Arundel Strategy Development Plan
South Coast Corridor Multi-Modal Study
Prepared for
Government Office for the South East
August 2002

Halcrow Group Limited
In association with:

- Accent
- Chris Blandford Associates
- DTZ Pieda
- Baxter Eadie Ltd
- Sustainable Futures
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Halcrow Group Limited
Vineyard House 44 Brook Green London W6 7BY
Tel +44 (0)20 7602 7282 Fax +44 (0)20 7603 0095
www.halcrow.com

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Arundel Strategy Development Plan

Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1		Sent to Steering Group	24/7	

Contents

1 Introduction

1 Introduction

1.1 *Background to the Strategy Development Plan*

1.1.1 The South Coast Corridor Multi Modal study (SoCoMMS) is being undertaken on behalf of the Government Office for the South East (GOSE). The study has developed a transport strategy for the South Coast between Southampton and Thanet. This in turn will be an important element of the Regional Transport Strategy being developed by the South East Regional Assembly.

1.1.2 The development of the transport strategy has made use of a strategic transport model, which has been specifically developed for SoCoMMS. The model represents an average hour between 0700 and 1900 and includes highway and rail network definitions. Travel forecasts have been developed for 2016 and 2030. A range of transport measures has been tested, either in isolation or in combination.

1.1.3 The transport strategy that has emerged includes a range of interventions:

- local initiatives (public and private sector);
- local public transport improvements;
- strategic public transport improvements;
- targeted road improvements;
- freight initiatives;
- safety and mobility initiatives; and
- balance - demand management.

1.1.4 In order to provide further detail on the elements of the strategy, a series of Strategy Development Plans are being prepared. These include:

- South Hampshire;
- Chichester;
- Arundel;
- Worthing;
- Brighton and Hove;
- East of Lewes;
- Bexhill-Hastings; and
- Public transport (bus and rail development plans).

1.1.5 The purpose of the strategy development plans is to investigate the performance of multi-modal measures at the local level. The plans provide a feedback to the strategy development process by confirming the inclusion of key measures. They provide further detail on the measures and their appraisal. In addition, the modelling of the impacts is undertaken for the peak periods. Where appropriate, an AST will be developed.

1.2 The Arundel Strategy Development Plan

1.2.1 This Strategy Development Plan covers the area around Arundel (see Figure 1). The Arundel bypass is one of the schemes that has been remitted to SoCoMMS for investigation. The wider SoCoMMS strategy has identified a range of multi-model measures including local public transport, rail and demand management measures. The strategy has also identified that there are locations where additional highway measures are needed. This includes the provision of a bypass for Arundel. The purpose of the SDP is to investigate issues relating to Arundel in more detail. The key issues to be considered as part of this strategy development plan are:

- to review potential for a bypass;
- examine alternative alignments; and
- provide appraisal summary table

2 Current Travel Conditions

2 Current Travel Conditions

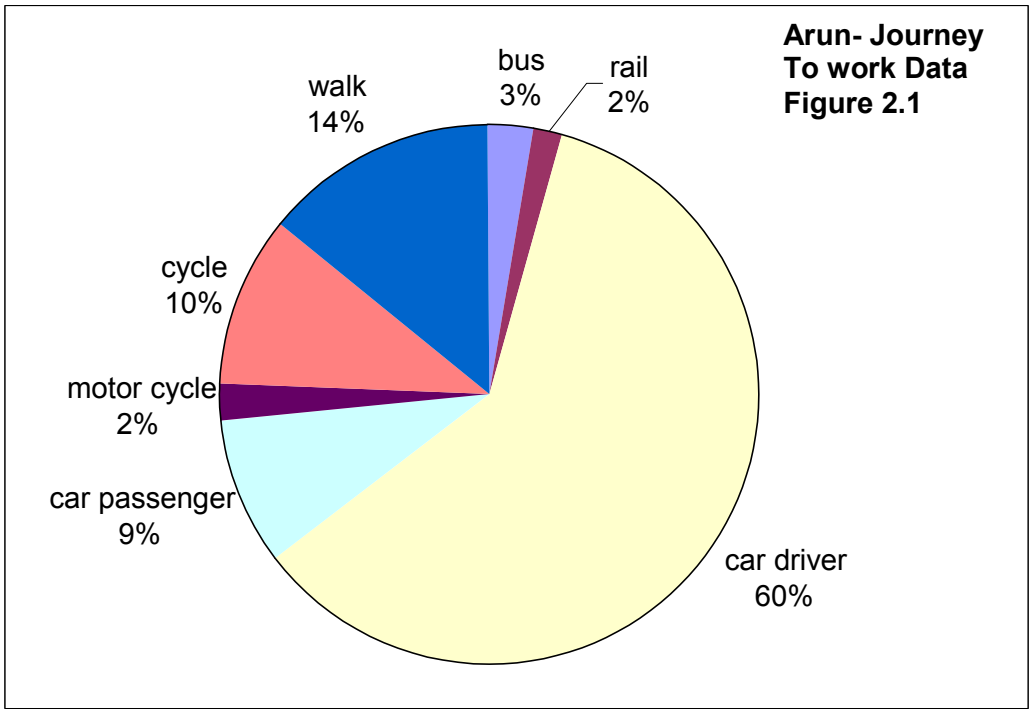
2.1 ***Introduction***

2.1.1 This section of the report outlines the current travel conditions within the Arundel area. This analysis draws on data collected from a wide range of sources including local authorities, transport operators and other survey information.

2.1.2 The study area lies within Arun District. The area has a population of 141,000 with the main population centres being Bognor Regis and Littlehampton, located to the south of Arundel. Arundel itself is a historic town with a population of around 3,800. The town is famous for its castle and cathedral, and as such is attractive to visitors and tourists, particularly during the summer months.

2.2 ***Journey to Work Mode Share***

2.2.1 Within Arun district as a whole, some 14% of commuting journeys are made by foot and 10% by bicycle (see figure 2.1). However, it is worth noting that the use of bicycles in Littlehampton is over 20% of commuting journeys. This reflects the level terrain of the area and the availability of cycle networks. By contrast, the use of cycles within the Arundel ward is very low. Overall within Arun district only 3% of commuting journeys are made by bus and 2% by rail. Thus, 71% of commuting journeys are made by car or motorcycle.



2.3 ***Rail***

2.3.1 Within the Arundel study area there are rail stations at Arundel, Barnham, Ford and Littlehampton. Services at these stations are provided by South Central. Ford and Barnham are on the western coastway route with the latter being a key interchange between services using the Coastway, the Arun Valley Line and the branch lines to Littlehampton and Bognor Regis. Services at Barnham include:

- the longer distance coastway services operating between London, Hove, Southampton and Bournemouth;
- a local coastway service between Brighton and Portsmouth;
- services from London via the Arun Valley to Chichester;
- Arun Valley services from London that divide/unite at Barnham. For example there are services from London via the Arun Valley line which divide at Barnham with sections going on to Portsmouth and Bognor Regis; and
- a local service between Littlehampton and Bognor Regis.

2.3.2 Ford is typically served by more local services including;

- Littlehampton to Bognor Regis;
- London to Portsmouth/ Bognor Regis (via Arun Valley); and
- Brighton to Portsmouth.

2.3.3 Littlehampton has services from London (via Hove) and local services from Brighton, Portsmouth and Seaford. Arundel station is on the Arun Valley line and served by trains between London and Chichester, Bognor Regis and Portsmouth.

2.3.4 The number of trains calling at each station per hour is shown in Table 2.1. This shows that Barnham is the key station in the area in terms of service provision. Typically there are between 6 and 11 trains per hour, in each direction, calling at the station during the week.

Station	Am peak (0700-1000)	Interpeak (1000-1600)	PM peak (1600-1900)	Evenings	Saturdays	Sundays
Arundel	1 to 2	2	1 to 2	1 to 2	2	1
Barnham	6 to 9	9	8 to 11	6	9	5
Ford	3 to 5	3	3 to 5	3	3	3
Littlehampton	3 to 8	1	3 to 5	3	3	3

Table 2.1: Number of Trains departing per Hour each direction

2.3.5 As part of the London Area Transport Survey (LATS), a number of stations in the south east have been surveyed. The data collection has included entry counts to the stations. Station counts have been obtained for the first tranches of stations that were surveyed. The length of the count varied between stations with smaller stations being counted for the peak periods only while larger stations were surveyed for 12 or 16 hours. Table 2.2 provides the entry counts for those stations for which data have been provided by the SRA (Strategic Rail Authority).

Station	Total Am peak (0700-1000)	Total Interpeak (1000-1600)	Total Pm (1600-1900)	Total
Arundel	204	120	40	364
Barnham	459	193	66	718
Ford	55	15	Not surveyed	70*

Table 2.2: Station Entry Counts, South Coast Stations, LATS Surveys 2001
*** part day**

2.3.6 The data show that there were 360 passengers entering Arundel station during the day. By contrast, over 700 passengers entered Barnham Station during a 12-hour day. Ford station is lightly used in comparison

2.4 ***Bus***

2.4.1 Bus timetable data has been assembled from local bus guides published by the operators and local authorities, and from the Great Britain Bus Timetable (version to June 2001).

2.4.2 **Table 2.3** shows the key bus routes serving the Arundel area. The main service to Arundel is route 702. This provides a connection to Worthing and Brighton with a service every 30 minutes. The journey time to Brighton is 2 hours. In addition

there is an hourly service to Chichester from Arundel. The other services which operate through Arundel are local community and school services.

Route	Operator	Mon-Friday frequency	Saturday	Sunday
13 Ford- Arundel-Worthing-Lancing	Compass Travel	3 per day	3 per day	No service
15 Worthing- Arundel-Chichester	Compass Travel	1 on Wednesday	No service	No service
55 Arundel- Barnham – Chichester	Stagecoach	Hourly	No service	No service
69 Worthing- Arundel-Pulborough- Alford	Buses R Us	1 journey Tuesday Thursdays	No service	No service
102 Worthing-Littlehampton- Arundel-Amberley	Compass Travel	3 journeys	No service	4 journeys
702 Brighton – Worthing-Arundel	Stagecoach Coastline	Every 30 minutes	Every 30 minutes	Every hour
A- Slindon-Arundel-Worthing	Amberley & Slindon Community	1 Friday	No Service	No service
Offham - Arundel- Ford	Arundel Community Routes	2 per Monday, Thursday 3 per Tuesday, Friday	No service	No service
Arundel Church service	Arundel Community Routes	No service	No service	1 per day

Table 2.3 : Key Bus Services to Arundel *(Source- 2002 National Bus Timetable and Local Authority/Operator timetables)*

2.4.3 Littlehampton is served by routes 700 and 701 which provide a coastal link between Portsmouth and Brighton. The service operates every 30 minutes during the week and hourly on Sundays. In addition, there are other local bus services between Littlehampton and Worthing.

2.4.4 National Express coast service 315 operates along the south coast via Arundel from Eastbourne/ Brighton along the coast to Southampton and Cornwall (2 per day). There is also a National Express service from Chichester and Littlehampton to London (route 27). There is one service each way per day.

2.5 ***Highway Issues***

2.5.1 The A27 is the trunk road for the South Coast and passes through the Arundel development plan area. Between Chichester and the west of Arundel, the A27 has dual two-lane carriageways, mainly with at-grade roundabouts or priority junctions. However, the A286 joins the route at Tangmere at a grade-separated intersection. This section of route generally functions satisfactorily.

2.5.2 The A27 through the southern fringe of Arundel is a poorly aligned single carriageway road. It also carries traffic between sections of the A284, which links Littlehampton with the A29 near Madehurst. This reduction in road standard, coupled with presence of two at-grade roundabouts gives rise to excess congestion at peak times, above average safety problems and the occurrence of rat running to avoid delays. There is a traffic signal junction at the Crossbush interchange where the A27 meets the A284 from Littlehampton.

2.5.3 To the east of the Crossbush roundabout at Arundel, the A27 reverts to a two-lane dual carriageway with at-grade junctions and continues at this standard to the outskirts of Worthing. This improved section of road, together with the grade separated intersection at Patching generally functions well.

2.5.4 The key north-south routes through the Arundel Strategy Development Plan area are:

- The A29 which provides a route from Bognor Regis towards London. The A29 is a single carriageway route through the villages of Westergate and Aldingbourne. The A29 intersects the A27 at the Fontwell and Slindon Common roundabouts; and
- The A284 provides a connection from Littlehampton, through Arundel to meet the A29 north of Slindon. The route is single carriageway and meets the A27 at the Crossbush junction and the western of the two Arundel roundabouts.

2.5.5 In addition to the above, there are unclassified routes between Arundel and the coast such as the route which passes through Ford. This is heavily used by heavy goods vehicles to the Ford industrial estate.

2.5.6 Each of the north-south routes has a level crossing where it meets the Coastway rail service.

2.5.7 The 2000 Annual Daily Traffic (AADT) flows on the A27 were recorded as 25,860 at Walberton and 27,200 at Poling. Traffic data is now available for Poling in 2001 and this shows an AADT flow of 27,400. The daily profile is shown in table 2.4. This shows that Fridays have the highest flows (over 30,000 vehicles per day at Poling) which are 10% higher than the AADT.

	Average Daily flow (two-way)	
	Poling	**Walberton**
Monday	27,005	25,980
Tuesday	27,651	25,944
Wednesday	28,436	26,662
Thursday	28,332	27,404
Friday	30,159	29,284
Saturday	24,382	23,161
Sunday	24,707	22,727
Av Mon-Fri- AAWT	28,316	27,055
Av Mon-Sun AADT	27,239	25,881

Table 2.4: 2000 Daily Traffic flows on the A27 (Source Highways Agency)

2.5.8 Typically, peak hour flows on the A27 represent 8% of daily traffic. The peak traffic flows at Walberton are between 1000 and 1150 vehicles between 0700 and 1000 and 1600 and 1900 in each direction. The Saturday and Sunday peak is at lunchtime with 900 to 1000 vehicles per hour.

2.5.9 Table 2.5 shows the average flow by month at Poling. This shows the seasonal nature of the route with flows in August exceeding 30,000 vehicles per day.

Month	**Average daily flow (two-way)**
January	23,769
February	25,688
March	26,318
April	27,170
May	28,398
June	29,067
July	29,721
August	30,445
September	29,193
October	27,427
November	26,530
December	24,739

Table 2.5: Average Monthly Traffic flows on the A27 Poling (Source Highways Agency)

2.5.10 For the SoCoMMS study, additional traffic counts have been undertaken in June 2002. These were undertaken for traffic model development purposes and supplemented data collected by West Sussex County Council. A traffic count was undertaken on the A27 where it crosses the River Arun. This showed that in 12-hours the flow here was 24,000 vehicles two way. This is equivalent to the 24,800 vehicles in the same 12-hour period at Poling. Thus, the single carriageway section through Arundel is carrying the same flow as the dual carriageway. The volume of heavy goods vehicle movements on the A27 is 7% of traffic flows, with light vans representing 9%, cars representing 82%. The full traffic count is given in Annex A, along with a count on the A284 to the north of Arundel.

2.5.11 Most of the traffic on the A27 crossing the River Arun is through traffic.

2.5.12 Figure 2.2 shows the traffic flows within the Arundel area.

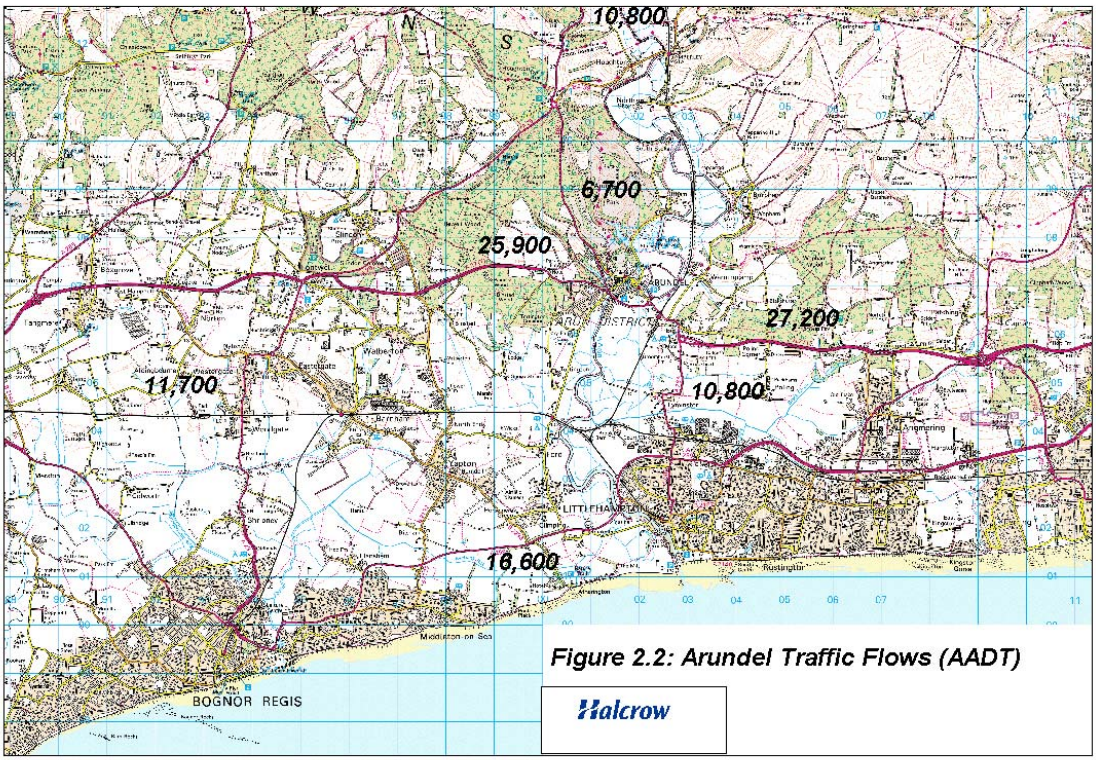


Figure 2.2: Arundel Traffic Flows (AADT)

2.5.13 The Highways Agency have developed an indicator called the Congestion Reference flow (CRF)(based on a procedure outlined in the Design Manual for Roads and Bridges Volume 5). This is used in comparison with the AADT to derive the stress factor for a link, which is used as a proxy for journey time reliability. Values greater than 0.75 are generally held to give cause for concern. Table 2.6 shows the stress factors as derived for Poling, Arundel and Walberton. The table shows that the single carriageway section through Arundel is well in excess of its stress factor.

