Assessing the Impact of the Harbour Authorities LDF Proposals on the Strategic Highway Network

Transport Assessment

Clients:

Gosport Borough Council
Portsmouth City Council
Fareham Borough Council
Havant Borough Council

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Executive Summary

The South-east Hampshire area has been identified for considerable growth in both employment and housing in the period from the present day to 2026. This growth could potentially be restricted by the constraints of the existing highway and transport networks.

The four local authorities of Portsmouth, Havant, Fareham and Gosport (Harbour Authorities) form the majority of this area and commissioned the study to determine the transport impacts on the strategic highway network and other key junctions (Designated Road Network).

The specific objectives of the study were to:

- Assess the traffic impacts on the Designated Road Network and its junctions arising from developments proposed in the administrative areas of the Harbour Authorities against a 2006 base case.
- Be consistent with other studies including the South Hampshire Transport Strategy study being undertaken on behalf of the Transport Authorities.
- Take account of the priority schemes identified in the 'South East Hampshire – Regional Funding Allocation – Refresh 2008' study.
- A final objective to *'identify and assess specific mitigation measures'* is not covered by this report.

A meeting with the Highways Agency and the Harbour Authorities confirmed that the use of the existing 2004 Saturn traffic model for South Hampshire was an appropriate method for assessing the impacts of the LDF proposals. The model was originally prepared by WSP for use in assessing motorway widening on the M27 and (as supplied to PBA) consists of a 362 zone model based on a one hour am peak period. The am peak model represents average weekday conditions between 07:00 and 09:00 and it should be noted that different parts of the highway network may have higher traffic flows for short periods within the two hours. In addition to the Saturn model, reference was made to a considerable volume of traffic count data in order to be able to check the comparison of modelled Saturn traffic flows with *'real'* traffic counts. The census home to work data was also used for a number of different purposes. This entailed checking existing trip patterns between the Saturn model and the census, producing realistic predictions of new vehicle trips, deciding on the likely distribution of new trips and in assessing the future use of public transport.

The scale of planned LDF employment and housing numbers was supplied by the Harbour Authorities for the period up to 2016 and separately for the period from 2016 to 2026. Data was also provided of the present day number of houses, flats and levels of employment in terms of Gross Floor Area (GFA) of the different employment use classes. The planned new development is shown below:

Proposed Housing & Employment in LDF	2006 - 2026 New			2006 - 2026 New				
	Houses	Flats	Total	Retail	B1	B2	B8	Total
Portsmouth	0	14701	14701	165000	183500	45000	51500	445000
Havant	3763	2709	6472	32,118	104,994	56,553	45,341	239,006
Gosport	907	1593	2500	3,542	52804	9,421	8081	73848
Fareham	3174	1728	4902	36,968	20,181	12,380	6,602	76,131
Fareham SDA	8027	2010	10037	11,000	72,461	16,600	32,400	132,461
West of Waterlooville	1680	720	2400	0	95,700	3,300	23,700	122,700
Total	17551	23461	41012	248628	529640	143254	167624	1089146

Table 3: Planned New Development

Figures based on 2005 retail study. 2008 study has been commissioned and figures are subject to change.

A number of transport improvements are already planned within the study area, and others are being considered as part of the *South-east Hampshire – Regional Funding Allocation – Refresh 2008* study. Although some of these schemes have yet to be approved it was considered sensible to include the following highway and transport improvements in the analysis:

- M27 climbing lanes between junctions 11 and 12.
- The construction of the Tipner Interchange on the M275.
- The construction of a link road from the north of Fareham SDA to Junction 11 of the M27.
- Improvement of bus services from the Premium Bus Network and related to developer contributions.
- Construction of a Bus Rapid Transit network of high quality limited stop buses.

A comprehensive *'Methodology'* section is included in **Appendix B** to the report which describes the complex modelling process that has been undertaken. This covers the production of the base year models in 2006, 2016 and 2026 (with no development growth in the study area), the trip generation used for the new housing and employment, the traffic growth applied to trips outside of the study area, the likely distribution of new trips, the method of producing future trip patterns (matrices) and the results obtained from the whole process.

The outcome of the analysis is shown on 22 *'Results Sheets'* which represent the impact of the LDF proposals at major junctions across the study area. The junction results sheets in **Appendix E** show the following information (using two facing sheets per junction):

- Indication of the pattern of traffic movements with a *'pie chart'* showing the proportions of traffic from 10 geographic areas. The pie chart and separate table of traffic flows shows the scale of traffic movements attributable to the four Local Authorities
- A histogram indicating the changes in traffic flow between the 2006 base year and the future 2016 and 2026 development years. This shows the differing impacts from each authority.
- Diagrams of total inflow into the junction for the 2006 base year, 2016 base year, 2016 with development, 2026 base year, 2026 with all development and 2026 with development and taking account of the beneficial impact of the Premium Bus Network and Bus Rapid Transit. The first three cases are shown on the 'left' page and the last three cases on the 'right' page.

The results show that the highest number of junctions with significant increases in traffic flow are in Fareham, followed by Portsmouth and these are all located along the A27, M27 or M275. The North of Fareham SDA has a high impact on junction 11 of the M27.

Flows modelled for Gosport do not indicate significant problems at the Brockhurst double roundabout.

Junctions in Havant are predicted to have increased demand but in general the base demand is low compared with junctions in Fareham and Portsmouth. As a result, increases in flow are generally moderate and will be primarily influenced by traffic to and from the West of Waterlooville SDA.

In terms of traffic along the M27, the results show that the situation is likely to worsen further on this already congested area of the network. Attention is drawn to junctions 9 to 12 in Fareham and Portsmouth where modifications may be required at some point in the development process.

The link road from the North of Fareham SDA will have a significant impact on the flows seen at Junction 11 and, despite the bus only access to Fareham via junction 10, a high flow remains at Junction 10. Both junctions need to be considered together in order to facilitate access to the SDA.

The junctions which should be considered for further investigation are:

- M27 Junctions 9, 10, 11 and 12
- M27 connections with the M275 (related to delays 'backing up' from junctions further south on Portsea Island.)

A number of recommendations are listed below for further study. It is for the consideration of each authority as to their chosen priorities from the list.

Recommendation for Further Study
PM Peak Traffic Model Produce a pm peak model by reversing the trip patterns in the am peak Saturn model. Junction effects in the evening peak could identify different capacity problems.
Study Alternative Designs for Junctions 10 and 11 of the M27 The operation of the junctions is critical to the viability of the Fareham SDA. It is considered that a detailed study should be undertaken based on the SDA being connected to both junctions with traffic able to travel in all directions at each junction.
A number of mitigation measures could be modelled as follows:
Make Fewer Trips The beneficial impacts of encouraging greater use of walking and cycling modes could be modelled.
Peak Spreading With increasing traffic flows it is likely that the peak could extend to perhaps three hours in both the am and pm periods with fairly constant flows occurring from 0630 to 0930 and from 1530 to 1830. This effect could be modelled.
Congestion Charging Based on a pragmatic consideration of congestion charging it is felt that a viable scheme would have to cover the whole of the South Hampshire area. The effects could be assessed by a simple factoring down of all trips in the Saturn model. The effect could be combined with the assessment of 'peak spreading'.
Change Mode to Public Transport A number of sensitivity tests could be undertaken as follows: Increase the use of bus beyond the 15% increase that has already been applied for the Premium Bus Network. For the Bus Rapid Transit network assume that more than 20% of vehicle users would transfer.
M27 Junction 9 Assess the effect of the possible highway network changes which could link North Whiteley to Botley. There is also a possible Botley Bypass and new roads associated with the North Hedge End SDA. These changes could change the impact at Junction 9. Detailed capacity assessment of Junction 9 in combination with Segensworth. The addition of segregated left turn lanes at Junction 9 together with coordinated signal timings between the two junctions could provide additional capacity.
Other Junctions Mention is made of a number of other junctions where capacity problems could be an issue. These are all located on the local road network and require discussion with the relevant Authorities highway officers to gain further information on the present day problems.

Table 4: Recommendation for Further Study

1 Introduction

1.1 Context

1.1.1. The South East Hampshire area has been identified for considerable growth in both employment and housing in the period from the present day to 2026. This growth could potentially be restricted by the constraints of the existing highway and transport networks. The four local authorities of Portsmouth, Havant, Fareham and Gosport (Harbour Authorities) form the majority of this area and wish to understand in greater detail the impacts of their separate Local Development Frameworks.

1.1.2. The Harbour Authorities have discussed the potential transport effects of their LDF proposals with the Highways Agency and have decided that a Transport Assessment should be undertaken to determine the impact of future growth on the Strategic Road Network (SRN).

1.1.3. The study responds to a recognised need for a robust assessment to demonstrate to the Highways Agency the *'soundness'* of the Harbour Authorities LDF's. Circular 02/2007 – *'Planning and the Strategic Road Network'* (DfT) sets out how the HA will take part in the developments of LDF's from the earliest stages and as such, the HA believe that an evaluation of the transport impact on the SRN is necessary to demonstrate that the LDF has been developed on a *'robust and credible evidence base'*.

1.1.4. The Harbour Authorities are conscious that the capacity and operational efficiency of the SRN may be affected by the capacity and constraints of the adjacent local highway network, therefore this study incorporates an extended network including some non-SRN roads. For the purposes of this study the extended network is described as the *'Designated Road Network'* (DRN) as shown in **Figure 1.1** below:

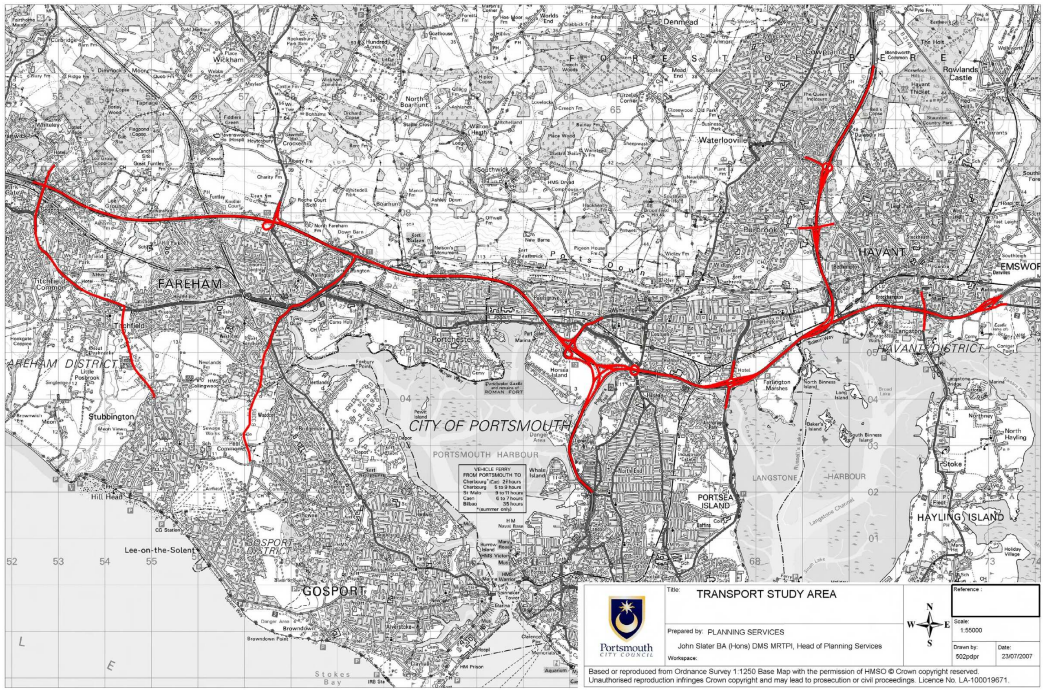


Figure 1.1 Plan of Designated Road Network (DRN)

1.1.5. The study provides an initial assessment of the impacts of the development proposals but at this stage does not discuss all the possible mitigation measures that may have to be considered at particular junctions within the study area. Depending on the results of the study further work may have to be commissioned to consider possible mitigation measures such as restraint, public transport enhancements, the effects of personalised travel planning, workplace travel plans, improvements to cycling and walking facilities and highway improvements.

