20% Sensitivity	Stage 1	10% Sensitivity	20% Sensitivity
Rumbolds Hill	568	216	77	757	342	115	819	388	124
West Street	18	17	15	19	18	16	19	18	16
Bepton Road	840	485	172	1014	631	281	1047	658	297
Petersfield Road	60	32	22	74	36	24	76	38	25

Compared to the previous assessment, if a 20% reassignment can be achieved in the 2032 reference case, junction performance with respect of delay improves from 'severe' to 'acceptable' on Rumbolds Hill, and on Bepton Road improves 'severe' to 'over capacity'.

With the addition of the preferred option (S1) development traffic, delay on Bepton Road increases by 109 seconds (c.1.8 minutes), however all other arms are within acceptable levels.

Midhurst Reassignment Modelling Conclusions

The results of the reassignment modelling demonstrate that junction performance (in terms of delay) will improve considerably over the previous assessments, particularly in the AM peak. However, the reassignment of a proportion of the longer distance traffic away from the junction, will not completely mitigate the operational problems, with Bepton Road still predicted to experience 'severe' delays in the PM peak, when development traffic is added. The difference between the reference case and the reference case plus development traffic is however at a more acceptable level. This difference represents the net impact of the planned development allocations. Furthermore as the RFCs (shown in model outputs in Appendix S) are still over 1.0, the model results should still be viewed with caution as queues and delays increase exponentially when the threshold value is exceeded.

Based on the modelling evidence presented, the biggest factor affecting performance is the level of background growth. When the background growth factors for Midhurst are compared to other areas tested within this study, the growth factor for Midhurst is approximately 10% higher, and on top of this the committed development traffic at King Edward VII Estate has also been added. Should this level of background growth not be realised (which is a possibility as TEMPro assumes consistent traffic growth and does not take into account how people make travel choices and assumes no change in government policy[17]), and traffic management measures are implemented to reassign longer distance trips away from Midhurst, then it is possible that the roundabout would operate within acceptable thresholds, as the modelling results in this chapter have shown that the addition of the Local Plan development traffic only adversely affects the Bepton Road arm. It is therefore concluded that the assessment for the Rumbolds Hill roundabout is very robust.

Petworth

The results of the junction modelling previously demonstrated that the junction is currently (2016) operating 'over capacity' and when the background traffic growth to 2032 is added, the junction performance remains 'over capacity'. When the local plan development traffic is added performance declines to 'severe'. The arrangement of the junction is not typical for a cross roads, as the largest flows is along East Street (minor arm), not along the major arm (Angel Street - New Street). East Street therefore experiences 'severe' levels of delay as a result of traffic having to give way for the movement between Angel Street and New Street. All other arms operate satisfactorily under all scenarios tested. The main part of this study considered changing the priorities or controls at the junction to resolve this issue, but

[17] Clark, H (2015) An Investigation into TEMPro Growth Factors, available from

https://tps.org.uk/public/downloads/Wwac7/An%20Investigation%20into%20TEMPro%20Growth%20Factors%20-%20best%20paper%20by%20Hannah%20Clark.pdf

concluded that it was not possible to do this within the physical constraints and limited sightlines of the junction.

The modelling outputs for the sensitivity testing are presented in Appendix T.

AM Peak

Table 11.6: Summary of AM Junction Performance within Petworth through Reassignment

Delay (secs)	2032RC			2032RC + S1			2032RC + S2		
	Stage 1	10% Sensitivity	20% Sensitivity	Stage 1	10% Sensitivity	20% Sensitivity	Stage 1	10% Sensitivity	20% Sensitivity
Middle Street to All Arms	10	10	10	8	8	8	8	8	8
Angel Street to All Arms	0	0	0	0	0	0	0	0	0
East Street to All Arms	580	330	148	813	542	232	905	545	240
New Street to All Arms	0	0	0	0	0	0	0	0	0

By reassigning 10% of long distance traffic away from the junction, a 250 second (c.4 minute) improvement is predicted in the 2032 reference case, which increases to 432 second (c.7 minute) improvement if 20% of traffic long distance traffic can be reassigned compared to the previous assessment which did not consider any reassignment.

In the previous assessment when the development traffic for the preferred option was added, delay on East Street was predicted to rise by 233 seconds (c.4 minutes), which was considered to be unacceptable. The reassignment assessments show that the level of delay will increase by a smaller amount, a 212 second (c. 3.5 minute) increase when the lower level of reassignment is applied, and an 84 second (c.1.4 minute) increase in delay when the medium level of reassignment is applied. Whilst still above the acceptable thresholds, there is a significant benefit demonstrated on East Street.

There is only a slight change in performance with the addition of the mid option plus 60% development traffic.