Section	AADT (two-way)	Stress Factor
A27 Poling	27,400	0.45
A27 Arundel	27,000	1.27
A27 Walberton	28,860	0.44

Table 2.6: Comparison of Current AADT and Stress factor- A27 (Source Highways Agency)

2.5.14 The high traffic flows on the A27 result in congestion. The average travel speed along the A27 during weekdays is shown in Table 2.7. The table shows that during the day the average speed between Fontwell and Arundel is 63 and 61 km/h in each direction. Between Arundel and Angmering Park the average daily speed is 68 and 69 km/h in each direction. In the peak periods, the peak direction speed falls to 46 km/h over the 5 kilometre section.

Section	Daily	Am peak weekday (0700-1000)	Interpeak (1000-1600)	Pm peak (1600-1900)
Fontwell to Arundel	63.4	61.9	65.4	61.1
Arundel to Angmering Park	67.8	45.6	65.8	40.8
Angmering Park to Arundel	69.1	69.5	69.6	51.7
Arundel to Fontwell	61.3	65.5	72.0	46.8

Table 2.7: Traffic Speeds (Km/h) (Source Highways Agency)

2.6 ***Accident Analysis***

2.6.1 The highway authorities have provided details of road crashes that resulted in personal injury for the SoCoMMS study area during a three year period. An analysis has been undertaken of the number and the severity of the injuries sustained, and the combination of vehicles and pedestrians involved. The crash

locations were recorded as OS grid references, supplemented in most, but not all, instances by a description of the location.

2.6.2 The national accident rates in 1999 (from table 4.16 of Transport Statistics Great Britain: 2000 edition) were:

- Motorway 11 accidents per 100 million vehicle-kilometres
- All A roads 50 accidents per 100 million vehicle-kilometres

2.6.3 The observed accident rate for the A27 is as follows:

- Chichester – end of dual carriageway west of Arundel 14.7 accidents/100 mvkm;
- Arundel – Crossbush = 31.4 accidents/100 mvkm

2.6.4 Thus, in terms of numbers of accidents, the A27 in this area has a below national average accident rate.

2.6.5 The analysis has examined the proportion of crashes for each section of route where someone was killed or seriously injured (KSI), and where a pedestrian, pedal-cyclist or motorcyclist was involved. The same national statistics as used above shows that the proportion of crashes in which someone is killed or seriously injured are:

- Motorway 13.3%
- All A roads 16.2%

2.6.6 The severity of injuries on the A27 is more than one-and-a-half times greater than the national average between Crossbush (south of Arundel) and Worthing

2.6.7 To identify accident "black spots", where a large number of crashes occurred on a short length of road, locations were determined where either of the following criteria was met.

- 10 adjacent crashes occurred in the three year period at a frequency in excess of 15 crashes/km (approximately twice the average for the whole route); or
- 10 crashes occurred in the three year period at a single location.

2.6.8 Accident "black spots" have been identified at the following locations.

- A27 in the vicinity of the Boxgrove roundabout= 11 crashes
- A27 in the vicinity of B2132 junction = 11 crashes
- A27 in Arundel between the eastern roundabout south of the town centre and Crossbush = 24 crashes, with a particularly high proportion of KSI (killed or seriously injured) casualties, and a high proportion of motorcyclist casualties.

2.6.9 This indicates that there are safety concerns in the Arundel area,

2.7 ***Key issues from consultation***

2.7.1 As part of the SoCoMMS study a series of workshops were held along the corridor. These sought to identify problems and issues with the transport system in the area. These are outlined in separate reports.

2.7.2 From these workshops, the local issues that came forward as being significant in the Arundel area can be summarised as follows:

- Congestion on the A27 at Arundel.
- Safety issues on the A27.
- The high flows on the A27 split the town of Arundel causing severance.
- Congestion arising from level crossings, particularly on the north-south routes.
- Traffic rat running through the villages to the south of Arundel to avoid the A27.
- Congestion on the A259 and its relationship to the A27.
- Impact of congestion on the economic regeneration of the area.
- Noise and air quality problems arising from high traffic flows and congestion.
- Traffic and safety problems are likely to be worse in the future.
- Poor accessibility to Littlehampton.
- A number issues related to the perceived quality of the rail service including poor infrastructure, journey times.
- Lack of through rail services to the east of Brighton.
- Lack of public transport integration between modes such as between rail with buses, taxis, and car parking.
- Availability of bus services.

- Facilities for the disabled.
- The National Park may increase the number of visitors adding further traffic pressure.
- Problems for cyclists due to lack of cycle network, high traffic flows and aggressive driving behaviour.

2.7.3 A second consultation phase sought opinions from stakeholders on potential solutions for the study area. This showed considerable support for an Arundel bypass. However, there was also support for improvements within towns for walking and cycling which would help social inclusion. Improvements to public transport were suggested, such as improving integration, reducing fares, and providing more rail capacity. On the highway issues, the need for reducing speed limits in small villages was highlighted .

2.8 ***Summary***

2.8.1 The key findings from the review of existing conditions and consultation on problems has highlighted:

- Traffic flows on the single carriageway through Arundel are similar to that on the nearby dual carriageway at Poling;
- The single carriageway section of the A27 is carrying traffic flows in excess of stress levels;
- There is congestion during peak periods in Arundel;
- There are safety issues on the A27 between Crossbush and Arundel with the route having a higher than average severity problem;
- There is local concern over the impact of traffic on the human environment in Arundel with noise, pollution and severance;
- Public transport is not seen as a reliable attractive alternative. There are limited regular bus services available from Arundel.

3 Transport Model Development

3 Transport Model Development

3.1 ***Introduction***

3.1.1 The modelling of schemes in relation to the Arundel area has been undertaken in two ways. There is a strategic transport model which covers the full area of the south east of England and allows wider traffic diversions to be assessed. Secondly a local model has been developed for the Arundel area which looks at local issues. This section outlines the models that have been developed.

3.2 ***Strategic Model***

3.2.1 A strategic transport model has been developed for the SoCoMMS study with the aim of testing a range of schemes, policy measures, and strategies within the study area. The model is multi-modal in nature in that it has representations of the highway, rail and interurban bus/coach networks. The model operates within the EMME/2 software.

3.2.2 The SoCoMMS model has been developed from a range of existing sources. The highway model has been developed from SERTM (South East Regional Traffic Model), ORBIT (a multi-modal study investigating orbital movements around London) and local models developed for other multi-modal studies (e.g. the Access to Hastings study and M27 Integrated Transport Study). The rail element of the model has been developed from data obtained from the DTLR (Department of Transport, Local Government and the Regions). The network databases have been developed in a Geographic Information System (GIS). The model covers an area from the south coast to London and the river Thames (northern boundary) and Wiltshire / Dorset (western boundary).

3.2.3 The model has been used to test a range of transport interventions including road schemes, rail measures, and demand management. The model has sub-models which allow the following to be included:

- Trip diversion;
- Modal transfer;
- Trip generation; and
- Trip suppression.

3.2.4 The development of the Strategic Model is outlined in the Strategic Model Development Report.

3.3 ***Development of Local Model***

3.3.1 A local traffic model has been built for the area using the SATURN software. This allows more detailed examination of junction delays to be assessed. The local model covers an area from Amberley to the sea, and from Angmering to Fontwell. The network includes the A and B road network with a number of the minor C class routes (such as through Ford). The network coverage is shown in figure 3.1.

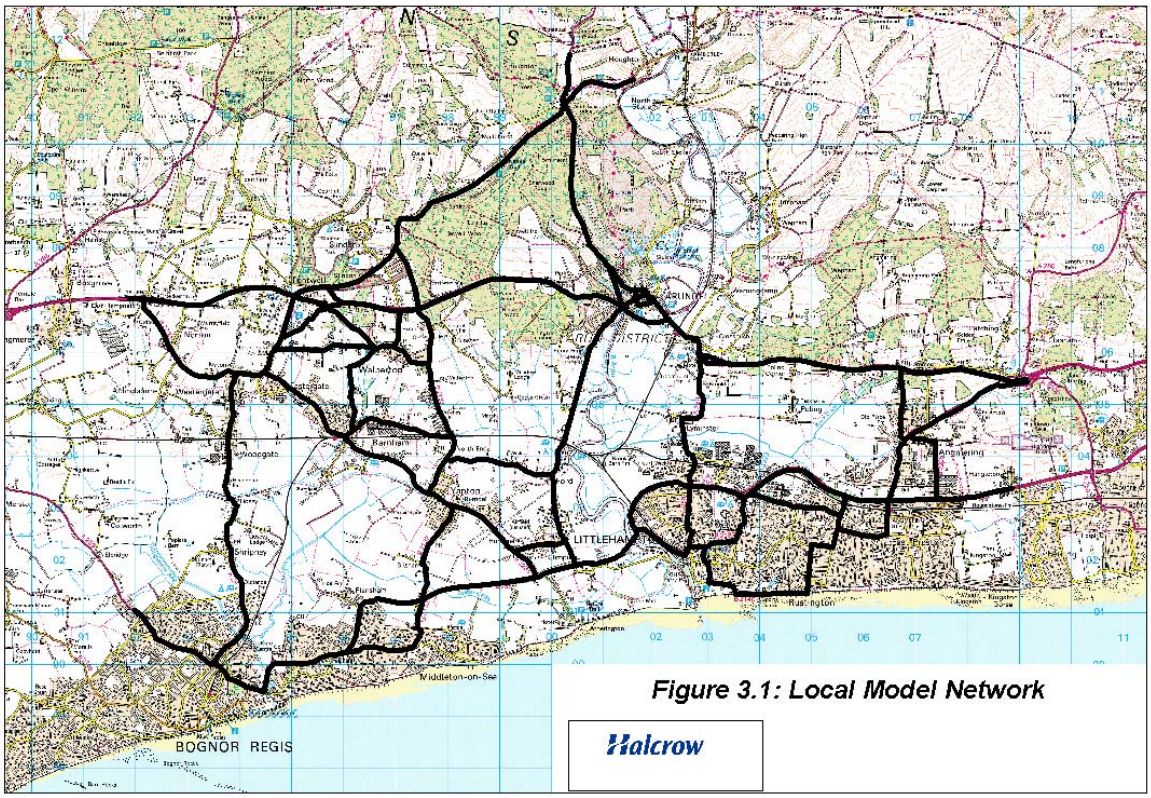


Figure 3.1: Local Model Network

3.3.2 As outlined above, the choice of the SATURN model is to allow junctions to be modelled in more detail. The network definitions includes:

- Link lengths; and
- Speed flow curves.

3.3.3 The junction descriptions include:

- Junction type (priority, roundabout or traffic signal);
- Number of lanes on each entry arm;
- Saturation flows by turn;
- Traffic signal timings; and
- Gap acceptance parameters.

3.3.4 The trip matrix for this assessment has been derived from the strategic model. A cordon trip matrix has been obtained from the strategic model for the base year. The zone system that has been used is shown in figure 3.2. Where appropriate, additional trips have been infilled by local data from the West Sussex county model.

3.3.5 The local model has been developed to assess morning peak hour conditions (between 0800 and 0900).

3.3.6 The link flow validation is shown in table 3.1. The location of cordons and screenlines is shown on figure 3.3. The validation is considered to be satisfactory for testing measures at Arundel.

Table 3.1: Morning Peak Validation- Arundel SATURN Model

Road	Location	Direction	Count Volume (veh)	PCU Volume	Model Flow (pcu)	Actual Diff.	% Diff
A29	Woodgate	Northbnd	650	676	576	-100	-15%
		Southbnd	470	489	440	-49	-10%
		Both	1120	1165	1016	-149	-13%
B2132	Bilsham	Northbnd	340	347	341	-6	-2%
		Southbnd	170	173	143	-30	-18%
		Both	510	520	484	-36	-7%
A259	Climping	Eastbnd	900	927	1008	81	9%
		Westbnd	500	515	576	61	12%
		Both	1400	1442	1584	142	10%
A284	Arundel Park	Northbnd	350	361	337	-24	-7%
		Southbnd	250	258	305	47	18%
		Both	600	618	641	23	4%
A27	Walberton	Eastbnd	900	956	875	-81	-8%
		Westbnd	1100	1168	1137	-31	-3%
		Both	2000	2124	2012	-112	-5%
Unclass	Tortington	Northbnd	300	300	368	68	23%
		Southbnd	220	220	208	-12	-5%
		Both	520	520	576	56	11%
A284	Lyminster	Northbnd	460	474	357	-117	-25%
		Southbnd	440	453	453	-0	0%
		Both	900	927	810	-117	-13%
A27	Poling	Eastbnd	1200	1274	1167	-107	-8%
		Westbnd	1200	1274	1303	29	2%
		Both	2400	2549	2470	-79	-3%
A29	Bury Hill	Northbnd	610	634	641	7	1%
		Southbnd	440	458	482	24	5%
		Both	1050	1092	1123	31	3%
B2139	Amberly	Northbnd	410	418	424	5	1%
		Southbnd	360	367	387	20	6%
		Both	770	785	811	26	3%
London Road, Arundel		Inbound	105	107	109	2	2%
		Outbound	92	94	93	-1	-1%
		Both	197	201	202	1	1%
Maltravers St, Arundel		Inbound	180	187	186	-1	-1%
		Outbound	126	131	154	23	17%
		Both	306	318	340	22	7%
Causeway,Arundel		Inbound	181	181	172	-9	-5%
		Outbound	156	156	160	4	3%
		Both	337	337	332	-5	-1%
A27	Arundel relief Road	Eastbnd	1208	1283	1137	-146	-11%
		Westbnd	1209	1284	1256	-28	-2%
		Both	2417	2567	2393	-174	-7%

Table 3.1: Morning Peak Validation- Arundel SATURN Model

Road Location	Direction	Count Volume (veh)	PCU Volume	Model Flow (pcu)	Actual Diff.	% Diff
Sw Screenline	Northbnd		1950	1925	-25	-1%
	Southbnd		1177	1159	-18	-2%
	Both		3127	3084	-43	-1%
N Screenline	Northbnd		1053	1064	11	1%
	Southbnd		825	869	44	5%
	Both		1877	1934	57	3%
Outer Cordon	Inbound		3262	3208	-53	-2%
	Outbound		3476	3302	-17	-5%
	Both		6738	6509	-229	-3%
Inner Cordon	Inbound		475	467	-8	-2%
	Outbound		381	407	25	7%
	Both		856	874	18	2%

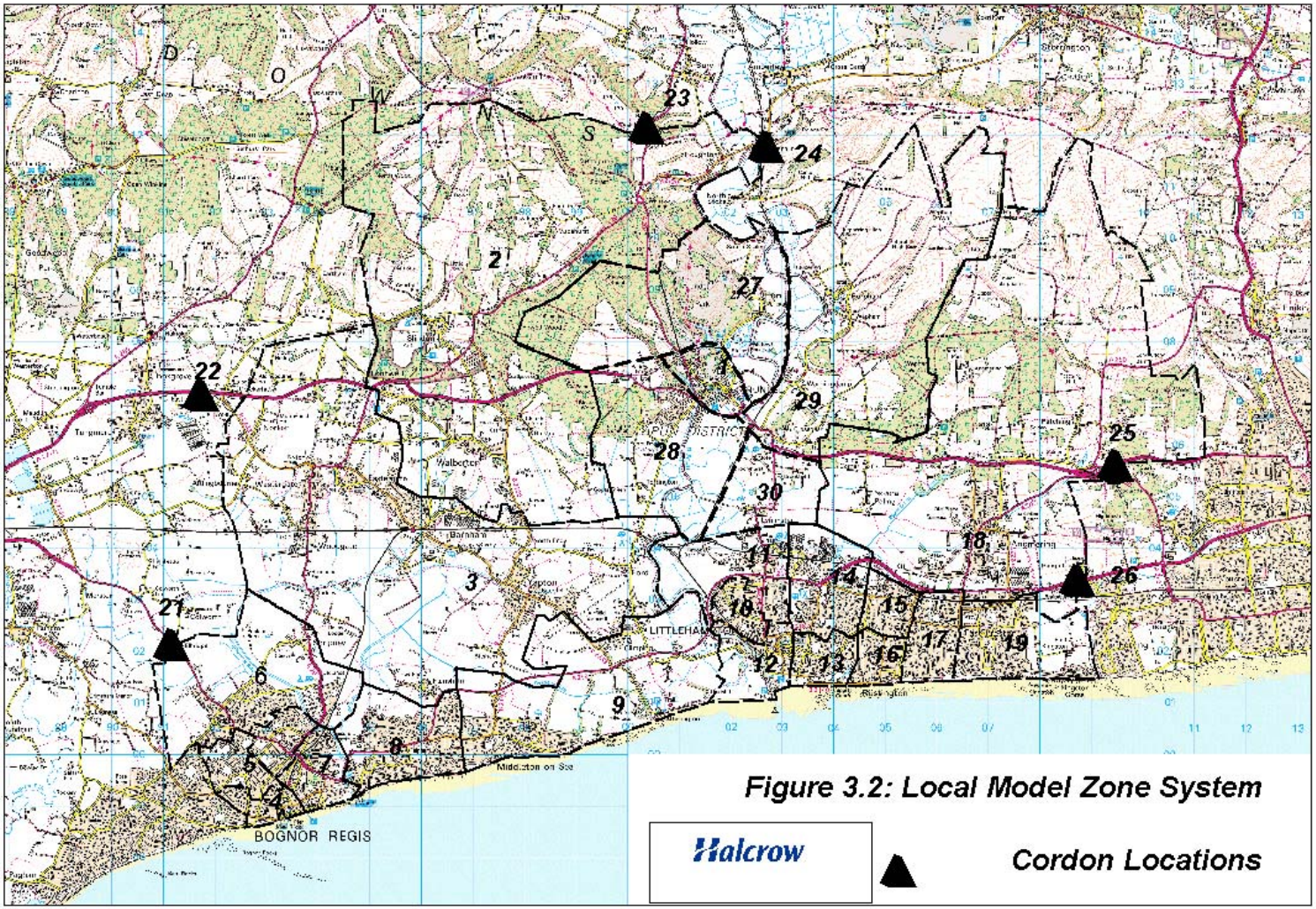


Figure 3.2: Local Model Zone System

Figure 3.3: Validation Screenlines

4 Future Travel Conditions

4 Future Travel Conditions

4.1 ***Introduction***

4.1.1 This chapter outlines the future travel conditions within the Arundel area. This starts from a review of development and planning policy. This is followed by a discussion of trip forecasts for 2016.