1.2 Objectives

1.2.1. The specific objectives of the study are as follows:

- Assess the traffic impacts on the Designated Road Network and its junctions arising from developments proposed in the administrative areas of the Harbour Authorities. The study includes a 2026 base case of background growth against which the net impact of the development proposals can be assessed.
- Be consistent with other studies including the South Hampshire Transport Strategy study being undertaken on behalf of the Transport Authorities.
- Take account of the priority schemes identified in the 'South East Hampshire – Regional Funding Allocation – Refresh 2008' study. The transport impacts of the proposed schemes upon the DRN are included in the assessment of possible mitigation measures.

1.2.2. A final objective to *'identify and assess specific mitigation measures, aside from the RFA priority schemes'* is not covered by this report.

1.3 Report Structure

1.3.1. The report is structured with:

- an analysis of the available traffic data;
- a description of the development proposals supplied by the four authorities;
- a discussion of the highway and public transport improvements from committed schemes and described in the *'Refresh Study'*;
- an explanation of the methods used to derive future traffic flows and bus patronage; and
- an indication of the impacts of the developments at critical junctions across the study area.

1.3.2. An Executive Summary is provided which highlights the main locations where substantial traffic impacts will occur. Recommendations are suggested for further studies.

2 Base Data

2.1 Introduction to the Saturn Traffic Model

2.1.1. The Solent Strategic Transport Model (SSTM) was developed by Atkins in 2006 to assess the implications of future growth in the Southampton to Portsmouth area. The model consists of a number of sub models one of which is a Saturn highway model developed by WSP for the Highways Agency to assess the impact of the widening of M27 between Junctions 3 and 4. The model is now maintained by Mott Gifford and has been supplied to PBA for use in this study.

2.1.2. The 2004 am peak model (one hour period as supplied to PBA) represents average weekday conditions between 07:00 and 09:00. It should be noted that different parts of the highway network may have higher traffic flows for short periods within the two hours. The coverage of the Saturn model is as shown in **Figure 2.1.**

2.1.3. Brief extracts from the Atkins Validation Report in August 2006 describe the history of this model:

- The M27 Integrated Transport Study (M27ITS) was undertaken by MVA in 2000 to develop a transport strategy for the M27 corridor. As part of that work, a SATURN morning peak hour highway model was developed. The approach taken by MVA was to combine two existing models and then update the combined model to a common base year of 1999.
- The two existing models were the Portsmouth model developed for the first phase of the South Hampshire Rapid Transit (SHRT) by Steer Davies Gleave with a base year of 1994.
- The Southampton Model obtained from the Southampton Strategic Transportation Model. The model was developed in 1992 by Halcrow Fox and used in the examination of land use development proposals at Eastleigh, access to the Port of Southampton and analysis of various SHRT proposals.

2.1.4. WSP was commissioned by the Highways Agency to update the M27 Integrated Transport Study as part of the review of the recommendations emerging from the South Coast Multi Model Study. This recommended the widening of the M27 between junctions 4 and 5 and this was subsequently incorporated into the Highway Agency's Target Programme of Improvements.

2.1.5. The development of the model was undertaken by WSP in several stages:

- development of network and matrices using a 362 zone system;
- calibration of model parameters including matrix estimation; and
- validation of assignments.

2.1.6. The study area of Portsmouth, Havant, Fareham and Gosport is represented by 92 zones within the 362 zone highway traffic model. The four authority areas have the following number of zones and are shown on a number of Figures as follows:

- Portsmouth, Havant & Gosport - **Figure 2.2**
  - Portsmouth has 34 zones

- Havant has 25 zones
- Gosport has 12 zones

- Fareham - 21 zones **– Figure 2.3**

2.1.7. The remainder of the model zones are shown on **Figure 2.4**.

2.1.8. In order to assess the impacts of the LDF proposals it has been agreed with the Highways Agency that the use of a traffic model is essential. Atkins considered that the SSTM highway model was appropriate for the assessment of strategic movements but was less able to assess the impact on the local highway network where the use of local models was more appropriate. Despite these limitations the Highways Agency accept that the model results will give a good indication of the impacts of the LDF proposals and are an appropriate method of assessment.

2.2 Recent Traffic Survey Data

2.2.1. In order to assess the accuracy of the highway model traffic data has been obtained from a number of sources as follows:

- 2004 to 2006 traffic data from approximately 70 sites on the trunk road network extracted from The Traffic Information Database (TRADS2);
- Traffic counts supplied by the authorities and obtained from Transport Assessments
- Traffic counts supplied by HCC
- Traffic counts organised by PBA at Segensworth

2.2.2. Although the use of the SSTM has been agreed by the HA it was considered essential to determine how well the model compared with actual traffic counts across the extent of the study area. The main source of data is available on the Highways Agency (TRADS2 website) and together with the other traffic data listed above has been incorporated into a spreadsheet. Further details of the comparison of the model with actual counts is provided in Section 6.

2.3 Use of the 2001 Census

2.3.1. In addition to the use of traffic counts to check the validity of the model, reference has also been made to the 2001 Census Home to Work statistics. The ESRI Graphical Information System (GIS) was used to re-code the 'output area' census data to the 362 zones used in the Saturn highway model. This information was used to assist in the following tasks (described in Section 6):

- Checking the patterns of movement in the study area between the census data and the Saturn model.
- Assessment of trip rates for the proposed housing and employment areas.
- Trip distribution for new development.
- Assessment of public transport use.

3 Future Development

3.1 Location of Developments

3.1.1 In order to identify the locations of future housing and employment development sites within the study area the four authorities were asked to supply detailed information based on the zoning system used in the Saturn traffic model. A GIS representation of the zone boundaries was supplied to the authorities together with a list of the 2001 'output areas' contained within each zone. As the zone system was originally based on the 1991 census boundaries minor rearrangement of the boundaries was required.

3.1.2 The documents available on the PUSH web site were also reviewed in order to obtain the latest position on development plans in areas adjacent to the study.

3.1.3 The following sections give an overview of housing and employment proposals, which are all at various stages of commitment. The locations of the major centres of development have been identified on **Figure 3.1** located at the end of this chapter. Three tables are shown below (compiled from the supplied local authority data) indicating the projected housing and employment levels within the study area of Portsmouth, Havant, Fareham and Gosport. Information is also shown for West of Waterlooville, Whiteley and North Hedge End using the latest information from PUSH.

Proposed Housing in LDF	2006 - 2016 New			2016 - 2026 New		
	Houses	Flats	Total	Houses	Flats	Total
Portsmouth	0	9,051	9,051	0	5,650	5,650
Havant	2,035	1,560	3,595	1,728	1,149	2,877
Gosport	792	1,376	2,168	115	217	332
Fareham	2,354	1,032	3,386	820	696	1,516
Fareham SDA	14	6	20	8,013	2,004	10,017
West of Waterlooville	980	420	1,400	700	300	1,000
Whiteley	2,240	560	2,800	480	120	600
North Hedge End	0	0	0	4,800	1,200	6,000
Total	8,415	14,005	22,420	16,656	11,336	27,992

Table 3.1 Projected LDF Housing Numbers to 2016 and 2026

Proposed Employment in LDF	2006 - 2016 New					2016 - 2026 New				
	Retail	B1	B2	B8	Total	Retail	B1	B2	B8	Total
Portsmouth	149,700	194,114	44,339	51,707	439,860	15,300	-10,614	661	-207	5140
Havant	32,118	66,150	24,939	20,669	143,876	0	38,844	31,614	24,672	95,130
Gosport	3,542	52,804	3,821	8,081	68,248	0	0	5,600	0	5,600
Fareham	10,600	15,181	11,380	2,602	39,763	26,368	5,000	1,000	4,000	36,368
Fareham SDA	0	461	0	0	461	11,000	72,000	16,600	32,400	132,000
West of Waterlooville	0	95,700	3,300	23,700	122,700	0	0	0	0	0
Whiteley	0	0	0	0	0	0	63,800	2,200	15,800	81,800
North Hedge End	0	0	0	0	0	0	45,880	8,140	19,980	74,000
Total	195,960	424,410	87,779	106,759	814,908	52,668	214,910	65,815	96,645	430,038

Table 3.2 Projected Employment GFA to 2026

Proposed Housing & Employment In LDF	2006 - 2026 New			2006 - 2026 New				
	Houses	Flats	Total	Retail	B1	B2	B8	Total
Portsmouth	0	14,701	14,701	165,000	183,500	45,000	51,500	445,000
Havant	3763	2709	6472	32,118	104,994	56,553	45,341	239,006
Gosport	907	1593	2500	3,542	52,804	9,421	8,081	73,848
Fareham	3174	1728	4902	36,968	20,181	12,380	6,602	76,131
Fareham SDA	8027	2010	10037	11,000	72,461	16,600	32,400	132,461
West of Waterlooville	1680	720	2400	0	95,700	3,300	23,700	122,700
Whiteley	2720	680	3400	0	63,800	2,200	15,800	81,800
North Hedge End	4800	1200	6000	0	45,880	8,140	19,980	74,000
Total	25,071	25,341	50,412	248,628	639,320	153,594	203,404	1,244,946

Table 3.3 Projected LDF Housing and Employment up to 2026

i – Figures for Fareham and Fareham SDA include potential 'windfall' projections which are likely to come forward based on past trends and policy position, which is recognised as being greater than the SE Plan figure.

ii – For the purposes of this study it has been assumed that the overall trip generation from residential development in Portsmouth will be equivalent to that of private flats. The distribution of houses, private flats and social housing will be established at later stages of the LDF process.

iii – The minor discrepancy between the South East Plan housing figures for Havant of 6300 and the above figure of 6472 reflects subsequent assessment and review of the yield of potential sites.

3.1.4 The following paragraphs indicate the general pattern of proposed development and key sites. The location of key sites is shown in **Figure 3.1**. The housing figures have been determined from evolving Strategic Housing Land Availability studies. Site allocations, where known, have been determined with regard to sustainability criteria. Site allocations for all housing are not yet determined and the location of proposed development is therefore based on the best available data at this time. **Figures 3.2, 3.3 and 3.4** show the location of proposed housing, employment and retail development related to the Saturn zones and giving an indication of the level of development by reference to a symbol which varies in size.

Portsmouth

3.1.5 The PUSH strategy envisages 14,700 new homes in the city by 2026. The allocations are based on known developments and the best estimate of the development potential of each of the zones at the time of this study. The PUSH figures include 2000 homes at Port Solent and 1500 at Tipner, and the emerging Core Strategy envisages further significant development at Fratton Park, Somerstown and North Southsea and in the defined town centres, particularly Cosham.