PM Peak

Table 11.7: Summary of PM Junction Performance within Petworth through Reassignment

Delay (secs)	2032RC			2032RC + S1			2032RC + S2		
	Stage 1	10% Sensitivity	20% Sensitivity	Stage 1	10% Sensitivity	20% Sensitivity	Stage 1	10% Sensitivity	20% Sensitivity
Middle Street to All Arms	18	15	12	19	16	13	20	15	13
Angel Street to All Arms	0	0	0	0	0	0	0	0	0
East Street to All Arms	1760	1398	914	2107	1755	1255	2198	1710	1205
New Street to All Arms	0	0	0	0	0	0	0	0	0

There is a 362 second (c.6 minute) improvement predicted in the 2032 reference case by reassigning 10% of the base traffic, which increases to an 846 second (c.14 minute) improvement if 20% of traffic can be reassigned away from the junction. Although these figures represent a significant improvement, they are not sufficient to bring the East Street arm within acceptable operational thresholds.

In the previous round of testing when the development traffic for the preferred option was added onto the 2032 base, the delay on East Street was predicted to rise by 347 seconds (c.6 minutes), which was considered to be 'unacceptable'. When the local plan development traffic is added to the reference cases for the sensitivity tests the following changes are predicted;

- Low reassignment = 357 second (c. 6 minute) increase on East Street; and
- Medium reassignment = 341 second (c.5.7 minute) increase on East Street.

Whilst still above the acceptable thresholds set, there is a significant benefit demonstrated on East Street, if through traffic can be reassigned away from the town centre.

There is only a slight change in performance with the addition of the mid option plus 60% development traffic.

Petworth Reassignment Modelling Conclusions

The results from the reassignment modelling at the Angel Street / Middle Street / New Street / East Street junction show that by reassigning longer distance through traffic away from the town centre there will be a reduction in delay, of a sufficient scale that when development traffic (both S1 and S2) is added the resultant delay incurred will be significantly less than that estimated in the 2032 reference case in the first round of testing. Unfortunately the level of delay predicted is still significantly higher than the acceptable thresholds set out in Chapter 4, however this is only experienced on the East Street arm of the junction, and a more apparent issue in the PM peak.

12 Seasonality

Introduction

As the SDNP is a major tourist / leisure attraction, the SDNPA requires the TA take into consideration seasonal variations in traffic flows on key inter-urban routes across the park. Data from the permanent count sites held by HCC and WSCC were selected for various locations within the SNDP on key routes surrounding the proposed site allocations. No account of background growth, development traffic or sensitivity testing has been considered in this part of the assessment. The sites selected and their relative locations in relation to the settlements are illustrated in Figure 12.1.

Figure 12.1: Location of Permanent Traffic Count Sites

Identification of the Peak Months

Data from each site has been studied for the most recent year, to determine which are the peak and low months in terms of traffic levels for daily 24 hour flows. The results are summarised in Table 12.1 and presented graphically in Figure 12.2.

Table 12.1 Peak and Low Months

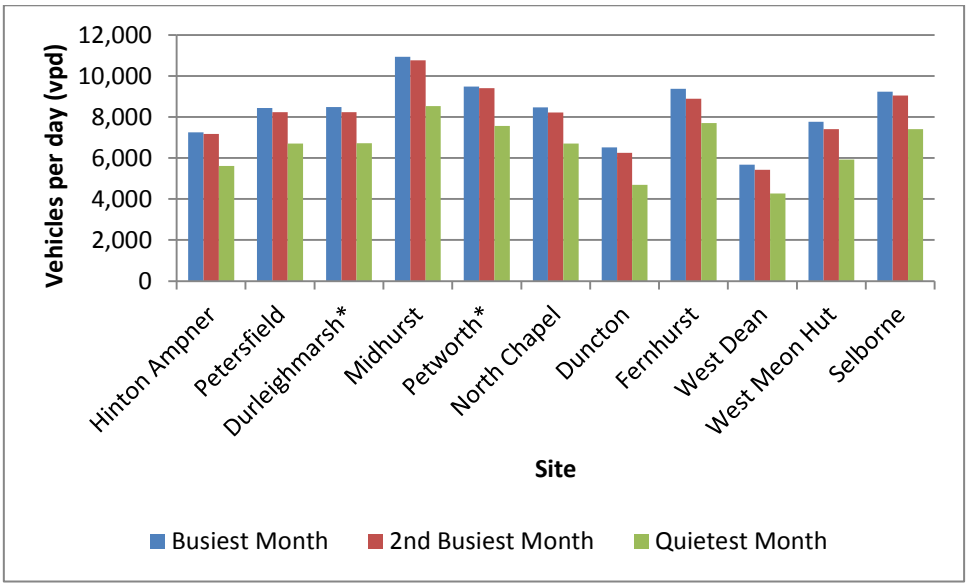
Road	General Location	Peak Month	2nd Peak Month	Low Month
A272	Hinton Ampner	July	June	January
A272	Petersfield	June	July	January
A272	Durleighmarsh*	June	July	December
A272	Midhurst	June	July	January
A272	Petworth**	July	June	December
A283	North Chapel	June	July	January
A285	Duncton	June	September	December
A286	Fernhurst	June	July	December
A286	West Dean	June	July	January
A32	West Meon Hut	July	June	December
B3006	Selborne	June	September	December

Note:

*indicates March data unavailable

**indicates March and April data unavailable

Figure 12.2 Peak and Low Months



Note: Assessment undertaken using Monday to Friday figures

*indicates where there is not a full year of data

Of the 11 sites selected, 8 of the peak months occur in June and 3 in July. The most common second peak month is July with 6 entries, with June having 3 entries and September having a total of 2 occurrences. The low months are either December (6) or January (5).