4.2 ***Structure Plan Policy***

4.2.1 The West Sussex Structure Plan was adopted in 1993 and covers the period to 2006. The Deposit Draft Structure Plan was published in 1996, extending the policy period to 2011. After an initial round of consultation with the District and Borough Councils, the county council has published a Consultation Document (The Choices Ahead – May 2000). The document sets out a range of options, promoting new development to be built on previously developed land as a first preference and suggests that 17,700 dwellings could be accommodated in this way between 1996 and 2011. Additionally, it sets out the options for greenfield development as follows:

- Solely by extensions to the main towns and possibly major expansion around Crawley, providing approximately 2,000-3,000 dwellings.
- Partly by extensions to the main towns and partly by new or expanded villages, providing approximately 2,000-3,000 dwellings.
- Partly by extensions to the main towns and partly by new market towns, providing approximately 10,000 dwellings.

4.2.2 There is the possibility of concentrating significant growth around Crawley, although it is only one of a number of ways in which growth could be accommodated. It would involve using land within Horsham and / or mid Sussex Districts

4.3 ***West Sussex Local Transport Plan***

4.3.1 In the Local Transport Plan six objectives are outlined for Transport Planning in West Sussex. These are:

Choice – to widen travel choice and promote the most sustainable transport modes by:

- obtaining a high standard of service in bus passenger transport and increase patronage through enhanced services;
- to maximise the use of rail for passengers and freight;
- making cycling more appealing and safer in order to increase the use of this mode;
- making walking more appealing and safer in order to increase the use of this mode;
- informing and influencing people about sustainable travel through the Travel/Wise programme; and
- promoting the introduction of Company Travel Plans.

Safety – to improve road safety and personal safety for the travelling public by:

- reducing road casualties;
- reducing the fear of crime in all aspects of transport;
- reducing and controlling vehicle speeds; and
- promoting road user safety.

Integration – to integrate transport and the various providers of services in order to maximise the efficiency of our transport systems by:

- working with public transport providers to improve integration within and between transport types, and to improve our public transport interchanges and information; and
- ensuring new development is designed and located to minimise the need to travel, and is accessible by sustainable travel modes.

Economic performance– to assist in the promotion of an efficient economy and the achievement of sustainable economic growth by:

- maintaining the road network to a high standard and addressing key gaps and weaknesses;
- working with business to ensure sustainable freight distribution and the viability of our town centres;
- improving sustainable access to Gatwick Airport and road access to Shoreham Harbour;

- maximising opportunities in relation to e-commerce, modern technology in local service and information provision and other new ways of working;
- encouraging and promoting local tourism and leisure opportunities in a sustainable manner.

The Environment - to reduce traffic growth, pollution and congestion in order to protect and enhance the built and natural environment by:

- reducing the growth in unsustainable travel;
- improving air quality and promoting Local Agenda 21 initiatives;
- reducing environmental impacts of undertaking all aspects of transport provision and maintenance;
- managing and improving our strategic road network to maintain efficiency and effectiveness and to encourage heavy goods vehicles and longer distance traffic to use it; and
- managing the remaining network in accordance with identified hierarchies giving due regard to the mobility impaired, pedestrians, cyclists, buses, taxis, freight, motorcyclists and car users.

Accessibility – to promote access to services and facilities for all by:

- ensuring proper provision for the mobility impaired;
- ensuring those without the use of a car (in both rural and urban areas) have access to local services or appropriate public or community transport; and
- helping all parts of our society to share in the benefits arising from improved communications and information technology.

4.3.2 In order to deliver the above objectives West Sussex County Council have a number of strategies that are fundamental to the delivery of these objectives. These are based on:

- a Network Management Strategy which seeks to maintain and enhance West Sussex strategic road and rail networks;
- a Road Safety Strategy;
- Economic and Freight Strategy;

- an Integrated Parking Strategy
- a Walking Strategy; and
- a Cycling Strategy.

4.4 ***Travel Forecasts for 2016 Do-minimum- Network Assumptions***

4.4.1 In developing a strategy for the south coast, account has been taken of those transport initiatives that are currently under construction, currently committed and those measures likely to be in place by 2016. Within the study area, these include:

- **Trunk Roads Schemes**
- A27 - Polegate bypass- D2 standard
- **Major Rail Improvements**
- Completion of CTRL from Ashford to St Pancras – currently under construction (this will need to take into account changes to service patterns on the existing network)
- Virgin Cross- Country service improvements
- Completion of Thameslink 2000 and associated timetable changes
- **Franchise Proposals**
- Measures arising from franchise proposals put forward by South Central, South West Trains and Connex South Eastern
- **Local Transport Plans** Through the Local Transport Plan process, a number of initiatives have been accepted for funding in the December 2000 statement. These include:
- Crawley Fastway (guided bus scheme in the Gatwick Area)
- East Kent Access – A256 upgrade to dual carriageway
- South Hampshire Rapid Transit (including provision of light rail between Portsmouth and Fareham and bus improvements between Portsmouth and Waterlooville-Horndean Bus Improvements
- A280 Angmering Bypass
- **Other Schemes**
- East Kent Access Phase 2
- A259 Bognor Regis Relief Road.
- M20 junction 10a

4.4.2 In addition, there are a number of schemes in the Area of Influence being pursued which influence the South Coast corridor. These include:

- **Trunk Roads Schemes**
- M2 widening to D4 standard between Cobham and junction 4
- A2- Bean – Cobham Widening Phase 1 (Bean-Tolgate) -D4 standard
- A2 – Bean – Cobham Widening Phase 2 (Tolgate- Cobham) – D4 standard
- A21 - Lamberhurst bypass (S of Maidstone) – D2 standard
- A249 - Iwade – Queenborough Improvement (Kent) – D2 standard
- M25 - J12-J15 Widening (Surrey) –D5/D6 standard
- A2/A282 – Dartford Improvement (M25) – D4 standard
- A23 - Coulsdon Inner Relief Road (S London)- D2 standard
- **Schemes from Multi Modal Studies and Road Based Studies**
- A21 Tonbridge to Pembury Improvements
- A3 Hindhead Common Tunnel
- Service improvements Wadhurst to Tonbridge
- **Other Schemes**
- A24 Horsham – Capel Improvement

4.5 ***2016 Land Use Assumptions- Strategic Model***

4.5.1 Throughout the development of the SoCoMMS Reference Case we have, as far as possible, attempted to maintain consistency with the other multi-modal studies which are proceeding simultaneously. In so doing, we have used the latest TEMPRO projections as control totals at the County level for those counties in the study area which fall into the South East Region. These County totals were prepared by HETA for use in the SERAS Reference Case and have been used to maintain consistency with SERAS, despite the reservations of some of the County Authorities about these totals.

4.5.2 However, the notable difference between the SoCoMMS methodology used in and that used for SERAS is the manner in which the district distributions for population, workforce, households and employment have been derived[1]. We felt that narrower study area of SoCoMMS necessitated more of a policy-related focus at the level of the individual districts, as it was thought that variations between

[1] The SERAS Planning Reference Case derived district distributions by dividing the TEMPRO county trend-based totals by the TEMPRO county policy based totals to achieve a factor. This factor was then applied to each of the TEMPRO trend based totals at the district level so as to derive a policy based total for each of the districts.

Districts within the Counties are likely to have an impact on the study outcomes. Thus, in order to determine distributions across the Counties, reference has been made to the relevant County Structure Plans which set out housing allocations for each of the districts. We have also consulted the County authorities to obtain their views on the distribution of these figures between the respective districts in their area.

4.5.3 Consultation with the Counties on the district distribution of the TEMPRO totals was undertaken in two phases. In the first instance letters were sent out following the land use planning workshop, requesting the population and employment figures which underpin the respective Structure Plan dwelling allocations to 2016 (where relevant). Housing and employment land monitoring reports were also requested.

4.5.4 In most cases, the levels of response from the Counties to this first round of consultation was good, although two broad issues emerged:

- In general, the Structure Plan time horizons were to 2011 rather than to 2016; and
- The County baseline figures and the projected growth figures were not always compatible with the TEMPRO County totals.

4.5.5 Although there was some level of variation between the levels of information supplied by the Counties, the approach adopted for each County was similar. For the assembly of the household, population and employment datasets, this broadly consisted of the following:

4.5.6 For **household growth**, based on the housing and employment land monitoring reports, an estimate of the completions to 1998 was obtained. This was fed into the baseline information and allowed us to calculate outstanding commitments (levels of housing growth) for the remainder of the Structure Plan period. Where the Structure Plan time horizon was to 2011, it was assumed that the distribution of dwelling growth implicit in the Structure Plan would continue to 2016 unless the County indicated otherwise. This permitted us to arrive at an estimate as to the distribution of future household growth between the districts in each county. This distribution was applied to the TEMPRO county level growth figure. When added to the TEMPRO 1998 base year figures, this yielded a distribution for 2016.

4.5.7 For **population growth**, where the county provided population growth figures, a similar approach to that described above was adopted, applying the County distribution to the TEMPRO County control total. Where the county did not provide population data, a similar distribution to that applied to household growth was applied to the TEMPRO population growth figure with the distribution for 2016 calculated as described above. For **workforce** totals a workforce/population factor was derived from the TEMPRO trend based forecasts for 2016 for each district, and then applied to the SoCoMMS population figures to arrive at a figure for 2016.

4.5.8 DTZ Pieda undertook to produce the **employment change** forecasts. TEMPRO 2016 county employment forecasts were used as control totals. A shift share method was adopted, taking into account land use policy considerations in order to determine the distribution of jobs at district level within each county. The first step was to calculate the shift in relative importance of employment within each district, assessing the distribution of the county total in the last 5 years, and to project that shift in the future to year 2016 assuming this shift happens at constant rate. These trend-based projections were then adjusted to take into account specific land use hypotheses that affect individual sites or areas within the districts. An adjustment factor was therefore applied to fine-tune the trend-based projections to knowledge of what is expected "on the ground" over the time period considered. Information on land use policy was substantiated by local forecasts of employment endorsed by the county councils themselves and / or by qualitative judgements from Structure Plans officers or forecasting officers in the County Councils.

4.5.9 Based on the above methodology, an interim draft distribution was derived for household, population and employment growth for each of the Counties to 2016. These figures were re-issued for comment by the Counties in mid-September. Where appropriate, the distributions have been adjusted to reflect further comments received. It is assumed that these figures are now generally in line with the County Authorities' views on the distribution of future growth for the purposes of this study.

4.5.10 Following consultation with the study area and area of influence local authorities, a set of planning data have been derived for each district. These are shown in **Table 4.1**.

	HOUSEHOLD		POPULATION		EMPLOYMENT		WORKFORCE	
District	**1998**	**2016**	**1998**	**2016**	**1998**	**2016**	**1998**	**2016**
Adur	25,089	27,473	57,450	57,530	20,368	20,895	27,187	27,614
Arun	62,892	75,145	137,911	155,104	49,760	55,846	61,688	71,348
Chichester	46,297	57,706	105,353	120,055	59,350	71,801	48,071	58,827
Crawley	39,506	46,211	95,280	102,832	68,740	76,139	49,864	55,529
Horsham	50,663	64,171	119,880	137,796	57,235	69,265	61,679	73,032
Mid Sussex	52,740	66,426	125,219	143,456	58,707	65,690	66,102	78,901
Worthing	44,416	49,438	97,697	102,276	48,245	53,632	45,300	48,070
WEST SUSSEX	**321,603**	**386,570**	**738,790**	**819,130**	**362,405**	**413,267**	**359,891**	**413,321**

Table 4.1: Demographic Data- 2016 SoCoMMS Reference Case

4.5.11 There is an additional refinement in allocating growth levels to individual zones. The SoCoMMS team have undertaken a review of development plans and environmental constraints to assess the future distribution of development within a district. On this basis, growth in the SoCoMMS model is allocated away from environmentally sensitive areas.

4.5.12 Annex B shows the major development sites located within Arun District. These are on the fringes of Bognor Regis, Littlehampton and Angmering.

4.6 ***Future Travel Forecasts***

4.6.1 The strategic model has been used to assess future traffic levels in the Arundel area in the future. Using the planning forecasts, the model has been used to assess traffic flows in the Arundel area in the future. The forecast AADT for the A27 corridor are shown in see table 4.2. These show that traffic growth of the order of 33% is forecast on the A27 corridor. It is noted that while within the overall study area, traffic growth of 28% is forecast, the local development pressures are adding to the local traffic growth. This will increase congestion through Arundel and as a result, the stress factor for the A27 at Arundel is well in excess of 1. It is noted that the Strategic model is not constrained by capacity at junctions.

Section	AADT Base year	AADT- 2016 Do-minimum	2016 Do-minimum Stress factor
A27 Walberton	25,900	32,600	0.57
A27 Arundel link road	27,000	35,600	1.69
A27 Poling	27,200	36,200	0.62

Table 4.2: 2016 Forecast AADT- Source SoCoMMS Strategic Model

4.6.2 The strategic model uses speed/flow curves to represent travel times and operates for an average hour between 0700 and 1900. The flows are factored to an AADT using a local factor derived from automatic traffic counts. The local morning peak SATURN model has been used to assess traffic conditions in the most congested period, to assess the likely flows.

4.6.3 A cordon matrix has been obtained from the 2016 strategic model and converted to morning peak using the same process derived for the base year model. Table 4.3 compares the traffic flows obtained for 2000 and 2016 do-minimum flows. The model shows reductions on the A29 and A284 routes to the south of Arundel. This is due to improvements such as the Angmering bypass.

Table 4.3: Morning Peak Flow Comparison- Arundel SATURN Model

Road	Location	Direction	2000 Volume (pcu)	2016 do-minimum Volume (pcu)	Actual Diff.	% Diff
A29	Woodgate	Northbnd	576	881	305	53%
		Southbnd	440	498	58	13%
		Both	1016	1379	363	36%
B2132	Bilsham	Northbnd	341	329	-12	-4%
		Southbnd	143	300	157	110%
		Both	484	629	145	30%
A259	Climping	Eastbnd	1008	1198	190	19%
		Westbnd	576	861	285	49%
		Both	1584	2059	475	30%
A284	Arundel Park	Northbnd	337	611	275	82%
		Southbnd	305	573	268	88%
		Both	641	1184	543	85%
A27	Walberton	Eastbnd	875	1168	293	34%
		Westbnd	1137	1423	286	25%
		Both	2012	2591	579	29%
Unclass	Tortington	Northbnd	368	395	27	7%
		Southbnd	208	258	50	24%
		Both	576	653	77	13%
A284	Lyminster	Northbnd	357	380	23	6%
		Southbnd	453	594	141	31%
		Both	810	974	164	20%
A27	Poling	Eastbnd	1167	1474	307	26%
		Westbnd	1303	1846	543	42%
		Both	2470	3320	850	34%
A29	Bury Hill	Northbnd	641	703	62	10%
		Southbnd	482	589	107	22%
		Both	1123	1292	169	15%
B2139	Amberly	Northbnd	424	873	450	106%
		Southbnd	387	920	533	137%
		Both	811	1793	982	121%
London Road, Arundel		Inbound	109	274	165	150%
		Outbound	93	237	144	156%
		Both	202	511	309	153%
Maltravers St, Arundel		Inbound	186	173	-13	-7%
		Outbound	154	157	3	2%
		Both	340	330	-10	-3%
Causeway,Arundel		Inbound	172	178	6	3%
		Outbound	160	172	12	8%
		Both	332	350	18	5%
A27	Arundel relief Road	Eastbnd	1137	1516	379	33%
		Westbnd	1256	1647	391	31%
		Both	2393	3163	770	32%
Sw Screenline		Northbnd	1925	2408	483	25%
		Southbnd	1159	1659	500	43%
		Both	3084	4067	983	32%
N Screenline		Northbnd	1064	1576	512	48%
		Southbnd	869	1509	640	74%
		Both	1934	3085	1151	60%
Outer Cordon		Inbound	3208	4362	1154	36%
		Outbound	3302	4360	1059	32%
		Both	6509	8722	2213	34%
Inner Cordon		Inbound	467	625	158	34%
		Outbound	407	566	160	39%
		Both	874	1191	317	36%

4.6.4 The SATURN model indicates that there is greater delay on the A27. The key locations where delays exceed 45 seconds per vehicle include:

- Crossbush traffic signals
- Arundel roundabout with Ford road; (particular the A27 arm from Chichester and the Ford Road south arm)
- The A29 approach to the A27 Fontwell roundabout.

4.6.5 The average speed across the entire area within the SATURN model is decreased from 62 km/h to 54km/h. Overall vehicle kilometres are increased by 35% while vehicle hours are increased by 57%.

4.6.6 A further test was undertaken to assess the implications for Arundel if there improvements at Worthing and Chichester. The strategic model was used to provide a cordon matrix for this scenario. Table 4.4 shows the A27 enhanced Do-minimum flows. These show increased traffic levels on the A27 due to transfers from alternative routes such as the A272, with delays significantly increased at Crossbush. The average speed across the entire area within the SATURN model is decreased from 62 km/h to 48km/h. Overall vehicle kilometres within the local model area are increased by 42% while vehicle hours are increased by 81%.