3.1.6 The PUSH strategy places an emphasis on Portsmouth City Centre for additional office floor space. Other town centres, in particular Cosham, are also expected to accommodate employment floor space, along with Tipner, Port Solent & North Harbour and the city's existing industrial areas.

Havant

3.1.7 The emerging South East Plan states that Havant Borough must provide 6300 new homes over the period between 2006 and 2026. It is expected that approximately 60-70% of these homes can be provided within the existing urban areas of Havant, Leigh Park, Emsworth, Waterlooville and Hayling Island. The remainder of the new homes will have to be provided on urban extension sites.

3.1.8 The West of Waterlooville Major Development Area will deliver a significant level of housing but only 600 of these new homes will be in the administrative area of Havant Borough. A larger proportion is contained within Winchester City Council's administrative boundaries.

3.1.9 New employment floor space is also required. One of the more significant potential employment sites is land at Dunsbury Hill Farm to the north-west of Havant / Leigh Park. Other potential employment sites have also been identified.

Winchester

3.1.10 The southern part of Winchester District falls within the PUSH area and the strategy proposes 6,740 dwellings in this area from 2006 to 2026. There are a number of major planned housing developments specified within the Winchester District Local Plan Review which will be carried forward into the Local Development Framework. Further development allocations will be needed and the City Council is currently consulting on strategic development options.

3.1.11 Major housing schemes are already committed at West of Waterlooville Major Development Area (3,000 dwellings including the 'reserve' element, of which 2,400 are in Winchester District), Knowle, and Whiteley where previous large allocations are now largely completed. Strategic development options currently being consulted on include possible urban extensions to the north of Whiteley or West of Waterlooville, or expansion of Knowle and the existing market towns in the area.

3.1.12 There are also a number of strategic employment sites in Winchester, at Whiteley (Solent Business Parks) and West of Waterlooville. Parts of the Solent Business Park are now well established, although Solent 2 has yet to be completed, and the allocations at West of Waterlooville have only recently received planning permission.

Fareham

3.1.13 Within the Borough of Fareham, future development will generally be located at Locks Heath and Fareham, together with a Strategic Development Area to the north of Fareham. Major housing allocations are identified within the existing urban area of Locks Heath (Peters Road 309), Titchfield Common (Hunts Pond Road 339) and North Whiteley (113) and construction has commenced at Coldeast Hospital (251). Long term potential for a significant level of housing has also been identified for Fareham Town Centre (around 500). In addition land situated to the north of the M27, near Fareham has been identified for a Strategic Development Area (SDA) in the South East Plan which will incorporate 10,000 dwellings and

approximately 121,000 m2 of employment floorspace. Existing allocated employment sites include land at the Solent Business Park in Whiteley and at Segensworth on the eastern periphery of Locks Heath.

Gosport

3.1.14 The Strategy for South Hampshire outlined in the emerging South East Plan states that 2,500 dwellings should be provided within the Borough of Gosport over the period between 2006 and 2026.

3.1.15 Employment is a very high priority for Gosport Borough Council. Out-commuting has increased by 41% from 1991 to 2001 with over 18,000 residents working outside of the Borough. The Borough provides work for only 51% of its resident workers. It has the lowest job density ratio in South East England and one of the lowest in the UK. This level of out-commuting on a constrained road network has led to significant congestion.

3.1.16 Two key strategic sites, Daedalus and the Gosport Waterfront, have been identified by the Borough Council. These sites will include a mix of uses and provide a significant proportion of the Borough's residential and employment land requirement. In addition the Rowner Renewal project will deliver a regenerated neighbourhood with additional dwellings and a new local centre.

3.1.17 Additional sites allocated in the Local Plan Review could provide at least 252 homes (outstanding allocated land at Daedalus and Priddy's Hard Heritage Area). The remaining homes will largely be located on the Gosport Waterfront and Rowner.

North Hedge End

3.1.18 The strategic development area of North Hedge End is located outside of the study area but due to its size has been included within the assessment. The PUSH strategy envisages 6,000 new homes and 74,000 sq m of employment use.

3.1.19 **Appendix A** shows the detailed breakdown of the projected housing and employment numbers for each zone within the study area.

Education, Leisure, Minerals & Waste

3.1.20 Developments in these categories have been considered but none of significance are anticipated within the plan period.

3.2 Existing Problems

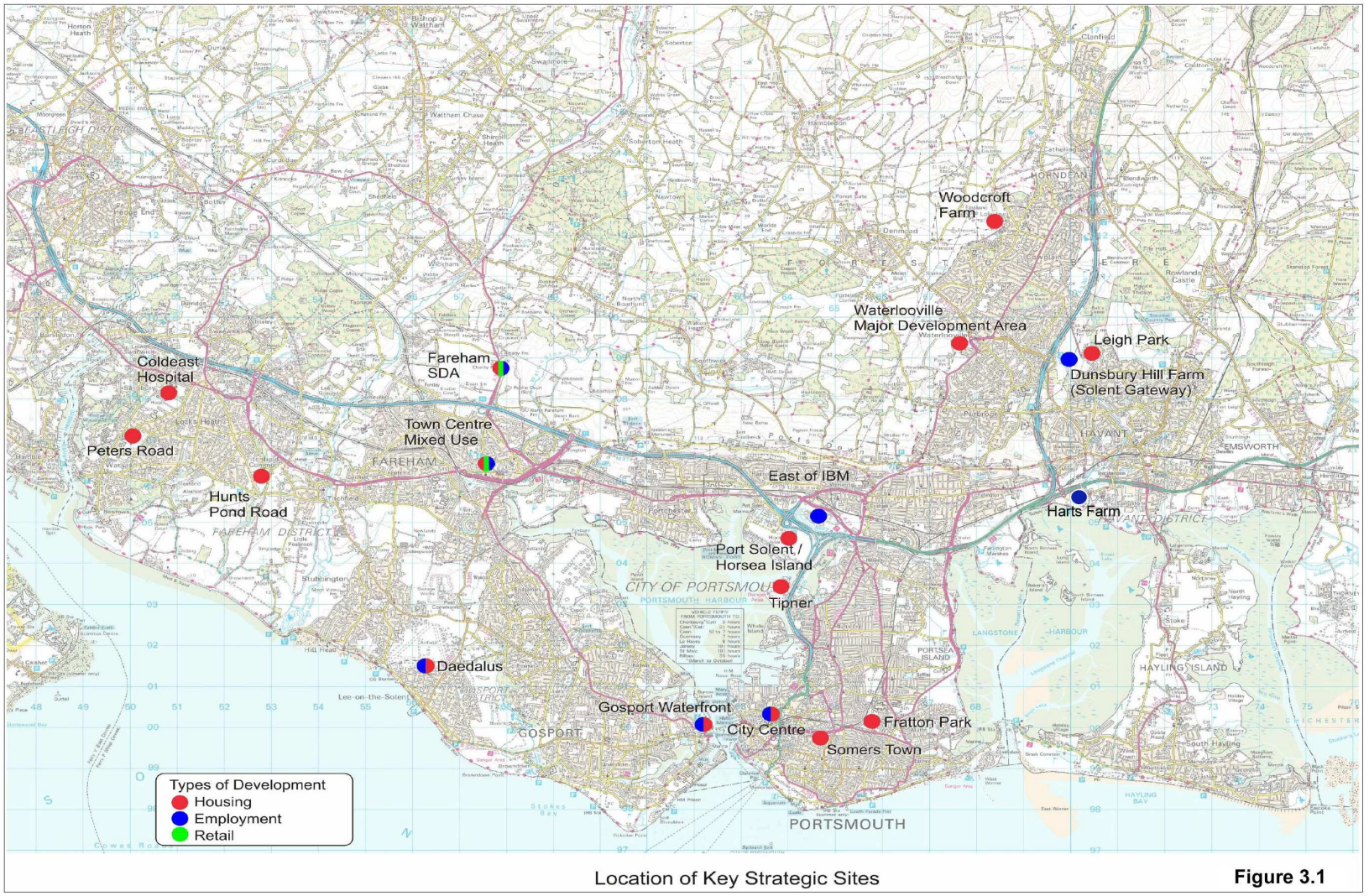
3.2.1 The Solent Transport Strategy includes a clear summary of transport problems and opportunities:

> *"The sub-region has a number of transport related challenges emanating from an existing transportation infrastructure deficit, relatively high density, peninsula geography, pockets of social deprivation and other specifically local issues. The South East Plan proposes significant growth in the region over the next 20 years and considerable investment will be needed to begin to accommodate this proposed growth"*

3.2.2 Congestion and roads operating at or above capacity is a significant issue in south Hampshire. The region's motorways are operating with high levels of traffic flow in the peak periods, with growth at over 2% per annum. As these motorways act as the links to the key regional gateways of the ports at Portsmouth and Southampton, and Southampton Airport, the negative impact on the economy is particularly important in the context of the Regional Spatial Strategy and transport plans.

3.2.3 Urban roads show similar levels of congestion and because of the geography of peninsulas and islands roads such as the A32 from Fareham to Gosport are severely congested, with limited alternative routes available to motorists. The congestion is regularly cited as a constraint on economic growth in such locations.

3.2.4 Demand management and travel behaviour change projects are identified as possible solutions to the regions congested highways, but both need long term commitment and resourcing to ensure that real impacts on mode share and travel patterns can be achieved. In particular significant levels of demand management, as identified in the Solent Transport Strategy, needs political and community support to be delivered and to be effective.



Location of Key Strategic Sites **Figure 3.1**

4 Highway Improvements

4.1 Introduction

4.1.1 Based on the brief for the study a number of committed highway improvements have been taken into account. These are detailed as follows:

4.2 M27 Climbing Lanes

4.2.1 Construction of two climbing lanes between junctions 11 and 12 of the M27 began in January 2008. The need for climbing lanes was identified in the South Coast Multi Modal Study (SoCoMMS) and the approval for the project was gained in February 2007.

4.2.2 The motorway section between junctions 11 and 12 carries in the region of 110,000 vehicles per day and this can cause significant congestion at present. The addition of the climbing lanes should help to mitigate this problem.