August may traditionally have been regarded as a peak month due to school summer holidays and an increased level of holiday traffic. The findings presented in Table 12.1 do not however support this theory and indicate that when education and some commuter trips are removed from the network, this results in lower traffic levels in the SDNP.

The percentage difference between the peak and low months and annual average traffic levels is quantified in Table 12.2.

Table 12.2 Percentage Change from Annual Average Monthly Traffic

Road	General Location	Peak Month	2nd Peak Month	Low Month
A272	Hinton Ampner	+9%	+7%	-16%
A272	Petersfield	+11%	+8%	-12%
A272	Durleighmarsh*	+12%	+8%	-12%
A272	Midhurst	+10%	+8%	-14%
A272	Petworth*	+10%	+9%	-12%
A283	North Chapel	+11%	+7%	-12%
A285	Duncton	+18%	+13%	-15%
A286	Fernhurst	+10%	+5%	-9%
A286	West Dean	+15%	+10%	-13%
A32	West Meon Hut	+12%	+7%	-15%
B3006	Selborne	+7%	+5%	-14%

Note: Assessment undertaken using Monday to Friday figures

*indicates April data unavailable

**indicates March and April data unavailable

The results in Table 12.2 show that the average maximum increase in the peak month was 11% and in the second peak month 8%. The traffic flows for the low month compared to the annual average figures have an average difference of 13%. These findings demonstrate that traffic within the SDNP is affected by the seasons / time of year.

It is important to recognise that not all of the increase in traffic associated with the peak months will have a final destination within the SDNP. For example in the peak months many journeys passing through the SDNP on the A3(M), A286, A285, A29, A24, A283. will be en route to destinations such as the Sussex Coast (The Wittering's, Bognor Regis, Worthing, Brighton) or Hampshire Coast (Hayling Island). Likewise there will also be an increase in journeys in the opposite direction in the peak months for destinations such as London, Gatwick Airport on the same routes.

The traffic flows for the low month compared to the annual average figures are between -9% to -16% lower, with the average difference -13%.

Figure 12.3 March vs Peak Month Comparison[18]