Table 4.4: Morning Peak Flow Comparison- Arundel SATURN Model						
Road	**Location**	**Direction**	**2000 Volume (pcu)**	**2016 A27 enhanced do-minimum Volume (pcu)**	**Actual Diff.**	**% Diff**
A29	Woodgate	Northbnd	576	731	155	27%
		Southbnd	440	396	-44	-10%
		Both	1016	1127	111	11%
B2132	Bilsham	Northbnd	341	201	-140	-41%
		Southbnd	143	132	-11	-8%
		Both	484	333	-151	-31%
A259	Climping	Eastbnd	1008	1347	339	34%
		Westbnd	576	927	351	61%
		Both	1584	2274	690	44%
A284	Arundel Park	Northbnd	337	448	112	33%
		Southbnd	305	464	159	52%
		Both	641	912	271	42%
A27	Walberton	Eastbnd	875	1472	597	68%
		Westbnd	1137	1607	470	41%
		Both	2012	3079	1067	53%
Unclass	Tortington	Northbnd	368	335	-33	-9%
		Southbnd	208	162	-46	-22%
		Both	576	497	-79	-14%
A284	Lyminster	Northbnd	357	391	34	10%
		Southbnd	453	181	-272	-60%
		Both	810	572	-238	-29%
A27	Poling	Eastbnd	1167	1580	413	35%
		Westbnd	1303	1709	406	31%
		Both	2470	3289	819	33%
A29	Bury Hill	Northbnd	641	752	111	17%
		Southbnd	482	613	131	27%
		Both	1123	1365	242	22%
B2139	Amberly	Northbnd	424	350	-74	-17%
		Southbnd	387	389	2	0%
		Both	811	739	-72	-9%
London Road, Arundel		Inbound	109	168	59	54%
		Outbound	93	134	41	45%
		Both	202	302	100	50%
Maltravers St, Arundel		Inbound	186	223	37	20%
		Outbound	154	196	42	27%
		Both	340	419	79	23%
Causeway,Arundel		Inbound	172	192	20	12%
		Outbound	160	219	59	37%
		Both	332	411	79	24%
A27	Arundel relief Road	Eastbnd	1137	1731	594	52%
		Westbnd	1256	1710	454	36%
		Both	2393	3441	1048	44%

Table 4.4: Morning Peak Flow Comparison- Arundel SATURN Model						
Road	**Location**	**Direction**	**2000 Volume (pcu)**	**2016 A27 enhanced do-minimum Volume (pcu)**	**Actual Diff.**	**% Diff**
Sw Screenline		Northbnd	1925	2279	354	18%
		Southbnd	1159	1455	296	26%
		Both	3084	3734	650	21%
N Screenline		Northbnd	1064	1102	38	4%
		Southbnd	869	1002	133	15%
		Both	1934	2104	170	9%
Outer Cordon		Inbound	3208	4371	1163	36%
		Outbound	3302	3978	677	20%
		Both	6509	8349	1840	28%
Inner Cordon		Inbound	467	583	116	25%
		Outbound	407	549	143	35%
		Both	874	1132	258	30%

4.7 ***Summary***

4.7.1 The use of the strategic and local models indicates that there will be greater traffic pressure on Arundel of which local development pressures are a significant factor. This will result in increased congestion and worsen safety and environmental problems in the area even when soft factors are taken into consideration at both a local and strategic level. This indicates the need for an improvement at Arundel.

5 A27 Arundel Bypass-History of The Remitted Scheme

5 A27 Arundel Bypass- History of The Remitted Scheme

5.1 ***Overview***

5.1.1 The Arundel bypass was one of three schemes formerly in the Targtted Programme of Road Improvements, which has been remitted to SoCoMMS to investigate. The previous chapter outlined that traffic modelling indicated that there was a need for improvement to the highway network at Arundel . Traffic growth on the A27 would result in a worsening of the current problems of congestion, safety and poor environment.

5.1.2 This chapter outlines the history of the remitted scheme at Arundel based on a review that has been undertaken of documents within the Highways Agency. Chapter 6 provides an assessment of alternative options at Arundel.

5.2 ***Background***

5.2.1 **Topography and Land Use** The central part of the study area comprises the flat flood plain of the River Arun with the area to the west and east being more elevated as the land rises away from the coastal plain to form the deep slopes of the South Downs. Coniferous woodlands cover large areas of the higher ground with the agricultural areas being a mixture of pasture and arable land of mainly Grades 3 and 4, quality.

5.2.2 A detailed topographical survey of the area possibly affected by the routes was carried out in 1990.

5.2.3 **Climate**- The review of documents indicates that the Arundel area does not experience any extreme climatic conditions except that the valley is prone to radiation fog, particularly in winter.

5.2.4 **Drainage**- The majority of the study area drains into the River Arun. The river is subject to tidal flows and drainage design needs to take into account the possible effects of the outfalls being tide locked.

5.2.5 **Geology**- As a result of the soil survey undertaken in 1976/77 it would appear that potential engineering problems are:

i) In forming stable embankments across the River Valley unless constructed and surcharged before the roadworks are undertaken to allow for an initial settlement of some 600mm, and a long term settlement of up to 1m.

ii) In founding a bridge over the railway and retaining the embankment without influencing the levels of the track.

iii) Cutting through and exposing the Reading Beds. Where these outcrop on the eastern slope of the river valley, there is evidence of solifluxious lobes indicating slope stability problems similar to those experienced elsewhere in the south of England.

5.2.6 A detail ground investigation over the area of interest, not covered by the 1976/77 soil survey was carried out in 1990/91.

5.3 ***History of the Remitted Scheme***

5.3.1 The proposed Arundel bypass has been through a series of planning stages including scheme assessment, consultation on routes and the selection of a preferred route. The scheme did not however, get as far as a public inquiry.

5.3.2 The original scheme's objectives were to reduce congestion, and improve safety and the environment of Arundel town centre by removing through traffic. Many of these issues have been confirmed by the SoCoMMS work on existing conditions.

5.3.3 A Scheme Assessment Report published in March 1989 summarised the alternative routes put forward for the public consultation in 1987, these were the Orange, Red and Purple routes as shown on the attached Figure 5.1. The results of the consultation indicated that the Orange route had the most support, followed by the Red with the Purple being least popular. None of the routes (including the Orange) where totally approved and modifications were suggested. In June 1989 the Secretary of State for Transport announced the Orange as the preferred route.

5.3.4 After the announcement of the preferred route there was still public demand for the Modified Orange route. This route had been put forward as a viable alternative during the consultation period. Consequently the Department has carried out further investigations including ecological and landscape studies.

5.3.5 A further consultation was carried out in 1991 seeking comment on the previously announced Orange route and amendments (Brown section at the western end and Blue section at the eastern end – see Figure 5.2).

5.3.6 As a result of the second public consultation, an Addendum to the Scheme Assessment Report was published in June 1992. The overall conclusion was that the preferred route had to be chosen from either the Pink route (see Figure 5.3), which was considered environmentally the best but longer and therefore giving the lowest economic return, or a modified Brown route, which was economically much better but environmentally much worse. It was also concluded that either of these options would combine with the Blue route, which was clearly preferred to the Orange route.

5.3.7 Whilst the Brown/Blue route was a consultation route, the Pink/Blue route was only identified during the course of the consultation. The June 1992 report suggested that if the latter route was chosen as the preferred route some further consultation may be required.

5.3.8 In July 1993, the Secretary of State issued a statement declaring that the Pink/Blue route would be adopted as the Preferred route. However, the Arundel Bypass Action Committee (ABAC) continued to oppose the Pink route and proposed a further alternative which they have named the Green option. The concern over the choice of route in this section relates to environmental matters. ABAC put forward 3 variations on the Green route (the approximate routes of which are shown on Figure 5.3):

5.3.9 Green (1) included the provision of an at grade roundabout on the existing A27 east of Hundredhouse Copse to achieve a change of direction. This was rejected by the department because an at grade roundabout would not be sufficient to meet the needs of traffic, particularly in the long-term. Although this would be the least ecologically damaging of the Green options, increasing pressure to provide a grade separated junction in the future could only be achieved by intruding into the valuable woodland block to the west of the proposed roundabout.

5.3.10 Green (2) would leave the existing A27 at Hundredhouse Copse and turn southeast avoiding the main body of the Woodland Complex. This was rejected by the DoT on the grounds that it would encroach into Hundredhouse Copse, an area of high ecological and nature conservation importance. A modified version of

Green (2), which would avoid intrusion into Hundredhouse Copse, was assessed by the Department and referred to as Green (4).

5.3.11 Green (3) would leave the Hundredhouse Copse, pass through Furzefield Copse, continue just inside the woodland edge then east to join the Blue route. This was rejected for reasons similar to those raised for the Brown route; namely it would pass close to an area of high nature conservation. It would also require the demolition of three dwellings.

5.3.12 Green (4) was considered the best Green option for comparison with the Pink/Blue route. It was rejected by the Department for the following reasons:

- It would cause severance to farmland north of Binsted village and would have significant impact on the landform and landscape quality of the area (the Pink option would be shielded by lower-quality woodland).
- It would require an additional 7 hectares of land compared with the Pink route.
- It would cost approximately £ 3 million more to build than the Pink route.
- The Pink route enjoys more support than the Green (4) option including that of Sussex County Council, English Nature, ABNC and Arun District Council.

5.4 ***Previous Preferred Route Conclusion***

5.4.1 At the commencement of SoCoMMS, the preferred route remains as the Pink/Blue route as announced by the Secretary of State in July 1993.

5.4.2 The preferred route consisted of approximately 5.4km of dual-two all-purpose carriageway at an estimated cost of £23.1m (in 1997 prices). From a grade separated junction situated to the north-east of Havenwood Park, the new road curved southwards, south west of Scotland Barn, and passed through the mainly coniferous woodland of Paines Wood and Tortington Common. Access from Arundel to the major part of Binsted Wood was provided by a footpath and bridleway underpass at Old Scotland Lane, a road overbridge for Binsted Lane (East) and an underpass for Footpath number 342.

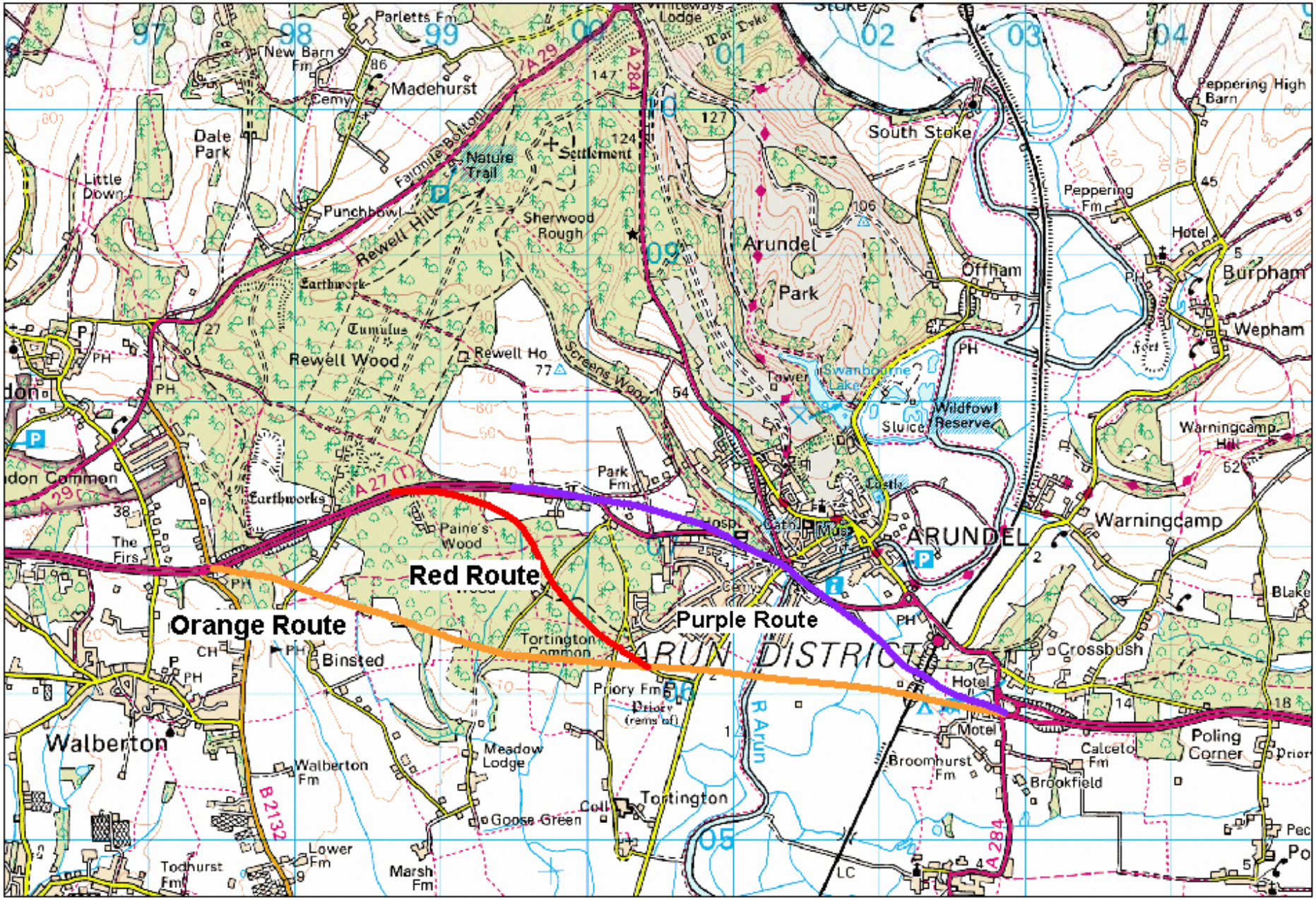
5.4.3 South of Tortington Common, the road curved eastward and passed over Ford Road, where a junction was provided, before crossing the River Arun and the railway. It then joined the Crossbush Bypass completing the junction with Lyminster Road, which passed over the new A27.

5.4.4 It was recognised that the Pink/Blue route would not have as great a benefit for residents of Havenwood Park as would the Green (4)/Blue route. Great care would therefore need to be taken in the detailed design to minimise the impact on the residents of the Park. By providing a new access road from the new junction, access to the Park would be safer than the existing arrangement. Pedestrians would also be able to use the junction to cross the new A27 and reach the existing A27 into Arundel. Care should also be taken in the detailed design to ensure that appropriate landscaping and noise mitigation measures are included in the vicinity of the Park.

5.4.5 Consideration should also be given in the detailed design to minimising the potential severance of Tortington Lane by providing a pedestrian/equestrian crossing.

5.4.6 The Secretary of State also concluded that the provision of a grade separated junction at Ford Road would significantly decrease, not increase, the traffic flow on Ford Road itself.

5.4.7 The preferred route is now protected from development in accordance with the provision of Article 15 of the Town and Country Planning General Development Order 1988 (SI 1988 No.1813).



Halcrow

Figure 5.1: Arundel Bypasses Orange, Red and Purple Routes

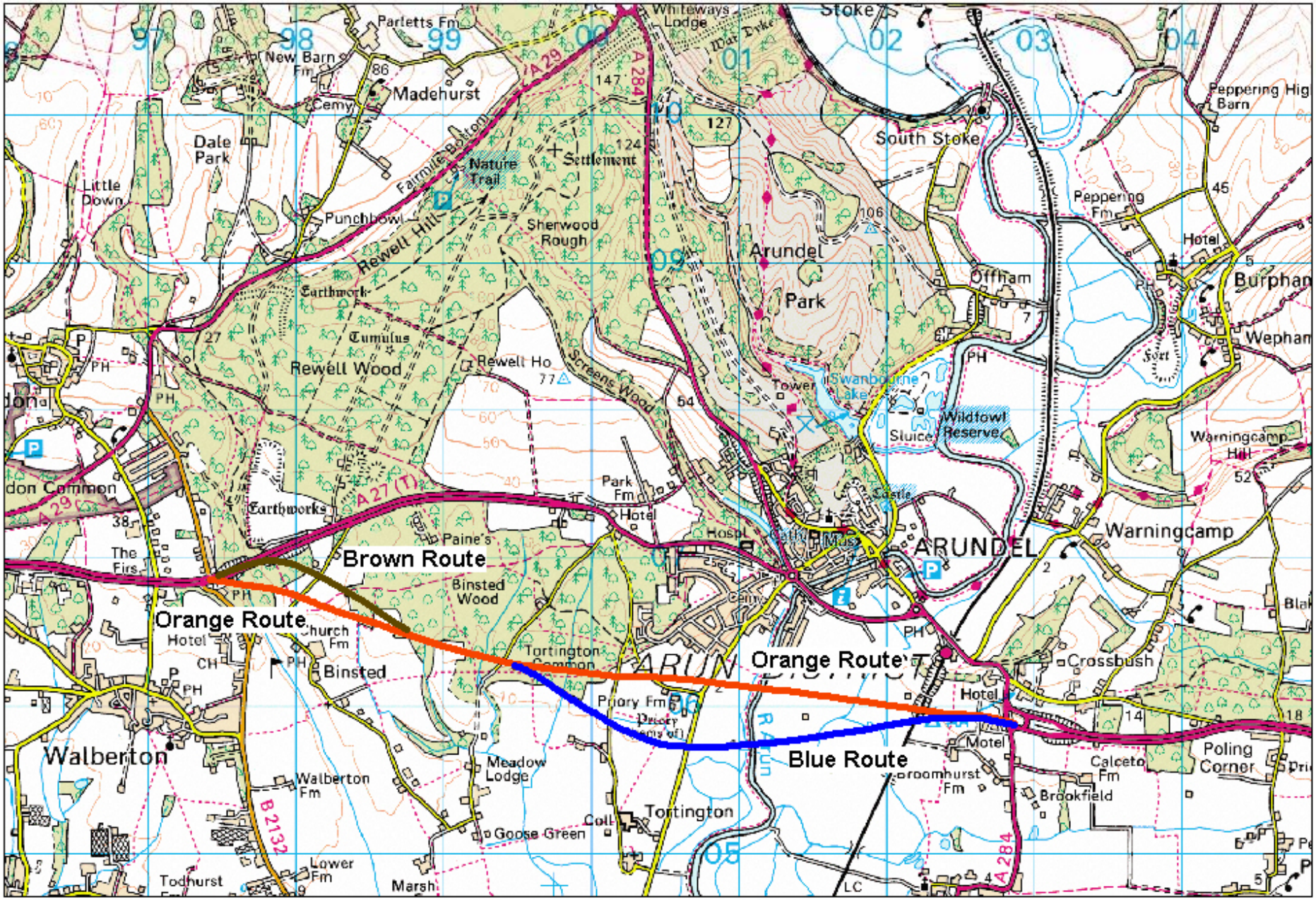


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Figure 5.2: Arundel Bypasses Brown and Blue Amendments to Orange Route