4.2.3 The location of the two climbing lanes is shown below in **Figure 4.1**.

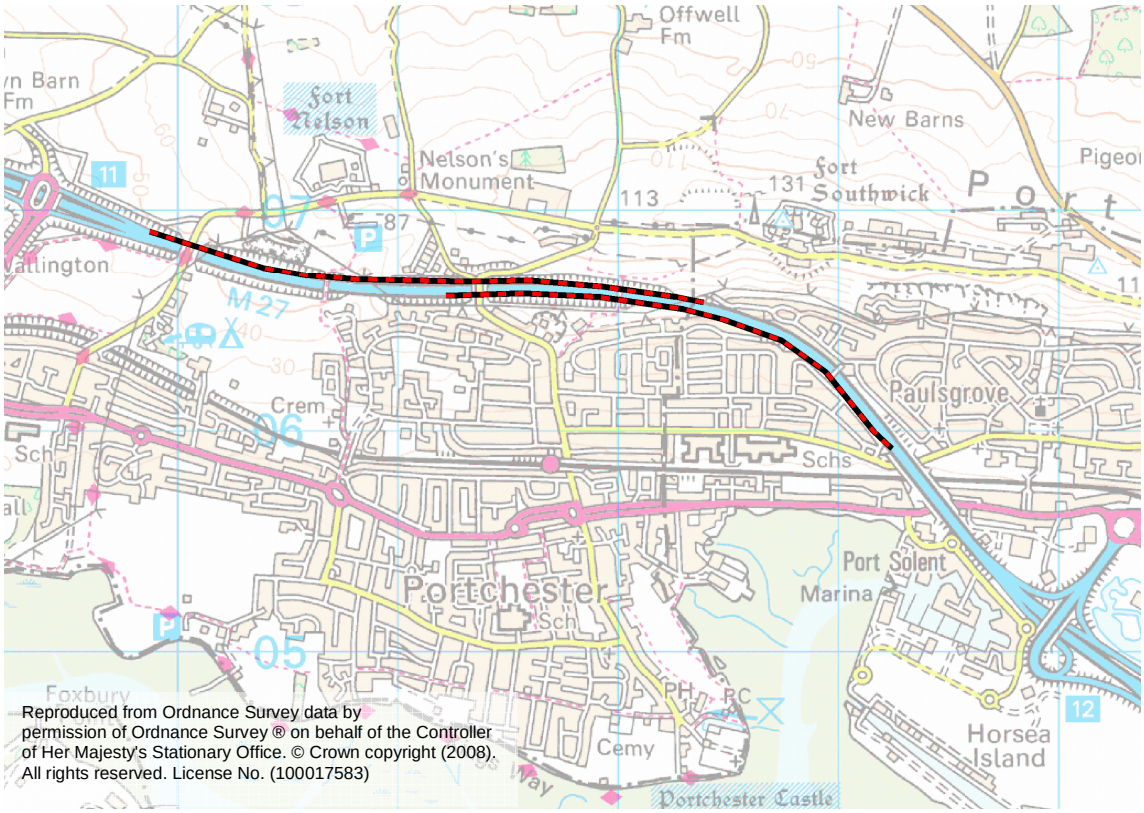


Figure 4.1 – Location of M27 Climbing Lanes

4.2.4 The climbing lanes are still under construction at the time of writing this report and are not included in the SATURN model for the 2006 base network. They are incorporated within the assessments for 2016 and 2026.

4.3 Tipner Interchange

4.3.1 Plans for redevelopment at Tipner in Portsmouth have been considered for a number of years and the M275 Tipner Scheme proposals now have a preferred option. The first public consultation on the project was held in February 2008 and it is envisaged that outline planning permission for the project will be sought towards the end of 2008.

4.3.2 Works to strengthen the current motorway bridge at Tipner have begun.

4.3.3 The development at Tipner is proposed to be mixed residential and employment and in order to serve this development a new motorway junction is proposed. Provision was made for a roundabout beneath the M275 at the time of its construction in the 1970's, although at present only the southern underpass is used to serve Tipner west of the M275. The preferred option has four slips with all moves and all traffic permitted.

4.3.4 **Figure 4.2** below indicates the expected location of this new motorway junction if planning permission is granted.

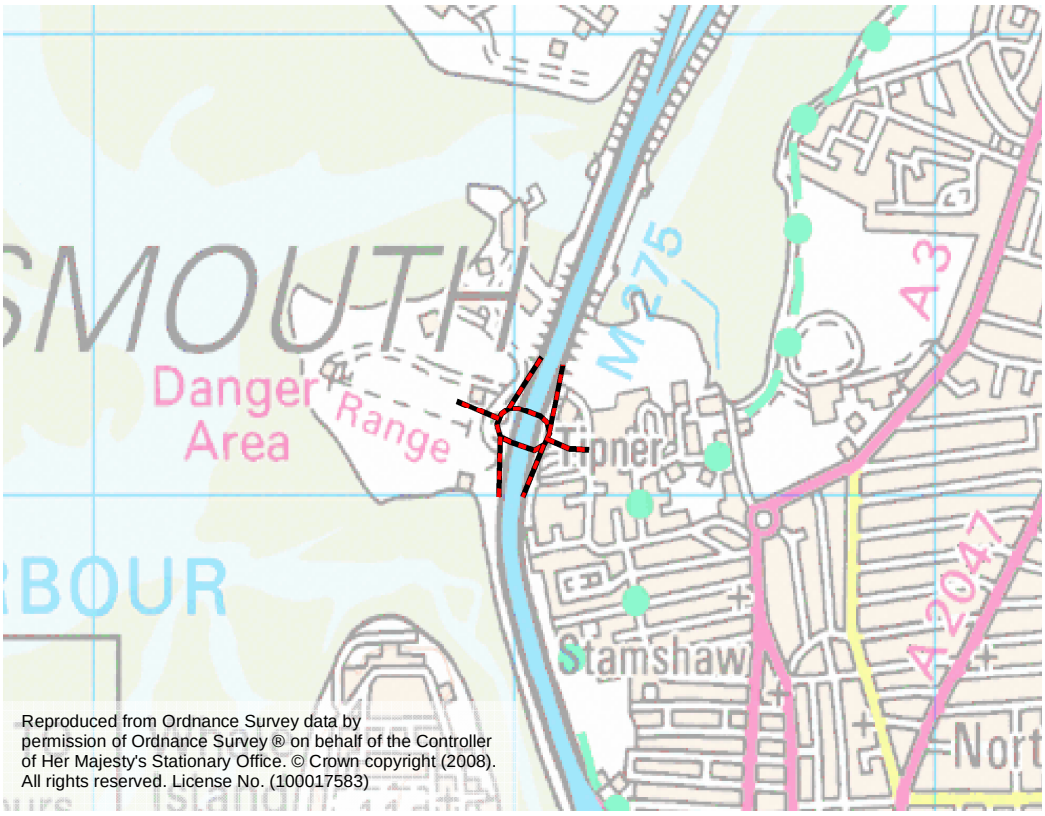


Figure 4.2 – New Motorway Junction at Tipner

4.3.5 Whilst there is an expectation that the junction will be constructed pre-2016, it is unlikely that there will be sufficient development to create significant peak hour traffic until post 2016. For this reason the junction has only been included in the SATURN network for '2026 Do Something'.

4.4 North of Fareham SDA Link Road

4.4.1 The north of Fareham strategic development area is expected to have 10,000 new dwellings by 2026 along with 121,000 m^2 of employment. It is also expected to have on site education, retail, commercial, and social/community facilities.

4.4.2 A report on the transport and access options for the SDA was published by Transport for South Hampshire and the Partnership for Urban South Hampshire in February 2008 (Setting Strategic Direction: North of Fareham Strategic Development Area).

4.4.3 A number of possible options were considered in terms of network improvements to make the development traffic work, including the conversion of junction 10 of the M27 into an all moves junction. However the currently favoured option (described in the MVA/Mott Gifford report titled "Setting Strategic Direction" Jan 2008 is to re-align the A32 to junction 11 of the M27 and restrict the current A32 alignment through Junction 10 to buses only. It was also suggested that the east facing slip roads at Junction 10 would be restricted to bus and high occupancy vehicles (HOV) only allowing HOVs from Portsmouth to cross under the motorway to access the SDA.

4.4.4 Due to the limitations of the Saturn modelling process it was not possible to assess the effect of HOVs and the eastbound slip roads at Junction 10 were therefore modelled for all traffic movements. The southbound A32 under Junction 10 was effectively banned to all traffic movements (allowing for bus movements only) and a new link provided connecting the A32 just north of Junction 10 to Junction 11. The net result of this form of modelling is that eastbound flows at the Junction 10 slip roads will be overestimated compared to a situation where their use is restricted to 'car share' HOV and bus movements only.

4.4.5 This network improvement is planned to be carried out only if the development occurs and so has only been included in the SATURN network for '2026 Do Something'.

5 Public Transport Improvements

5.1 Premium Bus Network

5.1.1 The Premium Bus Network (PBN) is envisaged to consist of a series of local bus corridors which are served by both commercial and supported services, where a number of routes combine to form a high frequency. This will be supported by high quality infrastructure and bus priority measures.

5.1.2 The routes consist of a number of key corridors in the sub-region:

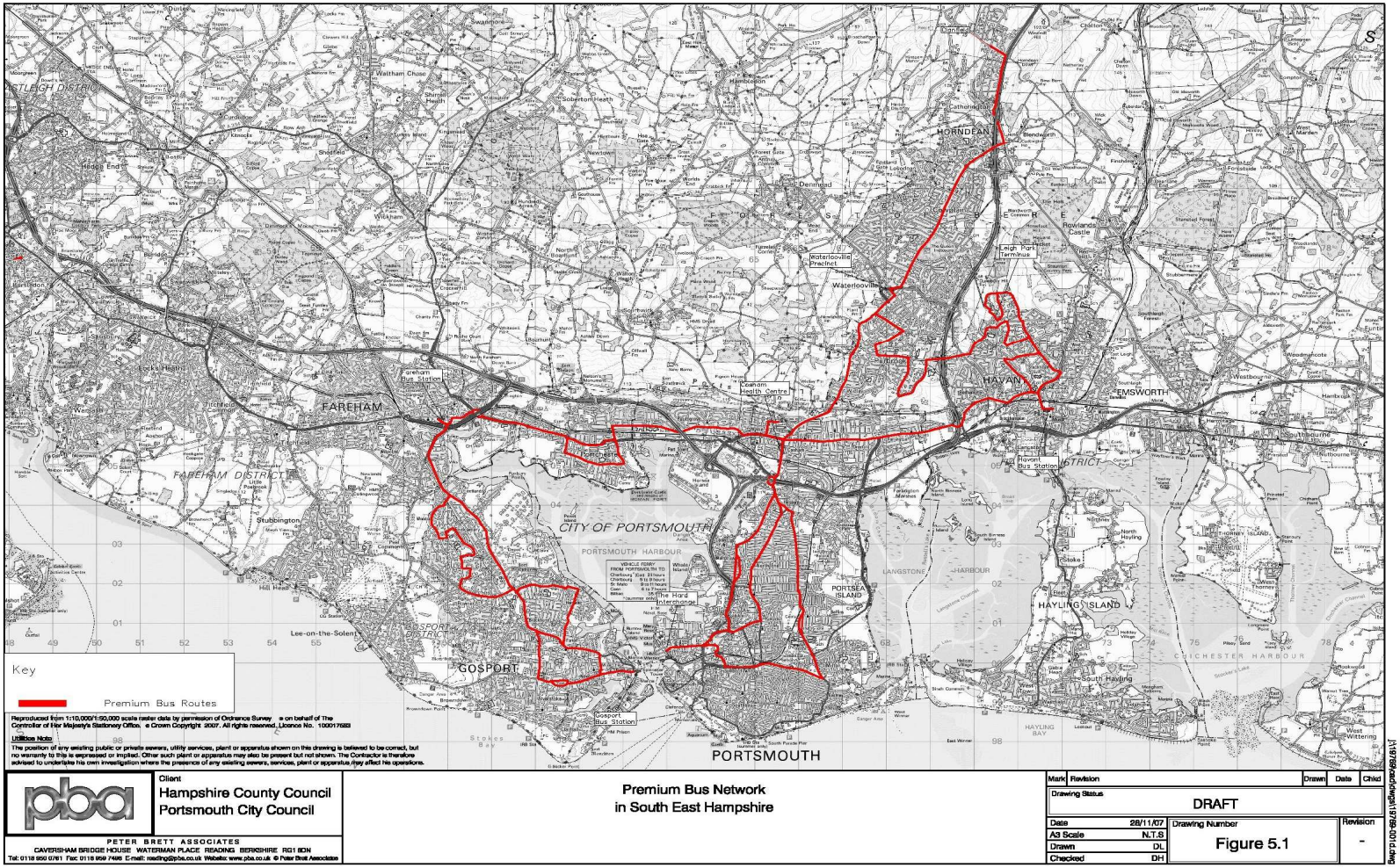
- Section A: Portsmouth - Cosham;
- Section B: Cosham - Clanfield;
- Section C: Cosham - Fareham via Q A Hospital;
- Section D: Cosham - Havant - Leigh Park;
- Section E: Havant - Waterlooville; and
- Section F: Fareham - Gosport.