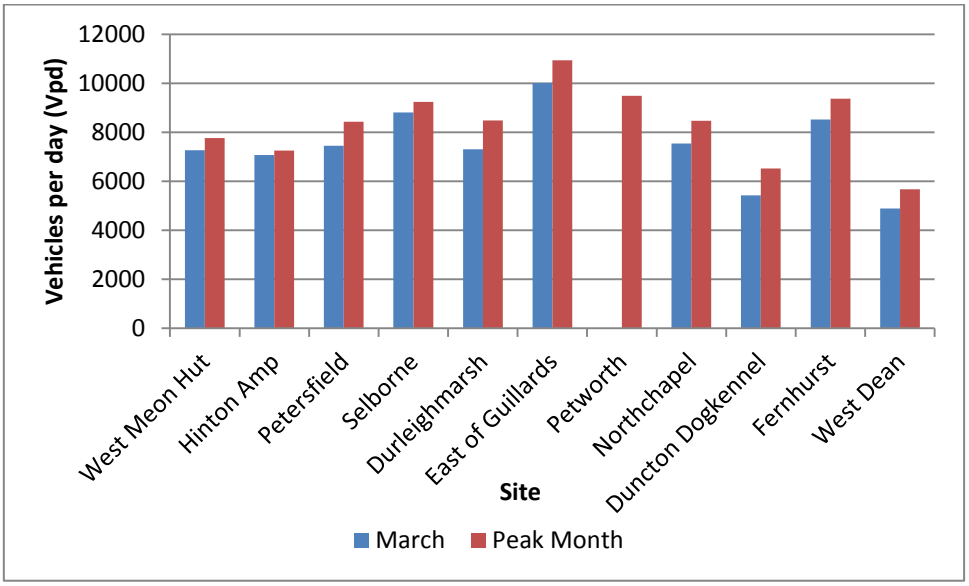


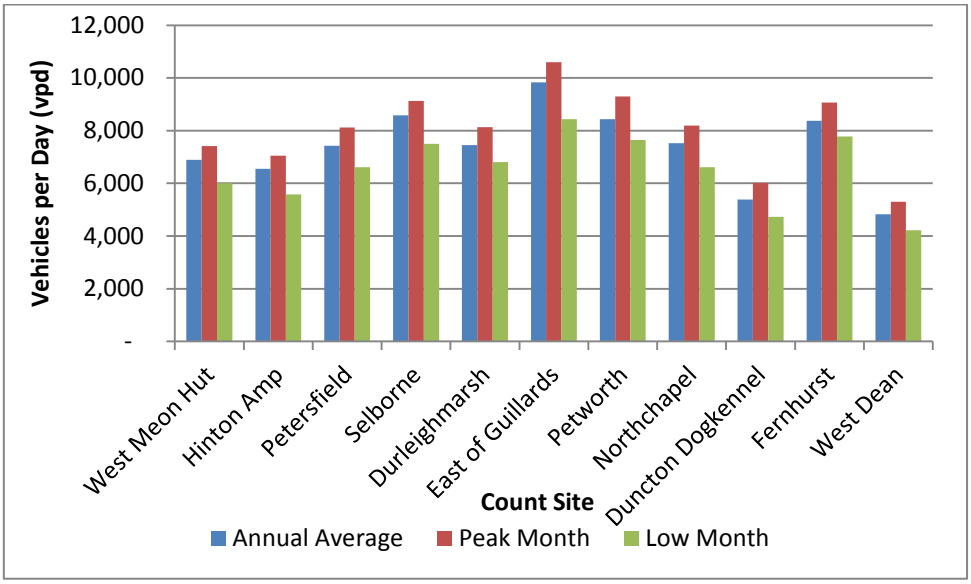
Figure 12.4 demonstrates the difference in traffic levels between March and the peak month. This comparison has been provided to give an indication as to the amount of extra traffic that roads in the SDNP could be carrying in the peak months, as opposed to when the surveys for the TA were undertaken. The data shows that the peak month is on average 11% higher than in March, but the ranges between 3% (Hinton Ampner, A272) and 20% (Duncton, A285).

Weekday vs Weekday Traffic Comparisons

The variation in traffic levels depending on the day of the week and peak / low month compared to annual average figures has been assessed for each of the traffic count sites. The data for all sites is summarised in Figure 12.4.

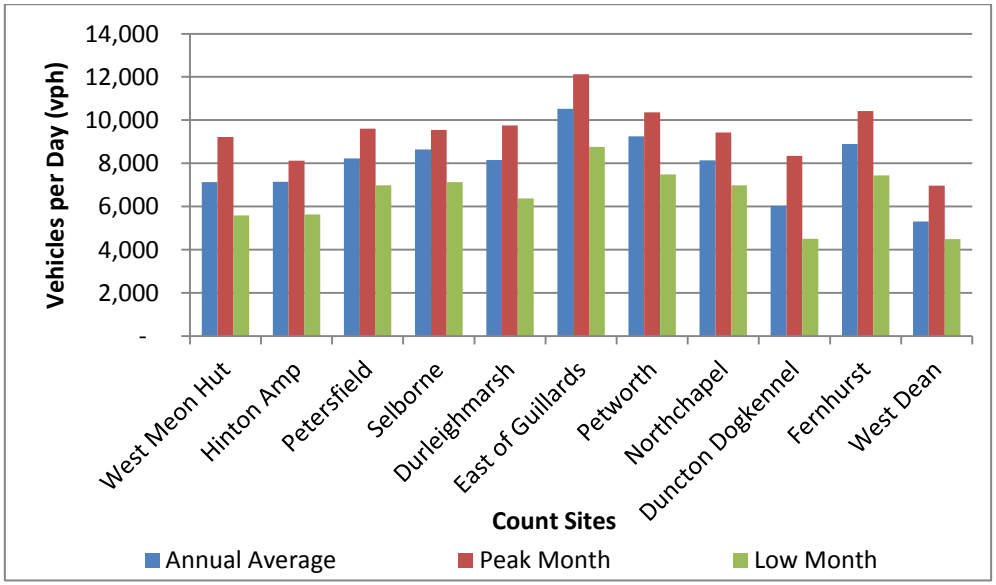
[18] Data unavailable for March in Petworth

Figure 12.4: Monday – Thursday Traffic Levels



The data presented in Figure 12.4 shows that the difference between the annual average traffic levels and the peak month traffic levels is between 6% to 12%. The difference between the annual average traffic levels and the low month traffic levels is -7% to -15%. The highest volume of traffic was recorded at Midhurst (East of Guillards) with c.10,600vpd, with c.9,300vpd recorded at Petworth and c.9,100vpd recoded at Fernhurst and Selborne.