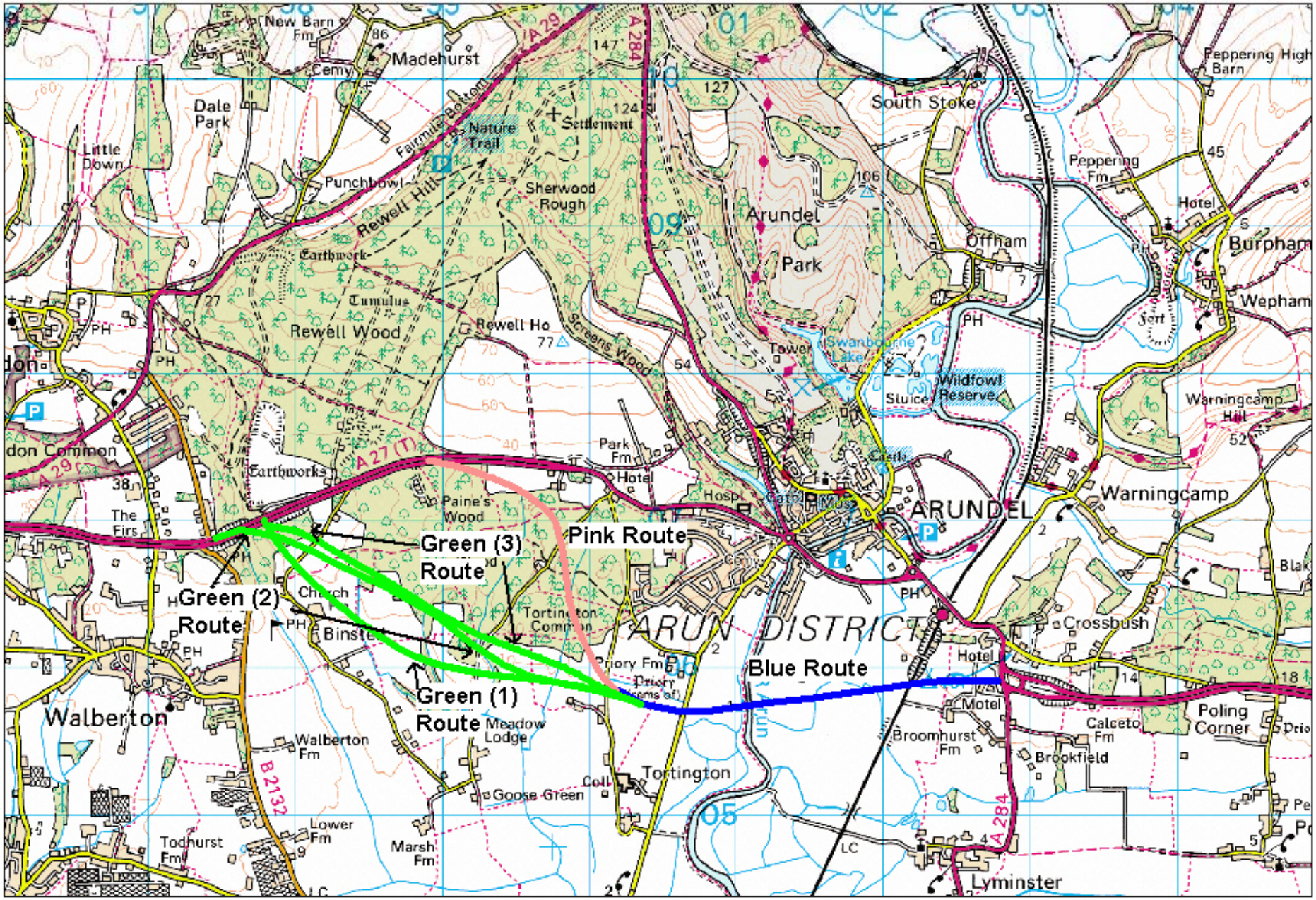

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Figure 5.3: Arundel Bypasses Pink and Green Routes

6 Traffic Appraisal of Options

6 Traffic Appraisal of Options

6.1 Introduction

6.1.1 The previous chapter provided a summary of the history of the Arundel bypass. The SoCoMMS study has reviewed the alternative alignments for an Arundel bypass. The starting point has been to re-examine the original preferred route and re-assess whether this should remain as the preferred route. As such, consideration has been given to the alignments that were previously examined. The focus has been on the two main alternatives that have been proposed, the Pink/Blue route and the Green Route. It is noted that any issues identified here may be revisited during later detailed design work undertaken for the Highways Agency.

6.1.2 This chapter reviews the two key impacts under consideration:

- Traffic impacts (in this chapter); and
- Impacts on the physical environment (Chapter 7).

6.1.3 An overall Appraisal Summary Table for the Arundel area is given in Chapter 9.

6.2 Strategic Model Results

6.2.1 The strategic model has been used to assess the impact of the Arundel bypass with the wider strategy measures in place. The transport strategy that has emerged includes a range of interventions:

- local initiatives (public and private sector);
- local public transport improvements;
- strategic public transport improvements;
- targeted road improvements;
- freight initiatives;
- safety and mobility initiatives; and
- balance - demand management.

6.2.2 In local terms, the strategy includes improvements at Chichester (junction improvements on the bypass) and Worthing (improvement to A27 to dual carriageway standard).

6.2.3 The model shows that traffic flows on a new A27 Arundel bypass would be 40,500 vehicles AADT (see table 6.1).

Section	AADT Base year	AADT-2016 Do-minimum	AADT 2016 SoCoMMS Strategy
A27 Walberton	25,900	32,600	49100
A27 Arundel link road	27,000	35,600	11,000
Arundel bypass	-	-	40,500
A27 Poling	27,200	36,200	51,000

Table 6.1: 2016 Forecast AADT- Source SoCoMMS Strategic Model

6.2.4 The model takes into account the generation effect of highway improvements. Traffic on the old route through Arundel past the station would be significantly reduced. In addition, the strategic model is also showing traffic reductions on the A259 and the B2232 through Eastergate and Yapton. The bypass thus brings wider traffic benefits on the routes to the south of the A27 as well as to Arundel.

6.3 ***Local SATURN Model Tests***

6.3.1 Within the local SATURN model, the alternative Pink/Blue and Green routes have been tested to assess the local impact on traffic conditions in the morning peak period. The assessments have been undertaken assuming Arundel is completed on its own (using the do-minimum network),

6.3.2 The alternative alignment options considered by SoCoMMS have included:

- The Pink/blue route with a junction with Ford Road (test 1); and
- The Pink/Blue route with no Ford Road junction (test 2)
- The Green route with no Ford Road junction (test 3);

6.3.3 The description of these alignments was given in chapter 5.

6.3.4 The network summary statistics for the assignments are given in Table 6.2. The table shows that in terms of global statistics, the green route gives the greater reduction in travel times than the Pink/Blue route. This confirms the work undertaken by the Department of Transport in the initial consideration of the

scheme. However it is noted that the Green route would cost £3m more than the Pink/Blue route.

6.3.5 In terms of global statistics there is little difference with/without the inclusion of a junction with Ford Road.

Indicator	Do-minimum	Pink/Blue	Green- no Ford Road junction	Pink/Blue no Ford Road junction
Pcu/hrs/hr	2731	2592	2567	2592
Pcu/km/hs	148,590	148,333	147598	148778
Average Speed (Km/h)	54.4	57.2	57.5	57.4
Queues	341	325	307	324

Table 6.2: Network Summary Statistics- Local SATURN Model,

6.3.6 **Pink/Blue Preferred Route-** Table 6.3 shows the traffic flow changes in the local network. This is with no additional speed management on parallel routes and is based on an assignment with a junction between the bypass and Ford Road.

6.3.7 The table shows increases on the A27 with reductions on the A259 and the B2132 at Yapton. There are increases in flow on the A284 at Lyminster. This is due to the reduction in delay at the Crossbush junction, thus making this more attractive for northbound traffic. There is also a major reduction in flow on the old A27 route through Arundel.

Table 6.3: Morning Peak Flow Comparison- Arundel SATURN Model- Pink/Blue Route- Test 1 and 2016 Do-minimum

Road	Location	Direction	2016 Do-minimum Volume (pcu's)	2016 Pink/blue Volume (pcus)	Actual Diff.	% Diff
A29	Woodgate	Northbnd	881	889	8	1%
		Southbnd	498	540	42	8%
		Both	1379	1429	50	4%
B2132	Bilsham	Northbnd	329	276	-53	-16%
		Southbnd	300	273	-27	-9%
		Both	629	549	-80	-13%
A259	Climping	Eastbnd	1198	1165	-33	-3%
		Westbnd	861	790	-71	-8%
		Both	2059	1955	-104	-5%

Table 6.3: Morning Peak Flow Comparison- Arundel SATURN Model- Pink/Blue Route- Test 1 and 2016 Do-minimum

Road	Location	Direction	2016 Do-minimum Volume (pcu's)	2016 Pink/blue Volume (pcus)	Actual Diff.	% Diff
A284	Arundel Park	Northbnd	611	607	-4	-1%
		Southbnd	573	572	-1	0%
		Both	1184	1179	-5	0%
A27	Walberton	Eastbnd	1168	1196	28	2%
		Westbnd	1423	1546	123	9%
		Both	2591	2742	151	6%
Unclass	Tortington	Northbnd	395	455	60	15%
		Southbnd	258	444	186	72%
		Both	653	899	246	38%
A284	Lyminster	Northbnd	380	546	166	44%
		Southbnd	594	508	-86	-14%
		Both	974	1054	80	8%
A27	Poling	Eastbnd	1474	1545	71	5%
		Westbnd	1846	1861	15	1%
		Both	3320	3406	86	3%
A29	Bury Hill	Northbnd	703	706	3	0%
		Southbnd	589	589	0	0%
		Both	1292	1295	3	0%
B2139	Amberly	Northbnd	873	873	0	0%
		Southbnd	920	924	4	0%
		Both	1793	1797	4	0%
London Road, Arundel		Inbound	274	267	-7	-3%
		Outbound	237	234	-3	-1%
		Both	511	501	-10	-2%
Maltravers St, Arundel		Inbound	173	172	-1	-1%
		Outbound	157	153	-4	-3%
		Both	330	325	-5	-2%
Causeway,Arundel		Inbound	178	182	4	2%
		Outbound	172	174	2	1%
		Both	350	356	6	2%
A27	Arundel relief Road	Eastbnd	1516	289	-1227	-81%
		Westbnd	1647	285	-1362	-83%
		Both	3163	574	-2589	-82%
A27 Arundel Bypass west of Ford Rd				1312		
			-	1655		
			-	2967		
A27 Arundel Bypass east of Ford Rd			-	1410		
			-	1064		
			-	2474		

6.3.8 **Pink/Blue Route- no junction with Ford Road-** The test with no junction at Ford road indicated that there would be less traffic on the Arundel bypass (see Table 6.4). This test indicated less traffic would use Ford Road. However, the traffic relief on the old route through Arundel is not as great. The morning peak flow on the bypass is some 2500 pcu's compared to the first option tested which had 2900 pcu's west of Ford Road with a junction.

Table 6.4: Morning Peak Flow Comparison- Arundel SATURN Model- Pink/Blue Route- No Junction with Ford Road Test 2 and 2016 Do-minimum

Road	Location	Direction	2016 Do-minimum Volume (pcus)	2016 Bypass Assignment Volume (pcus)	Actual Diff.	% Diff
A29	Woodgate	Northbnd	881	886	5	1%
		Southbnd	498	598	100	20%
		Both	1379	1484	105	8%
B2132	Bilsham	Northbnd	329	322	-7	-2%
		Southbnd	300	302	2	1%
		Both	629	624	-5	-1%
A259	Climping	Eastbnd	1198	1186	-12	-1%
		Westbnd	861	756	-105	-12%
		Both	2059	1942	-117	-6%
A284	Arundel Park	Northbnd	611	613	2	0%
		Southbnd	573	574	1	0%
		Both	1184	1187	3	0%
A27	Walberton	Eastbnd	1168	1184	16	1%
		Westbnd	1423	1585	162	11%
		Both	2591	2769	178	7%
Unclass	Tortington	Northbnd	395	389	-6	-2%
		Southbnd	258	265	7	3%
		Both	653	654	1	0%
A284	Lyminster	Northbnd	380	521	141	37%
		Southbnd	594	538	-56	-9%
		Both	974	1059	85	9%
A27	Poling	Eastbnd	1474	1540	66	4%
		Westbnd	1846	1841	-5	0%
		Both	3320	3381	61	2%
A29	Bury Hill	Northbnd	703	705	2	0%
		Southbnd	589	589	0	0%
		Both	1292	1294	2	0%
B2139	Amberly	Northbnd	873	873	0	0%
		Southbnd	920	923	3	0%
		Both	1793	1796	3	0%
London Road, Arundel		Inbound	274	267	-7	-3%
		Outbound	237	234	-3	-1%
		Both	511	501	-10	-2%
Maltravers St, Arundel		Inbound	173	171	-2	-1%
		Outbound	157	157	0	0%
		Both	330	328	-2	-1%

Table 6.4: Morning Peak Flow Comparison- Arundel SATURN Model- Pink/Blue Route- No Junction with Ford Road Test 2 and 2016 Do-minimum						
Road	**Location**	**Direction**	**2016 Do-minimum Volume (pcus)**	**2016 Bypass Assignment Volume (pcus)**	**Actual Diff.**	**% Diff**
Causeway,Arundel		Inbound	178	181	3	2%
		Outbound	172	180	8	5%
		Both	350	361	11	3%
A27	Arundel relief Road	Eastbnd	1516	470	-1046	-69%
		Westbnd	1647	377	-1270	-77%
		Both	3163	847	-2316	-73%
A27 Arundel Bypass west of Ford Rd				1066		
			-	1455		
			-	2521		
A27 Arundel Bypass east of Ford Rd			-	1066		
			-	1455		
			-	2521		

6.3.9 **Green Route-** Table 6.5 shows the results of the Green route test. It is noted that there is no junction with Ford Road assumed in this test. The results indicate a traffic reductione on Ford Road through Tortington than in comparison with the previous tests. The bypass itself is carrying additional traffic flows to the Pink/Blue route in test 2. The main difference is the traffic relief afforded to the A27 between Walberton and Arundel.

Table 6.5: Morning Peak Flow Comparison- Arundel SATURN Model- Green Route Test 3- and 2016 Do-minimum						
Road	**Location**	**Direction**	**2016 Do-minimum Volume**	**2016 Pink/blue Volume**	**Actual Diff.**	**% Diff**
A29	Woodgate	Northbnd	881	893	12	1%
		Southbnd	498	602	104	21%
		Both	1379	1495	116	8%
B2132	Bilsham	Northbnd	329	322	-7	-2%
		Southbnd	300	302	2	1%
		Both	629	624	-5	-1%
A259	Climping	Eastbnd	1198	1193	-5	0%
		Westbnd	861	761	-100	-12%
		Both	2059	1954	-105	-5%
A284	Arundel Park	Northbnd	611	613	2	0%
		Southbnd	573	574	1	0%
		Both	1184	1187	3	0%

Table 6.5: Morning Peak Flow Comparison- Arundel SATURN Model- Green Route Test 3- and 2016 Do-minimum

Road	Location	Direction	2016 Do-minimum Volume	2016 Pink/blue Volume	Actual Diff.	% Diff
A27	Walberton	Eastbnd	1168	113	-1055	-90%
		Westbnd	1423	138	-1285	-90%
		Both	2591	251	-2340	-90%
Unclass	Tortington	Northbnd	395	379	-16	-4%
		Southbnd	258	198	-60	-23%
		Both	653	577	-76	-12%
A284	Lyminster	Northbnd	380	520	140	37%
		Southbnd	594	533	-61	-10%
		Both	974	1053	79	8%
A27	Poling	Eastbnd	1474	1541	67	5%
		Westbnd	1846	1845	-1	0%
		Both	3320	3386	66	2%
A29	Bury Hill	Northbnd	703	705	2	0%
		Southbnd	589	589	0	0%
		Both	1292	1294	2	0%
B2139	Amberly	Northbnd	873	873	0	0%
		Southbnd	920	923	3	0%
		Both	1793	1796	3	0%
London Road, Arundel		Inbound	274	267	-7	-3%
		Outbound	237	234	-3	-1%
		Both	511	501	-10	-2%
Maltravers St, Arundel		Inbound	173	171	-2	-1%
		Outbound	157	157	0	0%
		Both	330	328	-2	-1%
Causeway,Arundel		Inbound	178	180	2	1%
		Outbound	172	170	-2	-1%
		Both	350	350	0	0%
A27	Arundel relief Road	Eastbnd	1516	508	-1008	-66%
		Westbnd	1647	383	-1264	-77%
		Both	3163	891	-2272	-72%
B2233 s of Yapton		Eastbound	241	220	-21	-10%
		Westbound	349	246	-103	30%
		BOTH	590	466	-124	-21%
A27 Arundel Bypass west of Ford Rd				1087		
			-	1523		
			-	2610		
A27 Arundel Bypass east of Ford Rd			-	1087		
			-	1523		
			-	2610		

6.3.10 **Pink/Blue Preferred Route with Other A27 schemes in-** A further test was undertaken which assumed all the SoCoMMS strategy measures were in place. As such, this includes improvements undertaken on the A27 at Worthing and Chichester. In the latter scenario there is increased traffic on the A27 with diversions from the A272. The strategic model was used to provide a cordon matrix for the latter scenario.