5.1.3 A map of the proposed premium network is included as **Figure 5.1**.

5.2 PBN Benefits

5.2.1 Benefits of the premium bus network will be enjoyed by existing and new bus users. In assessing the scale of benefits, detailed survey work and analysis would be required. At this stage it is possible to derive an indicative forecast of future trip making using existing bus patronage data derived from travel to work information from the 2001 census and applying a growth factor based on experience of the introduction of high quality bus schemes elsewhere in the UK.

5.2.2 For the Saturn modelling it has been assumed that an average increase in bus use of 15% would occur across the whole of the Harbourside Authorities area resulting from both the Premium Bus Network and other enhancements to bus frequency and quality that would be funded by new developments. No increase in bus use has been assumed in Whiteley, Southampton and Eastleigh. The 15% increase is based on survey data obtained from a number of high quality bus routes throughout the UK such as Oxford (52% over 10 years), Ipswich Superoute 66 (63% over 5 years), Bristol Showcase 76/77 (13% over 1 year), Brighton and Hove (50% over 10 years), Portsmouth A3 corridor (7% over 2 years) and Havant Service 23 (33% over 2 years).


Key
Premium Bus Routes
Reproduced from 1:10,000/1:50,000 scale raster data by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. © Crown Copyright 2007. All rights reserved. Licence No. 100017683
Utilities Note
The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake his own investigation where the presence of any existing sewers, services, plant or apparatus may affect his operations.
FAREHAM
GOSPORT
PORTSMOUTH
CITY OF PORTSMOUTH
HAVANT
EMSWORTH
HAYLING ISLAND
Client
Hampshire County Council
Portsmouth City Council
PETER BRETT ASSOCIATES
CAVERSHAM BRIDGE HOUSE WATERMAN PLACE READING BERKSHIRE RG1 8DN
Premium Bus Network
in South East Hampshire
Drawing Status
DRAFT
Date 28/11/07
A3 Scale N.T.S
Drawn DL
Checked DH
Drawing Number
Figure 5.1
Revision
-

5.3 Bus Rapid Transit (BRT)

Objectives

5.3.1 To establish a sub-regional high quality bus rapid transit system to deliver the following specific local objectives:

- To significantly enhance public transport accessibility to housing in North of Fareham SDA;
- To significantly enhance public transport accessibility to employment opportunities in central Portsmouth;
- To address growing traffic congestion on the Gosport peninsula; and
- To attract new passengers who would have previously used the private car for their trip.

5.3.2 The scheme is a bus-based rapid transit system to provide fast direct connectivity between key centres, with a limited number of high quality stops to preserve journey time competitiveness with the private car.

5.3.3 At this stage, the scheme consists of five sections as listed below and shown in **Figure 5.2**:

Section A: Gosport – Fareham

5.3.4 This section of route would link Gosport Harbour and town centre with Fareham town centre, principally using the disused rail line between the two towns but also with on-highway running to access local residential areas in Gosport.

Section B: Fareham – North of Fareham SDA

5.3.5 Section B would link Fareham town centre with the SDA and three route options have been investigated:

- Disused rail line between Fareham and Meon Valley, to the west of the Botley line and SDA site;
- A32 Wickham Road; and
- Tunnel under the M27 motorway at Fareham Common.

Section C: Fareham – Cosham

5.3.6 Section C connects Fareham with access to Portsmouth at Cosham, possibly using the Queen Alexandra Hospital as a transport interchange between BRT routes and local bus services. Three route options have been reviewed:

- A27 throughout;
- M27 – utilising hard shoulder motorway running; and
- A27, Allaway Avenue & Paulsgrove Estate.

Section D: Cosham – Portsmouth

5.3.7 Section D provides access to Portsmouth town centre, with the service terminating at The Hard transport interchange. Three route options have been considered:

- A3 – there are limited possible opportunities for further transfer of general highway space to bus only use on the A3 corridor but more detailed work would be required to ascertain the impact of such action on general traffic flow. In any event, there are few options for bus priority south of Northern Parade which would mean vehicles rejoining congestion in the general traffic flow;
- M275 – Utilising the Tipner interchange; and
- Local roads – the characteristics of the local road network in Portsmouth are severely constrained in terms of available highway capacity and lack of alternative routes to which general traffic can be displaced. It is not considered feasible to deliver a high quality segregated BRT scheme using either London Road (A2047) or Copnor Road (A288) due to the capacity constraints on these roads.

Section E: Horndean – Cosham

5.3.8 This section makes use of the A3 bus priority corridor which has been largely implemented and consists of long sections of bus lane in both directions between the Hampshire border and Waterlooville and north to Horndean.

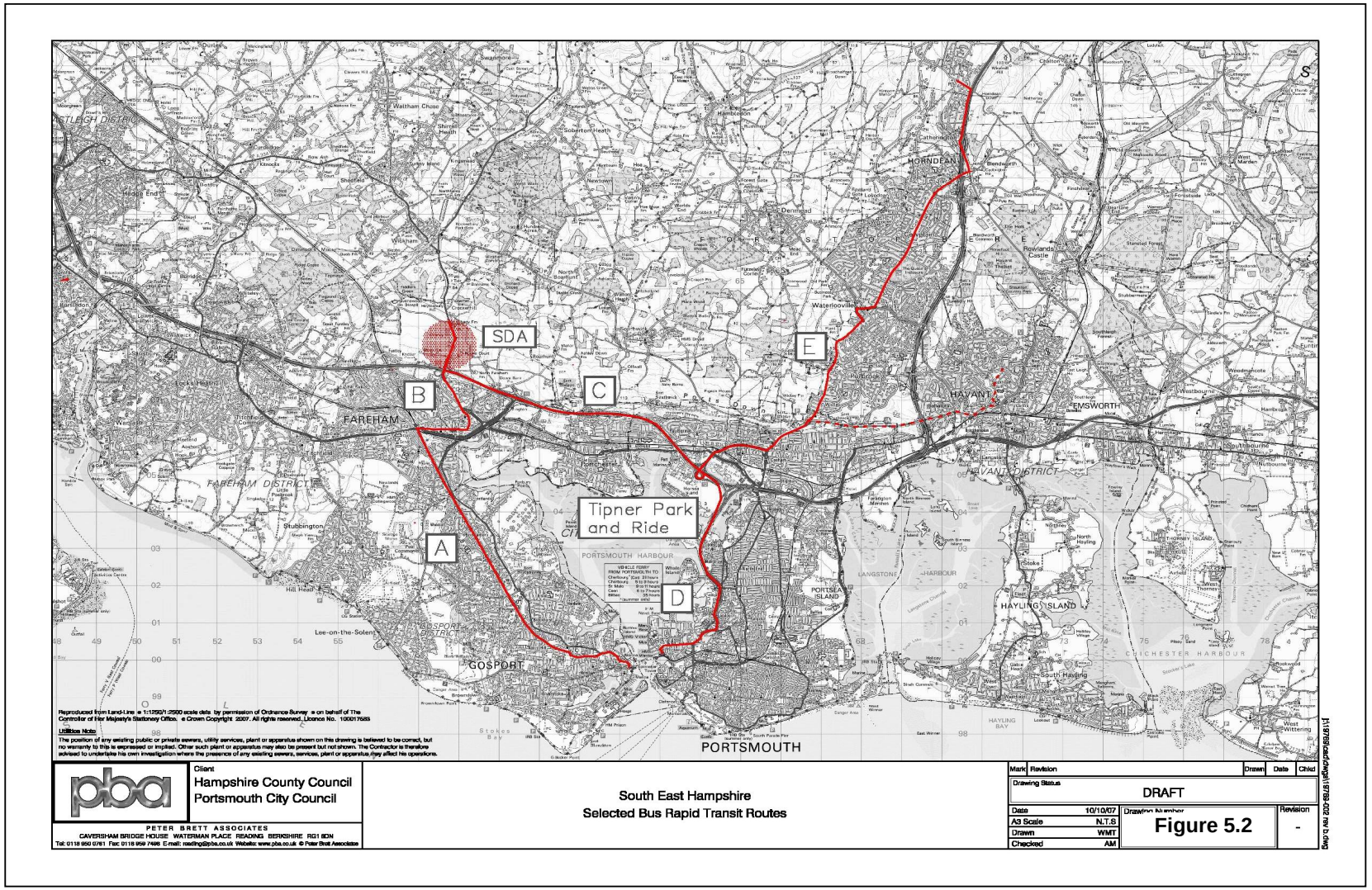
Other Sections

5.3.9 Potential future expansion of the core BRT scheme could include routes from Cosham to Havant and from Fareham to Hamble as well as westward development into the Southampton conurbation.

5.4 BRT Benefits

5.4.1 The BRT system is anticipated to appeal to non bus users because of the high quality attributes of the mode which is more akin to a light rail system. Accordingly, benefits will accrue not only to bus users who switch from existing services but also to former car users who change modes.

5.4.2 For the purpose of Saturn modelling it has been assumed that 20% of car trips between an origin and destination within 600 metres of a bus stop would transfer to the BRT. This is based on a combination of 'engineering judgement' and using data from the Kent Thameside Fastrack service which has achieved a considerable mode shift from car users.