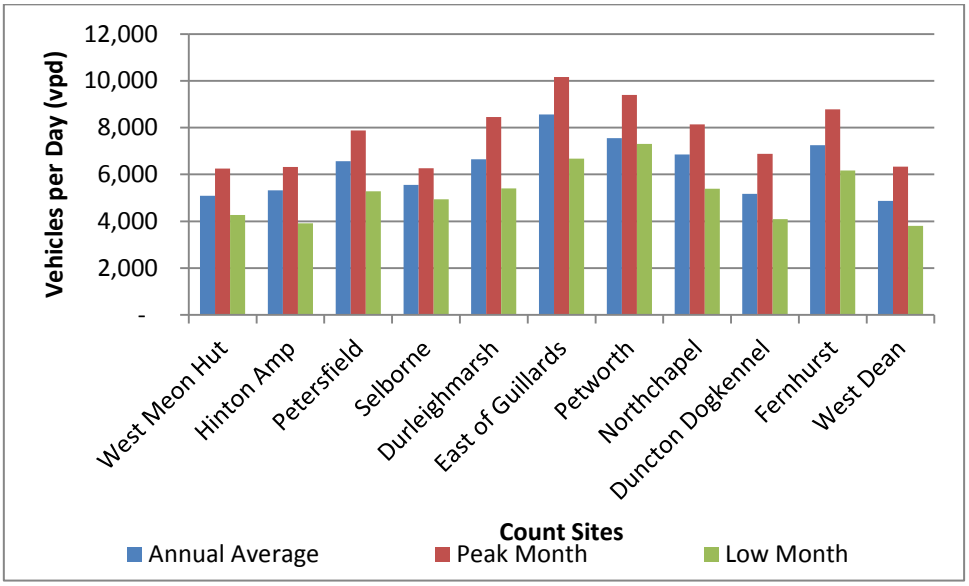
Figure 12.5: Friday Traffic Levels



The data presented in Figure 12.5 shows the difference between the annual average traffic levels and the peak month traffic levels. On average traffic levels on a Friday in the peak months are 19% higher than the annual average and in the low months -18% lower.

The highest volume of traffic was again recorded at Midhurst (East of Guillards) with c.12,100vpd, approximately 1,500vpd more than the Monday to Thursday levels of traffic presented in Figure 12.4. At Petworth and Fernhurst approximately 10,400vpd were recorded (between 1,100 to 1,300 additional vpd) and at the sites near Petersfield, Selborne and Northchapel over 9,000vpd were recorded, all showing an increase on the Monday to Thursday traffic levels.

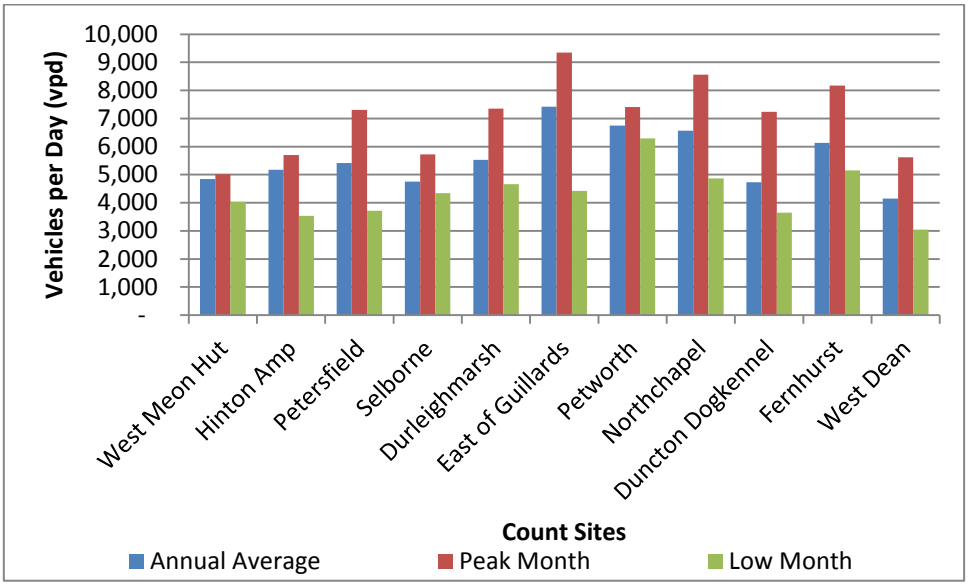
Figure 12.6: Saturday Traffic Levels



The data presented in Figure 12.6 shows that on average Saturday traffic levels in the peak months are 22% higher than the annual average and in the low months Saturday traffic levels are -18% lower.

The highest volume of traffic was recorded at Midhurst (East of Guillards) with c.10,200vpd, lower than the levels presented for Monday to Thursday and Friday. Conversely, Saturday traffic levels in Petworth were marginally higher than Monday to Thursday levels (+100vpd). Outside of the settlements on the more inter-urban routes i.e. the A32 at West Meon Hut and the A272 at Hinton Ampner and Petersfield / Durleighmarsh and the A286 Fernhurst, Saturday traffic levels were observed to be quieter than during the weekdays, reiterating their important function carrying a variety of traffic purposes during the weekday i.e. commuters, business, retail and leisure / tourist.

Figure 12.7: Sunday Traffic Levels



On average the data presented in Figure 12.7 shows that the Sunday traffic levels in the peak month are 26% greater than the annual average and in the low months -22% less than the annual average.

On the whole traffic levels for a Sunday are lower than Saturday, making it the quietest day of the week.

When compared to annual average traffic levels, Monday to Thursday flows demonstrated least amount of variation between the minimum and maximum percentages presented, and Sunday traffic levels presented the greatest amount of range. In summary the traffic data demonstrates that Fridays are the busiest day on the roads within the SDNP, which can be explained by the roads carrying not only visitor traffic but also commuter, business, retail and education trips.

Times of the Day

The peak month traffic data has been assessed for each of the sites to assess whether there is a notable difference in;

- the proportion of peak hour traffic depending on the day of the week;
- a difference in when the peak hour occurs; and
- determine the peak hourly flow and whether there are any special circumstances which might lead to it.