6.3.11 Table 6.6 shows the traffic flow changes in the local network. This is with no additional speed management on parallel routes and is based on an assignment with a junction between the bypass and Ford Road.

6.3.12 The table shows increases on the A27 with reductions on the A259 and the B2132, B2139 at Amberley. There are increases in flow on the A284 at Lyminster. This is due to the reduction in delay at the Crossbush junction, thus making this more attractive for northbound traffic. There is also a major reduction in flow on the old A27 route through Arundel.

Table 6.6: Morning Peak Flow Comparison- Arundel SATURN Model- Pink/Blue Route- Test 1 and 2016 Do-minimum

Road	Location	Direction	2016 Do-minimum Volume (pcu's)	2016 Pink/blue Volume (pcus)	Actual Diff.	% Diff
A29	Woodgate	Northbnd	881	804	-77	-9%
		Southbnd	498	488	-10	-2%
		Both	1379	1292	-87	-6%
B2132	Bilsham	Northbnd	329	300	-29	-9%
		Southbnd	300	213	-87	-29%
		Both	629	513	-116	-18%
A259	Climping	Eastbnd	1198	1314	116	10%
		Westbnd	861	815	-46	-5%
		Both	2059	2129	70	3%
A284	Arundel Park	Northbnd	611	564	-47	-8%
		Southbnd	573	462	-111	-19%
		Both	1184	1026	-158	-13%
A27	Walberton	Eastbnd	1168	1498	330	28%
		Westbnd	1423	1989	566	40%
		Both	2591	3487	896	35%
Unclass	Tortington	Northbnd	395	552	157	40%
		Southbnd	258	532	274	106%
		Both	653	1084	431	66%
A284	Lyminster	Northbnd	380	636	256	67%
		Southbnd	594	595	1	0%
		Both	974	1231	257	26%
A27	Poling	Eastbnd	1474	2126	652	44%

Table 6.6: Morning Peak Flow Comparison- Arundel SATURN Model- Pink/Blue Route- Test 1 and 2016 Do-minimum						
Road	**Location**	**Direction**	**2016 Do-minimum Volume (pcu's)**	**2016 Pink/blue Volume (pcus)**	**Actual Diff.**	**% Diff**
		Westbnd	1846	2627	781	42%
		Both	3320	4753	1433	43%
A29	Bury Hill	Northbnd	703	786	83	12%
		Southbnd	589	613	24	4%
		Both	1292	1399	107	8%
B2139	Amberly	Northbnd	873	362	-511	-59%
		Southbnd	920	389	-531	-58%
		Both	1793	751	-1042	-58%
London Road, Arundel		Inbound	274	158	-116	-42%
		Outbound	237	194	-43	-18%
		Both	511	352	-159	-31%
Maltravers St, Arundel		Inbound	173	219	46	27%
		Outbound	157	135	-22	-14%
		Both	330	354	24	7%
Causeway,Arundel		Inbound	178	228	50	28%
		Outbound	172	219	47	27%
		Both	350	447	97	28%
A27	Arundel relief Road	Eastbnd	1516	308	-1208	-80%
		Westbnd	1647	328	-1319	-80%
		Both	3163	636	-2527	-80%
A27 Arundel Bypass west of Ford Rd				1360		
			-	1894		
			-	3254		
A27 Arundel Bypass east of Ford Rd			-	1688		
			-	2216		
			-	3904		

6.4 ***Summary***

6.4.1 In summary, the traffic tests indicate that the Green Route provides greater traffic benefits than the Pink/Blue route. However, there are environmental issues associated with these routes which are considered in chapter 7.

6.4.2 There is traffic relief to the existing A27 old route old route through Arundel in each test. There are traffic increases on Ford Road with the introduction of the Bypass. It is recommended that speed management and traffic signing measures are used to encourage traffic onto the A27.

6.4.3 Based on the traffic flows identified by the traffic models, the bypass should be constructed as a 2 lane dual carriageway to cater for the future demands. This would provide a route such that flows on the A27 would be within future stress levels.

7 Impact on the Physical Environment

7 Impact on the Physical Environment-

7.1 ***Impact on the Physical Environment - Introduction***

7.1.1 One of the key issues with the construction of any new infrastructure is the impact on the physical environment. For the Pink/Blue and Green route options, an assessment has been undertaken of these impact. The assessment methodology has followed the assessment approach as set out in GOMMMS. The full GOMMMS assessment worksheets have been completed for each scheme.

7.1.2 Additionally, a worksheet was devised in order to summarise the GOMMMS worksheets. These reflect the GOMMMS assessment stages and aggregated scoring. The worksheets are based on these four stages, or steps, which are explained below, with the results and scores being translated onto the Appraisal Summary Table.

7.2 ***Landscape***

7.2.1 Landscapes as defined by GOMMMS is both the physical and cultural characteristics of the land itself and the way in which we perceive these characteristics. The methodology is based on an assessment of impacts on specific locations along the corridor where schemes are to be implemented.

Methodology

7.2.2 **Step A** – Description of the Countryside Character

(1) Description of the character zones where there is to be landtake (broad character area descriptions/tranquil areas);
(2) Identify main features that give the zone its district character/local distinctiveness/key characteristics; and
(3) Identify any landscape designations.

7.2.3 The methodology involves the describing of the countryside characteristics of the location. These characteristics or features come under the headings of:

- **pattern** –an expression of the relationship between topography and form, elevation and the degree of enclosure and scale
- **tranquillity** – the remoteness and sense of isolation, or lack of it within the landscape

- **cultural** – descriptions of how landscape elements of an historic or traditional nature contribute to landscape character
- **landcover** –the way in which the land is farmed or managed contributes to the character of the landscape
- **summary of character**- summarises and pulls together the primary features outlined above and includes more general observations

7.2.4 **Step B** - Evaluating Environmental Capital and Sensitivity to Change

(1) Identify the key attributes and their importance (eg scale, rarity, importance and substitutability);
(2) Identify the landscape's sensitivity to change:
  - low sensitivity;
  - moderate sensitivity; and
  - high sensitivity.

7.2.5 GOMMMS provides landscape indicator against which the description of each feature is assessed. These indicators are:

- **geographical scale** at which the feature attribute matters
- **rarity** of the feature in the locality and at regional and national level
- **importance** of feature and at what level
- **substitutability** addresses whether features are replaceable within a nominal 100 years
- **impact** – used to describe and score the potential impact of the scheme on features and attributes
- **additional mitigation** as part of the scheme design to achieve best fit within the landscape

7.2.6 GOMMMS suggests the completion of worksheet 4.5 so to assess the affect of the schemes on the features. The worksheets for each scheme are set out in Appendix B.

7.2.7 **Step C** - Impact Assessment

(1) Identify the potential impacts of the 'plan stage';

- direct and indirect landscape impacts and effects; and
- positive or adverse effects.

(2) Complete the Landscape 'Worksheet' (GOMMMS) and confirm Summary Assessment Score, together with qualitative comments. Use GOMMMS Scoring:
   (a) Very large negative impact;
   (b) Large negative impact;
   (c) Moderate negative impact;
   (d) Slight negative impact;
   (e) Neutral impact;
   (f) Slight positive impact; and
   (g) Moderate positive impact.

(3) Complete the Landscape section in the Appraisal Summary Table:
- Qualitative Impact;
- Quantitative Impact; and
- Assessment Score.

7.2.8 Meetings and discussions with statutory environmental bodies, county and local authorities, and the public have taken place and have informed the baseline environmental data.

7.2.9 The overall impact that each of the schemes has on the landscape is given an assessment score. These scores are based on the standard 7 point scale outlined and defined in GOMMMS. The following impact scores are given to the locations within the study area where the strategy suggests schemes should be introduced.

7.2.10 All of the accumulated data has been recorded in a set of plans on the SoCoMMS GIS Environmental Database to provide the basis for the assessments. These include landscape, biodiversity, cultural heritage, and townscape designations.

Appraisal

7.2.11 Direct results of the appraisal for each element assumed in the strategy are shown below:

LANDSCAPE		
Scheme	**Impact**	**Score**
Arundel Bypass Pink/Blue Route	Mainly offline route is likely to have a significant/detrimental impact on the landscape and be difficult to mitigate for. More information particularly the type and height of crossing structure over the Arun Valley is needed to fully assess impact.	Large* Negative
Arundel Bypass Green Route	Mainly offline route is likely to have a significant/detrimental impact on the landscape and be difficult to mitigate for. More information particularly the type and height of crossing structure over the Arun Valley is needed to fully assess impact.	Large* Negative

*May be possible to mitigate through design.

7.3 ***Townscape***

7.3.1 Townscape is defined by GOMMMS as the physical and social characteristics of the built and unbuilt urban environment and the way in which we perceive those characteristics. The methodology is based on an assessment of impacts on specific locations along the corridor where schemes are to be implemented.

7.3.2 **Step A** - Townscape Characterisation

(1) Description of the townscape where there is to be landtake (relevant elements of Character Areas).
(2) Identify main features that give the area its townscape character.
(3) Identify any townscape designations separately e.g. Area of Special Character - local plan designation (by scheme).

7.3.3 The methodology involves the describing of the townscape characteristics of the location. These characteristics or features come under the headings of:

- **Layout** – the way that buildings routes and open spaces are place in relation to each other
- **Density and mix** – refers to the amount of floorspace of buildings relative to and area and the range of uses
- **Scale** - is the size of buildings and structure in the townscape in relation to their surroundings

- **Appearance** – and local distinctiveness of buildings and structures within a townscape
- **Human Interaction** – the way in which people – rather than vehicles interact with the urban environment
- **Cultural** – descriptions of how townscape elements of a traditional or historic nature contribute to townscape character
- **Summary of character** - summarises and pulls together the primary features outlined above and includes more general observations

7.3.4 **Step B** - Evaluating Environmental Capital and Sensitivity to Change

(1) Identify the key attributes and their importance (eg scale, importance, substitutability);

7.3.5 GOMMMS provides landscape indicator against which the description of each feature is assessed. These indicators are:

- **geographical scale** at which the feature attribute matters
- **rarity** of the feature in the locality and at regional and national level
- **importance** of feature and at what level and to whom
- **substitutability** addresses whether features are replaceable
- **changes in do-minimum –** key changes that will occur in the absence of the transport proposal
- **impact** – used to describe and score the potential impact of the scheme on features and attributes
- **additional mitigation** as part of the scheme design to achieve best fit within the landscape

7.3.6 **Step C** - Impact Assessment

(1) Identify the potential input:
(2) Complete the Townscape 'Worksheet' (GOMMMS) and complete Summary Assessment Score, together with qualitative comments. Use GOMMMS Scoring:
    (a) Large negative impact

(b) Moderate negative impact
(c) Slight negative impact
(d) Neutral impact
(e) Slight positive impact
(f) Moderate positive impact
(g) Large positive impact

(3) Complete the Townscape Section of the Appraisal Summary Table:
- Qualitative Impact;
- Assessment Score

7.3.7 GOMMMS suggests the completion of worksheet 4.7 so to assess the affect of the schemes on the features. The worksheets for each scheme are set out in Appendix.

7.3.8 The overall impact that each of the schemes has on the townscape is given an assessment score. These scores are based on the standard 7 point scale outlined and defined in GOMMMS. The following impact scores are given to the locations within the study area where the strategy suggests schemes should be introduced.

7.3.9 Direct results of the appraisal for each element assumed in the strategy are shown below:

TOWNSCAPE		
Scheme	**Impact**	**Score**
Arundel Bypass Pink/Blue Route	The scheme would have a moderate beneficial impact on Arundel town centre where the nationally important features of the townscape are situated. There will, however, be a slight-moderate adverse impact on the area through which the proposed road would run (eg Tortington and south Arundel).	Neutral
Arundel Bypass Green Route	The scheme would have a moderate beneficial impact on Arundel town centre where the nationally important features of the townscape are situated. There will, however, be a slight-moderate adverse impact on the area through which the proposed road would run (eg Tortington and south Arundel).	Neutral

7.4 ***Heritage***

7.4.1 The man-made historic environment as defined by GOMMMs comprises of: buildings of architectural or historic significance; areas such as parks gardens other designed landscapes or public spaces remnant historic landscapes and

archaeological complexes; and sites (e.g. ancient monuments, places with historical associations such as battlefields, preserved evidence of human effects on the landscape etc).

7.4.2 **Step A** - Heritage Characterisation

(1) Description of the historic areas where there is to be landtake (relevant elements of Character Areas and Natural Areas);
(2) Identify main features that give the area its distinctive historic character; and
(3) Identify any heritage designations separately (by scheme/combination of schemes).

7.4.3 It involves describing the character of the heritage in question. The features that most strongly define the heritage resource come under the headings of:

- **Form** – the physical form of the site, buildings, historic land/townscapes or other heritage assets being described and appraised
- **Survival** – a description of the extent of survival of the likely original or characteristic fabric along with an estimate of how much remains
- **Condition** – the appearance and present management of the heritage resource along with its stability and likely rate of change from existing condition.
- **Complexity** – the diversity of elements and their relationships within a part of the heritage resource and the wider complexity of its relationships beyond these immediate limits.
- **Context** – the immediate setting of the site, building or area
- **Period** – the date of origin and duration of use of the heritage resource described

7.4.4 **Step B** - Evaluating Environmental Capital and Sensitivity to Change

(1) Identify the key attributes and their importance (eg scale, significance, rarity).

7.4.5 GOMMMS provides landscape indicator against which the description of each feature is assessed. These indicators are:

- **Scale it matters** – the geographical scale at which the features matter to both policy makers at all levels and to local stakeholders.
- **Rarity** - of the feature in the locality and at regional and national level as well as the fragility and vulnerability of the heritage
- **Significance** – of the feature at the local, regional and national scale
- **Impact** - used to describe and score the potential impact of the scheme on features and attributes

7.4.6 GOMMMS suggests the completion of worksheet 4.8 so to assess the affect of the schemes on the features. The worksheets for each scheme are set out in Appendix.

7.4.7 The overall impact that each of the schemes has on the townscape is given an assessment score. These scores are based on the standard 7 point scale outlined and defined in GOMMMS. The following impact scores are given to the locations within the study area where the strategy suggests schemes should be introduced.

7.4.8 **Step C** - Impact Assessment

(1) Identify the potential impacts
(2) Complete the Heritage 'Worksheet' (GOMMMS) and complete Summary Assessment Score, together with qualitative comments. Use GOMMMS Scoring:
    (a) Large negative impact;
    (b) Moderate negative impact;
    (c) Slight negative impact;
    (d) Neutral impact;
    (e) Slight positive impact;
    (f) Moderate positive impact; and
    (g) Large positive impact
(3) Complete the Heritage of Historic Resources Section of the Appraisal Summary Table:
    – Qualitative Impact
    – Quantitative Impact; and
    – Assessment Score.

Appraisal

7.4.9 Direct results of the appraisal for each element assumed in the strategy are shown below:

HERITAGE		
Scheme	**Impact**	**Score**
Arundel Bypass Pink/Blue Route	The scheme will have a beneficial effect on the amenity value of historic Arundel. It will have a negative impact on the setting of historic Arundel. The scheme will directly impact upon numerous known archaeological deposits, extensive areas of historic landscape interest and a medieval deep park. The scheme may also directly impact on one SAM. The scheme will indirectly impact upon one SAM and a number of other known archaeological sites. The scheme is also likely to impact upon currently unidentified heritage assets.	Large Negative
Arundel Bypass Green Route	The scheme will have a beneficial effect on the amenity value of historic Arundel. It will have a negative impact on the setting of historic Arundel. The scheme will directly impact upon numerous known archaeological deposits, extensive areas of historic landscape and a medieval deer park. The scheme will indirectly impact upon one SAM and a number of other known archaeological sites. The scheme is also likely to impact upon currently unidentified heritage assets.	Large Negative

7.5 ***Biodiversity***

7.5.1 The methodology is based on an assessment of impacts on all biodiversity and earth heritage areas in the study areas along the corridor where schemes are to be implemented.

7.5.2 **Step A** - Description of Biodiversity and Earth Heritage Features

(1) Identify the main biodiversity and earth heritage features that give the area its distinctive character; and

(2) Identify the designated area (international, national and county) (define by scheme/ combination of schemes)

7.5.3 It involves describing the biodiversity and earth heritage features of the location under the following headings:

- Area - all biodiversity and earth features that are affected, or potentially affected by each scheme are listed.
- Attribute/feature
- Scale at which it matter
- Importance
- Trend
- Substitution possibilities

7.5.4 **Step B** - Evaluating Environmental Capital and Sensitivity to Change

(1) Identify for the main features their key attributes;
(2) Identify sensitivity to change of attributes/features:

7.5.5 **Step C** - Impact Assessment

(1) Identify the potential impacts;
(2) Complete the biodiversity "Worksheet" (GOMMMS) and complete Summary Assessment Score, together with qualitative comments. Use GOMMMS Scoring:
    (a) Very Serious Adverse Impact;
    (b) Serious Adverse Impact;
    (c) Significant Adverse Impact;
    (d) Minor Adverse Impact;
    (e) Neutral;
    (f) Minor Gain;
    (g) Significant Gain; and
    (h) Major Gain.
(3) Complete the Biodiversity section of the Appraisal Summary Table:
    – Qualitative Impact;
    – Quantitative Impact and
    – Assessment Score.