SDA
A
B
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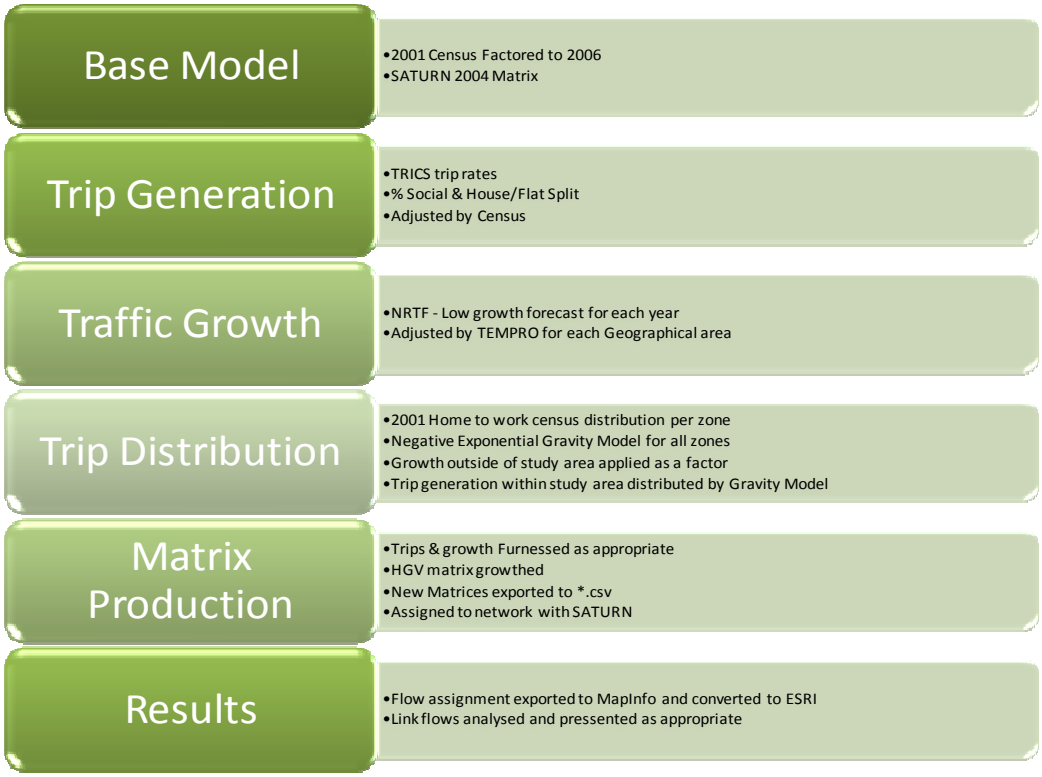
Tipner Park and Ride
FAREHAM
GOSPORT
PORTSMOUTH
HAVANT
HORNDEAN
EMSWORTH
HAYLING ISLAND
Lee-on-the-Solent
Stubbington
Waterlooville
Client
Hampshire County Council
Portsmouth City Council
PETER BRETT ASSOCIATES
South East Hampshire
Selected Bus Rapid Transit Routes
DRAFT
Figure 5.2

6 Methodology

6.1 Introduction

6.1.1 The basic steps used in the methodology for this study are outlined in the flow diagram below:



6.2 Summary of Methodology

6.2.1 The methodology used within each step of the modelling process is described in detail in **Appendix B**.

6.2.2 **Appendix C** provides a detailed breakdown of the 'calibrated TRICS data' and final trip generation to and from each zone based on the proposed housing and employment projections. This is shown for both the am and pm situations.

6.2.3 The percentage increase in trips resulting from the 2016 and 2026 development scenarios are also shown in **Appendix C** compared with the 2006 base year flows.

6.2.4 In order to be able to understand the results of the future trip patterns, reduced 17 x 17 versions of the 362 zone matrices are shown in **Appendix D.**

7 Results and Analysis

7.1 Saturn Modelling

7.1.1 The base and future trip patterns have all been assigned to the relevant highway networks using the Saturn modelling program. The program produces diagrams of traffic flows based on the network shown in **Figure 2.1** and can be quite difficult to interpret. In order to simplify the interpretation of the traffic predictions a number of results sheets have been produced for individual junctions across the study area.

7.1.2 The Highways Agency and the Harbour Authorities were asked to specify which junctions were considered to be of greatest concern and for these junctions the results have been analysed in detail and summarised on a series of 22 results sheets.

7.1.3 The junction results sheets in **Appendix E** show the following information (on two facing pages):

***Left Page* - 2016**

- Diagrams of total inflow into the junction for the 2006 base year, 2016 base year and 2016 with development
- Indication of the pattern of traffic movements with a 'pie chart' showing the proportions of traffic from 10 geographic areas. The pie chart and separate Summary Table of traffic flows shows the scale of traffic movements attributable to the four authorities. The Summary Table also shows the percentage increase compared with the 2006 base year.
- A histogram indicating the changes in traffic flow between the 2006 Base year and the future 2016 and 2026 development years. This shows the differing impacts attributable to proposed development in each authority.

***Right Page* - 2026**

- Diagrams of total inflow into the junction for the 2026 base year, 2026 with development and 2026 with development and taking account of the beneficial impact of the Premium Bus Network and Bus Rapid Transit.
- Indication of the pattern of traffic movements with a 'pie chart' showing the proportions of traffic from 10 geographic areas. The pie chart and separate Summary Table of traffic flows shows the scale of traffic movements attributable to the four authorities. The Summary Table also shows the percentage increase compared with the 2026 base year.
- Finally an indication is given of the total traffic movements through the junction.

7.1.4 The results sheets provide sufficient information to get a realistic view of the impacts on both the strategic road network (SRN) and the more local main routes serving the four authority areas. In the case of the local roads the Saturn base year flows cannot always be relied upon and in these situations the increase in development traffic is the most relevant factor. Depending on the conclusions drawn it may be necessary to check base Saturn flows

against recent or new traffic surveys in order that a more reliable picture is obtained of the existing congestion problems at particular junctions.

7.1.5 Summary sheets showing the location of each of the junctions and the percentage increase in traffic flow in 2016 (without bus improvements) and 2026 (with bus improvements) are shown as follows:

1. **Result Sheet 23** Base Year 2006
2. **Result Sheet 24** Full Development 2016 (without bus improvements)
3. **Result Sheet 25** Full Development 2026 (with bus improvements)

7.2 Summary of Results

7.2.1 The detailed results sheets for each of the 22 junctions studied are included in **Appendix E**. The following table summarises the predicted total traffic flow at each junction (grouped by District) and considers the impact of growth upon junction capacity in 2016 and 2026 without public transport improvements.

Summary Junction Results

Junctions in Fareham	Year	Flow	Increase	Comments	Status in AM Peak
Brook Lane, (Result Sheet 3)	***2006***	***2041***		The base flow is probably low due to limitations in the Saturn model in this area. Site observations indicate that the junction is approaching capacity in the morning and evening peak periods.	Approaching capacity
	2016	***2608***	***567***	The modelled increase by 2016 is just over 500 vehicles. This may start to cause some problems but is unlikely to cause too much congestion based on the modelled flows.	Approaching capacity
	2026	***3351***	***1310***	The total modelled increase for this junction is greater than 1,000 vehicles and, due to a low confidence in the modelled 2006 base flows from the Saturn model in this area. Based on present day conditions the junction is likely to be at capacity by 2026. Additional traffic count data at this junction would allow the inaccuracies in the Saturn model to be determined and could change the comment on future capacity problems to above capacity rather than at capacity.	At or Above capacity
Segensworth Roundabout, (Result Sheet 18)	***2006***	***5082***		This junction has recently been improved as it was over capacity in the peak periods. Even with improvements the capacity is likely to be approaching capacity.	Approaching capacity
	2016	***5658***	***576***	The modelled increase by 2016 is just over 500 vehicles. This may start to cause problems with the junction being at or above capacity.	At capacity
	2026	***6164***	***1082***	It is expected that the redesigned junction may be able to cope with the total modelled increases as they total just over 1,000 vehicles and less with public transport improvements. However flows just over 6,000 are significant and the junction may be above capacity.	At or Above capacity
Titchfield Gyratory, (Result Sheet 20)	***2006***	***2715***		Modelled flows of less than 3000 vehicles are expected to pass through this junction in the AM peak. (However, potential disruption to A27 eastbound traffic caused by PM queuing in excess of the right turn lane capacity will need to be considered).	Approaching capacity
	2016	***3167***	***452***	By 2016 flows have increased by 452 and the junction will likely be at capacity.	At capacity
	2026	***3841***	***1126***	By 2026 the modelled flows have increased to just under 4000 vehicles. The junction is currently only partly signalised and has give-way movements. Future high opposing flows are likely to require full signalisation of the junction to meet demand.	Over capacity

Junctions in Fareham	Year	Flow	Increase	Comments	Status in AM Peak
Quay Street Roundabout, (Result Sheet 17)	***2006***	***4945***		Quay Street roundabout is a partially signalised 5 arm junction. Modelled flows of nearly 5,000 vehicles and site observations indicate that the junction is at capacity in the base situation.	At capacity
	2016	***5080***	***135***	The impact on this junction by 2016 is predicted to be small at 135 vehicles. It is considered that this could be a false impression provided by the Saturn model which is possibly routing additional traffic via other routes to avoid congestion at this junction. The junction will remain at or above capacity.	At or Above capacity
	2026	***5309***	***364***	The modelled impact on this junction is 364 vehicles by 2026. The junction is likely to be above capacity.	Above capacity
Delme Roundabout (Wallington), (Result Sheet 22)	***2006***	***2649***		Despite the modelled base flows of only 2,649 vehicles it is thought that this junction may be nearing capacity in the base situation. This accords with site observations which indicate that the junction is approaching capacity and a poor confidence in the modelled Saturn flow which is thought to be low.	Approaching capacity
	2016	***2880***	***231***	Flows on this junction are modelled to gradually increase by 2016 and this may cause some strain on the junction.	At capacity
	2026	***3351***	***702***	The greatest increase in flow through this junction is modelled by 2026 and this is likely to be in part caused by development at the north of Fareham SDA. With the total impact well below 1,000 vehicles this junction is likely to be just above capacity by 2026.	At or Above capacity
Junction 9 of M27, (Result Sheet 9)	***2006***	***5654***		The modelled base flow for this junction has been compared with past turning count data and is considered a good match. The junction is currently operating at capacity.	At capacity
	2016	***6839***	***1185***	Modelled flows on this junction increase by greater than 1,000 vehicles by 2016 due to increased traffic from the Whiteley development area. Flows nearing 7,000 would put this junction over capacity. With the inclusion of a new 'development' road link to the north connecting to Botley (not modelled in Saturn) it is possible that the increase could be removed.	With northern link road 'at capacity'
	2026	***7496***	***1842***	Flows are predicted to increase further by 2026 but at a lower rate than between 2006 and 2016. The junction could be above capacity even with the Botley link road.	With northern link road 'at or above capacity'

Junctions in Fareham	Year	Flow	Increase	Comments	Status in AM Peak
Junction 10 of M27, (Result Sheet 10)	***2006***	***2074***		This junction only has eastbound slips and the base flows are low enough for free-flow slip roads to operate within capacity. This accords with site observations that indicate that the junction has spare capacity.	Below capacity
	2016	***2255***	***181***	Flow increases of approximately 200 vehicles by 2016 are unlikely to adversely affect the operation of the junction.	Below capacity
	2026	***3134***	***1060***	In 2026 the junction is modelled with only buses being able to travel southbound on the A32. The other SDA option of converting the eastbound slip roads to bus and HOV use was not modelled in Saturn. The predicted increases in flow on the slip roads would therefore be reduced if the HOV option were to be implemented and traffic would have to transfer through Junction 11. With the 'modelled' unrestricted use of the slip roads the junction could operate satisfactorily in 2026 subject to the possible signalisation of the off-slip junction with the A32.	Approaching capacity
Junction 11 of M27, (Result Sheet 11)	***2006***	***4888***		Modelled base flows on this junction are just under 5,000 vehicles. The junction is fully signalised and approaching capacity in the peak periods.	Approaching capacity
	2016	***4980***	***92***	By 2016 the flows have slightly increased. The impact is low as the SDA to the north of Fareham will not be operational until after 2016.	Approaching capacity
	2026	***6429***	***1541***	The north of Fareham SDA is due to be completed by 2026 and a link road is proposed to this junction. The effect is to add 1541 vehicles to a junction already nearing capacity. This would put the junction at capacity by 2026. If the 'HOV only' option were to be applied on the Junction 10 slip roads it is estimated that an additional 2000 vehicles would have to use Junction 11 rather than Junction 10. This would raise overall flows above 8000 vehicles resulting in the junction being **well above capacity.**	At capacity or **well above** capacity if Junction 10 HOV slip roads are implemented.
Longfield Avenue, (Result Sheet 15)	***2006***	***3189***		This roundabout is a fairly average size junction and the modelled flow of 3,000 vehicles is nearing theoretical capacity. However, this junction interacts with the Speedfields roundabout to the south and extensive queuing results in both peaks such that in practice the combined capacity is exceeded.	Above capacity
	2016	***3273***	***84***	A small predicted increase should have a limited impact on capacity.	Above capacity
	2026	***3176***	***-13***	By 2026 the modelled flows have fallen below those in the base and therefore the junction is not adversely affected by future development.	Above capacity