In the peak month

- Monday to Thursday peak hour most commonly occurs between 17:00-18:00;

- Friday peak hour also most frequently occurs between 17:00-18:00, although there are some sites where the peak occurs between 16:00-17:00 for example Northchapel, Midhurst and Petworth;
- The Saturday and Sunday peaks generally occur between 11:00–12:00 and 12:00–13:00.
- When the peak month falls in June, traffic at a number of sites in the SDNP is affected (in terms of volume and the time of day the peak occurs) by the Goodwood Festival of Speed which takes place the last weekend of the month. This pattern is likely to be repeated in early September when the Goodwood Revival also takes place.

At Petersfield, Durleighmarsh, Petworth, Duncton and West Dean the Saturday average was found to be in excess of the Monday to Thursday average. There were however, no instances where the Saturday average exceeded the Friday average.

Conclusions from Seasonality Assessment

The findings of the seasonality assessment have found the following broad conclusions;

- The peak month typically occurs in June with the low month occurring in either January or December;
- Peak monthly traffic is on average 11% higher than annual average traffic flows;
- The average difference between March and the peak month is 11%;
- Friday traffic levels are almost always higher than Monday to Thursday traffic levels;
- Saturday traffic levels are typically higher than Sunday traffic levels;
- The peak hour for Monday to Thursday and Fridays generally occurs between 17:00-18:00 however, on a Friday there are certain sites when the peak hour occurs an hour earlier;
- Weekend peak hours typically occur late morning / early afternoon between 11:00-12:00 or 12:00–13:00; and
- Peak hour volumes are significantly lower on a Sunday, although there are a number of sites (5) where Saturday peak hour volumes exceeds those recorded Monday to Thursday.

The seasonality assessment presented in this chapter is based on the relative changes in traffic volume between the peak month and the annual average traffic, to provide an estimate of the changes that could be expected to occur based on the time of year. The assessment has not however, considered link capacity, which would be needed to provide a more detailed assessment of the ability of the routes to manage the additional traffic in the peak months. This TA has used a standard methodology to assess traffic impact, including the use of 'neutral' survey data. For this reason, no adjustment has been made to reflect the seasonality variations within the detailed assessments. This approach has been agreed with the client and with the two Local Highways Authorities.

13 Summary and Conclusions

Summary

Hampshire Services (HS) was commissioned by South Downs National Park Authority (SDNPA) to undertake a Transport Assessment (TA) as part of the emerging South Downs Local Plan Evidence Base. The purpose of which was to assess the traffic impact that proposed levels of development could have on settlements within the South Downs National Park (SDNP) boundary. Hampshire County Council (HCC) and West Sussex County Council (WSCC) as the Local Highway Authorities (LHA) for the roads within the area of the SDNP where the majority of development is focused, have been involved in development of a robust methodology for quantifying and assessing the traffic related impacts of development on junctions. East Sussex County Council (ESCC) were content that work undertaken as part of the Lewes Joint Core Strategy was sufficient and therefore no further TA work was undertaken in this area of the SDNP. Brighton and Hove City Council were also contacted as part of the duty to co-operate although no response was provided.

The main objectives of this TA are to:

- Collate information to identify the baseline position with regards to traffic levels;
- Estimate the quantum and distribution of vehicular trips resulting from background growth and the additional development in the future;
- Assess traffic impacts and junction performance in the defined highway network and identify key junctions requiring mitigations;
- Propose mitigation measures and advise where possible on their effectiveness;
- Report findings on the main traffic impacts on the highway network and how these can be managed with the identified mitigation measures.

For the purpose of this TA, only settlements where development of over 80 residential units have been proposed as part of either the relevant Strategic Housing Land Availability Assessment (SHLAA) or Neighbourhood Plan (NP) has been tested. The following settlements have therefore been assessed;

- Liss (Hampshire);
- Petersfield (Hampshire);
- Midhurst (West Sussex);
- Fernhurst (West Sussex); and
- Petworth (West Sussex).

In addition to testing the impacts of residential developments, employment allocations proposed in Petersfield and Petworth have also been considered.

Two development scenarios have been tested, although if, as in the case of Liss, the level of development in a settlement had already been set as part of the an adopted development

plan document, then only one development scenario was tested for that settlement. Table 13.1 summarises the development scenarios.

Table 13.1 Development Scenarios

	Residential		
Settlement / Strategic Site	*Scenario 1*	*Scenario 2*	***Employment[19] (sqm)***
Liss	*150*	*220*	*N/A*
Petersfield	*805*	*805*	*9,160*
Midhurst	*150*	*240*	*N/A*
Former Syngenta Site, Fernhurst	*200*	*200*	*N/A*
Petworth	*150*	*240*	*4,275*
Total	*1455*	*1705*	*13,435*

A spreadsheet model for each settlement was developed to quantify the traffic impacts of the development scenarios on the local highway network. The development scenarios considered the network AM and PM peaks for;

- Base year 2016;
- Reference case (RC) 2032;
- Scenario 1: 2032 RC + Local Plan Preferred Options; and
- Scenario 2: 2032 RC + Medium Housing Target plus 60%.