Appraisal

7.5.6 Direct results of the appraisal for each element assumed in the strategy are shown below:

BIODIVERSITY -		
Scheme	**Impact**	**Score**
Arundel Bypass Pink/Blue Route	The proposed road would take traffic away from the Binstead Wood Complex SNCI, although the construction of the road may have adverse impacts on other areas (eg Rewell Wood Complex SNCI)..	Neutral
Arundel Bypass Green Route	The proposed road would cut through the Binstead Wood Complex SNCI, and may have adverse impacts on other areas (eg Rewell Wood Complex SNCI).	Very Serious Adverse

7.6 ***Water***

7.6.1 At the strategic level of assessment, either the GOMMMS methodology or MMEA (Multi Modal Environmental Assessment) methodology could be used. The MMEA methodology has been used on the recently completed South West Area Multi Modal Study (SWARMMS) appraisal. The MMEA methodology is based on unpublished work carried out by the Highways Agency to refine the GOMMMS method. The selection of the same methodology was based on the following reasons:

- GOMMMS is unclear on how the potential impacts arising from proposals should be identified. MMEA uses a simple ranking system for various transport modes and their potential to adversely impact the water environment;
- GOMMMS does not provide any real guidance/method for assessment at the strategic level, leaving much for the user to decide. MMEA leads the user through the methodology;
- GOMMMS requires a fair degree of information taking the outputs of the environmental impact assessment process, and is geared more to assessment at project/scheme level, whereas MMEA is designed for strategic assessment and requires much less data;

7.6.2 The MMEA methodology requires the use of a combined scoring/weighting system to provide quantitative evaluation of different strategy or scheme impacts. This scoring system was first used on the SWARMMS appraisal and provides rapid quantitative "illustration" of particular impacts associated with different scheme elements in any derived strategy. The methodology applied is outlined in the Strategy Appraisal Report.

Data Sources

7.6.3 For studies carried out on a strategic regional level the MMEA methodology identifies appropriate data sets for groundwaters and surface waters. These are as follows:

Indicator	Source
Groundwater - Groundwater Vulnerability Zones	Groundwater vulnerability maps published by HMSO at 1:100,000 scale (available as hard copy and digitally)
Rivers **-** Chemical GQA's - Biological GQA's - River Ecosystem Class	-From EA web site and regional maps (requested from the EA where required). -Regional maps (requested from the EA where required) -Designations for a given river from regional offices of the EA
Floodplains	Further details (local assessment only) from Section 105 maps from Flood Defence sections of regional office of EA

7.6.4 Of the above data sources, Groundwater Vulnerability Zone data is readily available nationally and Chemical GQA's are readily available from the EA web site. Biological GQA's and River Ecosystem classes are not so readily available and have not been used in the assessment. However, River Chemical GQA gives a good indication for river quality that may be used in a strategic assessment. Floodplain information has been derived from the indicative flood plain maps, also from the EA web site.

7.6.5 More detailed levels of data collection are not relevant or appropriate for strategic studies, however where readily available (eg the EA web site) may be used for cross reference.

Groundwater

7.6.6 The SoCoMMS study area can roughly be divided into two with regard to groundwater vulnerability. With the exception of an arc around Hastings, the remainder of the study area is primarily major and minor aquifers. The arc around Hastings, which is the outcrop of the Wealden and Gault clays is essentially non-aquifer.

7.6.7 The major aquifers are the Upper Greensand and the Chalk in which groundwater flow is intergranular and predominantly fracture flow respectively. Yields under the right conditions can be significant and support large public supply abstractions for the majority of the population. The Chalk is the single most important aquifer both nationally and regionally, and occupies approximately 40% of the study area. Within the Southern Region of the Environment Agency it provides over 70% of public water supplies and 85% of all groundwater abstractions. The integrity and protection of these sources is therefore a very important issue and every precaution must be taken to ensure they are not contaminated as a consequence of transportation measures. Contamination could result from the discharge of runoff or spillage of chemicals. The vulnerability of these aquifers to contamination depends upon the flow mechanism and the ability of the unsaturated zone to attenuate contaminants. As a result , a significant proportion of the area is highly vulnerable to contamination.

7.6.8 For the minor aquifers, such as the Lower Greensand and the Hastings Beds, typically sand horizons within a major clay sequence, groundwater flow can be restricted to intergranular flow, localised fractures and weathered zones, and therefore yields are relatively low. They can, however, be an important local supply source, and where mains water is unavailable in rural communities, these minor aquifers may be the only source available and must therefore be protected. As a consequence of shallow water tables, groundwater in these minor aquifers is often vulnerable to contamination

7.6.9 Under the Water Resources Act 1991, the Environment Agency has a duty to monitor and protect the quality of groundwater (Section 84) and to conserve its use for water resources (Section 19). It also has a duty (Section 16) to maintain, and where appropriate, enhance conservation of the surface water environment.

7.6.10 The Agency has developed a policy framework for protecting groundwater. This framework is based on the vulnerability of groundwaters to pollution and the need to prevent pollution of the groundwater that drains to a groundwater abstraction point, known as a Source Protection Zone (SPZ). The Agency's policies relate to

preventing certain types of development or engineering, to minimise risk in areas where groundwater is vulnerable to pollution and in SPZs. These policies are set out in the Policy and Practice for the Protection of Groundwater.

Surface Waters

7.6.11 All surface water bodies that are either crossed by a transportation route or receive runoff are vulnerable to contamination through both routine discharge and spillage of contaminants. The level of hazard will be increased when these discharges occur upstream of a public water supply abstraction point. The setting of objectives for river water quality in response to European Directives and their implementation under UK law falls within the remit of the EA. The EA would discourage any new development that poses a threat to the quality of surface water bodies but conversely, should encourage any development that allows for an improvement in river quality (however poor the existing water quality may be). Upgrading the method of disposal of drainage waters from existing road or rail schemes may thus be considered to contribute to enhancement of the water environment.

7.6.12 Significant flooding problems in the south east during the winter of 2000/01 have emphasised the need for determining the impact of any development on flooding potential. New transportation links may lead to an increased risk of flooding. The EA seek to guide new development and re-development away from areas where there is an unacceptable risk of flooding. Both locally and within the strategic context, nationally applied guidance must be followed in regional strategic planning, this should include:

- The principles set out in Planning Policy Guidance Note 25 (PPG25 – Development and Flood Risk) that establish flooding as a material planning issue to which the precautionary principle is applied including the consideration of conditions brought about by climate change.

7.6.13 On this basis there is a general presumption against new development within the flood routes and flood storage areas, unless it can be demonstrated that the proposal would not itself, or cumulatively in conjunction with other development:

- impede the flow of flood water;
- reduce the capacity of the floodplain to store water;
- increase the number of people or properties at risk from flooding;

- obstruct land adjacent to watercourses required for access and/or maintenance purposes; and
- cause unacceptable effects to the environment;

7.6.14 To avoid these risks flood plains should be avoided wherever possible.

7.6.15 Increased flood risk may also arise from drainage of large impermeable areas (eg road carriageways; airport runways and aprons) with high run off rates and little attenuation of flow.

7.6.16 Appropriate drainage control measures must be employed where risks of flooding have been identified.

Appraisal

7.6.17 Groundwater - No significant impacts have been identified in relation to the Arundel Bypass.

7.6.18 Surface Water Quality & Flood Plain Intrusion - . there is an impact caused by the Arundel bypass.

7.6.19 The impacts arise from the river crossing and the potential impact that this may have on the surface water, both with respect to drainage and with respect to impacts during construction. The off-line road schemes include new alignments that will require new river crossing with the associated impact.

Potential Mitigation and Strategic Balance

7.6.20 A range of mitigation measures are available for the impact of road and rail transport schemes on the water environment, these include:

- adopting appropriate methods and following established guidelines during construction;
- lined drainage over sensitive groundwaters;
- soakaways designed to minimise impact;
- provision of oil separators and sediment traps in drainage;
- provision of containment for spillage;
- provision of in-line "treatments" such as reed beds;
- design of bridges/culverts etc to minimise effect on flood flow regimes;
- attenuation measures for road drainage to reduce "flashiness" of flow; and

- provision of alternate flood storage to replace that lost.

7.6.21 Such mitigation may minimise impacts (in the case of new developments) and actually produce positive impact (benefit) where existing routes are being upgraded. (see below).

7.6.22 A differentiation thus needs to be made between those route improvements, which comprise new alignments, and those that essentially follow existing routes. This is on the basis that an upgrade of an existing route may offer the potential to introduce new drainage measures, designed to minimise impact on the water environment. Where these replace former drainage, potentially an environmental benefit may accrue and within the overall balance of the strategy this may reduce the significance of the impact

7.7 ***National Park Boundary***

7.7.1 The Countryside Agency have announced the plans for a South Downs National Park. A draft boundary has been submitted for public consultation. The previous boundary of the South Downs Area of Outstanding Natural Beauty lay to the north of the A27 at Arundel.

7.7.2 The current proposed boundary for the National Park includes Tortington Common and part of the flood plain south of Arundel. As such, the proposed alignment for the Arundel bypass lies within the draft boundary.

7.7.3 However, it is noted from correspondence between the Countryside Agency and west Sussex County Council that the boundary may be reviewed once the SoCoMMS multi modal study has been completed.

7.8 ***Summary of Impacts on the Physical Environment***

7.8.1 A comparison has been undertaken of the Pink/Blue and the Green routes that were considered during previous public consultation . There are environmental issues associated with the alternative schemes. The impacts of the remitted scheme (Pink/Blue route) are as follows:

- Landscape- likely to have a detrimental effect on the landscape due to the crossing over the River Arun. This is dependent on the height and type of crossing structure over the River Arun- (Score= Large Negative)

- Townscape- will provide a moderate beneficial impact on Arundel town where the nationally important features are, slight moderate adverse impact on the alignment (Score= neutral)
- Heritage – beneficial impact on the amenity value of Arundel. Potential direct impact on known archaeological deposits and may impact on one Special Ancient Monument (Score= large negative)
- Biodiversity= does not pass through Binstead Woods (Score= neutral).

7.8.2 It is noted that the alternative Green Route scores a Very Serious Adverse Impact due to its intrusion into Binstead Woods. As such, it is considered that the Pink/Blue route remains the preferred option on environmental grounds.

7.8.3 It is noted that the original preferred route passes into an area that is proposed to be designated as part of the South Downs National Park. However, this is likely to be reviewed by the Countryside Agency.

7.8.4 **Thus having examined traffic and environmental implications, based on the information collated at this stage, the Pink/Blue route remains the preferred option**. This will be investigated further during the detailed design process.

8 A Strategy For the Arundel Area

8 A Strategy For the Arundel Area

8.1 ***Introduction***

8.1.1 Much of the focus of this Strategy development Plan has been in relation to the remitted scheme which is the Arundel bypass. Current and forecast congestion indicate the need for an improvement at Arundel. The testing has shown that while the traffic impacts are greater for the Green route, there greater impacts on the physical environment. Thus, the Pink/Blue route which was selected as the preferred route remains the proposed alignment.

8.1.2 However, there are a number of other elements that should be considered for the Arundel area. The bypass provides opportunities for other initiatives to be pursued as part of an overall package for the area. In part this stems from the traffic and environmental relief being obtained due to the bypass.

8.1.3 Public transport measures being proposed for the South Coast are considered in other SDP's. The plan outlined blow only indicates those measures which are directly relevant to Arundel.

8.2 ***The Local Strategy***

8.2.1 **Strategy Elements –**In developing a strategy for the Arundel area, the following elements should be considered, in addition to the area wide initiatives:

- **Local Initiatives**
- New rail station at Littlehampton Parkway
- Improved information provision at Arundel, particularly in relation to AONB
- Station improvements at Arundel station- particularly to station building and forecourt,
- Improve pedestrian access to Arundel station;
- Provide additional bus connections from the station to the town centre;
- Provide additional bus connections from the station to the AONB
- Provide new bus service to Chichester
- Provide traffic management and improved passenger facilities.

- **Targeted Road based Improvements**
- Arundel bypass (designed to dual carriageway standard);

- Arundel bypass – design to take advantage of bus route/priority opportunities and facilities for pedestrians and cyclists
- Modifications to signing, particularly to Ford Industrial Estate
- Speed management through Eastergate, Barnham and Yapton;
- Modification of traffic signing for visitors to Arundel;
- Improvements to car parks;
- Wider Rail improvements
- Support South Central proposals to upgrade the Arun Valley line and the provision of a new chord at Arundel.

Demand Management Initiatives- aimed at reducing the level of future traffic growth

- increased long stay public parking charges in major centres (as part of the area wide strategy using a fee hierarchy that reflects the town's status);
- increases to short stay public parking charges in major centres so as to encourage off-peak modal transfer to public transport (as part of the area wide strategy);

8.2.2 The station at Littlehampton Parkway could be provided on the main coastway service. This would provide an additional facility in the northern area of Littlehampton. This will assist accessibility to the rail network. The station improvements at Arundel would improve the facilities available at the station. The types of improvement are outlined in the Rail Development Plan produced for SoCoMMS. In addition, access to Arundel station should be improved by all modes. Improved walk/cycle links between the station and the town centre would improve the 'Gateway' to the historic town. The provision of local bus service enhancements would also improve accessibility between the station and the town centre. In addition, Arundel has the potential to play a key role as a gateway to the proposed South Downs National Park. Access improvements to the station will be greatly assisted by the construction of the Arundel relief Road and the traffic relief that is provided on the 'old' A27.

8.2.3 Arundel is a tourist destination in its own right as well a gateway to the proposed South Downs National Park. It is suggested that an integrated visitor management plan should be developed for the town to reduce the impacts of tourists coming to the area whilst recognising the role tourism has for the local economy. This could take the approach outlined in the draft Regional Tourism Strategy.

8.2.4 The Arundel bypass is identified as a key component for the area. In addition, there is a need to consider speed and traffic management measures on alternative

routes which obtain relief. These include the B2132. There will be a need to review traffic signing in the area as a result of the bypass.

9 Appraisal Summary Table

9 Appraisal Summary Table

9.1 ***Introduction***

9.1.1 The appraisal of the Arundel SDPs has been based on the Guidance on the Methodology for Multi-Modal Studies (GOMMMS). There are 4 main parts to the GOMMMS appraisal process, which are:

- An Appraisal Summary Table (AST) which gives a summary appraisal against Central Government's five objectives for transport.
- An assessment of the degree to which the local and regional objectives identified would be achieved by the strategy.
- An assessment of the degree to which the problems identified would be ameliorated by the strategy, compared to the situation if there was no positive policy intervention.
- Supporting analyses of distribution and equity, affordability and financial sustainability and practicality and public acceptability. This will also include the issue of scheme "deliverability".

9.1.2 The AST is intended to be a summary of the appraisal against the Governments five objectives for transport and their associated sub-objectives which are described below.

- The **environment** objective is to protect the built and natural environment, and has the following sub-objectives:
- *to reduce* ***noise****,*
- *to improve* ***local air quality****,*
- *to protect and enhance the* ***landscape****,*
- *to protect and enhance the* ***townscape****,*
- *to protect the* ***heritage of historic resources****,*
- *to support* ***biodiversity****,*
- *to protect the* ***water environment****,*
- *to encourage* ***physical fitness****, and*
- *to improve* ***journey ambience****.*

- The **safety** objective is simply to improve safety, and has the following sub-objectives:
- *to reduce* ***accidents****, and*

- *to improve* ***security***.

- The **economy** objective is to support sustainable economic activity and get good value for money, and has the following sub-objectives:
- *to improve* ***transport economic efficiency****,*
- *to improve* ***reliability****, and*
- *to provide beneficial* ***wider economic impacts***.

- The **accessibility** objective is to improve access to facilities for those without a car and to reduce severance, and has the following sub-objectives:
- *to improve* ***access to the transport system****,*
- *to increase* ***value options****, and*
- *to reduce* ***severance***.

- The **integration** objective is to ensure that all decisions are taken in the context of the Government's integrated transport policy and has the following sub-objectives:
- *to improve* ***transport interchange****,*
- *to integrate transport policy with* ***land-use policy****, and*
- *to integrate transport policy with* ***other Government policies***.

9.1.3 The AST table is shown in table 9.1. The table shows that there will be benefits to the human environment resulting from the measures in the Arundel area. There are benefits due to less traffic passing through the urban area. The impacts on the human environment should be reviewed once a detailed design has been developed.

9.1.4 Safety- The bypass scheme would provide safety benefits. Traffic would be reduced between Arundel and Crossbush where there have been a number of accidents in recent years.

9.1.5 Economy- The preferred route scheme would cost £27 million in 2001. The scheme shows a positive Benefit Coast ratio.

9.1.6 Accessibility- The package of measures would assist accessibility by all modes. The provision of the Arundel bypass will assist traffic movements to the West Sussex Priority area for economic regeneration. The rail improvements will also enhance

rail access to the area while the local public transport, walking and cycling initiatives will assist accessibility in Arundel.

9.1.7 Integration- The measures that are proposed are consistent with the regional policies of increasing accessibility to PAER's. The package is also consistent with local policies.

9.1.8 Thus the remitted scheme provides traffic benefits to Arundel and surrounding villages but with negative impacts on the environment.