Junctions in Fareham	Year	Flow	Increase	Comments	Status in AM Peak
Stubbington Roundabouts, (Result Sheet 19)	***2006***	***3037***		Modelled base flows are below theoretical capacity but site observations indicate extensive queuing in both peaks. Actual performance may be limited by the pelican crossing, the geometry and balance of flows.	Above capacity
	2016	***3457***	***420***	By 2016 an increase of 420 vehicles has occurred and the junction would be increasing over capacity.	Above capacity
	2026	***3721***	***684***	A further modest increase of 264 is predicted.	Above capacity
Peel Common, (Result Sheet 16)	***2006***	***4884***		Modelled flows at this junction are just below 5,000 vehicles. Site observations indicate that the junction is at capacity in the peak periods.	At capacity
	2016	***5266***	***382***	Modelled increases by 2016 are around 400 vehicles onto a junction which is at capacity in the base situation. Signalisation of the junction could be considered to increase capacity.	At or Above capacity
	2026	***5402***	***518***	By 2026 the flows remain similar to 2016 levels.	At or Above capacity
Junctions in Gosport	**Year**	**Flow**	**Increase**	**Comments**	**Status in AM Peak**
Brockhurst Roundabouts, (Result Sheet 2)	***2006***	***2187***		The base flow is probably low due to limitations in the Saturn model in this area. Observations indicate spare capacity in the morning and approaching capacity in the evening peak periods.	Below capacity
	2016	***2396***	***209***	Small increase by 2016, remains below capacity in the AM peak.	Below capacity
	2026	***2442***	***255***	Small decrease since 2016 and so remains below capacity in the AM peak.	Below capacity

Junctions in Portsmouth	Year	Flow	Increase	Comments	Status in AM Peak
M27 with A27, (Result Sheet 12)	***2006***	***4918***		This junction has recently been converted into a signalised intersection from a large roundabout. Site observations indicate that the junction is approaching capacity.	Approaching capacity
	2016	***5766***	***848***	Modelled increases by 2016 are 848 vehicles. Despite the recent redesign of the junction it is thought that this level of increase will put the junction at or above capacity.	At or Above capacity
	2026	***6234***	***1316***	By 2026 modelled flows have increased by another 400 vehicles.	Above capacity
Screenline of M275, (Result Sheet 14)	***2006***	***7885***		The carriageway width of the M275 is three lanes which equates to a two-way capacity of approximately 12,000 vehicles. The modelled flow of nearly 8,000 vehicles should be well within capacity. Despite this site observations (in the am peak and at summer weekends) indicate that delays at junctions further south on Portsea Island cause queuing that can extend back to the junction of the M275 and M27.	Well below capacity but subject to queue back from junctions to the south
	2016	***8950***	***1065***	By 2016 the junction is modelled to have an extra 1065 vehicles putting the total close to 9,000 vehicles. The capacity of the slip roads will not be affected but queue back may worsen.	Below capacity
	2026	***9302***	***1417***	By 2026 the modelled flows are just over 9,000 vehicles.	Below capacity
Hilsea Roundabout, (Result Sheet 13)	***2006***	***3738***		The modelled flows in the base situation are approaching 4,000 vehicles. Am peak queuing occurs on the southbound approach from Cosham and on the westbound off-slip from the A27. Pm peak queues are regularly observed on all arms of the junction.	Approaching capacity in am peak
	2016	***4306***	***568***	By 2016 the modelled flows are up by 568 vehicles putting the total flow above 4,000.	At capacity
	2026	***4630***	***892***	Modelled flows increase slightly by 2026. Signalisation of the junction could potentially be considered if required.	At capacity

Junctions in Portsmouth	Year	Flow	Increase	Comments	Status in AM Peak
A27 with A2030, (Result Sheet 1)	***2006***	***5136***		This junction is a large signalised roundabout and has modelled base flows of approximately 5,000 vehicles. Delays are slight in the am peak with northbound queues from Portsea Island of more than 100 metres in the pm peak.	Approaching capacity
	2016	***5497***	***361***	By 2016 the modelled flows are up by 361 vehicles which may be result in the junction operating closer to capacity.	Approaching capacity
	2026	***5682***	***546***	The modelled flows are only slightly higher than 2016 levels.	Approaching capacity
Junctions in Havant	**Year**	**Flow**	**Increase**	**Comments**	**Status in AM Peak**
Langstone Road Roundabout, (Result Sheet 21)	***2006***	***1917***		Although confidence in the modelled 2006 base flow is low (as the total is under 2,000 vehicles), it is known that this signalised junction is currently approaching capacity.	Approaching capacity
	2016	***2075***	***158***	An increase of 158 vehicles by 2016 is small and is unlikely to adversely affect capacity.	Approaching capacity
	2026	***2177***	***260***	By 2026 the modelled increase remains low and the operation of the junction will not be adversely affected.	Approaching capacity

Junctions in Havant	Year	Flow	Increase	Comments	Status in AM Peak
Teardrop Junction, (Result Sheet 8)	***2006***	***2596***		The teardrop junction has just been redesigned to allow for an extra arm at the southern end. It has been signalised primarily to allow lower traffic flows to get onto the junction against the higher opposing flows from the north. However based on the modelled flows, this junction is currently operating within capacity.	Below capacity
	2016	***2468***	***-128***	The modelled increase by 2016 is negative and is likely to be a false prediction by Saturn as the new southern arm of the junction is not modelled. Despite poor modelling it is considered that the recent improvements are likely to accommodate future flows. Increased development on the southern arm will result in the junction getting closer to capacity.	Approaching capacity
	2026	***2713***	***117***	The predictions are again likely to give a false impression of future flows. The recent improvements are still likely to be adequate to cater for 2026 levels of development	Approaching capacity
Bedhampton Roundabout, (Result Sheet 7)	***2006***	***4526***		Flows modelled for the base situation of this junction are above 4,000 vehicles and this is high enough for a large unsignalised roundabout to be operating close to capacity. As site observations indicate that the junction has spare capacity in the peak periods it is possible that the 2006 Saturn modelled flows are slightly high.	Below capacity
	2016	***4899***	***373***	By 2016 the modelled flows are increased to almost 5,000 vehicles which could result in the junction approaching capacity. Proposed signalisation will cater for any potential capacity problems.	Approaching capacity
	2026	***5207***	***681***	The increase by 2026 is smaller than the increase from 2006 to 2016 and remains close to 5,000 vehicles.	Approaching capacity

Junctions in Havant	Year	Flow	Increase	Comments	Status in AM Peak
Junction 4 of the A3(M), (Result Sheet 6)	***2006***	***2742***		The flows modelled for the base situation of this junction are relatively low for a motorway junction, less than 3,000 vehicles. Observations indicate that the junction has spare capacity in the peak periods.	Below capacity
	2016	***3338***	***596***	By 2016 the modelled flows have increased by 600 vehicles. Proposed signalisation associated with the West of Waterlooville SDA will cater for this and additional flows predicted for 2026.	Approaching capacity
	2026	***3430***	***688***	The 2026 modelled increase is very small compared with the 2016 prediction.	Approaching capacity
Junction 3 of the A3(M), (Result Sheet 5)	***2006***	***2854***		The flows modelled for the base situation of this junction are relatively low for a motorway junction, less than 3,000 vehicles. Observations indicate that the junction has spare capacity in the peak periods.	Below capacity
	2016	***3459***	***605***	By 2016 the modelled flows are increased by about 600 vehicles. This is likely to be caused by the development area west of Waterlooville. The flows are approaching 3,500 vehicles and are unevenly distributed. This may result in opposing flows which could be problematic and the junction may be approaching capacity. Proposed signalisation associated with the West of Waterlooville SDA will cater for this and additional flows predicted for 2026.	Approaching capacity
	2026	***3996***	***1142***	The modelled increase by 2016 continues into 2026 and the flows near 4,000 vehicles.	Approaching capacity
Junction 2 of the A3(M), (Result Sheet 4)	***2006***	***3435***		Modelled base flows for this junction are about 3,500 vehicles. Observations indicate that there is spare capacity in the am peak but queues on the northbound off-slip in the pm peak.	Below capacity
	2016	***3772***	***337***	The increase by 2016 is not high and is unlikely to result in adverse effects.	Below capacity
	2026	***4104***	***669***	By 2026 the modelled increase is 656 vehicles putting the total above 4,000 vehicles. For a large unsignalised roundabout this is likely to be approaching capacity. Partial signalisation of the slip roads, particularly the northbound off-slip, may be appropriate at some point in the future.	Approaching capacity

7.2.2 In addition to the impact on junctions a Table has been created which shows an indication of the two-way am peak hour flows at various points on the motorway network. Flows are shown for the base year of 2006 and with the addition of development in 2016 and 2026. The effect of public transport improvements is not included.

Summary Motorway Results (Two-Way)

	M27 Junc 9 to Junc 10	M27 Junc 10 to Junc 11	M27 Junc 11 to Junc 12	A27 east of Junc 12	A27 east of A2030	A3M Junc 4 to Junc 5	A3M Junc 2 to Junc 3
2006 Base	***8233***	***9105***	***11214***	***10298***	***11370***	***7330***	***5185***
2016 Base	***8460***	***9326***	***11504***	***10490***	***11705***	***7471***	***5401***
2016 with development	***8825***	***9759***	***12094***	***10909***	***12219***	***8180***	***5607***
Percentage Change over 2006 Base	***7.2%***	***7.2%***	***7.9%***	***5.9%***	***7.5%***	***11.6%***	***8.1%***
2026 Base	***8833***	***9740***	***11954***	***10791***	***12084***	***7705***	***5745***
2026 with development	***8942***	***11101***	***13288***	***11540***	***13055***	***8760***	***6307***
Percentage Change over 2006	***8.6%***	***21.9%***	***18.5%***	***12.1%***	***14.8%***	***19.5%***	***21.6%***

7.3 Assessment of Mitigation Measures

7.3.1 Within the modelling process a number of mitigation measures have already been taken into account. These are:

- Bus Rapid Transit
- Premium Bus Network
- Access to North of Fareham SDA
- Tipner Link and Interchange, and
- M27 Climbing Lanes

7.3.2 In relation to the Bus Rapid Transit and the Premium Bus Network it has been calculated that 1.65% of study area traffic would be removed by these public transport enhancements. Additional transfer may be possible by the use of Personalised Travel Planning initiatives but at the moment this has not been assessed.

7.3.3 The access to North of Fareham SDA is presently suggested via Junction 11 with bus access using Junction 10. The predictions show that significant improvements may be required to both junctions to accommodate the SDA, or alternatively significant restraint measures and/or further enhanced public transport measures considered.