The TA applied a robust methodology, which was developed in conjunction with and approved by the LHAs, to assess the transport impacts of the allocation proposals on the local highway network based on the following principles;

- vehicle trip rates,
- no reassignment of traffic onto sustainable modes or alternate routes; and
- the application of a fixed demand response i.e. did not consider the potential for peak spreading to occur.

Highways England (HE) was also informed of the likely impacts of development on the Strategic Road Network (SRN), namely the A3.

[19] Useable Land

Where the development scenarios resulted in a 10% increase in traffic per junction arm above the RC, the junction was progressed for junction capacity modelling. The impacts of the development scenarios in comparison to the RC were then assessed in terms of their impact on delay and to a lesser extent the ratio of flow to capacity (RFC).

A key aspect of the TA was quantifying the level at which the impacts of development over and above the RC could be classified as a severe. To this end the following modelling outputs were defined.

Table 13.2 Parametres for Defining Impact of Development

	Acceptable	Over capacity	Severe
Delay (seconds)	<120	> 120 – 180	> 180
RFC (%)	<0.85	> 0.85 – 1.0	> 1.0

A summary of the modelling results is provided in Table 13.3.

Table 13.3 Summary of Junction Assessments

Settlement	Junction	2016		2032 RC		2032RC +S1		2032RC +S2	
		AM	PM	AM	PM	AM	PM	AM	PM
Petersfield	A3 / Winchester Road / Bedford Road / Winchester Road	<10% impact on 2032 RC							
	Bell Hill / Residential Road / Station Road / Winchester Road	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
	Dragon Street / Sussex Road / The Causeway / Hylton Road	Acceptable	Acceptable	Over capacity	Over capacity	Severe	Severe	Severe	Severe
	London Road / Pulens Lane / Inmans Lane	<10% impact on 2032 RC							
Midhurst	Rumbolds Hill / West Street / Bepton Road / Petersfield Road	Acceptable	Acceptable	Over capacity	Over capacity	Severe	Severe	Severe	Severe
Fernhurst	Easebourne Lane / Cowdray Park Access / North Street / Dodsley Lane	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Petworth	Pound Street / Station Road / Tillington Road	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Borderline	Borderline	Severe
	East Street / Angel Street / Middle Street / New Road	Over capacity	Over capacity	Over capacity	Over capacity	Severe	Severe	Severe	Severe
	Horsham Road / New Street / London Road	Acceptable	Acceptable	Acceptable	Acceptable	Severe	Acceptable	Severe	Acceptable

Conclusions

The findings from the traffic impact assessment have highlighted the significant role that background traffic growth, as forecasted by TEMPro software, will have on the operation of the highway network in the future year (2032). In some cases, for example Petersfield, Midhurst and Petworth, the level of background traffic growth predicted is such that it pushes junction performance "over capacity". Consequently, when the Local Plan development traffic is added, junction performance deteriorates into the "severe" category, even though the level of traffic generated by the Local Plan proposals is less than that forecast by TEMPro.

The results of the TA predicts that there is one junction within Petersfield, one junction within Midhurst and two junctions within Petworth, that potentially require mitigation to reduce the traffic impacts of development.

Petersfield

Within Petersfield, the level of development was approved by the JCS and Petersfield Plan and consequently is considered "fixed". The junction of Dragon Street / Sussex Road / The Causeway and Hylton Road, will require mitigation to reduce the severe impacts of development to more acceptable levels.

An initial feasibility design has been devised for this junction, which offers the potential to reduce the overall level of queuing delay currently experienced. The proposed mini-roundabout does not however, completely alleviate queuing as it will shift delay onto Dragon Street / The Causeway arms. On balance the Highway Authority considers that as there are alternative routing options which north / south traffic could divert onto and there is the potential for peak spreading to occur that the proposals, subject to further refinement, are acceptable. Developer contributions will continue to be sought for these changes, and the Stage 2 study should look to refine the design further in conjunction with traffic management / behavioural change options.

The other junctions within Petersfield are shown to operate within acceptable parameters with the proposed levels of development. As with Liss, the presence of a rail station within the town centre presents an opportunity to shift journeys from private car to mass transportation.

Midhurst

Within Midhurst further testing is required for the Rumbolds Hill / West Street / Bepton Road / Petersfield Road roundabout. The junction is at the confluence of the A286 and the A272 and therefore carries a substantial amount of longer distance through traffic with final destinations outside of the SDNP, for example Chichester, Haslemere,

There are very limited opportunities to increase highway capacity at this junction due to the urban environment. Within the existing constraints, if improvements to increase highway

capacity were made, it would require the footway and therefore be to the detriment of non-motorised users.

Opportunities to divert through traffic away from the centre of Midhurst along existing roads have been considered at a high level as part of this study. The existing road network for example via Hollist Lane could attract through trips from the A272 around the west of Midhurst to join Dodsley Lane / Petersfield Road depending on the direction of travel. These roads are however narrow single track country lanes passing through small settlements such as Woolbeding, and are consequently unsuitable for carrying a significant volume of traffic. It would also be inappropriate in environmental terms and economically unviable to increase the capacity of such routes.