Appraisal Summary Table	Arundel Bypass	Problems	Present Value Cost To Government £

OBJECTIVE	SUB- OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE MEASURE	ASSESSMENT
ENVIRONMENT	Noise	The bypass would provide relief to residents within Arundel		
	Local Air Quality		NO2: 64 zones "winners" NO2: 3 zones "losers" NO2: 0 zones no change PM10: 9 zones "winners" PM10: zone no "losers" PM10: 0 zones "no change"	Emissions estimate NO2: -164,355 Emissions estimate PM10: - 259,399
	Greenhouse Gases			Change of 26.99 tonnes of CO2 for 2016 against future do-minimum
	Landscape	Mainly offline route is likely to have a significant/detrimental impact on the landscape and be difficult to mitigate for. More information particularly the type and height of crossing structure over the Arun Valley is needed to fully assess impact.		Large Negative *
	Townscape	The scheme would have a moderate beneficial impact on Arundel town centre where the nationally important features of the townscape are situated. There will, however, be a slight-moderate adverse impact on the area through which the proposed road would run (eg Tortington and south Arundel).		Neutral
	Heritage of Historic Resources	The scheme will have a beneficial effect on the amenity value of historic Arundel. It will have a negative impact on the setting of historic Arundel. The scheme will directly impact upon numerous known archaeological deposits, extensive areas of historic landscape interest and a medieval deep park. The scheme may also directly impact on one SAM. The scheme will indirectly impact upon one SAM and a number of other known archaeological sites. The scheme is also likely to impact upon currently unidentified heritage assets.		Large Negative
	Biodiversity	The proposed road would take traffic away from the Binstead Wood Complex SNCI, although the construction of the road may have adverse impacts on other areas (eg Rewell Wood Complex SNCI)..		Neutral
	Water Environment	Potential impact of alignment on the flood plain. The impact will be dependent on the design.		
	Physical Fitness	Measures to improve cycling and walking facilities are likely to bring about an increase in walking and cycling and therefore improve physical fitness. At a strategic level it is unclear what changes in the number of cyclists and pedestrians will occur.		Beneficial Impact
	Journey Ambience	Traveller care is significantly improved under the strategy by the improvements to rolling stock, facilities at stations, and public transport access to stations. New and improved roads will also reduce traveller stress as will reduced access times to stations.		Large Beneficial Impact
SAFETY	Accidents	Significant accident savings associated with new highway infrastructure.		
	Security	The provision of CCTV, help points, and improved lighting at all stations across the study area will help to improve personal security for all passengers that use these interchanges		Large Beneficial Impact

ECONOMY	**Transport Economic Efficiency**			User Benefits: NPV £33.5M Benefit/Cost ratio BCR= 3.499 Value/Cost to Govt ratio = 2.5
	Reliability	Improvements to the transport networks will enhance capacity and improve journey time reliability for road users. Proposals for improved rail infrastructure and rolling stock will improve reliability for rail users.		Moderate Beneficial Impact
	Wider Economic Impacts	Improve access to priority regeneration areas in West Sussex		Beneficial
ACCESSIBILITY	**Option Values**	New rail station at Littlehampton Parkway provide strong beneficial effects at the local level.		Beneficial Impact
	Severance	Provides relief from existing severance for those in Arundel		Ppositive impact
	Access to the Transport System	Positive impacts are associated with the introduction of better station at Arundel and improving bus services		Large Beneficial Impact
INTEGRATION	**Transport Interchange**	The upgrading of existing interchanges, improved information and access for all travellers, introduction of new station contribute to providing an integrated transport system and a seamless journey.		Large Beneficial Impact
	Land-Use Policy	Performs well against national and regional guidance as well as LTP's and Structure Plans		Beneficial Impact
	Other Government Policies	Consistent with other Government policies relating to access to employment opportunity, reducing road accidents, promoting urban regeneration and promoting slow modes.		Beneficial Impact

10 Summary

10 Summary

10.1 ***The Arundel Plan***

10.1.1 This strategy development plan has examined issues in relation to the Arundel area. The key issues that are currently present within the area are:

- Congestion on the A27;
- Traffic rat-running through neighbouring villages in order to avoid the traffic congestion in the Arundel area;
- Safety concerns on the A27;
- Environmental problems of traffic (noise, air pollution, severance).

10.1.2 The SDP has shown how traffic levels on the single carriageway section through Arundel are in excess of stress levels. This causes congestion at different times of the week. Traffic is expected to grow by 33% if nothing is done.

10.1.3 The SDP has reviewed alternative alignments for an Arundel bypass. The analysis of impacts on traffic and the physical environment indicate that the Pink/Blue route is the one recommended by SoCoMMS to be taken forward for detailed design.

10.1.4 **Strategy Elements –**In developing a strategy for the Arundel area, the following elements should be considered, in addition to the area wide initiatives:

- **Local Initiatives**
- New rail station at Littlehampton Parkway
- Improved information provision at Arundel, particularly in relation to AONB
- Station improvements at Arundel station- particularly to station building and forecourt,
- Improve pedestrian access to Arundel station;
- Provide additional bus connections from the station to the town centre;
- Provide additional bus connections from the station to the AONB.

- **Targeted Road based Improvements**
- Arundel bypass (designed to dual carriageway standard);
- Modifications to signing, particularly to Ford Industrial Estate

- Speed management through Eastergate, Barnham and Yapton;
- Modification of traffic signing for visitors to Arundel;
- Improvements to car parks;

Annex A- Traffic Counts- Arundel

COUNT ON US

ARUNDEL **JUNE 2002**

MANUAL CLASSIFIED COUNT

SITE: 4 DATE: 13/06/2002

LOCATION: ARUNDEL BYPASS DAY: THURSDAY

	EASTBOUND												
TIME	PCY	MCY	CAR/TAXI	BUS	COACH	LGV	HGV 2XR	HGV 3XR	HGV 4+XR	HGV 3/4XA	HGV 5XA	HGV 6+XA	TOT
07:00	0	2	312	0	2	58	14	2	0	2	8	18	418
07:30	0	3	501	0	0	92	13	3	0	0	7	8	627
H/TOT	0	5	813	0	2	150	27	5	0	2	15	26	1045
08:00	0	6	573	0	0	50	24	9	0	4	3	3	672
08:30	1	4	425	0	6	63	12	2	3	4	2	14	536
H/TOT	1	10	998	0	6	113	36	11	3	8	5	17	1208
09:00	0	0	504	0	0	78	23	2	1	0	4	8	620
09:30	0	6	345	0	1	46	25	7	11	4	6	12	463
H/TOT	0	6	849	0	1	124	48	9	12	4	10	20	1083
10:00	1	2	351	0	2	52	27	3	2	3	2	6	451
10:30	0	2	332	0	2	43	32	1	1	3	2	7	425
H/TOT	1	4	683	0	4	95	59	4	3	6	4	13	876
11:00	0	2	328	0	2	48	36	0	1	2	6	4	429
11:30	0	1	355	0	2	54	35	0	1	0	8	11	467
H/TOT	0	3	683	0	4	102	71	0	2	2	14	15	896
12:00	2	10	400	0	4	66	40	2	1	0	7	14	546
12:30	0	8	356	0	1	81	23	2	3	1	12	18	505
H/TOT	2	18	756	0	5	147	63	4	4	1	19	32	1051
13:00	0	8	368	0	0	55	19	3	6	2	11	4	476
13:30	0	6	422	0	2	47	34	0	0	4	8	8	531
H/TOT	0	14	790	0	2	102	53	3	6	6	19	12	1007
14:00	0	7	415	0	1	52	22	2	3	1	6	6	515
14:30	1	8	432	0	2	48	25	1	2	5	2	7	533
H/TOT	1	15	847	0	3	100	47	3	5	6	8	13	1048
15:00	0	11	427	0	3	59	18	2	2	3	3	10	538
15:30	0	9	451	0	1	63	23	2	2	2	4	8	565
H/TOT	0	20	878	0	4	122	41	4	4	5	7	18	1103
16:00	0	17	556	0	0	71	21	0	2	1	1	14	683
16:30	0	4	408	0	2	36	11	0	0	4	6	10	481
H/TOT	0	21	964	0	2	107	32	0	2	5	7	24	1164
17:00	0	14	407	0	0	30	11	2	0	0	0	1	465
17:30	1	8	384	0	2	31	4	0	0	0	0	1	431
H/TOT	1	22	791	0	2	61	15	2	0	0	0	2	896
18:00	0	17	442	0	2	19	6	0	0	0	5	5	496
18:30	0	3	429	1	0	16	4	0	0	1	0	2	456
H/TOT	0	20	871	1	2	35	10	0	0	1	5	7	952
P/TOT	6	158	9923	1	37	1258	502	45	41	46	113	199	12329

COUNT ON US

ARUNDEL **JUNE 2002**

MANUAL CLASSIFIED COUNT

SITE: 4 DATE: 13/06/2002

LOCATION: ARUNDEL BYPASS DAY: THURSDAY

	WESTBOUND												
TIME	PCY	MCY	CAR/ TAXI	BUS	COACH	LGV	HGV 2XR	HGV 3XR	HGV 4+XR	HGV 3/4XA	HGV 5XA	HGV 6+XA	TOT
07:00	0	8	447	0	8	50	19	1	0	0	8	11	552
07:30	0	0	510	0	2	73	20	1	3	1	2	2	614
H/TOT	0	8	957	0	10	123	39	2	3	1	10	13	1166
08:00	0	10	512	0	3	75	12	6	5	0	3	1	627
08:30	1	4	511	0	0	32	18	1	3	2	6	4	582
H/TOT	1	14	1023	0	3	107	30	7	8	2	9	5	1209
09:00	0	6	457	0	5	51	28	0	2	5	3	4	561
09:30	1	2	416	0	3	38	16	0	2	4	6	7	495
H/TOT	1	8	873	0	8	89	44	0	4	9	9	11	1056
10:00	0	3	398	0	4	44	30	1	3	3	7	5	498
10:30	0	5	372	0	4	37	25	2	1	4	8	6	464
H/TOT	0	8	770	0	8	81	55	3	4	7	15	11	962
11:00	0	2	380	0	3	41	31	1	2	4	12	5	481
11:30	0	6	359	0	2	36	26	2	7	1	6	10	455
H/TOT	0	8	739	0	5	77	57	3	9	5	18	15	936
12:00	0	9	312	0	0	12	17	0	0	2	6	9	367
12:30	0	0	466	0	1	47	51	3	0	0	4	8	580
H/TOT	0	9	778	0	1	59	68	3	0	2	10	17	947
13:00	0	4	331	0	5	38	10	2	0	5	11	19	425
13:30	0	6	380	1	2	31	32	2	0	0	9	11	474
H/TOT	0	10	711	1	7	69	42	4	0	5	20	30	899
14:00	0	5	365	0	4	39	11	4	1	4	9	12	454
14:30	0	6	351	0	3	41	12	3	0	2	8	7	433
H/TOT	0	11	716	0	7	80	23	7	1	6	17	19	887
15:00	0	7	379	0	5	42	15	3	0	2	5	7	465
15:30	0	4	423	0	6	40	9	2	1	1	2	5	493
H/TOT	0	11	802	0	11	82	24	5	1	3	7	12	958
16:00	1	4	441	0	4	42	14	2	0	3	4	0	515
16:30	1	12	410	0	6	45	13	5	1	3	0	6	502
H/TOT	2	16	851	0	10	87	27	7	1	6	4	6	1017
17:00	0	14	553	0	0	57	2	2	0	0	0	5	633
17:30	1	6	536	0	3	28	10	0	0	0	0	4	588
H/TOT	1	20	1089	0	3	85	12	2	0	0	0	9	1221
18:00	1	3	356	1	5	27	10	2	0	4	0	0	409
18:30	0	0	335	1	0	26	6	1	0	0	3	4	376
H/TOT	1	3	691	2	5	53	16	3	0	4	3	4	785
P/TOT	6	126	10000	3	78	992	437	46	31	50	122	152	12043

COUNT ON US

ARUNDEL **JUNE 2002**

MANUAL CLASSIFIED COUNT

SITE: 1 DATE: 13/06/2002

LOCATION: ARUNDEL A284 DAY: THURSDAY

	NORTHBOUND												
TIME	PCY	MCY	CAR/TAXI	BUS	COACH	LGV	HGV 2XR	HGV 3XR	HGV 4+XR	HGV 3/4XA	HGV 5XA	HGV 6+XA	TOT
07:00	1	1	112	0	3	35	1	0	0	0	0	0	153
07:30	0	4	139	0	1	46	4	0	0	0	1	1	196
H/TOT	1	5	251	0	4	81	5	0	0	0	1	1	349
08:00	0	4	126	0	0	38	3	1	1	0	0	0	173
08:30	0	2	131	0	0	29	3	0	0	0	0	1	166
H/TOT	0	6	257	0	0	67	6	1	1	0	0	1	339
09:00	0	0	93	0	0	18	3	0	0	0	0	0	114
09:30	2	3	59	0	0	17	2	0	0	0	1	0	84
H/TOT	2	3	152	0	0	35	5	0	0	0	1	0	198
10:00	1	3	87	0	1	19	2	1	1	0	0	0	115
10:30	0	3	72	0	1	15	3	0	0	0	1	0	95
H/TOT	1	6	159	0	2	34	5	1	1	0	1	0	210
11:00	0	3	85	0	0	21	4	0	0	0	0	0	113
11:30	0	2	74	0	0	18	0	1	0	0	1	0	96
H/TOT	0	5	159	0	0	39	4	1	0	0	1	0	209
12:00	0	5	68	0	0	12	4	0	0	0	0	0	89
12:30	0	1	81	0	1	14	7	0	3	0	0	1	108
H/TOT	0	6	149	0	1	26	11	0	3	0	0	1	197
13:00	0	1	70	0	0	14	3	0	0	0	1	1	90
13:30	0	2	78	0	2	15	6	1	0	0	0	1	105
H/TOT	0	3	148	0	2	29	9	1	0	0	1	2	195
14:00	1	2	81	0	1	14	3	1	1	0	0	0	104
14:30	0	1	72	0	1	12	1	0	0	0	0	0	87
H/TOT	1	3	153	0	2	26	4	1	1	0	0	0	191
15:00	0	3	78	0	2	13	2	0	0	1	0	0	99
15:30	0	2	92	0	1	14	1	1	0	0	0	0	111
H/TOT	0	5	170	0	3	27	3	1	0	1	0	0	210
16:00	0	1	113	0	0	13	0	0	1	0	1	0	129
16:30	1	2	60	0	1	10	1	0	0	0	0	0	75
H/TOT	1	3	173	0	1	23	1	0	1	0	1	0	204
17:00	1	4	117	0	1	7	3	0	0	0	0	0	133
17:30	0	6	121	0	0	11	2	1	0	0	0	0	141
H/TOT	1	10	238	0	1	18	5	1	0	0	0	0	274
18:00	0	2	117	0	1	11	1	0	0	1	0	0	133
18:30	0	5	74	0	0	11	0	0	0	0	0	0	90
H/TOT	0	7	191	0	1	22	1	0	0	1	0	0	223
P/TOT	7	62	2200	0	17	427	59	7	7	2	6	5	2799

COUNT ON US

ARUNDEL **JUNE 2002**

MANUAL CLASSIFIED COUNT

SITE: 1 DATE: 13/06/2002

LOCATION: ARUNDEL A284 DAY: THURSDAY

	SOUTHBOUND												
TIME	PCY	MCY	CAR/ TAXI	BUS	COACH	LGV	HGV 2XR	HGV 3XR	HGV 4+XR	HGV 3/4XA	HGV 5XA	HGV 6+XA	TOT
07:00	0	1	35	0	0	11	0	0	0	0	0	1	48
07:30	0	2	62	0	0	10	3	1	1	0	0	0	79
H/TOT	0	3	97	0	0	21	3	1	1	0	0	1	127
08:00	0	3	91	0	1	12	0	2	0	1	0	0	110
08:30	0	0	120	0	1	18	5	0	0	0	0	2	146
H/TOT	0	3	211	0	2	30	5	2	0	1	0	2	256
09:00	0	0	86	0	1	24	3	0	0	0	4	0	118
09:30	0	1	90	0	1	19	3	0	3	0	2	1	120
H/TOT	0	1	176	0	2	43	6	0	3	0	6	1	238
10:00	1	2	89	0	2	17	2	1	0	0	2	1	117
10:30	0	2	93	0	2	25	2	0	0	1	0	0	125
H/TOT	1	4	182	0	4	42	4	1	0	1	2	1	242
11:00	2	3	84	0	0	20	3	1	0	0	1	3	117
11:30	0	1	101	0	1	18	2	0	0	1	1	3	128
H/TOT	2	4	185	0	1	38	5	1	0	1	2	6	245
12:00	0	2	97	0	1	20	2	0	0	0	0	0	122
12:30	0	6	104	0	1	19	2	0	0	1	0	0	133
H/TOT	0	8	201	0	2	39	4	0	0	1	0	0	255
13:00	0	3	78	0	0	16	4	0	0	0	0	0	101
13:30	0	1	94	0	0	17	2	0	0	0	0	0	114
H/TOT	0	4	172	0	0	33	6	0	0	0	0	0	215
14:00	0	2	102	0	2	19	2	1	0	0	0	0	128
14:30	1	3	98	0	1	21	1	0	0	0	0	0	125
H/TOT	1	5	200	0	3	40	3	1	0	0	0	0	253
15:00	1	3	113	0	0	28	2	0	0	0	0	0	147
15:30	0	3	119	0	1	31	2	0	0	0	0	0	156
H/TOT	1	6	232	0	1	59	4	0	0	0	0	0	303
16:00	0	3	109	0	0	35	3	0	0	0	0	1	151
16:30	0	5	126	0	0	35	5	0	0	0	0	1	172
H/TOT	0	8	235	0	0	70	8	0	0	0	0	2	323
17:00	1	3	155	0	0	38	2	0	3	0	0	0	202
17:30	1	6	171	0	2	37	3	0	0	0	0	0	220
H/TOT	2	9	326	0	2	75	5	0	3	0	0	0	422
18:00	1	8	167	0	0	18	2	0	0	0	0	0	196
18:30	0	5	90	0	1	14	0	1	0	0	0	0	111
H/TOT	1	13	257	0	1	32	2	1	0	0	0	0	307
P/TOT	8	68	2474	0	18	522	55	7	7	4	10	13	3186

Annex B- Development Sites in Arun

Major Employment Sites				
Location	**Use Class/ Description/**	**Timetable of development**	**Size (ha)**	**Likely land use implications**
Bognor Regis Town Centre	Redevelopment for retail, leisure etc	2001-2006	Unknown	
Roundstone Angmering	Commercial (B1)	2001-2011	3.3ha	Requires completion of Angmering Bypass
Horticulture Research International, Littlehampton	Mixed use housing and employment	2001-2011	3.2ha	
North of Bersted, Bognor Regis and Felpham	Mix res & commercial	2001-2011	39.2ha	New station and P&R facility

Major Housing Sites			
Location	**Use Class/ Description/ timetable of development**	**Size (ha)/ units**	**Likely land use implications**
Roundstone Angmering	Housing 2001-2006	600 dwellings	
Horticulture Research International, Littlehampton	Mixed use housing and employment 2001-2006	380 dwellings	
North of Bersted, Bognor Regis and Felpham	Mix res & commercial 2001-2006	1,050 dwellings	New station and P&R facility
Land at Toddington, Littlehampton	Residential 2001-2006	180 dwellings	A259 improvements