7.3.4 Tipner interchange was modelled in the 2026 assignment and the usage was approximately 1250 vehicles. No information was available on the usage for the proposed park and ride site at Tipner so the actual flows given represent other traffic that may use the junction if it was built. The Tipner Link has also been modelled but account has not been taken of the beneficial impact of the associated Park and Ride site. As the P&R would be served from the new junction the benefits to highway flows would only be apparent to the south of the junction on the approach to the city centre. The Portsmouth junctions reviewed in the tables would not therefore be affected by reductions in flow.

7.3.5 The M27 climbing lanes have been modelled in Saturn with 2026 predicted am peak hourly flows of 13288 two-way between Junctions 11 and 12. These are very significant flows and are close to the theoretical maximum that could be accommodated within the available number of traffic lanes. As with junctions 10 and 11 the Fareham SDA has a substantial impact on this section of motorway.

8 Conclusions

8.1 Impact of LDF Proposals

8.1.1 By use of the am peak SATURN model for South Hampshire it has been possible to undertake a comprehensive assessment of the impacts of the Harbour Authority LDF proposals on the strategic highway network. Indications are also shown of the impact on other major routes into and out of each authority area.

8.1.2 The 'Results' section shows that the highest number of junctions classified as 'at or above capacity' are in Fareham followed by Portsmouth and these are all located along the A27, M27 or M275.

8.1.3 Flows modelled for Gosport do not show significant problems. However it noted that the trip assignments are less accurate because they are distant from the strategic roads where the model was validated. The assessment of the increase in traffic flow due to development is however likely to be more accurate. New traffic surveys and local modelling will be necessary to improve accuracy.

8.1.4 Junctions in Havant are modelled to have increased demand but in general the base demand is low compared with junctions in Fareham and Portsmouth. As a result, the highest status was 'approaching capacity' and this status was primarily influenced by traffic to and from the west of Waterlooville SDA.

8.1.5 In terms of traffic along the M27, the results show that the situation is likely to worsen further on this already congested area of the network. Attention is drawn to the junctions in Fareham district and modifications may be required for the M27 junctions 9, 10, 11 and 12.

8.1.6 The link road from the North of Fareham SDA will have a significant impact on the flows seen at junction 11 and, despite the bus only access to Fareham via junction 10, a high flow remains at junction 10. Both junctions need to be considered together in order to facilitate access to the SDA.

8.1.7 The main conclusions are:

- The junctions within Havant are in general classified as 'approaching capacity' by 2026. This implies that it should be possible to accommodate further development based on the normal financial contributions that would accrue from developers as they promote the various sites. These contributions should allow improvements to be made to these junctions (if required) that will cater for the additional development traffic.

- In the Fareham and Portsmouth areas the impact of the LDF proposals is more significant with a number of junctions 'at or above capacity' by 2026. The following junctions are predicted to have significant capacity issues:

  - **M27 Junction 9** – The proportions of traffic using this junction are 21% Whiteley, 31% Fareham, 1% Fareham SDA, 7% Portsmouth, 8% Gosport and 2% from Havant. A flow of 7400 vehicles is predicted in 2026 which is 30% above the base flow and well above the nominal capacity of about 6500

vehicles. Predictions would be changed if account is taken of future planned highway links to Botley although this connection to the north would allow Hedge End and Botley traffic to gain access to Junction 9. Detailed modelling (outside of the scope of this commission) would be required to test the effect of the new link.

- **M27 Junction 10** – The proportions of traffic using this junction are 3% Whiteley, 23% Fareham, 34% Fareham SDA, 10% Portsmouth, 8% Gosport and 3% from Havant. A significant impact is attributable to Fareham and the SDA followed by development in Portsmouth. The junction has been classified as 'approaching capacity' on the assumption that the eastbound slip roads are available for all drivers. The planned operation of the junction includes bus priority measures to the south with the slip roads restricted to bus and HOV use only. Under this form of operation the junction would operate 'below capacity'. A flow of 3100 vehicles is predicted in 2026.

- **M27 Junction 11** – The proportions of traffic using this junction are 1% Whiteley, 22% Fareham, 23% Fareham SDA, 14% Portsmouth, 18% Gosport and 5% from Havant. A significant impact is attributable to Fareham and the SDA followed by development in Gosport. A flow of 6300 vehicles is predicted in 2026 which would increase to approximately 8300 vehicles if the proposed restricted movements at Junction 10 are implemented. The combined flows at Junctions 10 and 11 of 9400 vehicles suggest that a more even distribution between the two junctions could accommodate the construction of the SDA.

- **M27/A27 Junction 12** – The proportions of traffic using this junction are 3% West of Waterlooville, 15% Fareham, 5% Fareham SDA, 38% Portsmouth, 4% Gosport and 10% from Havant. A significant impact is attributable to Portsmouth followed by development in Fareham. A flow of 6200 vehicles is predicted in 2026.

- **M275 connections to M27** – The proportions of traffic using the motorway connecting links are 1% West of Waterlooville, 6% Fareham, 5% Fareham SDA, 57% Portsmouth, 3% Gosport and 8% from Havant. A significant impact is attributable to Portsmouth followed by development in Fareham. A flow of 8900 vehicles is predicted in 2026.

- **M27 connections with the M275** (related to delays 'backing up' from junctions further south on Portsea Island.)

- A number of other junctions are expected to be at or above capacity by 2026 as listed below:

    - Brook Lane – Fareham
    - Segensworth – Fareham
    - Quay St Roundabout – Fareham
    - Delme Roundabout – Fareham
    - Peel Common – Fareham
    - Hilsea Roundabout – Portsmouth
    - Longfield Avenue – Fareham

- Speedfields roundabout – Fareham
- Stubbington roundabouts – Fareham
- Titchfield Gyratory - Fareham

9 Recommendations for Further Study

9.1.1 As mentioned in paragraph 1.2 the study has not considered mitigation measures beyond the major measures discussed in paragraph 7.3. The analysis has only modelled the impact of development on the am peak period due to the lack of a pm Saturn model.

9.1.2 A number of recommendations are listed below for further study. It is for the consideration of each authority as to their chosen priorities from the list.

Recommendations for Further Study

PM Peak Traffic Model
Produce a pm peak model by reversing the trip patterns in the am Saturn model. Matrix estimation techniques would be used to ensure that main routes compare satisfactorily with traffic flows on the strategic road network. The pm development traffic shown in **Appendix C** is in general greater than the am peak and could have a different impact on junctions.

Study Alternative Designs for Junctions 10 and 11 of the M27
The operation of Junctions 10 and 11 of the M27 are critical to the viability of the Fareham SDA. It is considered that a detailed study should be undertaken based on the SDA being connected to both junctions with traffic able to travel in all directions at each junction. An alternative route for the BRT service would then be required and may be possible via an existing underbridge located between junctions 10 and 11. The study would involve a combination of modelling the effects of the changed movements at the two junctions, preliminary physical inspection of design options with comments on 'buildability' and capacity modelling using the TRANSYT traffic signal program.

A number of mitigation measures could be modelled as follows:

Make Fewer Trips
The beneficial impacts of encouraging greater use of walking and cycling modes could be modelled in the following way:

- The number of vehicle trips under 1.6km could be determined from the Saturn model and an assumption made as to how many of these trips could be encouraged to walk rather than drive. The assumed transfer would be based on an analysis of existing mode splits derived from the 2001 census.
- A similar process would be undertaken for trips under 5km which could potentially be transferred to cycle.

Peak Spreading
The present am peak model is based on the assumption that flows are averaged over a two hour period between 0700 and 0900. The Saturn model has therefore already taken account of a two hour peak period rather than one.

With increasing traffic flows it is likely that the peak could extend to perhaps three hours in both the

am and pm periods with fairly constant flows occurring from 0630 to 0930 and from 1530 to 1830. This effect could be simply modelled as follows:

- Analyse existing traffic count data on the motorway to derive average flows at various locations across the study area for both a three hour period and a two hour period. A factor could then be calculated to determine an average hour (over three hours) rather than the present average over two hours. This factor would be applied to the full Saturn base matrix and would slightly reduce modelled flows across the study area.

- The impact of new development could then be assessed using TRICS trip rates calculated over a three hour period rather than two.

- A limited number of model runs at 2026 development levels (possibly only for the am peak) would give an indication of the reduced impacts at critical junctions.

Congestion Charging

Based on a pragmatic consideration of congestion charging it is likely that any scheme within the study area would only apply to Portsmouth. If this were to occur the City would be unlikely to impose the charge unless a similar scheme was implemented in Southampton.

Even if schemes were applied to both cities there would be a substantial impact on trip distribution with workers being attracted to areas outside of the congestion charge such as the new SDAs. Other areas of employment growth in Havant, Fareham and Eastleigh would also become more attractive. The only viable scheme could therefore include the whole of the South Hampshire area from the edge of the new Forest in the west to Hedge End and Eastleigh to the north and Havant in the east.

If the testing of this scale of scheme is considered necessary it would be possible by a simple factoring down of all trips in the Saturn model by a relevant factor. In order that a relevant factor is used data would be researched from the London Congestion Charge area and from schemes applied in other countries.

Change Mode to Public Transport

A number of sensitivity tests could be undertaken as follows:

- increase the use of bus beyond the 15% increase that has already been applied for the Premium Bus Network. An assumption could be tested with the 15% either doubled or trebled to 30% or 45% additional passengers based on the experience in Cambridge and Peterborough.

- for the Bus Rapid Transit network an assumption has been made that the effective catchment is 600m from the bus stop with 20% of vehicle trips transferred to the new service. It would be possible to test the impact of either increasing the catchment area to perhaps 800m and/or increasing the proportion transferred to say 30%. It is recommended that the catchment area is not extended and that the sensitivity test is based on the proportion increasing to 30% within the 600m catchment.

M27 Junction 9

The 2026 assessment of Junction 9 has not taken account of the possible highway network changes which could link North Whiteley to Botley. There is also a possible Botley Bypass and new roads associated with the North Hedge End SDA. It would be possible to assess these effects with a modified Saturn highway network and determine whether the impacts on Junction 9 are reduced. As some traffic movements will be added to the junction and others removed it is possible that the net

effect could be similar to that shown in the Results Sheets. The flows at Junction 9 are likely to remain high (even with the links to the north) and a more useful assessment could involve a detailed TRANSYT assessment of Junction 9 and the new Segensworth junction to the south. The addition of segregated left turn lanes at Junction 9 together with coordinated signal timings between the two junctions could provide additional capacity. The assessment would also confirm the theoretical capacity of the two junctions and allow a more reasoned view to be reached on the potential problems arising from future development.
Other Junctions Within Section 7.2 mention is made of a number of other junctions where capacity problems could be an issue. These are all located on the local road network and require discussion with the relevant Authorities highway officers to gain further information on the present day problems. In a number of cases it is thought that the Saturn model may be underestimating base traffic flows. Depending on the comments received from these officers it may be necessary to obtain new traffic survey data so that the impact of the new development can be accurately assessed.

Table 9.1 Recommendations for further study

Buildings and M&E
Built Environment
Civil Engineering and Infrastructure
Energy and Utilities
Environmental Planning and Management
Geotechnical and Waste
Health & Safety
Land Development
Research and Development
Strategic and Commercial
Sustainable Development
Transport Planning
Water Management

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