As a second stage to this TA the WSCTM has been interrogated to gain an understanding of the level of longer distance trips that could potentially be reassigned away from Midhurst to alleviate some of the pressure on the Rumbolds Hill roundabout. The conclusions of this assessment are that achieving a 10% - 20% reassignment of traffic would result in delays at the junction falling to levels lower than in the 2032 RC, a level which is considered acceptable to WSCC.

Petworth

The modelling predictions for Petworth demonstrate that similar problems to Midhurst are likely to be expected, due to the arrangement of the highway network and the need to negotiate the one way system through the historic town centre in order to access the A272 or the A283.

There is the potential for more through traffic to be diverted onto the existing 'Lorry Route' to the south of Petworth, between the Tillington Lane (A272) ↔ Station Road (A285) ↔ Haslingbourne Lane ↔ A283 (east) and WSCC also see potential in investigating a route from Horsham Road (A283) ↔ Kingspit Lane ↔ A283 (north) ↔ Haslingbourne Lane ↔ Station Road (A285) ↔ Tillington Lane (A272). The impacts of diverting longer distances trips along these routes would require further detailed assessment of the operational capacity of the following junctions;

- Station Road / Haslingbourne Lane / Station Road / Rotherbridge Lane;
- A283 (north) / A283 (east) / Haslingbourne Lane;
- A283 / Kingspit Lane; and
- Horsham Road / Kingspit Lane

In order to achieve a significant reduction in traffic travelling through traffic, the alternative routes would need to be promoted alongside traffic management measures within Petworth Town Centre, to avoid a scenario whereby the reduction in delay within the town centre induces latent demand. It is also important to recognise that, even if through traffic can be reduced to levels which suggest that the impact of development on the East Street / Angel Street / Middle Street / New Street and Horsham Road / North Street / London Road is not severe, a significant volume of traffic will still need to pass through the Pound Street / Station Road / Tillington Lane roundabout. The altered flow profile at the roundabout, i.e. less traffic using Pound Street and more traffic using Station Road, could have negative consequences

which would need to be understood as there are very limited highway mitigation options available for this junction.

As a second stage to this TA the WSCTM has been interrogated to gain an understanding of the level of longer distance trips that could potentially be reassigned away from the East Street junction to reduce the level of delay. The conclusions of this assessment are that a 20% reduction in base traffic will reduce level of delay (when development traffic is added) to levels beneath that predicted in the 2032 RC. This is considered to be acceptable by WSCC. Although not specifically tested as part of this TA, it is expected that reassigning traffic away from Petworth would also have a benefit in terms of junction performance, at the Pound Street Road and London Road roundabouts.

Liss

The results of the traffic assignment and distribution assessment for Liss show that the level of development proposed is below the thresholds set by the study for further assessment. The location of the developments on the periphery of the settlement should help to minimise the need for development related traffic to travel through the centre of the settlement during the network peak hours. Furthermore as there are junction onto the A3 to the north and south of Liss and an alternate route to Petersfield via the B2070, there are a variety of realistic route choices available. The presence of the rail station is also a bonus in terms of offering an alternative means of transport along the A3 corridor between Portsmouth and London via stations including Havant, Petersfield, Haslemere, Godalming and Guildford, all of which are considered possible destinations for employment opportunities. There is also the possibility for shorter journeys between Liss and Petersfield or Liss and Liphook to be undertaken by bicycle using National Cycle Network route 22.

Fernhurst

The results of the traffic modelling work show that the junction of Easebourne Lane / Cowdray Park / North Street / Dodsley Lane, will not be severely affected by the introduction of the development traffic. Any traffic management measures to divert longer distance trips away from the junction would however lead to an improvement in junction performance. Although the highway network has been demonstrated to be able to cope with the expected level of development traffic, opportunities to improve highway capacity at this junction are limited by environmental and economic factors for example, the bridge over the River Rother and, properties abutting the highway.

Recommendations

The study predicts that the impact of development will be acceptable at the following locations;

- Liss;
- Petersfield;
    - A3 / Winchester Road / Bedford Road;

    - Bell Hill / Station Road / Winchester Road;
    - London Road / Pulens Lane / Inmans Lane;
- Midhurst (Rumbolds Hill / West Street / Bepton Road / Petersfield Road) – following reassignment of long distance traffic;
- Fernhurst (Easebourne Lane / Cowdray Park / North Street / Dodsley Lane);
- Petworth;
    - Pound Street / Station Road / Tillington Road.

As a consequence no further assessment is deemed necessary at this stage. However, once development comes forward, then an appropriate level of transport assessment e.g. TA / TS, should be undertaken by the developer and presented to the LHA as part of the planning application.

The recommendations from the outcomes of this study are that further work is jointly undertaken with the respective highway authority to, where applicable, refine the proposed junction arrangements and potentially consider further traffic management / behavioural change measures. Provision should be made to ensure that contributions continue to be taken from developments forthcoming in the vicinity of development sites to fund the evolving mitigation measures required.